รายงานวิจัยฉบับสมบูรณ์

ชุดโครงการ “พัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย” ระยะที่ 2

(Thai Panel Data for Economic and Social Research)

เสนอต่อ

สำนักงานกองทุนสนับสนุนการวิจัย (สกว.)

โดย

ผศ.ดร.วีระชาติ กิเลนทอง

สถาบันวิจัยเพื่อการประเมินและออกแบบนโยบาย

3 มกราคม 2561 (สิ้นสุดโครงการ)

สัญญาเลขที่ RDC6040003

รายงานวิจัยฉบับสมบูรณ์

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ผู้ประสานงาน

ผศ.ดร.วีระชาติ กิเลนทอง สถาบันวิจัยเพื่อการประเมินและออกแบบนโยบาย

สนับสนุนโดยสำนักงานกองทุนสนับสนุนการวิจัย (สกว.)

กิตติกรรมประกาศ

งานวิจัยชิ้นนี้ได้รับเงินทุนสนับสนุนจากสำนักงานกองทุนสนับสนุนการวิจัย (สกว.) ภายใต้ชุดโครงการพัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย คณะผู้วิจัยขอขอบคุณ รศ.ดร.เสาวณีย์ ไทยรุ่งโรจน์ อธิการบดีมหาวิทยาลัยหอการค้าไทย และ ศ.นพ.สุทธิพันธ์ จิตพิมลมาศ ผู้อำนวยการสำนักงานกองทุนสนับสนุนการวิจัย ที่ปรึกษาชุดโครงการที่ให้ข้อคิดเห็นเพื่อเป็นแนวทางในการดำเนินงานชุดโครงการ และขอขอบคุณคณะกรรมการกำกับทิศทางการวิจัยของชุดโครงการ ดร.ปัทมาวดี โพชนุกูล รองผู้อำนวยการสำนักงานกองทุนสนับสนุนการวิจัย, ดร.ปิติ ดิษยทัต ผู้อำนวยการสถาบันวิจัยเศรษฐกิจป๋วย อึ๊งภากรณ์, ดร.อัจนา ไวความดี อดีตรองผู้ว่าการธนาคารแห่งประเทศไทย, ดร.อิศรา ศานติศาสน์ ผู้อำนวยการฝ่ายนโยบายชาติและความสัมพันธ์ข้ามชาติ สำนักงานกองทุนสนับสนุนการวิจัย, ดร.นิพนธ์ พัวพงศกร นักวิชาการ สถาบันวิจัยเพื่อการพัฒนาประเทศไทย และคุณรัจนา เนตรแสงทิพย์ รองปลัดกระทรวงดิจิทัลเพื่อเศรษฐกิจและสังคม ที่ให้ข้อเสนอแนะในการกำหนดแนวทางการบริหารงานชุดโครงการพัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย

นอกจากนี้คณะผู้วิจัยขอขอบคุณ รศ.ดร.เรณู สุขารมณ์ ผู้อำนวยการฝ่ายชุมชนและสังคม และคุณพัชรินทร์ รักสัตย์ เจ้าหน้าที่ฝ่ายชุมชนและสังคม สำนักงานกองทุนสนับสนุนการวิจัย รวมทั้งเจ้าหน้าที่ในชุดโครงการที่มีส่วนช่วยให้งานสำเร็จลุล่วงไปได้ด้วยดี

คณะนักวิจัย

บทสรุปผู้บริหาร

ชุดโครงการพัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทยได้ร่วมมือด้านวิชาการกับ Professor Robert M. Townsend จาก Massachusetts Institute of Technology (MIT) ซึ่งเป็นผู้เชี่ยวชาญด้านเศรษฐศาสตร์พัฒนา เศรษฐศาสตร์การเงินและการคลัง และเศรษฐศาสตร์ทฤษฎี ที่ศึกษาครัวเรือนไทยมาเป็นเวลากว่า 20 ปี ทั้งนี้ Professor Robert M. Townsend และทีมงานได้พัฒนาฐานข้อมูล Townsend Thai Data ขึ้นมาในปี 1997 และยังดำเนินการอยู่จนถึงปัจจุบัน ซึ่งได้กลายเป็นต้นแบบให้กับองค์กรในประเทศต่าง ๆ นำไปพัฒนาฐานข้อมูลในลักษณะเดียวกัน

งานวิจัยชิ้นนี้สนับสนุนการพัฒนาฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำรายเดือน (monthly micro data) ให้มีข้อมูลที่ต่อเนื่องและเป็นประโยชน์ต่อการพัฒนาประเทศ และต่อยอดไปสู่โครงการวิจัยภายใต้การประยุกต์ใช้ฐานข้อมูล Townsend Thai Data รวมทั้งยังสนับสนุนให้เกิดการประยุกต์ใช้ฐานข้อมูลแบบตัวอย่างซ้ำ (panel data) ซึ่ง ณ ปัจจุบัน ประกอบไปด้วย 5 โครงการ ได้แก่

1. โครงการ “ฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำเพื่อการวิจัยด้านเศรษฐศาสตร์และสังคม”
2. โครงการ “การเปลี่ยนแปลงของความยากจนในชนบทไทย จากกรณีศึกษา Townsend Thai Data”
3. โครงการ “การจัดทำฐานข้อมูลแบบตัวอย่างซ้ำจากข้อมูลภาวะการทำงานของประชากร”
4. โครงการ “บทบาทของสภาพครัวเรือนและการอพยพออกต่อการพัฒนาคุณภาพกำลังแรงงานในอนาคตของสังคมสูงวัย”
5. โครงการ “การเปลี่ยนแปลงโครงสร้างการผลิตด้านการเกษตรของครัวเรือนในชนบท: บทเรียนจากข้อมูล Townsend Thai Data”

ชุดโครงการฯ ได้เล็งเห็นถึงความสำคัญของการเผยแพร่องค์ความรู้ จึงสนับสนุนให้เกิดการสัมมนาวิชาการระดับนานาชาติ ในหัวข้อ “Finance and Development: Data, Research, and Policy Design” ระหว่างวันที่ 8-9 มิถุนายน 2560 ณ ธนาคารแห่งประเทศไทย เพื่อนำเสนอผลงานวิจัยและแนวคิดของนักวิจัยชั้นนำทั้งในและต่างประเทศ อาทิเช่น Robert Townsend, Naraphong Srivisal, Suparit Suwanik, Scott Schuh, Xiaowen Yang, Yan Ji, Sommarat Chantarat, Flávio Cunha, Weerachart Kilenthong และ Antoine Martin เป็นต้น ในประเด็นที่เกี่ยวข้องกับการพัฒนาเศรษฐกิจและบทบาทของภาคการเงิน โดยเน้นถึงความสำคัญของการเก็บข้อมูลสำหรับงานวิจัยด้านเศรษฐศาสตร์และสังคม

นอกจากนี้ รายงานฉบับนี้นำเสนอบทความที่เกี่ยวข้องกับข้อมูล Townsend Thai Data จำนวน 8 บทความ ได้แก่

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2. Samphantharak, Krislert and Robert M. Townsend. “Risk and Return in Village Economies.” revised 2017. (Forthcoming in American Economic Journal: Microeconomics).
3. Samphantharak, Krislert, Scott Schuh and Robert M. Townsend. "Integrated Household Surveys: An Assessment of U.S. Methods and an Innovation", Economic Inquiry, 12 October 2017, DOI: 10.1111/ecin.12489.
4. Joseph P. Kaboski and Robert M. Townsend. “The Impact of Credit on Village Economies.” American Economic Journal: Applied Economics 4(2), April 2012: 98-133.
5. Joseph Kaboski and Robert M. Townsend. “A Structural Evaluation of a Large-Scale Quasi-Experimental Microfinance Initiative.” Econometrica 79(5), September 2011: 1357-1406.
6. Adriana de la Huerta. “Microfinance in Rural and Urban Thailand: Policies, Social Ties and Successful Performance,” University of Chicago, 2011.
7. Joseph P. Kaboski and Robert M. Townsend. “Policies and Impact: An Evaluation of Village-Level Microfinance Institutions.” Journal of the European Economic Association 3(1), January 2005: 1-50.
8. Archawa Paweenawat and Robert M. Townsend. “Occupational Choice, Financial Frictions, and Trade across Thai Villages”, July 2017, working paper.

อีกทั้งชุดโครงการยังได้จัดการอบรมการใช้ฐานข้อมูล Townsend Thai Data เพื่อให้นักวิจัยที่มีศักยภาพมีความรู้ความเข้าใจและสามารถนำข้อมูล Townsend Thai Monthly Micro Data และบัญชีครัวเรือน (Household Financial Accounting) ที่จัดทำขึ้นจากฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำรายเดือนดังกล่าวไปใช้ในงานวิจัยและการออกแบบนโยบายได้อย่างถูกต้องมากยิ่งขึ้น พร้อมกันนั้นคณะผู้วิจัยได้จัดทำสถิติเบื้องต้นของการเปลี่ยนแปลงโครงสร้างประชากรและสภาพเศรษฐกิจของครัวเรือนไทยในชนบทจากข้อมูลบัญชีครัวเรือน (Household Financial Accounting) ซึ่งสะท้อนให้เห็นว่า มีการเปลี่ยนแปลงโครงสร้างและสภาพเศรษฐกิจของครัวเรือนไทยในชนบทในช่วง 14 ปีแรกของการเก็บข้อมูล (พ.ศ. 2542-2555)

บทคัดย่อ

ชุดโครงการพัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทยได้ให้การสนับสนุน Townsend Thai Data ให้เกิดการพัฒนาฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำ (panel data) อย่างต่อเนื่อง อันจะช่วยพัฒนางานวิจัยและองค์ความรู้เกี่ยวกับเศรษฐกิจและสังคมของครัวเรือนไทย โดยในระยะที่ 2 ของชุดโครงการฯ ได้มีโครงการย่อยที่พัฒนาข้อมูลและประยุกต์ใช้ข้อมูลทั้งหมด 5 โครงการ ได้แก่ (1) โครงการฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำเพื่อการวิจัยด้านเศรษฐศาสตร์และสังคม, (2) โครงการการเปลี่ยนแปลงของความยากจนในชนบทไทย จากกรณีศึกษา Townsend Thai Data, (3) โครงการการจัดทำฐานข้อมูลแบบตัวอย่างซ้ำจากข้อมูลภาวะการทำงานของประชากร, (4) โครงการบทบาทของสภาพครัวเรือนและการอพยพออกต่อการพัฒนาคุณภาพกำลังแรงงานในอนาคตของสังคมสูงวัย และ (5) โครงการการเปลี่ยนแปลงโครงสร้างการผลิตด้านการเกษตรของครัวเรือนในชนบท: บทเรียนจากข้อมูล Townsend Thai Data

ทั้งนี้ ชุดโครงการพัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย มีความมุ่งหวังที่จะสร้างเครือข่ายนักวิจัยที่มีความเชี่ยวชาญในประเด็นที่เกี่ยวข้องกับการพัฒนาประเทศ ทั้งยังจะเชื่อมโยงกับเครือข่ายนักวิจัยในต่างประเทศที่นำข้อมูลชุดนี้ไปใช้อย่างแพร่หลายมาก่อนหน้านี้แล้ว ซึ่งจะช่วยให้เกิดการแลกเปลี่ยน/เรียนรู้ ระหว่างนักวิจัยทั้งสองกลุ่ม อันจะนำไปสู่การสร้างองค์ความรู้ใหม่ ๆ ในด้านเศรษฐกิจและสังคมของครัวเรือนไทยที่มากขึ้น และท้ายที่สุดจะช่วยให้เราสามารถออกแบบนโยบายโดยอาศัยงานวิจัยเชิงลึกที่มีคุณภาพ จนเกิดประสิทธิภาพสูงสุดต่อประเทศได้

Abstract

Thai panel data for economic and social research project supports the Townsend Thai data to ensure the continuity of the longest household panel database in Thailand, which can potentially generate a large amount of research that will enhance our knowledge and understanding about rural Thai economy. The second phase of project consists of 5 separate but related projects, including (1) Household Panel Data for Socio-Economic Research, (2) Poverty Dynamics in Townsend Thai Data, (3) Constructing a Panel Data from the Labor Force Survey of Thailand, (4) Implications of changes in family structures on skill development in an aging society and (5) Structural Changes of Agricultural Production in Rural Thailand: Lessons from the Townsend Thai Data.

This project aims to encourage and motivate Thai researchers to study economic and social issues using this long household panel data. In addition, it will build a network of Thai and foreign researchers, who use the Thai Townsend data extensively. These activities should help broaden our knowledge about economic and social issues of Thai households. Finally, the project will enable the policymakers to design effective policies based on high-quality empirical research generated from this dataset.

สารบัญ

สารบัญ (ต่อ)

เรื่อง **หน้า**

สารบัญ (ต่อ)

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รูปภาพ		หน้า

สารบัญภาพ (ต่อ)

สารบัญตาราง

บทที่ 1
บทนำ

1.1 ความเป็นมา

ที่ผ่านมาประเทศไทยประสบปัญหาขาดแคลนงานวิจัยเชิงลึกที่ประยุกต์ใช้ข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำ (household panel data) ในประเด็นต่างๆ อาทิ การออกแบบระบบการเงิน (design of financial system) ปัญหาความเหลื่อมล้ำและความยากจน การบริหารสินทรัพย์และความเสี่ยงของครัวเรือนในชนบท การติดตามปัญหาหนี้ครัวเรือนในชนบท (household indebtedness tracking) อุปสรรคและข้อจำกัดด้านการเงิน (financial constraints) ของครัวเรือนและธุรกิจขนาดเล็ก และปัญหาสังคมผู้สูงวัย (aging society) ซึ่งล้วนแล้วแต่เป็นประเด็นที่มีความสำคัญต่อการพัฒนาประเทศทั้งในด้านเศรษฐกิจและสังคม

จากปัญหาดังกล่าว จึงมีความจำเป็นอย่างยิ่งที่ต้องจัดทำชุดโครงการพัฒนาองค์ความรู้ด้านเศรษฐกิจและสังคมของครัวเรือนไทยเพื่อสร้างองค์ความรู้ในประเด็นดังกล่าว โดยชุดโครงการฯ ได้รับความร่วมมือด้านวิชาการจาก Professor Robert M. Townsend, Elizabeth & James Killian Professor of Economics ณ มหาวิทยาลัย Massachusetts Institute of Technology ซึ่งเป็นผู้เชี่ยวชาญด้านเศรษฐศาสตร์พัฒนา เศรษฐศาสตร์การเงินและการคลัง และเศรษฐศาสตร์ทฤษฎี ที่ศึกษาครัวเรือนไทยมาเป็นเวลากว่า 20 ปี ทั้งนี้ Professor Robert M. Townsend และทีมงานได้พัฒนาฐานข้อมูล Townsend Thai Data ขึ้นมาในปี 1997 และยังดำเนินการอยู่จนถึงปัจจุบัน ซึ่งได้กลายเป็นต้นแบบให้กับองค์กรในประเทศต่าง ๆ นำไปพัฒนาฐานข้อมูลในลักษณะเดียวกัน เช่น ธนาคารกลางของประเทศเม็กซิโก ธนาคารกลางของประเทศชิลี และธนาคารกลางของประเทศสเปน เป็นต้น

นอกจากนี้ ชุดโครงการฯ ยังมีความมุ่งหวังที่จะสร้างเครือข่ายนักวิจัยที่มีความเชี่ยวชาญในประเด็นที่เกี่ยวข้องกับการพัฒนาประเทศ และสามารถประยุกต์ใช้ฐานข้อมูล Townsend Thai Data ได้อย่างมีประสิทธิภาพ อีกทั้งยังจะเชื่อมโยงกับเครือข่ายนักวิจัยในต่างประเทศที่นำข้อมูลชุดนี้ไปใช้อย่างแพร่หลายมาก่อนหน้านี้แล้ว ซึ่งจะช่วยให้เกิดการแลกเปลี่ยน/เรียนรู้ ระหว่างนักวิจัยทั้งสองกลุ่ม อันจะนำไปสู่การสร้างองค์ความรู้ใหม่ ๆ ในด้านเศรษฐกิจและสังคมของครัวเรือนไทยที่มากขึ้น และท้ายที่สุดจะช่วยให้เราสามารถออกแบบนโยบายโดยอาศัยงานวิจัยเชิงลึกที่มีคุณภาพ จนเกิดประสิทธิภาพสูงสุดต่อประเทศได้

1.2 วัตถุประสงค์การวิจัย

1. เพื่อพัฒนาองค์ความรู้ด้านเศรษฐกิจและสังคมของครัวเรือนไทย
2. เพื่อสร้างเครือข่ายนักวิจัยทั้งภายในและภายนอกประเทศที่มีความเชี่ยวชาญ สามารถผลิตงานวิจัยเชิงลึกโดยการประยุกต์ใช้ฐานข้อมูล Townsend Thai Data
3. เพื่อพัฒนาฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำรายเดือน (monthly micro data) ให้มีข้อมูลที่ต่อเนื่องและเป็นประโยชน์ต่อการพัฒนาประเทศ

1.3 กิจกรรมต่าง ๆ เพื่อให้บรรลุวัตถุประสงค์

1.3.1 กิจกรรมเพื่อพัฒนาองค์ความรู้ด้านเศรษฐกิจและสังคมของครัวเรือนไทย

กิจกรรมหลัก

1. จัดประชุมพัฒนาข้อเสนอโครงการร่วมกับนักวิจัย สกว. – ธปท. เพื่อให้ข้อเสนอโครงการตรงตามวัตถุประสงค์ของชุดโครงการ
2. คัดกรองข้อเสนอโครงการ โดยผู้ทรงคุณวุฒิทำหน้าที่ประเมินโครงการวิจัย เพื่อเสนอขอรับทุนในปีงบประมาณ 2560
3. ตรวจสอบข้อเสนอโครงการที่นักวิจัยปรับแก้ก่อนส่งให้ สกว.ขึ้นสัญญาโครงการ
4. จัดประชุมคณะกรรมการกำกับทิศทางการวิจัยและคณะทำงานชุดโครงการ

1.3.2 กิจกรรมติดตามโครงการฯ

กิจกรรมหลัก

1. ติดตามการดำเนินงานในเดือนที่ 3 หลังรับทุน

กิจกรรมรอง

- จัดการประชุมกับนักวิจัยเพื่อรับทราบแผนการดำเนินงานรวมถึงปัญหาที่อาจเกิดขึ้นและหนทางแก้ไข

2. ติดตามการดำเนินงานในเดือนที่ 6 หลังรับทุน

กิจกรรมรอง

- จัดการประชุมนำเสนอรายงานความก้าวหน้า 6 เดือนที่ 1 ระหว่างนักวิจัยและผู้ทรงคุณวุฒิ เพื่อรับทราบผลการดำเนินงานของโครงการวิจัย ปัญหาที่เกิดขึ้นและการแก้ไข
- ตรวจสอบรายงานความก้าวหน้า 6 เดือนที่ 1 ของโครงการวิจัยที่รับทุน และจัดส่งให้ผู้ทรงคุณวุฒิประเมินผลความก้าวหน้า
- สรุปผลการดำเนินงานให้กับ สกว.

3. ตรวจเยี่ยมโครงการวิจัยที่ได้รับทุนตามความเหมาะสม

4. จัดประชุมแก้ไขปัญหาและอุปสรรคร่วมระหว่างนักวิจัย ผู้ทรงคุณวุฒิและ สกว. ในกรณีประสบปัญหา/อุปสรรคในการดำเนินโครงการ

1.3.3 กิจกรรมเพื่อพัฒนาต่อยอดหรือขยายผลผลงานวิจัย

1. จัดการประชุมระหว่างนักวิจัย ผู้ทรงคุณวุฒิ และผู้มีส่วนร่วม เพื่อระดมความคิดเพื่อพัฒนาต่อยอดหรือขยายผลงานที่ได้รับทุน
2. จัดสัมมนาเสนอผลงานของโครงการวิจัยและพัฒนาที่ดำเนินเสร็จสมบูรณ์ต่อผู้ใช้ประโยชน์และผู้สนใจ

1.4 แผนการพัฒนาโครงการ/ การติดตามโครงการ/ การประเมินผลงานวิจัย ประมาณ 6 ประเด็น

ชุดโครงการนี้จะพัฒนา ติดตาม และประเมินผลงานวิจัยย่อย โดยมีประเด็นหลักในการศึกษาดังต่อไปนี้

1. The financial life cycle of Thai households: management of assets, real and financial assets, saving for older age in theory and in practice. Regional comparison: northeast vs central or rich vs poor. Related are case studies of the lives of Thai households, including debt management and other issues. Including studies of aging population.
2. The role of the village, or community, as an informal network of support and assistance, including the role in gifts and loans in providing insurance, if not credit. Viewing the village or community as a financial market and the theory of portfolio diversification.
3. The industrial organization of financial service providers and their use by Thai households and business in their financial strategies. The interaction among government and private sector banks in the location of branches and services.
4. Obstacles and limitations, needs for improvement: the study of cash management, insurance against long term disability, investment and long term capital flows.
5. Local, regional and national development, the role of within country trade and capital flows and quantification of welfare impact. The role of financial deepening.

6. Aging society: effects of population structure on family institution and community in rural Thailand.

1.5 ผลที่คาดว่าจะได้รับในแต่ละช่วงเวลา

ตารางที่ 1.1: ตารางกิจกรรมและผลที่คาดว่าจะได้รับ

เวลา	กิจกรรม	ผลที่คาดว่าจะได้รับ (output)
6 เดือนที่ 1	1 จัดประชุมพัฒนาข้อเสนอโครงการร่วมกับนักวิจัย สกว - ธปท เพื่อให้ข้อเสนอโครงการตรงตามวัตถุประสงค์ของชุดโครงการ	ได้ข้อเสนอโครงการที่ตรงตามวัตถุประสงค์
	2 คัดกรองข้อเสนอโครงการ โดยผู้ทรงคุณวุฒิทำหน้าที่ประเมินโครงการวิจัย เพื่อเสนอขอรับทุนในปีงบประมาณ 2560	ได้ข้อเสนอโครงการที่ผ่านการคัดกรองแล้ว
	3 ตรวจสอบข้อเสนอโครงการที่นักวิจัยปรับแก้ก่อนส่งให้ สกว.ขึ้นสัญญาโครงการ	ได้ข้อเสนอโครงการที่ปรับแก้แล้ว
	4 จัดประชุมคณะกรรมการกำกับทิศทางการวิจัยและคณะทำงานชุดโครงการ	ได้รูปแบบและแนวทางในการดำเนินงาน
	5. จัดการประชุมนำเสนอรายงานความก้าวหน้า 6 เดือนที่ 1 ระหว่างนักวิจัยและผู้ทรงคุณวุฒิเพื่อรับทราบผลการดำเนินงานของโครงการวิจัย ปัญหาที่เกิดขึ้นและการแก้ไข	รับทราบความก้าวหน้าของงานวิจัยแต่ละโครงการ
	6. ตรวจสอบรายงานความก้าวหน้า 6 เดือนที่ 1 ของโครงการวิจัยที่รับทุน และจัดส่งให้ผู้ทรงคุณวุฒิประเมินผลความก้าวหน้า และสรุปผลการดำเนินงานให้กับ สกว.	ได้รายงานความก้าวหน้า
6 เดือนที่ 2	1. ตรวจเยี่ยมโครงการวิจัยที่ได้รับทุนตามความเหมาะสม	รับทราบความก้าวหน้าของงานวิจัยแต่ละโครงการ
	2. ตรวจสอบและสรุปผล	ได้องค์ความรู้ที่จะนำไปสู่การออกแบบนโยบายด้านเศรษฐศาสตร์และสังคมให้มีประสิทธิภาพ
	3. จัดสัมมนาเสนอผลงานของโครงการวิจัยและพัฒนาที่ดำเนินเสร็จสมบูรณ์ต่อผู้ใช้ประโยชน์และผู้สนใจ	

1.6 ผลที่คาดว่าจะได้รับเมื่อการดำเนินงานเสร็จสิ้นที่เป็นรูปธรรม และตัวชี้วัดความสำเร็จของโครงการ

1. ในระหว่างการดำเนินการวิจัย โครงการจะนำเสนอความก้าวหน้าของโครงการในรูปแบบรายงานการวิจัย รายงานความก้าวหน้าของโครงการ รายงานการสังเคราะห์ข้อมูล และข้อมูลที่เกี่ยวกับการส่งเสริมการกำหนดนโยบายหรืออื่น ๆ ตามความเหมาะสมและความพร้อมของข้อมูลอย่างน้อยปีละ 6 ชิ้น
2. ภายในระยะเวลา 3 ปี (ระยะเวลาของ MOU) โครงการจะสามารถผลิตงานวิจัยเชิงลึกจากฐานข้อมูล Townsend Thai Data ที่สามารถนำไปตีพิมพ์ในวารสารระดับนานาชาติได้อย่างน้อย 1 เรื่องต่อ 1 โครงการ

1.7 แผนการดำเนินการ

ตารางที่ 1.2: แผนการดำเนินงาน

กิจกรรม	ม.ค.	ก.พ.	มี.ค.	เม.ย.	พ.ค.	มิ.ย.	ก.ค.	ส.ค.	ก.ย.	ต.ค.	พ.ย.	ธ.ค.
1.คัดกรองข้อเสนอโครงการ โดยผู้ทรงคุณวุฒิทำหน้าที่ประเมินโครงการวิจัย เพื่อเสนอขอรับทุนในปีงบประมาณ 2560	✓											
2.จัดอบรมการใช้ข้อมูล Townsend Thai Micro Data ครั้งที่ 1		✓										
3.จัดประชุมนำเสนอข้อเสนอโครงการร่วมกับนักวิจัยในปีงบประมาณ 2560 (3 โครงการ อ.เนื้อแพร, อ.เชาวนา, อ.นราพงศ์)			✓									
4.จัดประชุมนำเสนอรายงานความก้าวหน้า 6 เดือนที่ 1 ในปีงบประมาณ 2559 (2 โครงการ อ.อนันต์, อ.ภัทรพรรณ)			✓									
5.ตรวจสอบข้อเสนอโครงการที่นักวิจัยปรับแก้ก่อนส่งให้ สกว.ขึ้นสัญญาโครงการ ปี 2560				✓								
6.ขึ้นสัญญาโครงการในปีงบประมาณ 2560				✓								
7.ตรวจเยี่ยมโครงการวิจัยที่ได้รับทุนตามความเหมาะสม					✓							
8.จัด conference "Households in Economic Development"						✓						
9.สรุปผลการจัดกิจกรรมและจัดทำรายงานความก้าวหน้า 6 เดือนที่ 1 ของชุดประสานงาน							✓					
10.จัดประชุมคณะกรรมการกำกับทิศทางการวิจัยและคณะทำงานชุดโครงการ								✓				
11.จัดประชุมนำเสนอรายงานความก้าวหน้า 6 เดือนที่ 1 ในปีงบประมาณ 2560									✓			
12.จัดประชุมนำเสนอรายงานฉบับสมบูรณ์ 6 เดือนที่ 2 ในปีงบประมาณ 2559									✓			
13.จัดอบรมการใช้ข้อมูล Townsend Thai Micro Data ครั้งที่ 2										✓		
14.เปิดรับพิจารณาข้อเสนอโครงการ เพื่อเสนอขอรับทุนในปีงบประมาณ 2561										✓	✓	✓
15.จัดสัมมนาเสนอผลงานของโครงการวิจัยและพัฒนาที่ดำเนินเสร็จสมบูรณ์ต่อผู้ใช้ประโยชน์และผู้สนใจ												✓

1.8 กระบวนการผลักดันผลงานออกสู่การใช้ประโยชน์

1. การประชุมเชิงวิชาการ
   เชิญผู้ทรงคุณวุฒิจากสาขาและหน่วยงานที่เกี่ยวข้องมาร่วมประชุมเชิงวิชาการ
2. การพิมพ์เผยแพร่ผลงาน
   โครงการจะเผยแพร่ผลการวิจัยผ่านเว็บไซต์และการจัดประชุมวิชาการเป็นหลัก
3. การเสนอผลงานในการประชุมนานาชาติ
   ตีพิมพ์บทความวิจัยในวารสารวิชาการระดับนานาชาติ เช่น Econometrica, Journal of Political Economy, Quarterly Journal of Economics, Journal of Development Economics เป็นต้น
4. กระบวนการผลักดันผลงานดังกล่าวออกสู่การใช้ประโยชน์อื่นๆ เช่น ด้านนโยบาย ด้านการพัฒนาชุมชนท้องถิ่น

ในระยะยาว องค์ความรู้ที่ได้จากงานวิจัยจะถูกนำมาสังเคราะห์เพื่อออกแบบนโยบายเกี่ยวกับระบบการเงินและการคลัง นโยบายเพื่อลดความยากจนและความเหลื่อมล้ำ นโยบายที่เกี่ยวข้องกับสังคมผู้สูงอายุ รวมถึงช่วยในการวางแผนพัฒนาชุมชนอย่างเป็นระบบ ซึ่งคาดว่าองค์กรที่มีบทบาทต่อการกำหนดนโยบายของประเทศ เช่น ธนาคารแห่งประเทศไทย สำนักงานคณะกรรมการพัฒนาการเศรษฐกิจและสังคมแห่งชาติ กระทรวงการคลัง สถาบันการเงินทั้งภาครัฐและเอกชน จะสามารถใช้ประโยชน์จากผลการวิจัยนี้ได้

ทั้งนี้ ชุดโครงการฯ จะจัดสัมมนาเสนอผลงานของโครงการวิจัยและพัฒนาที่ดำเนินเสร็จสมบูรณ์ระหว่างนักวิจัย ผู้ทรงคุณวุฒิ ผู้มีส่วนร่วมและผู้สนใจ เพื่อระดมความคิดเพื่อพัฒนาต่อยอดหรือขยายผลจากองค์ความรู้ที่ได้จากงานวิจัยมาสังเคราะห์เพื่อออกแบบนโยบายด้านเศรษฐศาสตร์และสังคมให้มีประสิทธิภาพ ตลอดจนวางแผนพัฒนาชุมชนให้เป็นระบบมากขึ้น

บทที่ 2
การปฏิบัติงานตามกรอบภารกิจ

2.1 การสร้างและสนับสนุนโครงการวิจัย

ภารกิจหลักของชุดโครงการ “พัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย” คือ การสร้างและสนับสนุนโครงการวิจัยที่จะเอื้อประโยชน์อย่างเป็นรูปธรรมตามเป้าหมายของฝ่ายและชุดโครงการ เพื่อส่งเสริมและสนับสนุนการพัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย ซึ่งประกอบไปด้วยโครงการต่าง ๆ ดังนี้

ตารางที่ 2.1: โครงการวิจัยภายใต้ชุดโครงการฯ

ชื่อโครงการ/กิจกรรม (หัวหน้าโครงการ)	ระยะเวลา	งบประมาณ (บาท)
1. โครงการ “ฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำเพื่อการวิจัยด้านเศรษฐศาสตร์และสังคม” (ระยะที่ 2) หัวหน้าโครงการ: คุณสมบัติ ศกุนตะเสถียร	1 ปี (1 ส.ค. 59 – 31 ก.ค. 60) สิ้นสุดโครงการ	11.5 ล้านบาท (ร่วมทุนกับ ธปท.)
2. โครงการ “ฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำเพื่อการวิจัยด้านเศรษฐศาสตร์และสังคม” (ระยะที่ 3) หัวหน้าโครงการ: คุณสมบัติ ศกุนตะเสถียร	1 ปี 5 เดือน (1 ส.ค. 60 – 31 ธ.ค. 61)	11.5 ล้านบาท (ร่วมทุนกับ ธปท.)
3. โครงการ “การเปลี่ยนแปลงของความยากจนในชนบทไทย Townsend Thai Data” หัวหน้าโครงการ: ดร.อนันต์ ภาวสุทธิไพศิฐ	1 ปี (15 ส.ค. 59 – 14 ส.ค. 60 ขยายระยะเวลาโครงการ 14 ธ.ค. 60)	556,600 บาท
4. โครงการ “การจัดทำฐานข้อมูลแบบตัวอย่างซ้ำจากข้อมูลภาวะการทำงานของประชากร” หัวหน้าโครงการ: ดร.ภัทรพรรณ อดทน	1 ปี (3 ต.ค. 59 – 2 ต.ค. 59 ขยายระยะเวลาโครงการ 1 ธ.ค. 60)	709,200 บาท
5. โครงการ “บทบาทของสภาพครัวเรือนและการอพยพออกต่อการพัฒนาคุณภาพกำลังแรงงานในอนาคตของสังคมสูงวัย” หัวหน้าโครงการ: ดร.เนื้อแพร เล็กเฟื่องฟู	1 ปี (1 ส.ค. 60 – 31 ก.ค. 61)	599,500 บาท
6. โครงการ “การเปลี่ยนแปลงโครงสร้างการผลิตด้านการเกษตรของครัวเรือนในชนบท: บทเรียนจากข้อมูล Townsend Thai Data” หัวหน้าโครงการ: ดร.เชาวนา เพชรรัตน์	1 ปี (15 ก.ค. 60 – 15 ก.ค. 61)	456,500 บาท

2.1.1 โครงการ "ฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำเพื่อการวิจัยด้านเศรษฐศาสตร์และสังคม ระยะที่ 2" (Household Panel Data for Socio-Economic Research)

โครงการนี้จัดทำขึ้นเพื่อสนับสนุนการเก็บและบริหารข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำใน Townsend Thai Data โดยเฉพาะอย่างยิ่งระดับครัวเรือนตัวอย่างซ้ำรายเดือน (monthly micro data) ซึ่งถือได้ว่า เป็นข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำที่สามารถนำมาวิจัยในประเด็นต่าง ๆ ได้มากมาย ไม่ว่าจะเป็น การออกแบบระบบการเงิน (design of financial system) ปัญหาความเหลื่อมล้ำและความยากจน การบริหารสินทรัพย์และความเสี่ยงของครัวเรือนในชนบท การติดตามปัญหาหนี้ครัวเรือนในชนบท (household indebtedness tracking) อุปสรรคและข้อจำกัดด้านการเงิน (financial constraints) ของครัวเรือนและธุรกิจขนาดเล็ก ปัญหาสังคมผู้สูงวัย (aging society) เป็นต้น โครงการนี้เป็นการร่วมสนับสนุนระหว่าง สกว. (6.5 ล้านบาทต่อปี) และ ธปท. (5 ล้านบาทต่อปี)

โครงการนี้ได้ดำเนินการโครงการต่อเนื่องในระยะที่สอง นับตั้งแต่เดือนสิงหาคม 2559 จนถึงเดือนกรกฎาคม 2560 ซึ่งโครงการได้สำรวจข้อมูลระดับครัวเรือนตัวอย่างซ้ำรายเดือน (monthly micro data) ประกอบด้วย 16 หมู่บ้าน โดยมีจำนวนครัวเรือนเป้าหมายในแต่ละหมู่บ้านไม่เกิน 45 ครัวเรือน (อาจมีบางหมู่บ้านมีจำนวนไม่ถึง 45 ครัวเรือนเนื่องจากจำนวนครัวเรือนทั้งหมดในหมู่บ้านขณะนั้นมีจำนวนไม่ถึง 45 ครัวเรือน) โดยในปีแรกมีครัวเรือนกลุ่มตัวอย่างทั้งหมด 682 ครัวเรือน และในปัจจุบัน (19 ปีผ่านไป) มีครัวเรือนกลุ่มตัวอย่างเหลืออยู่ทั้งหมด 670 ครัวเรือน ในรอบปีที่ผ่านมา ทีมงานเก็บข้อมูลสามารถสัมภาษณ์กลุ่มตัวอย่างได้ครบทุกครัวเรือนทุกเดือน ซึ่งมีจำนวนครัวเรือน ตามตารางดังนี้

ตารางที่ 2.2: จำนวนครัวเรือนตัวอย่างซ้ำรายเดือนที่ถูกสัมภาษณ์
ตั้งแต่เดือนสิงหาคม 2559 – พฤศจิกายน 2560

เดือน	เดือนของข้อมูล	ฉะเชิงเทรา	ลพบุรี	บุรีรัมย์	ศรีสะเกษ	รวม	เป้าหมาย	จำนวนครัวเรือนที่หายไปจากกลุ่มตัวอย่าง	จำนวนครัวเรือนทดแทน
สิงหาคม 2559	214	161	177	171	161	670	638	0	0
กันยายน 2559	215	161	177	171	161	670	638	0	0
ตุลาคม 2559	216	161	177	171	161	670	638	0	0
พฤศจิกายน 2559	217	161	177	171	161	670	638	0	0
ธันวาคม 2559	218	161	177	171	161	670	638	0	0
มกราคม 2560	219	161	177	171	161	670	638	0	0
กุมภาพันธ์ 2560	220	161	177	171	161	670	638	0	0
มีนาคม 2560	221	161	177	171	161	670	638	0	0
เมษายน 2560	222	161	177	171	161	670	638	0	0
พฤษภาคม 2560	223	161	177	171	161	670	638	0	0
มิถุนายน 2560	224	161	177	171	161	670	638	0	0
กรกฎาคม 2560	224	161	177	171	161	670	638	0	0

2.1.2 โครงการ "ฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำเพื่อการวิจัยด้านเศรษฐศาสตร์และสังคม ระยะที่ 3" (Household Panel Data for Socio-Economic Research)

โครงการนี้เป็นโครงการเก็บข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำใน Townsend Thai Data ระยะต่อเนื่อง ระยะที่ 3 ซึ่งในปี 2560 นี้จะเป็นปีสุดท้ายของการเก็บข้อมูลครัวเรือนแบบตัวอย่างซ้ำรายเดือน โดยจะสิ้นสุดลงในเดือนพฤศจิกายน 2560 กล่าวคือ การเก็บข้อมูลแบบตัวอย่างซ้ำรายเดือน (monthly resurvey) จะดำเนินการระหว่างเดือนสิงหาคม 2560 ไปจนถึงเดือนพฤศจิกายน 2560 หลังจากนั้น กิจกรรมส่วนหนึ่งจะเป็นการบันทึกข้อมูลและทำความสะอาดข้อมูล (data cleaning) ซึ่งต้องใช้เวลาอีกประมาณ 3 เดือน

นอกจากนี้ เพื่อปรับปรุงข้อมูลครัวเรือนในพื้นที่ที่มีการเก็บข้อมูลให้เป็นปัจจุบัน นักวิจัยจำเป็นต้องเก็บข้อมูลพื้นฐานของทุกครัวเรือนหรือกลุ่มประชากรในพื้นที่ (census) ใน 16 หมู่บ้าน 4 จังหวัด ได้แก่ ลพบุรี ฉะเชิงเทรา บุรีรัมย์ และศรีสะเกษ ซึ่งมีผลทำให้ระยะเวลาในการดำเนินการต้องขยายเป็น 17 เดือน โดยที่ค่าใช้จ่ายทั้งหมดยังเท่ากับปีก่อนคือ 11.5 ล้านบาทตลอดโครงการ

การเก็บข้อมูลสำมะโนประชากร (census) หรือข้อมูลพื้นฐานของทุกครัวเรือนในหมู่บ้านกลุ่มตัวอย่างหลังจากการเก็บข้อมูล monthly resurvey มีความจำเป็นอย่างยิ่งเพราะจะช่วยตรวจสอบได้ว่า กลุ่มตัวอย่างที่เก็บมาตลอดระยะเวลาของการสำรวจตั้งแต่เริ่มต้นจนถึงปัจจุบันนั้นมีการเปลี่ยนแปลงอย่างไรและเพื่อให้มั่นใจว่าข้อมูลที่ได้เป็นตัวแทนที่ดีมากน้อยแค่ไหน นอกจากนี้ ข้อมูลสำมะโนประชากรยังจะช่วยให้นักวิจัยสามารถศึกษาการเปลี่ยนแปลงของครัวเรือนและชุมชนที่เกิดขึ้นในช่วง 20 ปีที่ผ่านมาได้ในวงกว้างมากขึ้น อันจะเป็นส่วนเสริมกันกับข้อมูลกลุ่มตัวอย่างมีเก็บมาอย่างต่อเนื่องยาวนาน

2.1.3 โครงการ "การเปลี่ยนแปลงของความยากจนในชนบทไทย จากรณีศึกษา Townsend Thai Data"

โครงการนี้จะนำข้อมูล Townsend Thai Monthly Micro Data ที่ได้จากโครงการเก็บข้อมูล ซึ่งเป็นข้อมูลแบบตัวอย่างซ้ำรายเดือนที่ติดตามครัวเรือนในจังหวัดฉะเชิงเทรา ลพบุรี บุรีรัมย์ และศรีสะเกษ ดังนั้น เราสามารถใช้ข้อมูลนี้เพื่อศึกษาถึงการเปลี่ยนแปลงของครัวเรือนที่อยู่ในการสำรวจได้ หากใช้เส้นแบ่งความยากจนของ สศช. กับข้อมูลนี้เราจะพบว่าสัดส่วนคนจนในช่วงต้นของการสำรวจมีค่าประมาณ 60% หรือมากกว่าในแต่ละจังหวัด (ยกเว้นที่ฉะเชิงเทราซึ่งมีค่าประมาณ 50%) แต่สัดส่วนคนจนมีแนวโน้มที่ลดลงใน 3 จังหวัด ยกเว้นที่ศรีสะเกษซึ่งไม่ได้เกิดขึ้นอย่างชัดเจนนัก เมื่อคำนวณสัดส่วนของเวลาที่แต่ละครัวเรือนตกอยู่ภายใต้ความยากจนเราจะพบว่า ค่าเฉลี่ยแบบมัธยฐานอยู่ที่ 0.55 หรือครัวเรือนส่วนใหญ่ของการสำรวจได้ใช้เวลามากกว่าครึ่งหนึ่งในช่วงเวลาของการสำรวจอยู่ภายใต้ความยากจน ดังนั้น จะมีครัวเรือนส่วนหนึ่งที่หลุดออกจากความยากจนได้

และไม่กลับเข้ามาอีกหรือกลับเข้ามาเป็นครั้งคราวในขณะที่อีกส่วนหนึ่งยังตกอยู่ภายใต้ความยากจน หรือกลับเข้ามาสู่ความยากจนในความถี่ที่สูงกว่า และเพื่อค้นหาว่าทำไมคนกลุ่มหนึ่งจึงออกจากความยากจนได้ในขณะที่อีกกลุ่มหนึ่งยังตกอยู่ภายใต้ความยากจน ครัวเรือนแบบไหนที่มีความเสี่ยงที่จะตกหรือกลับเข้าไปสู่ความยากจนอีก เราสามารถใช้ Townsend Thai Data ศึกษาในประเด็นที่มีความสำคัญเหล่านี้ได้ ดังนั้น โครงการจึงต้องการศึกษาข้อเท็จจริงและสถานการณ์ของความยากจนรวมถึงการเปลี่ยนแปลงของความยากจนในชนบทในช่วงเวลาของการสำรวจโดยใช้ตัวแปรต่าง ๆ เช่น การบริโภค รายได้ และทรัพย์สิน และหาสาเหตุของการตกหรือกลับเข้าไปสู่ความยากจนของครัวเรือนในชนบท เพื่อวิเคราะห์ความแตกต่างระหว่างกลุ่มที่สามารถออกจากความยากจนได้และกลุ่มที่ยังตกอยู่ภายใต้ความยากจน

2.1.4 โครงการ “การจัดทำฐานข้อมูลแบบตัวอย่างซ้ำจากข้อมูลภาวะการทำงานของประชากร”

โครงการวิจัยนี้มีเป้าหมายเพื่อจัดทำฐานข้อมูลรายบุคคลแบบตัวอย่างซ้ำจากข้อมูลส่วน Out Rotation Group (ORG) ในข้อมูลการสำรวจภาวะแรงงานของประชากร (Labor Force Survey: LFS) ของสำนักงานสถิติแห่งชาติ ซึ่งจะเป็นประโยชน์ต่อการศึกษาวิจัยในประเด็นสำคัญต่าง ๆ เช่น การย้ายของประชากรถิ่น การเปลี่ยนงานของแรงงาน พลวัตของการจ้างงาน ผลกระทบของการเปลี่ยนแปลงระบบการกำหนดค่าจ้างขั้นต่ำ เป็นต้น เหตุผลที่สำคัญที่ต้องจัดทำเป็นโครงการวิจัยในครั้งนี้ เพราะข้อมูลที่จัดทำขึ้นมีเพียงตัวบ่งชี้ระดับครัวเรือนเท่านั้นที่สามารถเชื่อมโยงระหว่างรอบได้ แต่ตัวบ่งชี้ระดับรายบุคคลภายในครัวเรือนไม่สามารถใช้ได้ในทันที นักวิจัยจำเป็นต้องใช้เวลาและความพยายามอย่างมากที่จะเชื่อมโยงบุคคลเดียวกันระหว่างรอบ ดังนั้น เพื่อส่งเสริมให้เกิดงานวิจัยด้านเศรษฐศาสตร์แรงงานหรือด้านที่เกี่ยวข้องที่ใช้ข้อมูลตัวอย่างซ้ำ และลดต้นทุนในการสร้างข้อมูลให้กับนักวิจัย จึงมีความจำเป็นที่จะต้องสร้างข้อมูลตัวอย่างซ้ำขึ้นและเผยแพร่ฐานข้อมูลให้กับนักวิจัยเพื่อนำไปใช้ได้อย่างสะดวกและทั่วถึง โดยนักวิจัยจะเผยแพร่ Matching ID และ STATA code พร้อมคู่มือการสร้างข้อมูลตัวอย่างซ้ำในเวปไซต์ เพื่อช่วยให้นักวิจัยที่มีข้อมูลการสำรวจภาวะการทำงานของประชากรสามารถสร้างข้อมูลได้อย่างสะดวก

2.1.5 โครงการ “บทบาทของสภาพครัวเรือนและการอพยพออกต่อการพัฒนาคุณภาพกำลังแรงงานในอนาคตของสังคมสูงวัย”

โครงการนี้เป็นการศึกษาความสัมพันธ์ระหว่างรูปแบบลักษณะของครัวเรือนกับการลงทุนของครัวเรือนในเด็กและผลลัพธ์ระยะกลาง โดยที่การวิจัยนี้ยังมีความตั้งใจหาข้อเสนอแนะแก่นโยบายรัฐในการเตรียมความพร้อมเรื่องคุณภาพของกำลังแรงงานและทักษะสำหรับสังคมสูงอายุที่ปริมาณการเกิดลดลง โดยวิธีการศึกษาจะใช้วิธีทางเศรษฐมิติกับฐานข้อมูล Townsend Thai Data เป็นหลักและ

ประกอบกับฐานข้อมูลประชากรจากแหล่งอื่น ๆ ที่เกี่ยวข้อง นอกจากนั้นตัวอย่างข้อมูลจาก Townsend Thai Data ยังชี้ให้เห็นถึงความสัมพันธ์ระหว่างจำนวนเงินส่งกลับ (remittances) และลักษณะของครัวเรือนไว้ โดย อนันต์ ภาวสุทธิไพศิฐ (2559) พบว่าครัวเรือนแบบแหว่งกลางโดยเฉลี่ยได้รับจำนวนเงินส่งกลับมากที่สุด ทำให้เห็นว่าครัวเรือนในตัวอย่างของประเทศไทยมีการ pool resource ในปริมาณหนึ่ง ซึ่งอาจเป็นสื่อกลางของกลไกการจัดสรรทรัพยากรของครัวเรือนเพื่อใช้ในการลงทุนกับสมาชิกวัยเด็กของครอบครัว

ดังนั้น โครงการนี้จะสร้างโมเดลเชิงเศรษฐศาสตร์ที่แสดงถึงการจัดสรรทรัพยากรภายในครัวเรือนในรูปแบบของ overlapping generation resource transfer เพื่อเป็นแนวทางในการศึกษาทิศทางความสัมพันธ์ระหว่างลักษณะโครงสร้างของครัวเรือนและการลงทุนเชิงทักษะในเด็ก อีกทั้ง จะสรุปข้อมูลสถิติเชิงตัดขวางและเชิงพลวัตจากข้อมูลครัวเรือนที่ติดตาม เพื่อแสดงภาพความสัมพันธ์ระหว่างลักษณะโครงสร้างครัวเรือน การจัดสรรทรัพยากรในครัวเรือน และการลงทุนในเด็ก ซึ่งรวมถึงผลลัพธ์ต่อพัฒนาการของเด็กและทักษะโดยรอบ เช่น ภาวะสุขภาพ การศึกษา เป็นต้น

2.1.6 โครงการ "การเปลี่ยนแปลงโครงสร้างการผลิตด้านการเกษตรของครัวเรือนในชนบท: บทเรียนจากข้อมูล Townsend Thai Data"

โครงการนี้ นักวิจัยจะใช้ข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำรายเดือน (monthly panel data) จาก Townsend Thai Data เพื่อศึกษาการเปลี่ยนแปลงโครงสร้างการผลิตสินค้าเกษตรของครัวเรือนเกษตรกรใน 4 จังหวัด ได้แก่ จังหวัดลพบุรี ฉะเชิงเทรา บุรีรัมย์ และศรีสะเกษ ด้วยข้อมูลที่มีความต่อเนื่องยาวนานและมีความละเอียดสูง งานวิจัยชิ้นนี้จะช่วยสะท้อนให้เห็นถึงพัฒนาการและพลวัตของการตัดสินใจเลือกประเภทสินค้าเกษตรว่า เกือบ 20 ปีที่ผ่านมาครัวเรือนเกษตรไทยได้พยายามพัฒนาความชำนาญด้านการผลิตด้วยวิธีการเลือกผลิตสินค้าเกษตรแบบเฉพาะอย่าง (specialization) มากขึ้น หรือพยายามที่จะกระจายความเสี่ยงด้วยวิธีการผลิตสินค้าเกษตรแบบหลากหลาย (diversification) มากขึ้น นอกจากนี้ นักวิจัยยังจะศึกษาบทบาทในความแตกต่างของลักษณะครัวเรือน (household heterogeneity) และบทบาทของภาครัฐที่มีผลต่อการเปลี่ยนแปลงโครงสร้างการผลิตสินค้าเกษตร ผลการวิจัยในครั้งนี้จะมีส่วนช่วยให้ผู้กำหนดนโยบายสามารถออกแบบนโยบายที่ตอบสนองต่อความต้องการของครัวเรือนเกษตรกรได้อย่างมีประสิทธิภาพในอนาคต

2.2 การประสานงานภายในและภายนอกชุดโครงการ

นอกจากชุดโครงการฯ มีหน้าที่หลักในการสร้างและสนับสนุนโครงการวิจัยแล้วนั้น ชุดโครงการฯ ต้องคอยติดตามความก้าวหน้าของโครงการและประเมินโครงการต่าง ๆ ตามระยะเวลาที่ระบุในสัญญา และแนวทางที่ สกว. กำหนด ซึ่งประกอบไปด้วยการดำเนินกิจกรรมต่าง ๆ ดังนี้

2.2.1 การนำเสนอรายงานความก้าวหน้าของชุดโครงการพัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย ครั้งที่ 2 ต่อคณะกรรมการกำกับทิศทางการวิจัยชุดโครงการพัฒนาองค์ความรู้และนโยบายเศรษฐกิจและสังคมของครัวเรือนไทย ณ ห้องประชุม 1 ชั้น 14 สำนักงานกองทุนสนับสนุนการวิจัย ในวันที่ 20 มกราคม 2560 โดยมีหัวข้อ ดังนี้

- สรุปการดำเนินงาน ชุดโครงการ “พัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย” ในปีงบประมาณปี 2559
- เรื่องเพื่อพิจารณาสำหรับการยื่นข้อเสนอโครงการในปีถัดไปภายใต้ชุดโครงการฯ ซึ่งได้แก่

1. ข้อเสนอโครงการประสานงานชุดโครงการพัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย (โครงการต่อเนื่อง)
2. รายงานฉบับสมบูรณ์โครงการ “ฐานข้อมูลบัญชีครัวเรือนเพื่อการวิจัยด้านเศรษฐกิจและสังคม” ระยะเวลาโครงการตั้งแต่ 2 พฤศจิกายน 2558 – 30 ธันวาคม 2559 สัญญาเลขที่ RDG5940003 โดย ดร.นราพงศ์ ศรีวิศาล คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย
3. รายงานความก้าวหน้าโครงการ “การศึกษาการค้าระดับหมู่บ้านในไทยโดยใช้แบบจำลองการเลือกอาชีพที่มีความไม่สมบูรณ์ของตลาดการเงิน” ระยะเวลาโครงการตั้งแต่ 4 มกราคม 2559 – 30 ธันวาคม 2559 สัญญาเลขที่ RDG5940005 โดย ดร.อาชว์ ปวีณวัฒน์ คณะเศรษฐศาสตร์ มหาวิทยาลัยหอการค้าไทย
4. รายงานความก้าวหน้า โครงการ “การเปลี่ยนแปลงของความยากจนในชนบทไทย” ระยะเวลาโครงการตั้งแต่ 15 สิงหาคม 2559 – 20 มกราคม 2560 สัญญาเลขที่ RDG5940037 โดย ดร.อนันต์ ภาวสุทธิไพศิฐ คณะเศรษฐศาสตร์ มหาวิทยาลัยธรรมศาสตร์

- การจัด Conference ในวันที่ 8-9 มิถุนายน 2560

- Conference with distinguished international and national speakers.
- จัดทั้งหมด 2 วัน คือ วันที่ 8 และ 9 มิถุนายน 2560
- สถานที่: ธนาคารแห่งประเทศไทย
- เจ้าภาพร่วม: PIER, RIPED and TRF
- งบประมาณในการจัด conference รวมทั้งหมด 632,000 บาท

- แผนการดำเนินงานในระยะต่อไป

1. การนำเสนอรายงานความก้าวหน้า 2 โครงการ
- รายงานความก้าวหน้า โครงการ “การเปลี่ยนแปลงของความยากจนในชนบทไทย” โดย ดร.อนันต์ ภาวสุทธิไพศิฐ
- รายงานความก้าวหน้า โครงการ “การจัดทำฐานข้อมูลแบบตัวอย่างซ้ำจากข้อมูลภาวะการทำงานของประชากร” โดย ดร.ภัทรพรรณ อดทน

2. การนำเสนอข้อเสนอโครงการ 2 โครงการ
- ข้อเสนอโครงการเรื่อง “บทบาทของสภาพครัวเรือนต่อการพัฒนาคุณภาพกำลังแรงงานในอนาคตของสังคมสูงวัย” โดย ดร.เนื้อแพร เล็กเฟื่องฟู
- ข้อเสนอโครงการเรื่อง “การเปลี่ยนแปลงโครงสร้างการผลิตด้านการเกษตรของครัวเรือนในชนบท: บทเรียนจากข้อมูล Townsend Thai Data” โดย ดร.เชาวนา เพชรรัตน์

3. การจัด Townsend Thai Data Workshop (คาดว่าจะจัดขึ้นในเดือน ก.พ. 2560)
4. การจัดงาน Townsend Conference ประจำปี 2560 ในเดือนมิถุนายน 2560

2.2.2 การจัดการอบรมการใช้ Townsend Thai Micro Data ณ ห้องประชุมศูนย์วิจัยมหาวิทยาลัยชิคาโก-มหาวิทยาลัยหอการค้าไทย (UC-UTCC Research Center) อาคาร 21 ชั้น 7 มหาวิทยาลัยหอการค้าไทย

เนื่องจากข้อมูล Townsend Thai มีรายละเอียดและความซับซ้อนในการใช้งานจึงไม่ง่ายนักที่นักวิจัยทั่วไปจะนำข้อมูลชุดนี้มาใช้วิเคราะห์เพื่อพัฒนาต่อยอดสู่งานวิจัย ดังนั้น ชุดโครงการฯ จึงเห็นว่าการจัดอบรมการใช้ Townsend Thai Micro Data มีความจำเป็นอย่างยิ่งเพื่อให้บุคลากรนักวิจัยที่มีศักยภาพมีความรู้ความเข้าใจและสามารถนำข้อมูล Townsend Thai Monthly Micro Data และบัญชีครัวเรือนที่จัดทำขึ้นจากฐานข้อมูลดังกล่าวไปใช้ในงานวิจัยและพัฒนานโยบายได้อย่างถูกต้องมากยิ่งขึ้น โดยมีการจัดอบรมการใช้ข้อมูลภายใต้ชุดโครงการฯ เกิดขึ้น 2 ครั้ง ได้แก่

2.2.2.1 การจัดการอบรมการใช้ Townsend Thai Micro Data ครั้งที่ 1 ในวันที่ 6 กุมภาพันธ์ 2560

กลุ่มเป้าหมาย คณาจารย์มหาวิทยาลัย นักวิจัย



โดยมีกำหนดการการจัดอบรม ดังนี้

10:00 am	Introduction to Townsend Thai Survey Data (อ.ดร.อนันต์ ภาวสุทธิไพศิฐ)
10:30 am	Introduction to the Household Financial Account (อ.ดร.นราพงศ์ ศรีวิศาล)
11:00 am	Construction of the Household Financial Account: Assumptions and Key Concepts (อ.ดร.อาชว์ ปวีณวัฒน์, อ.ดร.นราพงศ์ ศรีวิศาล)
1:00 pm	Data Training and Case Study Workshop (อ.ดร.อนันต์ ภาวสุทธิไพศิฐ, อ.ดร.อาชว์ ปวีณวัฒน์, อ.ดร.นราพงศ์ ศรีวิศาล, ก้องเกียรติ + วาสิณี)

2.2.2.2 การจัดการอบรมการใช้ Townsend Thai Micro Data ครั้งที่ 2 ในวันที่ 26 ธันวาคม 2560

กลุ่มเป้าหมาย นักวิจัยที่ขอบริการใช้ข้อมูล Townsend Thai Data



โดยมีกำหนดการการจัดอบรม ดังนี้

8:30 น.	ลงทะเบียน
9:00 น.	ทบทวนโครงสร้างบัญชีครัวเรือน อ.ดร.นราพงศ์ ศรีวิศาล คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย
10:00 น.	ตัวอย่างแนวทางการวิเคราะห์ข้อมูลด้วยบัญชีครัวเรือน อ.ดร.นราพงศ์ ศรีวิศาล คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย อ.ดร.อาชว์ ปวีณวัฒน์ คณะเศรษฐศาสตร์ มหาวิทยาลัยหอการค้าไทย อ.ดร.อนันต์ ภาวสุทธิไพศิฐ คณะเศรษฐศาสตร์ มหาวิทยาลัยธรรมศาสตร์
12:00 น.	รับประทานอาหารกลางวัน

การจัดอบรมการใช้ข้อมูล Townsend Thai Micro Data ทั้ง 2 ครั้ง ได้รับความสนใจจากนักวิจัยทั้งภายในและภายนอกชุดโครงการฯ เป็นอย่างดี โดยมีผู้เข้าร่วมการอบรมรวมทั้งสิ้น 30 คน ซึ่งทางชุดโครงการฯ เล็งเห็นว่ายังเป็นกลุ่มนักวิจัยที่อยู่ในวงจำกัด ดังนั้นจึงควรมีการประชาสัมพันธ์ให้มากขึ้นเพื่อเพิ่มเครือข่ายนักวิจัยและขยายไปสู่นักวิจัยในต่างจังหวัดด้วยเช่นกัน

2.2.3 การประชุมการนำเสนอรายงานความก้าวหน้าและข้อเสนอโครงการภายใต้ชุดโครงการ “พัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย” ครั้งที่ 3 ณ ห้องประชุม 1 ชั้น 15 สำนักงานกองทุนสนับสนุนการวิจัย ต่อคณะกรรมการกำกับทิศทางการวิจัยชุดโครงการพัฒนาองค์ความรู้และนโยบายเศรษฐกิจและสังคมของครัวเรือนไทย ในวันที่ 3 พฤษภาคม 2560 ซึ่งประกอบไปด้วยการนำเสนอโครงการต่าง ๆ ดังนี้

- รายงานความก้าวหน้าโครงการ “การเปลี่ยนแปลงของความยากจนในชนบทไทย” สัญญาเลขที่ RDG5940037 (15 ส.ค. 59 – 20 ก.ค. 60) โดย ดร.อนันต์ ภาวสุทธไพศิฐ คณะเศรษฐศาสตร์ มหาวิทยาลัยธรรมศาสตร์
- รายงานความก้าวหน้าโครงการ “การจัดทำฐานข้อมูลแบบตัวอย่างซ้ำจากข้อมูลภาวะการทำงานของประชากร” สัญญาเลขที่ RDG6040001 (3 ต.ค. 59 – 2 ต.ค.60) โดย ดร.ภัทรพรรณ อดทน สถาบันวิจัยเพื่อการประเมินและออกแบบนโยบาย มหาวิทยาลัยหอการค้าไทย
- ข้อเสนอโครงการ “การเปลี่ยนแปลงโครงสร้างการผลิตด้านการเกษตรของครัวเรือนในชนบท: บทเรียนจากข้อมูล Townsend Thai Data” โดย ดร.เชาวนา เพชรรัตน์คณะเศรษฐศาสตร์ มหาวิทยาลัยเชียงใหม่
- ข้อเสนอโครงการ “บทบาทของสภาพครัวเรือนต่อการพัฒนาคุณภาพกำลังแรงงงานในอนาคตของสังคมสูงวัย” โดย ดร.เนื้อแพร เล็กเฟื่องฟู คณะเศรษฐศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย และ ดร.ธัญมัชฌ สรุงบุญมี คณะเศรษฐศาสตร์ มหาวิทยาลัยขอนแก่น

การจัดประชุมครั้งนี้จัดขึ้นเพื่อรับฟังข้อคิดเห็นและข้อเสนอแนะจากผู้ทรงคุณวุฒิที่มีต่อการดำเนินงานของโครงการในระยะเวลา 6 เดือนแรก เพื่อนำไปปรับปรุงแก้ไขสำหรับการดำเนินงานของโครงการในระยะถัดไป และเพื่อรับฟังข้อคิดเห็นและข้อเสนอแนะที่มีต่อข้อเสนอโครงการที่อยู่ระหว่างการพัฒนาภายใต้ชุดโครงการฯ

2.2.4 การจัดสัมมนาวิชาการระดับนานาชาติ หัวข้อ “Finance and Development: Data, Research, and Policy Design” ระหว่างวันที่ 8-9 มิถุนายน 2560 ณ ห้องประชุมภัทรรวมใจ อาคาร 2 ชั้น 2 ธนาคารแห่งประเทศไทย

สถาบันวิจัยเศรษฐกิจป๋วย อึ๊งภากรณ์ ธนาคารแห่งประเทศไทย ร่วมกับ สำนักงานกองทุนสนับสนุนการวิจัย มหาวิทยาลัยหอการค้าไทย และ Massachusetts Institute of Technology ได้จัดงานสัมมนาวิชาการระดับนานาชาติ ในหัวข้อ “Finance and Development: Data, Research, and Policy Design” ระหว่างวันที่ 8 - 9 มิถุนายน 2560 ณ ห้องประชุมภัทรรวมใจ อาคาร 2 ชั้น 2 ธนาคารแห่งประเทศไทย โดยมีวัตถุประสงค์เพื่อนำเสนอผลงานวิจัยและแนวคิดของนักวิจัยชั้นนำทั้งในและต่างประเทศ ในประเด็นที่เกี่ยวข้องกับการพัฒนาเศรษฐกิจและบทบาทของภาคการเงิน โดยเน้นถึงความสำคัญของการเก็บข้อมูลสำหรับงานวิจัยด้านเศรษฐศาสตร์และสังคม ซึ่งจะมีส่วนช่วยให้ผู้กำหนดนโยบายสามารถออกแบบนโยบายได้อย่างมีประสิทธิภาพ ซึ่งมีกำหนดการดังต่อไปนี้

June 8, 2017

8.30-9.00 Registration

9.00-9.15 Welcoming Remarks
by Veerathai Santiprabhob, Governor of the Bank of Thailand

9.15-9.25 Opening Remarks
by Patamawadee Pochanukul, Associate Director of Research Strategy of the Thai Research Fund

Session 1: Measuring Household and SME Finance

9.25-9.35 Session Opening Remarks

by Sauwanee Thairungroj, President of University of the Thai Chamber of Commerce

9.35-10.15 Chronicles from the Field: 20th Anniversary of the Thai Family Research Project and Townsend Thai Data

Robert Townsend, Massachusetts Institute of Technology

Sombat Sakunthasathien, Thai Family Research Project

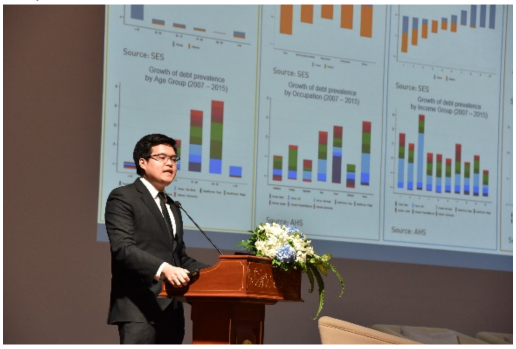
10.15-10.30 Coffee Break

10.30-10.55 Application of Townsend Thai Data: Case Studies

Naraphong Srivisal, Chulalongkorn University

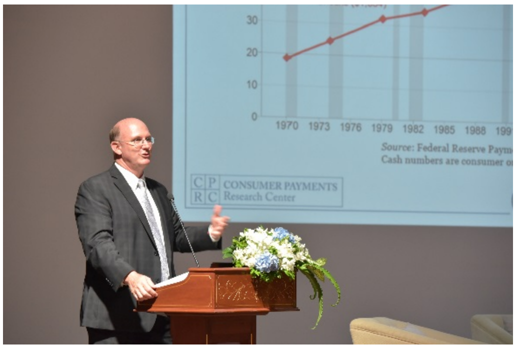
10.55-11.20 Measuring Household Finance in Thailand

Suparit Suwanik, Bank of Thailand



11.20-12.00 Payment Diaries: Innovative Measurement of Household Behavior

Scott Schuh, Federal Reserve Bank of Boston



12.00-12.30 Panel Discussion Moderator:

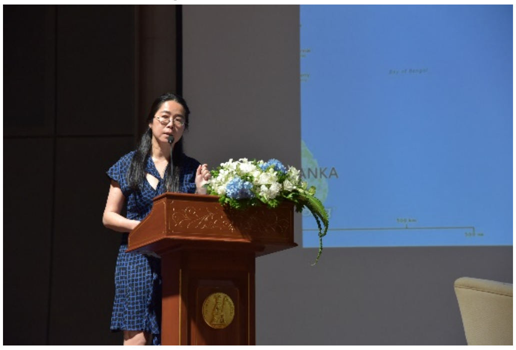
Krislert Samphantharak, University of California, San Diego

12.30-13.45 Lunch

Session 2: Harnessing Geographic Data for Finance and Policy

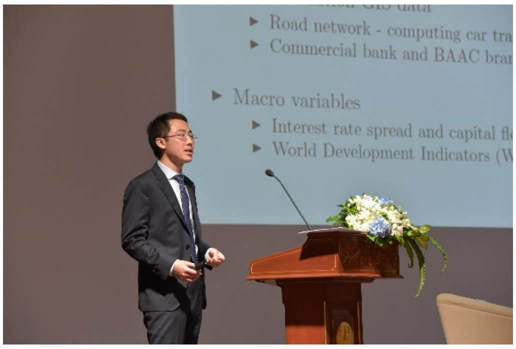
13.45-14.15 Geographic Data Visualization

Xiaowen Yang, Massachusetts Institute of Technology



14.15-14.45 Bank Branch Expansion vs International Capital Flows: Integrating Local Spatial Markets with Macro Aggregates

Yan Ji, Hong Kong University of Science and Technology



14.45-15.00 Coffee Break

15.00-15.30 The Geography of Household Finance in Thailand: Access, Vulnerability And Policy Responses

Sommarat Chantarat, Bank of Thailand

15.30-16.00 Panel Discussion Moderator:

Yunyong Thaicharoen, Bank of Thailand

June 9, 2017

Session 3: Research-Based Policy Design

9.00-9.40 Child Development: The Role of Parenting Beliefs

Flávio Cunha, Rice University

9.40-10.20 From Perry Preschool to RIECE Thailand: A Research-Based Large-Scale Implementation

Weerachart Kilenthong, University of the Thai Chamber of Commerce

10.20-10.35 Coffee Break

10.35-11.15 The Use of Data for Policy and Research at Central Banks: Perspectives from Financial Markets at the New York Fed

Antoine Martin, Federal Reserve Bank of New York

11.15-11.45 Panel Discussion Moderator:

Piti Disyatat, Bank of Thailand

11.45-12.30 Financial System Design: Principles for Policy and Regulation

Robert Townsend, Massachusetts Institute of Technology

12.30-13.30 Lunch

การจัดสัมมนาวิชาการระดับนานาชาติในครั้งนี้ได้รับทุนสนับสนุนค่าใช้จ่ายจากสำนักงานกองทุนสนับสนุนการวิจัย, สถาบันวิจัยเศรษฐกิจป๋วย อึ๊งภากรณ์ ธนาคารแห่งประเทศไทย และมหาวิทยาลัยหอการค้าไทย โดยมีรายการค่าใช้จ่ายที่เกิดขึ้นจากการดำเนินการ ตามรายละเอียดดังต่อไปนี้

หมวดค่าใช้จ่ายอื่น (งวด จ.)

International Conference “Finance and Development: Data, Research, and Policy Design”

ตารางที่ 2.3 : ตารางประมาณการณ์ค่าใช้จ่ายสำหรับ International Conference วันที่ 8-9 มิ.ย. 2560

	รายการ	**จำนวน (สกว.)**	**จำนวน (ธปท.)**
1.	ค่าตอบแทน International speakers 5 ท่าน x 10,000 บาท/ท่าน	50,000.00	-
2.	ค่าตอบแทนผู้ช่วยงาน จำนวน 5 คน x 300 บาท x 2 วัน	3,000.00	-
3.	ค่าตั๋วเครื่องบินไป-กลับ International speakers (ชั้นประหยัด) 5 ท่าน x 50,000 บาท	250,000.00	850,000.00
4.	ค่าเดินทางคุณสมบัติ และทีมงาน Thai Family Research Project 2 วัน x 1,000 บาท	2,000.00	-
5.	ค่าที่พัก international speakers 5 ท่าน x 4 คืน x 4,500 บาท และ ค่าที่พักคุณสมบัติ 1 ท่าน x 2 คืน x 2,000 บาท	94,000.00	20,400.00
6.	ค่าเอกสารประกอบ 200 ชุด x 100 บาท	20,000.00	-
7.	ค่าอาหารว่างสำหรับผู้เข้าร่วม 200 คน x 2 มื้อ x 2 วัน x 100 บาท	80,000.00	-
8.	ค่าอาหารกลางวันสำหรับผู้เข้าร่วม 200 คน x 1 มื้อ x 2 วัน x 300 บาท	120,000.00	-
9.	ค่าอาหารกลางวันสำหรับผู้ช่วยงาน จำนวน 5 คน x 2 วัน x 300 บาท	3,000.00	-
10.	ค่าของที่ระลึก สำหรับ International speakers และวิทยากรไทย จำนวน 10 คน x 1,000 บาท	10,000.00	-
	รวม	**632,000.00**	**870,400.00**

หมายเหตุ: ธนาคารแห่งประเทศไทย จะดูแลค่าเดินทางของวิทยากรชาวต่างประเทศและส่วนต่างค่าที่พัก นอกเหนือจากงบประมาณงวด จ. ที่ได้รับจาก สกว. ซึ่งมีค่าใช้จ่ายรวมประมาณ 870,400 บาท โดยแบ่งเป็นค่าเดินทาง 850,000 บาท และ ค่าที่พัก 20,400 บาท ตามรายละเอียด ดังนี้

ค่าใช้จ่ายที่เกิดขึ้นจริง

International Conference “Finance and Development: Data, Research, and Policy Design”

ตารางที่ 2.4 : ตารางค่าใช้จ่ายที่เกิดขึ้นจริงสำหรับ International Conference วันที่ 8-9 มิ.ย. 2560

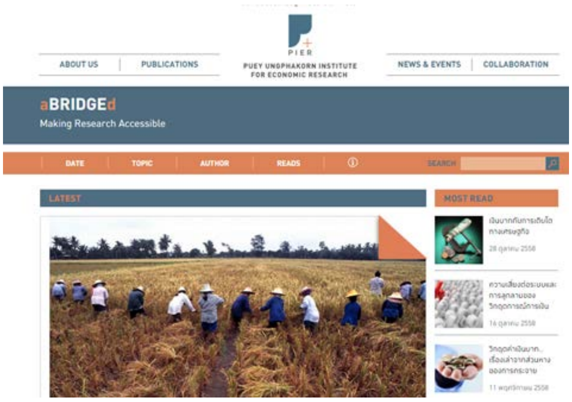
รายการ	**จำนวน**	**จ่ายจริง**	**คงเหลือ**
1. ค่าตอบแทน International speakers 5 ท่าน x 10,000 บาท/ท่าน	50,000.00	30,000.00	20,000.00
2. ค่าตอบแทนผู้ช่วยงาน จำนวน 5 คน x 300 บาท x 2 วัน	3,000.00	3,000.00	-
3. ค่าตั๋วเครื่องบินไป-กลับ International speakers	250,000.00	230,216.93	19,783.07
4. ค่าเดินทางคุณสมบัติ และทีมงาน Thai Family Research Project จำนวน 2 วัน x 1,000 บาท	2,000.00	2,000.00	-
5. ค่าที่พัก international speakers 5 ท่าน x 4 คืน x 4,500 บาท และ ค่าที่พักคุณสมบัติ 1 ท่าน x 2 คืน x 2,000 บาท	94,000.00	94,000.00	-
6. ค่าเอกสารประกอบ 200 ชุด x 100 บาท	20,000.00	20,000.00	-
รวมค่าอาหาร (7+8+9)	**203,000.00**	**185,797.00**	**17,203.00**
7. ค่าอาหารว่างสำหรับผู้เข้าร่วม 200 คน x 2 มื้อ x 2 วัน x 100 บาท	80,000.00		
8. ค่าอาหารกลางวันสำหรับผู้เข้าร่วม 200 คน x 1 มื้อ x 2 วัน x 300 บาท	120,000.00		
9. ค่าอาหารกลางวันสำหรับผู้ช่วยงาน จำนวน 5 คน x 2 วัน x 300 บาท	3,000.00		
10. ค่าของที่ระลึก สำหรับ International speakers และวิทยากรไทย จำนวน 10 คน x 1,000 บาท	10,000.00	7,750.00	2,250.00
รวม	**632,000.00**	**572,763.93**	**59,236.07**

นอกจากการจัดกิจกรรมต่าง ๆ ดังกล่าวแล้วนั้น ชุดโครงการฯ ยังให้ความร่วมมือกับฝ่ายประชาสัมพันธ์ สกว. ในการเผยแพร่ผลงานวิจัยเพื่อการผลักดันสู่การใช้ประโยชน์ จากกิจกรรมต่อไปนี้

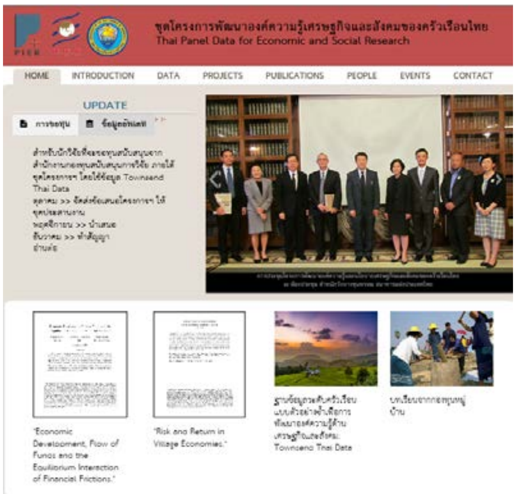
2.2.5 การเผยแพร่ผลงานวิจัยในชุดโครงการ “พัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย”

- PIER Discussion Paper

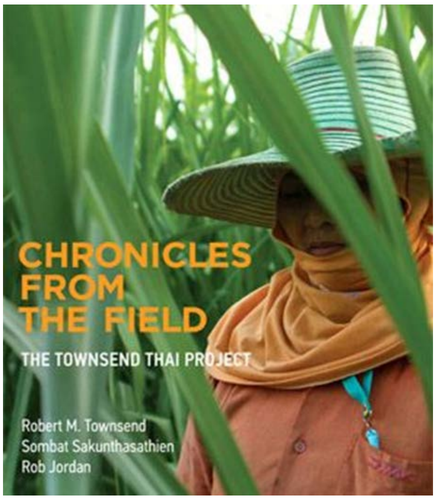
- aBridge Article



- เว็บไซต์สำหรับชุดโครงการฯ http://riped.utcc.ac.th/panel/



- หนังสือ http://riped.utcc.ac.th/projects



2.3 กิจกรรมที่จัดขึ้นตามกรอบภารกิจรอง

2.3.1 การพัฒนาฐานข้อมูลและระบบฐานข้อมูลเพื่อการวิจัยและพัฒนาในสำนักประสานงาน

ชุดโครงการ “พัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย” ได้จัดทำเว็บไซต์ของชุดโครงการฯ ซึ่งถือเป็นช่องทางหลักในการเผยแพร่ประชาสัมพันธ์ฐานข้อมูลภายใต้ชุดโครงการฯ ให้แก่นักวิจัยและบุคคลทั่วไปที่สนใจใช้ประโยชน์จากข้อมูล Townsend Thai Data โดยมีสถิติการขอใช้ข้อมูล ดังนี้

ตารางที่ 2.5: ตารางสถิติการขอใช้ข้อมูลจาก FEDR: http://riped.utcc.ac.th/fedr

ข้อมูล	ปี	ผู้ขอใช้ข้อมูล ปี 2560	ผู้ขอใช้ข้อมูล ปี 2559	ผู้ขอใช้ข้อมูล ปี 2558
Townsend Thai Annual Data (Rural Survey)	1997-2015	21 คน	11 คน	4 คน
Townsend Thai Annual Data (Urban Survey)	2005-2015			
Townsend Thai Monthly Data	เดือนที่ 1-196			
Monthly Survey Household Financial Accounting	เดือนที่ 0-160	21 คน	3 คน	-
Monthly Survey Household Financial Accounting	เดือนที่ 0-172	2 คน	-	-

*ผู้ที่ขอใช้ข้อมูล นับเฉพาะผู้ที่ไม่เกี่ยวข้องกับชุดโครงการฯ

นอกจากนี้ ทางชุดโครงการฯ ยังได้ประสานกับหน่วยงานภาคราชการ และสถาบันวิจัยภาครัฐและเอกชน ในส่วนที่เกี่ยวข้องกับการดำเนินงานของโครงการและฝ่ายที่เกี่ยวข้อง เพื่อเพิ่มองค์ความรู้ทางด้านเศรษฐศาสตร์และเศรษฐกิจของประเทศ รวมทั้งส่งเสริมให้นักวิจัยที่มีความรู้ความสามารถได้มีโอกาสผลิตผลงานวิจัยที่มีคุณภาพ ซึ่งได้รับความร่วมมือจากสถาบันวิจัยเศรษฐกิจป๋วย อึ๊งภากรณ์ ธนาคารแห่งประเทศไทย ที่ให้การสนับสนุนทุนวิจัยจำนวนหนึ่ง โดยจะเน้นโครงการวิจัยที่สร้างองค์ความรู้เกี่ยวกับเศรษฐกิจไทย และเป็นประโยชน์ต่อการดำเนินนโยบายสาธารณะ ปัจจุบันสถาบันวิจัยป๋วยฯ ร่วมกับสำนักงานกองทุนสนับสนุนงานวิจัย ได้ให้การสนับสนุน โครงการประสานงานชุดโครงการ “พัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย” ซึ่งเป็นโครงการที่สนับสนุนการสร้างและประยุกต์ใช้ข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำ (household panel data) เพื่อเป็นพื้นฐานในการศึกษาประเด็นต่าง ๆ เกี่ยวกับการเงินภาคประชาชน รวมทั้ง ปัญหา

ความเหลื่อมล้ำและความยากจน ซึ่งล้วนแล้วเป็นประเด็นที่มีความสำคัญต่อการพัฒนาประเทศทั้งในด้านเศรษฐกิจและสังคม

2.4 รายละเอียดผลการดำเนินงานของชุดโครงการตามแผนงานโดยสรุป

ตารางที่ 2.6: ตารางการดำเนินงานตามกิจกรรมของชุดโครงการฯ

กิจกรรม	วัน/เดือน/ปี	ผลที่คาดว่าจะได้รับ	ผลการดำเนินงาน
1. การประชุมการนำเสนอรายงานความก้าวหน้าและข้อเสนอโครงการภายใต้ชุดโครงการ “พัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย” ครั้งที่ 2 ต่อคณะกรรมการกำกับทิศทางการวิจัยชุดโครงการพัฒนาองค์ความรู้และนโยบายเศรษฐกิจและสังคมของครัวเรือนไทย ณ ห้องประชุม 1 ชั้น 14 สำนักงานกองทุนสนับสนุนการวิจัย	20 มกราคม 2560	1. ข้อคิดเห็นและข้อเสนอแนะจากผู้ทรงคุณวุฒิที่มีต่อการดำเนินงานของโครงการในระยะเวลา 12 เดือนเพื่อนำไปปรับปรุงแก้ไขสำหรับการดำเนินงานของโครงการในระยะถัดไป 2. ข้อคิดเห็นและข้อเสนอแนะที่มีต่อรายงานฉบับสมบูรณ์ของโครงการที่เพิ่งเสร็จสิ้นไป	1. การจัดทำแผนการดำเนินงานในระยะต่อไปของชุดโครงการฯ 2. การจัดทำรายงานฉบับสมบูรณ์โครงการ “ฐานข้อมูลบัญชีครัวเรือนเพื่อการวิจัยด้านเศรษฐกิจและสังคม” และ โครงการ “การศึกษาการค้าระดับหมู่บ้านในไทยโดยใช้แบบจำลองการเลือกอาชีพที่มีความไม่สมบูรณ์ของตลาดการเงิน”
2. การจัดการอบรมการใช้ Townsend Thai Micro Data ครั้งที่ 1 ณ ห้องประชุมศูนย์วิจัยมหาวิทยาลัยชิคาโก-มหาวิทยาลัยหอการค้าไทย (UC-UTCC Research Center) อาคาร 21 ชั้น 7 มหาวิทยาลัยหอการค้าไทย	6 กุมภาพันธ์ 2560	นักวิจัยมีความรู้ความเข้าใจและสามารถนำข้อมูล Townsend Thai Monthly Micro Data และบัญชีครัวเรือนที่จัดทำขึ้นจากฐานข้อมูลดังกล่าวภายใต้โครงการฐานข้อมูลบัญชีครัวเรือนเพื่อการวิจัยด้านเศรษฐกิจและสังคมไปใช้ในงานวิจัยและพัฒนานโยบายได้อย่างถูกต้องมากยิ่งขึ้น	การจัดอบรมดังกล่าวได้รับความสนใจจากนักวิจัยและผู้ที่เคยขอใช้ข้อมูล รวมทั้งสิ้น 27 ท่าน ซึ่งจะช่วยให้ผู้ที่เข้าร่วมอบรมสามารถนำข้อมูล Townsend Thai Monthly Micro Data และบัญชีครัวเรือนไปใช้พัฒนางานวิจัยได้อย่างถูกต้อง

กิจกรรม	วัน/เดือน/ปี	ผลที่คาดว่าจะได้รับ	ผลการดำเนินงาน
3. การประชุมการนำเสนอรายงานความก้าวหน้าและข้อเสนอโครงการภายใต้ชุดโครงการ "พัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย" ต่อคณะกรรมการกำกับทิศทางการวิจัยชุดโครงการพัฒนาองค์ความรู้และนโยบายเศรษฐกิจและสังคมของครัวเรือนไทย ครั้งที่ 3 ณ ห้องประชุม 1 ชั้น 15 สำนักงานกองทุนสนับสนุนการวิจัย	3 พฤษภาคม 2560	1. ข้อคิดเห็นและข้อเสนอแนะจากผู้ทรงคุณวุฒิที่มีต่อการดำเนินงานของโครงการในระยะเวลา 6 เดือนแรกเพื่อนำไปปรับปรุงแก้ไขสำหรับการดำเนินงานของโครงการในระยะถัดไป 2. ข้อคิดเห็นและข้อเสนอแนะที่มีต่อข้อเสนอโครงการที่กำลังจะขึ้นสัญญาภายใต้ชุดโครงการฯ	1.ข้อคิดเห็นและข้อเสนอแนะต่อโครงการ "การเปลี่ยนแปลงของความยากจนในชนบทไทย" และโครงการ "การจัดทำฐานข้อมูลแบบตัวอย่างซ้ำจากข้อมูลภาวะการทำงานของประชากร" ในระยะ 6 เดือนแรก เพื่อนำไปปรับปรุงการดำเนินงานในระยะถัดไปและการจัดทำรายงานฉบับสมบูรณ์ 2. ข้อคิดเห็นและข้อเสนอแนะต่อข้อเสนอโครงการเรื่อง "บทบาทของสภาพครัวเรือนต่อการพัฒนาคุณภาพกำลังแรงงานในอนาคตของสังคมสูงวัย" และข้อเสนอโครงการเรื่อง "การเปลี่ยนแปลงโครงสร้างการผลิตด้านการเกษตรของครัวเรือนในชนบท: บทเรียนจากข้อมูล Townsend Thai Data" เพื่อนำไปปรับปรุงก่อนการดำเนินงานและขึ้นสัญญาภายใต้ชุดโครงการฯ

กิจกรรม	วัน/เดือน/ปี	ผลที่คาดว่าจะได้รับ	ผลการดำเนินงาน
4. การจัดสัมมนาวิชาการระดับนานาชาติ หัวข้อ “Finance and Development: Data, Research, and Policy Design” ณ ห้องประชุมภัทรรวมใจ อาคาร 2 ชั้น 2 ธนาคารแห่งประเทศไทย	8-9 มิถุนายน 2560	แนวคิดของนักวิจัยชั้นนำทั้งในและต่างประเทศ ในประเด็นที่เกี่ยวข้องกับการพัฒนาเศรษฐกิจและบทบาทของภาคการเงิน โดยเน้นถึงความสำคัญของการเก็บข้อมูลสำหรับงานวิจัยด้านเศรษฐศาสตร์และสังคม ซึ่งจะมีส่วนช่วยให้ผู้กำหนดนโยบายสามารถออกแบบนโยบายได้อย่างมีประสิทธิภาพ	การจัดสัมมนาในครั้งนี้ได้รับความสนใจจากนักวิจัย บุคลากรและผู้ที่เกี่ยวข้องจากทั้งหน่วยงานภาครัฐและเอกชนรวมทั้งสิ้นประมาณ 200 กว่าท่าน ซึ่งก่อให้เกิดการสร้างเครือข่ายระหว่างนักวิจัยทั้งในและต่างประเทศเพื่อร่วมกันระดมความคิดเห็นและพัฒนาผลงานวิจัยในประเด็นที่เกี่ยวกับการพัฒนาเศรษฐกิจและบทบาทของภาคการเงิน
5. การประชุมผู้ประสานงานฝ่ายชุมชนและสังคม สกว. ประจำปี 2560	9 ตุลาคม 2560	เพื่อเป็นกรอบแนวทางในการบริหารจัดการทุนวิจัย และการบริหารองค์กรให้ตอบสนองต่อทิศทางการพัฒนาประเทศและสอดคล้องกับยุทธศาสตร์ชาติ 20 ปี	1. สร้างองค์ความรู้เกี่ยวกับการเปลี่ยนแปลงทางสังคม 2. สนับสนุนสร้างความคุ้มครองทางสังคม (social protection) ไม่ให้คนตกเข้าสู่ความยากจนและลดความเหลื่อมล้ำ 3. มุ่งหนุนเสริมการสร้างประสิทธิภาพของกลุ่ม องค์กร ที่ทำงานมิติเศรษฐกิจและสังคมเพื่อเพิ่มขีดความสามารถในการจัดการสังคมอย่างยั่งยืน และปรับเงื่อนไขเชิงโครงสร้างที่กดทับการพัฒาของชุมชนและท้องถิ่น

กิจกรรม	วัน/เดือน/ปี	ผลที่คาดว่าจะได้รับ	ผลการดำเนินงาน
6. การจัดการอบรมการใช้ Townsend Thai Micro Data ครั้งที่ 2 ณ ห้องประชุมศูนย์วิจัยมหาวิทยาลัยชิคาโก-มหาวิทยาลัยหอการค้าไทย (UC-UTCC Research Center) อาคาร 21 ชั้น 7 มหาวิทยาลัยหอการค้าไทย	26 ธันวาคม 2560	นักวิจัยมีความรู้ความเข้าใจและสามารถนำข้อมูล Townsend Thai Monthly Micro Data และบัญชีครัวเรือนที่จัดทำขึ้นจากฐานข้อมูลดังกล่าวภายใต้โครงการฐานข้อมูลบัญชีครัวเรือนเพื่อการวิจัยด้านเศรษฐกิจและสังคมไปใช้ในงานวิจัยและพัฒนานโยบายได้อย่างถูกต้องมากยิ่งขึ้น	การจัดอบรมดังกล่าวได้รับความสนใจจากนักวิจัยและผู้ที่เคยขอใช้ข้อมูล รวมทั้งสิ้น 11 ท่าน ซึ่งจะช่วยให้ผู้ที่เข้าร่วมอบรมสามารถนำข้อมูล Townsend Thai Monthly Micro Data และบัญชีครัวเรือนไปใช้พัฒนางานวิจัยได้อย่างถูกต้อง

2.5 สรุปงานเชิงปริมาณ

1. การเดินทางไปเจรจาเรื่องการร่วมทุนวิจัย
   - ยังไม่มีการดำเนินการในรอบ 12 เดือน
2. การเดินทางไปพบนักวิจัย เพื่อประสานงานให้ทำ proposal 4 ครั้ง
   - ครั้งที่ 1 ข้อเสนอภายใต้ชุดโครงการฯ โดย ดร.เนื้อแพร เล็กเฟื่องฟู (ขึ้นโครงการแล้ว)
   - ครั้งที่ 2 ข้อเสนอภายใต้ชุดโครงการฯ โดย ดร.เชาวนา เพชรรัตน์ (ขึ้นโครงการแล้ว)
   - ครั้งที่ 3 ข้อเสนอภายใต้ชุดโครงการฯ โดย ดร.นราพงศ์ ศรีวิศาล
   - ครั้งที่ 4 ข้อเสนอภายใต้ชุดโครงการฯ โดย ดร.ลลิตา จันทรวงศ์ไพศาล
3. การประชาสัมพันธ์รูปแบบอื่น 2 ครั้ง
   - การจัดการอบรมการใช้ Townsend Thai Micro Data ครั้งที่ 1 และ 2 ณ ห้องประชุมศูนย์วิจัยมหาวิทยาลัยชิคาโก-มหาวิทยาลัยหอการค้าไทย (UC-UTCC Research Center) อาคาร 21 ชั้น 7 มหาวิทยาลัยหอการค้าไทย
4. การประชุมร่วมติดตามความก้าวหน้า 2 ครั้ง
   - ครั้งที่ 1 การประชุมการนำเสนอรายงานความก้าวหน้าและข้อเสนอโครงการภายใต้ชุดโครงการ “พัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย” ครั้งที่ 2 ต่อคณะกรรมการกำกับทิศทางการวิจัยชุดโครงการพัฒนาองค์ความรู้และนโยบายเศรษฐกิจและสังคมของครัวเรือนไทย ณ ห้องประชุม 1 ชั้น 14 สำนักงานกองทุนสนับสนุนการวิจัย
   - ครั้งที่ 2 การประชุมการนำเสนอรายงานความก้าวหน้าและข้อเสนอโครงการภายใต้ชุดโครงการ “พัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย” ครั้งที่ 3 ณ ห้องประชุม 1 ชั้น 15 สำนักงานกองทุนสนับสนุนการวิจัย
5. ให้คำปรึกษาหารือกับนักวิจัย 6 ครั้ง
   - ครั้งที่ 1 การจัดทำข้อเสนอโครงการ “บทบาทของสภาพครัวเรือนต่อการพัฒนาคุณภาพกำลังแรงงานในอนาคตของสังคมสูงวัย”
   - ครั้งที่ 2 การจัดทำข้อเสนอโครงการ “การเปลี่ยนแปลงโครงสร้างการผลิตด้านการเกษตรของครัวเรือนในชนบท: บทเรียนจากข้อมูล Townsend Thai Data”
   - ครั้งที่ 3 การจัดทำรายงานความก้าวหน้าและรายงานการเงินของโครงการ “ฐานข้อมูลบัญชีครัวเรือนเพื่อการวิจัยด้านเศรษฐกิจและสังคม” โครงการต่อเนื่องระยะที่ 2
   - ครั้งที่ 4 การจัดทำรายงานความก้าวหน้าโครงการ “บทบาทของสภาพครัวเรือนต่อการพัฒนาคุณภาพกำลังแรงงานในอนาคตของสังคมสูงวัย”
   - ครั้งที่ 5 การจัดทำรายงานความก้าวหน้าโครงการ “การเปลี่ยนแปลงโครงสร้างการผลิตด้านการเกษตรของครัวเรือนในชนบท: บทเรียนจากข้อมูล Townsend Thai Data”

- ครั้งที่ 6 การจัดทำรายงานฉบับสมบูรณ์ในโครงการ "ฐานข้อมูลบัญชีครัวเรือนเพื่อการวิจัยด้านเศรษฐกิจและสังคม" โครงการต่อเนื่องระยะที่ 2

6. เป็นตัวแทน สกว. ในการร่วมประชุมอื่น ๆ
   - ยังไม่มีการดำเนินการในรอบ 12 เดือนนี้
7. เขียน research exploitation
   - ยังไม่มีการดำเนินการในรอบ 12 เดือนนี้
8. Review ความเห็นผู้ทรงคุณวุฒิโครงการ 8 ท่าน
   - ดร.ปิติ ดิษยทัต
   - ดร.กฤษฎ์เลิศ สัมพันธารักษ์
   - ดร.ปัทมาวดี โพชนุกูล
   - ดร.อัจนา ไวความดี
   - คุณรัจนา เนตรแสงทิพย์
   - ดร.ภัททา เกิดเรือง
   - ดร.อนันต์ ภาวสุทธิไพศิฐ
   - ดร.นิพนธ์ พัวพงศกร
9. ร่วมประชุมกับฝ่าย
   - ประชุมผู้ประสานงานฝ่ายชุมชนและสังคม สกว. ประจำปี 2560 เมื่อวันจันทร์ที่ 9 ตุลาคม พ.ศ. 2560 เวลา 8.30 – 16.30 น. ณ ห้องโลตัส โรงแรมรามา การ์เด้นส์ กรุงเทพฯ
10. มีการปฏิบัติเพื่อให้เกิดการ implement ผลงานวิจัย
   - บทความเรื่อง "ข้อจำกัดด้านการกู้ยืมและการตัดสินใจเป็นผู้ประกอบการของครัวเรือนไทย", อาชว์ ปวีณวัฒน์, 2 มกราคม 2560, aBRIDGEd articles
   - บทความเรื่อง "อุปสรรคของการพัฒนาระบบประกันที่สมบูรณ์ในชุมชนชนบทของไทย", นราพงศ์ ศรีวิศาล, 30 มกราคม 2560, aBRIDGEd articles
   - บทความวิจัยจากโครงการ "แบบจำลองการเลือกอาชีพ ความไม่สมบูรณ์ของตลาดการเงิน และการค้าระหว่างหมู่บ้านในชนบทของประเทศไทย" โดย ดร.อาชว์ ปวีณวัฒน์
   - บทความวิจัยจากโครงการ "การเปลี่ยนแปลงของความยากจนในชนบทไทย กรณีศึกษา Townsend Thai Data" โดย ดร.อนันต์ ภาวสุทธิไพศิฐ
11. มีการเจรจาเกี่ยวกับทรัพย์สินทางปัญญา
   - ยังไม่มีการดำเนินการในรอบ 12 เดือนนี้
12. มีโครงการอยู่ระหว่างการพัฒนา (ที่เริ่มภายใน 12 เดือนนี้) 2 โครงการ
   - โครงการ "ฐานข้อมูลบัญชีครัวเรือนเพื่อการวิจัยด้านเศรษฐกิจและสังคม" ระยะที่ 2 ของ ดร.นราพงศ์ ศรีวิศาล
   - โครงการของ ดร.ลลิตา จันทรวงศ์ไพศาล

13. มีโครงการที่ได้เซ็นสัญญา (ภายใน 12 เดือนนี้) 3 โครงการ
    - โครงการ “การเปลี่ยนแปลงโครงสร้างการผลิตด้านการเกษตรของครัวเรือนในชนบท: บทเรียนจากข้อมูล Townsend Thai Data” โดย ดร.เชาวนา เพชรรัตน์
    - โครงการ “บทบาทของสภาพครัวเรือนต่อการพัฒนาคุณภาพกำลังแรงงงาน ในอนาคตของสังคมสูงวัย” โดย ดร.เนื้อแพร เล็กเฟื่องฟู
    - โครงการ “ฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำเพื่อการวิจัยด้านเศรษฐศาสตร์และสังคม” (ระยะที่ 3) โดย คุณสมบัติ ศกุนตะเสถียร
14. มีโครงการที่ล้มเลิกไม่อาจพัฒนาต่อได้ (ภายใน 12 เดือนนี้)
    - ไม่มี
15. มีโครงการที่ได้สิทธิบัตร
    - ไม่มี
16. ในรอบ 12 เดือนนี้ มีโครงการได้เซ็นสัญญา 3 โครงการ เป็นวงเงิน 12.5 ล้านบาท
    - โครงการ “การเปลี่ยนแปลงโครงสร้างการผลิตด้านการเกษตรของครัวเรือนในชนบท: บทเรียนจากข้อมูล Townsend Thai Data” โดย ดร.เชาวนา เพชรรัตน์ เป็นวงเงิน 456,500 บาท
    - โครงการ “บทบาทของสภาพครัวเรือนต่อการพัฒนาคุณภาพกำลังแรงงงาน ในอนาคตของสังคมสูงวัย” โดย ดร.เนื้อแพร เล็กเฟื่องฟู เป็นวงเงิน 599,500 บาท
    - โครงการ “ฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำเพื่อการวิจัยด้านเศรษฐศาสตร์และสังคม” (ระยะที่ 3) โดย คุณสมบัติ ศกุนตะเสถียร เป็นวงเงิน 11.5 ล้านบาท

บทที่ 3
ผลงานวิจัย

ภายใต้ชุดโครงการพัฒนาองค์ความรู้ด้านเศรษฐกิจและสังคมของครัวเรือนไทย นักวิจัยจำเป็นต้องอาศัยข้อมูลระดับครัวเรือน (แบบตัวอย่างซ้ำ) เพื่อศึกษาและวิเคราะห์การบริหารสินทรัพย์และความเสี่ยงของครัวเรือนไทยในชนบท (financial and risk management of Thai household) สังคมผู้สูงอายุ (aging society) โครงการสร้างอุตสาหกรรมของระบบการเงิน (industrial organization of Thai financial system) อุปสรรคและข้อจำกัดด้านการเงิน (financial constraints) ครัวเรือนและธุรกิจขนาดเล็ก ดังนั้น เราจึงจำเป็นต้องให้การสนับสนุนการสำรวจข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำรายเดือน (monthly micro data) ซึ่งจะเป็นฐานข้อมูลหลักในการศึกษาประเด็นต่าง ๆ ที่เกี่ยวข้อง ภายใต้ชุดโครงการฯ

โดยในปัจจุบัน ข้อมูลที่เปิดเผยและให้บริการต่อสาธารณะแล้วประกอบไปด้วย ข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำรายปีในเขตชนบท (rural annual data) ข้อมูลระดับครัวเรือนตัวอย่างซ้ำรายปีในเขตเมือง (urban annual data) และข้อมูลระดับครัวเรือนตัวอย่างซ้ำรายเดือน (monthly micro data)

1. ข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำรายปีในเขตชนบท (rural annual data) นับตั้งแต่ปี 1997 ถึง ปี 2015
2. ข้อมูลระดับครัวเรือนตัวอย่างซ้ำรายปีในเขตเมือง (urban annual data) นับตั้งแต่ปี 2005 ถึงปี 2015
3. ข้อมูลระดับครัวเรือนตัวอย่างซ้ำรายเดือน (monthly micro data) นับตั้งแต่ปี 1997 ถึงปี 2014
4. ข้อมูลบัญชีการเงินครัวเรือนตัวอย่างซ้ำรายเดือน (monthly survey household financial accounting) ตั้งแต่เดือนเริ่มต้นถึงเดือนที่ 160 (ปี 1997-2011)
5. ข้อมูลบัญชีการเงินครัวเรือนตัวอย่างซ้ำรายเดือน (monthly survey household financial accounting) ตั้งแต่เดือนเริ่มต้นถึงเดือนที่ 172 (ปี 1997-2012)

ซึ่งผู้ที่สนใจสามารถติดต่อขอข้อมูลได้โดยไม่มีค่าใช้จ่ายที่ http://riped.utcc.ac.th/data-services/fedr/ หรืออีเมล์ data@riped.utcc.ac.th

ตารางที่ 3.1: จำนวนครัวเรือนตัวอย่างซ้ำรายเดือนที่ถูกสัมภาษณ์ในรอบ 12 เดือนที่ผ่านมา

เดือน	ฉะเชิงเทรา	ลพบุรี	บุรีรัมย์	ศรีสะเกษ	รวม	เป้าหมาย	จำนวนครัวเรือนที่หายไปจากกลุ่มตัวอย่าง	จำนวนครัวเรือนทดแทน
สิงหาคม 59	161	177	171	161	670	638	0	0
กันยายน 59	161	177	171	161	670	638	0	0
ตุลาคม 59	161	177	171	161	670	638	0	0
พฤศจิกายน 59	161	177	171	161	670	638	0	0
ธันวาคม 59	161	177	171	161	670	638	0	0
มกราคม 60	161	177	171	161	670	638	0	0
กุมภาพนธ์ 60	161	177	171	161	670	638	0	0
มีนาคม 60	161	177	171	161	670	638	0	0
เมษายน 60	161	177	171	161	670	638	0	0
พฤษภาคม 60	161	177	171	161	670	638	0	0
มิถุนายน 60	161	177	171	161	670	638	0	0
กรกฎาคม 60	161	177	171	161	670	638	0	0

นอกจากข้อมูลระดับครัวเรือนตัวอย่างซ้ำรายเดือนที่เพิ่มขึ้นมาอีก 6 เดือนแล้ว ผลลัพธ์ที่ได้จากการประยุกต์ใช้ข้อมูล Townsend Thai Data ประกอบไปด้วยงานวิจัยและบทความทั้งหมด 8 ชิ้น ดังต่อไปนี้

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2. Samphantharak, Krislert and Robert M. Townsend. “Risk and Return in Village Economies.” revised 2017. (Forthcoming in American Economic Journal: Microeconomics).
3. Samphantharak, Krislert, Scott Schuh and Robert M. Townsend. "Integrated Household Surveys: An Assessment of U.S. Methods and an Innovation", Economic Inquiry, 12 October 2017.
4. Joseph P. Kaboski and Robert M. Townsend “The Impact of Credit on Village Economies.” American Economic Journal: Applied Economics 4(2), April 2012: 98-133.
5. Joseph Kaboski and Robert M. Townsend. “A Structural Evaluation of a Large-Scale Quasi-Experimental Microfinance Initiative.” Econometrica 79(5), September 2011: 1357-1406.
6. Adriana de la Huerta. “Microfinance in Rural and Urban Thailand: Policies, Social Ties and Successful Performance,” University of Chicago, 2011.

7. Joseph P. Kaboski and Robert M. Townsend. "Policies and Impact: An Evaluation of Village-Level Microfinance Institutions." Journal of the European Economic Association 3(1), January 2005: 1-50.
8. Archawa Paweenawat, "Occupational Choice, Financial Frictions, and Trade across Thai Villages", July 2017, working paper.

บทที่ 4
สถิติเบื้องต้นของการเปลี่ยนแปลงโครงสร้างประชากรและสภาพเศรษฐกิจของครัวเรือนไทยในชนบท

คณะผู้วิจัยได้จัดทำรายงานสถิติเบื้องต้นจากข้อมูล Household Financial Accounting ตั้งแต่ปี พ.ศ. 2542 – 2555 ที่สร้างมาจากข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำรายเดือน ซึ่งได้สะท้อนถึงการเปลี่ยนแปลงโครงสร้างและสภาพเศรษฐกิจของครัวเรือนไทยในชนบทในช่วง 14 ปีแรกของการเก็บข้อมูล ซึ่งได้แบ่งออกเป็น 2 ประเด็นหลัก ๆ คือ 1) การเปลี่ยนแปลงโครงสร้างของครัวเรือนไทยในชนบท 2) การเปลี่ยนแปลงสภาพเศรษฐกิจของครัวเรือนไทยในชนบท

4.1 การเปลี่ยนแปลงโครงสร้างของครัวเรือนไทยในชนบท

ที่ผ่านมาประเทศไทยยังขาดแคลนข้อมูลเชิงลึกระดับครัวเรือนในชนบท เพื่อศึกษาปัญหาในประเด็นต่าง ๆ อาทิเช่น การเปลี่ยนแปลงโครงสร้างประชากร ปัญหาความเหลื่อมล้ำและความยากจน การบริหารสินทรัพย์และความเสี่ยงของครัวเรือนในชนบท การติดตามปัญหาหนี้ครัวเรือนในชนบท อุปสรรคและข้อจำกัดด้านการเงินของครัวเรือนและธุรกิจขนาดเล็ก และปัญหาสังคมผู้สูงวัย เป็นต้น ดังนั้น Townsend Thai Monthly Micro Data จึงเป็นข้อมูลที่สามารถสะท้อนภาพของครัวเรือนไทยในชนบทได้อย่างชัดเจน อีกทั้งข้อมูลชุดนี้ยังมีการสำรวจอย่างต่อเนื่องและยาวนานที่สุดในประเทศไทย โดยเริ่มดำเนินการตั้งแต่ปี 2541 จนถึงปัจจุบัน ครอบคลุมพื้นที่ใน 4 จังหวัด ได้แก่ ฉะเชิงเทรา ลพบุรี บุรีรัมย์ และศรีสะเกษ

ในช่วง 20 ปีที่ผ่านมา หากพิจารณาโครงสร้างประชากรไทยจะพบว่า มีการเปลี่ยนแปลงจากเดิมไปมาก ประชากรไทยในอนาคตเพิ่มช้าลงไปเรื่อย ๆ ทำให้อัตราการเพิ่มขึ้นของประชากรลดลงดังตารางที่ 4.1

ตารางที่ 4.1: จำนวนประชากรไทย ตั้งแต่ปี พ.ศ. 2536 – 2559

ปี พ.ศ.	จำนวนประชากร (คน)	จำนวนการเกิด (คน)	% การเกิด	จำนวนการตาย (คน)	% การตาย
2536	58,336,072	983,964	1.69	277,499	0.48
2537	59,095,419	970,760	1.64	244,061	0.41
2538	59,460,382	928,956	1.56	298,468	0.50
2539	60,116,182	983,395	1.64	315,467	0.52
2540	60,816,227	880,028	1.45	279,090	0.46
2541	61,466,178	862,260	1.40	344,210	0.56
2542	61,661,701	774,349	1.26	315,550	0.51
2543	61,878,746	786,018	1.27	323,846	0.52
2544	62,308,887	766,107	1.23	323,108	0.52
2545	62,799,872	771,787	1.23	326,583	0.52

ปี พ.ศ.	จำนวนประชากร (คน)	จำนวนการเกิด (คน)	% การเกิด	จำนวนการตาย (คน)	% การตาย
2546	63,079,765	778,445	1.23	334,725	0.53
2547	61,973,621	822,575	1.33	363,647	0.59
2548	62,418,054	809,774	1.30	399,331	0.64
2549	62,828,706	802,924	1.28	392,044	0.62
2550	63,038,247	811,384	1.29	398,438	0.63
2551	63,389,730	797,356	1.26	401,981	0.63
2552	63,525,062	787,739	1.24	398,130	0.63
2553	63,878,267	766,370	1.20	414,888	0.65
2554	64,076,033	796,104	1.24	419,265	0.65
2555	64,456,695	818,901	1.27	423,213	0.66
2556	64,785,909	782,129	1.21	438,648	0.68
2557	65,124,716	776,370	1.19	448,601	0.69
2558	65,729,098	736,352	1.12	456,391	0.69
2559	65,931,550	704,058	1.07	480,434	0.73

ที่มา: สำนักการบริหารการทะเบียน กรมการปกครอง กระทรวงมหาดไทย ตั้งแต่ปี พ.ศ. 2536-2559

ในขณะที่จำนวนประชากรไทยกำลังเพิ่มขึ้นช้าลงนั้น ได้เกิดการเปลี่ยนแปลงโครงสร้างอายุของประชากร เมื่ออัตราการเกิดลดต่ำลงอย่างมากและผู้คนมีอายุยืนยาวขึ้นนั้น สังคมไทยจึงกำลังก้าวเข้าสู่สังคมผู้สูงอายุอย่างรวดเร็ว จากตารางที่ 4.2 จะเห็นว่าแนวโน้มของดัชนีผู้สูงอายุ หรืออัตราส่วนผู้สูงอายุต่อเด็ก 100 คน ตั้งแต่ปี พ.ศ. 2548 มีแนวโน้มที่เพิ่มขึ้นตลอดเวลา และในระหว่างปี พ.ศ. 2563 – 2564 เป็นช่วงเวลาที่ดัชนีผู้สูงอายุเท่ากับ 100 หมายความว่าช่วงเวลานี้ประเทศไทยมีประชากรวัยเด็กเท่า ๆ กับผู้สูงอายุ ซึ่งหลังจากปี พ.ศ. 2564 ไปแล้วประเทศไทยจะมีผู้สูงอายุมากกว่าเด็ก

ตารางที่ 4.2: ดัชนีผู้สูงอายุของประเทศไทย พ.ศ. 2548 – 2578

ปี พ.ศ.	ประชากร (ล้านคน)			ดัชนีผู้สูงอายุ (ผู้สูงอายุ/เด็ก 100 คน)
	ทั้งหมด	วัยเด็ก[1]	ผู้สูงอายุ[2]	
2548	62.2	14.3	6.4	45.0
2553	63.7	13.2	7.5	57.0
2558	64.6	12.3	9.0	73.4
2563	65.1	11.2	11.0	98.0
2564	65.2	11.0	11.3	103.2
2568	65.1	10.4	12.9	123.6
2573	64.5	9.8	14.6	149.9
2578	63.4	9.1	15.9	174.4

[1] ประชากรวัยเด็กคือประชากรอายุต่ำกว่า 15 ปี

[2] ประชากรสูงอายุคือประชากรอายุ 60 ปีขึ้นไป

หมายเหตุ: ดัชนีผู้สูงอายุของประเทศไทย พ.ศ. 2548 – 2578 จากสถาบันวิจัยประชากรและสังคม มหาวิทยาลัยมหิดล[3]

จากตารางที่ 4.1 ข้างต้น เมื่อพิจารณาอัตราการเกิดและอัตราการตายของประชากรไทยพบว่า อัตราการเกิดมีแนวโน้มลดลง ในขณะที่อัตราการตายมีแนวโน้มเพิ่มขึ้น ส่งผลให้ขนาดของครัวเรือนลดลง ดังตารางที่ 4.3 พบว่าขนาดของครัวเรือนไทยโดยเฉลี่ยมีแนวโน้มลดลงอย่างต่อเนื่อง จากครัวเรือนที่มีสมาชิกเฉลี่ย 6 คน ลดเหลือสมาชิกเพียง 3 คน

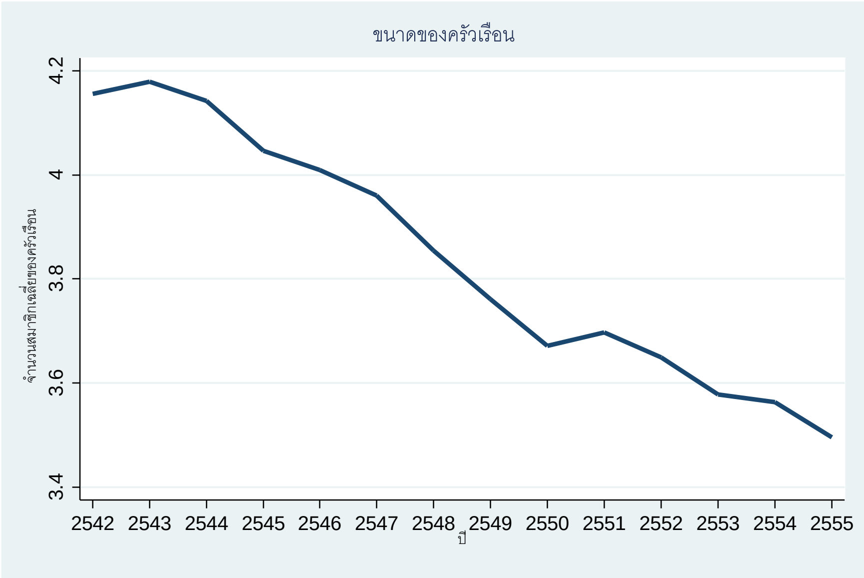
ตารางที่ 4.3: จำนวนประชากร ครัวเรือน และขนาดครัวเรือนเฉลี่ย พ.ศ. 2503 – 2553[4]

ปี พ.ศ.	ขนาดครัวเรือนเฉลี่ย (คน/ครัวเรือน)
2503	5.6
2513	5.7
2523	5.2
2533	4.4
2543	3.8
2553	3.2

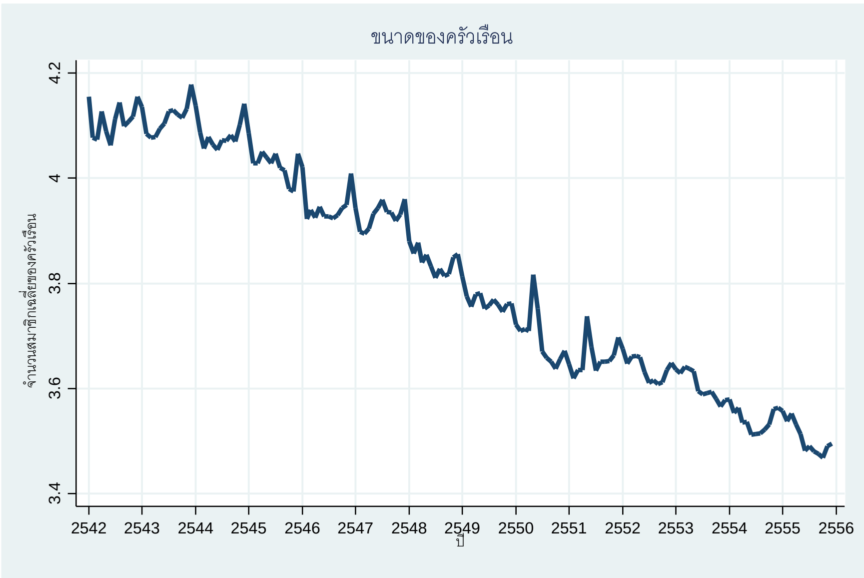
ที่มา: สำมะโนประชากรและเคหะ พ.ศ. 2503-2553 สำนักงานสถิติแห่งชาติ

จากข้อมูลข้างต้น สะท้อนให้เห็นว่า การเพิ่มขึ้นของประชากรเป็นการเพิ่มขึ้นอย่างช้า ๆ อัตราการเกิดลดลงและอัตราการตายเพิ่มขึ้น ส่งผลให้ขนาดของครัวเรือนลดลง ตามลำดับ ดังนั้นเมื่อพิจารณาขนาดของครัวเรือนผ่านข้อมูล Townsend Thai Monthly Micro Data พบว่า ขนาดของครัวเรือนไทยในชนบทลดลง ดังรูปที่ 4.1 และ 4.2 ตามลำดับ ซึ่งสอดคล้องกับข้อมูลในภาพรวมของประเทศ

[3] แหล่งที่มา : http://www.ipsr.mahidol.ac.th/IPSR/AnnualConference/ConferenceII/Article/Article02.htm
[4] แหล่งที่มา : http://www2.ipsr.mahidol.ac.th/newsletter/index.php/component/content/article/97-popdev-vol34-no5/218-50.html

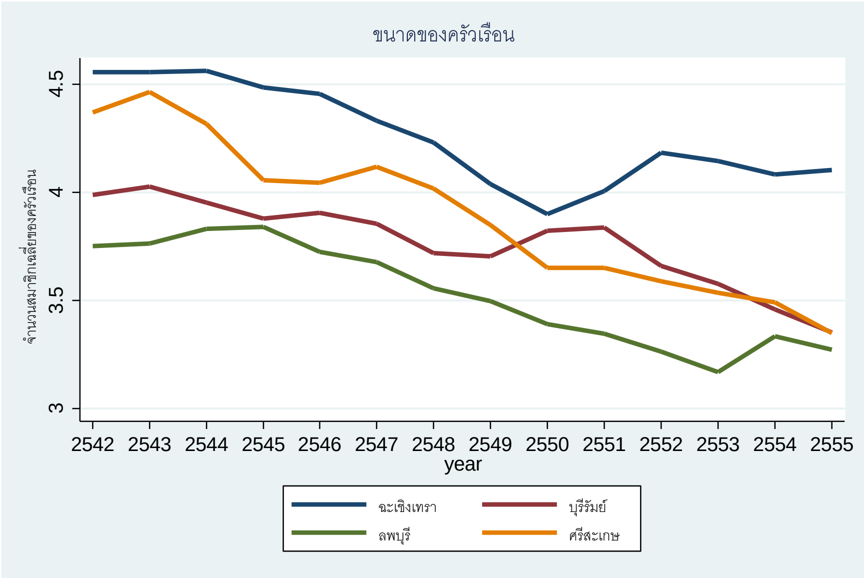


รูปที่ 4.1 : จำนวนสมาชิกเฉลี่ยของครัวเรือน ข้อมูลรายปี ตั้งแต่ปี พ.ศ. 2542-2555



รูปที่ 4.2 : จำนวนสมาชิกเฉลี่ยของครัวเรือน ข้อมูลรายเดือน ตั้งแต่ปี พ.ศ. 2542-2555

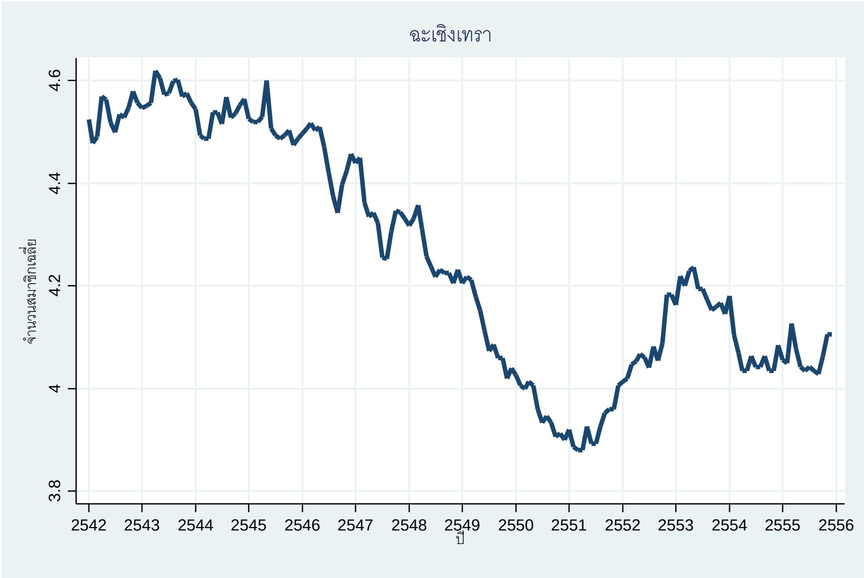
เมื่อพิจารณาขนาดของครัวเรือนแยกรายจังหวัดตามรูปที่ 4.3 พบว่า ทั้ง 4 จังหวัดมีขนาดของครัวเรือนลดลง โดยจังหวัดฉะเชิงเทรามีขนาดของครัวเรือนใหญ่ที่สุด รองลงมาคือจังหวัดศรีสะเกษ บุรีรัมย์ และลพบุรี ตามลำดับ



รูปที่ 4.3 : จำนวนสมาชิกเฉลี่ยของครัวเรือนแยกตามจังหวัด ข้อมูลรายปี ตั้งแต่ปี พ.ศ. 2542-2555

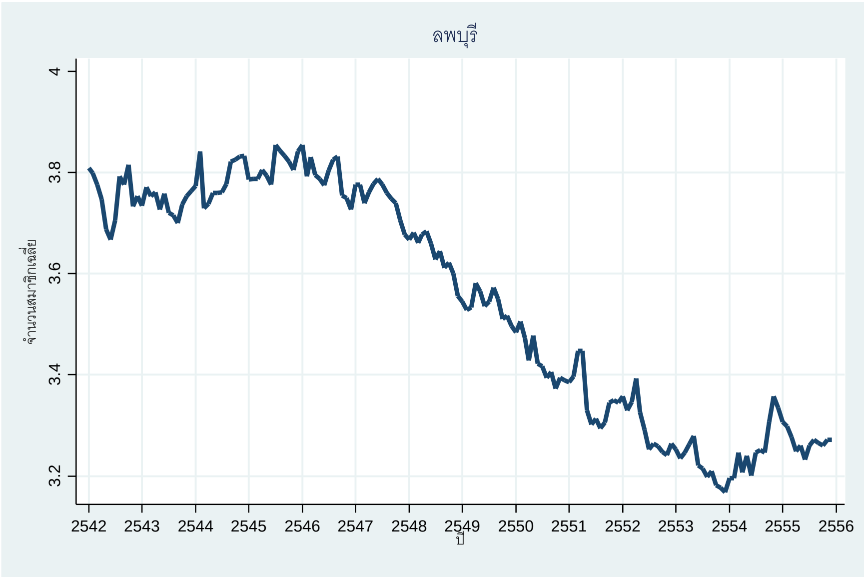
จากรูปที่ 4.4 จะเห็นได้ว่าขนาดของครัวเรือนในจังหวัดฉะเชิงเทรา มีแนวโน้มลดลงอย่างเห็นได้ชัดตั้งแต่ปี พ.ศ. 2547 และต่ำที่สุดในปี พ.ศ. 2550 อาจเนื่องมาจากชาวบ้านประสบปัญหาแม่น้ำบางปะกงเน่าเสีย ทำให้เกษตรกรผู้เลี้ยงกุ้ง เลี้ยงปลาเปลี่ยนอาชีพหรือมีการย้ายถิ่นฐาน หลังจากนั้นในปี พ.ศ. 2551 พบว่า ขนาดของครัวเรือนเพิ่มขึ้น สาเหตุหนึ่งอาจเนื่องมาจากกลุ่มบริษัทซีพีเอฟได้แนะนำเทคโนโลยีการเลี้ยงปลาทับทิม "ซีพีเอฟ เทอร์โบ โปรแกรม" ทำให้เกษตรกรตัดสินใจกลับมาเลี้ยงปลาอีกครั้ง[5]

[5] แหล่งที่มา : http://www.komchadluek.net/news/lifestyle/108288



รูปที่ 4.4 : จำนวนสมาชิกเฉลี่ยของครัวเรือนในจังหวัดฉะเชิงเทรา
ข้อมูลรายเดือน ตั้งแต่ปี พ.ศ. 2542-2555

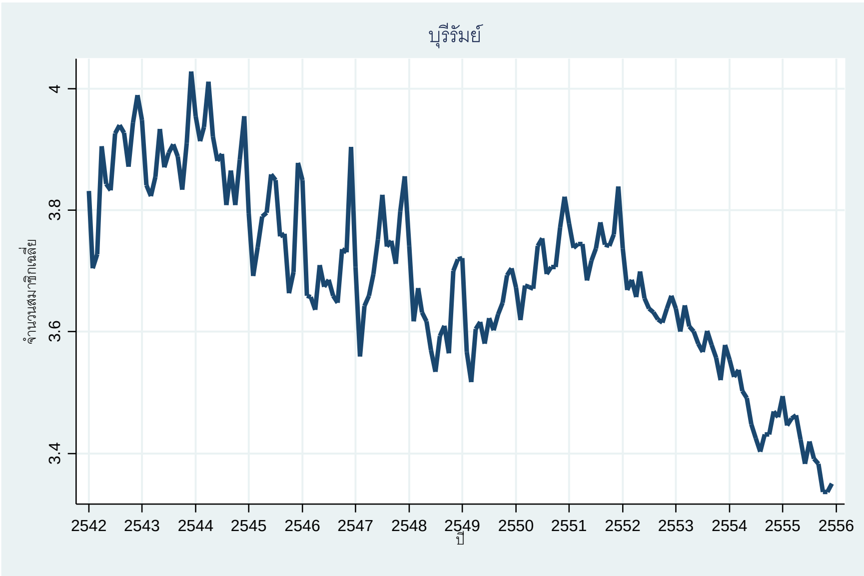
และจากรูปที่ 4.5 พบว่า ขนาดของครัวเรือนในจังหวัดลพบุรีลดต่ำสุดในปี พ.ศ. 2554 อาจเนื่องมาจากสถานการณ์น้ำท่วมจังหวัดลพบุรีในเดือนตุลาคม พ.ศ. 2554[6] ซึ่งทำให้สมาชิกครัวเรือนมีการย้ายถิ่นฐานไปอาศัยอยู่พื้นที่อื่น ๆ ก่อนชั่วคราว และกลับเข้ามาอีกครั้งในปี พ.ศ. 2555



รูปที่ 4.5 : จำนวนสมาชิกเฉลี่ยของครัวเรือนในจังหวัดลพบุรี
ข้อมูลรายเดือน ตั้งแต่ปี พ.ศ. 2542-2555

[6] แหล่งที่มา: http://oknation.nationtv.tv/blog/lopburiguide/2011/09/26/entry-1

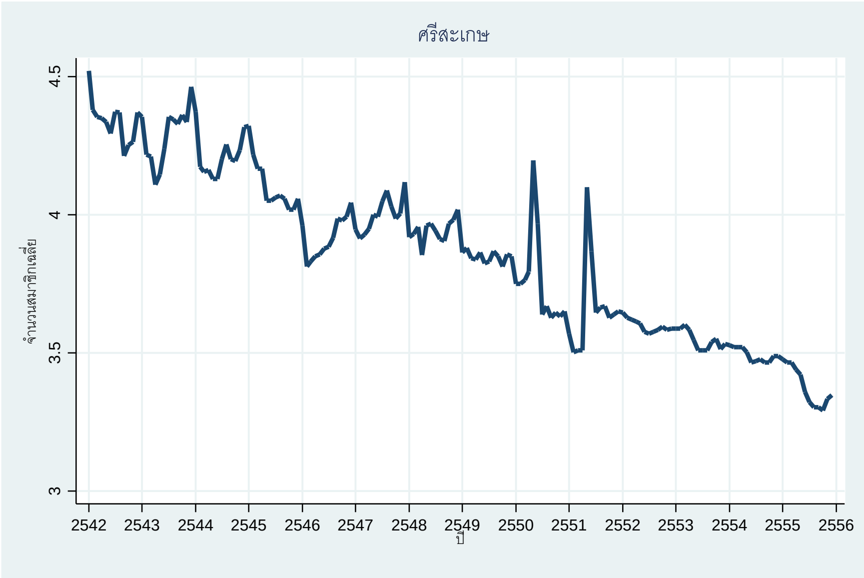
ตามรูปที่ 4.6 ขนาดครัวเรือนในจังหวัดบุรีรัมย์ลดต่ำลงในปี พ.ศ. 2550 อาจเนื่องมาจากประสบปัญหาภัยแล้ง และกลับมาเพิ่มขึ้นอย่างต่อเนื่องจนถึงปี พ.ศ. 2552 และลดลงในปี พ.ศ. 2553 เนื่องมาจากสถานการณ์น้ำท่วม 19 อำเภอ 121 ตำบล 1,198 หมู่บ้าน ทำให้นาข้าวได้รับความเสียหายกว่า 63,000 ไร่ ถนนถูกน้ำท่วมเสียหาย 233 สาย บ่อปลา 88 บ่อ สะพานและท่อระบายน้ำได้รับความเสียหาย 17 แห่ง มีผู้เสียชีวิต 6 ราย ราษฎรได้รับความเดือดร้อน 30,549 ครัวเรือน 142,419 คน[7]



รูปที่ 4.6 : จำนวนสมาชิกเฉลี่ยของครัวเรือนในจังหวัดบุรีรัมย์
ข้อมูลรายเดือน ตั้งแต่ปี พ.ศ. 2542-2555

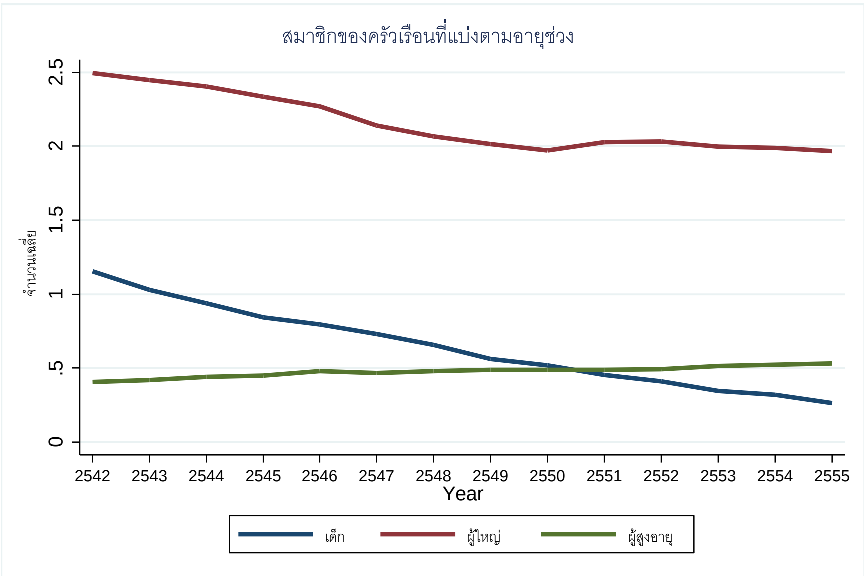
ขนาดของครัวเรือนในจังหวัดศรีสะเกษมีแนวโน้มลดลงอย่างต่อเนื่อง ตามรูปที่ 4.7 แต่มีขนาดเพิ่มขึ้นในปี พ.ศ. 2550 และ พ.ศ. 2551 คาดว่ามีสาเหตุมาจากการกลับภูมิลำเนาเพื่อลงประชามติ[8] ในช่วงดังกล่าว

[7] แหล่งที่มา : http://tuy-civil.blogspot.com/2010/10/blog-post.html
[8] แหล่งที่มา : http://oknation.nationtv.tv/blog/sakesit/2007/08/20/entry-1

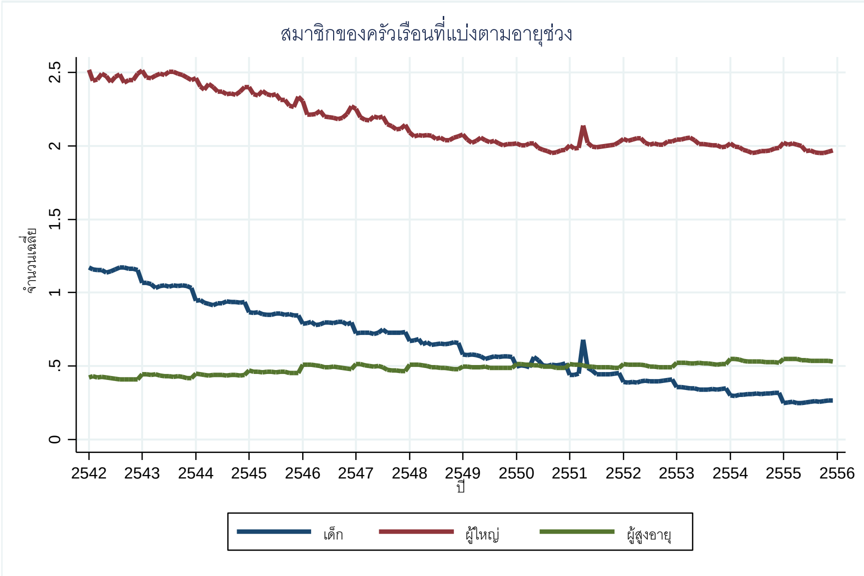


รูปที่ 4.7 : จำนวนสมาชิกเฉลี่ยของครัวเรือนในจังหวัดศรีสะเกษ
ข้อมูลรายเดือน ตั้งแต่ปี พ.ศ. 2542-2555

จากการพิจารณาขนาดครัวเรือนในแต่ละจังหวัดข้างต้น ทำให้สามารถสรุปได้ว่า การลดลงหรือเพิ่มขึ้นของขนาดครัวเรือนขึ้นอยู่กับปัจจัยที่ส่งผลต่อการประกอบอาชีพ อาทิเช่น ภัยธรรมชาติ โรคระบาด เป็นต้น ในพื้นที่ที่ประสบปัญหา ครัวเรือนไม่สามารถประกอบอาชีพได้ สมาชิกครัวเรือนจึงมีการย้ายถิ่นฐานเพื่อไปประกอบอาชีพ ส่งผลให้สมาชิกครัวเรือนในวัยทำงานมีขนาดลดลง สอดคล้องกับรูปที่ 4.8 และ 4.9 ตามลำดับ

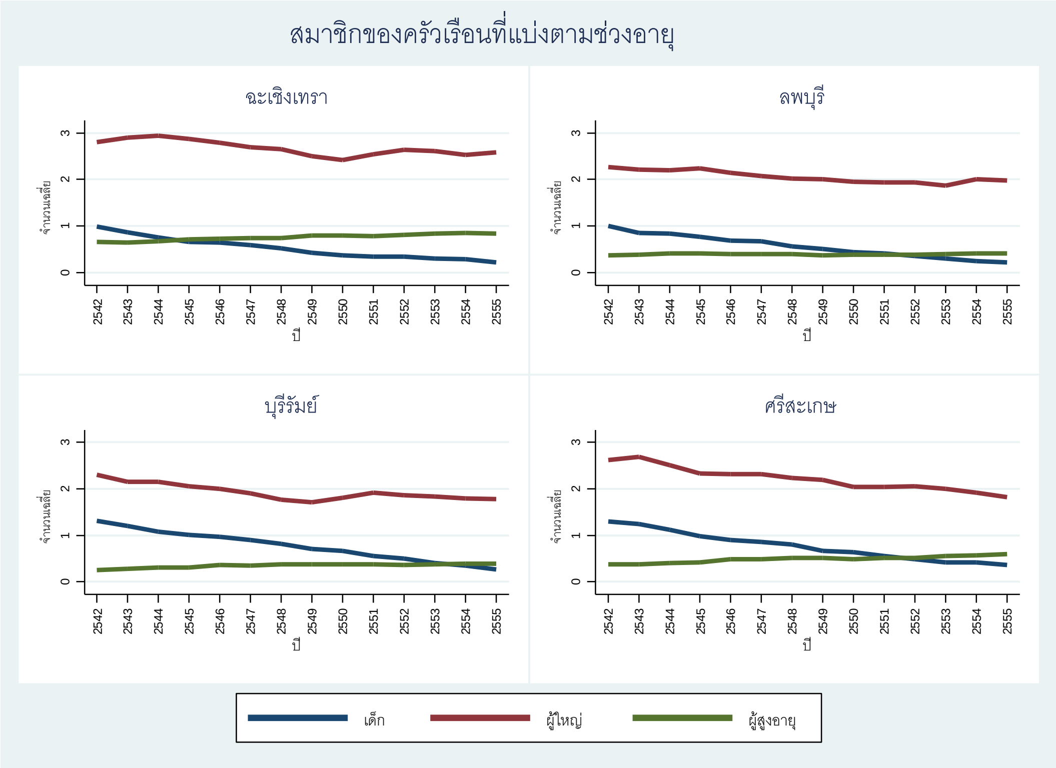


รูปที่ 4.8 : จำนวนเฉลี่ยของสมาชิกที่แบ่งตามช่วงวัย ข้อมูลรายปี ตั้งแต่ปี พ.ศ. 2542-2555

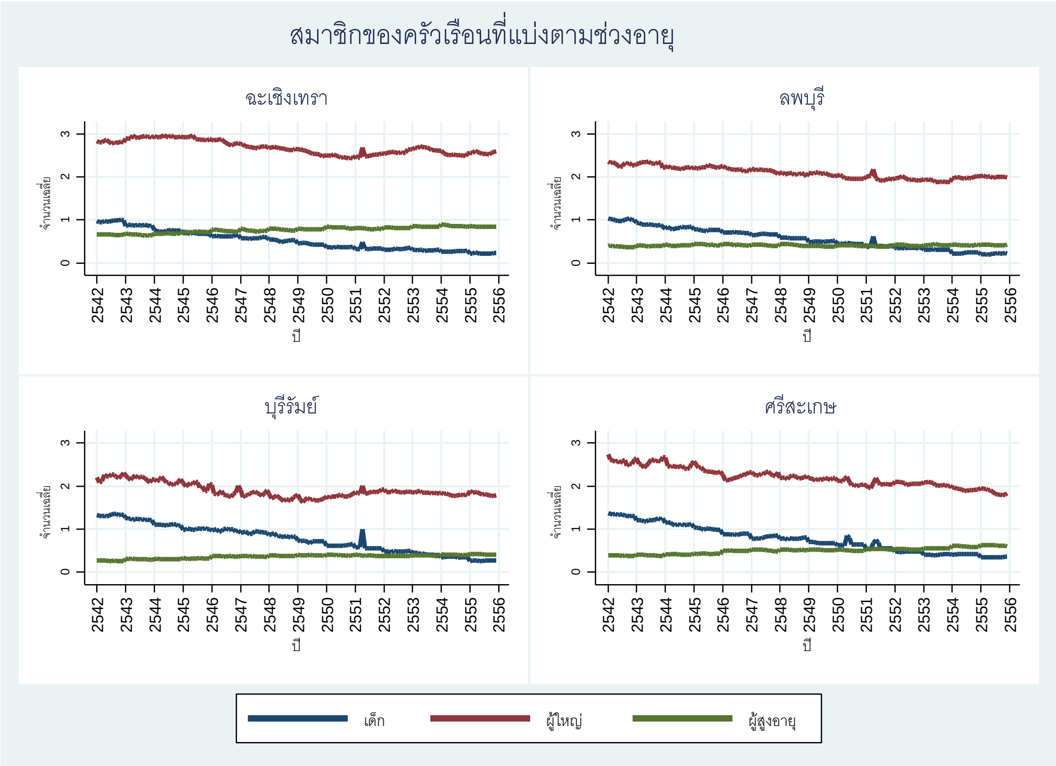


รูปที่ 4.9 : จำนวนเฉลี่ยของสมาชิกที่แบ่งตามช่วงวัย ข้อมูลรายเดือน ตั้งแต่ปี พ.ศ. 2542-2555

จากรูปข้างต้น นักวิจัยกำหนดให้สมาชิกในครัวเรือนในแต่ละช่วงวัย แบ่งออกเป็น เด็ก (อายุตั้งแต่ 0-14 ปี) ผู้ใหญ่ (อายุตั้งแต่ 15-64 ปี) และผู้สูงอายุ (อายุตั้งแต่ 65 ปีขึ้นไป) ซึ่งเมื่อแยกพิจารณารายจังหวัดตามรูปที่ 4.10 และ 4.11 จะเห็นได้ว่า ทุกจังหวัดมีจำนวนสมาชิกที่เป็นผู้ใหญ่มากที่สุด รองลงมาคือสมาชิกที่เป็นเด็ก และสมาชิกที่เป็นผู้สูงอายุ ตามลำดับ ซึ่งสมาชิกที่เป็นผู้ใหญ่และเด็กมีแนวโน้มลดลงตามระยะเวลา ในขณะที่สมาชิกที่เป็นผู้สูงอายุมีแนวโน้มเพิ่มขึ้น

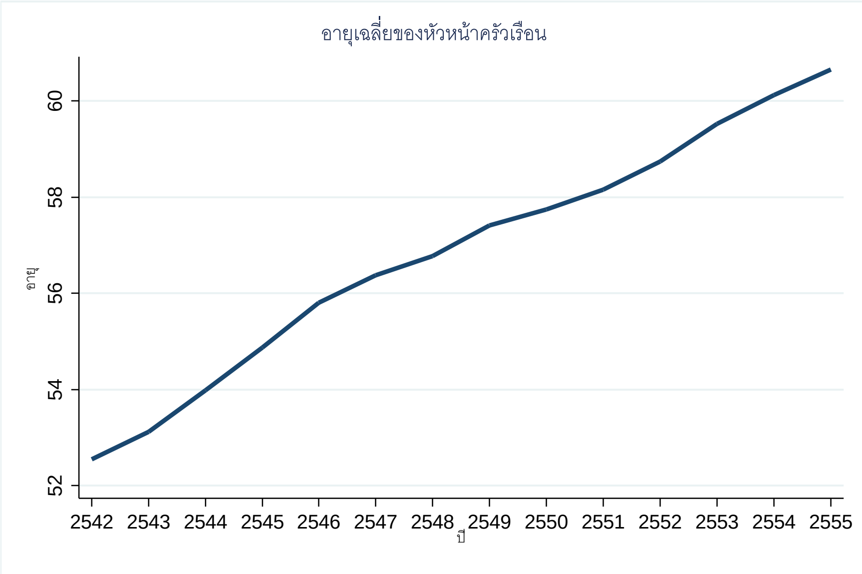


รูปที่ 4.10 : จำนวนเฉลี่ยของสมาชิกที่แบ่งตามช่วงวัย แยกรายจังหวัด
ข้อมูลรายปี ตั้งแต่ปี พ.ศ. 2542-2555



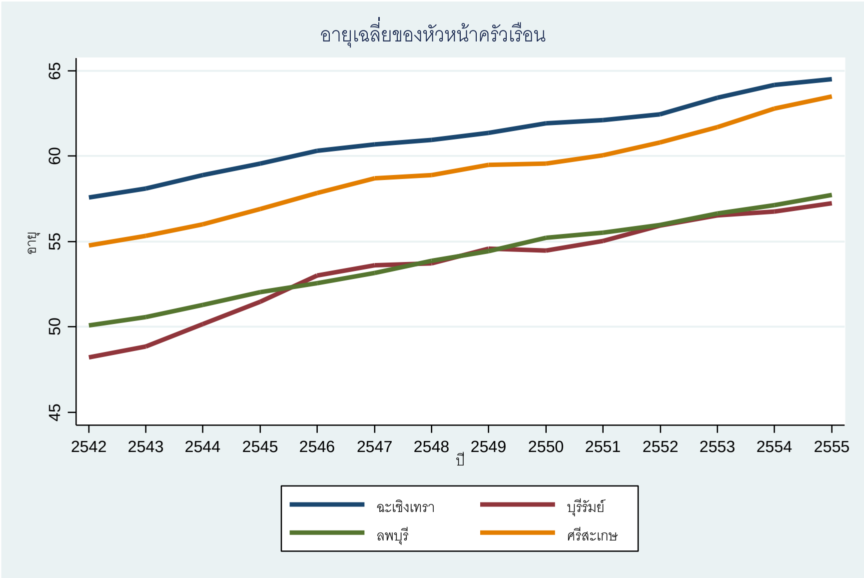
รูปที่ 4.11 : จำนวนเฉลี่ยของสมาชิกที่แบ่งตามช่วงวัย แยกรายจังหวัด
ข้อมูลรายเดือน ตั้งแต่ปี พ.ศ. 2542-2555

ผลลัพธ์ข้างต้นบอกเราว่า จำนวนสมาชิกครัวเรือนในวัยแรงงานลดลงอย่างต่อเนื่องซึ่งเกิดจากการย้ายออกจากครัวเรือนเพื่อไปประกอบอาชีพ ในขณะที่สมาชิกครัวเรือนที่เป็นผู้สูงอายุเพิ่มขึ้น ดังนั้น หัวหน้าครัวเรือนส่วนใหญ่ของข้อมูลชุดนี้น่าจะเป็นผู้สูงอายุด้วยเช่นกัน ซึ่งสอดคล้องกับข้อมูลของหัวหน้าครัวเรือนที่มีนิยามว่าเป็นผู้ที่มีอำนาจในการตัดสินใจสูงสุดของครัวเรือน โดยพบว่าหัวหน้าครัวเรือนมีอายุเฉลี่ยอยู่ระหว่าง 52-61 ปี และมีแนวโน้มเพิ่มขึ้นตามช่วงเวลา ตามรูปที่ 4.12



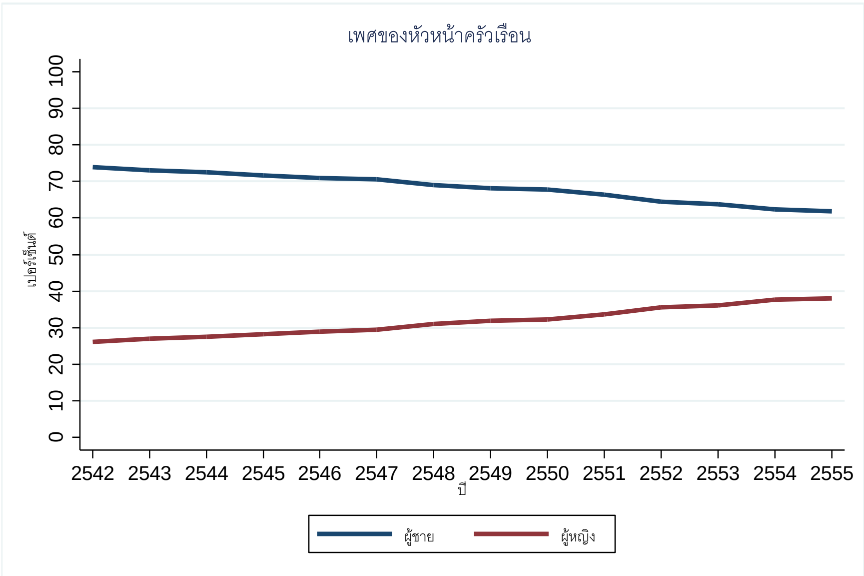
รูปที่ 4.12 : อายุเฉลี่ยของหัวหน้าครัวเรือน ตั้งแต่ปี พ.ศ. 2542-2555

เมื่อแยกพิจารณาอายุเฉลี่ยของหัวหน้าครัวเรือนรายจังหวัด พบว่า อายุของหัวหน้าครัวเรือนมีแนวโน้มเพิ่มขึ้นในทุกจังหวัด ซึ่งจังหวัดฉะเชิงเทรามีอายุเฉลี่ยของหัวหน้าครัวเรือนสูงที่สุด รองลงมาคือจังหวัดศรีสะเกษ ส่วนจังหวัดลพบุรีและบุรีรัมย์มีอายุเฉลี่ยของหัวหน้าครัวเรือนใกล้เคียงกัน ตามรูปที่ 4.13



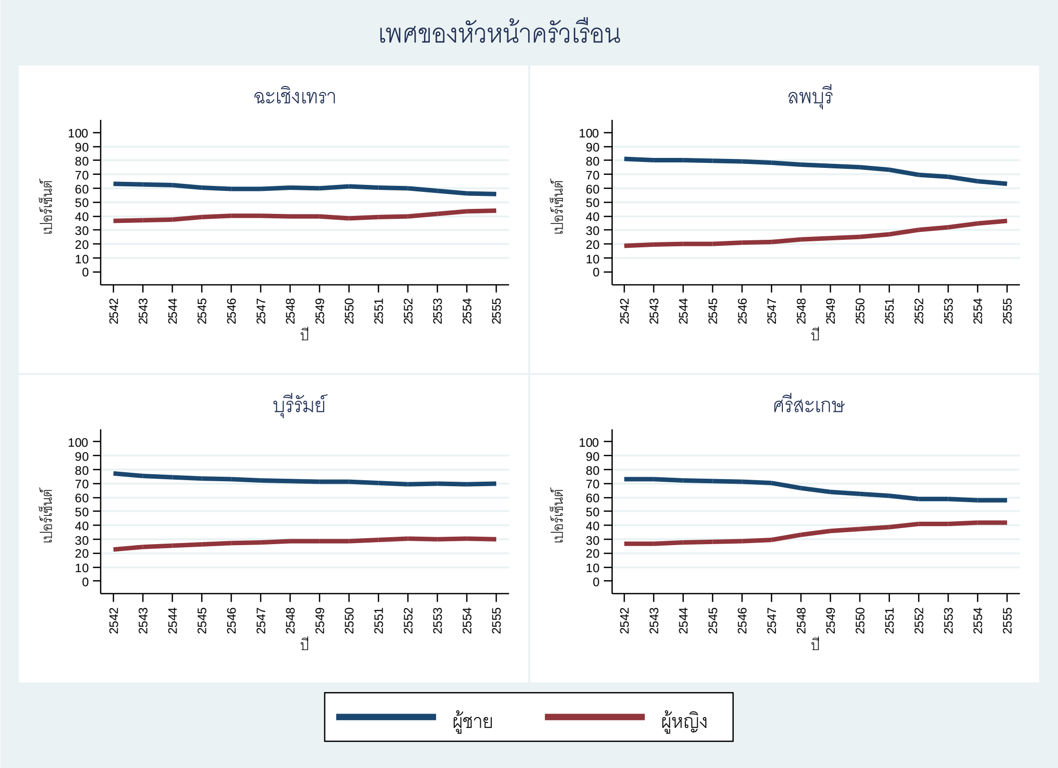
รูปที่ 4.13 : อายุเฉลี่ยของหัวหน้าครัวเรือนแยกตามจังหวัด ตั้งแต่ปี พ.ศ. 2542-2555

และเมื่อพิจารณาเพศของหัวหน้าครัวเรือนพบว่า หัวหน้าครัวเรือนเป็นเพศชายสูงถึงร้อยละ 70 และมีแนวโน้มลดลง ในขณะที่หัวหน้าครัวเรือนที่เป็นเพศหญิงมีแนวโน้มเพิ่มขึ้น ดังรูปที่ 4.14



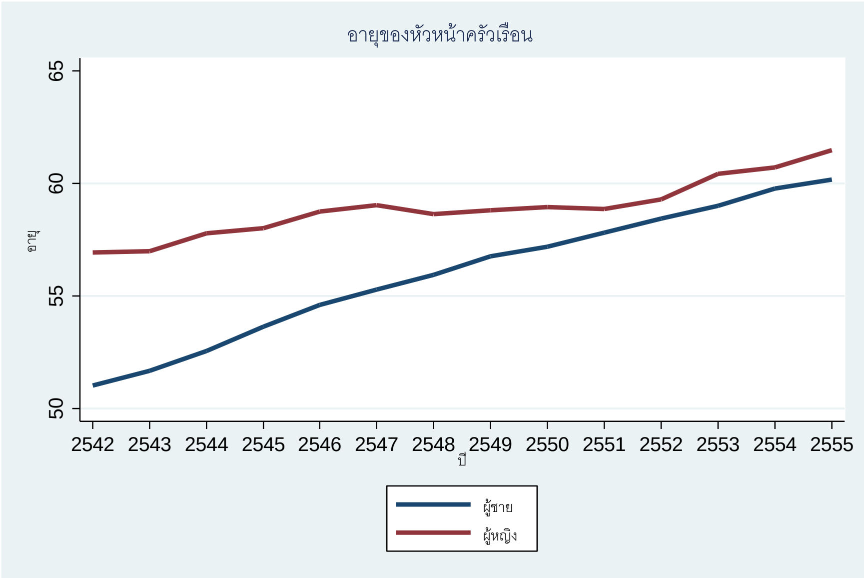
รูปที่ 14 : ร้อยละโดยเฉลี่ยของหัวหน้าครัวเรือนที่เป็นเพศชายและเพศหญิง ตั้งแต่ปี พ.ศ. 2542-2555

เมื่อพิจารณาเพศของหัวหน้าครัวเรือนแยกรายจังหวัด ตามรูปที่ 4.15 พบว่า ทุกจังหวัดมีแนวโน้มของหัวหน้าครัวเรือนที่เป็นเพศชายลดลง และหัวหน้าครัวเรือนที่เป็นเพศหญิงเพิ่มขึ้น

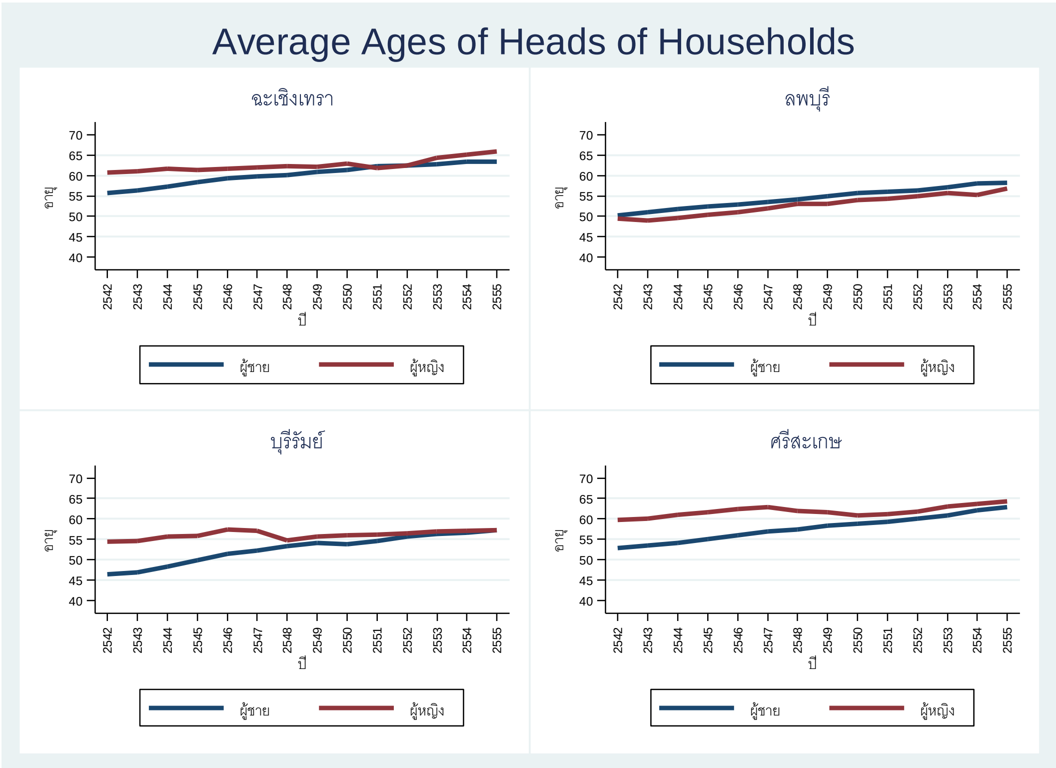


รูปที่ 4.15 : ร้อยละโดยเฉลี่ยของหัวหน้าครัวเรือนที่เป็นเพศชายและเพศหญิง
ตั้งแต่ปี พ.ศ. 2542-2555 แยกตามจังหวัด

หากพิจารณาหัวหน้าครัวเรือนที่เป็นเพศชาย ทั้งในภาพรวมหรือแยกรายจังหวัด พบว่า อายุของหัวหน้าครัวเรือนที่เป็นเพศชายเพิ่มขึ้นอย่างช้า ๆ ในขณะที่อายุของหัวหน้าครัวเรือนที่เป็นเพศหญิงมีการเพิ่มขึ้นอย่างต่อเนื่อง ดังรูปที่ 4.16 และ 4.17

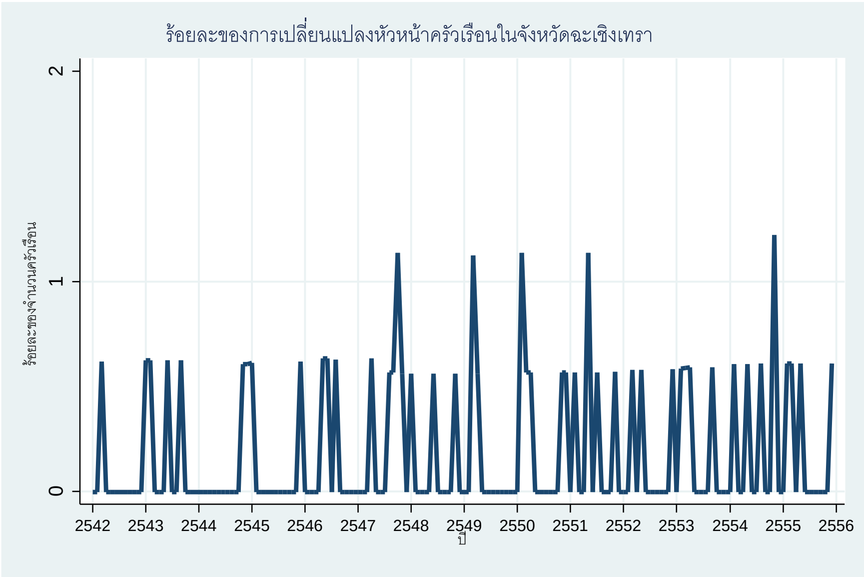


รูปที่ 4.16 : อายุของหัวหน้าครัวเรือนที่เป็นเพศชายและเพศหญิง ตั้งแต่ปี พ.ศ. 2542-2555

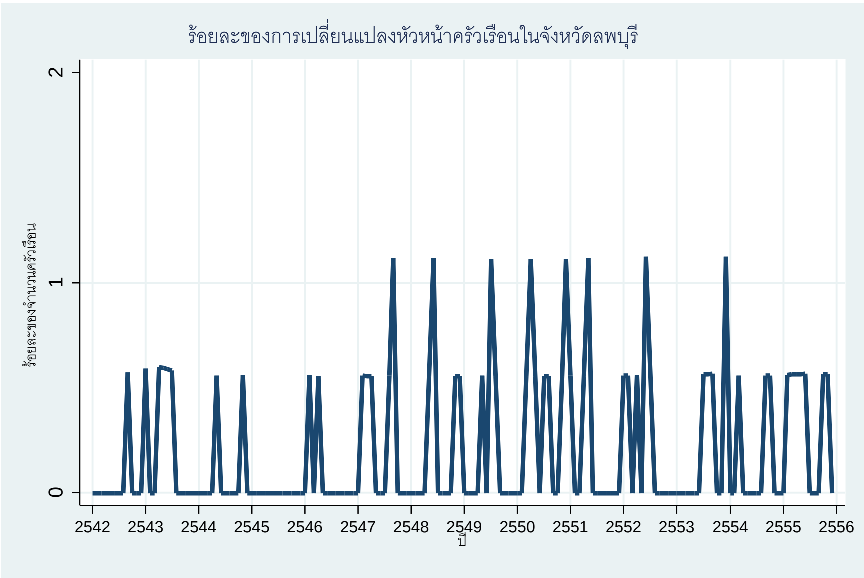


รูปที่ 4.17 : อายุของหัวหน้าครัวเรือนที่เป็นเพศชายและเพศหญิง
ตั้งแต่ปี พ.ศ. 2542-2555 แยกรายจังหวัด

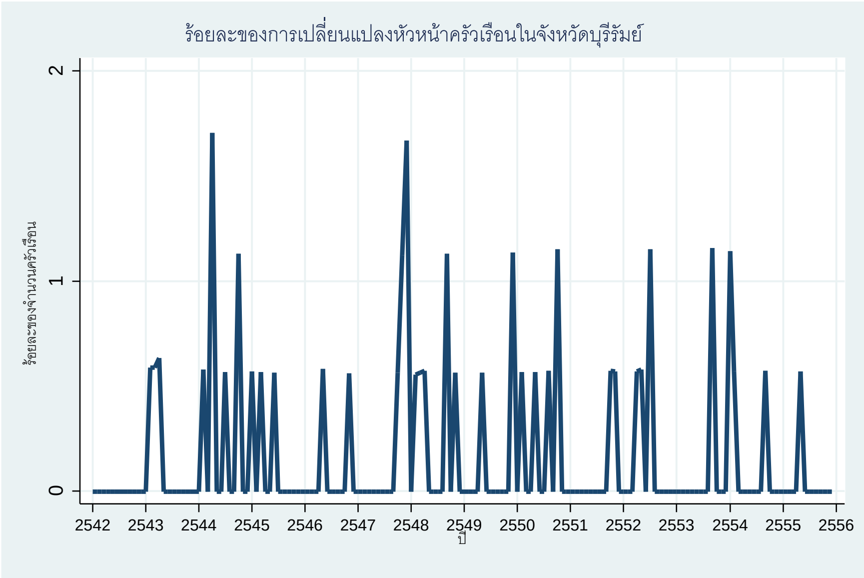
ข้อมูลข้างต้นสรุปได้ว่า หัวหน้าครัวเรือนทั้งเพศหญิงและเพศชาย มีอายุเพิ่มขึ้นตามระยะเวลา แต่ไม่สามารถระบุได้ว่าเป็นหัวหน้าครัวเรือนคนเดิมหรือไม่ ดังนั้นจึงได้พิจารณาจำนวนของครัวเรือนที่ไม่มีการเปลี่ยนแปลงหัวหน้าครัวเรือนตั้งแต่ปี พ.ศ. 2542-2555 ดังรูปที่ 4.18-4.21 พบว่า ครัวเรือนในแต่ละจังหวัดมีการเปลี่ยนแปลงหัวหน้าครัวเรือนโดยเฉลี่ยคิดเป็นร้อยละ 1 ของจำนวนครัวเรือนทั้งหมด ซึ่งครัวเรือนในจังหวัดบุรีรัมย์และศรีสะเกษมีร้อยละของการเปลี่ยนแปลงหัวหน้าครัวเรือนสูงกว่าครัวเรือนในจังหวัดฉะเชิงเทราและลพบุรี



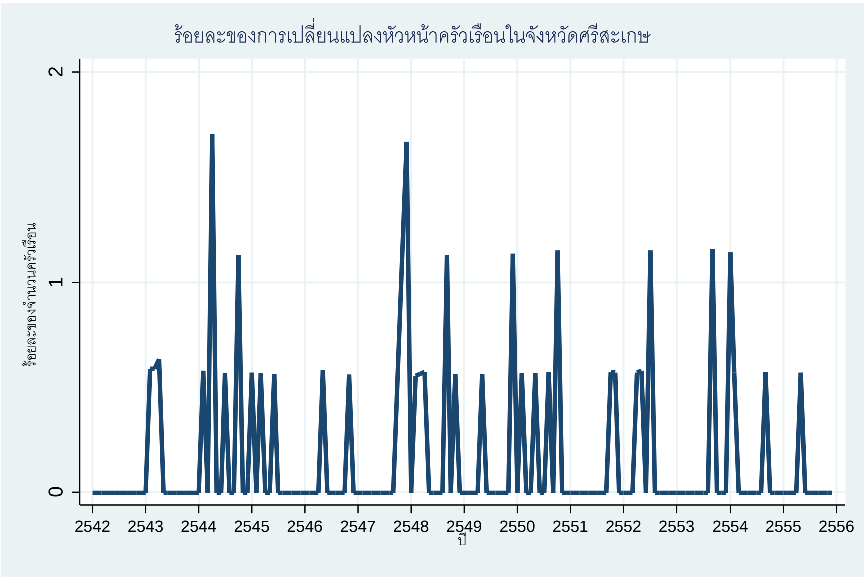
รูปที่ 4.18 : ร้อยละของครัวเรือนที่มีการเปลี่ยนแปลงหัวหน้าครัวเรือน
ในจังหวัดฉะเชิงเทรา ข้อมูลรายเดือน ตั้งแต่ปี พ.ศ. 2542-2555



รูปที่ 4.19 : ร้อยละของครัวเรือนที่มีการเปลี่ยนแปลงหัวหน้าครัวเรือน
ในจังหวัดลพบุรี ข้อมูลรายเดือน ตั้งแต่ปี พ.ศ. 2542-2555

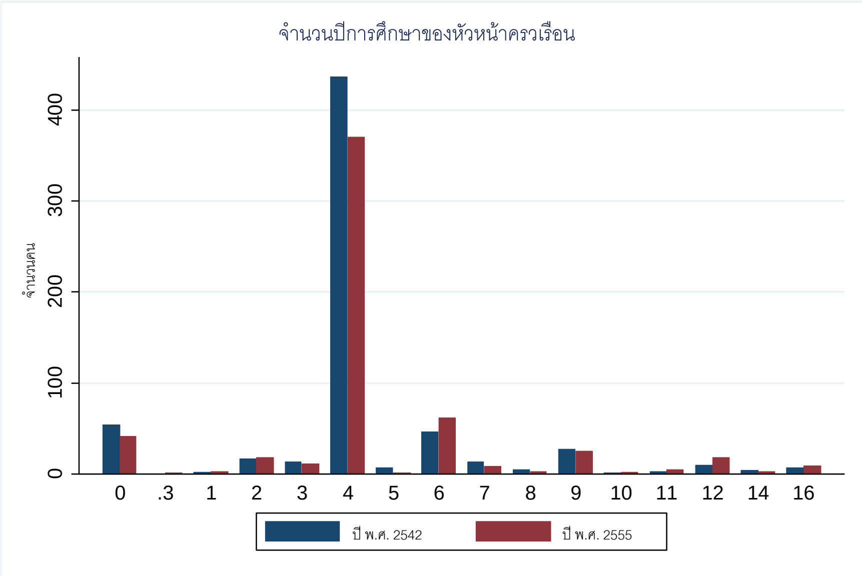


รูปที่ 4.20 : ร้อยละของครัวเรือนที่มีการเปลี่ยนแปลงหัวหน้าครัวเรือน ในจังหวัดบุรีรัมย์ ข้อมูลรายเดือน ตั้งแต่ปี พ.ศ. 2542-2555



รูปที่ 4.21 : ร้อยละของครัวเรือนที่มีการเปลี่ยนแปลงหัวหน้าครัวเรือน ในจังหวัดศรีสะเกษ ข้อมูลรายเดือน ตั้งแต่ปี พ.ศ. 2542-2555

หลังจากที่พิจารณาการเปลี่ยนแปลงหัวหน้าครัวเรือน พบว่า มีเพียงร้อยละ 1 ของครัวเรือนทั้งหมดที่มีการเปลี่ยนแปลงหัวหน้าครัวเรือน ซึ่งครัวเรือนส่วนใหญ่ยังคงมีหัวหน้าครัวเรือนคนเดิม ดังนั้น หากหัวหน้าครัวเรือนยังคงเป็นคนเดิม ระดับการศึกษาของหัวหน้าครัวเรือนก็ไม่น่าจะมีการเปลี่ยนแปลงมากนัก จากรูปที่ 4.22 พบว่า หัวหน้าครัวเรือนมีจำนวนปีการศึกษาเฉลี่ย 4 ปี ซึ่งเป็นการศึกษาในระดับประถมศึกษาทั้งในปี พ.ศ. 2542 และ พ.ศ. 2555 ตามลำดับ



รูปที่ 4.22 : การกระจายของจำนวนปีการศึกษาของหัวหน้าครัวเรือน

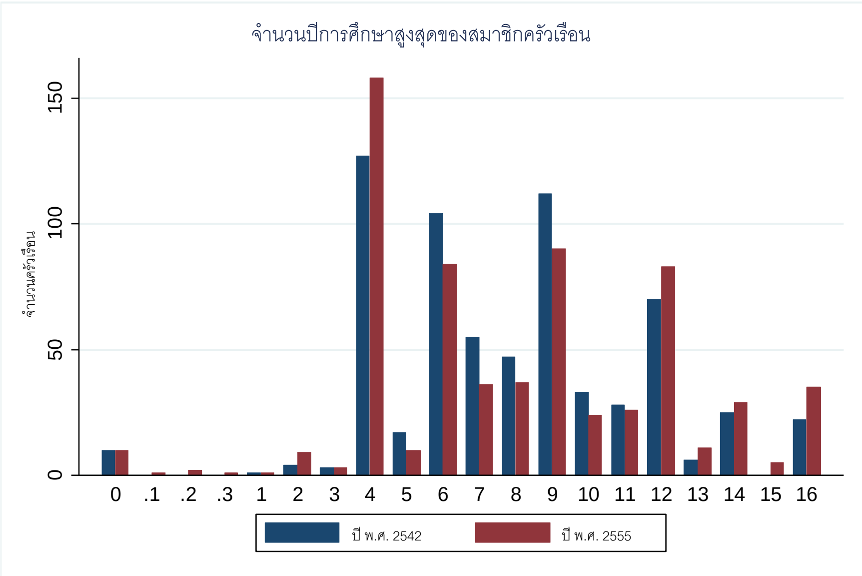
ในปี พ.ศ. 2542 และ พ.ศ. 2555

เมื่อแยกรายจังหวัด พบว่า หัวหน้าครัวเรือนในทุกจังหวัด มีจำนวนปีการศึกษาเฉลี่ย 4 ปี ดังรูปที่ 4.23

รูปที่ 4.23 : การกระจายของจำนวนปีการศึกษาของหัวหน้าครัวเรือน

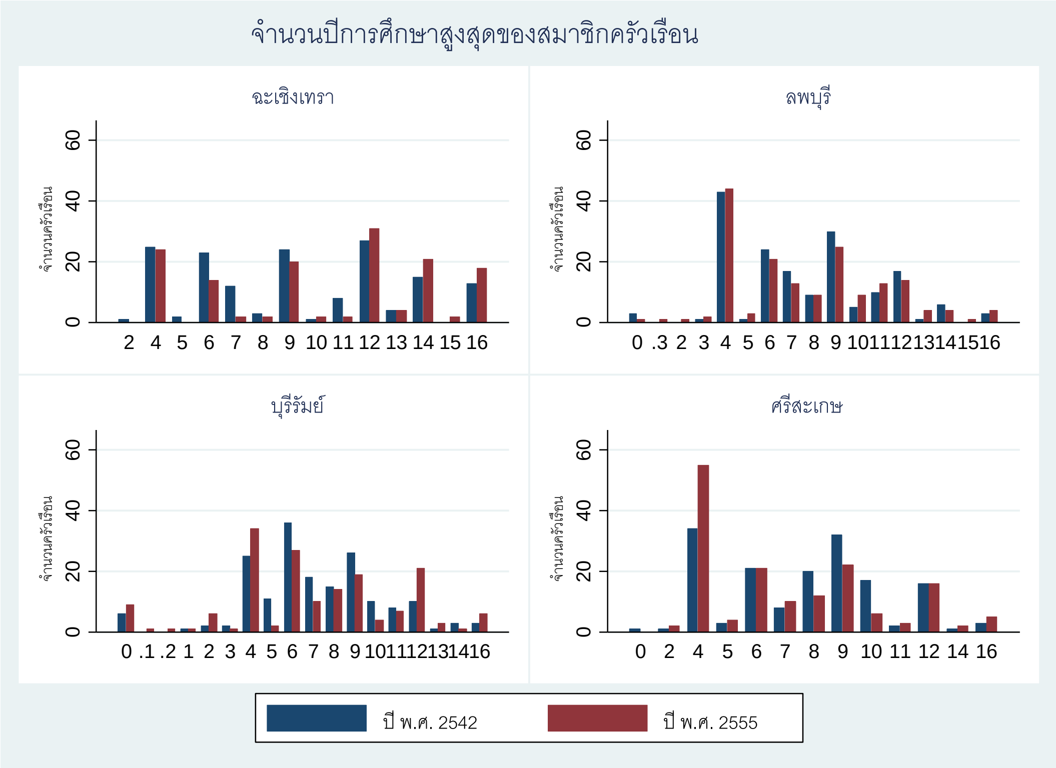
ในปี พ.ศ. 2542 และ พ.ศ. 2555แยกรายจังหวัด

นอกจากนี้ หากดูจำนวนปีการศึกษาสูงสุดของสมาชิกครัวเรือนจะพบว่า จำนวนปีการศึกษาสูงสุดเฉลี่ยกระจายในช่วง 4-12 ปี ซึ่งเป็นการศึกษาในระดับประถมศึกษาจนถึงมัธยมศึกษาตอนปลาย และเมื่อเปรียบเทียบระดับการศึกษาสูงสุดในปี พ.ศ. 2542 และ พ.ศ. 2555 พบว่า สมาชิกครัวเรือนมีจำนวนปีการศึกษาสูงขึ้น ในช่วง 12-16 ปี ซึ่งเป็นการศึกษาในระดับมัธยมปลายถึงระดับอุดมศึกษา แต่เมื่อสังเกตจำนวนปีการศึกษาที่ระดับ 4 ปี กลับพบว่า ในปี พ.ศ. 2555 มีจำนวนสูงกว่าในปี พ.ศ. 2542 อาจเนื่องมาจากสมาชิกที่อยู่ในวัยแรงงานที่มีระดับการศึกษาสูงสุดในชั้นประถมศึกษาปีที่ 4 ย้ายกลับเข้ามาในปี พ.ศ. 2555 ซึ่งคาดว่า ณ ขนาดนั้น สมาชิกส่วนใหญ่น่าจะมีอายุมากขึ้นและย้ายกลับเข้ามายังถิ่นฐานเดิมทำให้มีจำนวนเพิ่มขึ้น ดังรูปที่ 4.24



รูปที่ 4.24 : การกระจายของจำนวนปีการศึกษาสูงสุดของครัวเรือน
ในปี พ.ศ. 2542 และ พ.ศ. 2555

เมื่อแยกพิจารณารายจังหวัดพบว่า สมาชิกครัวเรือนในจังหวัดฉะเชิงเทรามีจำนวนปีการศึกษาเฉลี่ย 12 ปี ซึ่งเป็นการศึกษาในระดับมัธยมศึกษาตอนปลาย ส่วนในจังหวัดลพบุรี บุรีรัมย์ และศรีสะเกษ พบว่า สมาชิกในครัวเรือนมีจำนวนปีการศึกษาเฉลี่ย 4 ปี ซึ่งเป็นการศึกษาในระดับประถมศึกษา และเมื่อสังเกตุที่จำนวนการศึกษา 4 ปี พบว่า ในปี พ.ศ. 2555 จังหวัดบุรีรัมย์และศรีสะเกษมีจำนวนสูงกว่าในปี พ.ศ. 2542 ซึ่งเป็นไปได้ว่าสมาชิกในวัยแรงงานของทั้ง 2 จังหวัดมีการย้ายกลับเข้ามาในครัวเรือนตอนช่วงอายุมากขึ้น ดังรูปที่ 4.25



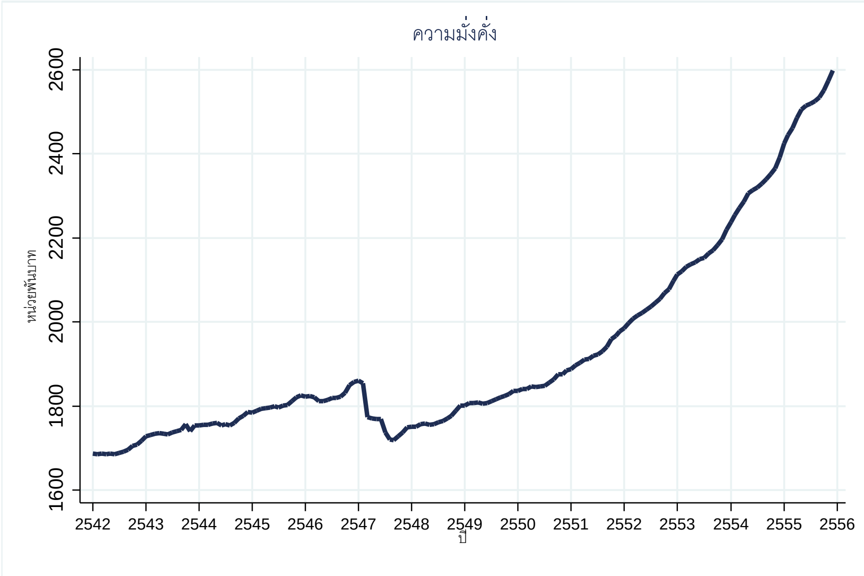
รูปที่ 4.25 : การกระจายของจำนวนปีการศึกษาสูงสุดของครัวเรือน
ในปี พ.ศ. 2542 และ พ.ศ. 2555 แยกรายจังหวัด

4.2 การเปลี่ยนแปลงสภาพเศรษฐกิจของครัวเรือนไทยในชนบท

ในส่วนถัดนี้จะกล่าวถึงการเปลี่ยนแปลงสภาพเศรษฐกิจของครัวเรือนไทยในชนบทผ่านข้อมูล Townsend Thai Monthly Micro Data ซึ่งพิจารณาจากส่วนต่างๆ ดังนี้ ความมั่งคั่งของครัวเรือน (wealth), รายรับของครัวเรือน (earning), ทรัพย์สินของครัวเรือน (asset), หนี้สินของครัวเรือน (liability) และรายได้กับการบริโภคของครัวเรือน (income and consumption)

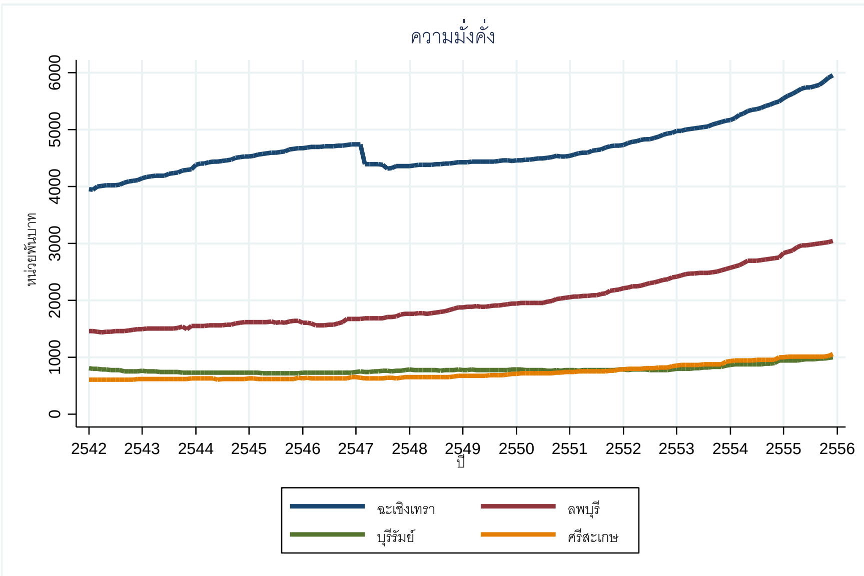
4.2.1 ความมั่งคั่ง (wealth)

หาได้จากการสำรวจทรัพย์สินและหนี้สินของครัวเรือนว่าสุดท้ายแล้วครัวเรือนมีทรัพย์สินสุทธิอยู่เท่าไร ซึ่งทรัพย์สินสุทธิจะบอกได้ว่าครัวเรือนมีความมั่งคั่งหรือไม่ โดยสามารถคำนวณได้จากการนำทรัพย์สินทั้งหมดของครัวเรือนลบหนี้สินทั้งหมดของครัวเรือน ดังรูปที่ 4.26 พบว่า ครัวเรือนมีการสร้างทรัพย์สินที่มีมูลค่ามากกว่าหนี้สิน สะท้อนให้เห็นว่าครัวเรือนมีความมั่งคั่งเพิ่มขึ้น แต่ในปี พ.ศ. 2547 ความมั่งคั่งของครัวเรือนลดต่ำลงมากที่สุด สาเหตุนั้นเราอาจต้องแยกพิจารณาข้อมูลในรายจังหวัด



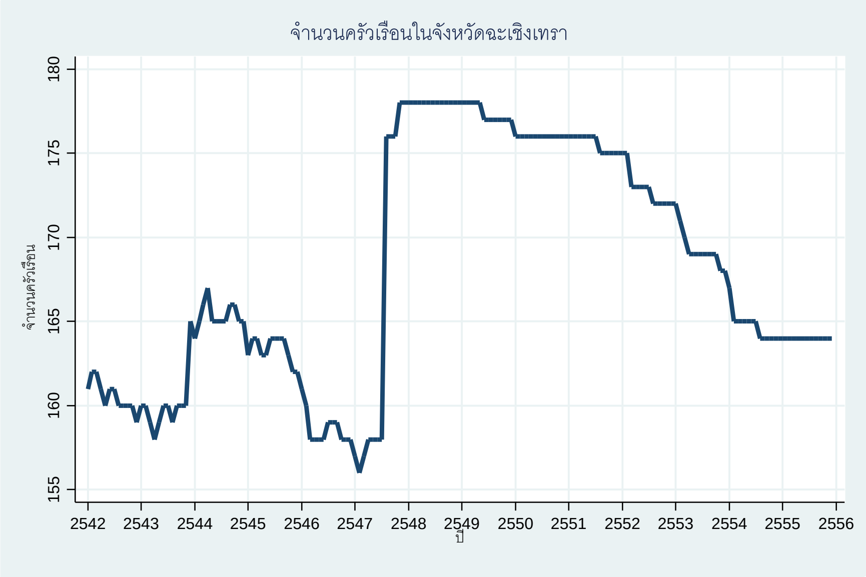
รูปที่ 4.26 : ความมั่งคั่งเฉลี่ยของครัวเรือน ตั้งแต่ปี พ.ศ. 2542-2555
(หน่วยละพันบาท/เดือน)

เมื่อพิจารณาข้อมูลแยกรายจังหวัด ตามรูปที่ 4.27 พบว่า ครัวเรือนในจังหวัดฉะเชิงเทรามีความมั่งคั่งมากที่สุด รองลงมาคือจังหวัดลพบุรี บุรีรัมย์และศรีสะเกษ ตามลำดับ โดยความมั่งคั่งของครัวเรือนในทุกจังหวัดมีแนวโน้มเพิ่มขึ้น แต่ในปี พ.ศ. 2547 จังหวัดที่ทำให้ความมั่งคั่งรวมลดลงคือจังหวัดฉะเชิงเทรา



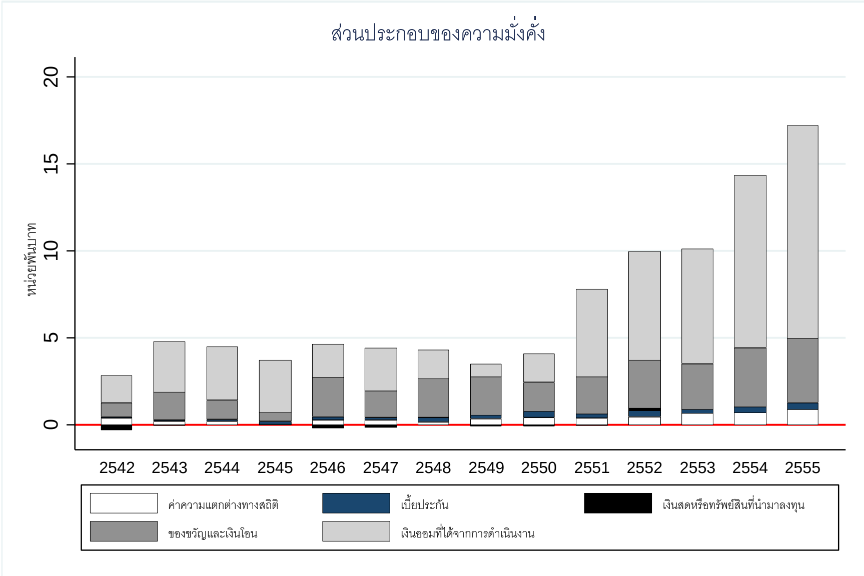
รูปที่ 4.27 : ความมั่งคั่งเฉลี่ยของครัวเรือน แยกรายจังหวัด ตั้งแต่ปี พ.ศ. 2542-2555
(หน่วยละพันบาท/เดือน)

และเมื่อพิจารณาจากจำนวนครัวเรือนทั้งหมดในจังหวัดฉะเชิงเทรา ตามรูปที่ 4.28 พบว่าจำนวนครัวเรือนลดต่ำลงมากที่สุดในปี พ.ศ. 2547 อาจเป็นเพราะมีครัวเรือนในจังหวัดฉะเชิงเทราออกจาก survey ไปและมีครัวเรือนทดแทนเข้ามาใหม่ ทำให้ข้อมูลความมั่งคั่งของครัวเรือนที่ออกไปแล้วไม่ปรากฏ ซึ่งจะเห็นว่าที่ค่าเฉลี่ยของความมั่งคั่งลดลงน่าจะเป็นเพราะครัวเรือนที่ออกไปรวยกว่าครัวเรือนทดแทนมาก



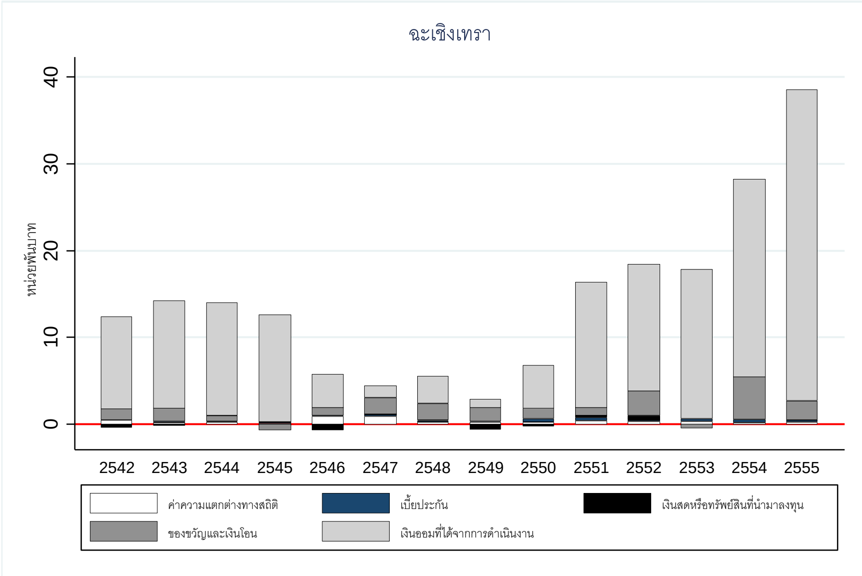
รูปที่ 4.28 : จำนวนครัวเรือนทั้งหมดในแต่ละเดือนของจังหวัดฉะเชิงเทรา ตั้งแต่ปี พ.ศ. 2542-2555

จากรูปก่อนหน้าได้แสดงให้เห็นถึงแนวโน้มการเพิ่มขึ้นอย่างต่อเนื่องของความมั่งคั่งของครัวเรือน ในส่วนถัดไปเราจะมาพิจารณาว่าครัวเรือนมีความมั่งคั่งจากแหล่งใดบ้าง จะเห็นได้ว่าแหล่งที่ใหญ่ที่สุดที่ทำให้ครัวเรือนมีความมั่งคั่งคือ เงินออมที่ได้จากการดำเนินงาน รองลงมาคือ ของขวัญและเงินโอน ตามมาด้วยเงินสดหรือทรัพย์สินที่นำมาลงทุน และค่าเบี้ยประกัน ตามลำดับ ซึ่งจะเห็นได้ว่า เงินออมที่ได้จากการดำเนินงาน และของขวัญและเงินโอนมีแนวโน้มเพิ่มขึ้นอย่างเห็นได้ชัด ดังรูปที่ 4.29



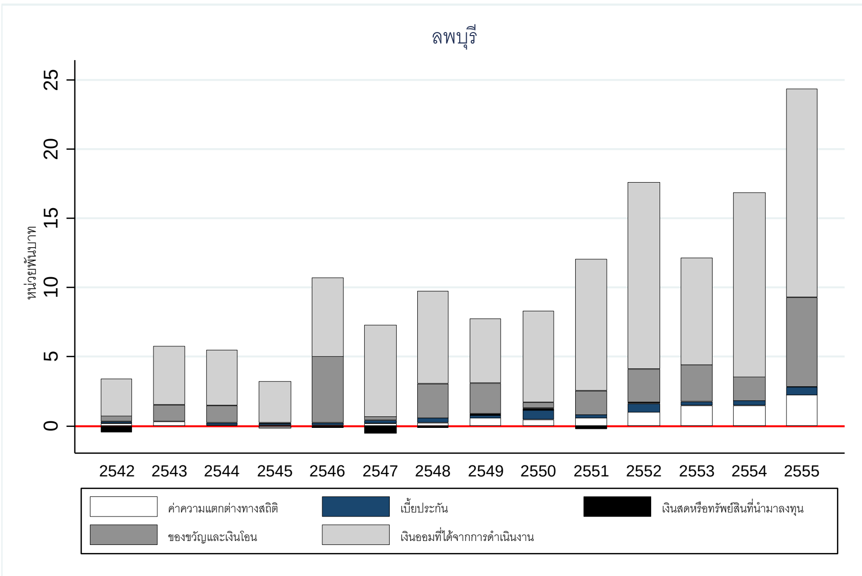
รูปที่ 4.29 : ส่วนประกอบของความมั่งคั่งของครัวเรือน ตั้งแต่ปี พ.ศ. 2542-2555
(หน่วยละพันบาท/เดือน)

เราทราบว่าความมั่งคั่งของครัวเรือนส่วนใหญ่มาจากแหล่งเงินออมที่ได้จากการดำเนินงาน และเมื่อพิจารณาความมั่งคั่งของครัวเรือนในจังหวัดฉะเชิงเทรา ดังรูปที่ 4.30 ก็ยังคงพบว่า แหล่งความมั่งคั่งที่มากที่สุดคือ เงินออมที่ได้จากการดำเนินงาน ซึ่งมีแนวโน้มเพิ่มขึ้นอย่างต่อเนื่อง ยกเว้นในช่วงปี พ.ศ. 2547 - 2549 แหล่งเงินออมที่ได้จากการดำเนินงานลดต่ำลง เนื่องจากรายได้ที่มาจากการเลี้ยงกุ้ง เลี้ยงปลาลดลง เพราะประสบปัญหาแม่น้ำบางปะกงเน่าเสีย และที่ได้กล่าวไปแล้วข้างต้นในปี พ.ศ. 2551 บริษัทซีพีเอฟได้เข้ามากระตุ้นให้เกษตรกรตัดสินใจกลับมาเลี้ยงกุ้ง เลี้ยงปลาอีกครั้ง ซึ่งทำให้ความมั่งคั่งของครัวเรือนเพิ่มสูงขึ้น



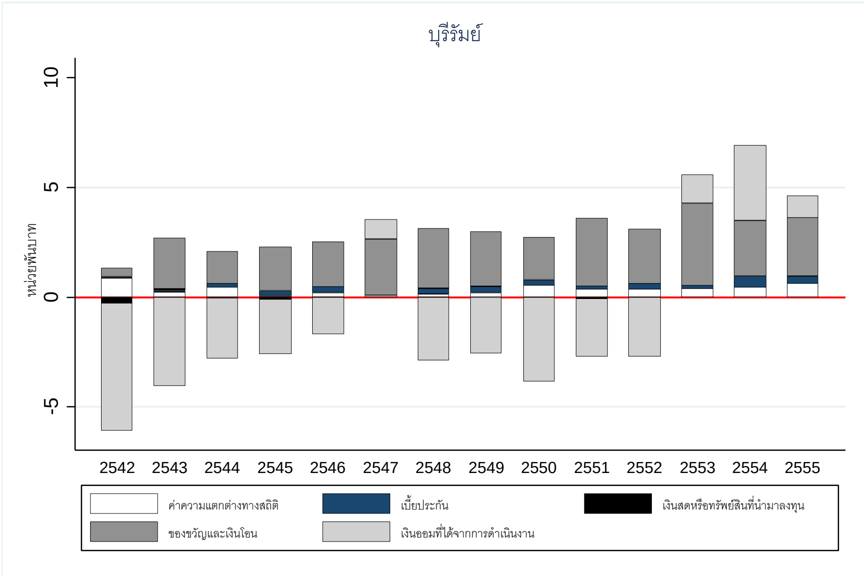
รูปที่ 4.30 : ส่วนประกอบความมั่งคั่งของครัวเรือน จังหวัดฉะเชิงเทรา
ตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)

และเมื่อพิจารณาครัวเรือนในจังหวัดลพบุรีพบว่า แหล่งความมั่งคั่งที่มากที่สุดคือ เงินออมที่ได้จากการดำเนินงานเช่นเดียวกันกับจังหวัดฉะเชิงเทรา นอกจากนี้จะเห็นได้ว่าของขวัญและเงินโอนเป็นแหล่งความมั่งคั่งในลำดับถัดมา ซึ่งมีค่าเพิ่มขึ้นมากที่สุดในปี พ.ศ. 2546 และ พ.ศ. 2555 เนื่องจากสมาชิกในวัยแรงงานมีขนาดลดลงจากการย้ายไปทำงานที่อื่น ส่งผลให้ของขวัญและเงินโอนเพิ่มขึ้นดังรูปที่ 4.31



รูปที่ 4.31 : ส่วนประกอบความมั่งคั่งของครัวเรือน จังหวัดลพบุรี
ตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)

ในขณะที่แหล่งความมั่งคั่งของครัวเรือนในจังหวัดบุรีรัมย์ที่มากที่สุดคือ ของขวัญและเงินโอน ดังรูปที่ 4.32 เนื่องจากสมาชิกในวัยแรงงานลดลงอย่างต่อเนื่อง แต่จำนวนผู้สูงอายุกลับเพิ่มขึ้น ส่งผลให้แหล่งรายได้หลักของครัวเรือนได้มาจากของขวัญและเงินโอน ในขณะที่เงินออมที่ได้จากการดำเนินงานมีค่าน้อยที่สุดในช่วงปี พ.ศ. 2542 จนถึง พ.ศ. 2552 อาจเนื่องมาจากมีการลงทุนในเกษตรกรรมหรือปศุสัตว์ ทำให้ครัวเรือนยังไม่มีเงินออมจากการดำเนินงานในช่วงดังกล่าว แต่กลับมีค่าเพิ่มขึ้นในปี พ.ศ. 2553 ซึ่งพบว่าในปีนี้การผลิตภาคเกษตรกรรมของจังหวัดบุรีรัมย์มีมูลค่ารวมของสาขาเกษตรขยายตัวจากปีก่อนตามปริมาณผลผลิตข้าว มันสำปะหลัง อ้อย และยางพาราที่เพิ่มขึ้น ประกอบกับราคาข้าวเปลือก อ้อย และยางพาราปรับตัวเพิ่มขึ้นจากปีก่อน ส่งผลให้รายได้ของเกษตรกรเพิ่มขึ้นตามปริมาณผลผลิต เช่นเดียวกับภาคการบริการและการท่องเที่ยวขยายตัวจากการเพิ่มขึ้นของจำนวนนักท่องเที่ยวชาวไทย[9]

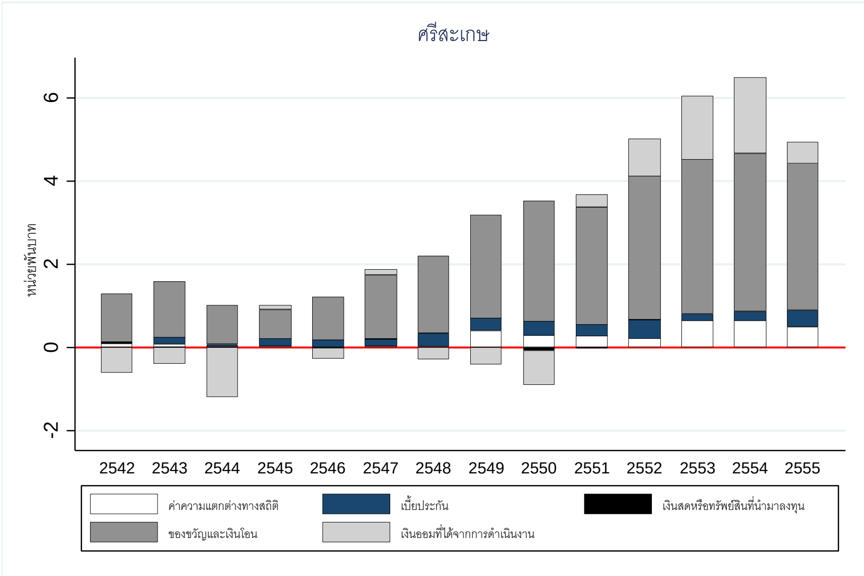


รูปที่ 4.32 : ส่วนประกอบความมั่งคั่งของครัวเรือน จังหวัดบุรีรัมย์
ตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)

และแหล่งความมั่งคั่งที่มากที่สุดของครัวเรือนในจังหวัดศรีสะเกษคือ ของขวัญและเงินโอน ซึ่งคล้ายกับจังหวัดบุรีรัมย์ ส่วนความมั่งคั่งที่ได้จากเงินออมมีค่าน้อยที่สุดในปี พ.ศ. 2542 - 2550 คาดว่าครัวเรือนกำลังเริ่มต้นลงทุนในการประกอบอาชีพ โดยเฉพาะในปี พ.ศ. 2544 จะเห็นว่าเงินออมมีค่าต่ำลง เนื่องจากมีการก่อตั้งกองทุนหมู่บ้าน เพื่อสนับสนุนให้ชาวบ้านเข้าถึงแหล่งเงินทุน[10] ดังนั้นทำให้ชาวบ้านมีการกู้ยืมเงินเพื่อนำมาลงทุนสำหรับการประกอบอาชีพ และในปี พ.ศ. 2551 เริ่มมีเงิน

[9] แหล่งที่มา : http://www.bpao.go.th/bpaoweb/index.php?option=com_content&view=article&id=15&Itemid=13
[10] แหล่งที่มา : http://www.villagefund.or.th/index.aspx

ออมที่ได้จากการดำเนินงานเพิ่มขึ้น ส่วนใหญ่มาจากผลผลิตทางการเกษตรที่มีการปรับตัวเพิ่มมากขึ้น[11] ดังรูปที่ 4.33

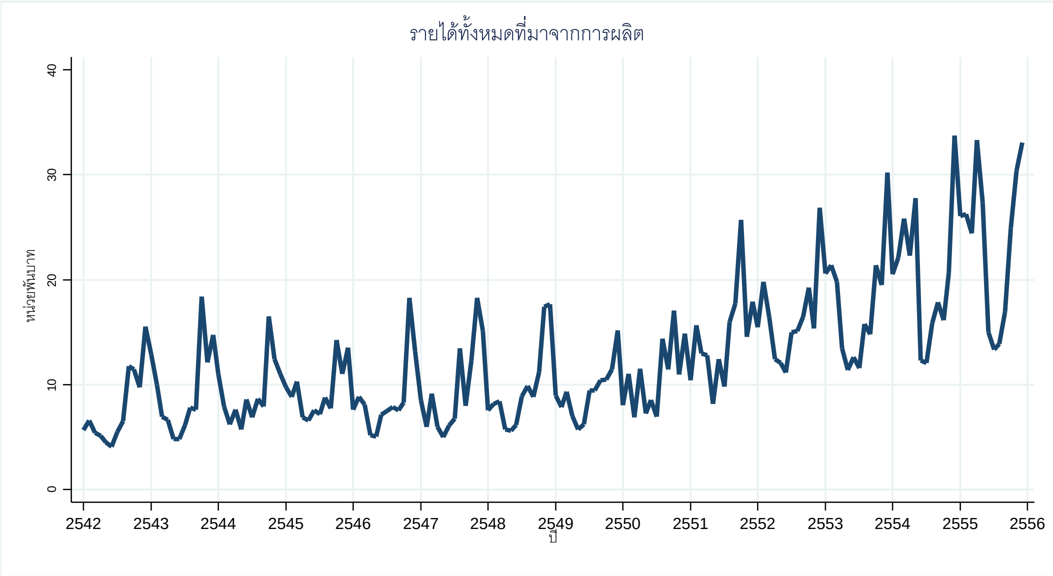


รูปที่ 4.33 : ส่วนประกอบความมั่งคั่งของครัวเรือน จังหวัดศรีสะเกษ
ตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)

4.2.2 รายรับของครัวเรือน (earning)

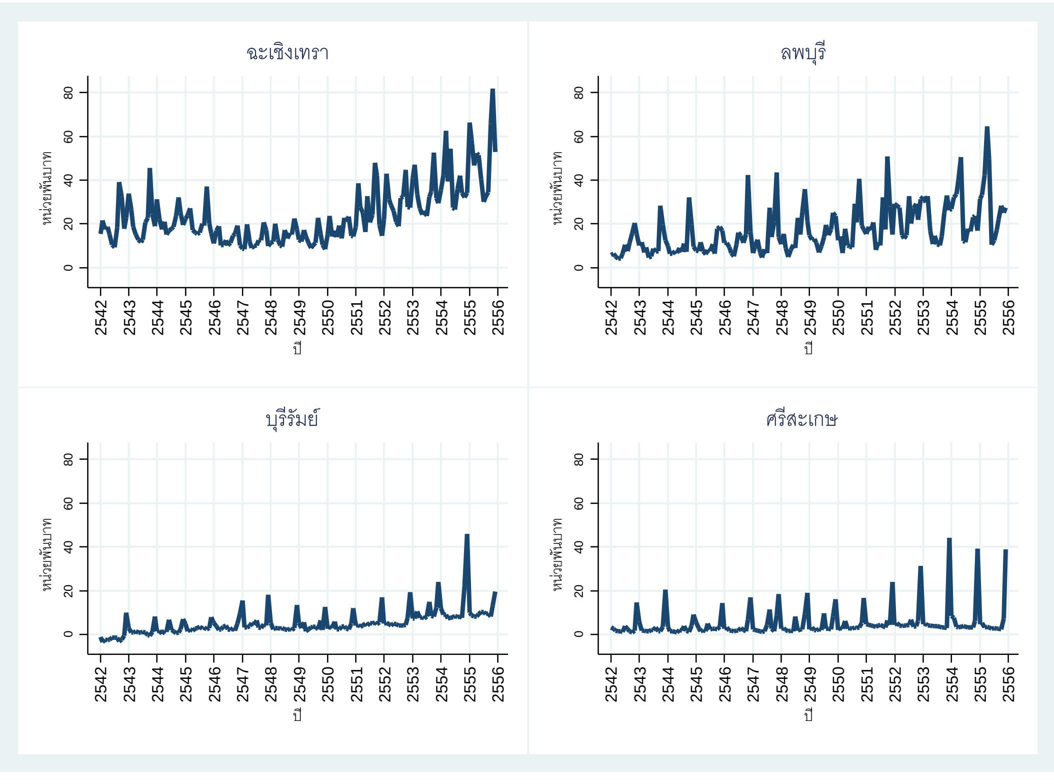
ก่อนหน้านี้เราได้พิจารณาเงินออมที่ได้จากการดำเนินงาน ในส่วนนี้เราจะพิจารณาถึงแหล่งที่มาของเงินออมในรูปของรายได้ (earning) เริ่มจากรายได้จากการผลิตซึ่งได้มาจากการประกอบอาชีพเป็นหลัก จากรูปที่ 4.34 พบว่า รายได้ต่อเดือนที่ได้จากการผลิตมีการแกว่งขึ้นและลดลงเป็นวัฏจักร เนื่องจากครัวเรือนส่วนใหญ่ประกอบอาชีพในภาคเกษตร โดยรายได้ที่เพิ่มขึ้นเป็นผลมาจากการขายผลผลิตในช่วงเก็บเกี่ยว ในขณะที่รายได้ที่ลดลงจะอยู่ในช่วงระหว่างการเพาะปลูก ซึ่งโดยเฉลี่ยจะเห็นได้ว่ารายได้จากการผลิตของครัวเรือนมีแนวโน้มเพิ่มขึ้นตามเวลา

[11] แหล่งที่มา : http://sisaket.mol.go.th/sites/sisaket.mol.go.th/files/72CA4808d01_0.pdf



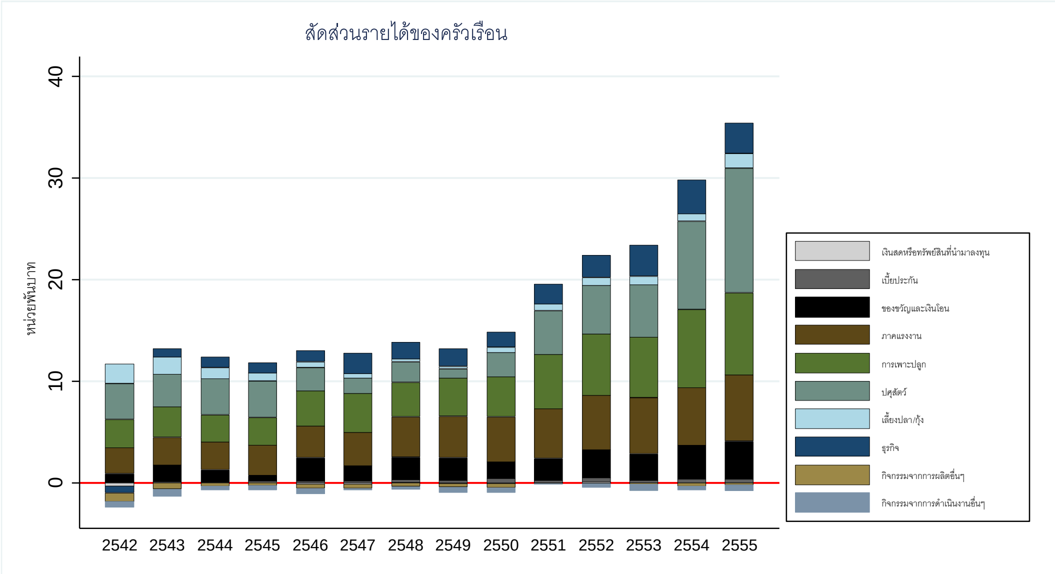
รูปที่ 4.34 : รายได้ทั้งหมดที่มาจากการผลิต (Income from production)
ข้อมูลรายเดือน ตั้งแต่ปี พ.ศ. 2542-2555

หากแยกพิจารณารายได้จากการผลิตในแต่ละจังหวัด ตามรูปที่ 4.35 พบว่า รายได้โดยเฉลี่ยเพิ่มขึ้นอย่างต่อเนื่อง ซึ่งรายได้ต่อเดือนยังคงเพิ่มขึ้นและลดลงตามวัฏจักรของผลผลิตเช่นเดียวกัน โดยที่ครัวเรือนในจังหวัดฉะเชิงเทรามีรายได้จากการผลิตมากที่สุด รองลงมาเป็นจังหวัดลพบุรี บุรีรัมย์ และศรีสะเกษ ตามลำดับ



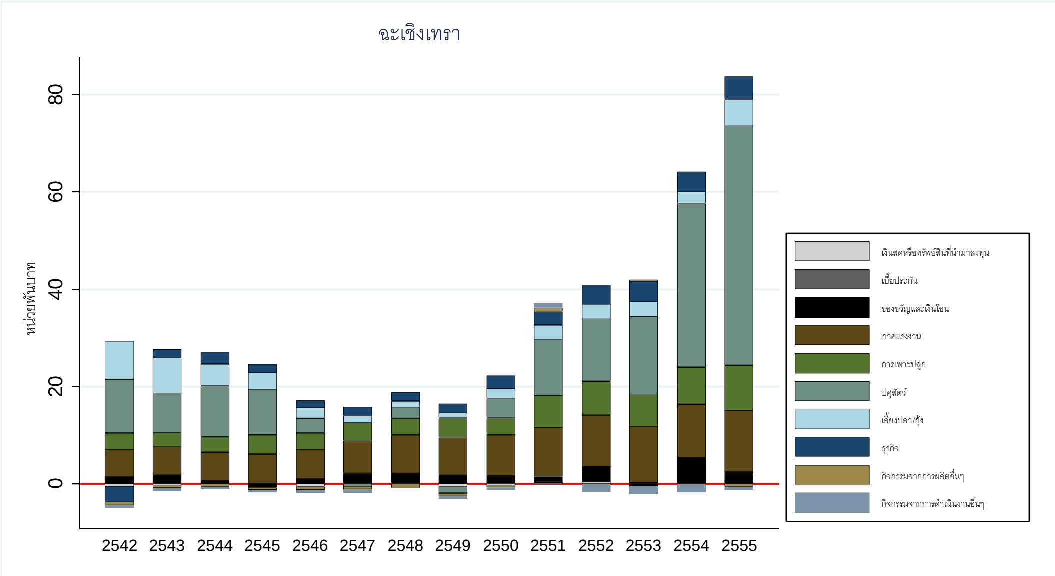
รูปที่ 4.35 : รายได้ทั้งหมดที่มาจากการผลิต (Income from production)
ข้อมูลรายเดือน ตั้งแต่ปี พ.ศ. 2542-2555 แยกรายจังหวัด

จะเห็นได้ว่าในทุกจังหวัดมีรายได้จากการผลิตเพิ่มขึ้นอย่างต่อเนื่อง ซึ่งหากต้องการทราบว่าครัวเรือนในแต่ละจังหวัดได้รับรายได้จากการผลิตในแหล่งใดบ้าง เราจะต้องพิจารณาจากแหล่งที่มาของรายได้ตามรูปที่ 4.36 ซึ่งพบว่า แหล่งรายได้ที่มากที่สุดของครัวเรือนมาจากปศุสัตว์ รองลงมาเป็นการเพาะปลูก และตามมาด้วยรายได้ที่ได้มาจากภาคแรงงาน



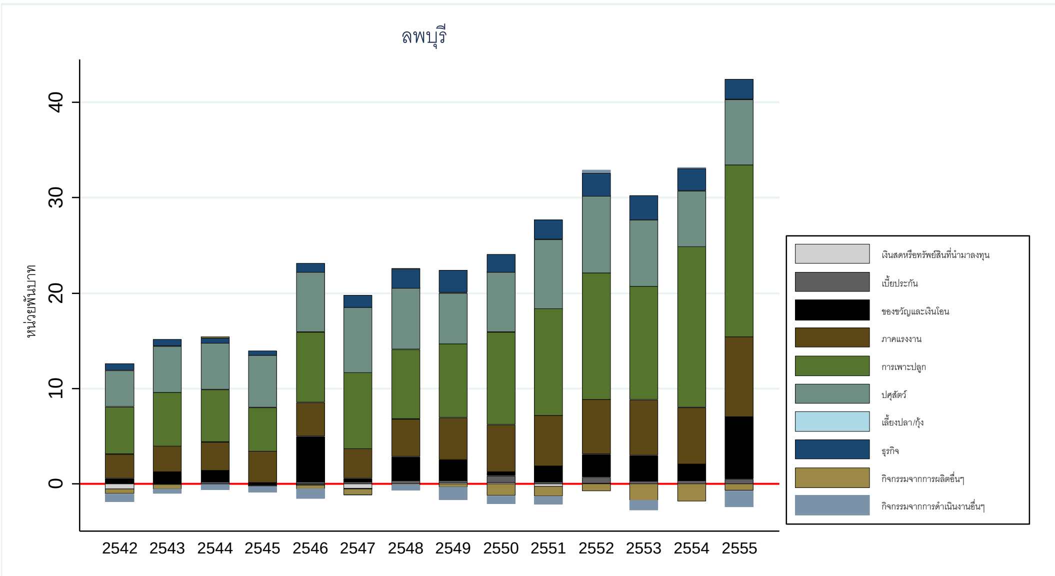
รูปที่ 4.36 : สัดส่วนรายได้ของครัวเรือน ตั้งแต่ปี พ.ศ. 2542-2555

โดยภาครวมพบว่า แหล่งรายได้ที่มากที่สุดของครัวเรือนมาจากปศุสัตว์ ซึ่งในแต่ละจังหวัดอาจจะมีแหล่งรายได้จากการผลิตแตกต่างกันไปขึ้นอยู่กับลักษณะทางภูมิศาสตร์และทรัพยกรที่มีอยู่ ดังนั้น หากพิจารณาแยกรายจังหวัดจะเห็นได้ว่า จากรูปที่ 4.37 แหล่งรายได้ที่มากที่สุดของครัวเรือนในจังหวัดฉะเชิงเทราคือการทำปศุสัตว์ เนื่องจากจังหวัดฉะเชิงเทรามีหลายครัวเรือนที่เลี้ยงไก่ไข่เพื่อส่งผลผลิตให้กับผู้ค้ารายใหญ่อย่างซีพีในปริมาณที่สูงมาก ทำให้รายได้ของครัวเรือนดังกล่าวสูงกว่าครัวเรือนที่ประกอบอาชีพอื่น ๆ ซึ่งในความเป็นจริงจำนวนครัวเรือนในจังหวัดฉะเชิงเทราที่เลี้ยงปลาและกุ้งมีมากกว่าครัวเรือนที่ทำปศุสัตว์ แต่กลับมีรายได้ที่ต่ำกว่าครัวเรือนที่ทำปศุสัตว์



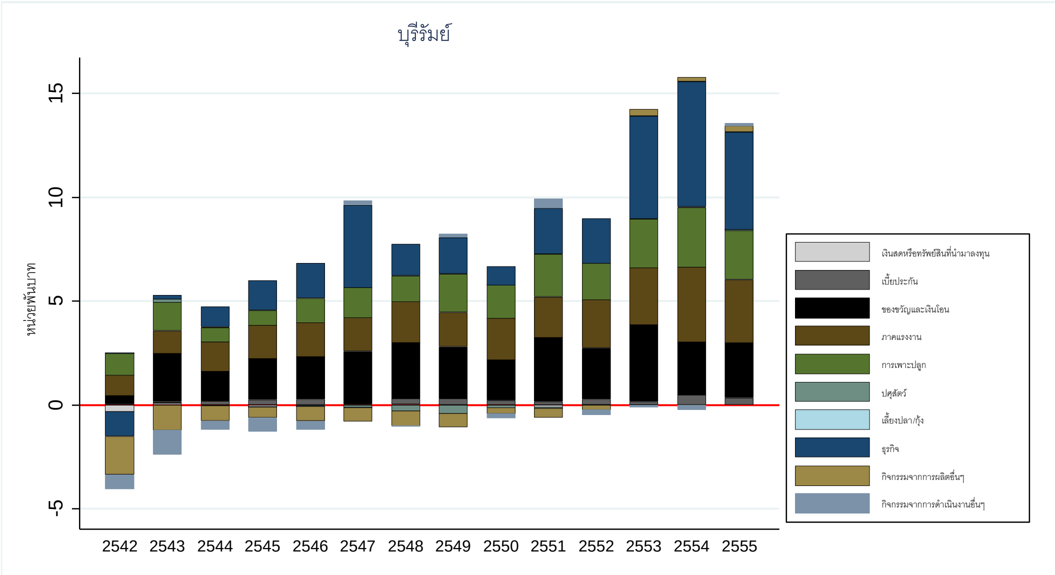
รูปที่ 4.37 : สัดส่วนรายได้ของครัวเรือน จังหวัดฉะเชิงเทรา ตั้งแต่ปี พ.ศ. 2542-2555

เมื่อพิจารณาครัวเรือนในจังหวัดลพบุรีพบว่า แหล่งรายได้จากการผลิตส่วนใหญ่มาจากการเพาะปลูก รองลงมาเป็นการทำปศุสัตว์ และถัดมาเป็นรายได้จากภาคแรงงาน ตามลำดับ ตามรูปที่ 4.38



รูปที่ 4.38 : สัดส่วนรายได้ของครัวเรือน จังหวัดลพบุรี ตั้งแต่ปี พ.ศ. 2542-2555

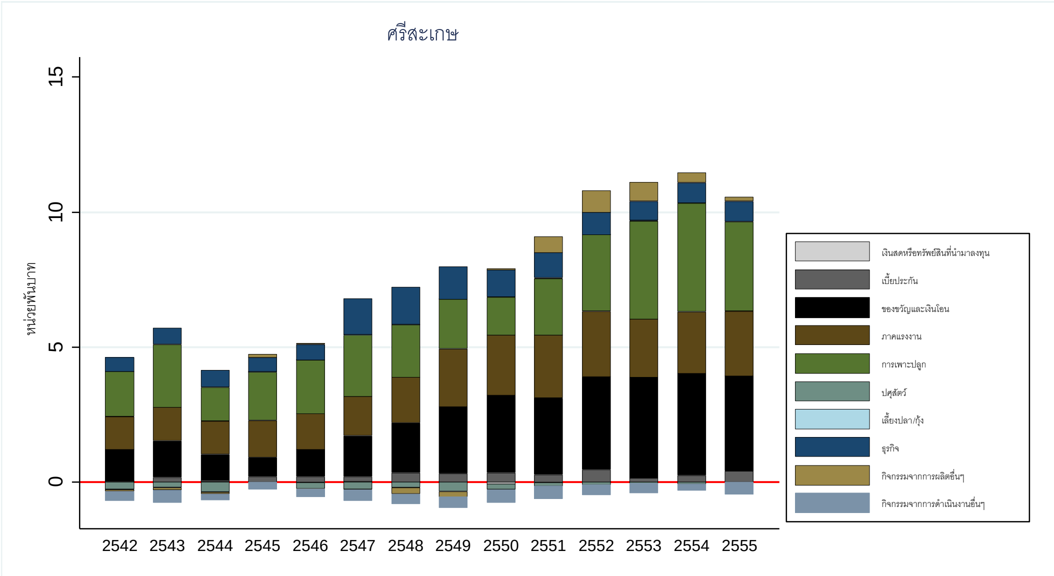
และจากรูปที่ 4.39 พบว่า ครัวเรือนในจังหวัดบุรีรัมย์มีแหล่งรายได้หลักมาจากการประกอบธุรกิจ เนื่องจากจังหวัดบุรีรัมย์มีจุดแข็งด้านการท่องเที่ยวและบริการ โดยมีสถานที่ท่องเที่ยวที่สำคัญอย่างเช่น ประสาทหินพนมรุ้ง และสนามกีฬาไอโมบาย นอกจากนี้ยังมีอาณาเขตเชื่อมต่อกับประเทศกัมพูชา ทำให้มีการค้าขายและแลกเปลี่ยนสินค้าได้สะดวกมากยิ่งขึ้น ทำให้ครัวเรือนในจังหวัดบุรีรัมย์มีรายได้จากภาคธุรกิจและการบริการเพิ่มขึ้นอย่างต่อเนื่อง



รูปที่ 4.39 : สัดส่วนรายได้ของครัวเรือน จังหวัดบุรีรัมย์ ตั้งแต่ปี พ.ศ. 2542-2555

ส่วนครัวเรือนในจังหวัดศรีสะเกษมีแหล่งรายได้จากการผลิตที่มากที่สุดมาจากการเกษตร โดยมีพืชผลหลักทางการเกษตร ได้แก่ ข้าว, มันสำปะหลัง, หอมแดง, กระเทียม, ข้าวโพด, ปอแก้ว, ถั่วลิสง ส่วนอาชีพที่สำคัญรองลงมาคือ อุตสาหกรรม โดยเฉพาะอุตสาหกรรมการแปรรูปผลผลิตการเกษตร การค้าและการบริการ[12] ซึ่งสอดคล้องกับแหล่งรายได้ที่ได้จากภาคแรงงานเป็นลำดับถัดมารองจากแหล่งรายได้ที่มาจากของขวัญและเงินโอน ดังรูปที่ 4.40

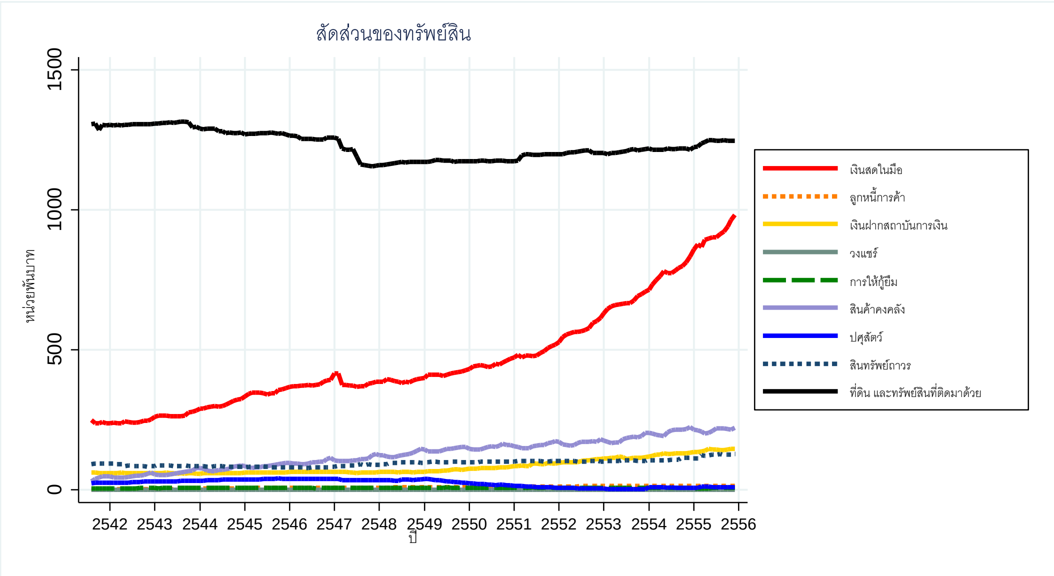
[12] แหล่งที่มา : https://sites.google.com/site/sarafyly/naeana-canghwad-srisakes/ch-kila-srisakes-meuxng-thiy-xef-si



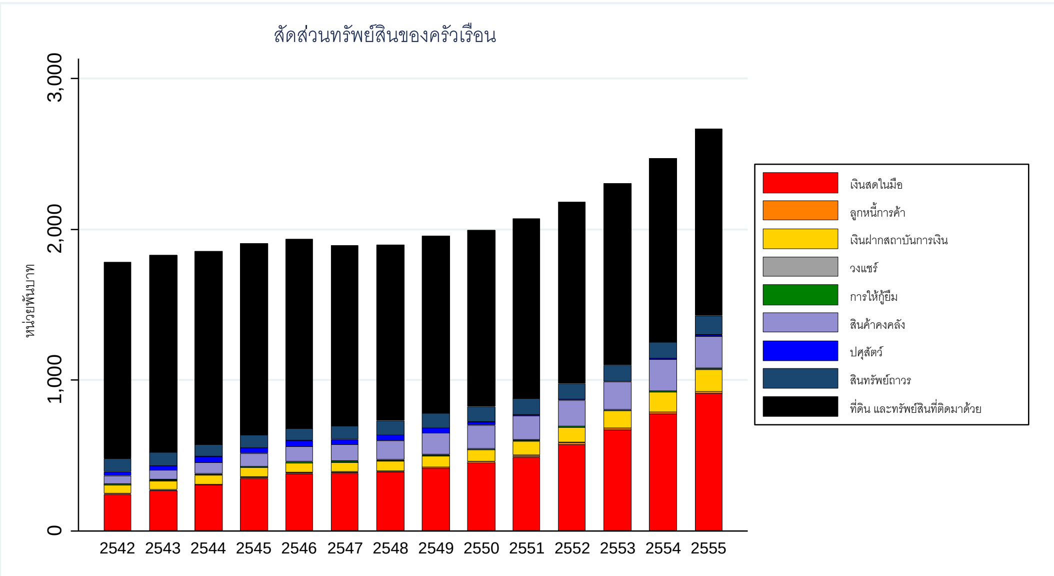
รูปที่ 4.40 : สัดส่วนรายได้ของครัวเรือน จังหวัดศรีสะเกษ ตั้งแต่ปี พ.ศ. 2542-2555

4.2.3 ทรัพย์สินครัวเรือน (asset)

เมื่อเราทราบว่าครัวเรือนมีรายได้หลักจากแหล่งใดบ้าง ในส่วนนี้เราจะมาดูว่าครัวเรือนมีทรัพย์สินที่ก่อให้เกิดรายได้ประเภทใดบ้าง ดังนั้น ทรัพย์สินครัวเรือน (asset) จึงหมายถึง ทรัพยากรที่ครัวเรือนเป็นเจ้าของ ซึ่งคาดว่าทรัพย์สินดังกล่าวจะก่อให้เกิดรายได้ในอนาคต ทั้งที่อยู่ในรูปของตัวเงินและไม่ใช่ตัวเงิน จากรูปที่ 4.41 และ 4.42 จะเห็นได้ว่าครัวเรือนมีทรัพย์สินที่เป็นที่ดินมากที่สุด และมีแนวโน้มของมูลค่าทรัพย์สินค่อนข้างคงที่ รองลงมา คือ เงินสดในมือซึ่งมีค่าเพิ่มขึ้นอย่างต่อเนื่อง ลำดับที่ 3 คือ สินค้าคงคลัง ตามด้วยเงินฝากในธนาคาร สินทรัพย์ถาวร ปศุสัตว์ เงินเชื่อ และสุดท้าย คือ เงินที่ได้จากวงแชร์

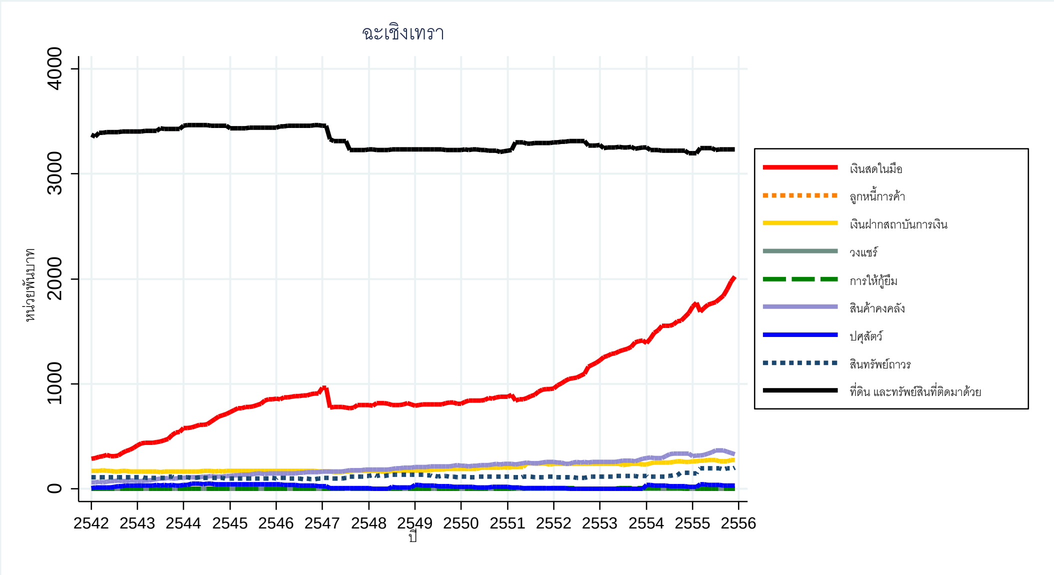


รูปที่ 4.41 : ประเภทของทรัพย์สินของครัวเรือน ข้อมูลรายเดือนตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)

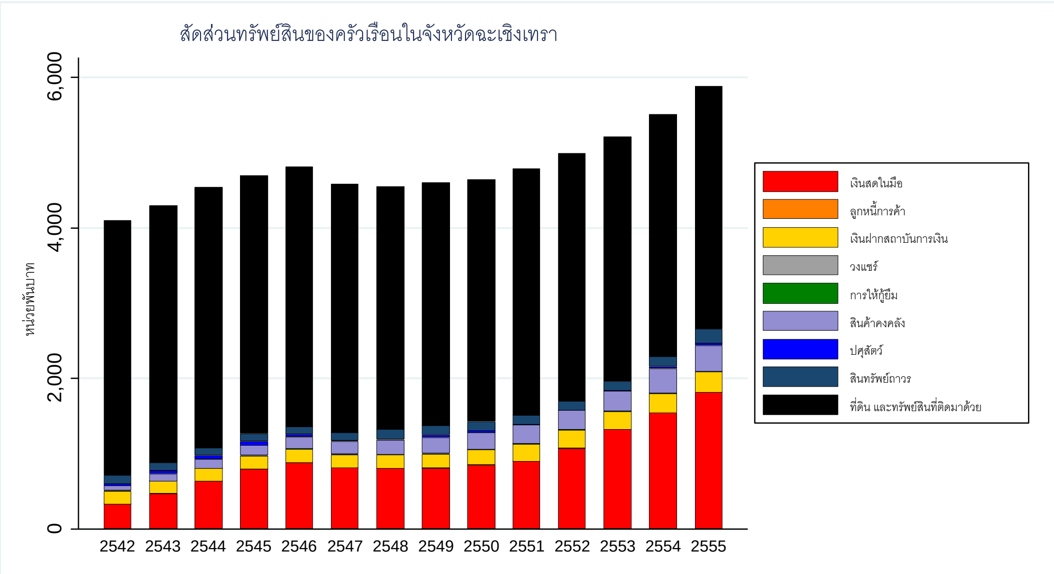


รูปที่ 4.42 : สัดส่วนของทรัพย์สินของครัวเรือน ข้อมูลรายปีตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)

เมื่อแยกรายจังหวัด จะเห็นได้ว่า ทรัพย์สินของครัวเรือนในจังหวัดฉะเชิงเทรามีมากที่สุด คือ ที่ดินซึ่งมีมูลค่าลดลง อาจเนื่องมาจากครัวเรือนมีการขายที่ดินออกไป ทำให้ครัวเรือนมีเงินสดในมือเพิ่มขึ้น อีกทั้งยังมีเงินฝากธนาคารและสินค้าคงคลังเพิ่มสูงขึ้นด้วย ตามรูปที่ 4.43 และ 4.44

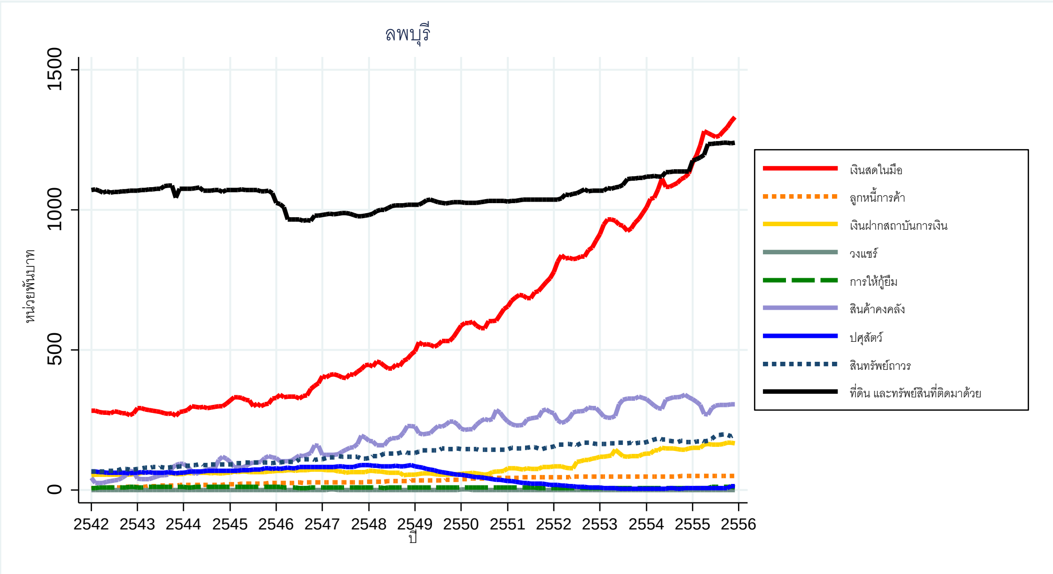


รูปที่ 4.43 : ประเภทของทรัพย์สินของครัวเรือน จังหวัดฉะเชิงเทรา
ข้อมูลรายเดือนตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)



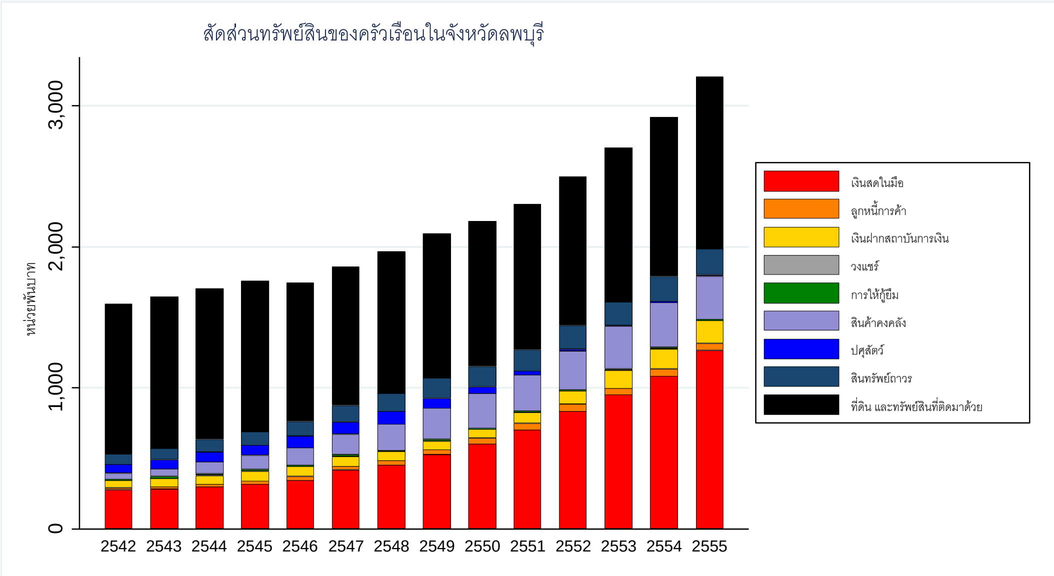
รูปที่ 4.44 : สัดส่วนของทรัพย์สินของครัวเรือน จังหวัดฉะเชิงเทรา
ข้อมูลรายปีตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)

และเช่นเดียวกันทรัพย์สินของครัวเรือนในจังหวัดลพบุรีที่มีค่ามากที่สุด คือ ที่ดิน ซึ่งมูลค่าที่ดินมีแนวโน้มเพิ่มขึ้น แต่ลดลงในปี พ.ศ.2546 อาจเนื่องมาจากการขายที่ดินออกไป รองลงมาเป็นเงินสดในมือซึ่งมีมูลค่าเพิ่มขึ้นอย่างต่อเนื่อง และจะเห็นได้ว่าในปี พ.ศ. 2555 เป็นต้นไป เงินสดในมือมีมูลค่าใกล้เคียงกับที่ดิน เนื่องจากครัวเรือนในจังหวัดลพบุรีประกอบอาชีพเกษตรกรรม โดยเฉพาะการปลูกข้าว ซึ่งเป็นพืชเศรษฐกิจหลักของจังหวัด โดยในปี พ.ศ. 2554 รัฐบาลในยุคนั้นมีโครงการรับจำนำข้าวทำให้เกษตรกรมีรายได้เพิ่มขึ้นจากการรับประกันราคาข้าว[13] ลำดับที่ 3 ยังคงเป็นสินค้าคงคลังที่มีแนวโน้มเพิ่มขึ้นเช่นกัน ดังรูปที่ 4.45 และ 4.46



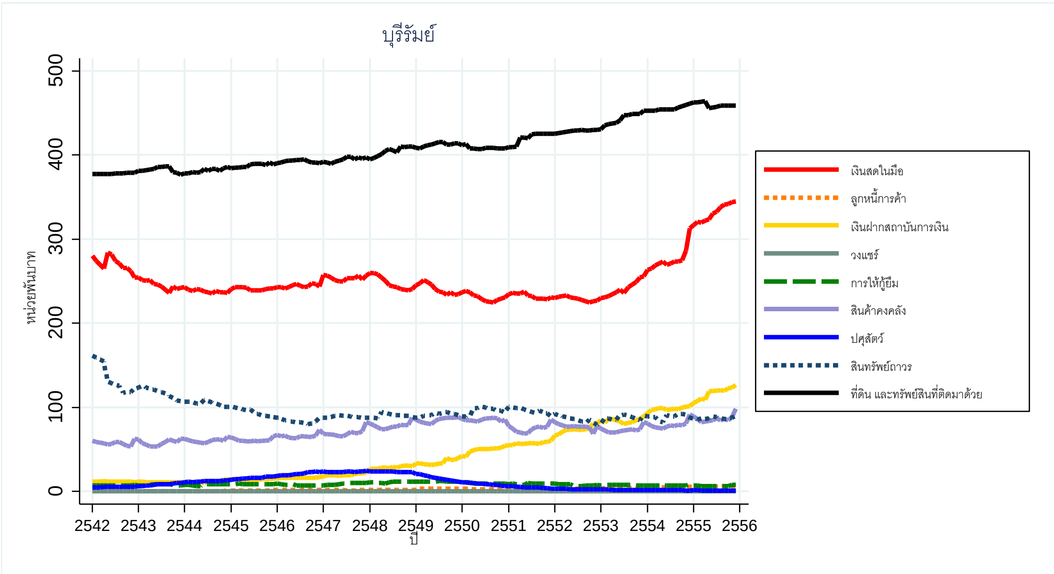
รูปที่ 4.45 : ประเภทของทรัพย์สินของครัวเรือน จังหวัดลพบุรี
ข้อมูลรายเดือนตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)

[13] แหล่งที่มา : http://www.bbc.com/thai/thailand-41410157

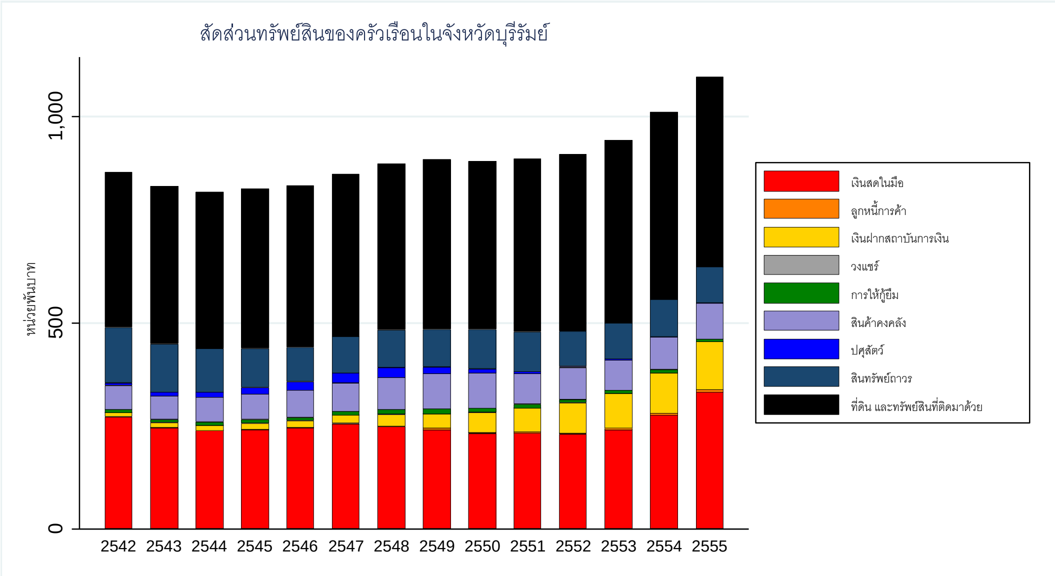


รูปที่ 4.46 : สัดส่วนของทรัพย์สินของครัวเรือน จังหวัดลพบุรี
ข้อมูลรายปีตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)

ในขณะที่ทรัพย์สินของครัวเรือนในจังหวัดบุรีรัมย์ที่มีมากที่สุดคือ ที่ดิน รองลงมา คือ เงินสดในมือ ซึ่งมีมูลค่าเพิ่มขึ้นอย่างต่อเนื่อง และในช่วงปี พ.ศ. 2549-2555 สินทรัพย์ของครัวเรือนที่อยู่ในรูปเงินฝากเพิ่มสูงขึ้นด้วยเช่นกัน แสดงให้เห็นว่าครัวเรือนในจังหวัดบุรีรัมย์มีพฤติกรรมการออมที่ดีกว่าเมื่อเทียบกับจังหวัดอื่น ๆ ตามรูปที่ 4.47 และ 4.48

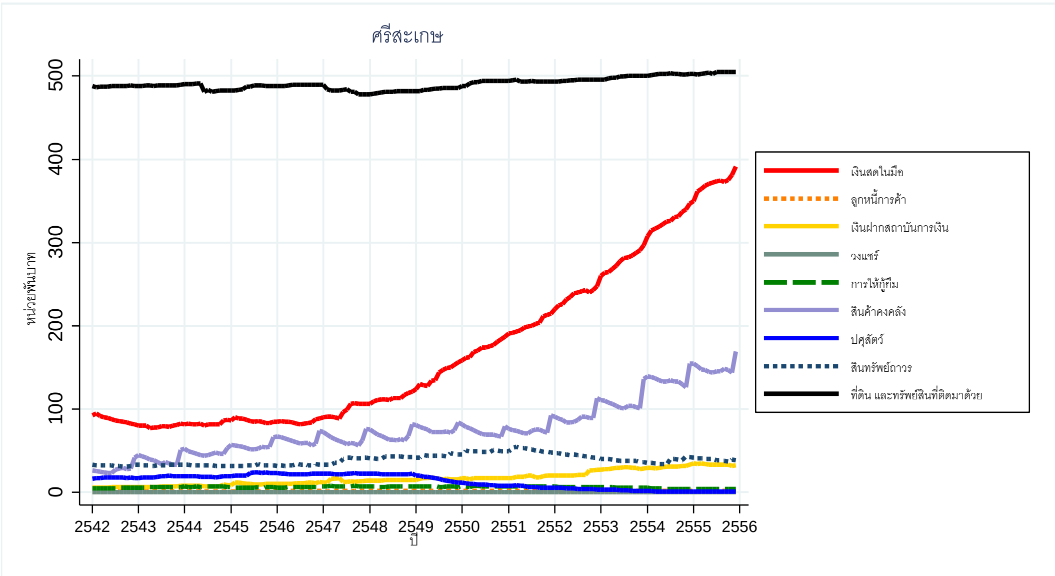


รูปที่ 4.47 : ประเภทของทรัพย์สินของครัวเรือน จังหวัดบุรีรัมย์
ข้อมูลรายเดือนตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)

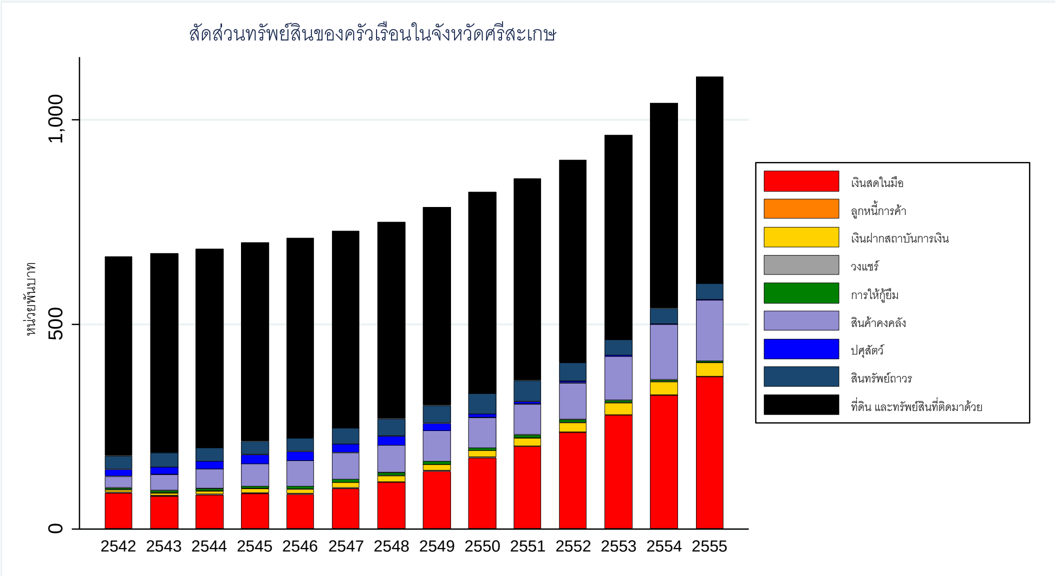


รูปที่ 4.48 : สัดส่วนของทรัพย์สินของครัวเรือน จังหวัดบุรีรัมย์
ข้อมูลรายปีตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)

ส่วนทรัพย์สินของครัวเรือนในจังหวัดศรีสะเกษที่มากที่สุดคือ ที่ดินซึ่งมีมูลค่าคงที่ รองลงมาคือ เงินสดในมือซึ่งมีมูลค่าเพิ่มขึ้นอย่างเห็นได้ชัดเช่นเดียวกันกับสินค้าคงคลัง ดังรูปที่ 4.49 และ 4.50



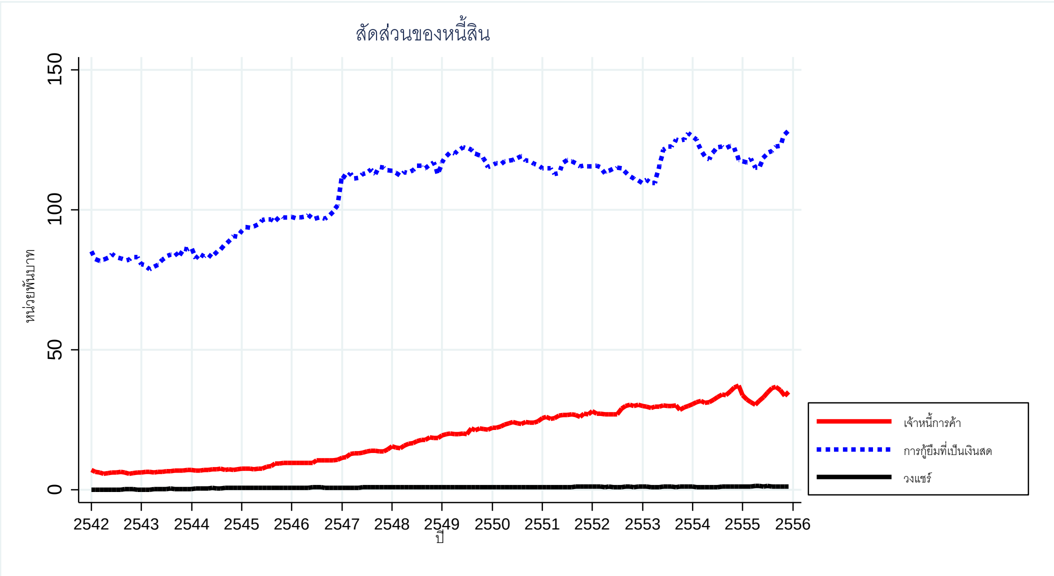
รูปที่ 4.49 : ประเภทของทรัพย์สินของครัวเรือน จังหวัดศรีสะเกษ
ข้อมูลรายเดือนตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)



รูปที่ 4.50 : สัดส่วนของทรัพย์สินของครัวเรือน จังหวัดศรีสะเกษ
ข้อมูลรายปีตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)

4.2.4 หนี้สิน (liabilities)

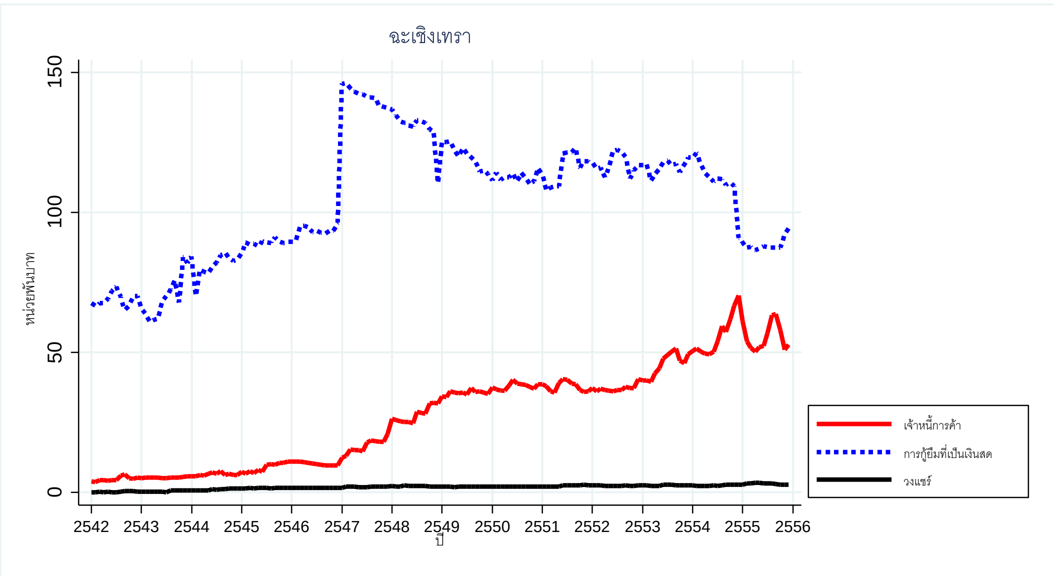
นอกจากการพิจารณาทรัพย์สินของครัวเรือนแล้วนั้น เราจะต้องพิจารณาหนี้สิน (liabilities) ของครัวเรือนประกอบด้วยเช่นเดียวกัน หากครัวเรือนมีหนี้สินมากกว่าทรัพย์สิน แสดงให้เห็นว่าครัวเรือนดังกล่าวมีความมั่งคั่งต่ำ ในขณะที่ครัวเรือนที่มีหนี้สินน้อยกว่าทรัพย์สิน จะแสดงให้เห็นว่าครัวเรือนมีความมมั่งคั่งสูง ดังนั้น เมื่อพิจารณาหนี้สินโดยรวมของครัวเรือนจากรูปที่ 4.51 พบว่าครัวเรือนมีหนี้สินที่มาจากการการกู้ยืมในรูปของเงินสด รองลงมาเป็นลูกหนี้การค้า และวงแชร์ตามลำดับ โดยหนี้สินของครัวเรือนมีแนวโน้มเพิ่มขึ้น แต่มูลค่าของหนี้สินที่เพิ่มขึ้นมีค่าน้อยกว่ามูลค่าของทรัพย์สิน แสดงให้เห็นว่าครัวเรือนโดยรวมมีความมั่งคั่งสูง



รูปที่ 4.51 : ประเภทของหนี้สินของครัวเรือน

ข้อมูลรายเดือนตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)

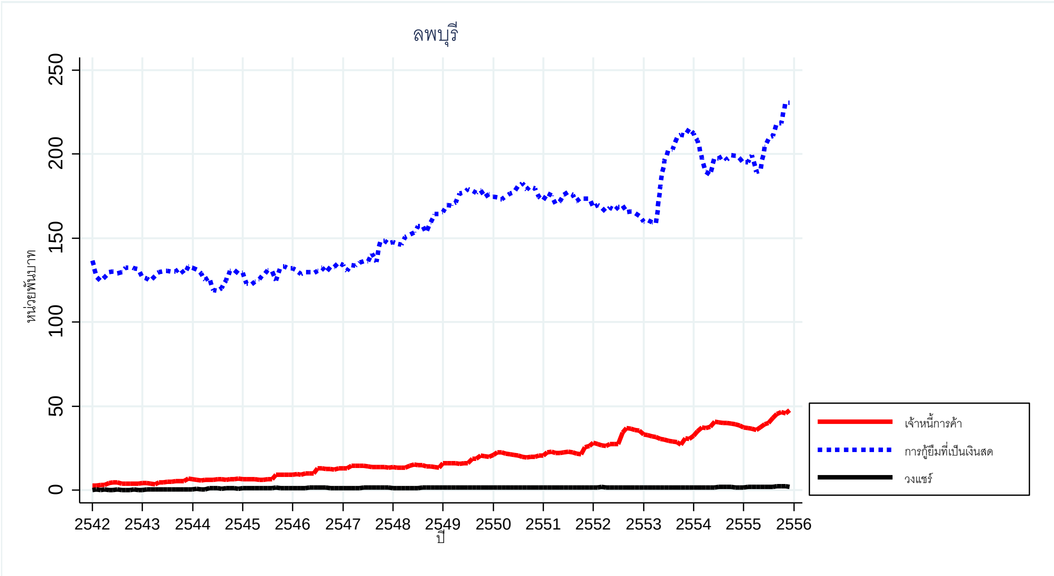
เมื่อพิจารณาหนี้สินแยกรายจังหวัด พบว่า หนี้สินของครัวเรือนในจังหวัดฉะเชิงเทราที่เป็นการกู้ยืมในรูปของเงินสดมีแนวโน้มลดลง ในขณะที่การกู้ยืมที่เป็นลูกหนี้การค้ากลับเพิ่มสูงขึ้น แสดงว่าครัวเรือนในจังหวัดฉะเชิงเทรามีพฤติกรรมการกู้ยืมเพื่อใช้ในการประกอบอาชีพ โดยมีมูลค่าของหนี้สินต่ำกว่าทรัพย์สิน ดังนั้น ครัวเรือนในจังหวัดฉะเชิงเทราจึงมีความมั่งคั่งสูง ดังรูปที่ 4.52



รูปที่ 4.52 : ประเภทของหนี้สินของครัวเรือน จังหวัดฉะเชิงเทรา

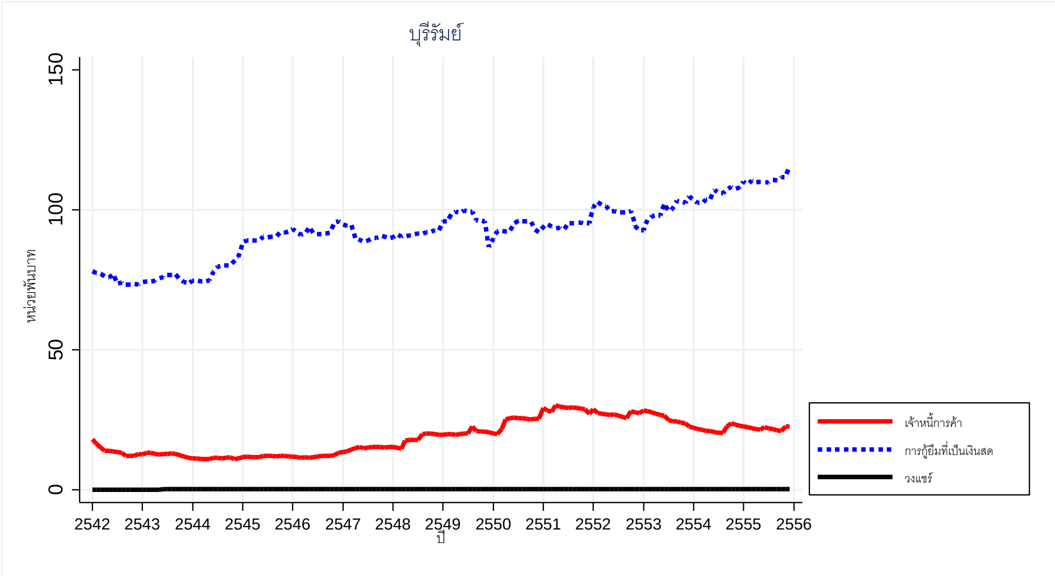
ข้อมูลรายเดือนตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)

ส่วนครัวเรือนในจังหวัดลพบุรี มีหนี้สินในรูปของเงินสดมากที่สุด รองลงมาเป็นลูกหนี้การค้าและวงแชร์ตามลำดับ โดยมีแนวโน้มเพิ่มขึ้น โดยมีมูลค่าของหนี้สินต่ำกว่าทรัพย์สิน ดังนั้น ครัวเรือนในจังหวัดลพบุรีจึงมีความมั่งคั่งสูงเช่นกัน ดังรูปที่ 4.53



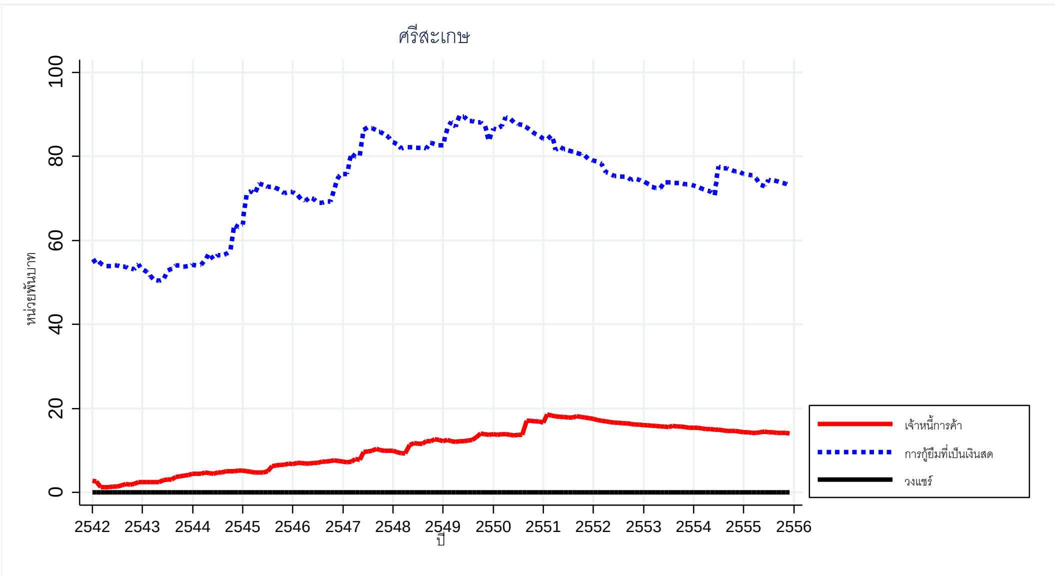
รูปที่ 4.53 : ประเภทของหนี้สินของครัวเรือน จังหวัดลพบุรี
ข้อมูลรายเดือนตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)

ส่วนครัวเรือนในจังหวัดพบุรีรัมย์ มีหนี้สินในรูปของเงินสดมากที่สุด รองลงมาเป็นลูกหนี้การค้าและวงแชร์ตามลำดับ โดยมีหนี้สินในรูปของเงินสดมีแนวโน้มเพิ่มขึ้น ในขณะที่ลูกหนี้การค้ากลับลดลง โดยมีมูลค่าของหนี้สินต่ำกว่าทรัพย์สิน ดังนั้น ครัวเรือนในจังหวัดบุรีรัมย์จึงมีความมั่งคั่งสูง ดังรูปที่ 4.54



รูปที่ 4.54 : ประเภทของหนี้สินของครัวเรือน จังหวัดบุรีรัมย์
ข้อมูลรายเดือนตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)

ส่วนครัวเรือนในจังหวัดศรีสะเกษ มีหนี้สินในรูปของเงินสดมากที่สุด รองลงมาเป็นลูกหนี้การค้า และวงแชร์ตามลำดับ ซึ่งหนี้สินในรูปของเงินสดและลูกหนี้การค้ามีแนวโน้มลดต่ำลงในปี พ.ศ. 2549 สอดคล้องกับทรัยพ์สินในรูปของเงินสดที่เพิ่มสูงขึ้นในปีดังกล่าว โดยมูลค่าของหนี้สินครัวเรือนยังต่ำกว่าทรัพย์สิน ดังนั้น ครัวเรือนในจังหวัดศรีสะเกษจึงมีความมั่งคั่งสูง ดังรูปที่ 4.55

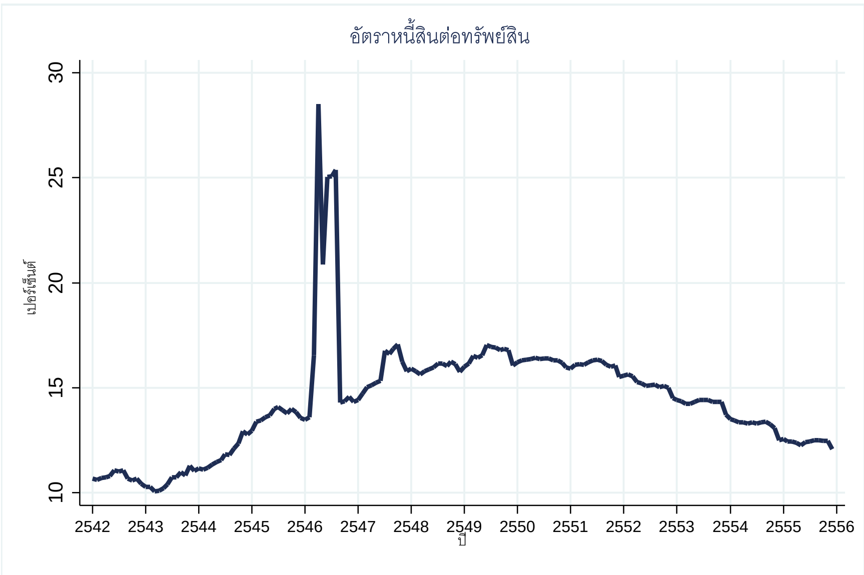


รูปที่ 4.55 : ประเภทของหนี้สินของครัวเรือน จังหวัดศรีสะเกษ
ข้อมูลรายเดือนตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยละพันบาท/เดือน)

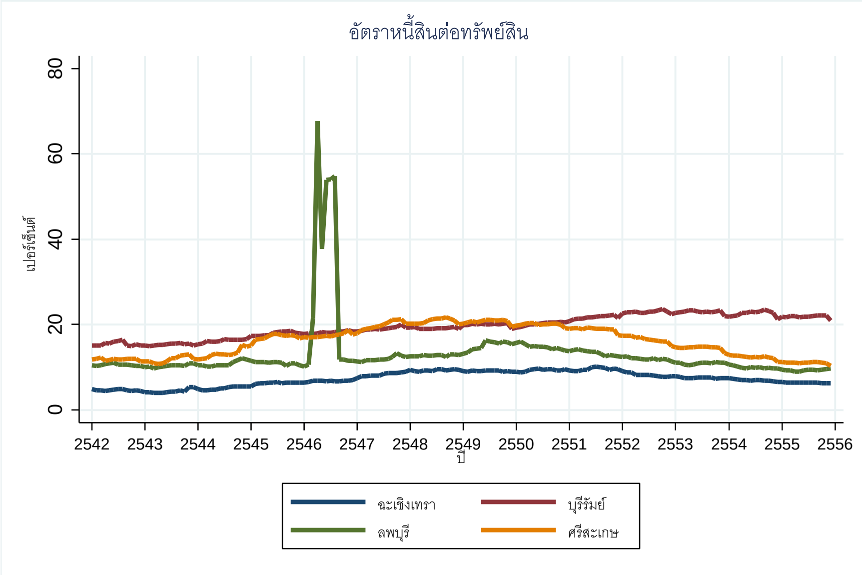
4.2.5 สัดส่วนของหนี้สินต่อทรัพย์สินของครัวเรือน (debt-to-asset ratio)

ในส่วนถัดไปนี้จะพิจารณาสัดส่วนของหนี้สินต่อทรัพย์สินของครัวเรือน (debt-to-asset ratio) ซึ่งแสดงถึงความสามารถในการชำระหนี้ ถ้าสัดส่วนสูงแสดงว่าครัวเรือนมีภาระหนี้สินสูง และความสามารถในการชำระหนี้ต่ำ จากรูปที่ 56 พบว่า ความสามารถในการชำระหนี้ของครัวเรือนเพิ่มขึ้นในช่วงแรกและลดต่ำลงในปี พ.ศ. 2550 การเพิ่มขึ้นของสัดส่วนหนี้สินต่อทรัพย์สินในช่วงแรกและลดลงในช่วงหลังนั้น แสดงให้เห็นว่า ช่วงแรกครัวเรือนมีการกู้ยืมเงินในจำนวนมากเพื่อนำมาลงทุนซึ่งทำให้ความสามารถในการชำระหนี้ต่ำ แต่เมื่อเวลาผ่านไปกิจการเริ่มมีกำไรและครัวเรือนมีความสามรถในการชำระหนี้เพิ่มขึ้นจึงทำให้สัดส่วนหนี้สินต่อทรัพย์สินลดต่ำลง

นอกจากนี้จะเห็นได้ว่า สัดส่วนหนี้สินต่อทรัพย์สินเพิ่มสูงสุดในช่วงปี พ.ศ. 2546 - 2547 ซึ่งจากรูปที่ 57 พบว่า ครัวเรือนในจังหวัดลพบุรีมีสัดส่วนหนี้สินต่อทรัพย์สินเพิ่มขึ้นในปีดังกล่าวเนื่องมาจากในปี พ.ศ.2546 มูลค่าของที่ดินลดลงจากการขายที่ดิน แต่หนี้สินกลับไม่ได้ลดลง ในขณะที่ เงินสดในมือกลับเพิ่มขึ้นในช่วงเวลาไม่กี่เดือนต่อมา ทำให้สัดส่วนหนี้สินต่อทรัพย์สินกลับลดลงมาอยู่ในระดับใกล้เคียงกับช่วงก่อนหน้านั้น

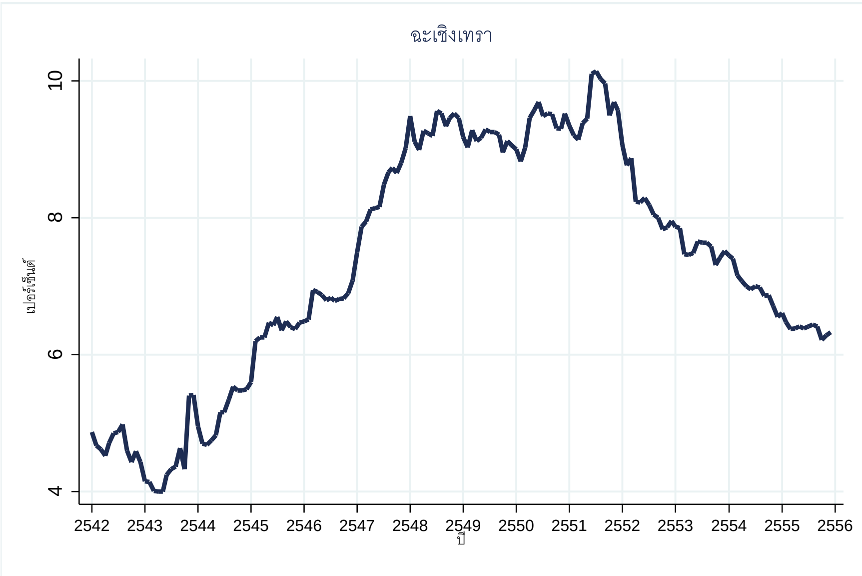


รูปที่ 4.56 : สัดส่วนของหนี้สินต่อสินทรัพย์ของครัวเรือน ตั้งแต่ปี พ.ศ. 2542-2555



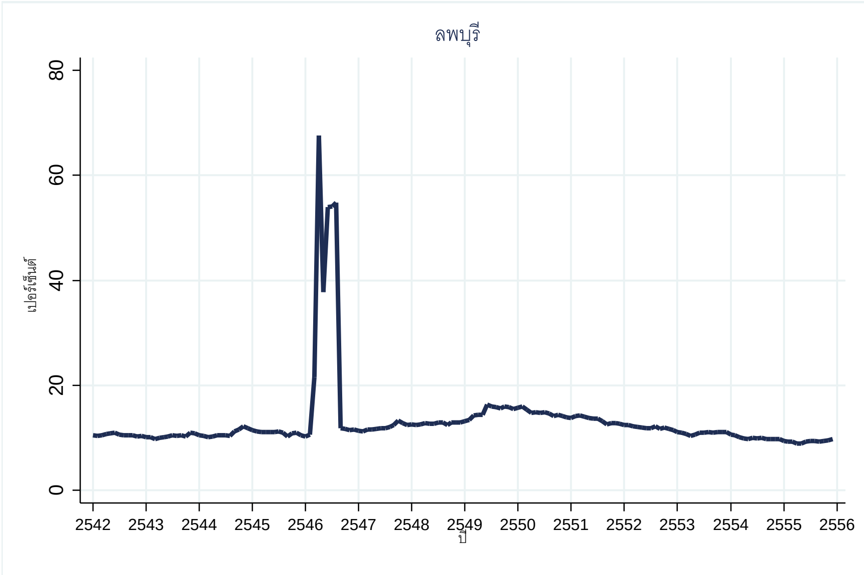
รูปที่ 4.57 : สัดส่วนของหนี้สินต่อสินทรัพย์ของครัวเรือน แยกรายจังกหวัด ตั้งแต่ปี พ.ศ. 2542-2555

หากพิจารณาสัดส่วนของหนี้สินต่อทรัพย์สินในจังหวัดฉะเชิงเทรา พบว่า สัดส่วนเพิ่มสูงที่สุดในปี พ.ศ. 2547 ซึ่งเกิดเหตุการณ์แม่น้ำบางปะกงเน่าเสีย และลดต่ำลงหลังจากปีดังกล่าว แสดงว่าครัวเรือนมีความสามารถในการชำระหนี้ที่ดีขึ้น ดังรูปที่ 4.58



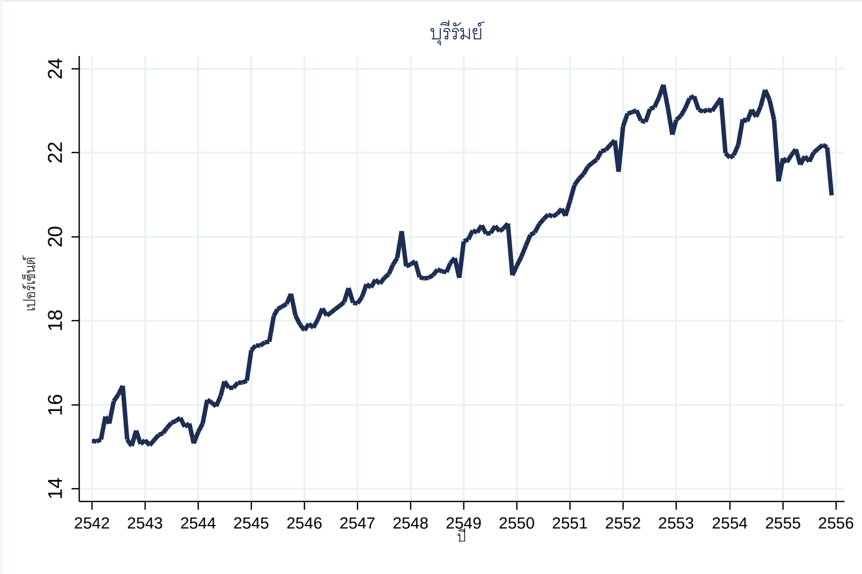
รูปที่ 4.58 : สัดส่วนของหนี้สินต่อสินทรัพย์ของครัวเรือน ตั้งแต่ปี พ.ศ. 2542-2555
จังหวัดฉะเชิงเทรา

ในขณะที่หากพิจารณาสัดส่วนของหนี้สินต่อทรัพย์สินในจังหวัดฉะเชิงเทรา พบว่า สัดส่วนเพิ่มสูงที่สุดในปี พ.ศ. 2546 ซึ่งครัวเรือนมีการขายที่ดินออกไปตามที่ได้กล่าวไปแล้วข้างต้น และหลังจากนั้น สัดส่วนก็ลดต่ำลง แสดงให้เห็นว่าครัวเรือนในจังหวัดลพบุรีมีความสามารถในการชำระหนี้ที่ดีขึ้นเช่นเดียวกัน ดังรูปที่ 4.59



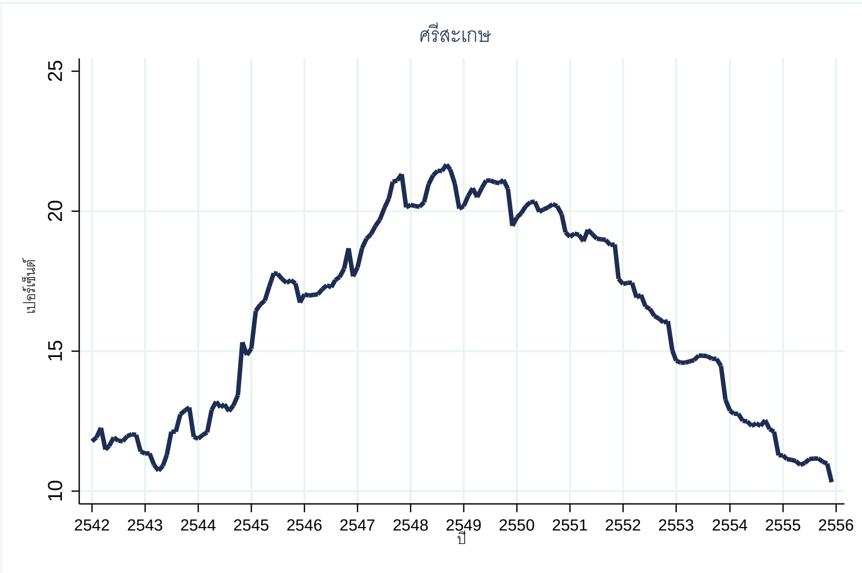
รูปที่ 4.59 : สัดส่วนของหนี้สินต่อสินทรัพย์ของครัวเรือน ตั้งแต่ปี พ.ศ. 2542-2555 จังหวัดลพบุรี

หากพิจารณาสัดส่วนของหนี้สินต่อทรัพย์สินในจังหวัดบุรีรัมย์ พบว่า สัดส่วนเพิ่มสูงขึ้นอย่างต่อเนื่อง และลงต่ำลงในปี พ.ศ. 2554 ซึ่งเป็นช่วงเศรษฐกิจของจังหวัดบุรีรัมย์ดีขึ้น และหลังจากนั้นสัดส่วนก็ลดต่ำลง แสดงให้เห็นว่าครัวเรือนในจังหวัดบุรีรัมย์มีความสามารถในการชำระหนี้ที่ดีขึ้น ดังรูปที่ 4.60



รูปที่ 4.60 : สัดส่วนของหนี้สินต่อสินทรัพย์ของครัวเรือน ตั้งแต่ปี พ.ศ. 2542-2555 จังหวัดบุรีรัมย์

สัดส่วนของหนี้สินต่อทรัพย์สินในจังหวัดศรีสะเกษ พบว่า สัดส่วนเพิ่มสูงและลดต่ำลงในปี พ.ศ. 2551 ซึ่งเป็นช่วงที่ครัวเรือนมีมูลค่าหนี้สินลดลง และหลังจากนั้นสัดส่วนก็ลดต่ำลง แสดงให้เห็นว่าครัวเรือนในจังหวัดศรีสะเกษมีความสามารถในการชำระหนี้ที่ดีขึ้น ดังรูปที่ 4.61



รูปที่ 4.61 : สัดส่วนของหนี้สินต่อสินทรัพย์ของครัวเรือน ตั้งแต่ปี พ.ศ. 2542-2555 จังหวัดศรีสะเกษ

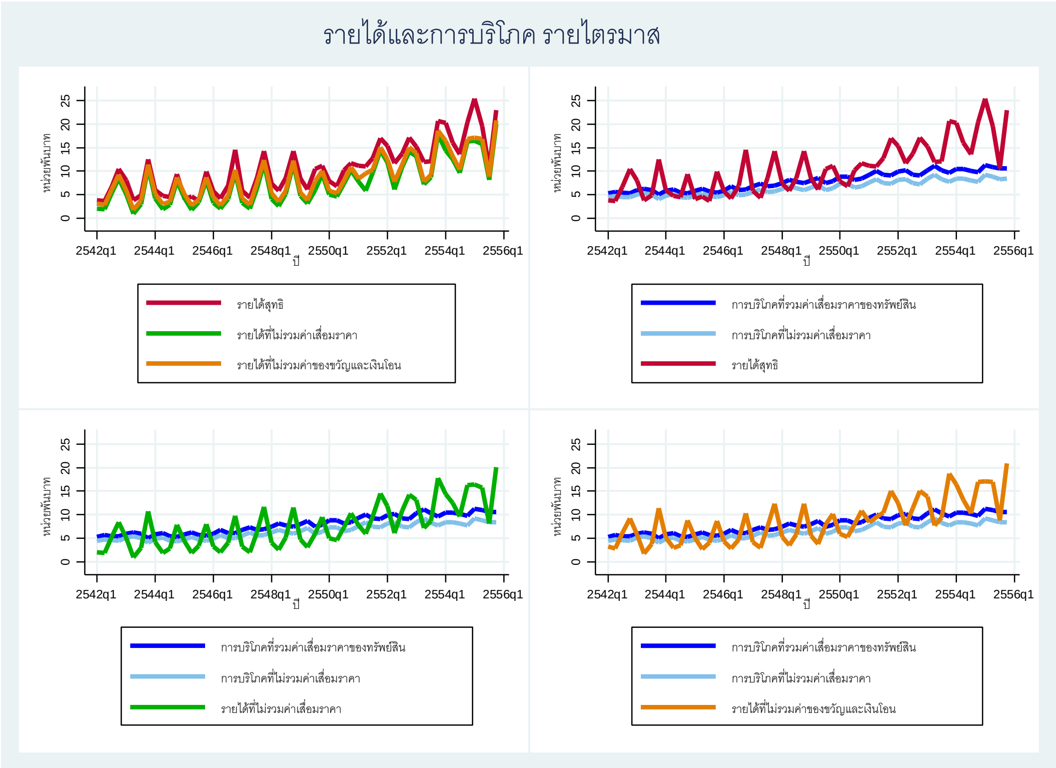
จากข้อมูลข้างต้นสามารถสรุปได้ว่า ครัวเรือนมีความมั่งคั่งเพิ่มขึ้น มีรายได้เพิ่มขึ้น มีทรัพย์สินที่เพิ่มขึ้น และมีหนี้สินเพิ่มขึ้นด้วยเช่นกัน ถึงแม้ครัวเรือนจะมีหนี้สินเพิ่มขึ้น แต่ครัวเรือนมีความสามารถในการชำระหนี้ที่ดี เนื่องจากครัวเรือนมีมูลค่าของทรัพย์สินโดยรวมมากกว่าหนี้สิน ซึ่งหนี้สินส่วนใหญ่น่าจะถูกนำมาลงทุนในกิจการของครัวเรือน เมื่อเวลาผ่านไปกิจการของครัวเรือนได้รับผลกำไรจึงทำให้ครัวเรือนมีความสามารถในการชำระหนี้เพิ่มขึ้น มูลค่าหนี้สินก็ลดต่ำลง นั่นแสดงให้เห็นว่า ครัวเรือนมีการจัดการบัญชีของครัวเรือนในเกณฑ์ที่ดี ดังนั้นถ้าครัวเรือนมีรายได้ที่เพิ่มสูงขึ้นแล้ว ครัวเรือนเองก็ควรจะมีเงินออมที่เพิ่มสูงขึ้นด้วยเช่นกัน เนื่องจากเราทราบว่าครัวเรือนมีความมั่งคั่งเพิ่มขึ้น ซึ่งแหล่งความมั่งคั่งของครัวเรือนที่มากที่สุดมาจากเงินออมที่ได้จากการดำเนินงาน โดยเงินออมของครัวเรือนสามารถคำนวณได้จากรายได้ของครัวเรือนหักออกจาการบริโภคของครัวเรือน

4.2.6 รายได้และการบริโภค (income and consumption)

ในส่วนนี้เราจะพิจารณารายได้และการบริโภค (income and consumption) ของครัวเรือนซึ่งจะบ่งบอกถึงการจัดการรายได้ของครัวเรือนเพื่อให้เพียงพอต่อการบริโภคและมีเหลือเก็บเป็นเงินออมไว้ใช้จ่ายในยามจำเป็น โดยรายได้จะถูกแบ่งออกเป็น 1) รายได้สุทธิ (net income) ซึ่งหมายถึงผลตอบแทนที่ครัวเรือนได้รับจากการขายสินค้าหรือบริการของกิจการ รวมทั้งผลตอบแทนอื่น ๆ ที่ไม่ได้เกิดจากการดำเนินงาน หลังจากหักค่าใช้จ่ายและค่าลดหย่อนแล้ว 2) รายได้ที่ไม่รวมค่าเสื่อมราคา (income excludes depreciation) เป็นรายได้ที่ไม่นำค่าเสื่อมราคามาคำนวณ โดยค่าเสื่อมราคาจะถูกคิดรวมอยู่ในมูลค่าของทรัพย์สินที่นำไปใช้ประโยชน์ในกิจการ เช่น อาคาร อุปกรณ์ เครื่องจักร รถยนต์ ซึ่งเป็นทรัพย์สินที่มีไว้ใช้งานเป็นระยะเวลายาวนานและมักจะมีมูลค่าสูง จึงมีการประมาณประโยชน์จากทรัพย์สินเหล่านี้เฉลี่ยเป็นค่าใช้จ่ายแต่ละงวด 3) รายได้ที่ไม่รวมค่าของขวัญและเงินโอน (income excludes gifts) เป็นรายได้ที่ครัวเรือนได้รับจากการขายสินค้าหรือบริการของกิจการ ซึ่งไม่รวมถึงของขวัญหรือเงินที่ครัวเรือนได้รับจากสมาชิกคนอื่น ๆ นอกครัวเรือน นอกจากนี้ยังแบ่งการบริโภคออกเป็น 2 กลุ่ม 1) การบริโภคที่รวมค่าเสื่อมราคาของทรัพย์สินครัวเรือน (consumption include depreciation of household assets) หมายถึงค่าใช้จ่ายต่าง ๆ ที่เกิดขึ้นทั้งในการดำเนินกิจการและการใช้จ่ายในครัวเรือนซึ่งรวมถึงค่าใช้จ่ายที่เกิดจากทรัพย์สินที่คิดค่าเสื่อมราคา 2) การบริโภคที่ไม่รวมค่าเสื่อมราคา (consumption) หมายถึงค่าใช้จ่ายต่าง ๆ ที่เกิดขึ้นทั้งในการดำเนินกิจการและการใช้จ่ายในครัวเรือนซึ่งรวมค่าใช้จ่ายที่เกิดจากทรัพย์สินที่ไม่คิดค่าเสื่อมราคา

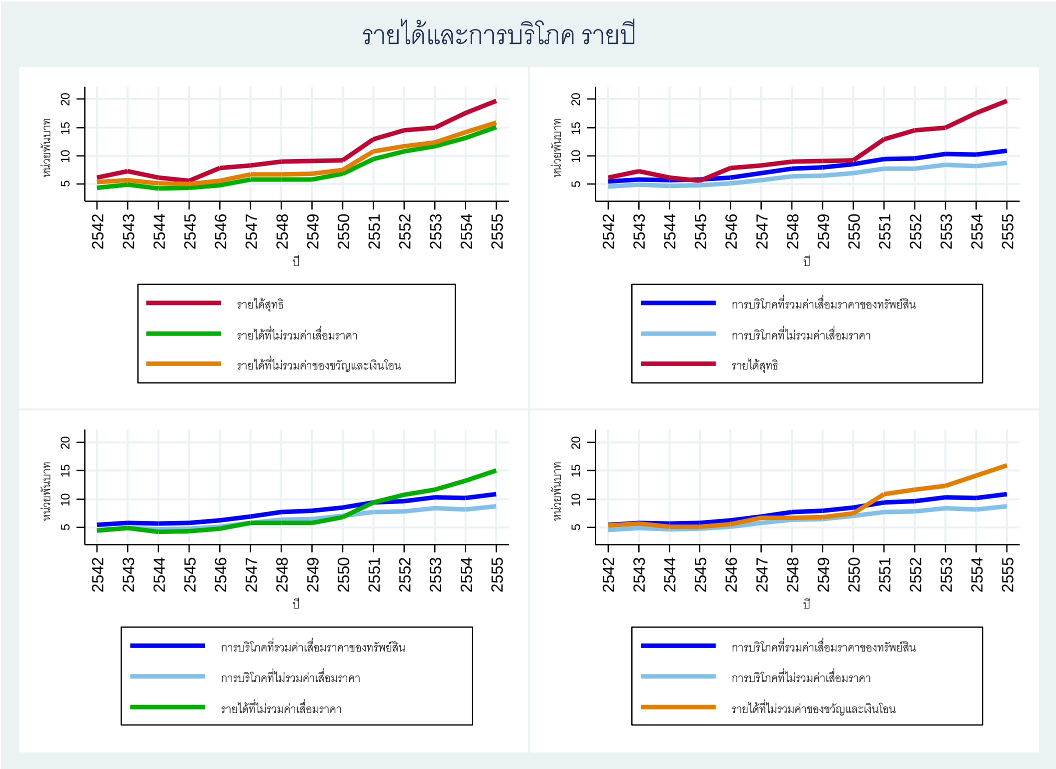
จากรูปที่ 4.62 พบว่า รายได้สุทธิ รายได้ที่ไม่รวมค่าเสื่อมราคา และรายได้ที่ไม่รวมค่าของขวัญและเงินโอนมีแนวโน้มเพิ่มขึ้นอย่างต่อเนื่อง โดยที่ครัวเรือนมีรายได้ที่มาจากของขวัญขวัญและเงินโอนสูงกว่ารายได้ที่มาจากทรัพย์สินที่ไม่รวมค่าเสื่อมราคา ซึ่งหากดูเป็นรายไตรมาสจะเห็นได้ว่ารายได้มีค่าเพิ่มขึ้นและลดลงตามฤดูกาล ขณะที่การบริโภคทั้งที่รวมและไม่รวมค่าเสื่อมราคามีค่าค่อนข้างคงที่

และเมื่อพิจารณารายได้เปรียบเทียบกับการบริโภคจะพบว่า หลังจากปี พ.ศ. 2550 เป็นต้นไป ครัวเรือนมีรายได้สูงกว่าการบริโภคอย่างเห็นได้ชัด



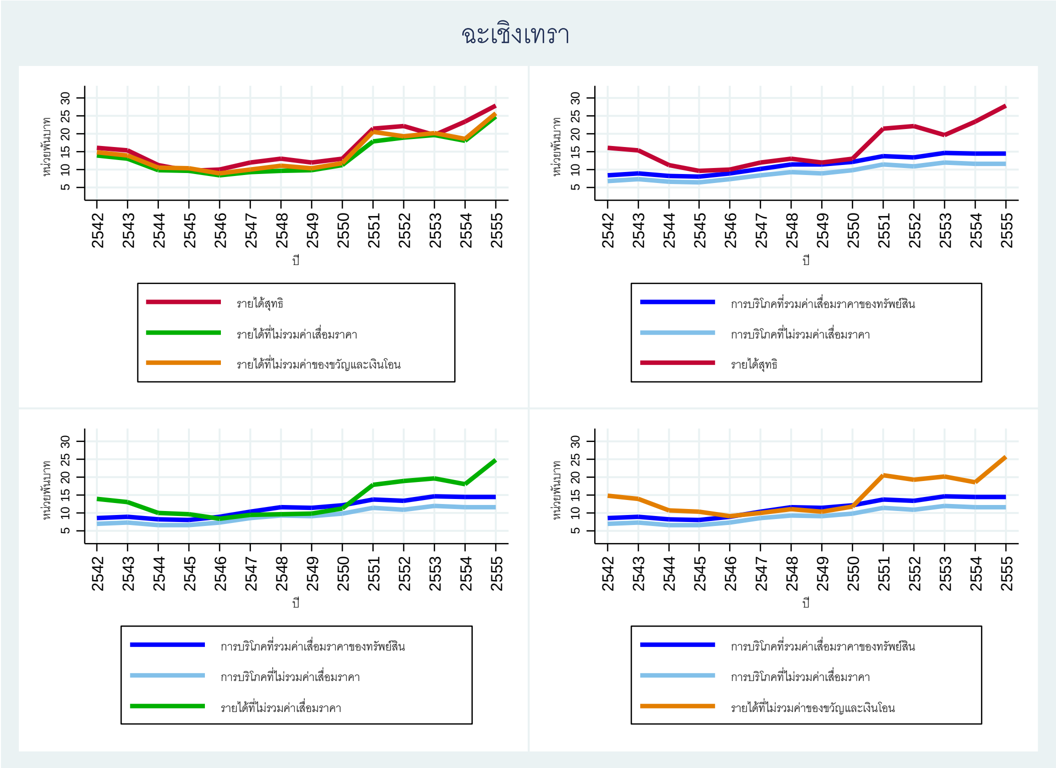
รูปที่ 4.62 : รายได้และการบริโภคของครัวเรือนรายไตรมาส ตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยพันบาท/เดือน)

นอกจากนี้ หากดูข้อมูลเป็นรายปีจะเห็นได้ว่ารายได้มีการเพิ่มขึ้นอย่างต่อเนื่อง และมีความผันผวนน้อยกว่าข้อมูลเป็นรายไตรมาส ถ้าดูรายได้สุทธิเปรียบเทียบกับการบริโภคพบว่ารายได้มีค่าสูงกว่าการบริโภคตลอดระยะเวลา ในขณะที่ถ้าดูรายได้ที่ไม่รวมค่าเสื่อมราคาและรายได้ที่ไม่รวมของขวัญและเงินโอนเทียบกับการบริโภคพบว่าก่อนปี พ.ศ. 2550 รายได้มีค่าต่ำกว่าการบริโภค และเพิ่มสูงขึ้นหลังจากปีดังกล่าว ดังรูปที่ 4.63



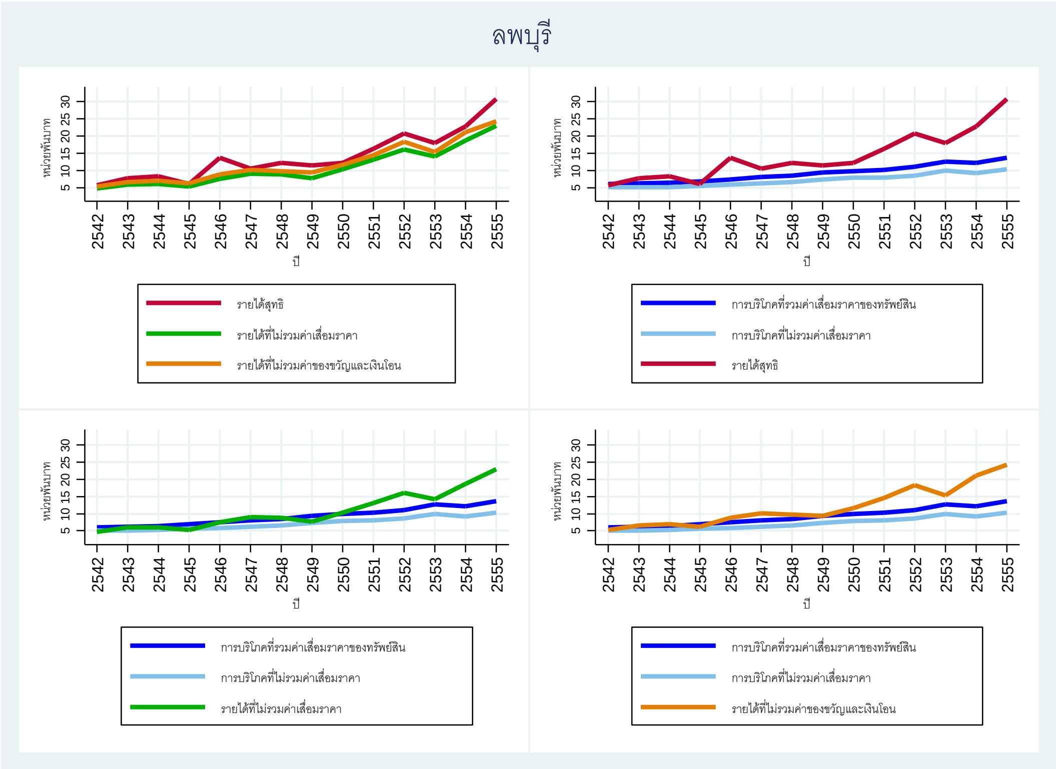
รูปที่ 4.63 : รายได้และการบริโภคของครัวเรือนรายปี ตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยพันบาท/เดือน)

เมื่อพิจารณารายได้และการบริโภคแยกรายจังหวัด จะเห็นว่า ครัวเรือนในจังหวัดฉะเชิงเทรามีรายได้สุทธิสูงกว่าการบริโภคตลอดช่วงระยะเวลา ในขณะที่รายได้ที่ไม่รวมค่าเสื่อมราคาและรายได้ที่ไม่รวมของขวัญและเงินโอนมีค่าใกล้เคียงกับการบริโภคในช่วงปี พ.ศ. 2546-2550 และเพิ่มสูงกว่าการบริโภคในปี พ.ศ. 2551 เป็นต้นไป สะท้อนให้เห็นว่า ครัวเรือนในจังหวัดฉะเชิงเทรามีรายได้หลักมาจากการดำเนินกิจการซึ่งมีทรัพย์สินที่มีค่าเสื่อมราคาในปริมาณที่น้อย นอกจากนี้ ครัวเรือนเองยังไม่จำเป็นต้องพึ่งพิงแหล่งเงินจากภายนอก เนื่องจากรายได้สุทธิมีค่าใกล้เคียงกับรายได้ที่ไม่รวมค่าเสื่อมราคาและรายได้ที่ไม่รวมของขวัญและเงินโอน ดังรูปที่ 4.64



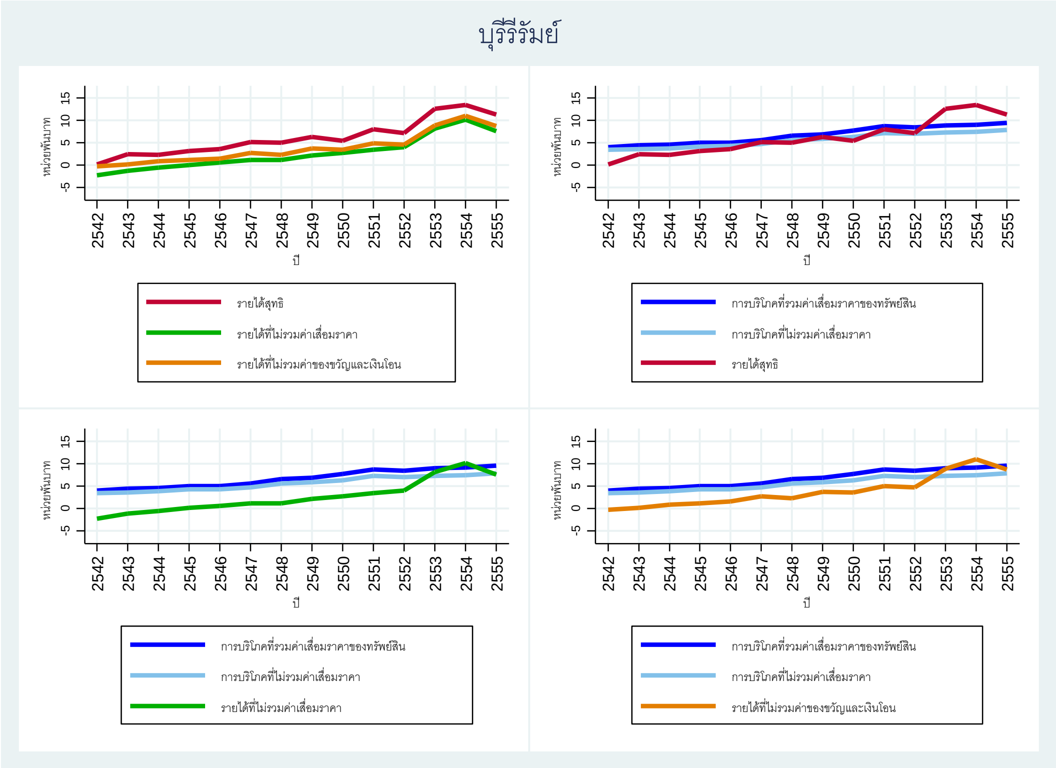
รูปที่ 4.64 : รายได้และการบริโภคของครัวเรือนในจังหวัดฉะเชิงเทรา
ข้อมูลรายปี ตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยพันบาท/เดือน)

เมื่อพิจารณารายได้และการบริโภคของครัวเรือนในจังหวัดลพบุรีพบว่า ครัวเรือนมีรายได้สุทธิสูงกว่าการบริโภค ในขณะที่รายได้ที่ไม่รวมค่าเสื่อมราคาและรายได้ที่ไม่รวมของขวัญและเงินโอนมีค่าใกล้เคียงกับการบริโภคในช่วงปี พ.ศ. 2542-2549 และเพิ่มสูงกว่าการบริโภคในปี พ.ศ. 2550 เป็นต้นไป โดยที่ครัวเรือนมีรายได้สุทธิใกล้เคียงกับรายได้ที่ไม่รวมค่าเสื่อมราคาและรายได้ที่ไม่รวมของขวัญและเงินโอน สะท้อนว่า ครัวเรือนในจังหวัดลพบุรีไม่จำเป็นต้องพึ่งพิงแหล่งเงินจากภายนอกเช่นเดียวกับจังหวัดฉะเชิงเทรา ดังรูปที่ 4.65



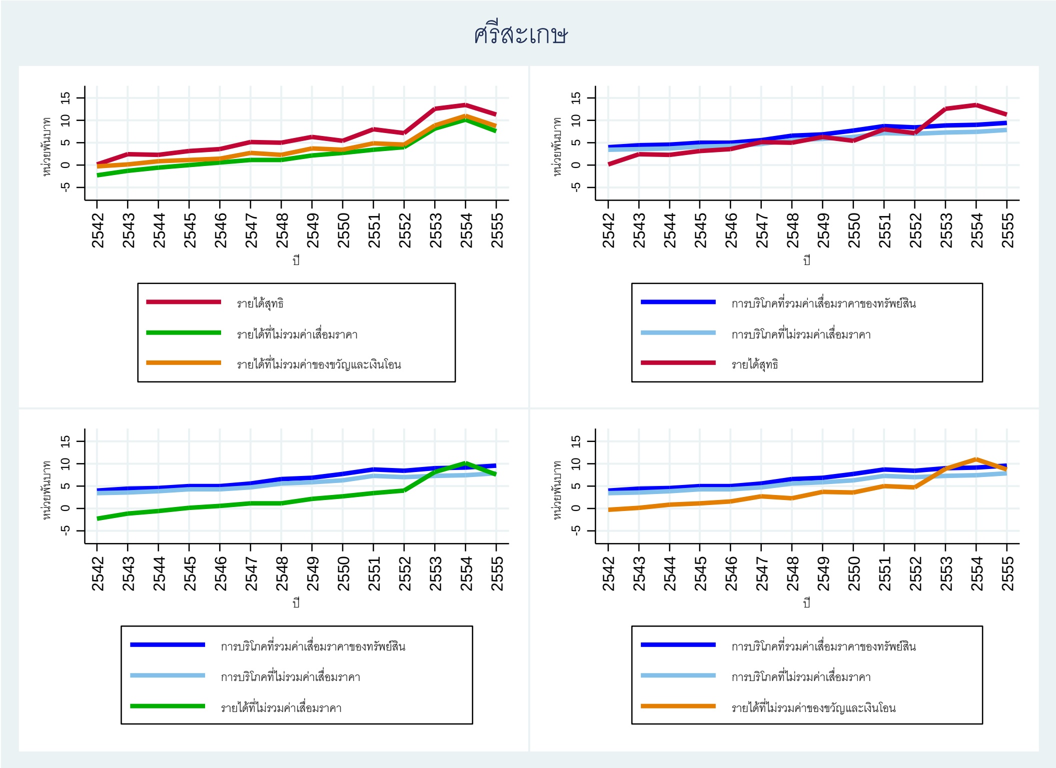
รูปที่ 4.65 : รายได้และการบริโภคของครัวเรือนในจังหวัดลพบุรี
ข้อมูลรายปี ตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยพันบาท/เดือน)

เมื่อพิจารณารายได้และการบริโภคของครัวเรือนในจังหวัดบุรีรัมย์พบว่า ครัวเรือนมีรายได้สุทธิต่ำกว่าการบริโภค แต่เพิ่มสูงขึ้นหลังจากปี พ.ศ. 2553 ซึ่งเป็นช่วงที่ครัวเรือนมีรายได้ส่วนใหญ่มาจากการประกอบธุรกิจ ในขณะที่รายได้ที่ไม่รวมค่าเสื่อมราคาและรายได้ที่ไม่รวมของขวัญและเงินโอนมีค่าน้อยกว่าการบริโภคตลอดระยะเวลา หากเปรียบเทียบรายได้ที่ไม่รวมค่าเสื่อมราคากับการบริโภคพบว่า ครัวเรือนมีรายจ่ายจากทรัพย์สินที่มีค่าเสื่อมราคาในปริมาณมาก ทำให้รายได้ของครัวเรือนที่ไม่รวมค่าเสื่อมราคามีค่าน้อยลง นอกจากนี้ เมื่อเทียบรายได้ที่ไม่รวมค่าของขวัญและเงินโอนกับการบริโภคพบว่า รายได้ที่ไม่รวมเงินโอนและของขวัญมีค่าต่ำกว่าการบริโภค สะท้อนว่า ครัวเรือนในจังหวัดบุรีรัมย์ยังคงต้องพึ่งพิงแหล่งเงินจากภายนอกครัวเรือน ดังรูปที่ 4.66



รูปที่ 4.66 : รายได้และการบริโภคของครัวเรือนในจังหวัดบุรีรัมย์
ข้อมูลรายปี ตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยพันบาท/เดือน)

เมื่อพิจารณารายได้และการบริโภคของครัวเรือนในจังหวัดศรีสะเกษพบว่า ครัวเรือนมีรายได้สุทธิต่ำกว่าการบริโภค แต่เพิ่มสูงขึ้นหลังจากปี พ.ศ. 2546 ซึ่งเป็นช่วงที่ครัวเรือนมีรายได้ส่วนใหญ่มาจากของขวัญและเงินโอน ในขณะที่รายได้ที่ไม่รวมค่าเสื่อมราคาและรายได้ที่ไม่รวมของขวัญและเงินโอนมีค่าน้อยกว่าการบริโภคตลอดระยะเวลา หากดูระยะห่างระหว่างรายได้ที่ไม่รวมค่าเสื่อมราคาและรายได้ที่ไม่รวมเงินโอนและของขวัญกับรายได้สุทธิมีระยะห่างอย่างเห็นได้ชัด จึงสรุปได้ว่าครัวเรือนมีค่าใช้จ่ายจากสินทรัพย์ที่รวมค่าเสื่อมราคามาก และมีรายได้จากของขวัญและเงินโอนมากเช่นเดียวกัน ซึ่งรายได้จากของขวัญและเงินโอนมีปริมาณเพียงพอต่อการบริโภคของครัวเรือน ดังรูปที่ 4.67



รูปที่ 4.67 : รายได้และการบริโภคของครัวเรือนในจังหวัดศรีสะเกษ
ข้อมูลรายปี ตั้งแต่ปี พ.ศ. 2542-2555 (หน่วยพันบาท/เดือน)

จากผลลัพธ์ในข้างต้น สามารถสรุปได้ว่า ครัวเรือนทั้ง 4 จังหวัด ยังคงมีแนวโน้มในการจัดการบัญชีครัวเรือนอยู่ในเกณฑ์ดี เนื่องจากครัวเรือนมีรายได้เพิ่มขึ้นอย่างต่อเนื่อง ในขณะที่ครัวเรือนมีการบริโภคอยู่ในระดับที่คงที่ ดังนั้น รายได้ของครัวเรือนจึงสูงกว่าการบริโภค ส่งผลต่อการเพิ่มขึ้นของเงินออม ทำให้ความมั่งคั่งของครัวเรือนเพิ่มขึ้นด้วยเช่นกัน

บทที่ 5
บทสรุป

ชุดโครงการพัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทยได้ให้การสนับสนุน Townsend Thai Data ให้เกิดการพัฒนาฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำ (panel data) อย่างต่อเนื่อง อันจะช่วยพัฒนางานวิจัยและองค์ความรู้เกี่ยวกับเศรษฐกิจและสังคมของครัวเรือนไทย โดยในระยะที่ 2 ของโครงการฯ ได้มีโครงการย่อยที่พัฒนาข้อมูลและประยุกต์ใช้ข้อมูลทั้งหมด 5 โครงการ ได้แก่ (1) โครงการฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำเพื่อการวิจัยด้านเศรษฐศาสตร์และสังคม, (2) โครงการการเปลี่ยนแปลงของความยากจนในชนบทไทย จากกรณีศึกษา Townsend Thai Data, (3) โครงการการจัดทำฐานข้อมูลแบบตัวอย่างซ้ำจากข้อมูลภาวะการทำงานของประชากร, (4) โครงการบทบาทของสภาพครัวเรือนและการอพยพออกต่อการพัฒนาคุณภาพกำลังแรงงานในอนาคตของสังคมสูงวัย และ (5) โครงการการเปลี่ยนแปลงโครงสร้างการผลิตด้านการเกษตรของครัวเรือนในชนบท: บทเรียนจากข้อมูล Townsend Thai Data นอกจากนี้ ชุดโครงการฯ ยังได้จัดทำสถิติเบื้องต้นของการเปลี่ยนแปลงโครงสร้างประชากรและสภาพเศรษฐกิจของครัวเรือนในชนบทไทย จากฐานข้อมูลบัญชีครัวเรือน (Household Financial Accounting) เพื่อให้เราเข้าใจถึงสภาพความเป็นอยู่ และปัญหาเศรษฐกิจของครัวเรือนไทยในชนบทที่เกิดขึ้นตลอดระยะเวลาตั้งแต่อดีตจนถึงปัจจุบันเป็นเวลากว่า 14 ปี (พ.ศ. 2542-2555)

อีกทั้ง งานวิจัยและบทความที่เกิดขึ้นจากชุดโครงการนี้ จะช่วยให้เกิดองค์ความรู้และข้อเสนอแนะเชิงนโยบายที่สำคัญต่อประเทศชาติ ซึ่งคณะผู้วิจัยเชื่อว่า ชุดโครงการพัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทยจะเป็นประโยชน์ต่อนักวิจัยและผู้กำหนดนโยบายของประเทศให้สามารถออกแบบนโยบายโดยอาศัยงานวิจัยเชิงลึกจากฐานข้อมูล Townsend Thai Data ที่มีคุณภาพจนเกิดประสิทธิภาพสูงสุดต่อประเทศได้ นอกจากนี้ คณะผู้วิจัยได้จัดสัมมนาวิชาการระดับนานาชาติ ในหัวข้อ “Finance and Development: Data, Research, and Policy Design” เพื่อเผยแพร่องค์ความรู้และสร้างเครือข่ายกับหน่วยงานต่าง ๆ ทั้งภาครัฐและเอกชนอย่างต่อเนื่องเพื่อให้งานวิจัยเชิงลึกนี้ถูกนำไปใช้ประโยชน์อย่างแท้จริง

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ภาคผนวก ก.

(งานวิจัยและบทความที่ได้จากการประยุกต์ใช้ข้อมูล Townsend Thai Data)

Economic development, flow of funds, and the equilibrium interaction of financial frictions

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We use a variety of different datasets from Thailand to study not only the extremes of micro and macro variables but also within-country flow of funds and labor migration. We develop a general equilibrium model that encompasses regional variation in the type of financial friction and calibrate it to measured variation in regional aggregates. The model predicts substantial capital and labor flows from rural to urban areas even though these differ only in the underlying financial regime. Predictions for micro variables not used directly provide a model validation. Finally, we estimate the impact of a policy of counterfactual, regional isolationism.

regional flow of funds | financial frictions | Thailand | big data | isolationist policies

Different regions within a given country interact in capital, labor, and product markets. This is reflected in cross-regional flows of these factors and goods. Regions also differ from each other locally in a number of dimensions. One of these is the financial environment, that is, the specific financial obstacles faced by local residents. In this paper we ask whether this regional heterogeneity in financial obstacles is in itself enough to generate the flows of factor inputs across space consistent with the data and the observed uneven geographic concentration in economic activity. We use a structural model with detailed micro data, aggregated but intermediate-level "meso" data, and macro data and find the answer to these questions to be yes: Differences in financial regimes across regions have the potential to explain these observed phenomena. This is a first-order result that has important implications for the debate on populism and contemporary pressures for regional isolation. Urban or industrialized areas might contemplate restrictions on interregional labor migration with the belief this might be helpful to local residents, raising local wages. However, if isolationist policies and the maligning of banks and capital markets also bring restrictions on the interregional flow of capital, then the overall impact can be substantial drops in average income, consumption, and wealth and large increases in local inequality.

Our paper also makes a timely contribution to research methods, in particular to the use of big data to uncover new findings and guide policy. Although big data are frequently thought of as the use of large administrative datasets, they include other types of data and refer to studies in which there is both a complexity and variety of data that need to be linked, connected, and correlated (1). The term "big theory" is used as a counterweight (2). We use a theoretical model here as a way to organize data, and this combination of big theory and big data yields the surprising implications regarding the factor flows just mentioned.*

Ours is one of the few papers in the economics literature that incorporates a micro-founded model of frictional lending with cross-regional heterogeneity and does so in a general equilibrium environment. More specifically, the research we report here uses micro data to document that a moral hazard (MH) regime is found to prevail in urban and industrialized areas and a limited commitment (LC) regime in rural and agrarian areas. This micro theory/data combination in conjunction with meso theory and data on flows and concentration of economic activity allows us to discover that regional heterogeneity in the financial environment is an important determinant of how different regions within countries interact and how they respond to policy. The same mechanism may potentially be relevant for understanding factor flows across countries.

In the United States there has been a surge of interest in local economies given the now-evident heterogeneity across them in the run-up to the financial crisis as well as in the response patterns thereafter.† Unfortunately, though, we do not have in the United States some of the details needed, down to individual actors. In the emerging-market application of this paper, Thailand, we have integrated financial accounts (income statements, balance sheets, and cash flows) at the household and small and medium enterprise level for stratified random samples of some communities (3). From these monthly data, we have community-level income and product accounts (National Income and Product Accounts) as well as the flows: balance of payments and flow of funds accounts (4). Provinces were selected for variation in their level of development, two in the relatively poor agrarian northeast and two in the developed and industrialized central region near Bangkok. We have annual data from stratified

Significance

Variation in the type of financial frictions faced by households and firms is an overlooked dimension of regional heterogeneity that has the potential to explain cross-regional factor flows and differences in concentration of economic activity. Our research combines a theoretical model with a complexity and variety of data from Thailand. The theoretical model features variation in financial regimes, moral hazard, and limited commitment, inferred from the data. In a counterfactual experiment we explore the effects of protecting wages in urban areas from incoming migrants and protecting rural areas from capital outflow. Economic life in cities would suffer enormously, as would rural and national productivity, with an increase in overall inequality.

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*Yet a model is not useful if it makes the wrong predictions because an incorrect underlying structure was guessed or imposed, without checking on the data. That is, big theory needs big data, not just the other way around.

†The level of geographic disaggregation varies across these US studies, in part depending on data used, from states to commuting zones to metropolitan statistical areas to ZIP codes.

random samples of rural villages and urban neighborhoods that are representative within each province.[‡] In sum, we use data on many different variables from a variety of different sources to motivate and discipline our theory—theory motivated by big data.

The theory is a micro-founded and totally integrated micro–macro model. Households make decisions about what occupation to enter, namely, whether to earn a wage or to run an enterprise of some size, and face various possible obstacles in the financing of business and in insurance to smooth consumption. Financial service providers compete in offering contracts to clients, pooling risk like mutual funds and intermediating funds from savers to borrowers. There are two difficulties here, which we overcome. The first is to solve a rich contracting problem involving occupational choice and production decisions for heterogeneous households that differ in their wealth while respecting incentive and LC constraints that differ across regions. Our technical innovation is to show how to integrate this contracting problem in general equilibrium by inverting the Pareto frontier between households and intermediaries, thereby replacing promised utility as the relevant state variable by household wealth. The second difficulty is finding a steady state with market-determined prices, equilibrium wages, and interest rates, again in the context of heterogeneity in financial obstacles across communities and, within each type of community, heterogeneity in wealth (endogenously determined by forward-looking agents) and in latent talent (following an exogenous stochastic process).

We impose as in the data that there is an MH problem for households and firms in the central region of Thailand, and in urban areas, and an LC, capital constraint in the northeast region and in rural areas. In our primary calibration, the model predicts that 23% of capital in industrialized areas is imported from rural, agrarian areas, accounting for 40% of the wealth owned by these rural households. At the same time, there are huge flows of labor in the same direction: 75% of labor in the urbanized areas comes from this migration and rural agricultural areas lose 85%. These findings can be summarized to say that the urban/industrialized areas use 79% of the economy's capital and 65% of its labor even though such areas are only 30% of the population.

Calibrating the model is a nontrivial endeavor, given the complexity of both the model and the data. Some of the values for parameters of preferences and technology come from micro studies using the Thai data and are similar to those used in other studies for other countries. A remaining set of parameters is calibrated to try to match key variables in the most accurate data we have, from the financial accounts of select communities, comparing the agrarian northeast to more industrialized central provinces: aggregate income, consumption, capital used in production, and wealth, all of which are higher in the central region than in the northeast, often by several orders of magnitude. As a check on what we do, and to take advantage of the additional data, we use the annual data and stratify by urban versus rural status, within a province and also averaging up across provinces. This shows again the concentration of activity in urban areas. The calibrated model is able to match reasonably well these patterns of concentration. It thus predicts flows of capital and labor from rural villages to towns within provinces, and at the same time from the agrarian provinces to industrialized provinces, depending on the ratio of urban to rural populations.

We take great pains to try to further validate the model, again taking advantage of the data. At the micro level we see that net savings differences across regions are consistent with micro facts in the data; over the relevant range, credit is increasing with assets in the cross-section in the northeast region and constant or decreasing with assets in the central region. There is much more persistence of capital over time in rural areas than in urban areas. These two facts are consistent with the micro data and indeed were some key findings used to motivate the variation in financial obstacles across regions and urban/rural status in the first place. We also emphasize predictions for new moments/facts. We predict that the growth of net worth is more concentrated in the central region, and this is consistent with the data. Predictions for distribution of firm size by capital are also consistent with the data, in that the MH regime has a skewed right tail, as do urban areas relative to rural areas.

In a counterfactual policy experiment we explore the effects of imposing wedges from policies that have the intent of "protecting" regions from cross-regional flows of capital and labor.[§] As an extreme case we shut down completely these resources flows and move to regional autarky. This is associated with households in rural and less developed areas experiencing increases on average in consumption, income, and wealth and increases in labor and capital used locally. Local inequality also decreases. However, there would be decreases in the wage (and in the interest rates) and drops in local productivity. For urban and industrialized areas it is the reverse: Despite rises in wages (and interest rates), there would be notably sharp drops in income, consumption, and wealth. Local inequality also increases substantially. Finally, an exercise shows that if we had instead imposed financial frictions without looking at the data we would be getting different and misleading answers to our policy question.

The working-paper version (5) discusses in more detail our contribution relative to the existing economics literature. There we also report in more detail on our methods and the evidence we have regarding variation in financial obstacles across regions and interregional flow of funds.

Micro/Meso Data Motivate Key Model Ingredients

Micro Data and Financial Obstacles. Here we briefly describe a series of studies using data from the Townsend Thai project that document that even within a given economy individuals face different types of financial frictions depending on location and urban/rural status. In particular, several studies using a variety of data, variables, and approaches reach the same conclusion, namely that MH problems are more pronounced in the central region and in urban areas whereas LC is the dominant constraint in the northeast region and in rural areas. For want of space we spare the reader a detailed description of the Townsend Thai project and its data, although this is available in *SI Appendix*, section A and in ref. 6.

Several studies make use of these data to infer financial obstacles on the ground. The working-paper version (5) describes these in detail, and we here only provide a brief summary. Paulson et al. (7) estimate the financial/information regime in place in an occupation choice model and find that MH fits best in the more urbanized central region whereas LC or a mixed regime fits best in the more rural northeast region. Karaivanov and Townsend (8) estimate the regime for households running businesses and find that an MH constrained financial regime fits best in urban areas and a more limited savings regime in rural areas. Finally, Ahlin and Townsend (9), with alternative data on joint liability loans, find that information seems to be a problem in the central area, with LC in the northeast.

[‡] In addition we use a comprehensive archive of secondary data, namely, a Community Development Department village-level Census (CDD), Population Census, Labor Force Survey, and the Socio-Economic Survey income and expenditure data (SES), and much of these data are mounted on a Geographic Information System platform.

[§] Our analysis is concerned with a closed economy, so there are no international capital flows in either the presence or absence of these wedges.

Meso Data and Factor Flows. Direct and indirect evidence suggests large flows of capital and labor.

Capital. We have some measurements within Thailand of the flow of funds across regions, the meso-level variables we referred to earlier. Ref. 4 shows how to use the integrated household financial statements for the monthly data of ref. 3 to construct the production, income allocation, and savings–investment accounts at the village and tambon (county) level. The balance of payment accounts then follow. Sisaket, the most rural area of this sample, has been running a balance of payments surplus, hence with capital outflows. In contrast, Buriram is running consistent deficits, and although they are in a relatively agrarian province the selected sample of former villages has become a newly urban area. Although Chachoengsao in the central region runs a surplus on average, the decline in income due to a shrimp disease was accompanied with an externally financed capital inflow and investment, as households switched to new occupations without dropping consumption. More generally, these flows relative to income across the villages are quite high relative to cross-country data (61% in Buriram, for example). The within-province urban/rural data show that credit from commercial banks is higher in urban areas, more so than the increase in capital used in production. Looking at other secondary data, we know from an SES survey that 24 to 34% of the population receive remittances and among these households remittances constitute 25 to 27% of their income (ref. 10, p. 71, based on ref. 11).

Labor. The Thai Community Development Department (CDD) data show that the fraction of households with migrant laborers increased from 22 to 34% from 1986 to 1998. Migration can be from rural to urban areas within a province, for example as it was early on, and the number and fraction of migrants leaving their region have increased over time. By 1985–1990 the largest flows were from northeast to central region and to Bangkok. By one estimate in 1990 the regional population as a percent of total population varied from 11 to 35% or, put the other way around, migrants to total population vary from 65 to 89% (figure 3.6 in ref. 10, based on ref. 12).

Model

We consider an economy populated by a continuum of households of measure one indexed by $i \in [0,1]$. As we explain in more detail below, a fraction ϑ of households live in urban areas and are subject to MH and the remaining fraction $1-\vartheta$ live in rural areas and are subject to LC. Time is discrete. In each period t, a household experiences two idiosyncratic shocks: an ability shock, z_{it}, and an additional "residual productivity" shock, ε_{it}. Households also differ in their wealth a_{it}. They receive an income stream y_{it} that potentially depends on all of $(a_{it}, z_{it}, \varepsilon_{it})$. Households have preferences over consumption, c_{it}, and effort, e_{it}:

$$v_{i0} = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t u(c_{it}, e_{it}).$$

Households can access the capital market of the economy only via a continuum of identical intermediaries. They contract with an intermediary according to an optimal contract specified below.

Households have some initial wealth a_{i0} and an income stream $\{y_{it}\}_{t=0}^{\infty}$ (determined below). When households contract with an intermediary, they give their entire initial wealth and income stream to that intermediary. The intermediary pools the assets and incomes of all of the households with which it contracts, invests them at a risk-free interest rate r_t, and transfers some consumption to the households. The intermediary keeps track of each household's wealth (for accounting purposes), which evolves as

$$a_{it+1} = y_{it} - c_{it} + (1 + r_t)a_{it}. \quad \textbf{[1]}$$

The intermediary can ensure households, partially or completely, against the realization of the idiosyncratic residual productivity shock ε_{it} (i.e., some, if not all, of this risk is shared across households). In contrast, we assume that ability z_{it} is not insurable at all (more on this below). In each period, the optimal contract specifies what consumption c_{it} each household gets, which in turn determines the level of assets a_{it+1} the household carries into the next period. These can depend on ε_{it} but not z_{it}. The optimal contract maximizes the intermediary's total equity value, which equals the expected present discounted value of profits from contracting with households. We assume there is free entry into intermediation initially. We do not allow intermediaries to compete ex post in a way that would undercut the households' long-run commitment to the financial contract. That is, intermediaries cannot try to pick off household types that are associated with a currently high equity value for the intermediary. In the steady-state equilibrium this competition makes the total equity value of each intermediary zero. As we show below, this implies that the contract equivalently maximizes each household's expected utility. Depending on the region the household lives in, the optimal contract offered by a representative regional intermediary is subject to one of two frictions, either MH or LC.

When making these decisions the regional intermediaries take as given current and future time profiles of wages w_t and interest rates r_t, respectively, and compete with each other in competitive labor and capital markets. Throughout the paper we assume that the economy is in a stationary equilibrium so that these factor prices are constant over time at fixed values w and r. This assumption is made mainly for simplicity. Our setup can be extended to the case where aggregates vary deterministically over time at the expense of some extra notation.

Household's Problem. Households can either be entrepreneurs or workers. We denote by $x_{it} = 1$ the choice of being an entrepreneur and by $x_{it} = 0$ that of being a worker. First, consider entrepreneurs. An entrepreneur hires labor ℓ_{it} at a wage w_t and rents capital k_{it} at a rental rate $r_t + \delta$, where δ is the depreciation rate, and produces some output. His observed productivity has two components: a component, z_{it}, that is known by the entrepreneur in advance at the time he decides how much capital and labor to hire and a residual component, ε_{it}, that is realized afterward. We will call the first component "entrepreneurial" ability and the second "residual productivity." The evolution of entrepreneurial talent is exogenous and given by some stationary transition process $\mu(z_{it+1}|z_{it})$. Residual productivity instead depends on an entrepreneur's effort, e_{it}, which is potentially unobserved, depending on the financial regime. More precisely, his effort determines the distribution $p(\varepsilon_{it}|e_{it})$ from which residual productivity is drawn, with higher effort making good realizations more likely. We assume that intermediaries can ensure residual productivity ε_{it}. In contrast, even if entrepreneurial ability, z_{it}, is observed, it is not contractible and hence cannot be ensured. An entrepreneur's output is given by

$$z_{it}\varepsilon_{it} f(k_{it}, \ell_{it}),$$

where $f(k, \ell)$ is a span-of-control production function.

Next, consider workers. A worker sells efficiency units of labor ε_{it} in the labor market at wage w_t. Efficiency units are observed but are stochastic and depend on the worker's true underlying effort, with distribution $p(\varepsilon_{it}|e_{it})$.¶ The worker's true underlying effort is potentially unobserved, depending on the financial

¶The assumption that the distribution of workers' efficiency units $p(\cdot|e_{it})$ is the same as that of entrepreneurs' residual productivity is made solely for simplicity, and we could easily allow workers and entrepreneurs to draw from different distributions at the expense of some extra notation.

regime. A worker's ability is fixed over time and identical across workers, normalized to unity.

Putting everything together, the income stream of a household is

$$y_{it} = x_{it}[z_{it}\varepsilon_{it} f(k_{it}, \ell_{it}) - w_t \ell_{it} - (r_t + \delta) k_{it}] + (1 - x_{it}) w_t \varepsilon_{it}.$$

As specified above, each household's wealth (deposited with the intermediary) accumulates according to Eq. **1**.

The timing is illustrated in Fig. 1 and is as follows. The household comes into the period with previously determined savings a_{it} and a draw of entrepreneurial talent z_{it}. Then, within period t, the contract between household and intermediary assigns occupational choice x_{it}, effort, e_{it}, and—if the chosen occupation is entrepreneurship—capital and labor hired, k_{it} and ℓ_{it}, respectively. All these choices are conditional on talent z_{it} and assets carried over from the last period, a_{it}. Next, residual productivity, ε_{it}, is realized, which depends on effort through the conditional distribution $p(\varepsilon_{it}|e_{it})$. Finally, the contract assigns the household's consumption and savings, that is, functions $c_{it}(\varepsilon_{it})$ and $a_{it+1}(\varepsilon_{it})$. The household's effort choice e_{it} may be unobserved depending on the regime we study. All other actions of the household are observed. For instance, there are no hidden savings.

We now write the problem of a household that contracts with the intermediary in recursive form. The two state variables are wealth, a, and entrepreneurial ability, z. Recall that z evolves according to some exogenous Markov process $\mu(z'|z)$. It will be convenient below to denote the household's expected continuation value by $\mathbb{E}_{z'} v(a', z') = \sum_{z'} v(a', z')\mu(z'|z)$, where the expectation is over z'. A contract between a household of type (a, z) and an intermediary solves

$$\begin{aligned} v(a,z) = & \max_{x,e,k,\ell,c(\varepsilon),a'(\varepsilon)} \sum_{\varepsilon} p(\varepsilon|e)\left\{u[c(\varepsilon), e] \right. \\ & \left. + \beta \mathbb{E}_{z'} v[a'(\varepsilon), z']\right\} \\ \text{s.t.} \quad & \sum_{\varepsilon} p(\varepsilon|e)\left\{c(\varepsilon) + a'(\varepsilon)\right\} \\ = & \sum_{\varepsilon} p(\varepsilon|e)\left\{x[z\varepsilon f(k,\ell) - w\ell - (r+\delta)k] + (1-x)w\varepsilon\right\} \\ & + (1+r)a \end{aligned} \qquad [2]$$

and also is subject to regime-specific constraints specified below.

The contract maximizes a household's expected utility subject to a break-even constraint for the intermediary. Note that the budget constraint in Eq. **2** averages over realizations of ε; it does not have to hold separately for every realization of ε. This is because the contract between the household and the intermediary has an insurance aspect. Such an insurance arrangement can be "decentralized" in various ways. The intermediary could simply make state-contingent transfers to the household. Alternatively, intermediaries can be interpreted as banks that offer savings accounts with state-contingent interest payments to households.

In contrast to residual productivity ε, talent z is assumed to not be insurable. Before the realization of ε, the contract specifies consumption and savings that are contingent on ε, $c(\varepsilon)$, and $a'(\varepsilon)$. In contrast, consumption and savings cannot be contingent on next period's talent realization z'.[#] As we explain above, one reason for introducing uninsurable talent shocks (besides realism) is to guarantee the existence of a stationary distribution in the presence of MH.

The contract between intermediaries and households is subject to one of two frictions: private information in the form of MH or LC. Each friction corresponds to a regime-specific constraint that is added to the dynamic program Eq. **2**. For sake of simplicity and to isolate the economic mechanisms at work, the only thing that varies across the two regimes is the financial friction. It would be easy to incorporate some differences, say in the stochastic processes for ability z and residual productivity ε at the expense of some extra notation. Most studies in the existing macro development literature work with collateral constraints that are either explicitly or implicitly motivated as arising from an LC problem. In contrast, there are relatively fewer studies that model financial frictions as arising from an asymmetric information problem like in our MH regime. Notable exceptions are refs. 13–15. We specify our two financial regimes in turn.

Urban Areas: MH. In this regime, effort e is unobserved. Because the distribution of residual productivity, $p(\varepsilon|e)$, depends on effort, this gives rise to a standard MH problem: Full insurance against residual productivity shocks would induce the household to shirk, that is, to exert suboptimal effort. The contract takes this into account in terms of an incentive-compatibility constraint:

$$\begin{aligned} & \sum_{\varepsilon} p(\varepsilon|e)\left\{u[c(\varepsilon), e] + \beta\mathbb{E}_{z'} v[a'(\varepsilon), z']\right\} \\ \geq & \sum_{\varepsilon} p(\varepsilon|\hat{e})\left\{u[c(\varepsilon), \hat{e}] + \beta\mathbb{E}_{z'} v[a'(\varepsilon), z']\right\} \ \forall e, \hat{e}. \end{aligned} \qquad [3]$$

This constraint ensures that the value to the household of choosing the effort level assigned by the contract, e, is at least as large as that of any other effort, $\hat{e}$. The optimal dynamic contract in the presence of MH solves Eq. **2** subject to the additional constraint Eq. **3**. As already mentioned, to fix ideas, we would like to think of this regime as representing the prevalent form of financial contracts in urban and industrialized areas.

Relative to existing theories of firm dynamics with MH, our formulation in Eq. **3** is special in that only entrepreneurial effort is unobserved. In contrast, capital stocks can be observed and a change in an entrepreneur's capital stock does not change his incentive to shirk. More precisely, the distribution of relative output obtained from two different effort levels does not depend on the level of capital. This is a result of two assumptions: that output depends on residual productivity ε in a multiplicative fashion and that the distribution of residual productivity $p(\varepsilon|e)$ does not depend on capital (i.e., it is not given by $p(\varepsilon|e,k)$). We focus on this instructive special case because—as we will show below—it illustrates in a transparent fashion that MH does not necessarily result in capital misallocation but that it can nevertheless have negative effects on aggregate productivity, gross domestic product (GDP), and welfare.

The existing literature on optimal contracting subject to MH typically makes use of an alternative formulation for problems like the one used here. In particular, the relevant dynamic programming problem is typically written with "promised utility" as a state variable and features a "promise-keeping" constraint

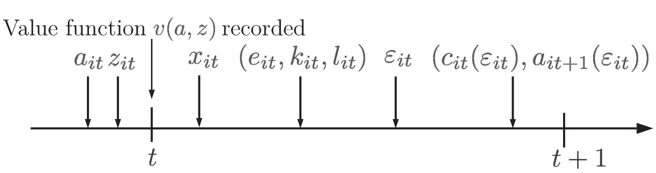

Fig. 1. Timing.

[#] The above dynamic program could be modified to allow for talent to be insured as follows: Allow agents to trade in assets whose payoff is contingent on the realization of next period's talent z'. On the left-hand side of the budget constraint in Eq. **2**, instead of $a'(\varepsilon)$, we would write $a'(\varepsilon, z')$ and sum these over future states z' using the probabilities $\mu(z'|z)$ so that z' does not appear as a state variable next period, because its realization is completely insured and that insurance is embedded in the resource constraint.

(16, 17). We here instead develop an alternative approach: We invert the Pareto frontier between households and intermediaries, thereby replacing promised utility as the relevant state variable by household wealth. This formulation has two advantages. First, the contracting problem in terms of wealth "communicates" more seamlessly with the rest of the model, in particular when we later embed the contracting problem in general equilibrium, which features a market-clearing condition in terms of wealth. Second, our alternative formulation can be mapped to the data more directly: Our ultimate interest is in flow of funds across households and regions, which is more naturally thought of in terms of wealth rather than promised utilities.

SI Appendix, section D lays out our approach and its connection to the more standard formulation in detail. We here briefly summarize it. Consider first a special case with no ability (z) shocks and only residual productivity (ε) shocks. For this case *Proposition 1* in *SI Appendix*, section D shows that the two formulations are equivalent if the Pareto frontier between households and intermediaries is monotone. In this case, one can invert the Pareto frontier and use a change of variables to express the problem in terms of household wealth rather than promised utility. In this sense, the insurance arrangement regarding ε-shocks is optimal (taking all paths of interest rates and wages as fixed). Next, consider the case with both z-shocks and ε-shocks. This case is then simply the problem just described but with uninsurable ability shocks "added on top." That is, in this case it is no longer true that we solve a fully optimal contracting problem. This is because we rule out insurance against z-shocks by assumption, whereas an optimal dynamic contract would allow for such insurance. In contrast, the insurance arrangements regarding ε-shocks are optimal as shown by the equivalence with an optimal dynamic contract in the absence of z-shocks.

Given this equivalence between the two formulations, it is also easy to motivate why we assume that idiosyncratic shocks are partly uninsurable. Dynamic MH economies in which all shocks can be insured against often do not feature a stationary distribution of promised utilities (see e.g., refs. 18 and 19). In our formulation this would correspond to nonexistence of a stationary wealth distribution. Uninsurable shocks aid with ensuring stationarity and, indeed, our numerical results indicate that a stationary wealth distribution always exists. Besides realism, ensuring stationarity is another reason for making the assumption that ability shocks are uninsurable.

When solving the problem Eq. **2** to Eq. **3** numerically, we allow for lotteries in the optimal contract to "convexify" the constraint set as in ref. 19. See *SI Appendix*, section E for the statement of the problem, Eq. **2** to Eq. **3** with lotteries.

Rural Areas: LC. In this regime, effort e is observed. Therefore, there is no MH problem and the contract consequently provides perfect insurance against residual productivity shocks, ε. Instead we assume that the friction takes the form of a simple collateral constraint:

$$k \leq \lambda a, \quad \lambda \geq 1. \qquad [4]$$

This form of constraint has been frequently used in the literature on financial frictions (see, e.g., refs. 7 and 20–25). It can be motivated as an LC constraint. The exact form of the constraint is chosen for simplicity. Some readers may find it more natural if the constraint were to depend on talent $k \leq \lambda(z)a$ as well. This would be relatively easy to incorporate, but others have shown that this affects results mainly quantitatively but not qualitatively (24, 26). The assumption that talent z is stochastic but cannot be insured makes sure that collateral constraints bind for some individuals at all points in time. If instead talent were fixed over time, for example, individuals would save themselves out of collateral constraints over time (27).

The optimal contract in the presence of LC solves Eq. **2** subject to the additional constraint Eq. **4**.

Factor Demands and Supplies. Households, via the intermediaries they contract with, interact in competitive labor and capital markets, taking as given the sequences of wages and interest rates. Denote by $k_j(a,z)$ and $\ell_j(a,z)$ the common optimal capital and labor demands of households with current state (a,z) in regime $j \in \{MH, LC\}$. A worker supplies ε efficiency units of labor to the labor market, so labor supply of a cohort (a,z) is

$$n_j(a,z) \equiv [1 - x_j(a,z)] \sum_{\varepsilon} p(\varepsilon | e_j(a,z))\varepsilon. \qquad [5]$$

Note that we multiply by the indicator for being a worker, $1-x$, so as to only pick up the efficiency units of labor by the fraction of the cohort who decide to be workers. Finally, individual capital supply is simply a household's wealth, a.

Equilibrium. We use the saving policy functions $a'(\varepsilon)$ and the transition probabilities $\mu(z'|z)$ to construct transition probabilities $\Pr(a', z'|a, z; j)$ in the two regimes $j \in \{MH, LC\}$. In the computations we discretize the state space for wealth, a, and talent, z, so this is a simple Markov transition matrix. Given these transition probabilities and initial distributions $g_{j,0}(a,z)$, we then obtain the sequence $\{g_{j,t}(a,z)\}_{t=0}^{\infty}$ from

$$g_{j,t+1}(a', z') = \Pr(a', z'|a, z; j) g_{j,t}(a,z). \qquad [6]$$

Note that we cannot guarantee that the process for wealth and ability in Eq. **6** has a unique and stable stationary distribution. Whereas the process is stationary in the z-dimension (recall that the process for z, $\mu(z'|z)$, is exogenous and a simple stationary Markov chain), the process may be nonstationary or degenerate in the a-dimension. That is, there is the possibility that the wealth distribution either fans out forever or collapses to a point mass. Similarly, there may be multiple stationary equilibria. In the examples we have computed, these issues do, however, not seem to be a problem and Eq. **6** always converges, and from different initial distributions.

Once we have found a stationary distribution of states from Eq. **6**, we check that markets clear and otherwise iterate. Denote the stationary distributions of ability and wealth in regime j by $G_j(a,z)$. Then, the labor and capital market clearing conditions are

$$\vartheta \int \ell_{MH}(a,z) dG_{MH}(a,z) + (1-\vartheta) \int \ell_{LC}(a,z) dG_{LC}(a,z)$$
$$= \vartheta \int n_{MH}(a,z) dG_{MH}(a,z) + (1-\vartheta) \int n_{LC}(a,z) dG_{LC}(a,z),$$
$$\vartheta \int k_{MH}(a,z) dG_{MH}(a,z) + (1-\vartheta) \int k_{LC}(a,z) dG_{LC}(a,z)$$
$$= \vartheta \int a dG_{MH}(a,z) + (1-\vartheta) \int a dG_{LC}(a,z).$$

The equilibrium factor prices w and r are found using the algorithm outlined in appendix A.1 of ref. 23.

Note that, in equilibrium, the demands and supplies of both capital and labor are equated in a frictionless manner and that this requirement determines the allocation of factors across regions. That is, we assume that there are no frictions to the movement of capital or labor across regions. In a counterfactual policy experiment, described later in this paper, we examine the effect of going from such an integrated equilibrium to the opposite extreme, namely autarky.

Calibration. Due to space constraints, we relegated the discussion of functional form choices and calibration of parameter values to

Table 1. Macro and meso aggregates in the baseline economy

Variable	Aggregate economy	MH/urban	LC/rural
	National and sectoral aggregates		
Income, % of FB	0.78	1.37	0.52
Capital, % of FB	0.82	1.88	0.40
Labor, % of FB	0.92	1.65	0.60
TFP, % of FB	0.88	0.78	1.04
Consumption, % of FB	0.87	1.05	0.79
Wealth, % of FB	0.82	1.45	0.55
	Intersectoral capital and labor flows		
Labor inflow, % of workforce		0.75	−0.86
Capital inflow, % of stock		0.23	−0.39

FB, first-best.

SI Appendix, section F. Our calibration targets various regional aggregates, namely income, consumption, capital, wealth, and the rate of entrepreneurship in both rural and urban areas (*SI Appendix*, Table 5).

Flow of Funds and the Equilibrium Interaction of Financial Frictions

Interregional Flow of Funds. At these calibrated parameter values we compute the model's steady state. See *SI Appendix*, section E for details on the computations. We feature in Table 1 the variables for each of the two regions separately, the overall economy-wide average, using population weights, and especially the flow of capital and labor across regions. As is evident in Table 1 the (urban) MH area has higher values of income, capital, labor, consumption, and wealth than the (rural) LC area.[‖] All variables are expressed as ratios to the corresponding first-best values, each line, one at time. The first-best economy eliminates the LC and MH constraints in rural and urban areas, respectively, so they are identical and thus have the same variable values—region labels lose any meaning in the first-best because one region is just a clone of the other one. In contrast, with the financial obstacles included, we see in Table 1 the additional implication that the urban area consistently has values higher than those of the rural area (i.e., more activity is concentrated there than in the first-best, and less in the rural area). The top part of the table is thus a tell-tale indicator of the relatively dramatic interregional flows at the bottom of the table. Urban areas are importing 23% of the overall capital used and 75% of the labor. Likewise, rural areas are exporting 39% of their capital and 86% of their labor. This is consistent with the direct and indirect evidence reported above. Equivalently urban areas are 79% of the economy's capital and 65% of its labor even though they account for only 30% of the population.[**]

[‖]Table 1 also reports numbers for aggregate and regional total factor productivity (TFP), a commonly reported statistic in the macro-development literature. Aggregate TFP is computed as $TFP = Y/(K^{\nu}L^{1-\nu})$ where Y is aggregate output, K is the aggregate capital stock, L is aggregate labor, and $\nu = \frac{\alpha}{\alpha+\gamma}$. Regional TFP is computed in an analogous fashion. Somewhat surprisingly, regional TFP in the LC region is 104% of first-best TFP. This is due to a better selection of entrepreneurs in terms of their productivity. This is despite one force that lowers productivity under LC, namely, talented entrepreneurs who are constrained by wealth. However, a force for lower productivity in the MH region is the lower effort due to that MH. Of course, the distribution of firm-level TFP is masked by the aggregation. More detailed results are available upon request.

[**]Our preferred interpretation of the labor flows from rural to urban areas is as temporary migration, which is a particularly widespread phenomenon in developing countries (see e.g., ref. 28). This interpretation is consistent with our assumption that individuals are subject to the financial regime of their region of origin rather than their workplace [e.g., individuals from the LC (rural) area are subject to LC and perfect risk-sharing of residual productivity even though they work in the MH area (city)]. An interesting extension would be to examine the feedback from temporary migration to participation in risk-sharing arrangements back in the village, as in ref. 28.

There are of course many other factors that distinguish cities from villages and industrialized from agricultural areas, and we listed some of these in the Introduction. Although we consider these other factors to be of great importance for explaining interregional flow of funds, we purposely exclude them from our theory and focus on differences in financial regimes only, in effect conducting an experiment that makes use of the model structure and answers the following question: How large are the capital and labor flows that arise from regional differences in financial regime alone? Our framework generates a number of observed rural–urban patterns by letting only the financial regime differ across these regions. In our model, without regional differences in the financial regimes, urban and rural areas would be identical with no factor flows occurring between the two regions.

To explain why this is happening we proceed in steps, first looking at the interest rate then the occupation choices and related variables in each region (at the equilibrium interest rate and wage and, of course, at our calibrated parameter values).

Determination of the Equilibrium Interest Rate. The interest rate is depressed relative to the rate of time preference in both regions, but as we shall now see there are pressures for it to be far lower in the LC rural area, if the domestic economy were not open across regions.

Fig. 2 graphically examines the aggregate demand for and supply of capital at various parametric interest rates, as if the regions were open to the rest of the world, and thus illustrates the determination of the equilibrium interest rate (as in ref. 29) for each region separately, where the curves cross, as if it were a closed economy (no regional or international capital flows).

Fig. 2*A* plots capital demand and supply for the MH regime (solid lines) and contrasts them with demand and supply in the "first-best" economy without MH (dashed lines). For each value of the interest rate, the wage is recalculated so as to clear the labor market. Fig. 2*B* repeats the same exercise for the LC regime. The first-best demand and supply (the dashed lines) are the same in the two panels and serve as a benchmark to assess the differential effects of the two frictions on the interest rate.

Consider first the MH economy in Fig. 2*A*. Relative to the first-best, MH depresses capital demand for all relevant values of the interest rate. This is because MH results in entrepreneurs and workers exerting suboptimal effort, which depresses the marginal productivity of capital. The effect of MH on capital supply is ambiguous and differs according to the value of the interest rate. It turns out that this ambiguity is the result of a direct effect and a counteracting general equilibrium effect operating through wages. For a given fixed wage, MH always decreases capital supply (i.e., capital supply shifts to the left). This is due to a well-known result: the inverse Euler equation of ref. 30, which states that the optimal contract under MH discourages saving whenever the incentive compatibility constraint Eq. **3** binds and hence results in individuals' being saving-constrained (see also refs. 31 and 32). *Lemma 1* in *SI Appendix*, section B derives the appropriate variant of this result for our framework and discusses the intuition in more detail. However, counteracting this negative effect on capital supply is a positive general equilibrium effect: Labor demand, and hence the wage, falls relative to the first-best, resulting in more entry into entrepreneurship, higher aggregate profits, and higher savings. The overall effect is ambiguous, and in our computations capital supply shifts to the right for some values of the interest rate and to the left for others.

Contrast this with the LC economy in Fig. 2*B*. Under LC, capital demand shifts to the left whereas capital supply shifts to the right. The drop in capital demand is a direct effect of the

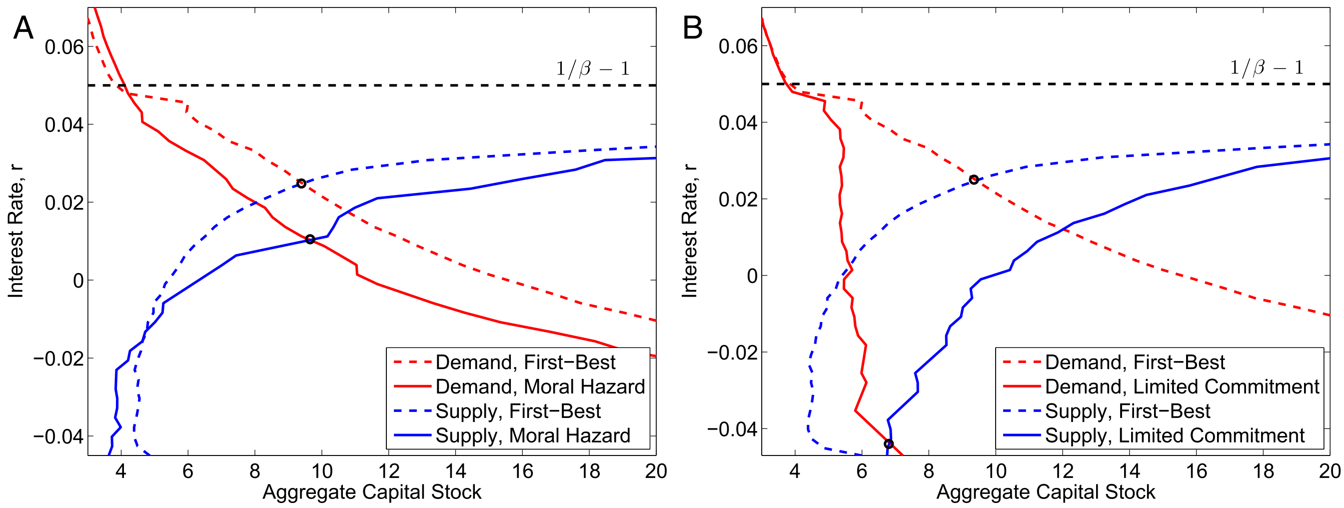

Fig. 2. Determination of equilibrium interest rate: moral hazard (*A*); limited commitment (*B*).

constraint Eq. **4**, and it is considerably larger than the demand drop under MH. That capital supply shifts to the right is due to increased self-financing of entrepreneurs (refs. 23 and 26, among others). As a result, the interest rate drops considerably relative to the first-best, and more so than under MH. Obviously, the size of this drop depends on the parameter λ, which governs how binding the LC problem is. The value we use in Fig. 2 is the one we calibrate, 1.80, but our findings are qualitatively unchanged for many different values of λ.

The finding that the equilibrium interest rate is lower under LC than under MH is present in all our numerical experiments and under a big variety of alternative parameterizations we have tried.[††]

This is not surprising, given that Fig. 2 suggests that there are some strong forces pushing in this direction. Foremost among these is that, under MH, individuals are savings-constrained, which, all else equal, pushes up the interest rate; in contrast, LC results in higher savings due to self-financing, which pushes down interest rates. Also going in this direction is that in practice LC results in a greater drop in capital demand than MH.

The bottom line from this analysis of the interest rate is that when the two regions are opened to capital (and labor) movements, capital flows toward what would have been the higher interest rate region, namely the MH urban area.[‡‡] Labor is complementary with capital and so the wage would have been higher in the MH urban area, too, if it were not for labor flows.

[††] In particular, and as discussed in *SI Appendix*, section F, the value for λ can be mapped to data on external finance to GDP ratios. That the interest rate under LC is lower than that under MH is true for all values of λ that are consistent with external finance to GDP ratios for low- and middle-income countries. In contrast, it is easy to see that for unrealistically large values of λ the LC interest rate will necessarily be higher than that under MH. This is because as $\lambda \to \infty$ the equilibrium under LC approaches the first-best (the intersection of the dashed lines), which features an interest rate that is strictly larger than that under MH.

[‡‡] Note that we assume throughout that, although there may be cross-regional factor flows, the economy is closed to the rest of the world. Of course, in reality the Thai economy is not a closed economy. An extreme alternative would be to model a small open economy where individuals can borrow and lend at a fixed world interest rate of $r^* = 1/\beta - 1$. Under this alternative assumption, the LC (rural) area would experience massive capital outflows, and in particular ones that are larger than the ones for the MH (urban) area. In reality, the Thai economy is likely somewhere intermediate between these two extremes, so that the insights from the closed economy carry over.

Are Different Financial Regimes Necessary? In the working-paper version (5), we also show that if we had followed much of the macro development literature on financial frictions, and just assumed those frictions, rather than imposing what we "see on the ground" (i.e., infer from micro data), then we would not be able to simultaneously match salient features of both the meso and micro data. It is key that the type of financial regime varies, as opposed to urban/industrialized and rural/agrarian areas' being subject to the same financial regime but with differing tightness of the financial constraint. To make this point, we conduct the following experiment. We suppose that, instead of MH, the central area is subject to the same form of LC as the northeast area but with a higher, more liberal maximum leverage ratio. We show that to do as well as our benchmark economy in terms of matching observed factor flows, we have to raise the central leverage ratio to well beyond reasonable levels (close to infinity).

Back to the Micro Data

The model has implications not only for meso variables such as regional variables and interregional resource flows but also for micro-level data. We first check on model-generated output for some of the micro facts that led to our choices of financial regimes, and then to "out-of-sample" predictions, looking at variables we have not heretofore explored.

First, in terms of adopted financial regimes we see in *SI Appendix*, Fig. 6 that borrowing is increasing in wealth for the LC regimes, at least at lower to midrange values for wealth (before a wealth effect on leisure kicks in, resulting in lower effort, firm productivity, and, indeed, entrepreneurship, as in *SI Appendix*, Fig. 7). For the MH regime, there is no relation between wealth and borrowing in this range (i.e., the relationship is nonincreasing). Consistent with this, Paulson and Townsend (33) found strictly increasing patterns in the northeast and decreasing patterns in the central regional data.

Another implication of the model, displayed in *SI Appendix*, Fig. 8, is the high degree of persistence of capital in the LC regime relative to the MH regime. Karaivanov and Townsend (8) found that the high degree of persistence in the rural data (figure 3 in ref. 8) was the main reason the overall financial regime was estimated to be borrowing with constraints if not savings only, whereas the MH regime was the best fit statistically in urban areas.

Next, in terms of out-of-sample predictions for micro data, we see in Fig. 3 that the model-generated firm size distribution in the urban area has more mass in the right tail, as is true in the

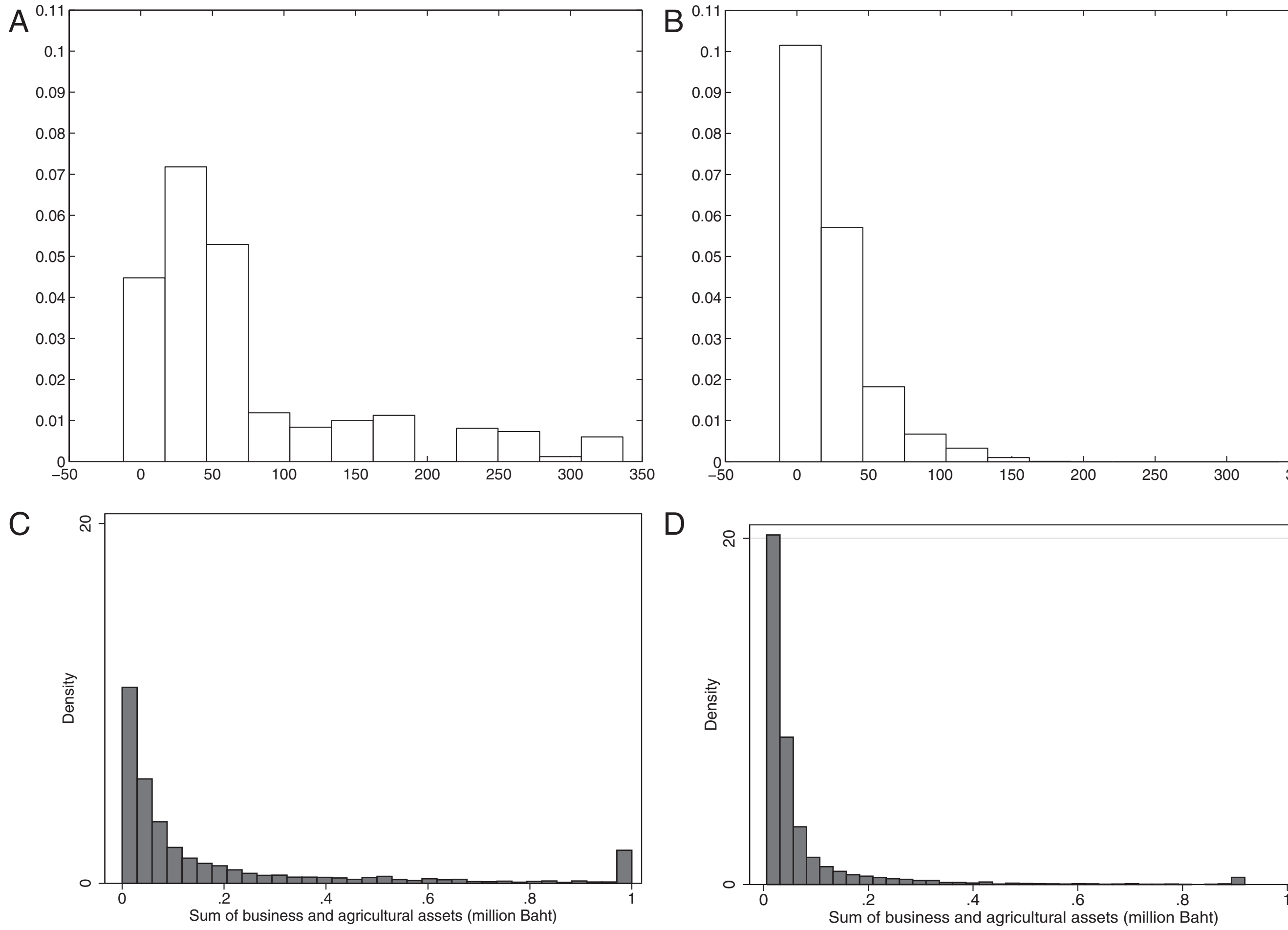

Fig. 3. Firm size (capital) distribution: Model versus data. Model: moral hazard (*A*); limited commitment (*B*). Data: urban (*C*); rural (*D*).

data, in contrast with the rural area.[§§] Finally, we examined the distributions of the growth rates of net worth and found that, as in the data, there is more dispersion in wealth growth rates in rural areas than in urban ones.

Counterfactual: Moving to Autarky

In this section we conduct a counterfactual policy experiment using our structural model. We start with our integrated economy with realistic regions and calibrated parameter values and then introduce wedges, reflecting either frictions or policies, that restrict cross-sectional factor flows. For simplicity we consider the extreme case of putting each region in autarky. We show that there are interesting implications for macro and regional aggregates and inequality. Table 2 plots our main variables of interest at the macro and meso levels for an economy in which each region is in autarky. Comparing these with the corresponding numbers in our integrated baseline economy in Table 1, we can assess the effects of a hypothetical move to autarky.

Shutting down resources flows and moving to regional autarky has interesting implications for regional aggregates, inequality, factor prices, and TFP. In particular, a move to autarky would be associated with households in rural areas experiencing increases on average in consumption, income, and wealth; increases in labor and capital used locally but decreases in the wage (and in the interest rates); and drops in TFP. The reason that rural aggregate TFP decreases is simple: Because rural capital and labor can no longer be used in urban areas, the supply of these factors is roughly 80% higher than in the integrated baseline economy. Although regional income in rural areas increases it

Table 2. Moving to autarky

Variable	Aggregate economy	MH/urban	LC/rural
Income, % of FB	0.78 (0.78)	0.69 (1.37)	0.82 (0.52)
Capital, % of FB	0.74 (0.82)	0.75 (1.88)	0.74 (0.40)
Labor, % of FB	0.95 (0.92)	0.66 (1.65)	1.08 (0.60)
TFP, % of FB	0.91 (0.88)	1.00 (0.78)	0.89 (1.04)
Consumption, % of FB	0.82 (0.87)	0.83 (1.05)	0.82 (0.79)
Wealth, % of FB	0.74 (0.82)	0.75 (1.45)	0.74 (0.55)
Wage, % of FB		1.10 (0.92)	0.76 (0.92)
Interest rate		0.027 (−0.009)	−0.029 (−0.009)

For comparison the numbers in parentheses reproduce the corresponding numbers for the integrated economy from Table 1. FB, first-best.

[§§]The plots use the 2005–2011 waves of the Townsend Thai Data from four provinces (Lopburi, Chachoengsao, Buriram, and Sisaket), which we described in detail in the data section above. Firm size is defined as the sum of agricultural and business assets, and we drop households who report zero holdings of each category, leaving us with 601 urban and 659 rural households. We chose assets as a measure of a firm's size rather than employment (as is perhaps more standard), because of the prevalence of self-employed individuals (i.e., few paid employees) in the Townsend Thai data. For comparison with the rural data, the urban data are winsorized at 1 million baht.

increases by considerably less than 80% and therefore aggregate TFP falls. Put differently, rural areas absorb the increased factor supplies by allocating them to somewhat less-efficient firms. Local inequality also decreases. For urban areas it is the reverse, although notably the movements in each of these variables is much more extreme. Local inequality increases substantially. At the national level, results are mixed: Although aggregate consumption, wealth, and capital decrease, labor supply, income, and TFP all increase. National inequality increases, particularly at the bottom of the distribution (which drives an increase in the Gini coefficient).

Our counterfactual experiment is interesting from the point of view of recent discussions about urban–rural migration. In particular, urban or industrialized areas might contemplate restrictions on interregional labor migration with the belief that this might be helpful to local residents, raising local wages. However, the results of our counterfactual experiment suggest that this may backfire: If isolationist policies also bring restrictions on the interregional flow of capital, then the overall impact can be substantial drops in average income, consumption, and wealth and large increases in local inequality.

Conclusion

More research is needed that takes seriously the microfinancial underpinnings for macro models that use micro data to help pin down these underpinnings, that looks into the possibility that financial obstacles might vary by geography, and that builds micro-founded macro models accordingly. We have done this for Thailand, an emerging market country, and emphasized quantitatively large flows of capital and migration of labor from rural to urban areas and that differential development of regions can be due to variation in financial obstacles alone. We have joined in a developing country context what have been largely two distinct literatures, macro development and micro development, and combined them into a coherent whole. It is our view that the macro development literature needs to take into account the implicit and explicit contracts we see on the ground and the micro development literature needs to take into account general equilibrium, economy-wide effects of interventions. This is what we have accomplished in this paper, in a particular context, although we believe that the methods developed here will be applicable more generally.

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Supporting Information Appendix

A. More Details on Townsend Thai Data

All studies we describe in Section 1 use data from the Townsend Thai project which first started collecting data in 1997. The initial sample in 1997 was a stratified clustered selection of villages, four randomly selected villages in each tambon (a small sub-county), 16 tambons chosen at random with a province, and four provinces deliberately selected based on a pre-existing socio-economic income and expenditure survey, the Thai SES survey, to take advantage of existing government data. Two provinces were selected in the relatively poor agrarian Northeast and two in the developed Central region near Bangkok, to make sure we had cross-sectional variety of stages of development. Within each village, households were selected at random from rosters held by the Headman. In addition to the household survey, with 2,880 households, there are instruments for the headman in each of the 192 villages, 161 village-level institutions, 262 Bank for Agriculture and Agricultural Cooperatives (BAAC) joint liability groups, and 1,920 soil samples. The first collection of data was in April/May of 1997. With the unanticipated Thai financial crisis, and the goal of assessing the impact of this seemingly aggregate shock, we began in 1998 the first of many subsequent rural annual resurveys in 4 tambons (16 villages) in each of the original four provinces, chosen at random. The scale then expanded to more provinces, so as to be more nationally representative: Two provinces in the South in 2003 and two in the North in 2004. An urban baseline and subsequent annual resurveys were added beginning in 2006, in order to be able to compare urban neighborhoods to villages within each of the selected provinces. Finally, an intense monthly rural survey began in August of 1998 in a subsample of the original 1997 baseline, 16 villages and 960 households, half in the Central region and half in the Northeast, to get the details on labor supply, use of cash, crop production, and many other features that are only possible to get accurately with frequent recall, high frequency data. For additional information on the Townsend Thai Data, see (1).

B. More Details on Moral Hazard vs. Limited Commitment

This Appendix summarizes additional implications of moral hazard for individual choices and contrasts them with those of limited commitment. We relegated these to an Appendix because many of these, particularly for limited commitment, are already well understood from the existing literature.

Saving Behavior. We first present some analytic results that characterize differences in individual saving behavior in the two regimes. These are variants of well-known results in the literature.

Lemma 1 *Let $u(c,e) = U(c) - V(e)$. Solutions to the optimal contracting problem under moral hazard* Eq. (2)–Eq. (3)*, satisfy*

$$U'(c_{it}) = \beta(1+r_{t+1})\mathbb{E}_{z,t}\left(\mathbb{E}_{\varepsilon,t}\frac{1}{U'(c_{it+1})}\right)^{-1} \tag{5}$$

where $\mathbb{E}_{z,t}$ and $\mathbb{E}_{\varepsilon,t}$ denote the time t expectation over future values of z and ε.

This is a variant of the inverse Euler equation derived in (2), (3) and (4) among others. With a degenerate distribution for ability, z, our equation collapses to the standard inverse Euler equation. The reason our equation differs from the latter is that we have assumed that ability, z, is not insurable in the sense that asset payoffs are not contingent on the realization of z. Our equation is therefore a "hybrid" of an Euler equation in an incomplete markets setting and the inverse Euler equation under moral hazard.

If the incentive compatibility constraint Eq. (3) is binding, marginal utilities are not equalized across realizations of ε. One well known implication of Eq. (5) is that in this case[‡]

$$U'(c_{it}) < \beta(1+r_{t+1})\mathbb{E}_{z,t}\mathbb{E}_{\varepsilon,t}U'(c_{it+1}). \tag{6}$$

The implication of this inequality is that when the incentive constraint binds, individuals are *saving constrained*. It is important to note that such saving constraints are a feature of the *optimal contract*.[§] The intuition is that under moral hazard there is an additional marginal cost of saving an extra dollar from period t to period $t+1$: in period $t+1$ an individual works less in response to any given compensation schedule. Therefore the optimal contract discourages savings whenever the incentive compatibility constraint Eq. (3) binds.

With limited commitment, the Euler equation is instead[¶]

$$U'(c_{it}) = \beta\mathbb{E}_{z,t}\left[U'(c_{it+1})(1+r_{t+1}) + \nu_{it+1}\lambda\right]$$

where ν_{it+1} is the Lagrange multiplier on the collateral constraint Eq. (4). If this constraint binds, then

$$U'(c_{it}) > \beta(1+r_{t+1})\mathbb{E}_{z,t}U'(c_{it+1}). \tag{7}$$

Contrasting Eq. (6) for moral hazard and Eq. (7) for limited commitment, we can see that in the moral hazard regime individuals are *savings constrained* and in the limited commitment regime, they are instead *borrowing constrained*.[‖] Finally, note that under limited commitment only the savings of entrepreneurs are distorted because only they face the collateral constraint Eq. (4). In contrast, under moral hazard the savings decision of both entrepreneurs and workers is distorted because both face the incentive compatibility constraint Eq. (3). As discussed in the main text, this is reflected in the equilibrium interest rate. Individual savings behavior is one prediction in which the two regimes differ dramatically.

Proof of Lemma 1: The Lagrangean for Eq. (2) to Eq. (3) is

$$
\begin{aligned}
\mathcal{L} &= \sum_{\varepsilon} p(\varepsilon|e) \left\{ U(c(\varepsilon)) - V(e) + \beta \mathbb{E}_{z'} v[a'(\varepsilon), z'] \right\} \\
&+ \psi \left[(1+r)a + \sum_{\varepsilon} p(\varepsilon|e) \left\{ x[z\varepsilon f(k,\ell) - w\ell - (r+\delta)k] + (1-x) w\varepsilon \right\} - \sum_{\varepsilon} p(\varepsilon|e) \left\{ c(\varepsilon) + a'(\varepsilon) \right\} \right] \\
&+ \sum_{e,\hat{e},x} \mu(e,\hat{e},x) \left[\sum_{\varepsilon} p(\varepsilon|e) \left\{ U(c(\varepsilon)) - V(e) + \beta \mathbb{E}_{z'} v[a'(\varepsilon), z'] \right\} - \sum_{\varepsilon} p(\varepsilon|\hat{e}) \left\{ U(c(\varepsilon)) - V(\hat{e}) + \beta \mathbb{E}_{z'} v[a'(\varepsilon), z'] \right\} \right]
\end{aligned}
$$

The first-order conditions with respect to $c(\varepsilon)$ and $a'(\varepsilon)$ are

$$
\psi p(\varepsilon|e) = p(\varepsilon|e) U'(c(\varepsilon)) + \sum_{e,\hat{e},x} \mu(e,\hat{e},x)[p(\varepsilon|e) - p(\varepsilon|\hat{e})] U'(c(\varepsilon))
$$

$$
\psi p(\varepsilon|e) = p(\varepsilon|e) \beta \mathbb{E}_{z'} v_a(a'(\varepsilon), z') + \sum_{e,\hat{e},x} \mu(e,\hat{e},x)[p(\varepsilon|e) - p(\varepsilon|\hat{e})] \beta \mathbb{E}_{z'} v_a(a'(\varepsilon), z')
$$

Rearranging

$$
\frac{p(\varepsilon|e)}{U'(c(\varepsilon))} = \frac{1}{\psi} \left[p(\varepsilon|e) + \sum_{e,\hat{e},x} \mu(e,\hat{e},x)[p(\varepsilon|e) - p(\varepsilon|\hat{e})] \right] \quad [8]
$$

$$
\frac{p(\varepsilon|e)}{\beta \mathbb{E}_{z'} v_a(a'(\varepsilon), z')} = \frac{1}{\psi} \left[p(\varepsilon|e) + \sum_{e,\hat{e},x} \mu(e,\hat{e},x)[p(\varepsilon|e) - p(\varepsilon|\hat{e})] \right] \quad [9]
$$

Summing Eq. (8) over ε,

$$
\sum_{\varepsilon} \frac{p(\varepsilon|e)}{U'(c(\varepsilon))} = \frac{1}{\psi}
$$

The envelope condition is

$$
v_a(a,z) = \psi(1+r) = (1+r) \left(\sum_{\varepsilon} \frac{p(\varepsilon|e)}{U'(c(\varepsilon))} \right)^{-1} \quad [10]
$$

From Eq. (8) and Eq. (9)

$$
U'(c(\varepsilon)) = \beta \mathbb{E}_{z'} v_a(a'(\varepsilon), z') \quad [11]
$$

Combining Eq. (10) and Eq. (11) yields Eq. (5).□

C. Accounting: The Intermediary and Capital Accumulation

The purpose of this section is to spell out in detail how capital accumulation works in our economy. For simplicity we impose from the get-go that the economy is in a stationary equilibrium so that the interest rate is constant at value r. The intermediary has two sources of income: it contracts with households and may obtain some income from that activity; it also owns and accumulates capital and rents that capital to households. The intermediary's total income stream in period t is

$$
\int_0^1 (y_{it} - c_{it}) di + RK_t - I_t \quad [12]
$$

where y_{it} is the income stream generated by household i, c_{it} is the consumption assigned to household i under the optimal contract, R is the rental rate of capital, K_t is the capital stock and I_t is investment. Capital accumulates according to

$$
K_{t+1} = I_t + (1-\delta) K_t
$$

where δ is the depreciation rate. The intermediary maximizes the PDV of the income stream in Eq. (12):

$$
V_0 = \underbrace{\sum_{t=0}^{\infty} \frac{1}{(1+r)^t} \int_0^1 (y_{it} - c_{it}) di}_{:=Q_0} + \sum_{t=0}^{\infty} \frac{1}{(1+r)^t} (RK_t - I_t)
$$

Using standard arguments, this value equals $V_0 = Q_0 + (1+r)K_0$ and the rental rate of capital equals $R = r + \delta$ to prevent arbitrage. The same relation also holds at all other times t

$$
V_t = Q_t + (1+r)K_t, \quad Q_t := \sum_{s=t}^{\infty} \frac{1}{(1+r)^{s-t}} \int_0^1 (y_{is} - c_{is}) di
$$

The interpretation is that Q_t is the equity value of contracting with households, $(1+r)K_t$ is the equity value from owning and renting out capital and the total equity value V_t is the sum of the two (the presence of the term rK_t is due to an awkward timing issue in discrete time – in continuous time we would simply have $V_t = Q_t + K_t$). We assume that there is free entry into the intermediary market. Free entry implies that the intermediary's total equity value V_t equals zero at each point in time:

$$0 = Q_t + (1+r)K_t \qquad [13]$$

Note that the intermediary's contracting problem can conveniently be broken up into a continuum of sub-problems, namely those of contracting with each individual household i. In particular

$$Q_t = \int_0^1 q_{it} di, \qquad q_{it} := \mathbb{E}_t \sum_{s=t}^{\infty} \frac{y_{is} - c_{is}}{(1+r)^{s-t}} \qquad [14]$$

The variable q_{it} has the interpretation of the equity value that the intermediary attaches to contracting with a particular household i. As we show below, it is convenient to formulate the problem as that of maximizing q_{it}. It is also useful to keep track of each household's wealth a_{it}. As explained above, given a_{i0}, it evolves according to Eq. (1). In present value form

$$0 = \sum_{s=t}^{\infty} \frac{y_{is} - c_{is}}{(1+r)^{s-t}} + (1+r)a_{it}.$$

From the definition of q_{it} in Eq. (14) therefore

$$0 = q_{it} + (1+r)a_{it} \qquad [15]$$

This says that the sum of the equity value of the intermediary q_{it} and the net worth of the household it contracts with a_{it} has to be zero (the presence of the term ra_{it} is again due to an awkward discrete-time timing issue – in continuous time the analogue of condition Eq. (15) is simply $q_{it} + a_{it} = 0$). That is, whatever is the intermediary's gain is the household's loss. Note that, while aggregate Q_t is fixed in a stationary equilibrium, the individual q_{it}'s move around over time depending on the sequence of idiosyncratic shocks experienced by households. Eq. (15) also implies another useful property. From the zero-profit condition Eq. (13), we have

$$\int_0^1 a_{it} di = K_t$$

i.e. total household wealth in the economy must equal the total capital stock. When solving for the economy's equilibrium in practice, this is the capital market clearing condition we impose.

D. From Promised Utility to Wealth: Inverting the Pareto Frontier

We here show how our formulation of the contracting problem under moral hazard with wealth as the relevant state variable, Eq. (2) to Eq. (3), is related to a more familiar formulation of an optimal dynamic contracting problem under private information with promised utility as the state variable. In particular, we show that there is optimal insurance against residual productivity shocks, ε, (in a sense defined precisely momentarily) but no insurance against ability shocks, z. Our key result is Proposition 1 below which shows that, for the special case in which there are only residual productivity shocks and ability is deterministic,[**] our formulation is equivalent to an optimal dynamic contracting problem. That is, there is optimal insurance against residual productivity shocks (subject to incentive compatibility) in this special case. The more general formulation Eq. (2) to Eq. (3) is then simply this special case with uninsurable ability shocks "added on top".

Equivalence for Special Case with only Residual Productivity (ε) but no Ability (z) Shocks.

Standard Formulation with Promised Utility. As we showed in Section C the intermediary's problem can be conveniently broken into a continuum of sub-problem, namely to maximize the equity value q_{it} from contracting with a particular household i. We here consider this problem for one particular household i. For simplicity, we drop the i subscript. The problem is:

$$q_t = \mathbb{E}_t \sum_{s=t}^{\infty} \frac{y_s - c_s}{(1+r)^{s-t}} \qquad [16]$$

subject to providing promised utility of at least W_t to the household

$$\mathbb{E}_t \sum_{\tau=t}^{\infty} \beta^{\tau-t} u(c_\tau, e_\tau) \geq W_t$$

and an incentive compatibility constraint for the household. Assume that there are only residual productivity shocks (ε) and that entrepreneurial ability (z) is deterministic and fixed over time. Without loss of generality, set $z = 1$. To simplify notation, define by $Y(\varepsilon, e)$ an household's income given optimal choices for capital, labor and occupation

$$Y(\varepsilon, e) = \max_{x,k,\ell} \{x[\varepsilon f(k,\ell) - w\ell - (r+\delta)k] + (1-x)w\varepsilon\}.$$

If $W_t = W$ is promised to the household, the intermediary's value $q_t = Q(W_t)$ satisfies the Bellman equation

$$\begin{aligned} &Q(W) = \max_{e,c(\varepsilon),W'(\varepsilon)} \sum_{\varepsilon} p(\varepsilon|e) \left\{ Y(\varepsilon,e) - c(\varepsilon) + (1+r)^{-1} Q[W'(\varepsilon)] \right\} \quad \text{s.t.} \\ &\sum_{\varepsilon} p(\varepsilon|e) \left\{ u[c(\varepsilon),e] + \beta W'(\varepsilon) \right\} \geq \sum_{\varepsilon} p(\varepsilon|\hat{e}) \left\{ u[c(\varepsilon),\hat{e}] + \beta W'(\varepsilon) \right\} \;\; \forall e, \hat{e} \\ &\sum_{\varepsilon} p(\varepsilon|e) \left\{ u[c(\varepsilon),e] + \beta W'(\varepsilon) \right\} = W. \end{aligned} \tag{P1}$$

Equivalence: As explained in Section C, the intermediary's equity value q_t and the net worth of the household it contracts with satisfy Eq. (15): whatever is the intermediary's gain is the household's loss. The key idea is to use this relation to establish a useful equivalence result.

Proposition 1 *Suppose the Pareto frontier $Q(W)$ is decreasing at all values of promised utility, W, that are used as continuation values at some point in time. Then the following dynamic program is equivalent to* Eq. (P1)

$$\begin{aligned} &v(a) = \max_{e,c(\varepsilon),a'(\varepsilon)} \sum_{\varepsilon} p(\varepsilon|e) \left\{ u[c(\varepsilon),e] + \beta v[a'(\varepsilon)] \right\} \quad \textit{s.t.} \\ &\sum_{\varepsilon} p(\varepsilon|e) \left\{ u[c(\varepsilon),e] + \beta v[a'(\varepsilon)] \right\} \geq \sum_{\varepsilon} p(\varepsilon|\hat{e}) \left\{ u[c(\varepsilon),\hat{e}] + \beta v[a'(\varepsilon)] \right\} \;\; \forall e, \hat{e} \\ &\sum_{\varepsilon} p(\varepsilon|e) \left\{ c(\varepsilon) + a'(\varepsilon) \right\} = \sum_{\varepsilon} p(\varepsilon|e) Y(\varepsilon,e) + (1+r)a \end{aligned} \tag{P2}$$

Proof: The proof has two steps.

Step 1: write down dual to Eq. (P1)**.** Because the Pareto frontier $Q(W)$ is decreasing at the W under consideration, we can write the last constraint of Eq. (P1) (promise-keeping) with a (weak) inequality rather than an inequality. This does not change the allocation chosen under the optimal contract.[††] The dual to Eq. (P1) is then to maximize

$$\begin{aligned} &V(q) = \max_{e,c(\varepsilon),q'(\varepsilon)} \sum_{\varepsilon} p(\varepsilon|e) \left\{ u[c(\varepsilon),e] + \beta V[q'(\varepsilon)] \right\} \quad \text{s.t.} \\ &\sum_{\varepsilon} p(\varepsilon|e) \left\{ u[c(\varepsilon),e] + \beta V[q'(\varepsilon)] \right\} \geq \sum_{\varepsilon} p(\varepsilon|\hat{e}) \left\{ u[c(\varepsilon),\hat{e}] + \beta V[q'(\varepsilon)] \right\} \;\; \forall e, \hat{e} \\ &\sum_{\varepsilon} p(\varepsilon|e) \left\{ Y(\varepsilon,e) - c(\varepsilon) + (1+r)^{-1} q'(\varepsilon) \right\} \geq q. \end{aligned} \tag{P1'}$$

where $q = Q(W)$. Because $Q(W)$ is decreasing, its inverse $V(q)$ is also decreasing. We can therefore replace the inequality in the last constraint of Eq. (P1') with an equality.

Step 2: express dual in terms of asset position rather than profits. The second step is a simple change of variables. In particular, we use the present-value budget constraint Eq. (15) to express the problem in terms of assets rather than the PDV of intermediary profits. To this end, let

$$q = -a(1+r), \quad q'(\varepsilon) = -a'(\varepsilon)(1+r). \tag{17}$$

Substituting Eq. (17) into Eq. (P1') and defining $v(a) = V[-(1+r)a]$, yields Eq. (P2) and proves the desired result.□

General Case: Comparison of Our Formulation with Optimal Contract. Optimal Contracting Problem. Consider the following problem: maximize intermediary profits

$$Q_t = \mathbb{E}_t \sum_{\tau=t}^{\infty} \frac{y_\tau - c_\tau}{\prod_{s=t}^{\tau}(1+r_s)}$$

subject to providing promised utility of at least W_t to the household

$$\mathbb{E}_t \sum_{\tau=t}^{\infty} \beta^{\tau-t} u(c_\tau, e_\tau) \geq W_t$$

and an incentive compatibility constraint for the household. If $W_t = W$ is promised to the household and its current ability shock is $z_t = z$, the intermediary's value $q_t = Q(W_t, z_t)$ satisfies the Bellman equation

$$\begin{aligned} &Q(W,z) = \max_{e,c(\varepsilon),W'(\varepsilon)} \sum_{\varepsilon} p(\varepsilon|e) \left\{ Y(\varepsilon,z,e) - c(\varepsilon) + (1+r)^{-1} \mathbb{E}_{z'} Q[W'(\varepsilon), z'] \right\} \quad \text{s.t.} \\ &\sum_{\varepsilon} p(\varepsilon|e) \left\{ u[c(\varepsilon),e] + \beta W'(\varepsilon) \right\} \geq \sum_{\varepsilon} p(\varepsilon|\hat{e}) \left\{ u[c(\varepsilon),\hat{e}] + \beta W'(\varepsilon) \right\} \;\; \forall e, \hat{e} \\ &\sum_{\varepsilon} p(\varepsilon|e) \left\{ u[c(\varepsilon),e] + \beta W'(\varepsilon) \right\} = W. \end{aligned} \tag{P3}$$

where

$$Y(\varepsilon, z, e) = \max_{x,k,\ell} \{x[z\varepsilon f(k,\ell) - w\ell - (r+\delta)k] + (1-x)w\varepsilon\}$$

Compare this formulation to the one used in the main text, Eq. (2) –Eq. (3). Note that under the optimal contract Eq. (P3), utility $W(\varepsilon)$ cannot depend on z'. That is, the principal absorbs all the gains or losses from z shocks. In contrast, in the formulation in the main text, Eq. (2)–Eq. (3), it is the reverse: the agent's utility varies with z' and its wealth does not. Since agent wealth is a negative scalar multiple of the principal's utility (profits) this means that the principal's welfare is made independent of z'. Exactly the reverse as in Eq. (P3). To see this even more clearly, shut down residual productivity shocks, $\varepsilon = 1$ with probability one. Then the formulation in the main text, Eq. (2)–Eq. (3) is an income fluctuations problem, like (5), (6) or other Bewley models. But Eq. (P3) is just perfect insurance, with a risk neutral principal.

E. Numerical Solution: Optimal Contract with Lotteries

When solving the optimal contract under moral hazard Eq. (2)–Eq. (3) numerically, we allow for lotteries as in (7). This section formulates the associated dynamic program.

Simplification Capital, labor and occupational choice only enter the problem in Eq. (2) through the budget constraint in Eq. (2). We can make use of this fact to reduce the number of choice variables in Eq. (2) from six $(e, x, k, \ell, c(\varepsilon), a'(\varepsilon))$ to three $(e, c(\varepsilon), a'(\varepsilon))$.

Entrepreneurs solve the following profit maximization problem.

$$\bar{\Pi}(z, e; w, r) = \max_{k,\ell} \ \bar{\varepsilon}(e) z f(k,\ell) - (r+\delta)k - w\ell, \quad \bar{\varepsilon}(e) \equiv \sum_{\varepsilon} p(\varepsilon|e)\varepsilon.$$

Note in particular that capital k and labor ℓ are chosen *before* residual productivity ε is realized (see the timeline in Figure 1). With the functional form assumption in Eq. (27), the first-order conditions are

$$\alpha z \bar{\varepsilon}(e) k^{\alpha-1}\ell^{\gamma} = r+\delta, \quad \gamma z \bar{\varepsilon}(e) k^{\alpha}\ell^{\gamma-1} = w$$

These can be solved for the optimal factor demands given effort, e, talent, z and factor prices w and r.

$$k^*(e, z; w, r) = (\bar{\varepsilon}(e) z)^{\frac{1}{1-\alpha-\gamma}} \left(\frac{\alpha}{r+\delta}\right)^{\frac{1-\gamma}{1-\alpha-\gamma}} \left(\frac{\gamma}{w}\right)^{\frac{\gamma}{1-\alpha-\gamma}}$$

$$\ell^*(e, z; w, r) = (\bar{\varepsilon}(e) z)^{\frac{1}{1-\alpha-\gamma}} \left(\frac{\alpha}{r+\delta}\right)^{\frac{\alpha}{1-\alpha-\gamma}} \left(\frac{\gamma}{w}\right)^{\frac{1-\alpha}{1-\alpha-\gamma}}$$

Realized (as opposed to expected) profits are

$$\Pi(\varepsilon, z, e; w, r) = z\varepsilon k(e, z; w, r)^{\alpha} \ell(e, z; w, r)^{\gamma} - w\ell(e, z; w, r) - (r+\delta)k(e, z; w, r)$$

Substituting back in from the factor demands, realized profits are

$$\Pi(\varepsilon, z, e; w, r) = \left(\frac{\varepsilon}{\bar{\varepsilon}(e)} - \alpha - \gamma\right) (z\bar{\varepsilon}(e))^{\frac{1}{1-\alpha-\gamma}} \left(\frac{\alpha}{r+\delta}\right)^{\frac{\alpha}{1-\alpha-\gamma}} \left(\frac{\gamma}{w}\right)^{\frac{\gamma}{1-\alpha-\gamma}} \quad [18]$$

and expected profits are

$$\bar{\Pi}(z, e; w, r) = (1-\alpha-\gamma)(z\bar{\varepsilon}(e))^{\frac{1}{1-\alpha-\gamma}} \left(\frac{\alpha}{r+\delta}\right)^{\frac{\alpha}{1-\alpha-\gamma}} \left(\frac{\gamma}{w}\right)^{\frac{\gamma}{1-\alpha-\gamma}} \quad [19]$$

The optimal occupational choice satisfies (note that agents choose an occupation *before* ε is realized):

$$x(z, e; w, r) = \arg\max_{x} \left\{x\bar{\Pi}(z, e; w, r) + (1-x)w\bar{\varepsilon}(e)\right\}$$

Given a realization of ε, those who choose to be entrepreneurs realize profits of Eq. (18) and those who choose to be workers realize a labor income of $w\varepsilon$. Therefore, realized (as opposed to expected) surplus is

$$S(\varepsilon, z, e; w, r) = x(z, e; w, r)\Pi(\varepsilon, z, e; w, r) + (1 - x(e, z; w, r))w\varepsilon.$$

Using these simplifications, the budget constraint in Eq. (2) can then be written as

$$\sum_{\varepsilon} p(\varepsilon|e)\left\{c(\varepsilon) + a'(\varepsilon)\right\} = \sum_{\varepsilon} p(\varepsilon|e) S(\varepsilon, z, e; w, r) + (1+r)a. \quad [20]$$

As already noted, the advantage of this formulation is that it features three rather than six choice variables.

Linear Programming Representation A contract between the intermediary and a household specifies a probability distribution over the vector

$$(c, \varepsilon, e, a')$$

given (a, z). Denote this probability distribution by $\pi(c, \varepsilon, e, a'|a, z)$. The associated dynamic program then is a linear programming problem where the choice variables are the probabilities $\pi(c, \varepsilon, e, a'|a, z)$:

$$v(a, z) = \max_{\pi(c,\varepsilon,e,a'|a,z)} \sum_{c,\varepsilon,e,a'} \pi(c, \varepsilon, e, a'|a, z) \left\{u(c, e) + \beta \mathbb{E} v(a', z')\right\} \quad \text{s.t.} \tag{21}$$

$$\sum_{c,\varepsilon,e,a'} \pi(c, \varepsilon, e, a'|a, z) \left\{a' + c\right\} = \sum_{c,\varepsilon,e,a'} \pi(c, \varepsilon, e, a'|a, z) S(\varepsilon, e, z; w, r) + (1 + r)a. \tag{22}$$

$$\sum_{c,\varepsilon,a'} \pi(c, \varepsilon, e, a'|a, z) \left\{u(c, e) + \beta \mathbb{E} v(a', z')\right\} \geq \sum_{c,\varepsilon,a'} \pi(c, \varepsilon, e, a'|a, z) \frac{p(\varepsilon|\hat{e})}{p(\varepsilon|e)} \left\{u(c, \hat{e}) + \beta \mathbb{E} v(a', z')\right\} \ \forall e, \hat{e}$$

$$\sum_{c,a'} \pi(c, \varepsilon, e, a'|a, z) = p(\varepsilon|e) \sum_{c,\varepsilon,a'} \pi(c, \varepsilon, e, a'|a, z), \quad \forall \varepsilon, e \tag{23}$$

Eq. (22) is the analogue of Eq. (20). The set of constraints Eq. (23) are the Bayes consistency constraints.[‡‡]

Bounds on Consumption Grid To solve the optimal contracting problem, we follow (8) and (7) and constrain all variables to lie on discrete grids. In order for the discretized dynamic programming problem to be a good approximation to our original problem, it turns out to be important to work with relatively fine grids, particularly for consumption. To achieve this with a limited number of grid points, we choose as tight an upper bound on the consumption grid as possible and adjust it when prices change. In particular, given (w, r), the upper bound is chosen as

$$\bar{c}(w, r) = r\bar{a} + \max\{\Pi(\varepsilon^H, \bar{z}, \bar{e}; w, r), w\varepsilon^H\},$$

for any given (w, r), where $\underline{a}, \bar{a}$ and so on are the lower and upper bounds on the grids for wealth and other variables, and where the profit function Π is defined in Eq. (18). These are the minimum and maximum levels of consumption that can be sustained if the agent were to choose $a'(\varepsilon) = a$ in Eq. (2). Note that this bound is tighter than what is typically chosen in the literature. After solving the dynamic programming problem, we verify that consumption never hits the upper bound. Table 1 lists our choices of grids.

Table 1. Variable Grids

Variable	grid size	grid range
Wealth, a	30	[0, 200]
Ability, z	15	$[\underline{z}, \bar{z}]$
Consumption, c	30	$[0.00001, \bar{c}(w, r)]$
Efficiency, ε	2	$[\varepsilon^L, \varepsilon^H]$
Effort, e	2	[0.1, 1]

F. Calibration

This Appendix discusses the functional forms and our calibration.

Functional forms We assume that utility is separable and isoelastic

$$u(c, e) = U(c) - V(e), \quad U(c) = \frac{c^{1-\sigma}}{1-\sigma}, \quad V(e) = \chi \frac{e^{1+1/\varphi}}{1+1/\varphi}, \tag{26}$$

and that effort, e, can take values in some bounded interval $[\underline{e}, \bar{e}]$. The parameter σ is the inverse of the intertemporal elasticity of substitution and also the coefficient of relative risk aversion. The parameter φ is the Frisch elasticity of labor supply.[§§] The production function is Cobb-Douglas

$$\varepsilon z f(k, \ell) = \varepsilon z k^\alpha \ell^\gamma. \tag{27}$$

We assume that $\alpha + \gamma < 1$ so that entrepreneurs have a limited span of control and positive profits. We assume the following transition process $\mu(z'|z)$ for entrepreneurial ability following (10) and (11): with probability ρ a household keeps its current ability z; with probability $1 - \rho$ it draws a new entrepreneurial ability from a discretized version of a truncated Pareto distribution whose CDF is[¶¶]

$$\Psi(z) = \frac{1 - (z/\underline{z})^{-\zeta}}{1 - (\bar{z}/\underline{z})^{-\zeta}},$$

where $\underline{z}$ and $\bar{z}$ are the lower and upper bounds on ability. We further assume that residual productivity takes two possible values $\varepsilon \in \{\varepsilon^L, \varepsilon^H\}$ and that the probability of the good draw

[§§] Our numerical results were computed using the separable utility function in Eq. (26). It is well-known that in moral hazard problems, the functional form of the utility function can be important, in particular whether it is separable. To explore this, we have also computed results for the case where the utility function takes the non-separable form proposed by (9), i.e. there is no wealth effect. This matters for some results but not for others. For example, the occupational choice patterns in the MH regime are now different because there is no longer a wealth effect making rich individuals less likely to exert effort and hence less likely to be entrepreneurs. It should also be relatively easy to compute results for alternative (say CES) production functions, and talent and residual productivity distributions, but we do not have any strong reasons to believe that these would yield different results.

[¶¶] The probability distribution of z' conditional on z is therefore $\mu(z'|z) = \rho\delta(z' - z) + (1 - \rho)\psi(z')$ where $\delta(\cdot - z)$ is the Dirac delta function centered at z and $\psi(z) = \Psi'(z)$ is the PDF corresponding to Ψ.

depends on effort as follows:

$$p(\varepsilon^H|e) = (1-\theta)\frac{1}{2} + \theta\frac{e - \underline{e}}{\bar{e} - \underline{e}}.$$

The parameter $\theta \in (0, 1)$ controls the sensitivity of the residual productivity distribution with respect to effort (and recall that $\underline{e}$ and $\bar{e}$ are the lower and upper bounds on effort). Note that under full insurance against ε, what matters for the incentive of a household as agent to exert effort is only θ *relative* to the disutility parameter χ. That is, since χ scales the marginal cost of effort, and θ scales the marginal benefit, what matters is the ratio χ/θ.

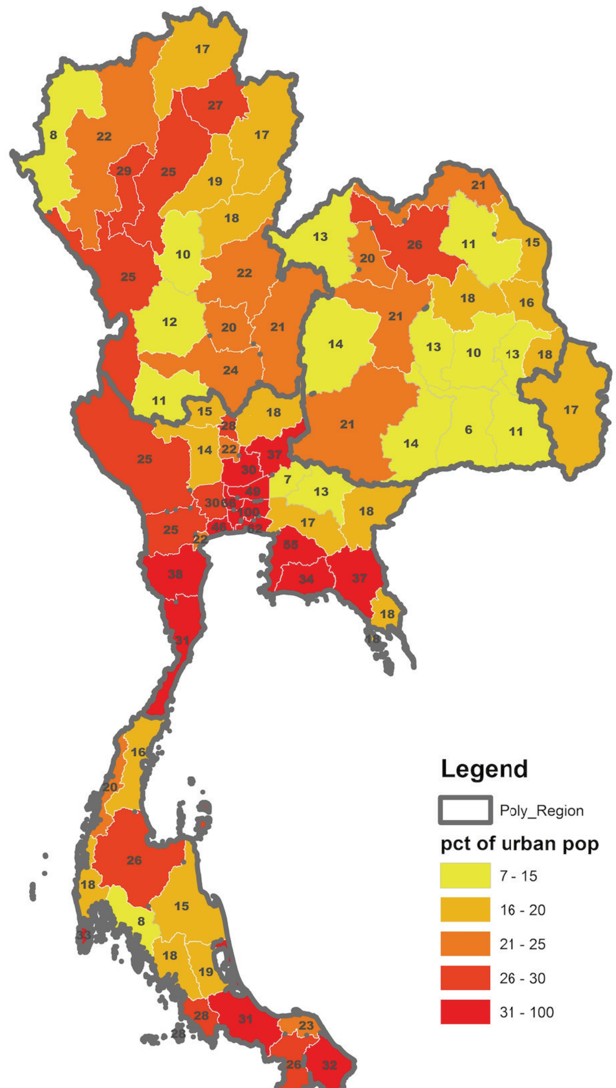
Calibrated Parameter Values Table 2 summarizes the parameter values we use in our numerical experiments. We split the parameter values into two groups, corresponding to panels A and B in the table. Those in the first group (panel A) are taken from other studies. Those in the second group (panel B) are internally calibrated with a mean squared error metric against regional aggregates, as we describe below. This division has in part to do with the confidence we can place in earlier estimates in the literature and our desire to calibrate ourselves key parameters that have to do with the damage caused by the various financial frictions. We also wanted to limit the number of free parameters to no more than the moments in the data we try to fit.[***]

Consider first the parameters in panel A. The preference parameters β, φ are set to standard values in the literature.[†††] The coefficients on capital and labor are 0.3 and 0.4, coming from those in (14) and (17). This implies returns to scale equal to $\alpha + \gamma = 0.7$ which is close to values considered in the literature.[‡‡‡] The one-year depreciation rate is set at $\delta = 0.08$.

Two other parameters that are given here, $\underline{z}$ and ε^H, are normalizations that take on meaning when their counterpart is calibrated below. Specifically the lower bound on entrepreneurial talent is set to $\underline{z} = 1$ and the upper bound on talent is calibrated below; likewise we set the value of the high residual productivity draw to $\varepsilon^H = 2$, and the lower productivity draw is calibrated below. Finally we set the population fraction in urban areas to $\vartheta = .3$. This number comes from the Housing and Population Census of Thailand for the year 2000 which reports an urban population share of .31 and we rounded this number consistent with grids on the fraction ϑ we have been using.

This aggregate number naturally masks a fair amount of heterogeneity in urban population shares across geographic areas. Figure 2 plots the percent of the population living in urban areas for different Thai provinces. Urbanization rates are lowest in provinces in the country's Northeast. But note that even in provinces with very low urbanization rates, some percentage of individuals live in urban areas, i.e. there is no province in which zero percent of the population live in urban areas. Conversely, there is only one province (Bangkok) which is 100 percent urban. For context see Figure 3 of the Townsend Thai surveys denoting in detail for the province of Lopburi both urban and rural areas selected.

Fig. 2. Urbanization Across Thai Provinces



[***] Note that our model is highly nonlinear so counting parameters and equations is not the correct metric (as it would be for a set of linear equations). We were nevertheless worried about overfitting.

[†††] Perhaps the most challenging among these is the Frisch elasticity φ. For instance (19) argues that a range of $1/2$ to 4 covers most values that either micro- and macroeconomists would consider reasonable ($\varphi = 4$ corresponds to the value in (20)). (18) find even lower values in direct use of the monthly labor data.

[‡‡‡] For example, (10) and (11) set returns to scale equal to 0.79.

Table 2. Parameter Values in Benchmark Economy

A. Parameters based on estimates from Thailand (and other studies)

Parameter	Value	Description	Source
β	1.09^{-1}	discount factor	set to deliver Thai r
φ	1	Frisch elasticity of effort supply	KT, PTK, BCTY
α	0.3	exponent on capital in production function	PT1, PT2, BBT
γ	0.4	exponent on labor in production function	PT1, PT2
δ	0.08	depreciation rate	ST
ϑ	0.3	fraction of population in urban areas	Thai Population Census

B. Parameters Calibrated to Meso Data

Parameter	Value	Description
σ	2.30	inverse of intertemporal elasticity of substitution
χ	0.89	disutility of labor
θ	0.44	sensitivity of residual productivity to effort
ε^L	0.19	value of low residual productivity draw
ρ	0.82	persistence of entrepreneurial talent
ζ	1.17	tail param. of talent distribution
$\bar{z}$	4.71	upper bound on entrepreneurial talent
λ	1.80	tightness of collateral constraints

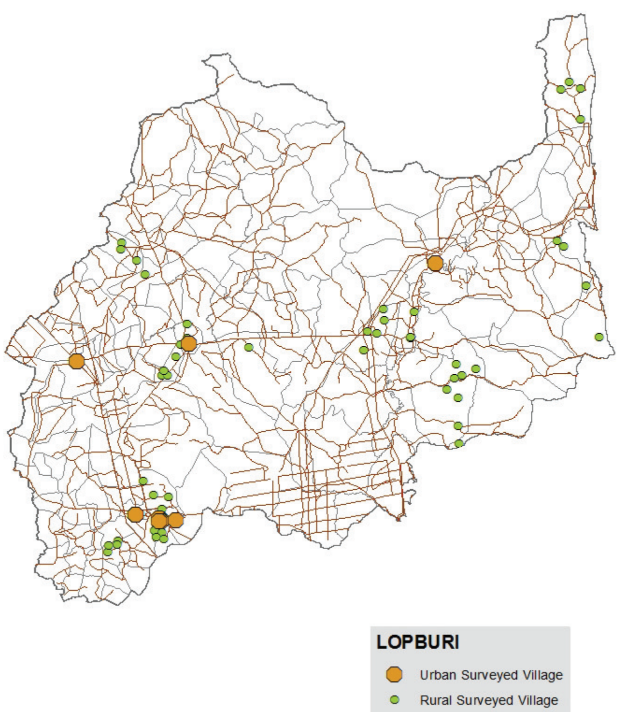
Notes: The table uses the following abbreviations for sources. PTK: (12), KT: (13), PT1: (14), PT2: (15), ST: (16), BBT: (17), BCTY: (18).

Table 3. Moments Targeted in Calibration

Moment	Data	Model
Aggregate rural income	0.254	0.382
Aggregate urban consumption	0.747	0.599
Aggregate rural consumption	0.430	0.451
Aggregate urban capital used in production	2.644	3.711
Aggregate rural capital used in production	1.323	0.787
Aggregate rural wealth rel to urban wealth	0.291	0.382
Urban entrepreneurship rate	0.58	0.507
Rural entrepreneurship rate	0.69	0.519

Notes: The first five moments are expressed as ratios to annual income in urban areas. The moments in the data are computed from the monthly data of the Townsend Thai project.

Fig. 3. Urban and Rural Areas selected in Lopburi Province



For our own calibration here we use a method of moments type estimation, that is find parameter values which minimize a weighted normalized difference between certain key regional aggregates in the model and the data. These are summarized in Table 3. We here provide a brief overview. More detail, including the objective function our procedure minimizes can be found at the end of this Appendix. The data for income, (nondurable) consumption, capital and wealth come from the monthly data of the Townsend Thai project, where we have complete financial accounts, as described earlier. The difference between capital and wealth (net worth) is that the former is machinery and equipment used in agricultural and business, excluding land whereas the latter covers all assets and all liabilities. We distinguish the central developed region from the less developed Northeast. Roughly, the variables in the data are anywhere from 75% to 4 times larger in the Central region (reported more precisely below). The means we analyze are time and household averages. Of course there are outliers which influence the means so we have winsorized all variables at the 95% level, except for capital, which has more extreme values, so we winsorized at the 90% level. As already discussed in the context of Figure 2, urbanization is higher in the Central region than in the Northeast. In the calibration below we therefore use the Central region as a stand-in for urban areas and the Northeast as a stand-in for rural areas.

Of course neither the Central and Northeast regions are purely urban or rural and each province instead contains both urban and rural areas (see Figure 2). We have therefore also checked the numbers in the annual data of Townsend Thai data where we can split the sample according to whether households live in urban or rural areas (and not just according to province). The overall patterns are similar, though the urban-to-rural ratios are less amplified, with income, capital and wealth being between 34% and 68% higher in urban areas. These types of differentials also appear for income and consumption in the Socio-Economic Survey (SES).

The numbers for income, capital, and consumption in Table 3 are in nominal Thai baht and we convert to model units by normalizing by income in the Central (moral hazard) region, as we do in the model simulation. We also try to match only relative wealth, the ratio of Northeast (rural) to Central (urban) since we remain worried about the levels which as noted include land, something the model does not have. The percentage of entrepreneurs is from the annual urban vs rural resurveys (21) and requires no normalization. The percentages are high, and surprisingly higher in rural areas relative to urban (though rural includes farms). To summarize this discussion and calibration, and to report precise values, the eight moments we attempt to match are in Table 3.

A quick summary of the fitted values against the targets should include the fact that the ratio of rural to urban income is about $1/4$ in the data and $1/3$ in the model.[§§§] Consumption in rural areas is close when comparing the model to the data, in urban areas less so. The capital to income ratio in the model is high relative to the data in the Central region and lower in the Northeast. Yet we do reasonably well with the relative wealth ratio, despite putting lower weight on this moment. We are somewhat underpredicting the level of enterprise, especially in rural areas (as anticipated). With the exception capital used in production, the model generated moments tend to understate the differentials in the monthly data, specifically for income, consumption, and wealth, but these same model model generated models are of a similar order of magnitude to the differentials in income and consumption in the urban/rural annual data (where wealth is unfortunately not well measured).

The best fitting parameter values are those in panel B of Table 2. The value for risk aversion $\sigma = 2.3$ is in a reasonable range, in particular it is within the range estimated by (22) for Thailand. As noted earlier, under full insurance against ε only the ratio of labor disutility to the productivity of effort matters, namely $\tilde{\chi} = \chi/\theta$ matters and our calibrated value of $0.89/0.44 = 2.02$ lies in the range usually considered in the literature.[¶¶¶]

Next consider the parameters governing the ability and residual productivity processes. The persistence of entrepreneurial talent is calibrated at $\rho = 0.82$. This is consistent with empirical estimates (Gourio, 2008; Collard-Wexler, Asker and DeLoecker, 2011), and similar to the parameter value used by Midrigan and Xu (2014) (0.74, see their Table 2). We calibrate the tail parameter of the talent distribution to $\zeta = 1.17$ which is only slightly higher than what would correspond to Zipf's law if the Pareto distribution were unbounded. The upper bound of talent $\bar{z}$ is 4.7 times the lower bound $\underline{z}$. This talent range is in line with that typically considered in the literature (for example see 10, 11, although their Pareto distributions feature thinner tails).

Finally, for our benchmark numerical results, we calibrated the key parameter λ governing the tightness of the collateral constraints, equation Eq. (4), to $\lambda = 1.80$. In our limited commitment economy, this results in an external finance to GDP ratio of 2.057 which is close to the values of the 2011 external finance to GDP ratios of Thailand (1.963) and China (2.033).[17]

Objective Function for Calibration. We here describe in more detail the procedure we use to arrive at the parameter values summarized in panel B of Table 2. We denote by $\Theta = (\sigma, \chi, \theta, \varepsilon^L, \rho, \zeta, \bar{z}, \lambda)$ the 8×1 vector or parameter values, by m the vector of moments in the data and by $d(\Theta)$ the vector of corresponding model-generated moments. We choose

$$\hat{\Theta} = \arg\min_{\Theta} \; F(\Theta)' \mathbf{\Omega} F(\Theta) \quad \text{where} \quad F(\Theta) = \frac{d(\Theta) - m}{m} \qquad [28]$$

where $\mathbf{\Omega}$ is a 8×8 positive definite weighting matrix. The reason for rescaling $d(\Theta) - m$ by m is so as to make sure that different units across moments do not affect things too much.[18] For the weighting matrix Ω, we choose a diagonal matrix with diagonal elements $(\omega_1, ..., \omega_8)$ so that Eq. (28) becomes

$$\hat{\Theta} = \arg\min_{\Theta} \sum_{i=1}^{8} \omega_i F_i(\Theta)^2 = \sum_{i=1}^{8} \omega_i \left(\frac{d_i(\Theta)}{m_i} - 1 \right)^2$$

Our eight target moments are ordered as in Table 3. As discussed in the main text, we use the following weights

$$\omega_1 = \omega \left(\frac{GDP^{LC}}{GDP^{MH}} \right) = 0.5$$
$$\omega_2 = \omega \left(\frac{C^{MH}}{GDP^{MH}} \right) = 1$$
$$\omega_3 = \omega \left(\frac{C^{LC}}{GDP^{MH}} \right) = 1$$
$$\omega_4 = \omega \left(\frac{K^{MH}}{GDP^{MH}} \right) = 1$$
$$\omega_5 = \omega \left(\frac{K^{LC}}{GDP^{MH}} \right) = 1$$
$$\omega_6 = \omega \left(\frac{W^{LC}}{W^{MH}} \right) = 0.5$$
$$\omega_7 = \omega \left(\%Entr.^{MH} \right) = 1$$
$$\omega_8 = \omega \left(\%Entr.^{LC} \right) = 1$$

The minimized objective $F(\hat{\Theta})' \mathbf{\Omega} F(\hat{\Theta})$ equals 0.3107 and the resulting moments $d(\hat{\Theta})$ and their counterparts in the data m are reported in Table 3.

[§§§] The model has a hard time getting close and we backed off setting the weight on this to one in our calibration as it was driving other results.

[¶¶¶] The macroeconomics literature typically assumes that $\theta = 1$ so that effort translates one for one into efficiency units of labor. In this case $\tilde{\chi} = \chi$ and only this utility shifter has to be calibrated. See for example (20) and (19) who use a similar value for $\tilde{\chi}$ as we do.

[17] These numbers are from (23). External finance is defined to be the sum of private credit, private bond market capitalization, and stock market capitalization. This definition follows (10). See also their footnote 9.

[18] We have also experimented with $F(\Theta) = \frac{d(\Theta) - m}{\sqrt{|d(\Theta) m|}}$ with very similar results.

We have chosen a standard macro calibration as is typical in the literature. We could potentially have done GMM estimation on one of our samples only. Though this would have allowed bootstrap standard errors of moments in the data, it would have masked the variation across alternative data sets we have featured. As one of our recurrent themes is big data, a more narrow focus seems inappropriate. Studies using multiple data sets typically put zero covariances in cross sample block-off-diagonal variables. The other part of GMM, derivatives of model generated moments with respect to parameter variation is reported in part in (24) though at a different set of benchmark parameter values. The important bottom line is that patterns in model-generated data are robust.

G. Supplementary Figures

Fig. 4. Borrowing and Lending

(a) Moral Hazard (b) Limited Commitment

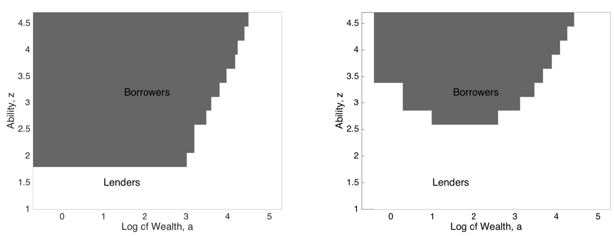


Fig. 5. Occupational Choice

(a) Moral Hazard (b) Limited Commitment

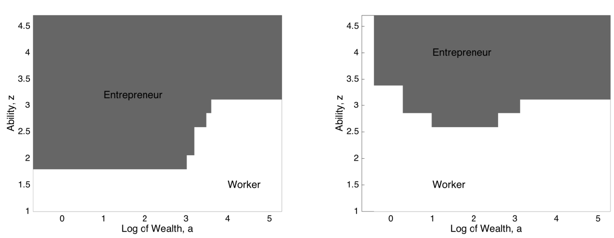
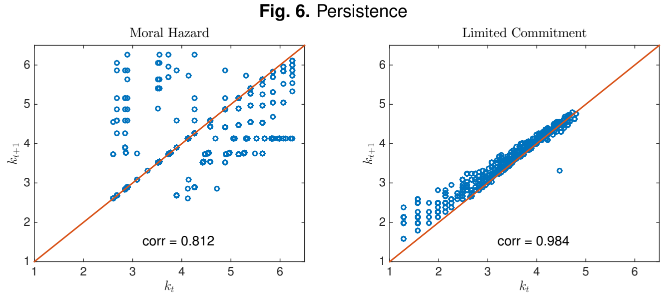


Fig. 6. Persistence



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Risk and Return in Village Economies

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Abstract This paper provides a theory-based empirical framework for understanding the risk and return on productive capital assets and their allocation across activities in an economy characterized by idiosyncratic and aggregate risk and thin formal markets for real and financial assets. We apply our framework to households running business enterprises in Thai villages with extensive networks, taking advantage of panel data: income, assets, consumption, gifts, and loans. We decompose risk and estimate the risk premia faced by households, distinguishing aggregate risk from idiosyncratic, potentially diversifiable risk. This distinction matters for estimating measures of underlying productivity and has important policy implications.

Keywords: Rate of Return, Aggregate Risk, Idiosyncratic Risk, Household Enterprise, Risk Sharing, Kinship Networks, Village Economy, Asset Pricing, CAPM, Risk Premium, Risk-Adjusted Return, Productivity

JEL Classification: D12, D13, G11, L23, L26, O12, O16, O17

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1. Introduction

This paper provides a theoretical framework for understanding the allocation, risk, and return on productive real capital assets across activities and sectors in an economy characterized by idiosyncratic and aggregate risk and thin formal markets for real and financial assets. We apply our framework to households running farm and non-farm business enterprises in rural and semi-urban Thai villages with extensive family networks, taking advantage of unusual panel data, a monthly household survey over 156 months that measures income, assets, consumption, gifts, and loans.

Our framework allows us to quantify and decompose the risk faced by households running these business enterprises into two components: (1) aggregate, non-diversifiable risk, and (2) idiosyncratic, potentially diversifiable, risk. In particular, we are able to estimate the risk premia for the aggregate and the idiosyncratic risk components separately. We find that these two risk premia are quite different from each other, specifically, much higher for the aggregate risk than for the idiosyncratic risk. The distinction thus matters for backing out accurate measures of underlying productivity, risk-adjusted net returns, i.e., what remains after subtracting risk premia from expected, average returns.

Many households in our data face relatively more idiosyncratic risk but this risk carries a low risk premium. For these households, although the quantity of idiosyncratic risk can be high, not much of it is borne by the household as it is diversified away to a considerable degree. Thus these households have low risk premia and, with not much to subtract, net returns are relatively close to unadjusted returns. In contrast, other households in the data bear considerably more aggregate risk than idiosyncratic risk. As this aggregate risk cannot be diversified away, it bears a high risk premium. Thus unadjusted returns for such households can seem quite high, but the net returns after subtracting the risk premia, i.e., the measures of their latent productivity, are low.

This in turn has important policy implications. To the extent that a community faces aggregate risk, there is little more that could be done within the community itself to alleviate that risk. Aggregate risk is not entirely exogenous, however. Under our framework, aggregate risk is chosen optimally as sectors and activities within and across households, but beyond that there is little the community can do ex post. On the other hand, idiosyncratic risk is in principle diversifiable, hence one can think about potential policy improvements, e.g., improved ex ante insurance products within the community or ex post government transfers. Therefore, the distinction between aggregate and idiosyncratic risk is important for policies that are geared toward risk sharing.

Other policies addressing credit constraints, financial access, and occupation choice also hang on the distinction between aggregate and idiosyncratic risk. The relatively poor households in the village economies of our sample are engaged in production activities with high expected returns. Thus they might appear to be credit constrained in the usual, stereotypical sense. But these poor households face high aggregate risk, and also idiosyncratic risk. Adjusting for each of these risks appropriately, with differential risk premia, we find that poor households in the more developed region of the country have net returns which are actually lower than the relatively wealthy in that region. So poor households in the developed region seem constrained after all but in a different sense: they are not constrained within their chosen sectors and activities but rather are constrained away from the activities with the highest returns net of risk premia that are available for richer households. Further, the returns of the relatively poor in the less developed, agrarian region are not different from those of the relatively wealthy in that region, after adjusting for risk premia. Thus poor households are not credit constrained in the usual sense, either.

Our framework and the results are made clear by a comparison of two extreme benchmarks. A full risk-sharing benchmark, not with ex ante asset trades but with ex post transfers of consumption goods contingent on output, delivers the prediction that only aggregate covariate risk contributes to the risk premium. In contrast, an autarky benchmark would predict that aggregate and idiosyncratic risks should enter the risk premium with the same weight because total risk faced by the household business is simply the sum of the risk from each component. In the data, the risk sharing benchmark picks up a large part, though not all, of the variation in risk premia. There is a residual, smaller part due to idiosyncratic risk, but otherwise it is substantially diversified away. More specifically, a financial autarky model that would simply adjust for total risk, that is, with equal weight on aggregate and idiosyncratic risk factors, is rejected in the data. Intermediate models which allow substantial though less than perfect risk sharing fit the data best.

This finding, derived entirely from production and rate of return data, is highly reminiscent of findings in the literature on risk sharing using consumption and income data (Townsend 1994). The full risk sharing benchmark is typically rejected, and so are the borrowing-lending or buffer stock financial regimes. The best fitting models typically lie between these extremes, sometimes closer the former than the latter. Here we take a direct look at this issue: we use the consumption as well as gifts and lending data from the same sample of households and establish a consistent picture of what we are seeing on production and consumption sides. Idiosyncratic shocks to rates of return are positively correlated with gifts-out and lending as the full insurance benchmark would suggest. Still, in consumption risk sharing regressions, these same idiosyncratic shocks do nevertheless move consumption, with positive but quantitatively small coefficients. So indeed households do bear some of the idiosyncratic risk and that is why there remains risk premium for idiosyncratic risk. Yet, the idiosyncratic risk premium is small relative to risk premium associated with aggregate shocks which in the data move both production and consumption. To the best of our knowledge, little previous work has analyzed risk sharing of the same households in the same sample using data from both consumption and production sides.

What we study in this paper is related to recent, important literatures in development, macroeconomics, and finance that focus on rates of return. In development economics, there is relatively sparse cross-referencing between risk and return concepts. Although there is literature on risk and the vulnerability of poor households as well as studies on returns on household enterprises as a source of household income, many of them do not explicitly consider risk premium as a part of the return. For example, there is existing literature showing that the impact on revenue of additional investments can be high, particularly with respect to small investments (for example, De Mel, McKenzie, and Woodruff 2008; Evenson and Gollin 2003; McKenzie and Woodruff 2008; and Udry and Anagol 2006). In a recent paper, Beaman, Karlan, Thuysbaert, and Udry (2015) demonstrate that the return to agricultural investment varies across farmers, farmers are aware of this heterogeneity, and farmers with particularly high returns self−select into borrowing. Related, the evidence from traditional microcredit, targeting micro enterprises, is mixed: some studies with randomized control trials find an increase in investment in self-employment activity while others do not.[1] In this paper, we add to this list an important consideration that measured rates of return may reflect a risk premium. We find that poor households, usually a natural target for policy intervention as they have high return and low investment, seem to engage in riskier production activities. Therefore, targeting without information on risk may blunt, if not seemingly eliminate real gains, in taking an average over individuals who vary in true underlying productivity (some are constrained and productive while others are not). Put differently, to the extent we can identify subgroups and their exposure to different kinds of risk, we would be better able to target the ones with genuinely high returns. In this respect, our study is among few exiting studies that explicitly connects risk and return together. Rosenzweig and Binswanger (l993) test for the existence of a positive association between the average returns to individual production assets and their sensitivity to weather variability.

[1] For a summary of recent randomized interventions on microcredit, see Banerjee, Karlan, and Zinman (2015).

Morduch (1995) finds that poor households in villages in India have limited ability to smooth consumption ex post and tend to choose production activities with lower yields to give them smoother ex ante income; our study in contrast finds that Thai households with lower initial wealth are more involved with risky activities, both aggregate and idiosyncratic, and for that reason have higher average returns. More recently, Karlan, Osei, Osei-Akoto, and Udry (2013), argue that risk is a constraint to agricultural investment in Ghana.

Likewise, in macroeconomics, Hsieh and Klenow (2009), Restuccia and Rogerson (2008), and Bartelsman, Haltiwanger, and Scarpetta (2013) study misallocation of resources. The essential idea is that an optimal allocation of capital (and other factor inputs) requires the equalization of marginal products. Deviations from this outcome represent a misallocation of resources and translate into sub-optimal aggregate outcomes. Typically, however, the literature does not examine the underlying causes. An important recent exception is David, Hopenhayn, and Venkateswaran (2014) in which firm's informational frictions drive capital decisions. Similarly, Midrigan and Xu (2013), Moll (2014), Buera and Shin (2013), and Asker, Collard-Wexler, and De Loecker (2012) study the role of financial frictions and capital adjustment costs, respectively. However, studies often take risk and return on the production side of the economy as exogenous. We add to these studies the role of risk aversion, the various types of risk faced by firms, and evidence that people can and do choose among potential projects based on a risk-return trade-off. For us, the market is crucial, but in our case informal markets are the mechanism allowing mitigation of much of the idiosyncratic risk. In turn, adjustments of the measured rates of return to get at underlying productivity require different risk premium, varying with idiosyncratic versus aggregate risk.

Our study also contributes to the standard empirical consumption-based asset pricing in macroeconomics and finance literature that typically relies on countrywide aggregate consumption to explain asset risk and return of financial assets. Our study is applied locally to collections of closely connected villages in which almost everyone is in a family network, allowing us to link asset returns of the households with panel data of relevant market participants, including household specific data on consumption, gifts, and loans.[2] In addition, households in our sampled villages infrequently trade their fixed business assets (machinery, livestock, and land).[3] However, they have extensive family networks and engage actively in gifts and loans. This makes the economic mechanism in these village economies with informal markets and institutions close to complete market mechanism in the standard capital asset pricing model, resulting in identical predicted outcome despite different institutional settings. Finally, there are studies of risk and return to private enterprises in the finance literature, but these are mainly in developed country contexts. For example, Moskowitz and Vissing-Jorgensen (2002) and Kartashova (2014) analyze private equity premium by comparing the rates of return on private equity in the US with the returns to public equity, arguing that private firms are seemingly more poorly diversified. Heaton and Lucas (2000) show that entrepreneurial risk is important for portfolio choice. In our village economies, at least, the limits to diversification at the household level are mitigated by risk sharing through informal networks of family in the community. Though it may be a stretch to imagine this is happening in advanced economies, the point remains that in any given setting informal networks could potentially rationalize apparent risk return anomalies.

The paper proceeds as follows. Section 2 presents the two benchmark, the end-points, as it were that we use to study risk and return in village economies. The more realistic intermediate case lies between these two extremes. Section 3 describes the data from the Townsend Thai Monthly Survey that we use in our empirical work. Section 4

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[2] Campbell (2003) provides a review of the development of the consumption-based model. Cochrane (2001) discusses how the traditional capital asset pricing model (CAPM) and the consumption-based model are interrelated. For the literature on limited market participation in the developed economy context, see Mankiw and Zeldes (1991), Vissing-Jorgensen (2002), and Vissing-Jorgensen and Attanasio (2003).

[3] The returns to the relatively illiquid real productive assets are mainly from the output they produce. There are a few financial assets (such as deposits at financial institutions). The returns to these tradable liquid financial assets are from interest, dividends, or capital gains (and losses), but these assets and their returns are small in the data and are not driving the conclusion.

presents the first set of our main empirical results on the relationship between expected return and aggregate risk. As robustness checks, we extend our analysis to incorporate human capital, time-varying risks, and time-varying stochastic discounts. We find that expected returns are positively associated with aggregate risks in our village economies. Section 5 quantifies idiosyncratic risk and analyzes its effect on risk premium and expected returns, as well. The main point is the contributions of the aggregate and the idiosyncratic risk premia to the total risk premia as distinct from the contribution of aggregate risk and idiosyncratic risk to total risk. This is the second set of empirical results. Section 6 presents our third set of empirical results by demonstrating that the empirical findings from the production and asset return data in this paper are consistent with those from the consumption and income data, as in earlier literature, by directly analyzing our panel data where both production and consumption are measured. Section 7 distinguishes the risk premium from the productivity of household enterprises, computing the household's rate of return net of the risk premium. Section 8 presents our fourth and final set of empirical findings that there is heterogeneity across households in their exposure to aggregate and idiosyncratic risks. Section 9 concludes and discuss policy implications.

2. Theoretical Framework

We start with an economy consisting of J households, indexed by j = 1, 2,..., J. There are I production activities, indexed by i = 1, 2,..., I, that utilize capital as the only input. Each production technology delivers the same consumption good. Let $k_{i,j}$ be the assets assigned to production activity i and operated by household j as of the end of the previous period. This is one of the key choices, whether chosen as if by the community as a whole, as in the first model below, or done at the household level, as in the second model. The technologies are fixed but the assignment of capital is endogenous. Let $f_{i,j}(k_{i,j})$ be the output, net of depreciation, realized at the beginning of the current period.

The fluctuation and the pairwise comovement of the marginal returns, under a particular capital allocation $k_{i,j}$, is denoted $\frac{df_{i,j}(k_{i,j})}{dk_{i,j}} = f_{i,j}^{/}(k_{i,j})$. Because the returns are random, a variance-covariance matrix represents these marginal returns. We feature endogenous determination of the various portfolios that can be formed by assigning assets to various households and to various activities. Varying the weights of the assets in a portfolio creates a feasible set of all possible returns that could be achieved by available current assets. Note that some of the elements in this set could have zero weight for some of the assets, i.e., it is not necessary to have all of the assets included in a particular portfolio. Also note that this feasibility set is derived from the production technology alone, without any assumptions on preferences or optimization.

We present two polar benchmarks in this section. For expositional clarity, we begin with the first benchmark economy where full risk-sharing delivers Pareto optimal allocations of risk for the community as a whole. We show how technologies introduced in the underlying environment above are linked together when risks are pooled efficiently over all households and production technologies. Then, we discuss the second, opposite benchmark that considers an economy where each household absorbs risk in isolation. The household is still making choices, however, on the composition of its portfolio. Note that the underlying technologies are the same in both benchmarks.[4]

2.1 A Full Risk-Sharing Benchmark: A Pareto Optimal Allocation of Risk

First we consider a benchmark case in which all households in the economy are able to completely pool and share risk from their production. Let k_M be the total assets of the aggregate economy, M, and F_M be the total output produced from all assets in the

[4] In the language of the Lucas tree model, households are not endowed with Lucas trees. Instead, the social planner or each household selects a portfolio of activities that maximizes its utility, choosing which type and how many of each type of tree (activity-specific asset) to own, and receives the fruit (return) from that tree.

aggregate economy. $F_M = F(\mathbf{k}) = \sum_{j=1}^{J}\sum_{i=1}^{I} f_{i,j}(k_{i,j})$ where **k** is a vector of capital allocation in the economy, $k_{i,j}$, for all activities *i* and all households *j*.

To determine an efficient, Pareto optimal allocation of assets across households and activities, and consumption to the households, we consider a social planning problem that maximizes a Pareto-weighted sum of expected utilities subject to resource constraints. At the beginning of each period, each household *j* starts with initial resources that consist of two components. The first component is the assets held from the previous period, summing over all production activities, $k_j = \sum_{i=1}^{I} k_{i,j}$. The second component is the sum of the associated outputs (net of depreciation), $\sum_{i=1}^{I} f_{i,j}(k_{i,j})$. The household *j* may give out or receive gifts and transfers with other households, as in a risk-sharing syndicate.[5] The household then invests a part of this interim wealth in the form of assets carried to the next period. For this social planning problem, the planner retains full control over the projects, assigns them to households, chooses the net current gifts and transfers to each household *j*, and chooses the assets to be allocated to each activity run by each household in the following period, $k'_{i,j}$. Effectively, the planner determines the current period consumption for each household *j*, $c_j = \sum_{i=1}^{I}\left(f_{i,j}(k_{i,j}) + k_{i,j}\right) - \sum_{i=1}^{I} k'_{i,j} + \tau_j$.

The value function of the social planning problem is

$$V(W;\Lambda) = \max_{k_{i,j}',\tau_j}\left(\sum_{j=1}^{J}\lambda_j u_j\left(\sum_{i=1}^{I}\left(f_{i,j}(k_{i,j}) + k_{i,j}\right) - \sum_{i=1}^{I} k'_{i,j} + \tau_j\right) + \phi E\left[V(W';\Lambda)\right]\right)$$

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[5] Generally, households could make state-contingent lending and borrowing contracts, which could be incorporated into the gift term in this setup. For an example of this arrangement, see Udry (1994).

subject to the aggregate resource constraint, i.e., aggregate consumption plus aggregate savings, in the form of next-period capital, equals wealth, $\sum_{j=1}^{J} c_j + \sum_{j=1}^{J} k'_j = W$, and the non-negativity constraint of capital, $k_{i,j}{}' \geq 0$, that is no project capital can go negative, i.e., households cannot short assets. Current state W denotes the aggregate wealth of the whole economy at the beginning of the current period, that is, $W = \sum_{j=1}^{J} \sum_{i=1}^{I} \left(f_{i,j}(k_{i,j}) + k_{i,j} \right)$.

Here the parameter ϕ is a common preference discount factor; the parameter Λ is a time- and state-invariant vector of the Pareto weights for the households, λ_j where *j =1, 2, .. J*; and the function $u_j(\cdot)$ is the within-period utility function of a risk-averse household *j,* which is strictly concave, continuously differentiable, increasing without satiation, and with infinite derivative at zero. Note that we are allowing in this general set up differential risk aversion. The solutions to this planning problem for fixed Pareto weights correspond to a particular Pareto optimal allocation, and all of the optima can be traced out as the Pareto weights are varied.

For a given Λ, the first-order conditions are that

$[\tau_j] : \lambda_j u_{jc}(c_j) = \mu$ for all *j*

$[k'_{i,j}] : -\lambda_j u_{jc}(c_j) + \phi E\left[V_W(W')(1 + f^{l}_{i,j}(k'_{i,j})) \right] \leq 0$ for all *i* and *j*, with equality for $k'_{i,j} > 0$,

where μ is the shadow price of consumption in the current period. Note that the first equation, i.e., equalized weighted marginal utilities, is the key equation in the study of consumption risk sharing, and it is an integral part of our framework here. The second equation is a standard Euler equation for investment. Finally, for each $k'_{i,j} > 0$, the technologies actually chosen, the first-order conditions imply

$$1=\frac{\phi E\left[V_W(W')(1+f_{i,j}^{/}(k'_{i,j})\right]}{\lambda_j u_{jc}(c_j)}=E\left[\frac{\phi V_W(W')}{\mu}(1+f_{i,j}^{/}(k'_{i,j})\right]=E\left[m'R'_{i,j}\right], \qquad (1)$$

where $m'=\dfrac{\phi V_W(W')}{\mu}$ and $R'_{i,j}=1+f_{i,j}^{/}(k'_{i,j})$.

We focus in part on equation (1) but the other equations are also a key part of the system. Equation (1) has some important properties. First, m', the stochastic discount factor or the intertemporal marginal rate of substitution, is common across households and across assets. The model also implies that equation (1) holds for each of the assets actively allocated to production activity *i* and run by household *j*, for any *i* and any *j*. This equation is equivalent to the pricing equation derived in the Consumption-based Capital Asset Pricing Model (CCAPM) in the finance literature.[6] However, it is important to reiterate that although our empirical counterpart will be similar to what is derived in the capital asset pricing literature, the mechanism that delivers the predicted allocation outcome is different. In the asset pricing literature, households (investors) trade their assets ex ante. Optimally allocated assets deliver the returns that the households in turn use to finance their consumption, or reinvest, ultimately maximizing their utility. Although asset reallocations across households are possible in our model environment, households do not typically trade their assets ex ante in some markets. The rate of return on an asset is simply the real yield from holding it. Given asset holdings and given returns, transfers among households in the economy then give an optimal consumption allocation, i.e., the consumption allocation under the full risk-sharing regime where the marginal rates of intertemporal substitution are equalized across households. These inter-

[6] For the derivation of this equation from consumer-investor's maximization problem, see Lucas (1978) and Cochrane (2001), for example.

household transfers could be through formal securities or through informal financial markets, namely, gifts and transfers within social networks.[7]

Finally, as in the standard asset pricing literature, we decompose expected return into a risk-free rate and a risk premium. Since $E[m'R'_{i,j}] = E[m']E[R'_{i,j}] + \text{cov}(m', R'_{i,j})$, equation (1) can be rewritten as $E[R'_{i,j}] = \gamma' + \beta_{m',ij}\psi_{m'}$, where $\beta_{m',ij} = -\dfrac{\text{cov}(m', R'_{i,j})}{\text{var}(m')}$, $\psi_{m'} = \dfrac{\text{var}(m')}{E[m']}$, and $\gamma' = \dfrac{1}{E[m']}$. Note that $\beta_{m',ij}$ could be interpreted as the *quantity* of the risk of the assets used in activity *i* by household *j* that cannot be diversified, i.e., the risk implied by the comovement of the asset return and the aggregate return. Note that the sign is negative since high returns mean low marginal utility. Since this risk cannot be diversified away, even in the full risk-sharing environment, it must be compensated by a risk premium, which is a product of the quantity of risk and the price of the risk. The *price* of the risk is in turn equal to the normalized volatility of the aggregate economy, $\psi_{m'}$. Finally, γ' is the risk-free rate, R_f' , since by definition the covariance of the risk-free rate and the aggregate economy return is zero.

The intuition behind this optimal allocation is straightforward. An optimal allocation of assets is a portfolio that delivers an aggregate consumption for the economy that maximizes the Pareto-weighted expected utility of the households. This optimal consumption allocation is stochastic, and its distribution is derived from the distribution of underlying assets in the optimal allocation. Since households are risk averse, the

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[7] The Pareto weights, λ_j, j = 1, 2,… , *J,* are implicit parameters in equation (1) as they are arguments in the value function. Intuitively, the marginal rates of substitution are common across households in any particular optimum but can vary across the many optima, as if moving along a (potentially nonlinear) contract curve. Our general analysis only requires that the risk sharing community be at one fixed social optimum, not at any particular optimal allocation per se. However, when preferences aggregate in a Gorman sense, then the Pareto weights can be dropped from the analysis, and it is as if a social planner were a "stand-in representative consumer" allocating assets among its various "selves".

optimal aggregate consumption represents a tradeoff between expected return and risk. In the full risk-sharing environment, idiosyncratic risks are diversified away, and this optimal aggregate consumption consists of only the aggregate nondiversifiable component. Note that some of the optimal asset holdings could be zero if they are not needed for the construction of the portfolio that delivers this optimal aggregate consumption. However, for all of the assets that are positively allocated, an optimal allocation implies that the stochastic intertemporal rates of substitution are equalized, i.e., the marginal utility from the expected returns, net of disutility from risk, from the next period are equal across these assets. This equalized intertemporal rate of substitution condition across assets implies that the assets with lower expected return are held in this optimal portfolio because they are less risky than other assets. Since the only remaining risk in the full risk-sharing economy is the covariate risk, an optimal allocation implies the positive relationship between the expected return of the asset and its covariate, nondiversifiable risk, as represented by the asset's beta.[8]

2.2 A Financial Autarky Benchmark

The second, opposite benchmark case is an economy where households are in financial autarky and so by definition there is no risk sharing across households. The underlying environment, in terms of preferences, technologies, and initial conditions, is of course the same as in the full risk sharing benchmark. In particular, production technologies deliver returns that are still correlated across households and production activities. However, households absorb the risk in isolation from the rest of the

[8] Our prediction from the full-risk sharing benchmark should be viewed as a necessary condition for the full risk sharing, but not a sufficient one. For example, if a household is endowed with a production technology that has returns comoving with the aggregate returns, there will be a positive relationship between expected return and household beta, even when this household is in autarky. However, we have a second necessary condition for optimality: not only is the risk premium determined by comovement with the aggregate, but it is not determined by the idiosyncratic risk as well. This is closely parallel to the consumption risk sharing literature: not only does consumption move with the aggregate but it also does not move with the idiosyncratic income risk.

community so that net incoming (or outgoing) transfers, τ_j , are zero for all *j*. In this benchmark, the value function of each household *j* is

$$V_j(W_j) = \max_{k'_{i,j}} \left(u_j \left(\sum_{i=1}^{I} \left(f_{i,j}(k_{i,j}) + k_{i,j} \right) - \sum_{i=1}^{I} k'_{i,j} \right) + \phi E[V_j(W'_j)] \right)$$

subject to the resource constraint of the household, $W_j = \sum_{i=1}^{I} \left(f_{i,j}(k_{i,j}) + k_{i,j} \right)$, and the nonnegativity constraint of asset holding, $k'_{i,j} \geq 0$.

Operationally, the Euler equation for asset allocation is of the same form as previous equation (1) for all activities *i* in which household *j* chooses to hold and operate. However, in this environment, the stochastic discount factor would be m_j , specific to household *j* and not equalized to *m*, common across all households in the economy as in the full risk sharing benchmark. Since risk cannot be shared across households, the total fluctuation of the rate of return on asset for each household consists of both the household's idiosyncratic component and the comovement with the economy-wide return, the latter just another source of risk. Alternatively speaking, since there is no risk sharing, each household cannot and does not need to differentiate its idiosyncratic and aggregate risk, as both components of fluctuation in the rate of return are viewed and treated identically by the household. In financial autarky, their contribution to the household risk premium would be the same.

2.3 Intermediate Cases

Between the full risk sharing benchmark and financial autarky benchmarks lie various possible intermediate models. These make clear the ways in risk idiosyncratic income could impact consumption and thus how idiosyncratic risk can end up in the risk premium. We do not disown either of the previous two benchmarks above: the full risk sharing benchmarks makes clear the standard ideal while the financial autarky benchmark makes clear that even if a household were acting in isolation there would remain risk premia, and with correlated returns, and both idiosyncratic and aggregate risk would typically enter into these premia. We view our paper as quantifying how close the villages in our sample are to these extremes, as with the early, seminal work on consumption risk sharing, and we anticipate subsequent efforts to fit structural models.[9]

2.4 Empirical Implementation

For our empirical implementation, we impose two additional assumptions onto the production technology and preferences that deliver a linear relationship between expected return and risk.[10] The first assumption is a linear production technology: $f_{i,j}(k_{i,j}) = r_{i,j}k_{i,j}$, which implies that $f_{i,j}^{/}(k_{i,j}) = r_{i,j}$ and $R_{i,j} = 1 + r_{i,j}$. This assumption can be derived from a more general constant return to scale production function where optimal inputs are chosen sequentially. Following Angeletos (2007) and Moll (2014), capital is predetermined at the beginning of the period. Technologies are then subject to productivity realizations and prices of input and output are determined. Finally households make input (such as labor) decisions and get output. This yields a linear technology mapping predetermined capital into output, an $A_{i,j}k_{i,j}$ model where productivity shocks and prices are embedded in the technology parameter $A_{i,j}$. It is as if

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[9] Among these one would include iceberg-like transactions costs on transfer, as in Schulholfer-Wohl (2011), where the divergence between the pre-transfer income and the ideal target necessitates a transfer, and the constrained optimal allocation reflects both that difference and the transfer costs. Another model would be moral hazard, in which the household puts in unobserved effort in production directly or effort in diverting output for private hidden use, and thus the constrained optimal solution would dictate the household retain some "skin in the game". The magnitude of this exposure to idiosyncratic risk is a function of the cost of effort and the variance of the idiosyncratic component. It can be difficult to derive closed form solutions in these models.

[10] Note that we can also arrive at a linear relationship between expected return and risk with other sets of assumptions, including those with (1) two-period quadratic utility; (2) two periods, exponential utility and normal returns; (3) infinite horizon, quadratic utility and i.i.d. returns; or (4) log utility. It is also a linear approximation of the models with continuous time limit and normal distributions. See chapter 9 of Cochrane (2001) for detail.

there were a single input, capital, and we focus on this technology henceforth, that is, a single factor production function in capital with random returns. The second assumption is that the value function of the social planning problem can be well approximated as quadratic in the total assets of the economy, $V(W) = -\frac{\eta}{2}(W - W^*)^2$. The derivation in Appendix A shows that under these additional assumptions, our model implies

$$E[R'_j] - R'_f = \beta_j \left(E[R'_M] - R'_f \right), \tag{2}$$

where R'_j is the return to household j's portfolio; $R'_M = \frac{\sum_{j=1}^{J}\sum_{i=1}^{I} R'_{i,j} k'_{i,j}}{k'_M}$, $k'_M = \sum_{j=1}^{J}\sum_{i=1}^{I} k'_{i,j}$; and β_j is the beta for the return on household j's assets with respect to the aggregate market return,

$$\beta_j = \frac{\operatorname{cov}(R'_M, R'_j)}{\operatorname{var}(R'_M)}. \tag{3}$$

3. Data and the Village Environment

The data used in this study are from the Townsend Thai Monthly Survey, an on-going intensive monthly survey initiated in 1998 in four provinces of Thailand. Chachoengsao and Lopburi provinces are semi-urban provinces in a more developed central region near the capital city, Bangkok. Buriram and Srisaket provinces on the other hand are rural and located in the less developed northeastern region by the border of Cambodia. In each of the four provinces, the survey is conducted in four villages, chosen at random within a given township.[11]

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[11] Given that all four villages in the same province in our data are located in the same township, we use the term province and township interchangeably in this paper. For details on the Townsend Thai Monthly Survey, see Samphantharak and Townsend (2010).

The analysis presented in this paper is based on 156 months from January 1999 to December 2011, which coincides with 13 calendar years. During this time, there were salient aggregate shocks and a plethora of repeated idiosyncratic shocks in these village economies. For example, seasonal variation in the amount and timing of rainfall and temperature can be crucial in rice cultivation. Shrimp ponds were hit with both diseases as well as restrictions on exports to the EU. At the micro level, milk cows varied in their productivity, i.e., the flow was quite irregular over time for a given animal and over the heard.

We include in this study only the households that were present in the survey throughout the 156 months. Since we compute our returns on assets from net income generated from cultivation, livestock, fish and shrimp farming, and non-agricultural business, we also include in this study only the households that generated income from farm and non-farm business activities for at least 10 months during the 156-month period (on average about one month per year). In other words, we drop the households whose income was mainly exclusively from wage earnings. In the end, there are 541 households in the sample: 129 from (the sampled township in) Chachoengsao and 140 from Lopburi provinces in the central region, and 131 from Buriram and 141 from Srisaket provinces in the northeast. Table A.1 in the appendix presents descriptive statistics of household characteristics. Table A.2 shows the revenue (gross of cost of production) of the occupations in the sample.

We use a township as the aggregate market for empirical analysis in this paper for two reasons. First, the four villages from the same province in our sample are from the same township and therefore located close to each other. There are likely economic transactions across these villages. Second, one of the salient features of the households in the Townsend Thai Monthly Survey is the pervasive kinship network with extended families. Table A.3 in the appendix shows that almost all households in our sample have at least one relative living in the same township.

We use a household as our unit of analysis and consider the return on the household's total assets instead of the return on specific assets. As noted earlier, we consider the total assets as a *portfolio* that is composed of multiple individual asset classes (including both financial and fixed assets), and apply the predictions from our framework to study the risk and return of this portfolio. It is difficult and arbitrary to assign the percentage use of each asset in each distinct activity. Imposing additional assumptions on the data to disaggregate assets into subcategories would likely induce measurement errors that could bias our empirical analysis.[12] The rate of return on assets (ROA) is calculated as household's accrued net income divided by household's total asset (net of liabilities) over the period from which that the income was generated, i.e., one month in this paper. This is a conventional financial accounting measure of performance of productive assets. We use the real accrued net income and the real value of household's total assets in the ROA calculation. The real variables were computed using the monthly Consumer Price Index (CPI) at the regional level from the Bank of Thailand. The rate is then annualized (multiplied by twelve). We assume that the real risk-free rate is zero for all of the periods and for all of the townships.[13] Table A.4 in the appendix presents descriptive statistics of the ROA. The median of the annualized average ROA was 0.38% for Chachoengsao and 1.46% for Lopburi in the central region, and 0.28% for Buriram, and 1.99% for Srisaket in the northeast. Excluding land and building structure from total

[12] For example, a household that grows rice and also owns a retail shop could use a pick-up truck for both production activities. Similarly, we do not distinguish well the use of assets for production activity versus consumption activity. This could lead to a downward bias of our estimates on return to assets, as some of the assets that we include in the calculation were not used in production. Samphantharak and Townsend (2012) provide an exercise that classifies total assets into subcategories based on additional assumptions on production and consumption of the households, and analyze the sensitivity of the rate of return. The ROA measure we use here is shown there to be robust.

[13] The rationale for the zero risk-free rate is based on the assumption that households have access to storage technology. If the nominal return on stored inventory is the same as inflation rate (which is likely in the case for food crop storage), then the real rate of return is zero. We also perform a robustness check with different risk-free rates. The overall conclusion does not change, which is what we expect because the shift in both excess asset return and excess market return does not affect the covariance between these two variables. Note that in the earlier versions of this paper, we also used alternative calculations of ROA in the analysis, namely, ROA computed only from fixed assets (i.e., excluding financial assets) and nominal ROA (i.e., not adjusted for inflation). Again, the main conclusions did not change. We also used ROA computed from total assets without subtracting liabilities; the overall conclusions were robust (which is sensible, given that liability to asset ratios for most households are relatively small).

assets, the median ROA is 1.27 for Chachoengsao and 4.55 for Lopburi in the Central region, and 1.11 for Buriram and 4.23 for Srisaket in the Northeast. Appendix C describes detailed definition and construction of income, assets, and rate of return, and provides a discussion on measurement error of the variables.

4. Aggregate Risk and Return on Assets

Baseline Specification

In the first stage of our empirical analysis, we compute the asset beta of each household's portfolio of assets to get household beta, β_j, for all household *j*. We define a township as the aggregate economy and use township average real returns on assets as aggregate return, $\bar{R}_M$, computed as the total net income in the township divided by the township's total assets. To avoid the effect of each household's return on the township return, for each household we do not include the household's own net income and assets in the calculation of its corresponding township return, i.e., we compute and use instead a leave-out mean. As shown in equation (3), an asset beta of household *j* is defined as $\beta_j = \dfrac{\operatorname{cov}(R'_M, R'_j)}{\operatorname{var}(R'_M)}$, which is the key ratio of moments we need. Operationally, it is identical and conveniently computed as a regression coefficient from a simple regression of $R'_{j,t}$ on $R'_{M,t}$. Specifically, in the first stage, for each household *j* we estimate β_j from a time-series regression

$$R'_{j,t} = \alpha_j + \beta_j R'_{M,t} + \varepsilon_{j,t}. \tag{4}$$

In the second stage, we study the expected return and beta relationship derived earlier in equation (2). With the assumption that the real return on risk-free asset is zero, we compute the expected rate of return on assets of household *j*, $E[R'_j]$. Empirically, the expected return is computed as a simple time-series average of monthly rates of return,

$\bar{R}'_j = \frac{\sum_{t=1}^{T} R'_{j,t}}{T}$, where T is the number of months (156 months in the baseline specification).

We run a cross-sectional regression of household's average asset returns on the betas estimated earlier in equation (4) across all households in each township, one township at a time.

$$\bar{R}'_j = \alpha + \psi\hat{\beta}_j + \eta_j . \tag{5}$$

With the assumption that the real risk-free rate is zero, the null hypotheses from equation (5) are that $\psi = E[R'_M]$ and that the constant term α is zero. Note that we report the regression coefficient with the standard error corrected for generated regressor and heteroskedasticity, following Shanken (1992) and Cochrane (2001).

The results in Panel A of Table 1 show that the regression coefficient on households' beta is positive for all of the regressions except for the township in Buriram. We then look at a stronger null hypothesis that $\psi = E[R'_M]$ comparing the magnitude of the estimated regression coefficient $\hat{\psi}$ with the township expected return, estimated by the time-series average $\bar{R}'_M = \frac{\sum_{t=1}^{T} R'_{M,t}}{T}$. The table also provides each township's aggregate expected return. For the two townships in the central region (Chachoengsao and Lopburi), the regression coefficients are not statistically different from the township average return (at 10% level of significance), consistent with the prediction from our model. However, the coefficients are different from the township average return for the township in Srisaket. The zero constant implication is also satisfied.

[Table 1]

To illustrate our results graphically, Figure 1 plots the beta of household *j* on the horizontal axis against the expected return on household *j*'s assets on the vertical axis for each of the four townships. In general, the figures show a positive relationship between households' beta and expected returns. Thus a major implication of the model is capturing a substantial part of the data. In particular, higher risk, as measured by the co-movement of household ROA and township ROA, is associated with higher average return. The positive ψ implication from the model is pervasive in the data at various levels of aggregation. The more stringent test of $\psi = \bar{R}'_M$ is more difficult to satisfy.[14] Note that this baseline specification is subject to some critiques. We now perform robustness checks that address these issues below.

[Figure 1]

Time-Varying Risk

Similar to the traditional CAPM in the finance literature, our empirical strategy assumes that household betas are time-invariant. This assumption allows us to estimate household betas from time-series regressions. In reality, household betas could be time-varying. Our sample consists of households engaged in multiple occupations over the period of 13 years. It is likely that the composition of household occupations (and hence assets and their associated risks) of some of our sampled households had changed during this period. Similarly, the expected aggregate returns $E[R'_M]$ could change over time as well, not least from changes in conditioning factors.

[14] One may argue that kinship networks are local and operate better at the village or network levels than at the township level. We present a similar analysis at the village and network levels in Appendix D, with the results shown in Tables A.5 and A.6. Overall conclusions remain for most, but not all, of the villages and networks, suggesting that networks may extend beyond the boundary of villages.

We explore this issue by conducting our empirical analysis on the subsamples of 60 months (5 years) at a time. Specifically, we first estimate household's β_j and expected return using the time-series data from month 5 to month 64 (years 1-5) for all households. We then perform a similar exercise using the time-series data from month 17 to month 76 (years 2-6), and so on until the five-year window ends in month 160 (years 9-13). With all of the estimated $\hat{\beta}_{j,s}$ and expected return from all of the nine subperiods for all households *j*, we finally estimate equation (2) using the pooled household-subperiod data.[15] Panel B of Table 1 presents the second-stage regression results. The table shows that the main prediction of our model still holds, i.e., higher beta is associated with higher expected (average) return. Note that allowing for time-varying risk (beta), the prediction from the model is also satisfied for Buriram. However, the null hypothesis that the constant term is equal to risk-free rate (assumed to be zero in this paper) is rejected in all of the four provinces.

Aggregate Human Capital

The model presented earlier in this paper implies that a household's beta captures all of the aggregate, non-diversifiable risk faced by the household. It is possible that there is omitted variable bias in the estimation of beta if the average return on township total assets is not the only determinant of the aggregate risk. Aggregate wealth, *W*, in the economy-wide resource constraint likely comes from other assets in addition to tangible capital held by the households in the economy. As shown in Table A.2, labor income contributes a large share of household income in our sample. Omitting human capital from the resource constraint implies that the economy-wide average return on physical assets (both financial and non-financial) might not capture the aggregate non-diversifiable risk of the economy. We address this issue by performing a robustness

[15] This empirical strategy is similar to the empirical CAPM literature by Black, Jensen, and Scholes (1972). The difference is that instead of moving the window month by month, we move the window 12 months (1 year) at a time.

check. Specifically we compute an additional household beta with respect to return to aggregate human capital, proxied by the change in aggregate labor income of all households in the economy.[16] In particular, the first-stage time-series regression becomes

$$R_{j,t} = \alpha_j + \beta_j^a R'^{a}_{M,t} + \beta_j^y R'^{y}_{M,t} + \varepsilon_{j,t}$$

where $R'^{a}_{M,t}$ represents the return to aggregate physical (non-human) asset and $R'^{y}_{M,t}$ is the return to aggregate human capital. The second-stage cross-sectional regression is

$$\bar{R}'_j = \alpha + \psi^a \hat{\beta}_j^a + \psi^y \hat{\beta}_j^y + \eta_j \,.$$

[Table 2]

We then extend our previous empirical analysis to include human capital. The first four columns of Table 2 show that the regression coefficient of beta with respect to human capital is not statistically significant in our sample. However, after controlling for the township return to human capital, the regression coefficients of beta with respect to total tangible capital (financial, inventory, and fixed assets) remain positive and significant in all of the four townships.[17]

Time-Varying Stochastic Discount Factor

Similar to the traditional CAPM in the finance literature, parameters that determine stochastic discount factors are assumed to be time-invariant when we take the full risk-sharing benchmark to the empirical analysis. In theory, however, they are

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[16] This approximation strategy is used in the finance literature by Jagannathan and Wang (1996). Their strategy is based on a simplified *ad hoc* assumption that labor income, *L*, follows an autoregressive process $L_t = (1+g)L_{t-1} + \varepsilon_t$. Therefore, human capital, *H*, defined as the discounted present value of the labor income stream, is approximated by $H_t = \frac{L_t}{r-g}$ where *r* is the discount rate on human capital, and both *r* and *g* are taken as constants. In this case, the realized capital-gain part of the rate of return on human capital (not corrected for additional investment in human capital made during the period) will be the growth of the stock of human capital, which is also the realized growth rate in per capita labor income.

[17] However, the coefficients on human capital are not significant. This could be due to human capital being measured imprecisely.

determined by the shadow price of consumption goods, which likely moves over time as the aggregate consumption of the economy changes. In order to capture this time-varying stochastic discount factor, we provide a further robustness check following a strategy introduced by Lettau and Ludvigson (2001a and 2001b) who show that these time-varying parameters are functions of aggregate consumption-wealth ratio. The log consumption-wealth ratio, *cay*, in turn depends on three observable variables, namely log consumption, *c*; log physical (non-human) wealth, *a*; and log labor earnings, *y*. For each household, we compute five betas with respect to: (1) the aggregate return on tangible capital, $R'^{a}_{M,t}$; (2) the aggregate return on human capital (as computed in the previous analysis), $R'^{y}_{M,t}$; (3) the predicted value of $\widehat{cay}_t$; (4) the interaction between $R'^{a}_{M,t}$ and $\widehat{cay}_t$; and (5) the interaction between $R'^{y}_{M,t}$ and $\widehat{cay}_t$.[18]

$$R'_{j,t} = \alpha_j + \beta_j^a R'^{a}_{M,t} + \beta_j^y R'^{y}_{M,t} + \beta_j^{cay} \widehat{cay}_t + \beta_j^{cay\cdot a}\left(\widehat{cay}_t \cdot R'^{a}_{M,t}\right) + \beta_j^{cay\cdot y}\left(\widehat{cay}_t \cdot R'^{y}_{M,t}\right) + \varepsilon_{j,t} \quad (6)$$

In the final stage we run a cross-sectional regression of households' average return on the five betas estimated in equation (6). Namely,

$$\bar{R}'_j = \alpha + \psi^a \hat{\beta}_j^a + \psi^y \hat{\beta}_j^y + \psi^{cay} \hat{\beta}_j^{cay} + \psi^{cay\cdot a} \hat{\beta}_j^{cay\cdot a} + \psi^{cay\cdot y} \hat{\beta}_j^{cay\cdot y} + \eta_j \quad (7)$$

The results are shown in the last four columns of Table 2. Overall, with the additional factors in this robustness check, the regression coefficient of market non-human, physical assets, the main variable from our model, remains positive and significant for all of the four townships.

5. Idiosyncratic Risk and Return on Assets

The empirical work thus far has abstracted from the presence of idiosyncratic risk and focused on the implications from the full risk-sharing benchmark. However, there are

[18] Appendix E provides more information on the estimation procedure of log consumption-wealth ratio.

reasons why idiosyncratic risk may matter. With any of the departure from complete risk sharing, the expected return on assets may contain a risk premium that compensates for residual exposure to idiosyncratic risk.[19] We wish to know if this is true for the households in our sample, and if so, how large that residual exposure is, quantitatively. In addition, as mentioned earlier, households may be endowed with production technology that generates the positive relationship between expected return and beta, even in autarky without risk sharing. We seek to disentangle this by first estimating idiosyncratic risk in equations (4) and (6) presented earlier and then quantify the contribution of idiosyncratic risk to the total return in equations (9) to (11) below.

We follow Fama and Macbeth (1973) and compute idiosyncratic risk from the variance of the residuals from each of the household's time-series regressions in the first step, i.e., the residuals from equation (4).[20] This strategy is consistent with the decomposition of total risk, as measured by the variance of the return on assets, into aggregate (non-diversifiable) and idiosyncratic (diversifiable) components. Since equations (4) could be rewritten in a matrix form as $R'_{j,t} = \mathbf{X}'_{M,t}\beta_j + \varepsilon_{j,t}$, we have

$$\mathrm{var}(R'_j) = E[\beta'_j \Omega_M \beta_j] + \mathrm{var}(\varepsilon_j) \tag{8}$$

where Ω_M is the variance-covariance matrix of the aggregate variables and β_j is a vector of the regression coefficients from equation (4). The first term of the right hand side of equation (8) is therefore the aggregate risk while the second term is the variance of the residual. We denote this variance of the residual, σ_j^2, henceforth simply referred as household sigma, as our measure of household specific idiosyncratic risk because it summarizes the volatility of the returns that are not captured by aggregate factor

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[19] In finance literature, Merton (1987) shows that under-diversified investors demand a return compensation for bearing idiosyncratic risk. Using the exponential GARCH models to estimate expected idiosyncratic volatilities, Fu (2009) finds a significant and positive relation between the estimated conditional idiosyncratic volatilities and expected returns.

[20] In addition to Fama and MacBeth (1973), a recent study by Calvet, Campbell, and Sodini (2007) also uses the same risk decomposition strategy as the one in this paper.

(aggregate return on assets). We emphasize that this is a household-by-household calculation.

[Table 3]

Table 3 presents the decomposition of the total risk faced by the median household in each of the provinces in our sample, based on equation (8). Panel A of the table presents the contribution of idiosyncratic risk to the total risk and the total risk premium, using the beta estimated earlier from the simple specification in equation (4). Similarly, Panel B uses the betas from the robustness specification in equation (6). The results shows that a large part of the volatility of the return to enterprise assets comes from the idiosyncratic component, in all four townships. The orders of magnitude are large, with the idiosyncratic component capturing at least 80-90% of the risk decomposition of the median households in three out of four provinces (the exception being Srisaket). Likewise, the aggregate component can be as low as 2% to 20% in these three provinces. Of course this finding per se is not inconsistent with the model, which allows for idiosyncratic risk in the technologies. Indeed it is good in the sense that it allows us to study the impact of aggregate risk, which one might presume from these numbers to be small, and of idiosyncratic risk, which one might presume to be large. Note that we can quantify the magnitude of idiosyncratic risk that was diversified from our estimates of risk and risk premium decomposition. Table 3 also shows that median households in all provinces except for Srisaket diversified over 90% of their idiosyncratic risk while in Srisaket, the median household was still able to share almost 80% of their idiosyncratic risk. These decompositions are for each and every household and we thus report as well the interquartile range in each line.[21]

[21] There are some households that appear to be overcompensated for either idiosyncratic or aggregate risk and have a contribution of either risk above 100% of the total risk premia.

We take the first step and add household sigma computed from regressions (4) and (6), $\widehat{\sigma_j^2}$, as an additional explanatory variable to equations (5) and (7), respectively.

$$\bar{R}'_j = \alpha + \psi^a \widehat{\beta_j^a} + \psi^\sigma \widehat{\sigma_j^2} + \eta_j\,, \tag{9a}$$

$$\bar{R}'_j = \alpha + \psi^a \widehat{\beta_j^a} + \psi^y \widehat{\beta_j^y} + \psi^{cay} \widehat{\beta_j^{cay}} + \psi^{cay \cdot a} \widehat{\beta_j^{cay \cdot a}} + \psi^{cay \cdot y} \widehat{\beta_j^{cay \cdot y}} + \psi^\sigma \widehat{\sigma_j^2} + \eta_j \tag{9b}$$

The results in Table 4 show that, in both baseline and robustness specifications, higher idiosyncratic risks as measured by household sigma are associated with higher average returns in all of the four townships.[22] Note, however, that the coefficients for the beta with respect to the market return on physical assets still remain positive and significant in three of the townships, with Buriram as the only exception.

[Table 4]

Indeed, though both aggregate and idiosyncratic risk are positively correlated with higher expected return, the "prices" of these risks, i.e., their contribution to risk premia, is now shown to be different. We compute aggregate and idiosyncratic risk premia from equations (9a) and (9b) as empirically estimated in Table 4. Specifically, for the simple specification, we have:

$$\text{Aggregate Risk Premium} = \widehat{\psi^a}\widehat{\beta_j^a} \tag{10a}$$

$$\text{Idiosyncratic Risk Premium} = \widehat{\psi^\sigma}\widehat{\sigma_j^2}\,, \tag{11a}$$

and for the robustness specification, we have:

$$\text{Aggregate Risk Premium} = \widehat{\psi^a}\widehat{\beta_j^a} + \widehat{\psi^y}\widehat{\beta_j^y} + \widehat{\psi^{cay}}\widehat{\beta_j^{cay}} + \widehat{\psi^{cay \cdot a}}\widehat{\beta_j^{cay \cdot a}} + \widehat{\psi^{cay \cdot y}}\widehat{\beta_j^{cay \cdot y}} \tag{10b}$$

$$\text{Idiosyncratic Risk Premium} = \widehat{\psi^\sigma}\widehat{\sigma_j^2} \tag{11b}$$

[22] Though this violates the exclusion restriction of the full risk sharing benchmark, we are now in a position to compute risk premium for each type of risk and compare.

In the financial autarky benchmark, households would not differentiate the idiosyncratic component and the aggregate component of the total fluctuation of the rate of return. In this case, the risk premia from both components should be proportional to the contribution of each component's contribution to the total fluctuation. Panels A.2 and B.2 of Table 3 present the results from the decomposition of total risk premium of each household (the sum of the aggregate risk premium and idiosyncratic risk premium) for the simple and the robustness specifications, respectively. The results show that, with the exception of Buriram, the contribution of the idiosyncratic risk premia to the total risk premia is lower than the contribution of idiosyncratic risk to the total risk (as discussed earlier in Panels A.1 and B.1 of the same table). Specifically, for the robustness specification, although idiosyncratic risk accounts for 86.5% and 89.1% of the total risk of the median households in Chachoengsao and Lopburi, it contributes to only 23.6% and 52.9% of the total risk premium. Likewise, for the median household in Srisaket, idiosyncratic risk accounts for 57.2% of the total risk while its premium contributes for only 16.7% of the total risk premium. We also perform a nonparametric statistical test for the difference in medians and find that the median percentage contribution of idiosyncratic risk to the total risk is statistically different from the median percentage contribution of idiosyncratic risk premium to the total risk premium at 1% level of significance in all provinces except for Buriram.[23] The pattern for lower and upper quartiles is also similar to the median. Finally, it is important to note that omitted variables could lead to a positive relationship between expected return and sigma if a component of aggregate risk were mistakenly in sigma. However, this would work against us. Our empirical results suggest the impact of sigma is largely diversified, anyway.

In sum, we cannot treat aggregate and idiosyncratic risks identically when we analyze the risk and return of household enterprises in developing economies. A

[23] One possible explanation for Buriram is that it is the place with the most transition of occupations (toward higher return) and we have shorter period to use our method. See Pawasuttipaisit and Townsend (2010).

household with high total risk (high variance) may have lower risk premium than another household if the higher risk is idiosyncratic and diversifiable. Likewise, a household with low total risk (low variance) could require a higher risk premium if most of the risk is covariate and non diversifiable.[24]

6. Risk Sharing: Connecting the Production Approach to the Consumption Approach

Reassuringly, our main findings on the production side are largely consistent with earlier studies on the consumption side that idiosyncratic risk is considerably shared across households in these villages. Using consumption data from the same sample as in this paper, Chiappori, Samphantharak, Schulhofer-Wohl, and Townsend (2013 and 2014) use variation in aggregate shocks to estimate the degree of heterogeneity in risk tolerance among the households and find evidence for full risk sharing. Likewise, Karaivanov and Townsend (2014) find that the consumption and income data of those in family networks is consistent with full risk sharing, though tied with moral hazard as best fitting models. Kinnan and Townsend (2012) show that households linked to one another by gifts and loans, and hence indirectly if not directly connected to outside financial institutions, achieve full risk sharing; in contrast, isolated households, especially the poor, are vulnerable to idiosyncratic income risk. Our larger point is that idiosyncratic risk in most of these studies is partially, though not necessarily completely, insured and this is consistent with what we are finding in this paper with the data on risk premia from the production side.

[24] To illustrate this point, let us consider two households, A and B, from Lopburi province in our sample. During the period of this study, A's main occupation was livestock farming while B grew beans and sunflowers. However, 99% of the variance of the rate of return on A's assets was from the idiosyncratic component while in contrast idiosyncratic risk contributed to only 63% for B. Consequently, we find that the risk premium for A, facing mostly diversified risk was only 0.008 (annualized) percentage point while for B with more aggregate risk it was 1.394, despite B's less volatile return. This example, though deliberately dramatic, is not an outlier. Below we return to an analysis of risk premia and associated characteristics of enterprises that deliver statistically significant variation.

Regarding the actual mechanisms used for smoothing, i.e., financing a deficit or saving a surplus, households may buy and sell their assets (though this is rare) or use crop storage inventory (more common). They can also borrow or lend money formally through financial institutions or informally through village moneylenders, friends, or relatives. Samphantharak and Townsend (2010) provide quantification for these various smoothing mechanisms using the same Thai data and document the role of gifts among social networks.[25] Our conceptual framework in this paper both combines the production and consumption sides, as the first-order conditions have made clear, and features the role of gifts as the primary smoothing mechanism.

[Table 5]

We perform further analyses that directly connect production and smoothing mechanism. For each household, we compute the residual from equation (8) as month by month idiosyncratic shocks. Then, as reported in Table 5, we regress household's net gifts (i.e., gift outflows minus gift inflows) on these idiosyncratic shocks, controlling for common township-time dummies (capturing aggregate shocks) and household fixed effects (capturing diverse Pareto weights). Since gifts could also be disguised in the form of state-contingent loans (as in Udry 1994), we also regress household's net lending (i.e, lending minus borrowing), as well as household's net gifts plus net lending, on the same set of explanatory variables. The coefficients are all statistically significant at the 1% level. Finally, we also run the standard risk-sharing regressions with the consumption data (Townsend 1994). Controlling for aggregate shocks and household fixed effects, we regress monthly consumption on the same idiosyncratic shocks and find a low but significant coefficient, significant at 5% level.

[25] The risk sharing implications of networks have been studied in other economies as well. For example, using data from the randomized evaluation of *PROGRESA* program in Mexico, Angelucci, De Giorgi, and Rasul (2011) find that members of an extended family share risk with each other but not with households without relatives in the village. They also find that connected households achieve almost perfect insurance against idiosyncratic risk. Recently, Attanasio, Meghir, and Mommaerts (2015) study group risk sharing in extended family networks in the US. They find that majority of shocks to household income are potentially insurable within family networks but they find, in contrast, little evidence that the extended family provides insurance for such idiosyncratic shocks.

To summarize, the results in Table 5 show that once we control for province-month fixed effects, which capture the provincial aggregate shocks, household consumption is positively correlated with household-specific, idiosyncratic shocks. Thus risk sharing is imperfect and households do bear some of their idiosyncratic risk. This is consistent with the fact that idiosyncratic risk is showing up in the idiosyncratic risk premium on the production side. On the other hand, the coefficient is small, and small in comparison with coefficients on the other regressions. Most of the movement in idiosyncratic shocks is absorbed by net gifts and lending across the households. Table 5 can be interpreted to show, via a kind of normalized covariance decomposition, that on average 40.66/45.52 = 89% of idiosyncratic shocks to rates of return are covered by gifts and net lending, with the residual onto consumption. Thus the results are quite consistent with the earlier Table 3.

Finally, we note that the consumption, gift, and lending-borrowing data used in the analysis in this section are from different modules of the questionnaire than what we use in the calculation of ROA. Consistency in the empirical findings reassures us that the main conclusions in this paper are unlikely driven by measurement error in the data. Of course there remains the possibility of measurement error inflating the variance of the idiosyncratic shocks, but attenuation bias would hit all of the regressions. Thus the relative comparison of coefficients across regressions remains of interest, confirming the role of social networks as a key institution in these villages.

7. Returns Net of Risk Premia

In the development and macroeconomics literatures mentioned earlier in the introduction, rates of return on assets are usually used as a measure of performance, the productivity of a firm or a household enterprise. These returns to assets however typically do not take into account that different household enterprises are involved in different risks and so that higher average returns could result from compensation for higher risk and not productivity.[26]

The framework in this paper gives us a practical way to compute the risk premia that contribute to the return on assets and hence the residual return, after adjusting for the premium, as in the example just given. In the conventional CAPM context, Jensen (1967) argues that intercepts α_j in equations (6) can be interpreted as the abnormal return of an asset, and financial analysts use Jensen's *alpha* as a measure of performance of an asset or a fund manager. We follow this tradition, thinking of α_j as how well household *j* manages its assets in generating income in excess of risk-free rate adjusting for measured risk premia.

[Figure 2]

Figure 2 shows the histograms comparing the return on assets that is not adjusted for risks with the return adjusted for both aggregate and idiosyncratic (based on the robustness specification). Though risk adjusted returns are naturally shifted to the left, other aspects of the distribution also change. The modes receive high mass consistently in the risk-adjusted returns. Further in two provinces the adjusted returns have more mass in the left tail, and in the other two provinces, in the right tail. The overall point is that the distributions of the rate of return do change when we adjust for risks, as evident from the differences in the skewness and the kurtosis of the returns. Table A.7 in the appendix presents selected descriptive statistics of household alpha.

[26]A comparison of two farming households in Srisaket province, C and D, from our sample illustrates this argument. Their main crops were rice and cassava, respectively. During the period of our study, the average annualized monthly real rate of return on assets for C was 9.06% while it was only at 3.93% for D. However, C's higher return was largely due to the higher risk and the types of risk it faced. First, C was engaged in production activity whose return fluctuated more than D: the variance of the rate of return for C was 2.26 times higher than that of D. Second, while 70% of the total risk faced by C was idiosyncratic and could be (partially) diversified away, the diversifiable risk component accounted for 89% for D. As a result, the risk premium of C was 8.25 percentage points while it was only 1.11 percentage points for D. In the end, C actually had a lower return net of risk, i.e., after subtracting risk premia, a net of 0.81%, in comparison to D at 2.82%.

8. Household Characteristics Associated with Risk Exposure and Return on Assets

Figure 3 presents a scatter plot displaying for each household its aggregate risk premium and idiosyncratic risk premium. The figure shows that some households in our sample were exposed to both high aggregate and idiosyncratic risks (those in the upper-right corner) while many faced little of both risks (those in the lower-left corner). Still, there are a large number of households that were mainly exposed to one type of risk, but not the other (those in the upper-left and in the lower-right corners).[27]

[Figure 3]

Table 6 presents correlations in the data, with different measures of return and risk of assets as the dependent variable and household's initial wealth and other demographic characteristics on the right hand side. Specifically, Panel A presents regression results when we us the simple measured rate of return on assets (not adjusted for risk) as the dependent variable. In three out of four provinces, we find that poor households (as measured by initial wealth) tend to have higher average return on assets. This result might prompt us to conclude that households in these provinces are financially constrained. However, the results in Panel B reveal a different story. Once adjusted for risk, poorer households in the central region tend to have a lower return on assets while there is no relationship between wealth and return on assets for the two provinces in the northeast.

The explanation for these findings is shown in Panels C and D where we examine the relationship between household characteristics and household beta (aggregate risk with respect to the market return on physical assets) and household sigma (idiosyncratic

[27] Figure 3 also presents two salient findings from our sample. First, there is a positive correlation between aggregate risk premium and idiosyncratic risk premium (the correlation coefficient is 0.49 and statistically significant at 1%). Second, there is a large portion of our sampled households with low risk (those near the origin in Figure 3). In particular, there is variation in aggregate risk premium while the idiosyncratic part is near zero. This produces a cluster of points on the horizon axis.

risk). The results highlight the heterogeneity in the risk exposure of households in our sample. Controlling for household demography, poorer households tend to be more involved with risky activities, both aggregate (in 3 out of 4 provinces) and idiosyncratic (in all 4 provinces). We also find that households with younger, less educated, and male head tend to have more exposure to both aggregate and idiosyncratic risks (although specific results vary across provinces).

[Table 6]

One might well ask, what is the mechanism that households choose to make their income smooth or risky? We further explore the sources of this household risk exposure (results not shown here). Using the data on the shares of household total revenue from each production activity as well as the data on each household's main occupation (cultivation, livestock, fish and shrimp farming, and non-farm business), we find that cultivation is associated with the highest aggregate and idiosyncratic risk (these are statistically significant at 1%). Cultivation is common in our sample (hence aggregate risk), but at the same time there is heterogeneity in the variability of returns within cultivation (hence idiosyncratic risk). Finally, we find that poorer households are more likely to participate in cultivation (again, statistically significant at 1%). Note also that this finding is unlikely driven by the difference in risk preferences between rich and poor households as Chiappori, Samphantharak, Schulhofer-Wohl, and Townsend (2013 and 2014), using data from the same household survey as this paper, find that risk aversion was not correlated with household wealth. This is related to the underlying force of the full risk sharing benchmark, under which production and consumption activities are separated.

The result shows how easily one could misinterpret data, if one did not adjust for risk. One might have impression that relatively poor households have high returns on assets (as shown in Panel A for all of the provinces except for Lopburi) and thus suffer from financial constraints. The results here show that the reason why these poor households have a higher simple rate of return to their business enterprises is from the fact that they take more risk in their production activities and get compensated accordingly. Controlling for risks, household enterprises of the poor in the northeast are not productively different those of the rich, while the poor in the central region tend to have lower return on assets that the rich. Thus some poor households in our sample, those of the central region, do seem constrained, but not in the usual, stereotypical sense. Poor households seem limited in their choices of production activities, as if constrained away from the activities that have high return net of risk premia and are available largely for richer households. Our findings suggest that there exist obstacles for the poor to leave their current occupation rather than funding the current one. Our finding is similar to Rampini and Viswanathan (2016) who find that household risk management is incomplete and increasing in household net worth and income.[28] The limitation of poor households to diversify idiosyncratic income risk is in contrast to Morduch (1995), who finds that poor households in villages in India that have limited ability to smooth consumption ex post and tend to choose production activities that give them smoother income ex ante.

9. Conclusion and Policy Implications

We study the risk and return of farm and non-farm business enterprises in village economies. Using data from the Townsend Thai Monthly Survey, we find that although idiosyncratic risk is the dominant factor in the total risk, it is diversified away to a large extent, and so bears a low risk premium. In contract, aggregate risk cannot be diversified

[28] Our findings do not necessarily contradict existing literature that analyzes the gross rate of return, unadjusted for risk premia, and financial constraints. If all households are in the same occupation or a sector that has identical aggregate risk, and if idiosyncratic risk is fully diversified, then actual net returns, adjusted for risk, are simply a downward shifted version of the unadjusted returns. Some on the right tail of this distribution may have high net returns and thus may be constrained. More generally, however, with different occupations and differential exposure to risk, high returns on the right tail of the distribution may be simply the compensation for high risk. Likewise, high rates of growth of net worth for poor households with high rates of return does not necessarily indicate the presence of financial constraints, as those with high expected returns, however risky, will on average as a group, experience high growth.

away and likewise it captures a much larger share of the total risk premia. Our results, using data on the rates of return from production side, are parallel to those in the consumption risk sharing literature that uses income and consumption as key variables. We also provide an analysis that jointly makes use of production and consumption panel data, at the level of individual households over time. Our study has important policy implications: when comparing business across sectors or production across different activities, the adjustments for aggregate and idiosyncratic risks can vary and there is potentially little association between high returns and underlying productivity.

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Appendix

Appendix A: Derivation of Empirical Specification

Due to the first assumption on linear production technology, equation (1) also holds for any of the portfolios constructed by any combinations of the assets $k'_{i,j}$ for all i and all j. If we consider a household as our unit of observation, equation (1) implies that $1 = E[m'R'_j]$, where $R'_j = \frac{\sum_{i=1}^{I} \theta'_{i,j} R'_{i,j}}{\sum_{i=1}^{I} \theta'_{i,j}}$. In other words, R'_j is the weighted average return to the portfolio of the assets operated by household j, where the weights are the shares of each asset in household j's portfolio. This insight allows us to study the risk and return of a household's portfolio of assets instead of the risk and return of each individual asset. This implication is especially important in the empirical study where the classification of asset types and the income stream from each asset is problematic, as one asset may be used in various production activities or various types of assets are used jointly in a certain production activity.

The second assumption that the value function of the social planning problem can be well approximated as quadratic in the total assets of the economy implies that at W',

$$V_W(W') = -\eta(W' - W^*) = -\eta\left(\sum_{j=1}^{J}\sum_{i=1}^{I} R'_{i,j} k'_{i,j} - W^*\right) = -\eta\left(R'_M k'_M - W^*\right), \qquad \text{(A1)}$$

where $R'_M = \frac{\sum_{j=1}^{J}\sum_{i=1}^{I} R'_{i,j} k'_{i,j}}{k'_M}$ and $k'_M = \sum_{j=1}^{J}\sum_{i=1}^{I} k'_{i,j}$. The first-order conditions from the value function (A1) imply

$$m' = -\frac{\phi\eta\left(R'_M k'_M - W^*\right)}{\mu} = \frac{\phi\eta W^*}{\mu} - \frac{\phi\eta k'_M}{\mu} R'_M ,$$

$$m' = a - bR'_M , \qquad \text{(A2)}$$

where a and b are implicitly defined. Next, combining equation (A2) with the Euler equation derived earlier,

$$E[R'_{i,j}] = \gamma' - \frac{\operatorname{cov}(a - bR'_M, R'_{i,j})}{\operatorname{var}(a - bR'_M)} \cdot \frac{\operatorname{var}(a - bR'_M)}{E[a - bR'_M]}$$

$$E[R'_{i,j}] = \gamma' + \frac{\operatorname{cov}(R'_M, R'_{i,j})}{\operatorname{var}(R'_M)} \cdot \frac{b\operatorname{var}(R'_M)}{a - bE[R'_M]}$$

$$E[R'_{i,j}] = \gamma' + \beta_{ij}\psi , \qquad \text{(A3)}$$

which is a linear relationship between the expected return of an asset, $E[R'_{i,j}]$, its nondiversifiable risk as measured by the comovement with the aggregate return, β_{ij} , and the price of the nondiversifiable risk, ψ. Note again that equation (A3) holds for any assets or portfolios of assets, including the market portfolio, M, and the risk-free asset, f. Since $\beta_M = 1$ and $\beta_f = 0$, equation (A3) also implies that $\gamma' = R'_f$ and $\psi = E[R'_M] - R'_f$. In other words, the price of the aggregate, nondiversifiable risk is equal to the expected return on the market portfolio in excess of the risk-free rate. This condition, presented in equation (A3), is equivalent to the relationship between risk and expected return derived in the traditional Capital Asset Pricing Model (CAPM) in asset pricing literature. Finally, as discussed earlier, equation (A3) also holds for any of the portfolios constructed by any combinations of the assets for any i and any j because the production technologies are assumed to be linear in capital. In other words, for each household j, we can derive equation (2) as

$$E[R'_j] - R'_f = \beta_j \left(E[R'_M] - R'_f \right), \tag{2}$$

where R'_j is the return to household j's portfolio and β_j is the beta for the return on household j's assets with respect to the aggregate market return,

$$\beta_j = \frac{\mathrm{cov}(R'_M, R'_j)}{\mathrm{var}(R'_M)}. \tag{3}$$

Also, note that common quadratic utility functions do Gorman aggregate and we can drop the reference to Pareto weights. Also, the quadratic utility function is not the only setting that delivers this result.

Appendix B: Descriptive Statistics

[Tables A.1-A.4]

Appendix C: Construction of Income, Assets, and Rate of Return

Net Income: Income is accrued household enterprise income, which is the difference between the enterprise total revenue and the associated cost of inputs used in generating that revenue. Revenue is realized at the time of sale or disposal. Associated cost could be incurred earlier, in the periods before the sale or disposal of outputs. Total revenue includes the value of all outputs the household produces for sale (in cash, in kind, or on credit), own consumption (imputed value), or given away. Revenue also includes rental income from fixed assets. Revenue does not include wages earned outside the household or gifts and transfers received by the household. Cost includes the value of inputs used in the production of the outputs, regardless of the method of their acquisition, i.e., purchase (in cash, in kind, or on credit) or gifts from others or transfers from government. Costs includes the wage paid to labor provided by non-household members as well as imputed compensation to the labor provided by household members.[29] Cost includes all utility expenses of the household regardless of the purposes of their uses and also includes depreciation of fixed assets.

Total Assets: Assets include all assets, i.e., fixed assets, inventories, and financial assets. *Fixed assets* are surveyed in the Agricultural Assets, Business Assets, Livestock, Household Assets, and Land Modules of the survey. In the Agricultural Assets Module, fixed assets include walking tractor, large four-wheel tractor, small four-wheel tractor, aerator, machine to put in seeds and pesticides, machine to mix fertilizer and soil, sprinkler, threshing machine, rice mill, water pump, rice storage building, other crop storage building, large chicken coop, other buildings for

[29] For the detailed procedure how we impute the compensation to household's own labor, See Samphantharak and Townsend (2010).

livestock, and other buildings. In the Household Assets Module, assets include car, pick-up truck, long-tail boat with motor, large fishing boat, bicycle, air conditioner, regular telephone, cellular telephone, refrigerator, sewing machine, washing machine, electric iron, gas stove, electric cooking pot, sofa, television, stereo, and VCR.[30] Due to the variety in non-agricultural businesses, in the Business Module, we do not list the specific name of the assets, but instead ask the household to report the fixed assets they use in their business enterprises. In the Land Module, assets include land and building at acquisition value, the value of land and building improvement, and the appreciation of land when major events occurred (such as an addition of new public roads). In all of the modules, assets that are not explicitly listed but have value more than 2,000 baht are also asked and included. We also adjust the value of fixed assets with monthly depreciation. *Inventories* include raw material, work in progress, finished goods for cultivation, fish and shrimp farming, livestock activities (such as milk and eggs), and manufacturing non-farm businesses. For merchandizing non-farm businesses, inventories are mainly goods for resale. Animals from the Livestock Inventory Module, which include young meat cow, mature meat cow, young daily cow, mature dairy cow, young buffalo, mature buffalo, young pig, mature pig, chicken, and duck, are accounted as either inventories or fixed assets, based on their nature. *Financial assets* include cash, deposits at financial institutions, other lending, and net ROSCA position. These line items are computed from the Savings Module, the Lending Module, and the ROSCA Module. The stock of cash is not asked directly but can be imputed from questions about each and every transaction that each households had since the last interview. Finally, the total asset used in the calculation of rate of return is *net* of liabilities. We use the information from the Borrowing Module to calculate the household's stock of total liabilities.

Rate of Return: The rate of return on assets (ROA) is defined as household's accrued net income divided by household's average total assets (net of total liabilities) over the period from which that the income was generated, i.e., one month in this paper. The average total asset is the sum of total assets at the beginning of the month and total assets at the end of the month, divided by two.

Discussion on Measurement Errors

For the aggregate risk, the positive relationship between beta and expected (or mean) return could be driven by measurement errors if the measurement errors of household ROAs are positively correlated with the measurement errors of the aggregate ROA. However, for most production activities, we use direct answers on revenue from those production activities from each household to compute that household's ROA. Constructing price indices from these data reveals that prices in a given month can vary considerably over households. This may be due in part to the fact that we did not try to distinguish within village versus farm gate prices, i.e., we have revenue and price at the point of sale, wherever that might be. Actual and imputed wages also vary enormously over households at a point in time. There are also likely measurement errors in idiosyncratic returns but detailed studies of rice production show that yields can be explained beyond rainfall by measured differences in soil moisture, soil type, elevation, and timing of rain, which are all household specific, and hence much of the heterogeneity across households is real and not necessary measurement error (Tazhibayeva and Townsend 2012). Of course some measurement errors are intrinsic to any survey. However, as we will discuss later in this paper, our findings from the analyses that use the data from the production modules of the survey are largely consistent with the findings from the consumption, gifts, and loan modules of the same survey. This independence across modules reassure us that the main conclusions in this paper are unlikely driven by measurement error in the data.

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[30] Note that we decide to include all household assets in our calculation. This is mainly because some of these assets were used by the households in their production activities as well and it would be arbitrary to include certain household assets while excluding others. However, the value of these assets was relatively small compared to the value of total assets (which was largely determined by land and other fixed assets). See Samphantharak and Townsend (2012) for the sensitivity analysis of ROA on household assets.

Appendix D: Alternative Definitions of the Aggregate Economy

One may argue that kinship networks are local and operate better at the village or network levels than at the township level. Table A.5 reports the second-stage regression results when we use villages as aggregates. Despite the smaller number of observations, the results show that the regression coefficient of household beta is significantly positive at 10% (or lower) level of significance for 9 of the 16 villages in our sample, with the only exception of all four villages in Buriram province, two villages in Lopburi, and one village in Chachoengsao. The result also shows that we cannot reject the null hypothesis that $\psi = \overline{R}_M$ at 10% level of significance for 5 out of those 9 villages in the sample (Village 7 in Chachoengsao; Village 4 in Lopburi; and Villages 6, 9, and 10 in Srisaket).

[Tables A.5]

We also perform a similar analysis at the network level. In order to analyze the risk and return at the network level, we construct kinship network maps for the households in the Townsend Thai Monthly Survey. Specifically, for each of the relatives of the household head and the spouse (parents and siblings of the head, parents and siblings of the spouse, and their children) who was still alive and lived within the village, the survey recorded which building structure as recorded in the initial census he or she lived. With this information, we constructed a kinship network map for each village by drawing a link between two households that were family-related related. We present in Table A.6 the regressions using network as our definition of aggregate economy. We present only the results for the networks with more than 15 households. There are nine of them. All are from different villages (four from Lopburi in the central region; two from Buriram and three from Srisaket in the northeast). Table A.6 shows that the regression coefficient of household beta is significantly positive for 5 of the 9 networks. For 2 of the 9 networks, we however cannot reject the null hypothesis that the regression coefficient is equal to the network's average return (Networks 602 and 902 in Srisaket).

[Tables A.6]

Appendix E: Time-Varying Stochastic Discount Factor

To show that the consumption-wealth ratio summarizes the expectation of future returns, Lettau and Ludvigson (2001a) start from the resource constraint in period *t* analogous to what presented in Section 2 of this paper, $W_{t+1} = (1 + r_{M,t+1})(W_t - C_t)$, where W_t , C_t , and $r_{M,t+1}$ are wealth, consumption, and market rate of return in period *t*. Following Campbell and Mankiw (1989), the log-linear approximation of this constraint yields $c_t - w_t \approx E_t\left[\sum_{s=1}^{\infty} \rho_w^s (r_{M,t+s} - \Delta c_{t+s})\right]$, where $\rho_W = \frac{W - C}{W}$ or the steady-state investment to wealth ratio. Define $cay_t = c_t - w_t = c_t - \omega a_t - (1-\omega) y_t$, where *a* is the share of physical wealth in total wealth. Since we do not observe the share of non-human wealth, ω ,we cannot directly compute the log consumption to wealth ratio, cay_t . Instead, we follow Lettau and Ludvigson (2001a) and obtain the value of cay_t from $\widehat{cay}_t = c_t^* - \widehat{\omega} a_t^* - \widehat{\theta} y_t^* - \widehat{\delta}$, where the starred variables are the observed quantities from our data and the hatted values are the estimated coefficients from the township time-series regression $c_t^* = \delta + \omega a_t^* + \theta y_t^* + \varepsilon_t$.

Appendix F: Risk-Adjust Return

[Table A.7]

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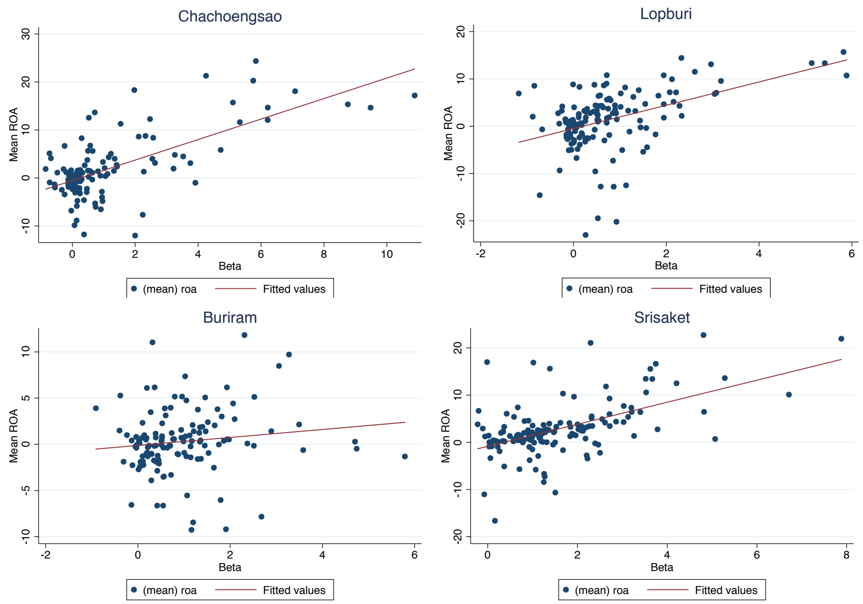
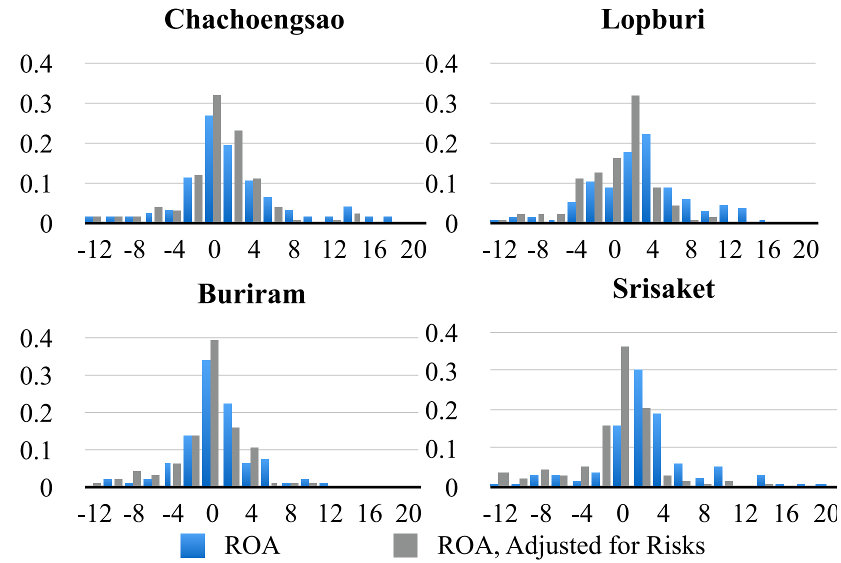
Figure 1 Risk and Return: Township as Market



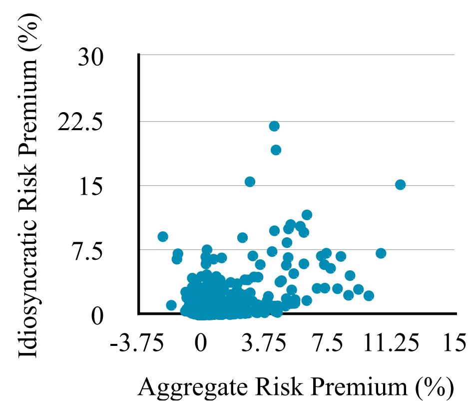
Remarks Unit of observation is household. There are 129 households in Chachoengsao, 140 in Lopburi, 131 in Buriram, and 141 in Srisaket. The fitted lines correspond to regression results presented in Columns (1)-(4) in Table 1.

Figure 2 Histograms of Rate of Return on Assets, Unadjusted and Adjusted for Risk



Remarks Unit of observation is household. ROA is the annualized monthly rate of return on asset in percentage. ROA adjusted for risk is the rate of return adjusted for both aggregate and idiosyncratic components of the total risk faced by the households.

Figure 3 Scatter Plots Aggregate Risk Premium and Idiosyncratic Risk Premium



Remarks Unit of observation is household. The observations are from all of the four townships. Aggregate risk premium is computed from equation (14b) while idiosyncratic risk premium is computed from equation (15b), both using estimates from Table 8. The premia are presented in annualized monthly percentage return.

Table 1 Risk and Return Regressions: Township as Market

Dependent Variable:	***Household's Mean Return on Assets***							
	Panel A: Constant Beta				***Panel B: Time-Varying Beta***			
Region:	***Central***		***Northeast***		***Central***		***Northeast***	
Township (Province):	***Chachoengsao***	***Lopburi***	***Buriram***	***Srisaket***	***Chachoengsao***	***Lopburi***	***Buriram***	***Srisaket***
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Beta	2.135***	2.465***	0.432	2.335***	1.250***	2.307***	0.530**	1.888***
	(0.386)	(0.518)	(0.455)	(0.663)	(0.169)	(0.326)	(0.265)	(0.48)
Constant	-0.535	-0.503	-0.122	-0.847	-0.325*	-0.631***	-0.782***	-1.114***
	(0.412)	(0.561)	(0.364)	(0.668)	(0.176)	(0.235)	(0.162)	(0.304)
Observations	129	140	131	141	1,161	1,260	1,179	1,269
R-squared	0.467	0.210	0.017	0.297	0.330	0.204	0.019	0.260
Township Returns:								
Monthly Average	1.68	2.49	0.15	0.80	1.19	2.40	-0.07	1.04
Standard Deviation	0.07	0.10	0.10	0.10	0.75	1.47	0.54	0.75

Remarks For columns (1)-(4), unit of observations is household. Beta is computed from a simple time-series regression of household's adjusted ROA on township's ROA over the 156 months from January 1999 to December 2011. Household's mean adjusted ROA is the time-series average of household adjusted ROA over the same 156 months. For columns (5)-(8), unit of observation is household-time window. Each time window consists of 60 months. The window shifts 12 months (1 year) at a time. There are 9 moving windows in total for each household. Beta is computed from a simple time-series regression of household's adjusted ROA on township's ROA in each corresponding time window. Household's mean adjusted ROA is the time-series average of household adjusted ROA over the corresponding time window. Robust standard errors corrected for generated regressors (Shanken 1992) are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 2 Risk and Return Regressions with Human Capital and Time-Varying Stochastic Discount Factor: Township as Market

Dependent Variable:	***Household's Mean Return on Assets***							
Region:	***Central***		***Northeast***		***Central***		***Northeast***	
Township (Province):	***Chachoengsao***	***Lopburi***	***Buriram***	***Srisaket***	***Chachoengsao***	***Lopburi***	***Buriram***	***Srisaket***
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Beta with respect to	1.242***	2.233***	0.564***	1.813***	1.094***	2.005***	0.392	1.893***
return on market physical capital (ra)	(0.163)	(0.329)	(0.271)	(0.49)	(0.148)	(0.334)	(0.242)	(0.45)
Beta with respect to	0.00177	0.0217	-0.0524	0.149	-0.00542	0.0375	-0.0310	0.179
return on market human capital (rh)	(0.056)	(0.187)	(0.181)	(0.363)	(0.061)	(0.185)	(0.171)	(0.354)
Beta with respect to					-0.00441	0.00246	0.0333	0.0789
residual log consumption (cay)					(0.055)	(0.17)	(0.149)	(0.324)
Beta with respect to					-0.00533	-0.0304	-0.131	-0.101
the interaction cay*ra					(0.065)	(0.216)	(0.168)	(0.351)
Beta with respect to					0.00134	-0.000574	0.0109	-0.0130
the interaction cay*rh					(0.035)	(0.162)	(0.142)	(0.315)
Constant	-0.307*	-0.584**	-0.757***	-1.080***	-0.156	-0.464**	-0.589***	-1.164***
	(0.176)	(0.232)	(0.164)	(0.310)	(0.178)	(0.223)	(0.162)	(0.268)
Observations	1,161	1,260	1,179	1,269	1,161	1,260	1,179	1,269
R-squared	0.329	0.203	0.021	0.270	0.315	0.203	0.049	0.306

Remarks Unit of observation is household-time window. For Columns (1)-(4), beta's are computed from a multivariate time-series regression of household's monthly adjusted ROA on township's monthly return on market physical capital (ra) and township's return on human capital (ry), which is proxied by the monthly growth rate of township's total labor income. Regressions are performed on moving windows of 60 months. The window then shifts 12 months (1 year) at a time and there are 9 moving windows in total for each household. Household's mean adjusted ROA is the time-series average of household adjusted ROA over the corresponding time window. For Columns (5)-(8), similar analysis is performed, with additional explanatory variables. Residual log consumption is the residual computed from time-series regression of township's monthly log food consumption on township's total physical asset at the beginning of the month and township's total labor income during that month. Interaction terms are then defined accordingly. Robust standard errors corrected for generated regressors (Shanken 1992) are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 3 Contribution of Idiosyncratic Risk to Total Risk and Total Risk Premium

Region:	Central						Northeast					
Township (Province):	Chachoengsao			Lopburi			Buriram			Srisaket		
	p25	p50	p75	p25	p50	p75	p25	p50	p75	p25	p50	p75
						Panel A: Baseline Specification						
Contribution to Total Risk (Variance)	93.9%	98.1%	99.7%	92.3%	97.6%	99.5%	84.0%	94.0%	98.2%	43.8%	65.9%	88.9%
Contribution to Total Risk Premium	4.7%	21.6%	45.4%	41.7%	61.5%	88.7%	105.6%	118.7%	152.8%	13.3%	28.8%	53.9%
Percentage of Diversified Idiosyncratic Risk	98.6%	99.6%	100.0%	92.4%	96.3%	99.9%	111.2%	135.2%	172.2%	67.4%	82.0%	90.0%
						Panel B: Robustness Specification						
Contribution to Total Risk (Variance)	77.4%	84.9%	89.0%	80.2%	88.0%	91.6%	73.4%	79.7%	87.1%	40.9%	55.0%	68.9%
Contribution to Total Risk Premium	6.3%	32.6%	56.6%	21.2%	54.9%	102.2%	35.4%	88.4%	147.0%	9.1%	19.5%	33.3%
Percentage of Diversified Idiosyncratic Risk	79.4%	93.4%	100.3%	69.6%	94.9%	110.2%	75.5%	112.7%	153.6%	63.4%	79.9%	89.4%
Number of Observations	129	129	129	140	140	140	131	131	131	141	141	141

Remarks Unit of observation is household. Panel A presents the results from a baseline specification, as shown in equation (4), using the empirical results from Columns (1)-(4) of Table 1. Panel B presents the results from a full robustness specification, as shown in equation (6), using the empirical results from Columns (5)-(8) of Table 2. The numbers for each household are the average across estimates from nine different time-shifting windows.

Table 4 Aggregate Risk, Idiosyncratic Risk, and Rate of Return: Township as Market

	Panel A: Baseline Specification				*Panel B: Robustness Specification*			
Dependent Variable:	***Household's Mean ROA***				***Household's Mean ROA***			
Region:	***Central***		***Northeast***		***Central***		***Northeast***	
Township (Province):	***Chachoengsao***	***Lopburi***	***Buriram***	***Srisaket***	***Chachoengsao***	***Lopburi***	***Buriram***	***Srisaket***
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Beta with respect to	0.903***	1.518***	-0.181	1.334***	0.487***	1.105***	0.0137	1.331***
return on market physical capital (ra)	(0.311)	(0.305)	(0.349)	(0.354)	(0.194)	(0.341)	(0.248)	(0.442)
Beta with respect to					0.00598	0.06	-0.0411	0.0799
return on market human capital (rh)					(0.054)	(0.18)	(0.168)	(0.335)
Beta with respect to					-0.0117	-0.00401	0.0106	0.0376
residual log consumption (cay)					(0.049)	(0.168)	(0.145)	(0.321)
Beta with respect to					-0.0117	0.0245	-0.0686	-0.0560
the interaction cay*ra					(0.056)	(0.214)	(0.162)	(0.344)
Beta with respect to					-0.00166	-0.000644	0.00392	-0.0127
the interaction cay*rh					(0.034)	(0.162)	(0.141)	(0.314)
Sigma	0.216***	0.184***	0.131***	0.205***	0.00428***	0.00467***	0.00389***	0.00367***
	(0.0499)	(0.0362)	(0.0432)	(0.0361)	(0.000689)	(0.000400)	(0.000435)	(0.000296)
Constant	-1.999***	-3.132***	-1.576***	-2.745***	-0.489***	-1.535***	-1.356***	-1.491***
	(0.433)	(0.695)	(0.509)	(0.589)	(0.171)	(0.214)	(0.151)	(0.237)
Observations	129	140	131	141	1,161	1,260	1,179	1,269
R-squared	0.558	0.280	0.114	0.459	0.433	0.330	0.196	0.446

Remarks Unit of observation is household-time window. Beta's are computed from a multivariate time-series regression of household's monthly adjusted ROA on township's monthly return on market physical capital (ra) and township's return on human capital (rh), and township's residual log consumption (cay). Township's return on human capital (ry) is proxied by the monthly growth rate of township's total labor income. Township's residual log consumption is the residual computed from time-series regression of township's monthly log food consumption on township's total physical asset at the beginning of the month and township's total labor income during that month. Interaction terms are then defined accordingly. Sigma is the variance of error terms from regressions used to estimate beta's for each household-time window. Robust standard errors corrected for generated regressors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5 Idiosyncratic Income, Consumption, Gift, and Lending

Dependent Variable:	**Net Gift Outflow**	**Net Lending**	**Net Gift Outflow Plus Net Lending**	**Consumption**
Idiosyncratic Income	13.02***	27.67***	40.66***	4.857**
	(4.795)	(7.507)	(9.000)	(2.081)
Province-Month Fixed Effects	Yes	Yes	Yes	Yes
Household Fixed Effects	Yes	Yes	Yes	Yes
Observations	81,664	81,712	81,664	81,712
R-squared	0.011	0.009	0.009	0.014
Number of Households	541	541	541	541

Remarks: Unit of observation is household-month. Net gift outflow is defined as gift outflow minus gift inflow. Net lending is defined as lending minus borrowing. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6 Determinants of Rate of Returns and Risks

Region	Central		Northeast		Central		Northeast	
Province	**Chachoengsao**	**Lopburi**	**Buriram**	**Srisaket**	**Chachoengsao**	**Lopburi**	**Buriram**	**Srisaket**
	Panel A: Simple Rate of Return				*Panel B: Risk-Adjusted Rate of Return*			
Total Initial Wealth	-0.0140**	0.534***	-0.594**	-2.149***	0.0287***	0.711***	-0.323	-0.109
	(0.00694)	(0.0791)	(0.255)	(0.323)	(0.00806)	(0.0691)	(0.262)	(0.192)
Household Size	-0.0868	-0.729***	-0.0651	-0.144	0.182	-0.872***	-0.239	-0.577***
	(0.177)	(0.249)	(0.169)	(0.228)	(0.123)	(0.205)	(0.146)	(0.166)
Age of Household Head	-0.0417**	0.00155	0.00627	0.00231	0.0217	0.0338*	0.0257**	0.0550***
	(0.0201)	(0.0211)	(0.0142)	(0.0209)	(0.0133)	(0.0174)	(0.0125)	(0.0148)
Education of Household Head	-0.115	-0.469***	0.128	-0.492***	0.209*	-0.368***	0.0896	-0.252**
	(0.136)	(0.120)	(0.0823)	(0.133)	(0.108)	(0.106)	(0.0746)	(0.108)
Household Head Gender (Male=1)	0.590	-0.597	-0.997**	1.710***	-1.580***	-0.291	-0.685*	-0.0355
	(0.444)	(0.510)	(0.415)	(0.510)	(0.345)	(0.369)	(0.386)	(0.401)
Constant	4.434**	4.472**	0.101	4.636***	-2.320*	-0.815	-1.911**	-2.299*
	(1.815)	(1.766)	(1.103)	(1.791)	(1.204)	(1.494)	(0.964)	(1.233)
R-squared	0.014	0.078	0.022	0.084	0.026	0.128	0.027	0.080
	Panel C: Aggregate Risk				*Panel D: Idiosyncratic Risk*			
Total Initial Wealth	-0.0261***	-0.00532	-0.178***	-0.831***	-6.902***	-34.73***	-68.39***	-239.2***
	(0.00397)	(0.0148)	(0.0572)	(0.0935)	(1.087)	(7.917)	(17.98)	(35.16)
Household Size	-0.141**	0.0543	0.0622	0.224***	-51.43***	23.16	43.24**	27.56
	(0.0695)	(0.0491)	(0.0444)	(0.0526)	(19.67)	(17.68)	(18.51)	(26.59)
Age of Household Head	-0.0482***	-0.0152***	-0.00635	-0.0115**	-9.930***	-1.943	-4.848***	-9.827***
	(0.0108)	(0.00479)	(0.00432)	(0.00540)	(2.391)	(1.529)	(1.549)	(2.270)
Education of Household Head	-0.266***	-0.0172	0.000534	-0.111***	-49.46***	-8.927	9.993	-21.49*
	(0.0529)	(0.0158)	(0.0187)	(0.0225)	(10.47)	(5.995)	(6.210)	(11.86)
Household Head Gender (Male=1)	1.766***	0.0687	0.304***	0.789***	319.9***	-109.6	-63.05	153.8***
	(0.212)	(0.122)	(0.0936)	(0.117)	(48.73)	(77.08)	(46.39)	(58.81)
Constant	4.888***	1.574***	0.847***	2.326***	1,081***	648.4***	505.1***	1,038***
	(0.918)	(0.366)	(0.313)	(0.429)	(216.8)	(141.2)	(105.9)	(190.6)
R-squared	0.080	0.164	0.043	0.169	0.072	0.050	0.041	0.109
Observations	1,082	1,195	1,100	1,172	1,082	1,195	1,100	1,172

Remarks Unit of observation is household-round (shifting time window). For each household, beta and sigma are estimated from the regression in equation (6). Beta is the regression coefficient with respect to aggregate return on physical assets. Sigma is the variance of the error terms from the regression. Household size is the number of household members aged 15-64. Age of household head was as of the end of December 1998. Initial wealth is in million baht. All regressions include village fixed effects. Robust standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A.1 Descriptive Statistics of Household Characteristics

	Number of Observations	Percentiles 25th	Percentiles 50th	Percentiles 75th	Number of Observations	Percentiles 25th	Percentiles 50th	Percentiles 75th
Region	***Central***							
Township (Province)	***Chachoengsao***				***Lopburi***			
As of December 1998:								
Household size	129	3.0	4.0	6.0	140	3.0	4.0	5.0
Male	129	1.0	2.0	3.0	140	1.0	2.0	3.0
Female	129	1.0	2.0	3.0	140	1.0	2.0	3.0
Male, age 15-64	129	1.0	1.0	2.0	140	1.0	1.0	2.0
Female, age 15-64	129	1.0	1.0	2.0	140	1.0	1.0	2.0
Average age	129	29.3	36.3	44.5	140	25.6	32.3	42.0
Maximum years of education	129	6.0	9.0	12.0	140	4.2	6.0	9.0
Total Assets (Baht)	129	380,465	1,109,228	3,636,334	140	336,056	1,074,082	2,387,329
156-Month Average (January 1999-December 2011):								
Monthly Income (Baht)	129	7,561	13,696	23,637	140	5,836	10,486	20,765
Total Assets (Baht)	129	857,892	1,745,109	4,275,229	140	653,339	1,645,757	3,052,390
Fixed Assets (% of Total Assets)	129	37%	61%	80%	140	40%	59%	71%
Total Liability (Baht)	129	8,470	31,455	105,216	140	34,595	121,412	285,300
Liability to Asset Ratio	129	0%	2%	6%	140	4%	8%	16%
Region	***Northeast***							
Township (Province)	***Buriram***				***Srisaket***			
As of December 1998:								
Household size	131	3.0	4.0	5.0	141	4.0	5.0	6.0
Male	131	1.0	2.0	3.0	141	2.0	2.0	3.0
Female	131	1.0	2.0	3.0	141	2.0	2.0	3.0
Male, age 15-64	131	1.0	1.0	2.0	141	1.0	1.0	2.0
Female, age 15-64	131	1.0	1.0	2.0	141	1.0	1.0	2.0
Average age	131	20.9	27.6	39.3	141	25.2	32.0	36.3
Maximum years of education	131	4.0	6.0	8.3	141	5.3	7.0	10.3
Total Assets (Baht)	131	356,201	572,491	947,314	141	156,313	387,634	881,455
156-Month Average (January 1999-December 2011):								
Monthly Income (Baht)	131	2,073	3,677	5,584	141	2,160	3,672	5,276
Total Assets (Baht)	131	503,434	741,882	1,114,981	141	317,444	577,064	1,048,213
Fixed Assets (% of Total Assets)	131	39%	57%	69%	141	35%	63%	75%
Total Liability (Baht)	131	24,316	56,805	109,264	141	23,471	42,932	75,531
Liability to Asset Ratio	131	3%	8%	17%	141	4%	9%	17%

Remarks The unit of observations is household. Average age and maximum years of education across household members within a given household. Assets, liabilities, and income are in nominal value. Fixed assets include equipment, machinery, building, and land.

Table A.2 Revenue from Production Activities (% by Township)

Region:	***Central***		***Northeast***	
Township (Province):	***Chachoengsao***	***Lopburi***	***Buriram***	***Srisaket***
Production Activities				
Cultivation	13.2%	39.4%	13.5%	33.7%
Livestock	21.0%	22.8%	1.0%	1.1%
Fish and Shrimp	17.6%	0.0%	0.3%	1.6%
Non-farm Business	28.8%	19.7%	59.2%	28.6%
Wage Earning	18.4%	15.2%	22.6%	27.9%
Number of Sampled Households	129	140	131	141

Remarks The unit of observations is township. The percentage of revenue is the revenue of each production activity from all households in our sample divided by the total revenue from all activities in the township. The revenues are computed from all of the 156 months (January 1999 to December 2011).

Table A.3 Descriptive Statistics of Networks in Village and Township

Region	***Central***		***Northeast***	
Township (Province)	**Chachoengsao**	**Lopburi**	**Buriram**	**Srisaket**
Number of Observations	129	140	131	141
% of Households with relatives living in the same...				
Village	50.4%	76.4%	80.9%	87.9%
Township	87.8%	88.4%	97.1%	94.0%

Remarks The unit of observation is household. Relatives are defined as parents of household head, parents of household head's spouse, siblings of household head or of household head's spouse, or children of household head. Network variables are computed as of August 1998 (the initial baseline survey, i.e. Month 0).

Table A.4 Descriptive Statistics of Return on Assets: Quartiles by Township

	Number of Observations	Percentiles 25th	50th	75th	Number of Observations	Percentiles 25th	50th	75th
Region:				***Central***				
Province (Township):		***Chachoengsao***				***Lopburi***		
Mean	129	-1.72	0.38	3.99	140	-1.67	1.46	4.53
Standard Deviation	129	4.38	7.56	16.61	140	10.16	16.51	24.77
Coefficient of Variation	129	2.02	3.14	5.46	140	3.27	4.65	8.85
Region:				***Northeast***				
Province (Township):		***Buriram***				***Srisaket***		
Mean	131	-1.32	0.28	1.56	141	0.21	1.99	4.29
Standard Deviation	131	8.38	13.92	22.59	141	10.16	16.78	26.87
Coefficient of Variation	131	4.03	8.70	17.48	141	4.03	5.92	11.52

Remarks Unit of observations is households. ROA is rate of return on household's total asset, computed by household's net income (net of compensation to household labor) divided by household's average total assets over the month. ROA is real return, adjusted by regional Consumer Price Index from the Bank of Thailand, and reported in annualized percentage. Mean, standard deviation, and coefficient of variation of ROA are computed from monthly ROA f*or each household* over 156 months (January 1999 to December 2011). The percentiles are *across households* in each township.

Table A.5 Risk and Return Regressions: Village as Market

Dependent Variable:	***Household's Mean ROA***							
Province:	***Chachoengsao***				***Lopburi***			
Village:	***02***	***04***	***07***	***08***	***01***	***03***	***04***	***06***
Beta	2.473***	3.232***	6.741***	0.720	2.163	3.185	4.399***	4.884***
	(0)	(1)	(2)	(1)	(4)	(3)	(1)	(1)
Constant	-1.105	-0.333	-0.739	1.162	-0.827	0.312	0.257	-1.629
	(0.899)	(0.756)	(0.821)	(0.984)	(1.434)	(0.873)	(0.572)	(1.503)
Observations	35	36	27	31	34	29	37	40
R-squared	0.449	0.702	0.446	0.036	0.012	0.126	0.472	0.337
Village Returns:								
Monthly Average	1.09	1.48	4.13	0.73	2.03	2.49	2.48	2.85
Standard Deviation	0.14	0.08	0.50	0.12	0.17	0.34	0.14	0.33

Province:	***Buriram***				***Srisaket***			
Village:	***02***	***10***	***13***	***14***	***01***	***06***	***09***	***10***
Beta	0.827	0.547	0.217	0.697	2.759***	3.680***	1.557**	1.902*
	(1)	(2)	(1)	(1)	(1)	(2)	(1)	(1)
Constant	-0.628	0.346	0.684	-0.541	-2.407**	-0.558	0.735	-1.748
	(0.417)	(1.197)	(0.831)	(0.688)	(1.172)	(1.661)	(1.001)	(1.907)
Observations	34	28	34	35	38	42	39	22
R-squared	0.022	0.010	0.003	0.014	0.510	0.387	0.114	0.149
Village Returns:								
Monthly Average	-0.14	1.56	0.36	-0.52	-0.57	1.88	0.87	0.95
Standard Deviation	0.11	0.14	0.23	0.17	0.16	0.12	0.13	0.15

Remarks Unit of observations is household. Beta is computed from a simple time-series regression of household adjusted ROA on village ROA over the 156 months from January 1999 to December 2011. Household's mean adjusted ROA is the time-series average of household adjusted ROA over the same 156 months. Standard errors corrected for generated regressors (Shanken 1992) are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A.6 Risk and Return Regressions: Network as Market

Dependent Variable:	***Household's Mean ROA***			
Region:	***Central***			
Province:	***Lopburi***			
Village:	***01***	***03***	***04***	***06***
Network:	***03***	***03***	***06***	***01***
Beta	-3.088	3.265	7.366***	5.189***
	(4.302)	(4.033)	(2.383)	(0.881)
Constant	0.433	1.523	0.123	-1.655
	(1.448)	(1.244)	(0.865)	(1.799)
Observations	16	18	20	33
R-squared	0.012	0.041	0.464	0.345
Network Returns:				
Monthly Average	2.03	2.46	2.52	2.85
Standard Deviation	0.20	0.41	0.13	0.35

Region:	***Northeast***				
Province:	***Buriram***		***Srisaket***		
Village:	***13***	***14***	***01***	***06***	***09***
Network:	***03***	***03***	***03***	***02***	***02***
Beta	1.373	0.728	2.842***	3.832**	1.540**
	(0.988)	(1.046)	(0.722)	(1.484)	(0.618)
Constant	-0.249	-0.460	-2.205*	-0.452	0.554
	(0.694)	(0.794)	(1.226)	(1.845)	(1.025)
Observations	23	27	23	37	36
R-squared	0.184	0.015	0.365	0.374	0.134
Network Returns:					
Monthly Average	0.38	-0.52	-0.58	1.88	0.87
Standard Deviation	0.20	0.16	0.14	0.13	0.13

Remarks Unit of observations is household. Beta is computed from a simple time-series regression of household's adjusted ROA on network's ROA over the 156 months from January 1999 to December 2011. Household's mean adjusted ROA is the time-series average of household adjusted ROA over the same 156 months. Standard errors corrected for generated regressors (Shanken 1992) are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A.7 Descriptive Statistics of Household Alpha: Township as Market

Province	Number of Observations	Mean	Standard Deviation	Skewness	Kurtosis	Percentiles		
						25th	50th	75th
			Panel A: Return on Assets, Not Adjusted for Risks					
Central								
Chachoengsao	129	1.90	6.51	1.14	4.64	-1.72	0.38	3.99
Lopburi	140	1.37	6.31	-0.93	5.46	-1.67	1.46	3.16
Northeast								
Buriram	131	0.30	3.49	0.24	4.79	-1.32	0.28	1.39
Srisaket	141	2.83	5.87	0.75	5.53	0.21	1.99	4.29
			Panel B: Return on Assets, Adjusted for Aggregate Risks					
Central								
Chachoengsao	129	0.68	5.52	0.44	5.17	-1.75	-0.15	2.59
Lopburi	140	0.28	5.81	-1.47	7.05	-1.98	1.00	3.16
Northeast								
Buriram	131	-0.28	3.60	-0.02	4.54	-1.94	-0.27	1.39
Srisaket	141	-0.11	4.84	0.24	5.76	-1.43	-0.08	1.18
			Panel C: Return on Assets, Adjusted for Aggregate and Idiosyncratic Risks					
Central								
Chachoengsao	129	-0.49	4.52	-0.305	6.09	-2.21	-0.42	1.469
Lopburi	140	-1.54	5.27	-1.87	8.12	-3.49	-0.12	1.493
Northeast								
Buriram	131	-1.36	3.52	-0.73	4.38	-2.75	-0.75	0.54
Srisaket	141	-1.49	4.16	-0.677	5.70	-2.55	-0.72	0.313

Remarks Unit of observations is households. Panel A reports descriptive statistics of rate of return without adjusting for any risk (but adjusted for household's own labor). Panel B report rate of return adjusted for aggregate risks, where risk premium is computed from market's mean ROA (ra), market return on human capital (ry), residual consumption (cay), and their interactions cay*ra and cay*rh, as defined in equation (7) in the text. Panel C report rate of return adjusted for aggregate risks, where risk premium is computed from market's mean ROA (ra), market return on human capital (ry), residual consumption (cay), and their interactions cay*ra and cay*rh, as well as idiosyncratic risk from sigma, as defined by equation (9b) in the text. For each household, the return in Panels B and C is averaged across 9 shifting time windows. *** $p<0.01$.

Economic Inquiry

INTEGRATED HOUSEHOLD SURVEYS: AN ASSESSMENT OF U.S. METHODS AND AN INNOVATION

KRISLERT SAMPHANTHARAK, SCOTT SCHUH and ROBERT M. TOWNSEND*

We present a vision for improving household financial surveys by integrating responses from questionnaires more completely with financial statements and combining them with payments data from diaries. Integrated household financial accounts—balance sheet, income statement, and statement of cash flows—are used to assess the degree of integration in leading U.S. household surveys, focusing on inconsistencies in measures of the change in cash. Diaries of consumer payment choice can improve dynamic integration. Using payments data, we construct a statement of liquidity flows: a detailed analysis of currency, checking accounts, prepaid cards, credit cards, and other payment instruments, consistent with conventional cash flow measures and the other financial accounts. (*JEL* D12, D14, E41, E42)

I. INTRODUCTION

During recent decades, interest in the study of household finance has grown rapidly. Campbell (2006) first advanced the case for treating household finance as a distinct field of study in economics. The global financial crisis of 2008–2009 strengthened that case due to the subprime housing debacle in many industrial economies and its persistent impact on household balance sheets. In particular, the extent and nature of increased leverage and risk in household mortgages and their effects on the real (housing industry) and financial (shadow banking) sectors of the economy were not well known or understood prior to the crisis. Consequently, there is now a focus on household decision making, how households got

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ABBREVIATIONS

ALP: American Life Panel
BLS: Bureau of Labor Statistics
CAMS: Consumption and Activities Mail Survey
CCE: Cash and Cash Equivalents
CE: Consumer Expenditure Survey
CF: Cash Flows
CPI: Consumer Price Index
CPRC: Consumer Payments Research Center
DCPC: Diary of Consumer Payment Choice
DDA: Demand Deposit Account
HFCS: Household Finance and Consumption Survey
HRS: Health and Retirement Survey
ISIR: Institute for Social Research
LLC: Limited Liability Corporations
LSMS: Living Standard and Measurement Study
LTFA: Long-Term Financial Assets
NFDA: Nonfinancial Deposit Accounts
NIPA: National Income and Product Accounts
NORC: National Opinion Research Center
PSID: Panel Study on Income Dynamics
SCF: Survey of Consumer Finance
SCPC: Survey of Consumer Payment Choice
SIPP: Survey of Income and Program Participation
ST: Samphantharak and Townsend (2010)
TTMS: Townsend Thai Monthly Survey

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into this trouble, what transpired in the crisis, and the difficulties encountered thereafter.[1]

A hindrance to research and understanding of household economic behavior (real and financial) has been the lack of sufficient data. Relative to other countries, the United States has a large amount of high-quality data on household economic behavior; these data will be examined closely in this paper. Even the U.S. data, however, were inadequate to inform economic agents and policymakers sufficiently to avoid the financial crisis. Many efforts are underway to acquire and develop additional needed data; these efforts include the Eurosystem's Household Finance and Consumption Survey (HFCS), which was inspired partly by the U.S. Survey of Consumer Finances (SCF).[2] Other efforts, such as the National Academy of Science's call for a substantially revised Consumer Expenditure Survey (CE), aim to reform existing datasets (Dillman and House 2013).

The U.S. household survey data exhibit several characteristics that limit their effectiveness. The U.S. statistical system (public and private) is decentralized, with each data source specializing in a part of household activity. Although there are often good reasons for specialization, the result is a general lack of comprehensive measurement of household activity. Many datasets are cross-sectional, which limits their ability to track the behavior of specific households over time, and are gathered infrequently. When data sources are combined in an effort to provide a more comprehensive view of household behavior, the combination of the specialized data sources can create imperfect, if not misleading, views of household economic conditions, due to differences in sampling, measurement, and linkages between microeconomic and aggregate data.[3] These imperfections make it difficult to ascertain from the data the extent and nature of important developments, such as adjustments affecting household balance sheets in the wake of financial crisis, increases in income inequality, and intergenerational dynamics of household net worth.

Data on household behavior in other countries also exhibit limitations, but there are signs of improvement in response to major economic developments. Most notably, the financial crisis reaffirmed the view that household finance is at the center of development economics because financial access is thought to be one of the key factors that could help poor and vulnerable households become more productive and resilient in the face of economic shocks. In addition, there have been payment innovations such as M-Pesa in Kenya, an electronic money issued by a cell phone company, Safaricom, that in many respects is now on par with currency there as a medium of exchange (Jack, Suri, and Townsend 2010). The often-expressed hope in developing economies is that a deeper, more developed financial system can be built on top of such an improved payments system, with some progress evident in countries such as Pakistan.[4] These developments bring us back to the need for better data on payments, household behavior, and a microfounded view of the macroeconomy in developing countries. Fortunately, more countries are producing data from household surveys that are doing a better job of measuring these developments.

We believe an important step forward in understanding household behavior is the development of more reliable and effective measures of household economic activity, both real and financial. Therefore, an overarching goal of this paper is to describe a comprehensive vision for practical implementation of household surveys that are integrated with financial statements and

1. For example, Mian and Sufi (2011) study the aggregate impact of the home-equity-based borrowing channel and find that a large portion of total new defaults between 2006 and 2008 were from homeowners who had borrowed aggressively against the rising value of their houses. In a panel analysis of 30 countries, Mian, Sufi, and Verner (2017) find that an increase in the household debt-to-GDP ratio predicts lower GDP growth and high unemployment. Outside the United States, a study by Agarwal and Qian (2014) shows a negative consumption response by Singaporean households to a decrease in access to home equity, with the result concentrated in credit card spending and stronger among individuals with limited access to credit markets or with a high precautionary saving motive.

2. For more information on the HFCS, see https://www.ecb.europa.eu/pub/economic-research/research-networks/html/researcher_hfcn.en.html.

3. Carroll, Crossley, and Sabelhaus (2015) contains numerous studies showing the various practical and theoretical tradeoffs inherent in attempting to use survey data to build economic aggregates, tradeoffs that can make comparing results from different surveys extremely challenging. For instance, Crossley and Winter (2015) note the difficulties survey designers can have even in defining the term "household," which can significantly affect the comparability of survey results. Similarly, surveys with a short reference period may underestimate infrequent purchases, while surveys with a long reference period may suffer from recall issues. Two surveys with different reference periods may have comparability issues.

4. See Ahmed et al. (2015) for more information on the rise of branchless banking in Pakistan.

payments data, leaving no gaps in measurement and strengthening the theoretical and applied linkages among measures. The main contributions of this paper are: (1) to assess how well integrated U.S. household surveys are with elements of financial statements for households; and (2) to demonstrate how a diary of U.S. consumer payment choices can be used to construct a new statement of liquidity flows that advances the current state of the art in measuring stock-flow dynamics and thus takes a step closer to realizing the overarching vision of the paper.

Samphantharak and Townsend (2010, henceforth ST) describes the baseline conceptual framework for the design of an integrated survey that has been implemented in the field for almost 20 years and that allows construction of a complete set of household financial statements that is comprehensive and fully integrated. Essentially, ST create a set of financial accounts akin to those of corporate firms: this set comprises a balance sheet, income statement, and statement of cash flows (CF). The concept is of a household with projects, that is, a collection of assets that earn income from farm and nonfarm production activities. This idea of assets earning income also extends to households engaged in wage or salaried labor, meaning those that essentially generate income from their human capital. A key element of this analysis is that all aspects of household situations and behaviors are measured: income, in order to measure the productivity of physical and human capital; assets and liabilities, to measure wealth; and CF, to distinguish liquidity from income and profitability. A key to this measurement is that the accounts are required, by construction, to be consistent with one another, thereby eliminating the possibility of gaps. Few surveys feature this dynamic integration.

To illustrate how this works, and as a first step in the paper, we use the ST framework to assess the degree of integration in leading U.S. household surveys. For each survey considered, we tabulate and juxtapose the data of each in the form of corporate financial statements applied to the representative U.S. household. We first construct for each survey a harmonized balance sheet, income statement, and statement of CF for a recent time period that matches the survey dates—around 2012—as closely as possible. To ensure maximum accuracy, we have invited assistance from representatives associated with each survey; and to encourage further refinement of this effort, we make our programs available to interested researchers. Then, we use the estimated U.S. household financial statements to characterize the degree of integration by two distinct measures. *Integration by coverage* reflects the extent to which a survey contains estimates of each line item in the financial statements. All the surveys cover roughly half the income statement items, although most specialize in income or expenditures. However, the coverage of the balance-sheet items varies widely across surveys. *Integration by dynamics* reflects the extent to which the statement of CF accurately measures the law of motion between stocks (shown in the balance sheet) and flows (shown in the income statement). None of the surveys can provide truly direct statements of CF, and all of them make large errors relative to indirect estimates of changes in assets and liabilities.

Our assessment of integration in U.S. household surveys is merely a factual statement of results and is not intended to be a criticism of the surveys or a call for reforming them. We recognize and accept the specialty nature of U.S. surveys, which has the benefit of allowing gains from specialization and achievement of each survey's original goals. For example, the Panel Study on Income Dynamics (PSID) was originally designed to measure poverty and to contribute to its reduction in conjunction with President Johnson's Great Society programs; the CE was designed to gather data for developing accurate price indices; and the SCF to measure wealth. Although some of these surveys have evolved over the years, particularly the PSID, others retain their original mandate. Yet, the specialization and persistence of the U.S. surveys do leave gaps in measurement that can only be overcome by comprehensive integration of the surveys with financial statements. Ironically, because the PSID and SCF are so highly regarded, they are adopted as the gold standard elsewhere in the world, for example, in China and Europe, thus propagating essentially the same gaps in these other surveys as in their U.S. counterparts.

A second step of this paper is to use the Federal Reserve Bank of Boston's 2012 Diary of Consumer Payment Choice (DCPC) to demonstrate how consumer payment diary surveys can improve the dynamic integration of surveys.[5]

5. Separately, Schuh (2017) reports that the DCPC produces estimates of U.S. consumer expenditures that greatly exceed those from the CE (and diary) and that approximately match National Income and Product Account estimates of comparably defined measures of consumption and disposable income.

The DCPC directly measures several, but not all, components of the law of motion governing the stock-flow relationship between assets and liabilities (balance-sheet items) and income and expenditures (income-statement items). Because the 2012 DCPC is focused on consumer payments authorized by payment instruments (cash, check, debit or credit card, online banking, and such), it focuses on liquid assets used as payment instruments, including the currency held and used by U.S. consumers. In this respect, the DCPC is similar to the Townsend Thai Monthly Survey (TTMS), which underlies the ST methodology, where currency is the main household asset and payment instrument in rural Thailand. To provide a bridge to our key next step, we compare and contrast the household financial statements constructed with TTMS with those constructed with the DCPC.

The central innovation of this paper is the construction of a new, more detailed analysis of CF at the level of liquid asset accounts, where currency, checking accounts, and other liquid assets are distinguished and treated separately. By tracking consumer expenditures that are authorized by payment instruments tied to specific types of liquid asset accounts, the DCPC matches expenditures to the sources of money and credit that fund them. This matching cannot be done feasibly by surveys that track consumer expenditures at the level of individual products (the CE) or at the level of aggregated expenditure categories ("food away from home").

Linking all the liquidity accounts to one another and to the expenditures (or investments) they fund makes it possible to better assess the changing landscape of payments taking place in the United States and industrialized countries as well as in emerging-market and low-income countries.[6] This then links back to the need for data to better inform public policy and to provide consumers with the information they need to improve household decision making and economic behavior. More informative financial accounts come from considering payments, and vice versa: better payments data come from integrated financial accounts. Development of household economic data from dynamically integrated household surveys that include payment diaries might be particularly beneficial for developing countries, where household economic data are scarce, there are few preestablished surveys with prior missions, and payment systems and financial industries are changing rapidly. Of course, payments systems are also changing in the United States. The 2015 DCPC took a small step toward integrating payments and employing the ST framework, as described below. We provide a framework and guidance for policymakers to implement this longer-run vision.

The remainder of the paper proceeds as follows. Section II provides an overview of the main U.S. household surveys. Section III reviews the ST methodology and explains how it will be used in our analyses. Section IV assesses the degrees of integration in U.S. household surveys, by coverage and dynamics. Section V compares and contrasts the TTMS and DCPC survey data. Section VI describes the innovation made possible by the interaction of ST's methods with the DCPC. Section VII concludes.

II. OVERVIEW OF U.S. HOUSEHOLD SURVEYS

This section describes the main surveys included in this study, which are used to collect data on U.S. household economic conditions (henceforth, "household surveys"), plus the TTMS. Summary descriptions of these surveys appear in Table 1 in order of chronology based on continuous fielding. Five sponsors produce these U.S. surveys:

- *University of Michigan, Institute for Social Research (ISIR)*—The Michigan ISIR sponsors two surveys. First, the biennial PSID, which is "the longest running longitudinal household survey in the world" and that includes data on wealth and expenditures as well as other socioeconomic and health factors.[7] Second, the biennial (even-numbered years) Health and Retirement Survey (HRS), which "has been a leading source for information on the health and well-being of adults over age 50 in the United States" for more than 20 years; the HRS includes the biennial Consumption and Activities Mail Survey (CAMS) for tracking household expenditures in "off" years (odd-numbered).[8]
- *U.S. Bureau of Labor Statistics (BLS)*—The BLS sponsors the CE, comprising "two surveys—the quarterly *Interview*

6. For information about Federal Reserve efforts to stimulate innovations in the U.S. payment system, see https://fedpaymentsimprovement.org/.

7. For more information about the PSID, see https://psidonline.isr.umich.edu/.

8. For more information about the HRS, see http://hrsonline.isr.umich.edu/.

TABLE 1
Overview of U.S. Surveys and Diaries and TTMS

	PSID	CE-S/D	SCF	SIPP	HRS/CAMS	S/D-CPC	TTMS
Sponsor	University of Michigan	BLS	Federal Reserve Board	Census Bureau	University of Michigan	Boston Fed	Townsend Thai Monthly sponsors
Vendor	University of Michigan	Census Bureau	NORC/University of Chicago	Census Bureau	University of Michigan	RAND/University of Southern California	Thai Family Research Project
Frequency	Biennial	Monthly	Triennial	Quarterly	Biennial	Yearly/Irregular	Monthly
Period	1968–present	1980–present	1983:Q1–present	1983:Q4–present	2008–present	2012, 2015	1998–present
Statistical calculations	2011, 2013	2011, 2012	2009, 2012	2010, 2011	2010, 2012	2011, 2012	2012
Questionnaires							
Observation unit	U.S. family unit	U.S. consumer units	U.S. primary economic units	U.S households	U.S. households	U.S. consumers and households	Thai households
Mode(s)	Interview	Interview, diary	Interview	Interview	Interview, mail	Interview, diary	Interview
Data collection	Recall	Recording, recall	Recall	Recall	Recall	Recording (1 day), recall (1 year)	Recall
Measurement period	Past year	Daily expenditures (diary), or past year (survey)	"Average" week for expenditures, past year for income	Past month, past 4 months, or past year	Past year	Daily payments (DCPC), or "typical" week, month, year (SCPC)	Past month
Sampling							
Target population	Total U.S. noninstitutional	Total U.S. noninstitutional	Total U.S. noninstitutional	Total U.S.	U.S. ages 50+ noninstitutional	Age 18+ noninstitutional	Rural and semi-urban households
Sampling frame	Survey research center national sampling frame	U.S. Census Bureau master address file	NORC national sampling frame and IRS data	U.S. Census Bureau master address file	Panel of adults born 1931–1941	RAND ALP, USC UAS, GfK knowledge networks	Initial village census
Sample size	~10,000	~7,000	~6,000	14,000–52,000	9,000–15,000	~2,000	~800
Longitudinal panel	4 consecutive quarters	14 days	None	2.5–4 years	Fixed	3-day waves tied to SCPC annual panel	1998–present

CE-S: http://www.bls.gov/CE/capi/2015/cecapihome.htm; CE-D: http://www.bls.gov/CE/ced/2013/cedhome.htm; TTMS: http://townsend-thai.mit.edu/about/; SIPP: http://www.census.gov/programs-surveys/sipp/about.html; PSID: https://psidonline.isr.umich.edu/; SCPC: http://www.bostonfed.org/economic/cprc/scpc/; DCPC: https://www.bostonfed.org/economic/cprc/data-resources.htm; SCF: https://www.federalreserve.gov/econresdata/scf/scfindex.htm; HRS/CAMS: https://hrs.isr.umich.edu/about

Survey and the *Diary Survey*—that provide information on the buying habits of American consumers, including data on their expenditures, income, and consumer unit (families and single consumers) characteristics."[9] "As in the past, the regular revision of the Consumer Price Index (CPI) remains a primary reason for undertaking the Bureau's extensive CE. Results of the CE are used to select new 'market baskets' of goods and services for the index, to determine the relative importance of components, and to derive cost weights for the market baskets."

- *Federal Reserve Board*—The Board sponsors the SCF, "normally a triennial cross-sectional survey of U.S. families. The survey data include information on families' balance sheets, pensions, income, and demographic characteristics. Information is also included from related surveys of pension providers and the earlier such surveys conducted by the Federal Reserve Board." The SCF collects some consumer expenditures directly.[10]
- *U.S. Census Bureau*—The Census Bureau sponsors the Survey of Income and Program Participation (SIPP), "the premier source of information for income and program participation. SIPP collects data and measures change for many topics including: economic well-being, family dynamics, education, assets, health insurance, childcare, and food security."[11]
- *Federal Reserve Bank of Boston*—The Boston Fed's Consumer Payments Research Center (CPRC) sponsors the annual Survey of Consumer Payment Choice (SCPC) and the occasional DCPC, both of which measure consumer adoption of payment instruments and deposit accounts and the use of instruments. Originally, the SCPC and DCPC were not integrated like the CE but were developed independently; they are now being integrated. The SCPC collects only the number of payments, while the DCPC also tracks the dollar values. Both provide data on cash and (in later years) checking accounts plus revolving credit. The SCPC contains very limited information about household balance sheets.

These surveys were selected because of their quality and breadth of coverage of U.S. household financial conditions, including relatively large numbers of detailed questions pertaining to the line items of household financial statements (assets, liabilities, income, or expenditures). None of the surveys contains all relevant financial conditions because none was designed to do so. Thus, no single survey is fully integrated with financial accounting statements and no single survey alone can provide complete estimates of household financial conditions. When combined, however, these U.S. household estimates come closer than any single dataset available today to providing a comprehensive assessment of U.S. household financial conditions. These surveys were also chosen because, except for the HRS, they are representative of U.S. consumers.[12] However, the surveys are implemented with different samples of households (or consumers) and, in some instances, substantively different survey questions, so their estimates are not necessarily comparable.

We reiterate that each survey has its own particular purposes or goals and that none is intended to provide a comprehensive, integrated set of household financial conditions as described in ST. The CE, for example, is primarily intended to produce data on a wide range of consumption expenditures that aid in the construction of the CPI. In contrast, the SCF primarily tracks details of assets and liabilities plus income from all sources but does not track all consumer expenditures. The PSID aims to estimate most income and expenditures but also focuses on collecting data on social factors and health, a practice that might be beneficial for every survey and data source. In any case,

9. For more information about the CE, see http://www.bls.gov/cex/ and http://www.bls.gov/cex/csxovr.htm. The CE dates back to the 1800s but was not implemented annually until 1980; for details, see https://www.bls.gov/cex/ceturnsthirty.htm.

10. For more information about the SCF, see http://www.federalreserve.gov/econresdata/scf/scfindex.htm.

11. For more information about the SIPP, see http://www.census.gov/sipp/.

12. The HRS includes consumers ages 50 years and older and thus includes households with relatively high income and assets, making it more representative of all U.S. consumers than other surveys that focus on subsets of the population, such as low-income consumers. Two nonrepresentative surveys merit analogous analysis but are not included here because they focus on selected low- and moderate-income (LMI) U.S. consumers. One is the U.S. Financial Diaries (USFD), produced jointly by the Center for Financial Services Innovation (CFSI) and the NYU Wagner Financial Access Initiative. For more information, see http://www.usfinancialdiaries.org/. Another is the National Asset Scorecard for Communities of Color (NASCC), which is very similar to the PSID. For more information, see https://socialequity.duke.edu/research/wealth, Darity et al. (2015), and Chang et al. (2015).

the PSID's breadth limits the amount of detail it can obtain on income and expenditures, so it does not obtain a comprehensive estimate of balance-sheet items. For all of these reasons, the analysis in the next section does not expect or presume to find an individual integrated financial survey, nor does it recommend that any of these surveys change what it is currently doing.

Table 1 summarizes the key characteristics of the selected U.S. household surveys in terms of their basic features, survey methodologies, and sampling methodologies. Surveys are listed in columns in chronological order (left-to-right) based on their initial years of continuous production. The oldest is the PSID, which dates back to the 1960s, while the newest, the SCPC and DCPC, are less than a decade old. Most of the surveys are conducted relatively infrequently, ranging from quarterly (the CE and SIPP) to triennially (the SCF). Although implemented daily for 1 or 2 months, the official DCPC has been implemented only three times in 5 years. The date of statistical calculations refers to the period used to estimate the elements of the household financial statements, as discussed later in the paper. The rows of the table are grouped into sections related to the survey methodology and the sampling methodology. For further comparison, the table also shows corresponding information about the TTMS.

Survey methodologies vary widely across the surveys along several dimensions. One obvious distinction is the mode: survey (PSID, CE-S, SCF, HRS, SIPP, and SCPC) versus diary (CE-D and DCPC) or "diary survey." This distinction is complicated by the fact that modes also vary for each type of survey or diary, including paper surveys, paper diaries (or memory aids), online surveys—with or without assistance—and interviews; some surveys use mixed-mode strategies. A key differentiating factor among surveys is whether they collect data based on respondents' recall, where the recall period can vary in length from a period of 1 week to 1 year, or based on respondents' recording the data, where the recording period is typically 1 day. Recall-based surveys are more susceptible to memory errors and aggregation errors (over time and variable types). Some sponsors field their own survey (Michigan ISIR), while others outsource to vendors (e.g., the SCF uses NORC, formerly called the National Opinion Research Center).

The sampling methodologies are relatively similar across surveys. All surveys aim to provide estimates that are representative of some U.S. population measure, except the HRS, which is limited to older households. The main reporting unit varies across surveys from individual consumers to entire households, with some surveys obtaining information about the household from just one member—an important choice that can significantly affect the results of the survey. The surveys also differ in whether the samples are drawn as independent cross sections or as longitudinal panels. The precision of survey estimates varies widely because sample sizes range from 2,000 to 52,000 reporting units.

Estimates of economic and financial activity for consumers and households are influenced heavily by at least two major types of factors: (1) heterogeneity in the survey specifications, sampling methodologies, and data collection methodologies; and (2) variation across surveys in the content, scope, and nature of questions about real and financial economic activity. Therefore, the reader should not expect estimates of income, expenditures, or wealth from the surveys to coincide. Instead, there might be large discrepancies in estimates of these economic and financial activities even if the conceptual measures are similar. Differences in target populations can naturally produce large differences in economic and financial measures. But even more subtle survey design differences, such as recall versus recording, can produce large differences in the estimated measures. With regard to survey content and questions, even minor differences in wording can elicit differences in measured concepts between surveys. Similarly, the level of aggregation—collecting data on just the total or on the sum of the parts of the total (and then adding them up)—can have dramatic effects on estimates of the total values across surveys.

III. THE ST FRAMEWORK

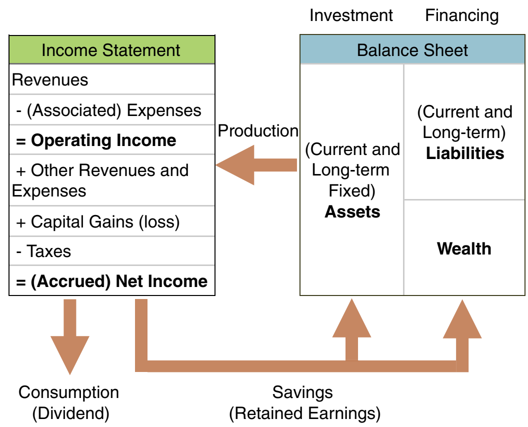
This section provides a brief overview of the ST (2010) framework for defining and measuring the integration of household surveys with corporate financial statements.

A. Conceptual Framework

There are three main financial statements in the ST "household as corporate finance" framework.[13] The first statement is the balance sheet or the statement of financial position, which reports all assets and liabilities at a point in time. The difference between assets and liabilities is net worth. In the terminology of corporate financial accounts, net worth is the household's equity in the household enterprise. The second financial statement is the income statement, which measures flows of revenues and expenses as well as the disposition of net profit into consumption and savings over a period of time. Finally, the statement of CF measures money, cash, or other liquid assets flowing into and out of the household as part of the payments system. In practice, CF are simply the outflows of cash for the acquisition of inputs of production, as well as for investment and consumption expenditures, and the inflows from sales of product, liquidation of assets, and financing.

The balance sheet is a stock report, while the income statement and the statement of CF are flow reports. There is a close connection between the balance sheet and the income statement through the connection between stocks and flows, as summarized in Figure 1. Specifically, profits from production or from salary and other income can be saved or consumed. Consumption is analogous to paying out a dividend to the owner. Positive savings show up as an increase in (real or financial) assets and wealth, reflected in the balance sheet at the end of the period. Likewise, negative savings show up as a decrease in assets and wealth. Indeed, the change in wealth in the balance sheet between two points in time is essentially net savings.[14]

FIGURE 1
Relation between Household Income Statement and Balance Sheet



Income in corporate financial statements is typically accrued income, based on the idea that expenses of production are not subtracted until revenues from sales resulting from that production are recognized.[15] The essential idea behind this notion of accrued income is that one wants to

13. This conception of households as analogous to corporate firms raises some interesting issues. First, one may think of firms as registered corporate entities. But the financial accounts also apply to firms that are proprietorships, so formality or legality is not the issue, per se. More substantive complications remain. The first is how to treat membership in a household, not only with respect to changes due to births and deaths of family members but also with respect to changes due to marriages, divorces, and migration. For that matter, even within the family there may be individual ownership of assets and liabilities, traceable in principle when the distinction is clear to the family members, but often it is not. Or, in the other direction, seemingly separate families may in fact be closely related, not just by blood or marriage but also by financial transactions and behavior. This is the case for family and extended networks, as typically occurs in developing economies, but also in some advanced economies, such as Spain.

14. There are two further qualifications. First, there is an adjustment for net incoming unilateral transfers (e.g., gifts and remittances), which are not thought to be part of the return on investment projects per se but rather a financing device or even good will. These are not uncommon for households. Second, the balance sheet can change with asset appreciation or depreciation if these capital gains or losses are recognized in the income statement. Thus, it is easy to measure savings poorly if appreciation and depreciation change the balance sheet and income statements if one does not consider active flows of funds. Appreciation and depreciation can contribute substantially to increases and decreases in income, especially for those with substantial financial portfolios, as is the case for some older households.

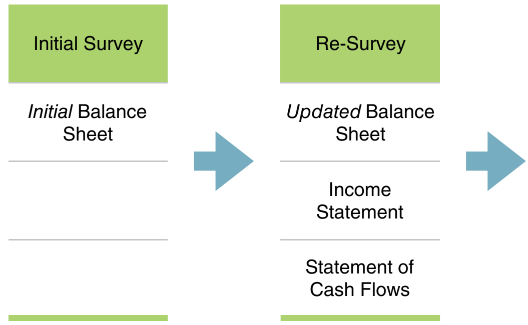
15. Accrual-basis accounting, where revenues (income) are reported when they are earned and expenses (expenditures) are reported when revenues are reported, may be a more accurate representation of a company's net profits or financial condition (and a household's financial condition) than cash-basis accounting. Accrual-basis estimates would involve a substantial change. ST does this for the TTMS data, and the contrast of cash basis with accrual basis has been quite useful in research, as noted earlier. Note that the differences between cash basis and accrual basis become less relevant with annual data (in comparison to monthly or quarterly) since cash received and revenues recognized are likely reported in the same period (although some differences persist in the Thai data). Likewise, in such cases, cash outflows and expenses likely take place in the same period. These two accounting approaches are also less relevant for non-business households, whose incomes are less likely to involve inventories and trade credits. Another reason a small difference likely exists between cash and accrued income in the U.S. data is that a large portion of income earned by households in the United States is from wages, whose receipt mostly corresponds to the period when labor services are provided (the main caveat is the complication on how pensions are treated, as mentioned above).

measure the ultimate return on a project in order to compare that return to alternatives; that is, one wants to measure the opportunity cost in order to see whether the project is warranted, in order to answer the obvious question: do the economic activities the household has adopted "make sense"? Essentially, accrued income is supposed to measure productivity. However, since the accrual basis of accounting does not necessarily recognize revenues or expenses when cash flows in or out of the enterprise, it cannot give analysts a full understanding of the enterprise's liquidity. For example, a project may be productive with a reasonably high rate of return, but it may become illiquid due to CF fluctuations and the household may even go bankrupt. This example illustrates one of the reasons why the statement of CF is needed to obtain a comprehensive understanding.

To summarize, the reconciled financial statements must exhibit the following accounting identities: (1) in the balance sheet, the household's total assets must be identical to its total liabilities plus total wealth or net worth, (2) the increase in household wealth in the balance sheet over the period must be identical to the household's savings (adjusted for unilateral transfers); that is, it must be identical to a household's net income from the income statement minus consumption, and (3) the increase in the household's cash holdings in the balance sheet must be identical to the household's net cash inflow in the statement of CF, summing over all sources. Both sides of every accounting identity are measured.

One benefit of imposing accounting identities is that we avoid the common problem that a variable generated from one set of questionnaire responses yields a different value when computed from an alternative set of responses. For example, Kochar (2000) finds that household savings in the Living Standard and Measurement Study (LSMS) surveys computed as "household income minus consumption" is different from household savings computed from "change in household assets." This discrepancy could come from various problems in questionnaire design. For example, some of the assets might be omitted from total assets, some assets might be financed by liabilities rather than savings, or income and savings might be defined inconsistently. Indeed, as mentioned above, one can use these two different measures of savings, which may differ as indicated, as a consistency check within a survey or diary fielding, with follow-up questions in the case of discrepancies.

FIGURE 2
Constructing Financial Statements from a Panel Household Survey



ST applied this vision of integrated surveys to the TTMS. Transactions in the monthly data are like journal entries for an accountant, allowing the analyst to create complete financial accounts. As details of the transaction partners are also recorded, one can map networks within the village and also geographic patterns. Figure 2 illustrates the procedure for creating a household's balance sheet, income statement, and statement of CF from a panel household survey. More information about the TTMS appears in Section V.

B. Details of the Statement of CF

Because the dynamic accounting of linkages between stocks and flows is central to this paper, we provide a more detailed discussion of this topic. The statement of CF provides an accounting of cash received and cash paid during a particular period of time, thereby providing an assessment of the operating, financing, and investing activities of the firm (or household).

The first step in constructing a CF statement is to define the term "cash." Despite the label, it is important to remember from the outset that currency is typically only part of this. For advanced industrial economies such as the United States, standard corporate financial statements tend to focus CF on the concept of "cash and cash equivalents" (CCE):

- *Cash*—Currency (coins, notes, and bills)[16] and liquid deposits at banks and other financial

16. Currency could also refer to foreign currency, such as Euros, or even private virtual currency, such as bitcoin, but we abstract from these because the holdings of these currencies by U.S. households are small and their liquidity is less than that of sovereign currency.

institutions, including demand deposits, other checkable deposits, and savings accounts. This measure is similar to the broad measure of money known as M2.[17]

- *Cash equivalents*—Short-term investments with a maturity of 3 months or less that can be converted into cash quickly, easily, and inexpensively (high liquidity and low risk). None of the surveys identify cash equivalents separately from similar investments of longer maturity. Examples include 3-month Treasury bills versus 1-year Treasury bonds and 3-month versus 6-month certificates of deposit.[18]

The assessment of U.S. surveys will focus on CCE for the statement of CF. For the TTMS and DCPC, however, the statement of CF will focus only on currency because Thai households transact primarily in currency (Thai baht) and the 2012 DCPC is a payment diary that does not track the entire balance sheet and has only one liquid asset (currency in U.S. dollars, which is a payment instrument).[19] Most U.S. surveys do not collect data on currency, which is a relatively small portion of liquidity for most U.S. households, and only the SCPC and DCPC do so comprehensively.

Once cash is defined, CF for that defined concept (CCE) can be calculated to account for the operating, investing, and financing activities of the firm (or household).[20] In particular, the statement of CF includes three main parts:

- *CF from production (or operating activities)*—These are net CF from operating activities of the firm (or household). The direct method shows cash inflows from operations and cash payments for expenses, by major classes of revenue and expense. Equivalently, the indirect method converts net income from an accrual basis to a cash basis, using changes in balance-sheet items.
- *CF from investing activities (consumption and investment)*—These are net CF from investing activities of the firm (or household). Cash outflows are primarily for investment in capital and for the purchase of securities that are not CCE. Cash inflows are the converse, including sales of capital and non-CCE securities. Individual items are listed in gross amounts (inflows minus outflows), by activity. As applied to the household, these are consumption expenditures (on nondurable goods and services) and capital expenditures (on durable goods).
- *CF from financing*—These are net CF from transactions considered to be the financing activity of the firm (or household). Cash inflows occur when resources are obtained from owners or investors, such as by issuance of equity or debt securities. Cash outflows are the converse, in the form of payment to owners and investors or to creditors. As with CF from investing, individual items are listed in gross amounts.

Another type of transaction sometimes associated with the statement of CF is direct exchange, which occurs when noncash (not CCE) assets or liabilities are traded without implications for cash. Often these exchanges are difficult to classify as either investing or financing activity because they may have elements of both. For that reason, accountants do not agree on whether to include direct exchanges in the statement of CF or to report them in a separate statement. For this paper, we do not include them in the statement of CF.

In theory, the statement of CF provides an exact linkage between flows in the income statement and changes in stocks on the balance sheet. To verify this, the statement of CF compares measured CF with the measured changes in assets and liabilities from the balance sheet. Total CF is simply the sum of component flows,

$$\mathrm{CF}_t = \mathrm{CF}_t^p + \mathrm{CF}_t^v + \mathrm{CF}_t^f,$$

17. Recent innovations in the U.S. payment system include nonbank financial companies that take deposits and make payments, such as PayPal and general purpose reloadable (GPR) prepaid cards, such as Green Dot, NetSpend, and Blue Bird. In some cases, these nonbank and/or nonfinancial companies act as an agent between banks and households and deposit the money they receive into bank accounts. However, tracking the actual location of these assets is difficult and is attempted only in the CPC due to its focus on payments. For most households, bank deposits are the main type of cash, but nonbank deposits are becoming more common for some households, especially unbanked and lower-income households.

18. Some CF statements focus on "current assets," which is CCE plus other assets that can reasonably be expected to be converted into cash (or cash equivalents) within about a year. Some current assets are primarily attributable to business activity, which is not in the scope of U.S. financial surveys or covered well by them and is therefore excluded. These assets include accounts receivable, inventories, marketable securities, prepaid expenses, and other liquid assets. In theory, these items apply to household finance, but it would require significant changes in the scope and methodology of the U.S. surveys to include them.

19. ST also included deposits at financial institutions and rotating savings and credit association (ROSCA) positions in their balance sheets. However, these assets are not used much as a medium of exchange by TTMS households and they change little over time, so they were excluded from the definition of "cash." Nevertheless, the ST statements of CF include adjustments for changes in these other liquid assets.

20. The material in this section draws heavily from Imdieke and Smith (1987).

where superscript p denotes production (operating activity), v denotes investing activity, and f denotes financing activity. If all financial-statement items are measured accurately and constructed comprehensively, this estimate from the statement of CF should exactly match the change in the stock of cash from the balance sheet,

$$\mathrm{CF}_t = \Delta A_t^C = A_t^C - A_{t-1}^C,$$

where A_t^C denotes the asset value (end-of-period t) of CCE (superscript C). If these CF identities were to hold exactly using data from a survey, then that survey would be fully dynamically integrated with financial statements. In practice, however, measurement of financial-statement items is neither exact (due to measurement error) nor comprehensive in actual surveys (due to failure to include all items), so we expect to observe errors in the CF identities above (i.e., we expect to see less-than-full dynamic integration). One logical measure of the degree to which survey estimates are integrated across time (dynamically) is

$$\mathrm{CF\,error} = 100 \times \left[\frac{\mathrm{CF}_t - \Delta A_t^C}{A_{t-1}^C}\right],$$

which is expressed as a percentage of lagged cash. Smaller CF errors (in absolute value) are interpreted as indicating better dynamic integration of a survey.[21]

This analytical linkage between CF (also on the income statement if the cash basis rather than the accrual basis is used) and the stock of cash (balance-sheet items) can be disaggregated into the linkages between individual liquid assets (stocks) in CCE and the gross flows among them. Henceforth, our language assumes the cash basis is used, but our analysis remains valid for the accrual basis, since the real difference between the cash and accrual bases is only the labeling of the transaction; for example, goods sold create an account receivable that is not necessarily cash and does not appear on the statement of CF if the latter does not recognize accounts receivable as CCE. Nevertheless, the sale would be recognized as creating an increase in an asset (an accounts receivable item).

21. This interpretation of the error is likely to be valid for a point in time, as in our analysis later in the paper. However, the error could be small in absolute value at any point in time by chance, so a better measure over time might be the average absolute error over time.

To see the point about disaggregation, let A_{kt}^C denote the end-of-period dollar value of a liquid asset in CCE from the balance sheet, where subscript k denotes the account/type of liquid asset (currency, demand deposits, and such) and subscript t denotes the discrete time period (such as month, quarter, or year). Liabilities, L_{kt}, are defined analogously and primarily represent various types of loans; in principle, liabilities can be viewed as negative-valued assets.[22]

Let D_{kdt} denote the dollar value of deposits into account k on day d (nearly continuous), and W_{kdt} the analogous withdrawals.[23] Gross CF in period t are the sums across all daily flows into and out of an asset type:

$$D_{kt} = \sum_{d=1}^{N_t^d} D_{kdt} \text{ and } W_{kt} = \sum_{d=1}^{N_t^d} W_{kdt}.$$

Asset deposits include primarily income of all types (including any capital gains and losses from holding CCE), transfers of another type of asset (or liability) into the account, or unilateral gifts received. Asset withdrawals include primarily payments for goods and services (consumption expenditures or capital goods investment), transfers to another type of asset, or unilateral gifts given. Again, liability flows are defined analogously.

Individual assets are governed by the following law of motion between periods $t-1$ and t:

$$A_{kt}^C = A_{k,t-1}^C + D_{kt} - W_{kt}$$

$$\Delta A_{kt}^C = D_{kt} - W_{kt}.$$

Individual liabilities are governed by an analogous law of motion where the liability "return" is primarily interest paid.

Finally, the disaggregated CF for each CCE type of asset include some that net to zero when aggregated across all account k accounts. For example, if a consumer withdraws \$100 in currency ($k=1$) from a checking account ($k=2$), then $D_{1dt} = W_{2dt}$. For this reason, it is informative

22. Assets and liabilities are owned by individual consumers, denoted by subscript i, who are members of a household, denoted by subscript h. Agent identifiers are suppressed for simplicity because the following discussion assumes aggregation occurs across all agents eventually.

23. The day-specific flows are net of intraday deposits and withdrawals, so this accounting could occur even more frequently (hourly or even by the minute) to obtain further insight into CF.

to track the flows among types of asset (and liability) accounts when analyzing the CF behavior of households. For some types of asset accounts, such as a checking account, withdrawals can be made with multiple payment instruments, such as checks, debit cards, and various electronic bank account payments. Thus, the gross flows between accounts can be further disaggregated by the type of payment instrument used to authorize the flow.[24]

IV. ASSESSMENT OF INTEGRATION IN U.S. HOUSEHOLD SURVEYS

This section evaluates the content and structure of the main U.S. household surveys, excluding the SCPC and DCPC, which are not designed to be general surveys of household finance, in relation to corporate financial statements. As noted earlier, no U.S. survey is fully integrated with financial statements in a manner consistent with the ST framework. However, all of the U.S. surveys contain questions that provide estimates of many of the relevant stocks and flows in financial statements. Therefore, the ST framework can be used to organize the survey data into estimates of a representative (average) U.S. household's financial statements: a balance sheet, income statement, and statement of CF. The remainder of this section presents those estimates for each survey and analyzes the results.

The tables in this section report estimates of U.S. financial statements from the surveys. Each statement contains nominal dollar-value estimates for the line-item elements from each survey, aggregated to the U.S. average per household, with the sampling weights provided by the survey programs.[25] Selected aggregate measures are supplemented with medians. The line items (rows) of each financial statement reflect our best effort to combine survey concepts into reasonably homogeneous measures.[26] Where necessary and feasible, some survey concepts fall into the "other" categories; tables are footnoted extensively to clarify these details. To the extent possible, all economic concepts from each survey are included in the statements. However, the question wording and concept definitions can vary significantly across surveys, so detailed estimates fall short of perfect harmonization. To ensure proper handling, we have provided our preliminary results and software programs to managers or principal investigators of each survey and offered them the opportunity to evaluate and correct our analysis.[27]

Juxtaposing estimates of the financial statements for each survey provides two benefits. First, and independently of the ST methodology, the financial statements provide valuable information about the relative magnitudes of real and financial economic conditions estimated by each survey. Differences between survey estimates can be large in absolute and relative terms because of the absence of perfect harmonization, as noted above. The aggregate estimates may also diverge due to significant differences in survey or sampling methodologies, described in Section II, or due to differences in the coverage of statement line items, described below. In any case, the comparison of estimates reveals the relative strengths and weaknesses of each survey in measuring household economic conditions.

Second, juxtaposing the estimates facilitates an easy and quantitative assessment of how well each survey's questions integrate with the elements of the household financial statements. The degree of integration can be evaluated by at least two standards: (1) the coverage of items in the statements; and (2) the dynamic interaction between stock and flow concepts. With regard to coverage, we can further quantify two types of coverage: (1) the percentage of detailed line items estimated by the survey; and (2) the aggregate dollar values of the estimates. As an example of the first of these coverage measures, suppose that a balance-sheet concept had ten detailed items and one survey estimated eight of them while another estimated only two of them. Then, the

24. This discussion and conceptualization apply even if a survey does not have disaggregated data. Some notion of cash is implicitly being used. That said, one can imagine how errors could arise, in particular, discrepancies between the income statement and balance sheet.

25. This conversion is necessary because of differences in the sampling units. For surveys that do not use households as the reporting unit, we sum across all reporting units to get the U.S. total and then divide by a common estimate of the number of households from the March Current Population Survey (CPS).

26. This classification naturally involves some discretion as to the grouping and especially the level of aggregation. The latter affects the quantitative measure of integration later, but can be made higher or lower for alternative analyses.

27. We again thank the staff members of each survey program who did so. This comparison is painstaking and difficult for one survey, much less several, and it is a challenge even for the survey managers. Thus, we view our results in this section as preliminary and welcome further development and improvement of the analysis. To this end, we are making underlying data and software programs available to the public, and we invite other researchers to refine and expand our analysis.

first survey has broader coverage (80% vs. 20%). However, line-item coverage is not necessarily an accurate indicator of value coverage. If a survey had two estimates of the ten balance-sheet items, and if each one were an estimate of the aggregate of five of the detailed items (e.g., short-term assets and long-term assets), then the survey might produce a very high percentage of the total value of assets even though it did not include an estimate of each of the ten items. Still, estimating the aggregate value of five items without estimating each individual item is prone to producing biased estimates due to the adverse effects of recall and reporting errors. The juxtaposed estimates reveal the extent to which this kind of aggregation effect appears in the survey estimates.

A. *Balance Sheets and Income Statements*

Balance sheets constructed from the U.S. surveys appear in Table 2 (A [assets] and B [liabilities]). The asset and liability estimates are reported as current market values to the best of our ability, although it is not always possible to be certain of the type of valuation reported by respondents. Assets are divided into financial and nonfinancial categories, with financial assets further divided into highly liquid current assets (short-term) and assets with other terms and liquidity (long-term). For financial assets, surveys usually obtain market values explicitly or by assumption; where they distinguish between *face* value and *market* value (e.g., for a U.S. government saving bond) the latter is reported. For nonfinancial assets, the valuation issue is almost the same, except the potential distinction is between market value and *book* value.[28] For housing assets, the surveys generally ask for the current (market) value of homes, but we cannot be sure they do not report the purchase price, which is a book value. For business assets, all surveys ask for a current (market) value, although the form of the question varies and may use analogous terms (e.g., "sale price"). Liabilities are the current outstanding balances for debt, not the original loan amounts. Liabilities are divided into categories of revolving debt, characterized by an indefinite option to roll over the liability, and nonrevolving debt. Because the maturity of debt is generally not known from the surveys and the term varies by debt contract within a category, the nonhousing debt categories are listed in rough order of liquidity from most to least liquid.

All the surveys report an estimate of total assets in Table 2A. The U.S. households own average assets worth as much as $632,246, according to the SCF, less half that amount, $226,314, in the CE survey. The HRS estimate of $556,295 is close to the SCF estimate, despite being limited to older consumers. The breakdown of asset types is similar for all the surveys. Financial assets generally account for less than half of asset values, 29%–41%, despite variation in the number and type of detailed asset categories. Tangible (physical) assets represent the majority of asset values. Within financial assets, cash accounts for roughly $30,000 for all but the SIPP, where it accounts for roughly $12,000, and most is held in bank accounts. Only the SCF contains an estimate of currency, but even that is not a direct estimate of actual currency holdings of the household.[29] Overall, estimates of balance-sheet assets are relatively comprehensive for all surveys, as shown by their similar aggregate values and by the breadth of coverage across detailed asset categories. The SCF is the most comprehensive, with asset estimates in every category except short-term assets other than bank accounts (checking and saving); the PSID, HRS, and SIPP are almost as comprehensive as the SCF. The CE is much less comprehensive and has considerably lower asset values.

All the surveys also report an estimate of total liabilities. The U.S. households have average liabilities ranging across the surveys between $61,979 and $112,306, much lower than the value of total assets and exhibiting less variation than across surveys. Housing debt is by far the largest portion of liabilities, ranging from $58,143 to $87,228 in all surveys where it is reported. The HRS asks specifically only about housing-related debt, with a catch-all question for other loans. The SIPP does not permit an exact estimate for

28. There are some tradeoffs between using book value and market value. For illiquid assets (of any type) that are rarely traded, market value is not readily available. Subjective assessments of value are prone to have measurement errors. In such cases, conservative accounting practices value the assets at historical cost. In contrast, mark-to-market requirements may be more appropriate when markets are thick and volatility is not excessive.

29. Respondents to the SCF report actual currency holdings only if they choose to do so in an optional response about other assets, and this category also includes "cash" that is not currency, like prepaid cards. The SCF estimate is very small relative to the amount reported by Greene, Schuh, and Stavins (2016) from the SCPC, which indicates average total cash holdings per consumer of $207 (excluding large holdings, which represent the top 2% but are not estimated precisely).

TABLE 2
U.S. Surveys: Balance Sheets: (A) Assets, Various Dates and (B) Liabilities, Various Dates

	PSID	**CES**	**SCF**	**HRS**	**SIPP**
(A) Assets	**422,616**	**226,314**	**632,246**	**556,295**	**351,702**
Median	151,000		170,600	240,000	67,113
Financial assets	**163,376**	**65,537**	**262,168**	**205,461**	**160,651**
(% of assets)	(39)	(29)	(41)	(37)	(46)
CURRENT ASSETS	**95,883**	**65,115**	**140,176**	**125,898**	**102,642**
Cash	29,850	30,849	30,354	34,733	12,434
Currency			12		
Government-backed currency			12		
Private virtual currency					
Bank accounts	29,850	30,849	30,342	34,733	536
Checking accounts		17,239	12,660		536
Savings accounts		13,610	17,682		
Other deposit accounts			0		11,898
Other current assets	66,033	34,266	109,822	91,165	90,208
Certificates of deposit			4,994	9,354	
Bonds		408	8,227	14,860	3,376
Mutual funds/hedge funds			40,964		18,830
Publicly traded equity	56,335	33,858	48,874	66,951	
Life insurance	9,698		6,763		68,002
LONG-TERM INVESTMENTS	**67,493**	**422**	**121,992**	**79,563**	**58,009**
Retirement accounts	67,493		97,007	79,563	54,759
Annuities			5,490		
Trusts/managed investment accounts			13,773		
Loans to people outside the household		422	5,722		361
Other important assets					2,889
Tangible (physical) assets	**259,240**	**160,777**	**362,445**	**336,951**	**191,051**
(% of assets)	(61)	(71)	(57)	(61)	(54)
Business	51,404		108,760	55,006	25,921
Housing assets	188,992	160,777	234,187	264,500	154,795
Primary residence	149,211	149,760	170,159	190,818	147,855
Other real estate	39,781	11,017	64,028	73,682	6,940
Vehicles	18,844		19,498	17,445	10,335
Unknown assets			**7,633**	**13,883**	
(%) of assets)			(1)	(2)	
(B) Liabilities	**82,288**	**73,668**	**112,306**	**64,614**	**61,979**
Median	18,800		23,000	5,600	3,750
Revolving debt	**2,671**	**4,512**	**2,185**		**2,661**
(% of liabilities)	(3)	(6)	(2)		(4)
Credit cards/charge cards	2,671	4,447	2,096		
Revolving store accounts		65	89		
Nonrevolving debt	**79,617**	**69,156**	**110,121**	**64,614**	**59,318**
(% of liabilities)	(97)	(94)	(98)	(100)	(96)
Housing	67,506	58,143	87,223	58,584	
Mortgages for primary residence	54,856	52,559	63,889	48,984	
Mortgages for investment real estate or second home	12,650	3,086	19,598	4,440	
HELOC/HEL		2,498	3,556		
Loans for improvement			180	5,160	
Loans on vehicles	4,310	3,926	4,508		3,707
Education loans	6,507		5,788		
Business loans			10,317		5,338
Investment loans (e.g., margin loans)			289		102
Unsecured personal loans					
Loans against pension plan			288		
Payday loans/pawn shops					
Other loans	1,294	7,087	1,708	6,030	50,171
Net worth (equity)	**340,328**	**152,646**	**519,940**	**491,681**	**289,723**
Cumulative net gifts received					
Cumulative savings					

Notes: Table entries are average dollar values for the survey's unit of observation, approximately a household. Assets and liabilities are stocks dated as of the time of the survey, generally the end of the year. Sampling weights provided by each survey were used in calculating the average values in accordance with the survey's data documentation. A more detailed data appendix (Appendix S1, Supporting Information) and the Stata programs used to construct the tables are available at http://dx.doi.org/10.7910/DVN/F7JB1K. HELOC/HEL, home equity line of credit / home equity loan.

Sources: PSID 2013, CE 2012, SCF 2013, HRS 2012, and SIPP 2011. See Section II for more details.

housing-related debt, but the "other loans" category most likely includes some housing-related debt. While estimates of balance-sheet liabilities are somewhat comprehensive for most surveys, they are not as comprehensive as the estimates of assets. The aggregate values vary less and there is less line-item coverage across detailed categories of liabilities. Once again, the SCF is the most comprehensive, with liability estimates in nearly every category. The PSID is almost as comprehensive as the SCF. The other surveys are less comprehensive, although in different ways. Given the estimates of total assets and total liabilities, household net worth ranges from $152,646 in the CE to $519,940 in the SCF.

Income statements constructed from the U.S. surveys appear in Table 3. Income is divided into two main categories: compensation of employees (the most common source of U.S. household income) and other income. The latter includes income from all types of businesses owned and operated by households. Expenditures also are divided into two main categories: production costs and taxes. As explained above, the production costs of households are expenditures associated with businesses operated directly by a U.S. household; these businesses include sole proprietorships, partnerships, and certain Limited Liability Corporations (LLC).[30] Unlike TTMS, where most households operate a business (typically agricultural), only a minority of U.S. households have a business.[31] For the minority of U.S. households with a business, it would be natural to apply corporate financial accounting to income (revenues) and expenses, as in ST. However, none of the surveys provide sufficient information about household business activity, so we use the simpler approximation of revenues as "income" to accommodate the majority of U.S. households without a business. Furthermore, all income-statement estimates are reported on a cash basis of accounting, so revenues and expenses are reported for the period when the cash is received (income) or paid out (expenditures), because this method is the primary way data are collected in the U.S. surveys.

30. For more information about these business structures and their tax implications, see https://www.irs.gov/businesses/small-businesses-self-employed/business-structures.

31. The number of sole proprietorships and partnerships was equal to about 24% of U.S. households in 2012, and about 6% of U.S. employment is self-employment as of 2016. The actual share of households with one of these businesses depends on the type of business and the composition of households, but we lack sufficient data to make exact calculations.

All of the surveys report an estimate of total income (revenues). The U.S. households received average total income of $61,431 to $83,863 per year. Estimates of labor income are even more similar across surveys, ranging only between $42,377 and $53,623, essentially all of which is wages and salaries. Estimates of other income types vary more, ranging between $9,816 and $37,402, but account for less than one-quarter of total income, except for the HRS estimates, which represent 45% of total income. Overall, income estimates are the most comprehensive and consistent portion of the household financial statements across surveys, most likely because employment compensation is widespread among U.S. households and the data are relatively easy to collect. Estimates of income other than employment compensation are less uniform across the surveys due to the unavailability of some detailed line-item categories.

Although three surveys (the PSID, CES, and SCF) have estimates of business income, none of them provide much information about household business expenditures. They ask few, if any, questions about household business activity (aside from the mere existence of a home business). No survey has an estimate of production costs for household businesses. Only three surveys with business income have estimates of taxes (these estimates average less than $5,000 per household), and only the CE reports employment taxes. Tax expenditures are those paid directly by households and do not include taxes deducted by employers or paid by third parties on behalf of households.

Given their estimates of total income and total expenditures, all of the surveys provide estimates of net income (income less expenditures), which range from $60,971 (CE) to $81,856 (SCF), as shown at the bottom of Table 3. The HRS does not collect expenses, so its net income equals total income. Net income is similar to income in the other surveys because expenditures are relatively small (taxes only). Household net income is treated as retained earnings that are distributed to household members for consumption and investment expenditures, which are recorded in the statement of CF (described below).

B. *Quantifying Integration by Coverage*

We wish to characterize the degree to which surveys are integrated with household financial statements in terms of coverage. We propose to develop the criteria for measuring this kind of

TABLE 3

U.S. Surveys: Income Statements, Various Dates

	PSID	CES	SCF	HRS	SIPP
Income	**67,187**	**65,316**	**83,863**	**79,779**	**61,431**
Median	44,500	46,774	45,000	46,300	45,396
Labor income	**53,623**	**51,543**	**53,192**	**42,377**	**48,767**
(% of total income)	(80)	(79)	(63)	(53)	(79)
Wages and salaries	53,473	51,543	53,192		
Professional practice or trade	113				
Other labor earnings	37				
Production income	**3,748**	**3,075**	**11,347**		**1,144**
(% of total income)	(6)	(5)	(14)		(2)
Business income (self-employment)	2,472	2,926	11,347		
Rent	1,276	149			1,144
Other income	**9,816**	**10,698**	**19,324**	**37,402**	**18,176**
(% of total income)	(15)	(16)	(23)	(47)	(30)
Interest, dividends, etc.	2,206	1,204	6,682	18,093	
Government transfer receipts	1,302	5,812	10,670	12,415	7,294
Other transfer receipts, from business	131			423	
Other transfer receipts, from persons		380	372		
All other income	6,177	3,302	1,600	6,471	10,882
Expenditures	**1,837**	**4,345**	**2,007**	**0**	**22,487**
Production costs					
(% of total expenditures)					
Depreciation					
Capital losses					
Business expenses					
Cost of labor provision					
Cost of other production activities					
Taxes	**1,837**	**4,345**	**2,007**		**2,798**
(% of total expenditures)	(100)	(100)	(100)		
Employment taxes		2,508			585
Other taxes	1,837	1,837	2,007		2,213
Net income	**65,350**	**60,971**	**81,856**	**79,779**	**38,944**

Notes: Table entries are average dollar values for the survey's unit of observation, approximately a household. Income and expenses are reported for the prior 12 months, or annualized where necessary. Sampling weights provided by each survey were used in calculating the average values in accordance with the survey's data documentation. A more detailed data appendix (Appendix S1) and the Stata programs used to construct the tables are available at http://dx.doi.org/10.7910/DVN/F7JB1K.

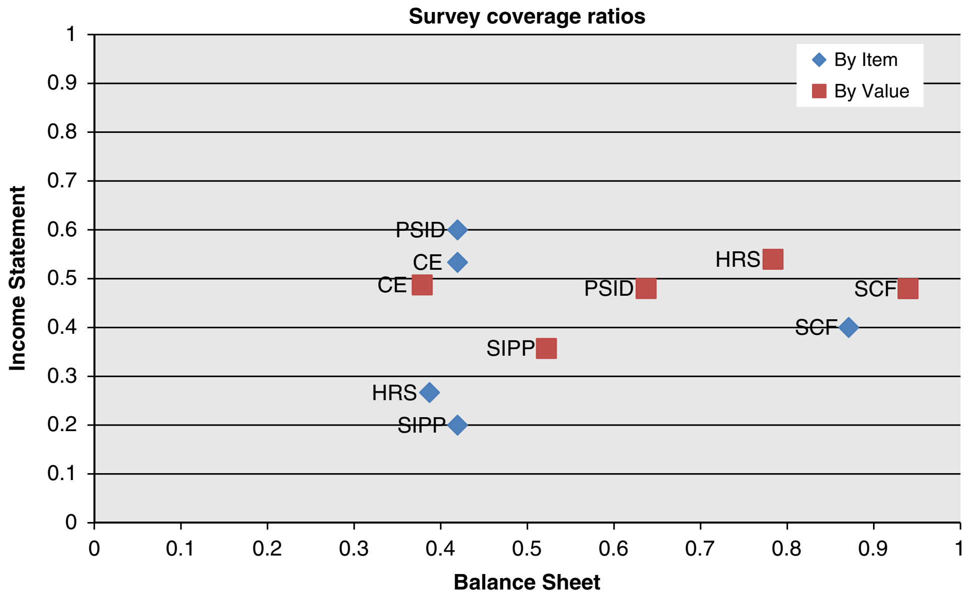
Sources: PSID 2013, CE 2012, SCF 2013, HRS 2012, and SIPP 2011. See Section II for more details.

integration by quantifying the extent to which a particular household financial survey covers (includes) the breadth of the line items in standard balance sheets and income statements. There are at least two dimensions along which integration by item coverage could be measured using the estimates from the preceding subsection. One is the fraction of detailed line items for which a survey provides estimates ("line-item coverage"). Another is the fraction of the total dollar value of all line items estimated by a survey ("value coverage"). The two measures are independent and not necessarily highly correlated. A survey could cover most items in the financial statements but underestimate them significantly; likewise, a survey might cover only a small number of items but obtain very high-value estimates if the items covered include mainly the highest-valued items. The latter situation may occur when a survey only collects data on two aggregate subcategories (such as short-term and long-term assets) but collects none on the detailed line items within each subcategory.

We construct the measure of line-item coverage as follows. We define the range of each financial statement as the number of the most detailed line items (rows) from the tables earlier in this section. Then, we count the number of line items (rows) for which each survey provides a dollar-value estimate. The coverage estimate of integration is the proportion of line items estimated relative to the total number of line items. We call this the "item-coverage ratio," and we construct two separate ratios, one for the balance sheet and one for the income statement. This measure reflects only the extensive margin of coverage because it does not account for the magnitude of the dollar values in each line item; thus, it may not give a complete reflection of coverage for total assets, liabilities, income, or expenditures.

FIGURE 3

Financial Statement Line-Item Coverage Ratios for U.S. Surveys



Source: Authors' calculations.

We construct the measure of value coverage analogously, as follows. We use the nominal dollar values for each individual line item in the statements to construct the aggregate total values (sum of all individual items) for each statement and divide the aggregate value by the best available per-household estimate of the relevant metric for the U.S. population. For the balance sheet, we use total assets and total liabilities from the Flow of Funds accounts as the denominator. For the income statement, we use personal income from the National Income and Product Accounts (NIPA). The "value-coverage ratio" represents survey coverage of the intensive margin of coverage. The difference between the two types of ratios reflects the extent to which a survey's coverage of financial statements is more integrated in its intensive or extensive coverage of financial statements. To the extent that one wishes to construct accurate estimates of aggregate U.S. household financial conditions, the dollar-value ratio may be more important.

Figure 3 provides scatter plots of the item-coverage ratio (diamonds) and value-coverage ratio (squares) for the balance sheet and income statement. The feasible range of both ratios is [0, 1], with the upper end indicating that a survey has estimates of every single item in the corresponding financial statement. Recall that the ratios are independent and may not be highly correlated. Thus, the item-coverage ratio does not necessarily reflect how well a survey produces aggregate estimates of the data, and the value-coverage ratio does not necessarily reflect how well a survey covers the number of line items in the financial statements. Also, we make one important adjustment to the income statement ratios to adjust for the application to households. As shown in the next subsection, household consumption and durable goods investment are listed in the statement of CF rather than the income statement. However, for the purpose of quantifying the overall coverage of household income and total household expenditures, both business-related expenditures and household consumption or investment expenditures, we include all types of expenditures in constructing the coverage ratios for the income statements.

None of the U.S. surveys are completely integrated (ratio of 1.0) with aggregate financial conditions for either statement, as can be seen from Figure 3. In fact, no survey has either type of coverage ratio that is greater than 0.6 for both financial statements. However, four of the five balance-sheet ratios are greater than 0.5 (except CE) and four of the five income-statement ratios are about 0.5 (except SIPP). The key differences across surveys occur in both types of coverage ratios for the balance sheets. The SCF has nearly complete value coverage of the balance sheet (above 0.9 by value) and the HRS has a value ratio about 0.8 (by value). Most surveys have item-coverage ratios of about half of the balance-sheet line items except the SCF, which covers the vast majority of line items. Variation across surveys is less in the item-coverage ratios for income statements.

C. Quantifying Integration by Dynamics

We also wish to characterize the degree to which surveys are integrated with household financial statements in terms of dynamics. Our proposed criterion for measuring this kind of integration is a quantification of the extent to which the estimated stock-flow identity holds in the survey estimates of household financial statements. The statement of CF is well suited to quantifying this measure of integration because it provides the linkage between the income statement (flows of income and expenditures) and *changes* in the balance sheet (stocks of assets and liabilities), assuming all stocks and flows are measured exactly and comprehensively. As explained in Section III, however, the CF error that arises in practice quantifies how well the balance sheet and income statement are integrated over time. CF errors represent consequences of incomplete item coverage of financial statements, as well as various forms of mismeasurement of the items in the financial statements.

Table 4 reports estimates of the statements of CF for each survey. Starting with net income (from the income statement), the estimated change in CF is the sum of three types of CF: from production, from consumption and investment, and from financing. To construct these statements, we have to estimate the elements of the CF from financing using estimated changes in the relevant assets and liabilities from the prior-period balance sheet. This methodology produces a CF estimate that is a residual difference between net income and net CF, rather than a direct measure of the gross CF in and out of the balance sheet, because the latter are not available from the U.S. surveys. For comparison, we estimate the change in cash holdings directly from the current and prior-period balance sheets.[32]

The degree of dynamic integration is defined as the difference (error) between the estimated CF variables and the change in cash holdings estimated from the current and prior period balance sheets, expressed in dollar terms and as a percentage of the lagged stock of cash. We call this the "internal" CF error because it is calculated using only the survey's estimates of stocks and flows. However, cash holdings from any particular survey may differ from the actual aggregate U.S. estimate of cash holdings (from the Flow of Funds), so these errors may not accurately represent the true degree of integration. Therefore, we also include the change in household cash holdings from the Flow of Funds (same for each survey) and construct errors in the survey CF estimates relative to the actual Flow of Funds cash to give a better measure of dynamic integration. We call this the "external" CF error.

As measured by their ability to track stock-flow identities in the statements of CF, the U.S. surveys exhibit relatively weak dynamic integration, and the degree of integration varies widely across surveys. The absolute value of the internal CF error ranges from \$6,290 (CE) to \$47,404 (SCF). Note that these errors are just one estimate in a time series of errors that could be estimated, and other errors might be smaller in absolute value during other periods. However, the sheer magnitude of these internal errors suggests significant gaps in tracking household financial conditions over time, even within the self-contained estimates of a particular survey.[33] The CF errors are reported in percentage terms relative to the two benchmarks: (1) the lagged cash stock from the survey's balance sheet (internal error); and (2) the lagged cash stock from the Flow of Funds aggregate benchmark data (external error). The internal errors are relatively large, ranging from about 13% to 37% of lagged cash (CE and SCF, respectively). The survey estimates of CF are generally less than the external benchmark: all but one of the external CF errors are even larger

32. The duration of the preceding period varies according to the frequency of the surveys, from one quarter (CE) to 3 years (SCF).

33. In principle, it would be interesting to compare the coverage ratios with the CF errors to quantify the relationship between them. However, with only one point-in-time estimate of coverage and dynamic integration for a handful of surveys, such an analysis would be premature. With more data on CF errors over time, it might be feasible to conduct such an analysis.

TABLE 4
U.S. Surveys: Statements of CF

(Cash Defined as Current Assets)	PSID 2010–2012	CES 2011–2012	SCF 2010–2013	HRS 2010–2012	SIPP 2010–2011
Net income (+)	65,350	60,971	81,856	79,779	38,944
Adjustments:					
Depreciation (+)	0	0	0	0	0
Change in account receivables (−)	0	0	0	0	0
Change in account payables (+)	0	0	0	0	0
Change in inventory (−)	0	0	0	0	0
Change in other (not cash) current assets (−)	0	0	0	0	0
Consumption of household produced outputs (−)	0	0	0	0	0
CF from production	**65,350**	**60,971**	**81,856**	**79,779**	**38,944**
Consumption expenditure (−)	−43,766	−44,849	−28,850	−45,073	−22,487
Capital (durable goods) expenditure (−)	0	0	0	0	0
CF from consumption and investment	**−43,766**	**−44,849**	**−28,850**	**−45,073**	**−22,487**
Transfers to/from long-term investments	−362	0	1,231	0	0
Leading (−)	0	−151	1,359	50	4,452
Borrowing (+)	4,230	8,089	−4,349	−3,757	−8,988
Net gifts received (+)	0	0	0	0	0
CF from financing	**3,868**	**7,938**	**−1,759**	**−3,707**	**−4,536**
Change in cash holding (from statement of CF)	25,452	24,060	51,247	31,000	11,921
Change in cash holding (from statement of balance sheet)	3,091	17,770	3,843	1,678	−18,622
CF error	**22,362**	**6,290**	**47,404**	**29,322**	**30,543**
Internal error (%)	**25**	**13**	**37**	**24**	**25**
External error (%)	**30**	**8**	**61**	**39**	**42**

Notes: Table entries are average dollar values for the survey's unit of observation, approximately a household. CF are at a yearly rate and are constructed with the most recent prior data available. Sampling weights provided by each survey were used in calculating the average values. A more detailed data appendix (Appendix S1) and the Stata programs used to construct the tables are available at http://dx.doi.org/10.7910/DVN/F7JB1K.

Sources: PSID 2010–2013, CE 2011–2012, SCF 2010–2013, HRS 2010–2012, and SIPP 2010–2011. See Section II for more details.

in absolute value, ranging from about 8% to 61% of lagged cash.

V. THE TTMS AND DCPC

Moving beyond the U.S. household surveys, we now focus on two other surveys that offer improved integration with financial statements and reflect better measurement of certain aspects of household economic conditions. The TTMS and DCPC are quite different in most regards. The TTMS is a comprehensive survey of household economic conditions, including home businesses; it is administered to Thai households, which are relatively low-income, less-developed, and located in rural geographic regions. In contrast, the DCPC is a relatively narrow consumer survey that is administered to U.S. consumers and is focused on payment choices. Nevertheless, the TTMS and DCPC both embody certain elements of improved integration with financial statements. The TTMS is heavily focused on the most basic and liquid M1 portions of "cash" (or current assets). The DCPC includes currency and is unique in this respect among the U.S. surveys that we analyze here. The DCPC also features other means of payment, for example, payments that use deposit accounts, although it does not track the level of these deposits.

This section compares and contrasts the TTMS and DCPC surveys. First, we present estimated balance sheets and income statements for each survey and discuss their degrees of integration by item coverage. Next, for each survey, we describe the methodology for measuring CF. Finally, we assess its degree of integration by dynamics, emphasizing its relatively high integration compared with the U.S. surveys. For this section, we combine survey responses from the DCPC with responses from the SCPC because both surveys are needed to estimate the financial statements as thoroughly as possible. For simplicity, we refer to the combined DCPC and SCPC estimates as "CPC."

A. *Balance Sheets and Income Statements*

Balance sheets and income statements constructed from the TTMS and CPC surveys appear in Tables 5 and 6, respectively. These statements are designed and organized similarly to the analogous statements from the U.S. surveys, with a

TABLE 5

TTMS and SCPC/DCPC: Balance Sheets, October 2012

	TTMS	DCPC/ SCPC		TTMS	DCPC/ SCPC
Assets	**89,082**	**301,425**	**Liabilities**	**5,317**	**120,689**
Median		146,053	Median		42,935
Financial assets	**35,553**	**836**	**Revolving debt**		**5,306**
(% of assets)	(40)	(0)	(% of liabilities)		(4)
CURRENT ASSETS	**35,321**	**836**	Credit cards/charge cards		5,306
Cash	35,332	836	Revolving store accounts		
Currency	30,874	836	**Nonrevolving debt**	**5,317**	**115,383**
Government-backed currency	30,874	836	(% of liabilities)		(96)
Bank accounts	4,458		Housing		67,278
Other current assets	−11		Mortgages for primary residence		67,278
Certificates of deposit			Mortgages for investment real estate		
Net ROSCA position	−11		HELOC/HEL		
Accounts receivable	0		Loans for improvement		
Bonds			Accounts payable	1,480	
Mutual funds/hedge funds			Loans on vehicles		
Publicly traded equity			Education loans		
Life insurance			Business loans		
LONG-TERM INVESTMENTS	**232**		Investment loans (e.g., margin loans)		
Retirement accounts			Unsecured personal loans		
Annuities			Loans against pension plan		
Trusts/managed investment accounts			Payday loans/pawn shops		
Other lending	232		Other loans	3,837	48,105
Tangible (physical) assets	**53,529**	**148,421**			
(% of assets)	(60)	(49)	**Net worth (equity)**	**83,765**	**180,736**
Business assets	334		Cumulative net gifts received		
Agricultural assets	1,243		Cumulative savings	56,779	
Housing/household assets	4,582	148,421			
Primary residence		148,421			
Inventories	8,394				
Livestock	290				
Other nonfinancial assets	38,687				
Unknown assets		**152,168**			
(% of assets)		(50)			

Notes: Thai baht converted to U.S. dollars at a rate of 30.68 baht per dollar. Values are stocks as of the time of the survey, which for the CPC is between the beginning of September and the end of October. TTMS entries are at the household level. CPC entries are either at the household level or converted to a household level by multiplying consumer values by 2.045. A more detailed appendix (Appendix S1) and the Stata programs used to construct the tables are available at http://dx.doi.org/10.7910/DVN/F7JB1K. HELOC/HEL, home equity line of credit / home equity loan.

Sources: TTMS and SCPC.

few exceptions. In these tables, the TTMS and CPC data represent exactly the same time period (October 2012), and the TTMS estimates have been converted to U.S. dollars using the Thai baht exchange rate for October 2012. Unlike the U.S. survey entries, the entries are not annualized because both the TTMS and the DCPC are designed to be monthly surveys.

In general, the TTMS and CPC financial statements are not really comparable due to the relative magnitudes of their respective economies. The average asset value (Table 5) for TTMS households includes several types of business assets, and is $89,082, and the average asset value for CPC households is $301,425; this measure does not include any business assets. This difference is magnified by the fact that the CPC estimate is well below the highest estimate in the U.S. surveys (Table 2A) because it does not include any current assets beyond currency and approximates tangible assets only roughly. The average liability value is only $5,317 for TTMS households but, at $120,689, is more than 20 times larger for the CPC because there are relatively few borrowing options for Thai households. The disparity between the Thai and U.S. economies is even more evident from the income statements, shown in Table 6, where the average CPC household income is roughly three and one-half times larger than the average TTMS household income ($5,921 vs. $1,643), and nearly five times larger net of expenditures ($4,081 vs. $830).

One similarity between the TTMS and CPC financial statements is the predominance of currency among current asset holdings. The average TTMS household is estimated to have $30,874 in currency and less than $5,000 in other current assets (mostly bank accounts). The average CPC household has $836 in currency, which is the only type of current asset data collected. Although currency holdings are much lower in U.S. households than in Thai households, the other U.S. surveys (except the SIPP) estimate bank account

TABLE 6
TTMS and SCPC/DCPC: Income Statements, October 2012

	TTMS	SCPC/DCPC		TTMS	SCPC/DCPC
Income	**1,643**	**5,921**	**Expenditures**	**813**	**1,840**
Median		4,413	**Production costs**	**813**	
Censored income		4,789	(% of total expenditures)	(100)	
Labor income	**252**		Business	251	
(% of total income)	(15)		Agricultural activities	529	
Production income	**1,368**		Cultivation	133	
(% of total income)	(83)		Livestock	292	
Business	326		Capital losses	1	
Agricultural activities	1,042		Depreciation	12	
Cultivation	536		Other expenses	280	
Livestock	392		Fish and shrimp	104	
Produce	390		Labor provision	32	
Capital gains	2		Other production activities	1	
Fish and shrimp	114		**Taxes**		**1,840**
Other income	**23**		(% of total expenditures)		(100)
(% of total income)	(1)				
			Net income	830	4,081

Notes: Thai baht converted to U.S. dollars at a rate of 30.68 baht per dollar. Values are stocks as of the time of the survey, which for the CPC is between the beginning of September and the end of October. TTMS entries are at the household level. CPC entries are either at the household level or converted to a household level by multiplying consumer values by 2.045. CPC household income is originally reported in buckets; precise estimates are imputed with the help of SCF data. A more detailed appendix (Appendix S1) and the Stata programs used to construct the tables are available at http://dx.doi.org/10.7910/DVN/F7JB1K.

Sources: TTMS, DCPC, and SCPC.

holdings of about the same magnitude as Thai cash holdings, which are roughly $30,000, as shown in Table 2A. The improved 2015–2016 CPC also contains bank account balances (see below). The accuracy of the data on currency holding in Thai households could be improved, and we come back to this later.

In addition to differences in their respective economies, the TTMS and CPC survey instruments are sufficiently different to inhibit meaningful comparisons. The TTMS aims to collect data on all aspects of Thai household economic behavior, an aim that produces extensive estimates of the line items in the financial statements despite lower economic development. In contrast, the CPC strives to measure payments activity comprehensively and does not aim to cover financial-statement line items widely. For these reasons, comparisons of line-item coverage ratios between these surveys are not meaningful, nor are comparisons with the U.S. surveys.

B. Measuring Cash (Currency) Flows

TTMS Survey Instruments. ST apply this household financial accounting framework to households in the TTMS and create the accounts from a baseline 1998 comprehensive survey and then month-by-month interviews, currently up to month 205 and counting: that is, they have 17 years of monthly data. There was an initial enumeration of all structures and all households living in a village (or in an urban neighborhood), a census including who is eating and sleeping in what structure, and a description of family relationships across the individuals in these structures. The initial survey was an extensive baseline, measuring not only initial assets and liabilities, but also contracts and relationships, for example, borrowing and labor arrangements. There are month-by-month follow-up interviews with separate modules for assets and liabilities and for revenues and expenses of various production activities. Every transaction is measured in principle, subject to recall, for example, recall of purchases, sales, gifts, and labor supply. A key to implementing this large survey is the creation of rosters, lists of individuals in the household, debts not yet repaid, plots of land under cultivation, and so on, so that enumerators know which questions to ask.

The TTMS asks households for every transaction, such as a purchase, whether it was done in cash (currency), in kind, or as a gift. Again, the period of recall in the survey is the previous month (more exactly, the time since the last interview, which is roughly 30 days). Interviewers do not observe or ask about initial levels of cash holding, but they do try to measure these flows by assuming that the initial cash holding at the beginning of the survey was high enough so that households never run out of cash; that is, cash levels can go to zero but are never negative. Cash holding does hit the zero bound when households purchase a durable or investment good with cash, which is reassuring.

In contrast with this finding, ST infer that on average households hold relatively large cash positions. This leads to two related concerns. First, consumption expenditures in cash may be underestimated. In this case, double-entry bookkeeping hits with a vengeance in the sense that there could be two errors: an underestimate of cash consumption and an overestimate of cash on the balance sheet. Second, households may choose to underreport deposits into and withdrawals from savings accounts, although they typically do confirm many transactions, large and small. In this case, two items on the balance sheet, although offsetting, may be mismeasured.

In addition, because currency is not only a means of payment but also a store of value, it constitutes a relatively large portion of a household's wealth, on average. Therefore, households are understandably reluctant to report to enumerators how much currency they are holding. A second problem is the frequency of interviews, hence 30-day periods of recall. One potential remedy would have been to have households keep diaries of daily transactions for the entire month, or to use intensive diaries for shorter time intervals per respondent (as the DCPC does) to obtain a measure of aggregate activity. Initial attempts to implement a diary in real time at the request of the households themselves show great promise in dealing with this second problem. We may not know the initial balance (still hidden), but the changes in balances due to better-measured monthly transactions are more accurate. This is a step toward the degree of accuracy of the CPC surveys described below.

At the time of the conception and initiation of the TTMS in 1997, the use of payment devices other than cash was rare in these rural areas. Over time, there has been an increase in card dissemination and small levels of use. The TTMS was modified to incorporate cards into the survey, but measurement has been difficult due to many complex issues, including question design, accounting methods, tracking card payments, reconciling end-of-month statements, separating interest from principal, rolling over debt, and so on. The remainder of the paper describes the Boston Fed's DCPC, an approach that might have improved the TTMS, and then shows how the integrated financial accounts can be extended with the DCPC data to include multiple means of payment.

CPC Survey Instruments. The 2012 SCPC and 2012 DCPC are related but independent instruments that were implemented around October 2012 with a common sample of respondents from the RAND Corporation's American Life Panel (ALP). The SCPC is an approximately 30-minute online questionnaire that collects data on consumer adoption and use of bank accounts and payment instruments. The DCPC is a 3-day mixed-mode survey with daily recording of payments in a paper memory aid (or other form) plus three daily online questionnaires to input memory-aid data plus answer additional questions based on recall within the day. In 2012, most respondents took the SCPC before their randomly assigned 3-day period during October, but some respondents completed the SCPC after the DCPC. The order did not affect survey responses because the instruments are independent.

Cash holdings (stock) data are collected by the SCPC and DCPC, which are related but distinctly different types of survey instruments, as described in Section II. The SCPC obtains estimates of cash held by respondents on their person ("pocket, purse, or wallet") or on their property (home, car, or elsewhere).[34] The 2012 DCPC obtained estimates of currency (no coins) held by respondents on their person on each of the four nights of the diary, asking the respondent to report amounts by denomination of the bills ($1, $2, $5, $10, $20, $50, and $100) and in total (summed for them in the online questionnaire).[35] In October 2012, U.S. holdings of currency on person were on average $56 per person with a median value of $22.

CF—deposits and withdrawals (payments)—are collected by the SCPC and

34. Measuring cash in "pocket, purse, or wallet" is an approximate method of identifying actual "transactions balances" of cash. Although it does not ask the respondent for these balances directly, it is a relatively objective and easy method of collecting these data. An alternative approach is to ask for "transactions balances" directly, as in the Survey of Household Income and Wealth in Italy (http://www.eui.eu/Research/Library/ResearchGuides/Economics/Statistics/DataPortal/SHIW.aspx). The SCPC also estimates U.S. consumer holdings of cash balances "on their property" (house, car, etc.), and some of this cash may be intended (eventually) for use in transactions as well. However, it is unclear whether respondents have an appropriate understanding of transactions balances or provide accurate estimates of them.

35. See Fulford, Greene, and Murdock (2015) for an analysis of $1 bills and Greene and Schuh (2014) for an analysis of $100 bills.

DCPC as well. With regard to cash withdrawals made for expenditures (payments), the SCPC obtains estimates of the number of cash payments "in a typical period [week, month, year]," whereas the DCPC more precisely obtains estimates of the number and value of each cash payment (expenditure) made during a 3-day period. Both the SCPC and the DCPC collect data on the number and value of cash withdrawals from bank accounts and other sources. However, because cash withdrawals are relatively rare for most consumers, the DCPC does not obtain estimates that are as comprehensive for individual consumers as does the SCPC, which asks for "typical" currency withdrawals during a longer time period than 3 days. Only the DCPC tracks currency deposits to bank accounts and other sources plus other unusual currency activity (conversion of currency to/from other assets, exchanging coins for bills, and such).

Two additional differences between the SCPC and DCPC have important implications for their cash data. First, while both surveys ask respondents to record their cash holdings at the time of the survey, the SCPC allows respondents to estimate their holdings, while the DCPC requires respondents to count their cash on person (bills only, no coins) by reporting the number of bills of each denomination, and the online DCPC questionnaire assists respondents in summing the value of their cash holdings. As a result, the SCPC cash holdings data exhibit more rounding (to the nearest \$5, \$10, or \$20) and approximation than the DCPC data. Second, the SCPC collects data on cash payments based on respondents' recall of their typical behavior, while the DCPC collects data that respondents record in essentially real time at the point of payment. Recall-based estimates of payments are likely to be inferior to recorded estimates due to potential errors from memory loss and time aggregation. For more information about the DCPC and its advantages in measuring consumer expenditures, see Schuh (forthcoming).

Measurement by Recall Versus Recording. By way of summarizing the material in this paper so far, we describe the main advantage of TTMS over the U.S. surveys and the innovation in the DCPC relative to the TTMS. The main advantage of TTMS is that it aims to achieve complete integration with household financial statements by line-item coverage and by stock-flow dynamics. To see this point, consider the following illustrative system of equations that reflects the subset of TTMS financial-statement estimates for the CF dynamics of M1 liquid assets:

$$\widetilde{\Delta A_{1t}} = \widehat{D_{1t}} - \widehat{W_{1t}} + \eta_{1t}$$

$$\widetilde{\Delta A_{2t}} = \widehat{D_{2t}} - \widehat{W_{2t}} + \eta_{2t}$$

$$\widetilde{A_t} = \widetilde{A_{1t}} + \widetilde{A_{2t}},$$

where the two assets, $k = \{1, 2\}$, are currency (1) and demand deposits (2) and η denotes a composite measurement error. An overhead circumflex ("hat") denotes a variable that is estimated directly by the survey (TTMS). The exception is that the TTMS does not directly collect cash holdings *every* period, unlike the DCPC. Instead, the TTMS makes an estimate of the initial stocks, $(\widehat{A_{1,0}}, \widehat{A_{2,0}})$, and then uses these stock-flow identities to impute the estimates of cash stocks in subsequent periods, denoted by an overhead tilde (~). In the imputation procedure, the TTMS enforces the constraints imposed by the principles of integration, such as $\widetilde{A_{kt}} \geq 0$, and makes judgmental adjustments where necessary.

Conceptually, the TTMS is fully integrated. It achieves complete integration by line-item coverage because it estimates all items of the balance sheet (A_{1t}, A_{2t}) and CF statement $(D_{1t}, D_{2t}, W_{1t}, W_{2t})$. As a result, the TTMS would also achieve complete integration by dynamics, provided it covered 100% of the dollar values of the items; in this case, the stock-flow dynamics would hold without error. However, it is essentially impossible for a survey to reach complete value coverage, due to sampling errors, among other challenges. For this reason, the TTMS imputes the periodic stock of currency using a judgmental estimate of the starting value of currency holdings for each household and adjusts it periodically if the stock-flow law of motion produces an invalid level estimate. Of course, the TTMS cannot claim to achieve full integration by dynamics or by item coverage in terms of dollar value, as TTMS estimates likely have measurement errors, as all surveys do. Nevertheless, the TTMS is generally much more integrated than the U.S. surveys analyzed earlier, which have much less than full integration by coverage (item or value) and relatively large errors in CF dynamics. The links between the income statement and the balance sheet were not incorporated into these U.S. surveys.

In particular, one type of measurement error likely occurring in the TTMS CF estimates arises from recall-based low-frequency (monthly) estimates of CF. As noted, recall errors may occur from memory loss due to time aggregation over the days of the month or over the number of cash deposits and withdrawals (payments). To see this, note that monthly currency withdrawals,

$$W_{1t} = \sum_{d=1}^{D_t} \sum_{k=1}^{K_t} W_{1kdt},$$

are the sum over all opportunities and days, where $28 \le D_t \le 31$ and $K_t \ge 0$. Like most U.S. surveys, the TTMS obtains an aggregate recall-based estimate of monthly cash withdrawals, $\widehat{W_{1t}}$, from deposits to currency, without measuring each individual cash withdrawal, W_{1kdt}. The same measurement issue holds for currency deposits, which are less frequent and thus may be measured with less error.

By comparison, daily payment diaries like the DCPC represent an innovation in the measurement of stock-flow dynamics by recording high-frequency (daily) CF. For example, the DCPC obtains an estimate of each individual cash withdrawal, $\widehat{W_{1kdt}}$, by type, so the DCPC estimate of aggregate monthly cash withdrawals is the sum of individual withdrawals estimates,

$$\overline{W}_{1t} = \sum_{d=1}^{D_t} \sum_{k=1}^{K_t} \widehat{W_{1kdt}},$$

denoted by an overhead line. Therefore, if high-frequency (daily) recorded estimates of CF are more accurate than low-frequency (monthly) recall-based estimates, then we expect that

$$\left|\overline{W_{1t}} - W_{1t}^{*}\right| < \left|\widehat{W_{1t}} - W_{1t}^{*}\right|,$$

at least on average, if not period-by-period as well. Consequently, the DCPC estimates of the stock-flow law of motion for currency,

$$\Delta A_{1t} = \overline{D_{1t}} - \overline{W_{1t}} + \mu_{1t},$$

are likely to be a better measure than those from the TTMS for the reasons enumerated above: (1) DCPC estimates of monthly currency flows are sums of individual opportunity-day flows; and (2) DCPC estimates of currency holdings are obtained each period, not derived from an initial condition (estimate) using the estimated flows. In this sense, the DCPC estimates improve the integration of surveys with financial statements and offer the opportunity for enhanced analysis of household behavior, as demonstrated below.

C. Statements of CF

The statements of CF constructed from the TTMS and CPC surveys appear in Table 7. In most respects, these CF statements are designed analogously to the statements of CF from the U.S. surveys (Table 4), and the elements are defined similarly to those in the balance sheets and income statements for TTMS and SCPC/DCPC (Tables 5 and 6). One exception is that the TTMS and DCPC represent CF and balance-sheet changes for one exact month (October 2012) rather than annual (or lower-frequency) flows. Also, bear in mind that the TTMS CF from financing equal the actual changes in the balance-sheet stocks. Therefore, the estimated change in currency from the CF statement equals the change from the balance sheet by definition; hence, the CF error is exactly zero because the stock-flow principle of motion is an identity, a significant step forward. Thus, the TTMS appears fully integrated by dynamics, but this integration is "artificially" high because it is derived rather than estimated directly.

CF in Thai and U.S. households differ in both magnitude and type. Net income is naturally much larger, \$5,767 versus \$729, in U.S. households. Adjustments to net income for accrual-based income in the statements of CF are modest for Thai households that have business income (a total increase of \$130), and not measured for U.S. households (\$0), so the difference in CF from production are still large, \$5,767 versus \$859. However, CF for consumption and investment by U.S. households are very large, estimated at \$6,767, relative to net income but much smaller relative to income, estimated at \$327, for Thai households. Similarly, U.S. CF from financing are larger, \$259 versus \$13, and more diverse, notably with respect to credit cards (which were not included in the 2012 TTMS). The estimated changes in currency from CF are roughly similar, \$−741 versus \$544, despite larger differences in net income and other flows. Finally, the CF error analysis is not relevant or comparable. The TTMS error is zero (\$0) by definition because the balance-sheet changes are restricted to equal the CF. In contrast, the DCPC error is a legitimate derivation from estimates of all components of the stock-flow relationship. However, the error, \$905, is relatively large, 135% of lagged currency, because the DCPC was not designed or implemented in a way that would ensure full dynamic integration. Instead, the DCPC calculations illustrate the potential advantage of a payment diary in tracking the gross flows of

TABLE 7
TTMS and DCPC: Statements of CF, October 2012

(Cash Defined as Currency)	TTMS	DCPC
Net income (annual basis) (+)	8,750	69,207
Net income (monthly basis) (+)	729	5,767
Adjustments:		
Depreciation (+)	94	0
Change in account receivables (−)	−37	0
Change in account payables (+)	0	0
Change in inventory (−)	80	0
Consumption of household produced outputs (−)	−6	0
Net capital gains (+)	−1	
CF from production	**859**	**5,767**
Consumption expenditure (−)	−245	−6,767
Capital (durable goods) expenditure (−)	−77	0
CF from consumption and investment	**−327**	***−6,767***
Change in demand deposits (−)	−67	*−421*
Change in NFDA deposits (−)	NA	*59*
Change in foreign currency (−)	NA	*−2*
Change in credit card balance (−)	NA	*1,292*
Change in long-term assets (−)	76	*−669*
Change in other debts (−)	4	NA
CF from financing	**13**	***259***
Change in currency balance (from statement of CF)	*544*	*−741*
Change in currency balance (from statement of balance sheet)	*544*	*164*
CF error	**0**	***905***
Internal error	**NA**	***135%***

Notes: Thai baht converted to U.S. dollars at a rate of 30.68 baht per dollar. Values are stocks as of the time of the survey, which for the CPC is between the beginning of September and the end of October. TTMS entries are at the household level. CPC entries are either at the household level or converted to a household level by multiplying consumer values by 2.045. CPC household income is originally reported in buckets; precise estimates are imputed with the help of SCF data. A more detailed appendix (Appendix S1) and the Stata programs used to construct the tables are available at http://dx.doi.org/10.7910/DVN/F7JB1K.

Sources: TTMS, DCPC, and SCPC.

currency and the stock-flow dynamics in financial statements.

VI. AN INNOVATION TOWARD BETTER INTEGRATION

This section introduces an innovation to CF accounting that demonstrates a second advantage of the DCPC for moving another step toward complete ST integration of surveys and financial statements. The previous section explained how payment diaries like the DCPC produce better estimates of CF and stocks than monthly surveys do. In addition, payment diaries can produce estimates of CF that directly link individual asset and liability accounts to CF via the payment instrument, rather than just linking aggregate categories of assets and liabilities to aggregate categories of CF. The remainder of this section describes the linkage between the balance sheet and payment instruments and then presents a new analysis of CF by account, before concluding with a preview of further innovations in the 2015 DCPC.

A. Payment Instruments and Balance-Sheet Accounts

Table 8 depicts the linkage between payment instruments and their associated balance-sheet accounts: assets and liabilities. Payments are funded (settled) by one of two broad types of accounts: money (asset) and credit (liability). Money includes transactions balances, or M1 (currency plus checking accounts), plus certain non-transaction balances, which are part of M2. The latter are savings, but in some cases can support a limited number of payments directly from or to the account (account-to-account, or A2A, transfers). Payments funded by money are usually settled instantly (with cash) or with delays of at most a couple days. Alternatively, credit accounts fund payments that are settled much later; nonrevolving credit accounts (charge cards) require consumers to repay their debt during a certain period (typically a month), while revolving credit accounts (credit cards) offer consumers the option of rolling over some of the debt (up to a credit limit) to the future indefinitely in exchange for incurring interest charges. Monetary assets

TABLE 8
Payment Instruments and their Balance Sheet Accounts

Balance Sheet Accounts	Payment Instruments
Assets (money)	
Currency	U.S. currency, foreign currency, private currency (e.g., Bitcoin)
Traveler's check	Traveler's check
Checking accounts owned by consumers (demand and other checkable deposits)	Checks (personal or certified), debit card, OBBP, BANP
Checking accounts owned or managed by financial institutions or nonfinancial payment service providers (but may have pass-through deposit insurance for consumers)	Cashier's check, prepaid card, money order
Savings accounts owned by consumers ("nontransactions" accounts in the non-M1 part of M2 with direct payment capability)	Checks, debit card, OBBP, BANP
Liabilities (credit)	
Revolving credit	Credit card
Nonrevolving credit	Charge card, text/SMS

OBBP, online banking bill payments; BANP, bank account number payments; SMS, short message service.
Source: Authors' analysis and Greene, Schuh, and Stavins (2016).

and unused credit limits are the liquidity that fund payments that are tracked by instrument in the DCPC.[36]

The linkage between payment instruments and balance-sheet accounts merits additional discussion before moving ahead. Table 8 reveals that in U.S. household balance sheets the linkage is not one-to-one, due to the proliferation of accounts and payment instruments in the U.S. monetary and payment system. This linkage complexity is most evident in the variety of instruments that can access various types of deposit accounts (including saving accounts in M2). In particular, debit cards, various types of checks, and electronic banking methods (OBBP and BANP) all can be used to authorize payment or transfer from different types of accounts. In addition, the linkages depicted in Table 8 reflect aggregation of individual accounts within a type of account that the overall pattern does not reveal. For example, the 2012 SCPC indicates that 38% of U.S. consumers have more than one demand deposit (checking) account (DDA), and 57% of consumers with multiple DDAs have multiple debit cards, typically one (per account holder) for each DDA. Consequently, the linkages between accounts and instruments can be disaggregated further to match specific accounts and instruments within the categories of Table 8. For example, a consumer (or household) may own two DDAs with a debit card for each; thus, it would be necessary to link DDA #1 to debit card #1, and similarly for the other account and card. The 2012 DCPC accurately measures the linkages between types of accounts and types of instruments (such as DDAs and debit cards), but it does not measure the linkages between specific individual accounts and specific individual instruments.

B. CF by Account

Given the linkage between accounts and instruments, the DCPC can also link balance-sheet accounts (or types of cash stocks) to household expenditures on consumer nondurable goods and services (or types of withdrawal flows).[37] Theoretically, a payment diary could link balance-sheet accounts for household capital goods to payments for investment in durable goods, but the 2012 DCPC did not track these concepts. In any case, the payment instrument plays the pivotal role because, for each payment, it directly links the balance sheet—that is, the asset or liability funding the payment—to consumer expenditures broadly defined (more broadly than narrow consumption) for *each* payment transaction.

36. Note that deposits into an asset account are similar to reductions in loan accounts, although one is an asset and the other a liability. Likewise, withdrawals from an asset account are similar to increases in loan accounts. But there is a substantive difference in that asset accounts require deposits before being used, whereas liability accounts can be unfunded initially and repaid later.

37. If designed properly, a payments diary also could link balance-sheet accounts to the expenditures of household businesses, but we omit these from the discussion because the DCPC instructed respondents to exclude household business payments.

TABLE 9
DCPC Statement of Account Flows, October 2012

	Flows Associated with Accounts							
	Currency	DDA	NFDA	Foreign Currency	LTFA	Revolving Debt	Other Debt	All
A. Production (inflows)	**388**	**5,379**	**NA**	**NA**	**NA**	**NA**	**NA**	**5,767**
B. Consumption and investment (outflows)	**−1,038**	**−4,422**	**−58**	**NA**	**—**	**−1,249**	**NA**	**−6,771**
B.1 Consumption expenditure	−1,038	−4,422	−58	NA	—	−1,249	NA	−6.771
B.2 Capital (durable goods) expenditure	NA	NA	NA	NA	—	NA	NA	NA
C. Financing	**−91**	**−536**	**−1**	**2**	**NA**	**−43**	**669**	**0**
C.1 Deposits (inflows)	**498**	**564**	**20**	**2**	**NA**	**NA**	**669**	**1,753**
From currency	—	564	*15*	2	NA	NA	*8*	589
From demand deposits	455	—	2	NA	NA	NA	*643*	1,100
From nonfinancial deposit accounts	21	NA	—	NA	NA	NA	0	21
From foreign currency	0	NA	NA	—	NA	NA	NA	0
From long-term financial assets	NA	NA	NA	NA	—	NA	NA	0
From revolving accounts	22	NA	3	NA	NA	—	*18*	43
From other debt	NA	NA	NA	NA	NA	NA	—	0
Addendum: Total deposits (inflows)	*886*	*5,943*	*20*	*2*	NA	NA	*669*	*7,520*
C.2 Withdrawals (outflows)	**−589**	**−1,100**	**−21**	**0**	**NA**	**−43**	**NA**	**−1,753**
To currency	—	−455	−21	0	NA	−22	NA	−498
To demand deposits	−564	—	NA	NA	NA	NA	NA	−564
To nonfinancial deposit accounts	*−15*	−2	—	NA	NA	−3	NA	−20
To foreign currency	−2	NA	NA	—	NA	NA	NA	−2
To long-term assets	NA	NA	NA	NA	—	NA	NA	0
To revolving accounts	NA	NA	NA	NA	NA	—	NA	0
To other debt	*−8*	−643	0	NA	NA	−18	—	−669
Addendum: Total withdrawals (outflows)	*−1,627*	*−5,522*	*−79*	NA	NA	*−1,292*	NA	*−8,524*
D. Change in account balance (from Statement of Account Flows)	**−741**	**421**	**−59**	**2**	**NA**	**−1,292**	**669**	**−1,004**
E. Change in account balance (from Balance Sheets)	**164**	**NA**	**NA**	**NA**	**−4,501**	**−673**	**9,489**	**−8,816**
F. Flow error	**905**	**NA**	**NA**	**NA**	**NA**	**−619**	**−8,820**	**7,812**
G. Error (% lagged account balance)	**135%**	**NA**	**NA**	**NA**	**NA**	**92%**	**93%**	**−89%**

Source: 2012 DCPC and authors' calculations.

Our major innovation of this paper is the "Statement of Account Flows," which is constructed using the DCPC and appears in Table 9. The rows in this new type of financial statement are generally formatted as in a statement of CF, but separately for each payment account. For example, the first column is the statement of currency flows, which records the inflows and outflows of currency for each type of transaction, starting with currency inflow from production activities (monthly basis) in row A and followed by currency outflow from consumption and investment activities in row B (separating consumption expenditure in row B.1 from capital expenditure in row B.2). Next, row C and its subsidiary rows report the net currency flows from financing activities and its components: deposits (inflows; the C.1 rows) of currency from each other account (DDA, nonfinancial deposit accounts [NFDA], foreign currency, long-term financial assets [LTFA], revolving debt, and other debt) and withdrawals (outflows; the C.2 rows) of currency to each of those accounts. The remaining rows compare the changes in currency balances from the statement of currency flows above (row D) with those estimated from the balance sheet (row E), plus an estimate of the error (in value and percentage of prior-period balance, rows F and G, respectively).

Similarly to the statement of currency flows in the first column, the remaining columns of the table represent information for the flows of DDA, NFDA, foreign currency, LTFA, revolving debt, and other debt, with the final column reporting the row sum. This provides the link from aggregate cash to each of the payments mechanisms. Importantly, note that the total net flows concept in row C appears in the last column ("All") as exactly zero by construction, since what goes into one payment account comes from another.

Total average account balances of U.S. consumers declined $1,004 in October 2012, according to the DCPC, as average consumption, at $6,771, exceeded total account flows from production activities, which were $5,767. This change in account balances tabulated from account flows resulted from much larger gross inflows and outflows, as withdrawals, at $8,524, exceeded deposits, which were $7,520. However, the decline in account balances estimated from the statement of account flows was considerably smaller in absolute value than the corresponding change estimated from balance-sheet stocks, which was $8,816. Therefore, the statement of account balances suggests that the DCPC is likely incomplete and may have considerable measurement errors, despite its conceptual promise for better integration by dynamics. One obvious area of incompleteness in the statement of account flows is that deposits of income to DDAs are not measured directly, but rather assumed to equal the difference between net income and currency deposits to income.[38]

The statement of account flows exhibits at least two interesting results with economic implications that may be useful for future research to link real (consumption) and nominal (financial) household choices. First, 99% of consumption, at $6,771, is funded by payments from DDAs (65.3%), from credit cards (18.4%), and from currency (15.3%). This result reflects heterogeneity in consumer payment choices, which may have implications for payment systems and for household budgeting and management of liquidity. Second, the gross-flow magnitudes are not small relative to income and consumption, which raises questions about the efficiency of the monetary system and relates to the classic literature on money demand: Why are U.S. households holding relatively large amounts of their liquid assets in payment accounts (just as Thai households hold so much in currency)? Also, it is still not entirely clear why consumers make such large transfers between currency and DDA, two assets that have the same monetary nature (M1) and are essentially equivalent for the settling of exchange. Evidence from the Survey of Consumer Payment Choice indicates that many U.S. consumers still rate the characteristics of currency (cost, speed, convenience, recordkeeping, and such) high relative to other payment instruments, and merchant acceptance of instruments is still not universal. Nevertheless, these large transfers between currency and DDA likely involve costs that may be reduced by the use of electronic money. All together, the account flows provide new data with advantages that potentially offer greater insight than existing data and research do into household financial decision making and the optimal design of the payments system more generally.

C. *Improvements to the 2015 DCPC*

While the 2012 DCPC introduced an innovation to the measurement of currency flows that has enhanced the degree of integration for one type of asset (currency), its coverage of financial statements has been relatively low, due to its limited mission and purpose. However, expanding the DCPC to measure the stocks of other assets from which consumers make payments not only increases coverage and integration but also provides important information for studying payment choices. For example, the analysis of the demand for currency and payment cards (debit and credit) by Briglevics and Schuh (2014) was limited by the lack of data on checking account balances. Also, the results by Schuh (2017) demonstrating the close correspondence between payments and personal income were produced without the benefit of direct measurement of the receipt of income by DCPC respondents.

Consequently, in 2015, the Boston Fed undertook to make major improvements to the SCPC and DCPC that substantially improved their integration with household integrated financial statements and the ST methodology. Improvements to the coverage of balance sheets included adding:

38. Furthermore, the income of individual consumers (2012 DCPC respondents) is not estimated directly. We use the 2012 SCPC estimate of household income for the respondent (reported in categorical form rather than in exact dollar amounts) and other data in the SCPC, DCPC, and SCF to impute income for the DCPC respondents. This shortcoming was partially addressed in the 2015 DCPC (see Section VI.C below).

• Additional short-term liquid assets other than currency, including balances held in checking (DDA) and nonbank deposit accounts, such as prepaid cards, PayPal, and so on (SCPC and DCPC).

• Collection of outstanding debt balances from credit card bill payments (DCPC only).

Improvements to coverage of income and CF statements included adding:

• More intentional and detailed classification of expenditures based on official NIPA definitions of consumption, which increases the precision of the distinction between consumption and nonconsumption expenditures (DCPC only).

• Collection of the actual dollar values, types, and frequencies of personal income receipts, which will permit direct comparison of aggregate DCPC income with NIPA income[39] (DCPC only).

• Increased precision and information about the timing and nature of bill payments, which will improve the classification of expenditures and expand the capability to link payments to assets, and especially to liabilities (such as outstanding debt other than credit card debt).

Data from the 2015 and 2016 DCPC are in the process of being analyzed and prepared for publication in the near future.

D. *Lessons for Survey Design*

For all of the household financial surveys covered in this paper, and for any other similar survey, there is a relatively clear and straightforward path to developing complete integration with household financial statements. At least two main steps would need to be taken:

1. *Obtain complete item coverage*. All of the surveys are missing some line items from the balance sheet, income statement, or statement of CF. Adding survey questions to obtain estimates for each of these line items would provide complete item coverage. Of course, the coverage of a line item is not sufficient for full integration because errors may arise from sampling, question design, and other factors. Also, further disaggregation of the line items of the financial statements reported earlier may be required to achieve accurate aggregate estimates. Nevertheless, conditional on accurate estimation, comprehensive coverage of line items is a necessary step toward full integration. The surveys should also take into consideration innovations in financial instrument and payment methods, as they provide alternatives or replacements.

2. *Ensure exact stock-flow identities*. All surveys could improve the accuracy of their estimation of the dynamic identities inherent in the statement of CF. The use of high-frequency payment diaries appears to be one promising method for achieving this improvement. Provided the estimation of stocks (assets and liabilities) is relatively accurate, it is the estimation of aggregate flows (income and expenditures) over relatively long periods of time (minimum 1 month, but up to 1 year or more) that is the key survey methodology issue. Survey methods other than high-frequency payment diaries may yield improved estimates of aggregate flows, but it is not apparent which are the most successful. Further research is needed on this matter.

These two items are necessary for improving the integration of household financial surveys with household financial statements; they may also have interaction effects: for example, the omission of an asset from the balance sheet prevents improvements in the statement of CF. However, there may be other development issues to address as well, such as further improvements in the survey sampling frames.

VII. EXTENSIONS AND CONCLUSIONS

While the development issues necessary for integration are reasonably clear and straightforward, countervailing factors may inhibit comprehensive integration. One factor may be the lack of motivation, mandate, scope, or directive by the survey sponsors. Relatedly, the expansion of one survey may begin to overlap the coverage of another, which might be problematic for sponsors. For example, the SCF and CE each have relative strengths that, when combined, might move the collective dataset much closer to full integration of the accounts, but expansion of one or both of these surveys would create significant and costly duplication and would likely trigger a call for streamlining. Finally, an obvious inhibiting factor is the lack of sufficient budgetary resources to expand the survey and diary program, although budgetary resources are jointly determined with the previously mentioned factors.

39. The 2012 DCPC only asked for the days on which income was received by the respondent, not the dollar amount of income of individual respondents. The 2012 and 2015 SCPC asked for total household income in dollar ranges.

The preceding discussion is equally relevant for the CPC survey and diary. Like all surveys, the 2012 SCPC and DCPC have advantages and disadvantages relative to the other surveys. However, one promising feature of the CPC survey and diary is that they have considerable room for quality improvements to the questionnaires that do not require additional budgetary resources, alternative sampling methods, or broader scope of operation and directive. The Boston Fed implemented the following improvements in the SCPC and DCPC during the fall of 2015, and the results will be forthcoming in future research.

- Separately identifying the payer (consumer) and payee rather than defining merchant categories that combine payee and type of expenditure, a separation that enables a far richer understanding of the purposes and reasons for the expenditure (including whether or not the expenditure was expected and the source of funding for unexpected expenses).
- Improvements to the statement of CF include additional information on how households finance their expenditures, and also provide additional real-time error-checking of online questionnaire responses, using stock-flow identities among assets, income, and expenditures.

These improvements highlight the fact that payment diaries link individual expenditure entries of the income statement with their associated assets and liabilities in the balance sheet and the detailed statement of CF in ways that have not been realized in other studies, including ST. However, the improvements are modest relative to the additional innovations that would be required to achieve complete integration, so much more research and data collection are needed.

The CE also is undergoing a redesign and improvement effort in response to recommendations from a National Academy of Sciences review panel, as described by National Research Council (2013). The report recommends considering three new prototype designs:

- Design A—Detailed expenditures through self-administration. This method would improve respondent reporting of expenditures and reduce respondent burden in data collection.
- Design B—A comprehensive picture of income and expenditures. This method would use technology, financial records, financial software, and budget balancing to improve estimates of the income statement.
- Design C—Dividing tasks among multiple integrated samples. This method would improve estimation of income-statement items through better use of sampling methodology.

While these improvements are valuable and promising, the NAS report does not appear to discuss or advocate the concept of integration beyond improvements to estimation of the income-statement line items.

A detailed discussion of research coming from the TTMS, SCPC, DCPC, and the other U.S. surveys is outside the scope of this paper. Many excellent contributions make use of each of the various surveys, and some use combinations of them. At the same time, analysts are limited in what they do without the integration of the accounts; indeed, a literature review would be useful to enumerate these strengths and limitations and to illustrate what might be done with improved data. Of course, this would take us well beyond the current endeavor.

Relatedly, although we have aggregated up to a common “representative” set of financial accounts, one would often like to disaggregate to some degree and go back to the underlying data organized by the accounts. Given the recent interest in the observed heterogeneous outcomes across U.S. communities in the lead-up and fall-out from the financial crisis, it would be natural to disaggregate by geography (ZIP code, SMSA, commuting zone, county, and state). Unfortunately, many of the surveys were not designed to be representative at this level or lack sufficient observations to provide statistical significance. Indeed, one ends up taking one piece of data from one survey, another from another, and so on. But the available data are not organized systematically under the conceptual framework of integrated financial accounts. This, too, would seem to be a worthwhile endeavor that is beyond the scope of the current paper.

In the broader introduction to this paper and in the measurement efforts in the last few sections, we stressed the importance of payments data that could make it possible to distinguish among the payment instruments, align with more conventional measures of CF, and be used to calculate changes in balance-sheet items and income statements. Again, we have not had space in this paper to describe this connection in more detail. Suffice it to note that innovation in financial markets and monetary policy all point to issues related to the still-important use of currency and issues related to the potential of alternative media of exchange based on new asset accounts. Indeed, some papers in the literature already note that the impact of monetary policy as previously conducted was a function of the industrial organization of banks at a local level. In particular, the willingness and ability of households to substitute across cash and demand deposits was found to be crucial in gauging the impact of policy. Better data on payments is thus central to understanding the impact of monetary policy moving forward.

Although we have presented standard accounting practices, the measurement provided by the accounts should be consistent with the measurement suggested by theoretical models. For example, if there were complete markets for contingent claims, then future income flows would be conceptualized as discounted future income adding to contemporary wealth. Contingent assets lose value when the expected states of the world on which their value depends do not occur, but they gain in value if the contracted state is realized. Wealth or net worth would move only with aggregate shocks. With incomplete markets and contracts, it is easier to envision wealth as the buffer stock or pension fund used to deal with this uninsured uncertainty. In any event, there needs to be a review of the contracts and implicit understandings a household has entered into and scrutiny, in turn, of how to treat these in the accounts. This, as well, remains the subject of another paper.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Data Appendix

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The Impact of Credit on Village Economies

Joseph P. Kaboski and **Robert M. Townsend**

Abstract

This paper evaluates the short-term impact of Thailand's 'Million Baht Village Fund'program, among the largest scale government microfinance iniative in the world, using pre- and post-program panel data and quasi-experimental cross-village variation in credit-per-household. We find that the village funds have increased total short-term credit, consumption, agricultural investment, income growth (from business and labor), but decreased overall asset growth. We also find a positive impact on wages, an important general equilibrium effect. The findings are broadly consistent qualitatively with models of credit-constrained household behavior and models of intermediation and growth.

1 Introduction

While the impacts of financial intermediation have been well studied at the macro-level, a criticism of some of this literature is that intermediation is endogenous.[1] We study a microfinance program that induced smaller though still substantial increases in intermediation with an important degree of exogeneity. This exogeneity makes the villages "test tube"-like experiments for studying the impacts of microcredit and phenomena important to macro-economies more broadly, including general equilibrium (GE) effects.

The program we examine is Thailand's Million Baht Village Fund Program, among the largest-scale government microfinance initiative of its kind. The intervention injected potential funds into 77,000 heterogeneous Thai villages[2] Each transfer of one million baht (about $24,000) was used to form an independent village bank for lending within the village. Every village, whether poor or wealthy, urban[3] or rural, was eligible, and all villages in our data did indeed receive the funds. Across our sample, the transfers averaged twelve percent of total annual income in the village economies, and forty-one percent of total short term credit flows.

Two crucial elements of the structure of the Million Baht program gave the transfers a (plausible) degree of exogeneity. First, the program was a rapidly introduced "surprise" policy initiative. In November 2000, the Thai Parliament was dissolved, and by January 2001, the populist Prime Minister Thaksin Shinawatra was elected. The new policy was implemented quite rapidly with all our survey villages receiving the funds between the 2001

[1]Earlier influential work by King and Levine (1993) establishes correlations between growth and private sector intermediation. Rajan and Zingales (1996) is an attempt to establish causality. Aghion et al (2005) models the nonlinear relationship between financial intermediation on convergence. Townsend (2009) gives a very detailed analysis of the Thai experience of growth with increased financial intermediation.

[2]The Thai program involves approximately $1.8 billion in initial funds, or about 1.5 percent of Thai GDP in 2001. This injection of credit into the rural sector is much smaller than Brazilian experience in the 1970s, which saw a growth in credit from about $2 billion in 1970 to $20.5 billion in 1979. However, in terms of a government program implemented through village institutions and using micro-lending techniques, the only comparable government program in terms of scale would be Indonesia's KUPEDES village bank program, which was started in 1984 at a cost of $20 million and supplemented by an additional $107 million in 1987. (World Bank, 1996)

[3]The village (*moo ban*) is an official political unit in Thailand, the smallest such unit, and is under the sub-district (*tambon*), district (*amphoe*), and province (*changwat*) levels, respectively. Thus, "villages" can be thought of as just small communities of households that exist in both urban and rural areas.

and 2002 survey rounds. Second, there is strong variation in the intensity of the credit injection in the cross-section of villages. Specifically, each village received the same amount – one million baht – regardless of the population of the village, so smaller village economies received a relatively more intense injection of credit. For example, the million baht transfer injection averaged 27 percent of income for the lowest quintile (i.e., smallest) village economies, and less than 2.5 percent for the top quintile (i.e., largest) village economies.

We therefore instrument for the amount of credit received using interactions of the program years and the number of households in a village as instruments, which we believe to be exogenous. *A priori* the variation in inverse number of villages in our data is among small villages, between 50 and 250 households (though our results are robust to including larger and smaller villages). Second, villages are geopolitical administrative units, and it is not uncommon for villages to be split for administrative purposes. Finally, while inverse village size is strongly related to outcomes in the years of the program, there is no significant pattern between inverse village size and either village fund credit or the outcome variables in the years before the program. That is, after controlling for household characteristics, villages look very similar until the program is instituted.

It is important to keep in mind that each village we consider is in many ways its own small economy, and so it matter where a person lives. Specifically, the village economies are open economies, but not identical and not entirely integrated with one another or the broader economy (nearby provinces, regions, etc.). There is substantial variation in institutional and market arrangements across villages (Townsend, 1995). Certainly informal borrowing and lending within the village is more common than across village lending, and there is cross village variation in interest rates and the amount of credit.[4] Even labor markets are not entirely integrated with local wages varying considerably across villages.[5] Finally, risk sharing may vary. The household-specific fixed effects we use attempt to control for much of this heterogeneity, but because village are small (quasi-open) economies, we anticipate movements in quantities and prices that vary with the size of intermediation.

The Townsend Thai dataset we use has unique advantages. It contains eleven years (1997–2007) of panel data on 960 households in 64 rural and semi-urban villages across four provinces of Thailand. These data include information on: education; assets and investment; income; borrowing and saving through various forms; consumption; occupation; household composition; and other variables. The first five years of data give us a “before” picture of the environment, while the remaining years give us the ability to look at the effect of the program on levels and growth rates of relevant outcome variables. We use the first two relatively short “after” horizon gives us a window for examining the impacts of credit on villages, at a time when these impacts were still localized, as we verify. The full six years of post-program data are then used to discern long run impacts, and indeed this paper is the only study of the long run impacts of microfinance. Finally, a smaller monthly panel with only 16 villages has separate information on wage rates.

Methodologically, we run two-stage regressions using short-term village fund credit as a measure of treatment. The major impacts we examine are the effect of the new village institutions on (other and total) credit, saving and investment decisions, consumption, asset growth, income and income sources, wage rates, and business enterprise.

[4]The ratio of the number of loans to relatives within vs. outside of the village is 2:1, for non-relatives this ratio is 3:1 and interest rates are much lower on within-village loans. Small loans are less likely between households in different villages. (Kaboski and Townsend, 1998)

[5]For each village in Thailand, we have a reported average wage in the village from the Thai Community Development Department. Among the four provinces (*changwats*) we examine, the within-province coefficient of variation in average daily wage across villages ranges between 23 and 41 percent.

1.1 Findings in Light of Theory

Our analysis is motivated by two broad classes of theories on credit constrained environments: buffer stock models and entrepreneurship and growth models.

In the classic buffer stock savings model, households accrue buffer stocks of liquid assets in response to the borrowing constraints and income uncertainty they face. These theoretical features appear to characterize the data, but we also note that default is not uncommon (average credit in default is about 12 percent of average income), and households also make lumpy and illiquid physical investments that tend to pay higher returns than earned on liquid savings. In our companion paper, Kaboski and Townsend (forthcoming), we incorporate these features into an explicit structural model, which we then estimate and quantitatively simulate the Thai Million Baht intervention. Many of the findings here are broadly consistent with this class of model.

First, the availability of credit increased total borrowing, and so crowding out of or substitution away from other sources was not a major issue. Indeed, we cannot reject the null hypothesis that credit increased one-for-one with the injection of available credit. At the same time, average interest rates on short-term credit did not fall but may have actually risen slightly. This can be viewed as evidence that households were originally credit constrained, since credit increased even though interest rates did not fall. Thus, similar to Banerjee and Duflo (2004), households are not merely substituting toward lower cost credit or expanding borrowing in response to lower borrowing costs. Credit for the stated purpose of consumption is the primary type of borrowing that increased, however.

Second, and related, consumption increased substantially, perhaps one for one with credit, which indicates credit constraints are particularly binding in consumption decisions. The surprising magnitude of such an increase in consumption is consistent with buffer stock models, where the ability to borrow has large effects on consumption by increasing consumption among both currently constrained borrowers but also the unconstrained, who are impacted by the potential to borrow in the future.[6] The composition of consumption increases is also of interest. Grain, clothes, tobacco, ceremony, and educational expenditures were stable, but credit increased expenditures on household and auto repair, meat, and alcohol. The more typically income elastic components of consumption or those with an intertemporal element (like repairs) responded the most to credit. The increase in fuel usage and auto repairs harmonizes with Karlan and Zinman (2008)'s findings of increased transportation expenditures for consumer loans in South Africa.

The consumption and credit results are *not* consistent with an alternative story, in which households simply viewed the village fund transfers as a grant or aid program. For consumption, this story would predict that, absent credit constraints, households would only consume the return on this one-time, transitory income shock rather than the full amount of the grant. However, in the initial years, we observe consumption increasing more than one-for-one with the size of the credit injection. Moreover, the loans could only be a substantial gift if they were not repaid. Credit from the program persisted at or above initial rates throughout the six post-program years we examine, however, and the fraction of credit in default toward the village funds themselves was low: four percent or less, with the exception of one year, when default was nine percent.

Furthermore, looking at the longer run data, while village fund credit and short-term credit grew throughout the sample, the positive impacts of village fund credit on consumption and

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[6]The fact that informal credit and household lending did not respond, however, indicates that relending to non-borrowers, as in Angelucci and De Georgi (2006), is not a major issue.

income growth were confined to the initial years of the program. These transitional impacts are qualitatively consistent with the dynamics in buffer stock savings model as in Fulford (2010) and our companion paper. Moreover, default (on all types of credit) did increase, but in a way consistent with the bufferstock story. Specifically, it did not increase in the first year, when more credit was available, but only in later years when loans need to be repaid.

The second broad class of models motivating our analysis are models of macro-intermediation, entrepreneurship and growth (e.g., Lloyd-Ellis and Bernhardt, 2000, Greenwood and Jovanovic, 1990, Banerjee and Newman, 1993, Buera and Shin, 2008, Buera, Kaboski, and Shin, forthcoming, and Buera, Kaboski and Shin, 2011). Such models have been shown to perform relatively well in fitting the long run Thai growth experience (see Felkner and Townsend, forthcoming, Gine and Townsend, 2004, Jeong and Townsend, 2007, and Townsend and Ueda, 2006, forthcoming). In these models, improvements in intermediation on the extensive and/or intensive margin can spur business or agricultural investments and growth in business income.

The implied connection between access to finance, entrepreneurship, and growth is often a central motivation for microfinance programs as poverty alleviation interventions. Microfinance programs typically cater to poor people who lack access to other forms of intermediation in the hope that the poor are financially constrained and have high returns to investment. Women, in particular, are often targeted under the belief that they have less access to credit, lower outside options in the labor market, and therefore the highest returns to private entrepreneurship.

The results here under a quasi-experimental intervention are mixed with regards to the predictions of these models. On the one hand, we indeed measure significant increases in income growth and a change in the composition of income as a result of the intervention. As the models would predict, business and labor market income tended to increase, but agricultural income did not. On the other hand, business and labor income did not seem to be driven by the extensive margin of investment and business starts themselves. To the contrary, we find no change in business starts or business investment, and some evidence of an actual decline in assets in response to the program. We do see an increase in the frequency of agricultural investments, but a reduction in the use of fertilizer and, again, no increase in agricultural income.

Theoretically, several potential explanations could reconcile these findings, but our ability to evaluate these empirically is unfortunately limited. First, we may simply have difficulty discerning investments given our sample size, since investment is highly variable and infrequent (e.g., business starts). In the simulations of the structural model in our companion paper, the actual positive impacts on investment cannot be typically discerned given our sample size. Second, households report both increased labor income and higher payments to outside laborers in response to the program. Perhaps credit was most useful as working capital, allowing businesses and farms to hire more laborers and potentially use more intermediate inputs. That is, perhaps it is the intensive margin, and access to working capital, rather than fixed entry costs that most constrain households in their business activities. McKenzie and Woodruff (2006) offer complementary evidence that fixed costs in Mexico are negligible, yet they find high average returns. Their experiments in Sri Lanka (McKenzie and Woodruff, 2008) also find high returns to increases working capital among entrepreneurs. Our measures of inputs (fertilizer, wages paid) do not uncover this, but again data are limited here. A third possibility is that credit offers consumption-smoothing, cashflow management, and/or limited liability, which, for a given level of investment, can change the composition of investment and labor decisions toward higher risk but higher yield sources of income a la Greenwood and Jovanovic (1990) and Braverman and Stiglitz

(1986). Indeed, the buffer stock model of our companion paper, predicts a decline in low return liquid assets (along with a move toward high return investment). Evaluating this conjecture on the composition of investment is difficult, however, since measuring second moments of returns on disaggregated investments is non-trivial.

A fourth potential explanation, which we can evaluate, is that the program caused a GE increase in wages, a common implication of many of the macro-intermediation, TFP, entrepreneurship, including the Thai research of Gine and Townsend (2004) and Jeong and Townsend (2007), and many of the other growth models above.[7] As an example, Buera, Kaboski and Shin (2011) predict that microfinance will lead to a more efficient distribution of capital and entrepreneurs in the economy, and therefore an increased demand for labor. Yet, the resulting higher wages greatly limits the aggregate increase in entry and investment. They further argue that the same increase in wages may lead to lower savings/higher consumption because it redistributes from households with high savings rates to those with low saving rates.

Thus hard-to-measure GE effects are central to theory, but here the sheer scale of the intervention and the partial segmentation of labor markets across villages allow us to discern impacts on wages. We find that wage rates increase overall with the point estimate implying an increase of seven percent in the median village during the first two years (the period for which we have wage data). Consistent with expectations from theory, the wages increase for general non-agricultural labor, construction in the village, but not for professional occupations or occupations outside of the village.

1.2 Existing Literature on Microfinance

A growing, yet still relatively small, literature has arisen to evaluate the booming field of microfinance. The advantages of this study relative to much previous work on microfinance interventions are essentially five-fold. First, the program is unique because of the size of the intervention and its consequent policy importance. A key policy question is the extent to which smaller programs can be scaled up for larger scale poverty reduction, or whether large scale increases in credit availability might hamper the programs (Duflo, 2004, World Bank, 2004, Buera, Kaboski, and Shin, 2010). Second, as stated earlier, the size of the intervention and the segmented credit and labor markets yielded GE effects both within the village economies.[8] Microevaluations have great difficulty identifying GE effects, since they require relatively large interventions and also because they impact the control group. Again, these impacts are important for scaling up and also give insights into the micro-mechanisms behind macro-theory. Third, we have data on households and small enterprises, and the relevant variables necessary to consider potential channels of impact in an environment of local, household-level investment and occupational choice decisions. Fourth, the program design produced a convincing, exogenous instrument for evaluation. Our exogeneity has both a cross-sectional and timing element, which is important since impacts may vary over time. Finally, and related, we have long run data extending six years after the program implementation which allows us to shed light on long run impacts.

This paper is closely related to our already mentioned companion paper, which presents an analysis of the short-run impact on four key outcomes (consumption, investment, income and default) using a partial equilibrium structural model. Methodologically, this paper is

[7]It can also lead to higher interest rates by expanding the demand for capital while reducing the capital stock. Our point estimates on interest rates are positive but insignificant.

[8]In principle, aggregate (economy-wide) general equilibrium effects would not be identified by our methods. However, since the general equilibrium impacts we find do not seem to extend to neighboring villages (see Section 3.6), we don’t think that general equilibrium impacts at an even wider scale are a major issue over the time span we examine.

distinct in that we take a more reduced form approach here, which allows us to delve more deeply into the data. We also apply stronger tests of orthogonality of village size before the program and control for geographic spillovers. Topically, we evaluate a greater range of outcomes (including the credit market and subcomponents of consumption, income, and investment and productive activities) and assess the differential impact on women. Moreover, our analyses of GE impacts on wages and long run impacts are also unique to this paper, and this is the only paper known to provide evidence of the impacts of microfinance along these two dimensions.

Of course, our paper contributes to an existing literature that includes many of five advantages above, though not simultaneously. Boonpern et al. (2009) studies the same intervention with a larger data set, but they lack data prior to the intervention of the program. They confirm short-run increases in income and expenditures that we find. Karlan and Zinman (2008 Karlan and Zinman (2009) study true controlled experiments in which a financial institutions randomized loan decisions on consumer loans to wage-earners or microenterprise loans to entrepreneurs. Pitt and Khandker (1998) study the Grameen Bank, using cutoff participation requirements as an instrument, an instrument questioned by Morduch (1998). They have a cross-section, larger than ours, with four outcomes: labor supply, child schooling, female assets, and expenditure. The amount borrowed is quite large relative to expenditures per household. Pitt et al. (2003) studies the same program, but examines biometric health outcome measures. Burgess and Pande (2005) also study a big program, but it is an expansion of banks over twenty years differentially across regions in India. Their outcomes are macro-level poverty headcount and wage measures. Coleman (1999) studies much smaller NGO lending in Thailand using a smaller dataset of about 500 people, but with a great variety of variables. He has a set of villages with programs and a set that will receive them in the future. This is a fairly good control, but there is no exogeneity in the timing of how long the program has been used, and he examines only short-term effects. Gertler et al. (2003) study BRI in Indonesia to see if microfinance helps insure against shocks to health. They have an instrument with less clear exogeneity (proximity to financial institutions), but also a fairly large panel data set (the IFLS). Alem and Townsend (2008) use a similar instrumental approach to study the impact of financial institutions on risk-sharing. Banerjee and Duflo (2003) study firm's borrowing from banks but not household borrowing. Aportela (1998) looks at the expansion of bank branches and argues it is exogenous. In any event it is a smaller expansion, and he looks only at savings behavior. Finally, but not least, our results complement the results of Banerjee, Duflo, Glennerster, and Kinnan (2009), who use experimental data in India. They find higher entry into entrepreneurship and sizable income effects on owners of existing businesses but increases in consumption for households not in business.

Clearly, the exogeneity of our instrument (the inverse number of households in a village interacted with program years) is a critical argument in our analysis. We present a priori justification for its exogeneity in Section 2, which also discusses the program and data in more detail. Section 3 lays out our methods, explicitly states our exogeneity assumption, and gives *empirical* support for the exogeneity of the instrument. Section 4 then presents the results, while Section 5 concludes.

2 Description of Program and Data

We provide an overview of the Million Baht Village Fund, including its quasi-experimental implementation, and then describe the data.[9]

2.1 Overview of Million Baht Program

The fund was a key program in Prime Minister Thaksin's election platform. The primary hope was that the money would be a revolving, self-sustaining fund to be used for investments in occupational development, employment creation and income-generating activities. It was promoted as an attempt to reach the underprivileged, alleviate the dependence of villages on government aid, develop a decentralized grass roots approach to growth, and link communities with government agencies and the private sector.

The program was funded by the central government. While it is difficult to know precisely how the program was funded, it clearly entailed a substantial transfer from Bangkok to rural areas in line with the populist goals of the government. For example, the households in the rural areas pay little to no taxes.

The transfers were given to the villages with both carrot and stick provisions to encourage sound management and repayment of loans. The stick involved telling villages that if the funds were abused or the village institutions failed, they would be offered no further assistance, and even other sources of government funding would be cut off.[10] The carrots were the promises of additional loans and additional grants to village funds that receive their highest rating. In 2004, loans from the Bank of Agriculture and Agricultural Cooperatives (BAAC) were first available but take up rates were quite low. In 2005, funds with the highest rating were granted an additional 100,000 baht (de la Huerta, 2010). Thus, these subsequent injections, which took place after the focus of most of this study, were small relative to the initial injection but did provide incentives for responsible management.

2.1.1 Organization and Founding—The program was jointly administered by multiple government agencies. In the rural and semi-urban areas we study, the BAAC received the initial money transfer and held both the lending and savings accounts for the village funds.[11] Officers from the Community Development Department provided oversight and guidance, as they do with other village funds. Local teaching colleges were in charge of conducting audits of the village funds as well as an evaluation of the funds and member households. These audits are in addition to the BAAC's own fund ratings mentioned above.[12]

In order to receive funds, villages needed to form committees, develop policies, submit an application/proposal for the village fund, and have the proposal evaluated and accepted.[13,14] The vast majority of village households became members of the village funds and village

[9]This overview is based on data from the institutional panel data set, as well government materials and informal interviews of village funds committee members, Community Development Department (CDD) officers, and Bank for Agriculture and Agricultural Cooperatives (BAAC) officers and administrators in March, 2002. BAAC administrators were interviewed in Bangkok, while three branch officers, a CDD officer, and six village fund committees were interviewed in Buriram, Chachoengsao and Chiangmai.

[10]This threat was not completely credible, which is especially clear since Thaksin is now deposed, but based on interviews it seemed to at least be an important issue to villagers.

[11]Each village fund holds two accounts, the first for receiving the million baht transfer and the second for holding member savings. When a loan is granted by the village fund, the member takes a form signed by committee members to the BAAC, and the loan amount is transferred from the fund account to the individual account.

[12]We, the authors, tried to assist BAAC officials in the development of this rating system.

[13]Government agencies provided villagers with informal advice and manuals describing the goals, procedures and regulations of the village funds. In addition, the appendix contained an example of the policies of a village fund. Although these policies were shown as an example, from interviews, it appears that many committees felt that these suggested policies were fixed regulations for all funds, and also some policies were misinterpreted (de la Huerta, 2010).

[14]The applications in our survey villages were submitted to the BAAC and evaluated first by an district (*amphoe*) level sub-committee with final approval from the national fund committee. The evaluation criteria included: the selection of the fund committee; the qualification of the fund committee including its knowledge, experience and management ability; the policies and regulations of the fund; the extent of participation of villagers and members in the funds management; and the compliance with fund regulations.

funds averaged 94 members.[15] The committees were selected democratically by the villagers at a village meeting, with regulations set up to ensure fairness of these elections.[16]

Although a federal program, the village funds themselves are only quasi-formal, in the sense that they have no building or facility and no employees.[17] They are administered at the village level by a committee elected by the village and by occasional meetings of all villages.[18] Such quasi-formal village institutions are typical in Thailand (see Kaboski and Townsend, 2005). One villager is appointed as an accountant/bookkeeper, and the accounting is fairly detailed, including dated records of all loans, payments, deposits and withdrawals.[19]

2.1.2 Policies—Some savings and lending policies were stipulated, while others were set by the villages themselves, often based on the suggestions from printed materials or suggestions from CDD officers.

For lending, the fund was typically divided into two portions: 900,000 baht for standard lending, and 100,000 baht for emergency loans, which were typically smaller and shorter term.[20] According to the institutional survey, village funds lent out on 950,000 baht in the first year, and according to the household data lending increased about 22 percent from the first to the second year. In order to ensure equal access to the funds, regulations stipulated a maximum loan size of 20,000 baht.[21] Loans above this amount require approval by all members of the fund, but loans were not supposed to exceed 50,000 baht (about $1100) regardless. Less than five percent of loans exceeded 20,000 baht, but we do observe four households with loans exceeding 50,000). The repayment period could not be set longer than one year. In addition, villagers claim that they were required to charge a positive rate of interest on loans. Village funds set a standard rate to all borrowers, but these interest rates varied from two to twelve percent across funds, with an average nominal interest rate of seven percent. Another suggested policy that was generally adopted was the use of two guarantors for loans, though the number of guarantors required ranged from one to eight across the sixty-four institutions.[22] Only eleven of these institutions required collateral, and only three had fully collateralized loans. Repayment was quite high. According to the household data, using a 90-day definition, default rates to the village funds were quite low (see Table 8).

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[15]The primary membership criteria for most institutions was to live in the village. Non-member households typically did not want to borrow, and two reasons were often given: either the households were wealthy and did not need the money or wanted to leave the funds for poorer households, or the households were poor and did not want to get into more debt.

[16]The village meeting required 75 percent of households in the village for a quorum. By regulation, the committee needs to consist of 9 to 15 villagers, with half of them women. Requirements were that committee members be at least 20 years old, have lived in the village for at least two years, be a person of good character (e.g. no gamblers or drug users), not be bankrupt, never have been imprisoned or have violated position or property, not have been evicted from the government or a state enterprise, have maintained the right to vote, and never have been evicted from the fund committee. Committee members can serve a maximum of two years with half of the committee members being replaced each year.

[17]According to the sample regulations, committee members were by regulation allowed to divide ten percent of the fund profits among themselves as compensation for their work. Few of the funds surveyed compensated committee members, however.

[18]While a general meeting of fund members is required to take place at least once a year, only 85 percent of the funds interviewed reported having these general meetings. The committee plays the primary administrative role in the fund and typically reported meeting one to two times a year to evaluate loan applications.

[19]Instruction manuals of accounting procedures were provided by various government agencies. These manuals were roughly 50 pages, and while groups noted that the accounting was tedious, complicated and difficult, none claimed that it was unmanageable.

[20]Many funds claimed this was a requirement of the program, but again it appeared to only have been an element of the sample village fund regulations.

[21]About 35 percent of all loans are of this maximum size.

[22]Other suggested policies that were often adopted: a late payment penalty of 0.5 percent per day, a duration for emergency loans that was less than one year, and no future loans in the event of default. de la Huerta (2010) finds that the latter policy was associated with lending growth and repayment.

Committee members typically were to decide who receives loans. The evaluation of the loans included the members' ability to repay, the appropriateness of the investment, and the amount requested. Given the small loan sizes, institutions made a large number of loans, and a large fraction of households received loans. In the eleven-year balanced panel, 76 percent of households received loans at some point and the median number of years with village fund loans is four.

Seventy percent of the village funds also offered savings services, with most of these requiring that members save and make pledged deposits into their accounts. Members' savings are jointly held in a separate (individual) BAAC savings account. One suggested set of savings regulations that was often followed was that all members must pay an application fee, and buy at least one, but not over 20 percent of shares in the fund. Another suggestion was pledged savings funds with the following policies: deposits are made on a given date, pledged amounts varying from 10 to 500 baht across members, and pledge amounts able to be changed once a year. The average nominal interest rate on savings was just 0.5 percent, that is, a negative real interest rate. The total stock of initial savings averaged about 4000 baht across funds. Some funds lent out member savings, while others limited the loans to the initial transfer.

2.2 Quasi-Experimental Design of the Program

As described in the introduction, the program design was beneficial for research in two ways. First, it arose from a quick election, after the Thai parliament was dissolved in November, 2000, and was rapidly implemented in 2001. None of the funds had been founded by our 2001 (May) survey date, but by our 2002 survey, each of our 64 village had received and lent funds, lending 950,000 baht on average. Households would not have anticipated the program in earlier years.[23] Second, the same amount was given to each village, regardless of the size, so villages with fewer households received more funding per household. Regressions below report a highly significant relationship between household's credit from a village fund and inverse village size in 2002 after the program.

There are strong *a priori* reasons for expecting this variation in inverse village size in the years of the program to be exogenous with respect to important variables of interest.

First, villages are geopolitical units, and villages are divided and redistricted for administrative purposes. These decisions are fairly arbitrary and unpredictable, since the decision processes are driven by conflicting goals of multiple government agencies. (See, for example, Pugenier, 2002 and Arghiros, 2001). Data for the relevant period are unavailable, but between 2002 and 2007 the number of villages increased by three percent, while since 1960 the number of villages increased by roughly 50 percent.

Second, because inverse village size is the variable of interest, the most important variation comes from a comparison among small villages (e.g., between 50 and 250 households). Indeed, we focus our baseline estimates on these villages, but show that results are quite robust to including the whole sample. That is, our analysis is not based on comparing urban areas with rural areas, and we are not picking up the effects of other policies biased toward rural areas and against Bangkok.

Third, village size is neither spatially autocorrelated, nor correlated with underlying geographic features like roads or rivers. Figure 1 shows the random geographical distribution of villages by decile of village size over the four provinces (Chachoengsao,

[23]Although villages did received the funds in different months of the year, the precise month that funds were received is uncorrelated with the amount of credit per household after controlling for village size.

Lopburi, Buriram and Sisaket) in the year 2001. The Moran spatial autocorrelation statistics in these provinces are 0.019 (standard error of 0.013), 0.001 (0.014), 0.002 (0.003), and 0.016 (0.003), respectively.[24] Only the Sisaket autocorrelation is statistically significant, and the magnitudes of all of them are quite small. For comparison, the spatial autocorrelation of the daily wage in villages ranges from 0.12 to 0.21. We also checked whether village size was correlated to other underlying geographic features by running separate regressions of village size on distance to nearest two-lane road or river (conditioning on changwat dummies). The estimated coefficients were 0.26 (standard error of 0.32) and −0.25 (0.24), so neither was statistically significant. Small villages did tend to be located closer to forest areas however, where the coefficient of 0.35 (0.03) was highly significant, indicating that forest area may limit the size of villages.[25] Nonetheless, these regressions explain at most five percent of the variation in village size, so the variation is not well explained by geographic features. We have included roads, rivers, and forest in Figure 1.

Finally, since we control for household level fixed effects, any contamination would need to result from village size capturing changes in the outcome variables over time, which is doubtful. We verify in Section 3.4 that village size is unrelated to the variables we examine in the years prior to the program.

2.3 Data

As stated in the introduction, our data are panel survey data from the Townsend Thai dataset.[26] We utilize five years (1997–2001) of data before the onset of the program and six years (2002–2007) of post-program data. We focus on two components of the survey (the household data and the institutional data), and supplement the data with information gathered in informal interviews conducted in the field. For our analysis of wages, we use a parallel monthly longitudinal survey, August, 1998 through December, 2003. Both surveys are part of an on-going project. That is, they have no specific relationship with the village fund program, which limits incentives to misreport regarding the program.

The household panel data set is a stratified, clustered, random sample, including 15 households in each of 64 villages distributed across four provinces (*changwats*) of Thailand - the changwats of Chachoengsao and Lopburi in the Central region relatively near Bangkok, and Sisaket and Buriram in the poorer Northeast region.[27] The attrition rate from year to year averaged only three percent annually so that, of the 960 households surveyed annually, 800 of them were followed for the seven years, while 655 were followed for all eleven years. Attrition was largely due to migration. We use a balanced panel in our regressions, though with the larger sample for the seven year analyses.

24The general formula for Moran's statistic is:

$$I=\frac{n}{\sum_{i=1}^{n}\sum_{j=1}^{n}w_{ij}}\left(\frac{\sum_{i=1}^{n}\sum_{j=1}^{n}w_{ij}\,(z_i-\overline{z})\,(z_j-\overline{z})}{\sum_{i=1}^{n}\sum_{j=1}^{n}(z_i-\overline{z})^2}\right)$$

where n is the number of observations (villages), z_i is the statistic for observation i (village size of village i); and w_{ij} is the weight given villages depending on their spatial distance. Here we use inverse cartesian distance between villages.

25Forest conservation efforts have driven some redistricting decisions but these decisions have been largely haphazard and unsystematic. For discussions, see Pugenier (2001) and Gine (2005).

26See Townsend, et al. (1997).

27The survey design was based in part on the results of prior field research in the Northern region (see Townsend, 1995).

The household data set has several strengths. First, it is the only panel data from Thailand that spans across the pre- and post-program years. Second, the data is exceptional in its breadth and level of detail. These data include information on education, assets[28] and investment, income and expenditures in production, borrowing and saving through various forms, consumption,[29] occupation, businesses operated, and household composition, for example. Using credit as an example of the detail in the data, for every year we have a record of all loans, both formal and informal, that a household has taken. The lending environment in these villages is very nuanced, with the BAAC, commercial banks, family, relatives, money lenders, and other quasi-formal village institutions in addition to the village funds all playing significant roles.[30] These household level loan data include the amount of the loan, date of the loan, duration, amount to be repaid, interest rate, lender, stated reason for borrowing[31], collateral used, value of collateral, whether the loan has been repaid, and the consequences of defaulting on the loan. We measure default as loans that are 90 days past due using current data on repayment and terms but also linking loans across years to uncover default (e.g., we do not allow the term of the loan to be extended after it was taken.) We then record the amount of village fund credit in default and whether a household has any loan either short- and long-term in default.[32]

Table 1 gives summary statistics for the relevant variables of the annual household data used in this paper. The exchange rate of baht to dollars in this period is roughly 40 to 1. Importantly, we see that after the introduction of the program, 54 percent of households borrow per year with average borrowing of 9000 baht. The median level of village fund credit is 16,000 baht, with a mean of 16,700. Loan sizes vary, but the middle 90 percent of loans are between 5000 and 30,000 baht. For reference, household income averages 108,000 baht with a median of 64,000 baht (per capita numbers are 24,000 and 15,200 baht, respectively).

The monthly dataset is a smaller panel of 400 households in 16 villages over 65 months from late-1998 through 2003. The villages differ from the annual panel data, but they are in the same changwats and both were drawn from a common survey in 1997. The monthly dataset has strengths that complement the annual data. In particular, it includes not only income, but separate records for labor supply (measured in days), which allow for daily wage rates by activity to be calculated.

Finally, we use data from the Community Development Department (CDD), which includes all villages in our provinces, for our geographic analysis.

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[28]The initial 1997 value of real assets is found by depreciating the purchase price of the asset (in 1997 baht) from the time of purchase to what it would have been worth six years ago. We assume that the depreciation rate for all household and agricultural assets is 10 percent per year. One exception is land, the value of which we do not depreciate over time.

The retrospective wealth levels are incomplete in (at least) two respects. The first issue is that we only have information on household and agricultural assets that the household still owns. The second concern is that we do not have any information on past financial assets and liabilities. Fortunately, financial assets and liabilities tend to make up a small fraction of current household wealth, and so were probably also a small fraction of past wealth. Subsequent asset levels were found using current investment data and a depreciation rate of ten percent.

[29]Consumption is non-durable in that it excludes household asset expenditures, and includes only food, drink, fuel, clothing and services. Consumption is measured by a solicitation of 13 disaggregate items that best predict aggregated non-durable consumption expenditure in the larger more comprehensive SES survey. In practice 50–80% of the variation can be explained by these 13 items. A price index for each of the four provinces was created by the average price of the inter-quartile, 25–75% range of purchases and sales of the key consumption items for which both quantities and values were recorded. Given the weights on each component, impacts on the components of consumption do not simply sum to the total impact (see Table 5).

[30]See Kaboski and Townsend (1998)

[31]Variables measuring the amount of credit borrowed for different purposes are based on these reported reasons for borrowing.

[32]The panel data also include an institutional component surveying all of the quasi-formal micro-financing institutions encountered in the survey villages, which we use as the source of many of the descriptive statistics given above.

3 Methods

We focus on the effects of village funds on short-term credit (defined as loans of one year or less). The vast majority of village fund credit was short-term, and so we want to see its impact on the short-term credit market and abstract away from other credit markets.

The dependent variables we focus on are divided into four categories:

- First, we measure the impact of the village fund credit on the short-term credit market, including: its effects on total short-term credit; borrowing from other formal sources (i.e., the BAAC and commercial banks); the stated reasons for borrowing (i.e., business investment, agricultural investment, fertilizer/pesticides, and consumption); and measures of the tightness of credit markets (interest rates, default and informal borrowing).
- Second, we measure the effect of village fund credit on consumption and its different components. Specific components include grains, dairy, meat, fuel, clothes, home repair, vehicle repair, eating out, tobacco, alcohol (consumed both in and out of the home), ceremonies, and education.
- Third, we assess the impact on the income and productive decisions of households. In particular, we look at overall asset and income growth, as well as components of net income (agriculture by component, business, and wages/salaries), investment (agricultural and business), and input use (wages paid and fertilizer/pesticides). We also look at wages (calculated as the ratio of income over work days) by type of activity.
- Fourth, we look at differential impacts on the above variables in female-headed households. Microcredit is often targeted toward women, and theory (e.g., Bourgignon, et al., 1994, Browning and Chiappori, 1998) and evidence (e.g., Pitt and Khandker, 1998, Kaboski and Townsend, 2005) suggest that impacts may differ across men and women.

We propose the following specification for the impact of short-term village fund credit ($VFCR_{n;t}$) of household n at time t on outcome measure $y_{n;t}$:

$$y_{n,t}=\alpha VFCR_{n,t}+\sum_{i=1}^{I}\beta_i X_{i,n,t}+\varphi_t+\varphi_n+\varepsilon_{n,t} \qquad (1)$$

$VFCR_{n;t}$ is a measure of the amount (stock) of credit with less than twelve month duration that household n borrowed from a village fund in year t. The X_i are a set of household control variables including number of adult males, number of adult females, number of children, a dummy for male head of household, age of household head, age of head squared, years of schooling of head. In addition, we allow for a time-specific fixed-effect φ_t, and a household-specific fixed-effect φ_n.

Equation (1) has strengths and disadvantages. On the one hand, by not adhering to one particular theoretical model, it allows us to look at a wide range of outcomes that go beyond the predictions of an explicit theory. On the other hand, equation (1) is at best a reduced form attempt to approximate a more explicit behavioral model.[33] In Kaboski and Townsend

[33]We also used the differenced version of equation (1). This specification had advantage of allowing for fixed effects on not only levels, but also changes. The specification produced broadly consistent results, but for the components of consumption and income where measurement error is greater, results were often no longer significant.

(forthcoming), our structural model implies that credit interventions ought to affect the growth rate of income and asset accumulation, while affecting the level of choice variables such as consumption and investment. (When we focus on specific components of income, we look only at levels, since these measures are noisy, and differencing appears to eliminate most of the signal in the data.) Similarly, for the three outcome variables that may proxy borrower's *ex post* ability to repay loans, default, interest rates and borrowing from informal sources, we run alternative regressions using either current village fund credit $VFCR_{n,t}$ or the lagged value of village fund credit, $VFCR_{n,t-1}$.

3.1 Instrumenting

In addition to running OLS on equation (1), we use a two-stage approach to instrument for village fund credit. The instrument used is the interaction between the inverse number of households in the village and the post-program year dummies, χ. That is, we control for variation across households correlated with the inverse of village size, but use the additional effect of village size in post-program years ($invHH_n * \chi_{t=t^*}$, where t^* is the relevant program year) as our instrument. This first-stage regression is therefore[34]:

$$VFCR_{n,t}=\lambda_2 invHH_n\chi_{t=2002}+\lambda_3 invHH_n\chi_{t=2003}+\sum_{i=1}^{I}\delta_i X_{i,n,t}+\theta_t+\theta_n+e_{n,t}. \qquad (2)$$

The sufficient assumptions for ensuring consistency refer to the error terms in the second-stage (outcome $y_{n,t}$) equations, and are given below:

$$\begin{gathered}\text{Orthogonality Assumption:}\\ \varepsilon_{n,t},\ u_{n,t}\perp invHH_n*\chi_{t=2002}|X_{i,n,t},\theta_t,\theta_n\\ \varepsilon_{n,t},\ u_{n,t}\perp invHH_n*\chi_{t=2003}|X_{i,n,t},\theta_t,\theta_n.\end{gathered} \qquad (3)$$

In the discussion of impacts, we will primarily focus on significance of estimates $\hat{\alpha}$ in equations (1), respectively, at the five-percent level, but also point out significance at the ten-percent level, when those results are supported by multiple regressions.

Table 2 gives a sample of the first- and second-stage estimation results from the 2SLS procedure on equations (2) and (1), respectively. The variables of greatest interest are italicized. We cluster by village-year combination and report robust standard errors throughout the paper.

In the first stage estimates on the top of the table one can see that the instrument, inverse village size, is strongly predictive of village fund credit in the years of the Million Baht Program, but not otherwise. The z-statistics are 2.4 and 8.7 in 2002 and 2003, respectively. The magnitude of the interacted instrument in 2002 of 464,000 is nearly 50 percent of the 950,000 (an accumulated flow) that village funds claimed to have lent out on average. The higher coefficient of 853,700 in 2003 reflects the higher total household borrowing from village funds in 2003. So the coefficients are both statistically significant and economically meaningful.

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[34]The corresponding equation for when lagged credit is used in the outcome equation is:

$$VFCR_{n,t-1}=\lambda_2 invHH_{t,n}\chi_{t=2002}+\sum_{i=1}^{I}\delta_i X_{i,n,t}+\theta_t+\theta_n+e_{n,t}.$$

The second stage shows that total (i.e., from all sources) short-term credit increased in response to village fund credit, since the $\hat{\alpha}$ estimate is 1.92.

3.2 Outlier Robustness

The data show a great deal of variability, and so the results can be very sensitive to a single or handful of observations. For example, the vast majority of investments and loans are small, so that one major investment or loan in the regressions can swamp all the activity happening at a smaller scale.

We run several different regressions in order to deal with this problem.

- Our baseline instrumental variable regression is a standard two-stage fixed-effect least squares regression omitting households in villages with greater than 250 households and fewer than 50 households. This excludes nine of 64 villages. In 2002, the two very small villages had 30 and 34 households, while the large villages had 268, 297, 305, 314, 400, 900, and 3194 households.
- The second regression includes outlier villages. It is identical to the baseline regression above except that it uses all 64 villages.
- The third regression excludes outlier observations of the dependent variable. Specifically, we drop the top and bottom one percent of non-zero values of the dependent variable. If one of the endpoints of the distribution has a mass point greater than one percent, we do not drop any observations from that end.

3.3 Heterogeneity of Impacts

In the theories that motivate our study, unobserved heterogeneity (i.e., ability, project size, permanent income) is important and leads to heterogeneous impacts of exogenous shifts in intermediation (see Kaboski and Townsend, forthcoming, and Gine and Townsend, 2003, Townsend and Ueda, 2006, for example). Also, impacts can be non-linear and time-varying. Moreover, GE impacts may play a role, and so a precise policy-relevant interpretation of α is limited, and we will not assign one. We view estimates of α as rough but nonetheless informative measures of an average linearized impact of the program on village households, scaled into per baht of credit injected terms.

Still, we are interested in potentially observable heterogeneity in impacts. If women are indeed more constrained, female headed households may be differentially impacted by the program. When estimating the differential impacts of female-headed households, we use an additional interaction term of village fund credit with a dummy variable for female headed households:

$$y_{n,t}=\alpha_1 VFCR_{n,t}+\alpha_2 VFCR_{n,t}*\chi_{female,n}+\sum_{i=1}^{I}\beta_i X_{i,n,t}+\varphi_t+\varphi_n+u_{n,t} \qquad (4)$$

where $\hat{\alpha_2}$ is the differential impact of credit on female-headed households. Our second instrument comes from letting the the impact of inverse village size vary by female headed households in the first-stage.

We also looked at impacts based on two other potential proxies for the degree a household is constrained: tercile of time-averaged income and land-ownership. Households with higher income tend to borrow more (see Kaboski and Townsend, forthcoming), so we conjectured that they may be less constrained by the availability of credit. Similarly, land is necessary to collateralize loans (from commercial banks and also the BAAC), and so landowners may have been less constrained. We found no evidence of differential impacts along either of these dimensions, however, and so we do not report the results.[35]

3.4 Exogeneity of Village Size

Here we focus on evidence of whether inverse village size is plausibly exogenous during the program years. We do so by introducing interactions of the inverse village size variable with the pre-program years, i.e., $invHH_n\chi_{t=j}$ for all $j < 2002$. We scale the coefficients by 1,000,000 to assist comparison by putting them in terms of the transfer per household. We then run a series of F-tests to evaluate the joint significance of these variables. The actual values of the coefficients for four different interactions and our 41 different dependent variables are not reproduced, but they are available in our on-line appendix.

The major point here is that these year-specific village size interactions do not significantly predict outcomes before the program. Of the 41 outcome regressions, only one yielded jointly significant dummies at a five-percent level of significance. The exception is wage income which had a p-value of 0.03. In terms of the individual dummies, income from wage labor is significantly lower in small villages in the year prior to the program, with a coefficient on $invHHn\chi_{t=2001}$ of −0.52 (standard error: 0.21): At a ten percent level, one additional variable is significant, log asset growth with a p-value of 0.09. Asset growth tends to be somewhat smaller in small villages, especially in the year after the crisis, but none of the individual coefficients are significant. The largest is the coefficient on $invHH_n\chi_{t=1998}$ of −3.30e-5 (standard error: 1.91e-5). Even at a much more stringent fifteen-percent level of significance, the dummies were jointly significant for only a third variable: income from crops other than rice. In the case of crop income, none of the individual dummies are significant, but the largest coefficient is again on $invHH_n\chi_{t=2001}$. This value is 0.46 (standard error: 0.51). The signs on the coefficients on wage and crop income change from year to year. Moreover, the frequency of significance is well within the expected rate of type I-errors.

3.5 Multiple Inference

Type I-errors are also a potential issue in our impact estimates, especially given the large number of outcomes we evaluate. Kling et al (2007) and Karlan and Zinman (2010) address these problems in two ways: (1) reducing the number of outcomes by creating indexes, and (2) using family-wise adjusted p-values. Creating indices is less necessary in our analysis since the four main components (credit, consumption, income, and assets) are essentially natural indexes, while the other variables are generally subcomponents of these four. In our tables, we report significance based on individual p-values, but in the text we also note family-wise significance, first for the four main components jointly where a z-statistic of at least 2.23 would lead to a five percent significance level, and next for the subcomponents of credit (13 subcomponents, z-statistic≥2.66), consumption (12, 2.63), income (5, 2.32) and assets/investment (7, 2.44).

3.6 GIS Robustness

Another question of interest is to what extent the impacts of credit spillover to non-borrower households. One interpretation of the above specifications assumes that the effects are only on the borrowing household. Of course, viewing each village as a small (open) economy, we might presume that credit injections could affect even non-borrowing villagers, through internal GE effects, in particular. In this case, a second interpretation of the $\hat{\alpha}$ estimates in

[35]Using a similar village-size identification strategy to evaluate an Indonesian grant program, Yamauchi (2009) finds heterogeneity in impacts across underlying village features. Namely, impacts on labor supply, income and expenditures were greater in villages with local markets and in villages accessible by land.

(1) would be the impact of an additional dollar of credit in the village on the outcome, rather than the impact of directly borrowing an additional dollar on the household's outcome. What is important for this interpretation is that households only benefit from credit injection into its own village. That is, any impacts of credit on non-borrowers must be local to the village.

We test whether it is the local injection of credit into the village that drives our results, or whether neighboring village also has important effects. That is, we construct a GIS control variable for the size of neighboring villages. The control variable is a spatial kernel estimate of the inverse village size (number of households) of neighboring villages (e.g., all villages in a 5 kilometer radius). The second-stage regressions are therefore of the form:

$$y_{n,t}=\alpha VFCR_{n,t}+\sum_{i=1}^{I}\beta_i X_{i,n,t}+\mu invHH_{n,t,neighborhood}*\chi_{t>=2002}+\varphi_t+\varphi_n+\gamma invHH_{t,n}+\varepsilon_{n,t} \quad (5)$$

The results we present are overwhelmingly robust to the inclusion of such a neighborhood control variable. The $\hat{\alpha}$ estimates from regressions of equation (5) are nearly identical to those of equation (1). All significant coefficients are significant in both direction and of very similar magnitude. Even the insignificant estimates are of the same sign in 49 of the 50 estimates again with very similar magnitudes. Finally, the $\hat{\mu}$ estimate was not a strong predictor of outcomes and was significant in only two of the regressions. Villages surrounded by smaller villages are associated with less income from rice farming (coefficient: −1.10, standard error: 0.55) and more from other crops (2.46, 1.31). Neither of these coefficients are significant using the family-wise p-values, however. Again, these results are available in our on-line appendix.

Together, the robustness of our results to the GIS variable support the claim that in the two years after the program's founding, which we study, impacts remained local to the village in the short run, and our view of the experiment on separate village economies appears justified. We note, however, that our GIS variable does pick up significant variation in the longer run estimation described below.

3.7 Long Run Impacts

In the long run, village funds likely have spillovers onto other villages, through migration or wider GE effects, for example. Given this caveat, we examine the long run data. To our knowledge, the results we present, however imperfect, are the only estimates of the long run impact microfinance over five years. For these results, in order to see trends in the overall impact of the program, we present reduced form results rather than two stage estimates. For the same reason, for log assets and net income, we use levels rather than growth as the dependent variable. That is, we use the following equation:

$$y_{n,t}=\sum_{\tau=1}^{T}\omega_\tau invHH_n\chi_{t=\tau}+\sum_{i=1}^{I}\beta_i X_{i,n,t}+\varphi_t+\varphi_n+\varepsilon_{n,t} \quad (6)$$

We scale the estimates $\hat{\omega}_\tau$ by the one million baht injection so that the coefficient are in terms of per baht injected. We interpret the series of $\hat{\omega}_\tau$ as reflecting the changing impact of the program over time. The caveat is that it may confound changing impacts with the changing predictive power of initial village size and/or the changing importance of spillovers. Indeed, the addition of year-specific GIS controls (as in equation (5)) after 2003 into (6) yields jointly significant estimates as well as significant estimates for individual years, generally in the last two years. These estimates were significant for village fund credit, consumption and income, but ω_{τ} estimates do not appear to be significantly affected by inclusion of the controls, as we note in the results section.

4 Results

Table 3 presents estimates of the program's short-term impacts on four key summary variables: credit, consumption, asset growth and income growth. The table reports estimates of α along with standard errors, and significance at the five and ten percent levels is noted. Each of the columns corresponds to a different outcome variable, while the rows correspond to OLS (at the top), the baseline regression, and the regressions with alternative treatment of outliers.

The first column indicates that the flow of total new short-term credit increased. That is, the program was successful in increasing overall credit and did not simply crowd out other sources of credit. There actually is some evidence from the levels regression that the credit injection may have had a multiplier effect (i.e., a baht of credit injected by the village fund led to more than one baht of additional total credit), though none are significantly greater than one at the five percent level.

Similarly, the second column of IV estimates shows substantial and significant increase in consumption levels. Indeed, the estimates suggest that the increased value of consumption is of the same order of magnitude as the credit injection, or even larger with the baseline estimate of an additional 1.71 baht of consumption for every baht of village fund credit injected. The estimate that drops outliers also indicate a large number (1.47). The consumption impacts is not seen in the OLS regression, perhaps because those with lower than typical consumption are more likely to borrow.

The third column indicates some evidence that credit lowered the log growth of assets. Recall assets includes the value of physical assets and financial assets (net of loans). The point estimates are all negative, but only the regression that includes all the villages is statistically significant. Given the average credit of 8900 baht, the baseline point estimate would imply 7 percentage point lower asset growth.

The fourth column indicates that households had higher income growth, significant in three of the regressions. The impact is quite large, with an increase of income of 66 percentage points higher growth for the average household from the first to second year of the program. Recall, however, that the fund injection was large, averaging twelve percent of village income, and this lead to an even greater increase in overall credit. The impact on income growth was short-lived as we discuss in Section 4.5.

To summarize, we see a substantial increase in credit on the order of the size of the injection, a comparable, perhaps larger, increase in consumption, and a higher preponderance of low asset growth, and high income growth. Of these IV impacts, only the impact on consumption (and only in the baseline regression) drops to a ten percent significance level, when the family-wise p-levels are applied.

The large increase in credit may be evidence of credit constraints. The large increase in consumption – of similar magnitude, if not larger, than the increase in credit – is a striking finding. A major argument in favor of credit interventions like the Million Baht Program is that the poor in non-intermediated sectors actually have returns to investment that exceed market interest rates and the returns to investment in the financially-intermediated sector.

The observed large increase in consumption might indicate that the returns are actually highest in consumption. Such behavior is quantitatively consistent with Kaboski and

Townsend (forth-coming)'s structural buffer stock savings model. In this model, two groups increase consumption: consumption-constrained households with short-term liquidity needs, and households with buffer stocks that are larger than necessary after the credit constraint has been relaxed. The second group can make consumption growth exceed credit growth, since they increase consumption without actually borrowing.[36] The intermediation and growth explanation is that constraints are binding on investment and input use and the observed income growth may reflect this. The asset growth might then be a result of households with higher future income intertemporally substituting toward present consumption (as in the intermediation and growth models). Finally, even though we focus on non-durable consumption, the increase in consumption may have an investment aspect to it.

To gain more insight into these issues, we analyze each of the impacts (credit, consumption, and income/assets) more closely below.

4.1 Impact on the Credit Market

In Table 4, we delve more deeply into the impacts of the program on the credit market. For the purpose of comparison, the first column reproduces the results for the impact on total new short-term credit of Table 3. The most salient finding is that credit for consumption increased significantly, and this is robust across all four regressions. (This is the only additional IV impact in Table 3 that remains significant when the family-wise p-level is applied, and this is only at the ten percent level for the baseline.) These consumption loan estimates are substantially less than the total increase in short-term borrowing, and the positive point estimates on credit for other reasons may also be contributing to this total. The increase in credit for fertilizer and pesticides are also sizable, though this increase is only statistically significant in the regression using all villages (and the OLS regression).

Clearly, the reason for borrowing should be ambiguous, since money is fungible across uses. We will see, however, that the consumption (and to some extent investment) borrowing patterns are reflected by actual levels of consumption (investment), while fertilizer usage is not. Fertilizer and pesticide usage may simply be a fallback reason that households give for borrowing; in the past, a large share of loans from the BAAC in the past were given for such use, for example. Related, there is some evidence in Table 4 that borrowing from the BAAC increased as a result of the program.

The final six columns of Table 4 show the effect of the program on other aspects of the credit market: interest rates, default, and informal borrowing. We distinguish between the impact on the credit market in the year the loans were taken, and the impact on the credit market in the year the loans were due. The results indicate that the injection did not appear to have large effects on these aspects of the credit market. First, short-term interest rates did not fall. The baseline impact is insignificant and amounts to less than a basis point for the average household, and the point estimate for the regression with all villages would amount to an increase of one percentage point. The fact that short-term interest rates did not fall is supporting evidence that households were credit constrained. The taking of loans seems to have little effect on default and the use of informal credit. The results for the impact on the credit market in the year of repayment provide some evidence of tighter credit markets, however. Looking at the point estimates, there is some evidence that more households are in default, and face higher interests rates after borrowing, but they do not appear to be resorting

[36]Another potential way that the program could impact non-borrowers consumption is through relending to non-borrowers as in Angelucci and De Georgi, 2006. We do not view such indirect borrowing as an important channel in the Thai context, since we found no substantial or significant increase in household lending to others, whether inside or outside of the village.

more to informal lenders in the year of repayment. Only one lone positive estimate on the probability of default has any level of significance, and this is just at a ten percent level.

4.2 Impact on Consumption

Table 3 showed a substantial impact on consumption, and Table 4 showed that stated borrowing for consumption increased in a similar fashion. We analyze here the impacts on different components of nondurable consumption in Table 5. Durable consumption showed no significant impacts and are therefore not presented.[37] A first observation from Table 5 is that the consumption of several components of nondurables are unaffected by the credit program. The fact that grain, a "necessity" does not increase is perhaps not surprising, but other components such as ceremonies, clothes, and educational expenditures are also not significantly affected. Our result of no measured impact on educational expenditures should not be construed as evidence against credit constraints in educational investment, since an increase in the opportunity cost of going to school may have offset the reduced cost from credit constraints.

The components with the largest responses to the credit programs are housing repair and vehicle repair, which are investment-like in the sense that they have a durable aspect to them. Housing repair expenditures are sizable but infrequent, and so do not show up in the regression using dummy variables. The baseline estimates indicate that a baht of village fund credit led to 1.33 baht of expenditures on household repair and 0.18 baht on vehicle repair. To the extent that vehicles are necessary inputs into production or transportation to jobs, such repairs may be investments with high returns rather than consumption. Karlan and Zinman (2008) make a similar argument in their assessment of transportation expenditures.

The other components with statistically significant increases are spending on alcohol consumed at home (0.08 baht per baht of credit). The positive impacts on tobacco (0.06) and meat consumption (0.03) are only marginally significant in the baseline, and the alternative specifications find some evidence of significant increases on dairy and eating out. However, none of these are significant with family-wise p-values. Indeed only the impact on vehicle repair in the bottom row is significant at a five percent level using these p-values, while the other impacts on vehicle repair as well as the impact on alcohol in the home and home repair drop to a ten percent significance level.

We find the breakout of consumption of great interest, since the components that policy makers might particularly associate with waste (e.g. alcohol, tobacco, clothing) show relatively small increases, while again the repair services, which have an aspect of investment to them, show the largest response.

4.3 Impact on Productive Activities

Recall that in Table 3, we saw that income growth increased as a result of the village fund credit. Table 6 examines this in more detail by showing impact estimates for income, investment and input use. In the first three columns, we examine the effect of village fund credit on income generated from the most important sources of earned income: business profits, wage/salary labor income, and agricultural income from rice, other crops and livestock.

There is some evidence that wage income, and perhaps business profits, increased in response to the program. The marginally significant point estimate on wage income indicates an increase of 1.25 baht in wage income for every baht of village fund credit. The

[37]This differs in an important way from the results of Banerjee et al (2010) for microfinance in India.

estimate on business profits is of similar magnitude, but it is only in the regression using all villages. (This impact is the only additional IV impact in Table 3 that remains significant under the family-wise p-values, and it remains at the five percent level.) We see no significant increase in income from rice and other crops, and indeed in alternative regressions that look at the fraction of income, these sources show a statistically significant decline. The increase in business and wage income relative to agriculture is broadly consistent with the models of intermediation, entrepreneurship, and growth, and the stated aims of the program.

On the other hand, the results in the middle columns on measures of investment and input use do not support a story in which credit is needed for either start-up costs or business investment. Specifically, the last five columns focus on this investment behavior and the use of inputs. We see no significant impact on business starts. The lack of significance may simply be due to a lack of power. Less than five percent of the sample start new businesses. The point estimates are all positive, and the baseline would imply three higher percentage points for the average household. The coefficient on business investment is actually negative, however, and we do not find a large effect on the probability of investing, or even wages paid. The evidence of an increase in wages earned, and some evidence of an increase in business profits, is puzzling since no measures of investment, intermediates, or payments to labor appear to have increased.

The increase in income, and large increase in consumption, despite few measured impacts on investments is potentially puzzling. Karlan and Zinman (2010) find a similar result. At least two potential explanations exist, though there are doubtless others. First, our companion paper shows that such the large increase in consumption can be quantitatively explainable through buffer stock dynamics, and that investment increases are difficult to discern in our sample size because of the noisiness of the data. Second, Buera, Kaboski and Shin (2011) show that GE increases in wages from improved allocative efficiency can lead to redistribution from high- to low-saving households. That is, an increase in consumption can increase without aggregate changes in investment.[38]

An increase in the actual wage rate is a strong prediction of models of intermediation, entrepreneurship and growth, however, and we therefore examine the evidence for wage rate increases a little more directly. Although the annual data does not have separate data on wages, the monthly panel provides direct evidence of a GE effect on prices (i.e., wages) from the program. The monthly data distinguish between days of labor supply and daily wages by activity, but it is a smaller sample of (16) villages, and the very high frequency of the data creates timing issues (e.g., should credit affect outcomes in the month it is disbursed, some period after disbursement, or for the loan period, or after it is repaid?). Using regressions that best replicate the annual data, the monthly data corroborates the significant positive impact we found on income growth.[39] These results are available in our on-line appendix. The main point is that we view these data as informative.

Analogous regressions with the level of log wages as the dependent variable of interest yield quite interesting results as shown in Table 7. In the first column, we find a robust impact on the overall level of wages across occupations. The baseline estimate amounts to an increase of almost 7 percentage points for the average household. This is both qualitatively and

[38]Studying the same program, Boonperm et al (2009) find increases in consumption only using log consumption, which they interpret as evidence that consumption growth is concentrated among the poor.

[39]The credit variable is a point in time stock of outstanding short-term credit, while the outcome variables are the twelve month growth in total income and income by source twelve months later. We include household and time fixed effect, but, lacking data on time-varying data on head of household characteristics and household composition in these data, we instead add a quadratic in assets as a substitute control for these changes.

quantitatively consistent with the comparably-sized hypothetical microfinance simulations of Buera, Kaboski, and Shin (2011) which yield wage increases of 5–10 percent.

We delve into which occupations or types of labor experienced wage increases in the remaining columns. Agricultural wages decline substantially, which is somewhat surprising, but the other impacts are all consistent with expectations from theory. We find no impacts in government or professional work, construction outside of the village, and factory work. White-collar employers and factories are unlikely to be financed by small microfinance loans, and all three are likely to be performed outside of the village. In contrast, there are significant positive impacts on wages in general-non agricultural work, construction in the village, and “other”. The impact on construction wages is particularly interesting because it is only evident for local wages. Wages for construction work in other counties (including Bangkok) do not increase. This is consistent with the idea of village economies, with (partially) segmented labor markets, and also with the increases in the consumption of household repairs found above.

4.4 Differential Impact on Women

We examined whether the impacts of credit were significantly different for female-headed households using all of the outcome measures. Overall, perhaps the most surprising result that female-headed households behave similarly to households headed by males. We found no significant differential impacts of the village fund on female headed household with respect to credit or agricultural income. The only significant differential impacts were on the sources of income, and the distribution of consumption. Table 8 summarizes these impact results, i.e., estimates of $\hat{\alpha}_2$ in equation (4).

Looking at the sources of income, the only significant difference between male- and female-headed households is that credit causes a relatively larger positive impact on business income for female-headed households, but this just at a ten percent level in the full sample of villages.

Their are also significant responses of female-headed households is in their consumption patterns, but not in the ways typically argued in the literature. In other countries, the literature (e.g., Pitt and Khandker, 1998) has found that men tend to spend money on things such as alcohol, while women’s spending patterns are directed toward children. Our results in Thailand differ. For example, there is no difference in expenditures on children’s education in response to credit. There is also some evidence that female-headed households shift consumption toward clothing and especially meat, and less on home repairs. Finally, we do find that female-headed households shift consumption less toward alcohol consumed outside of the home, but this is balanced by their increased consumption of alcohol in the home, where it is more culturally acceptable.

4.5 Long Run Impact

Table 9 presents the long run results, which incorporate a balanced panel on all eleven years of data. There are several patterns of interest. First, village funds were relatively successful in lending over time, as evidenced by the first three columns. The average amount of village fund credit grows over time, and the amount of village fund credit in default as a fraction of total credit is relatively low and stable, 0.04 or less, except 2005, when it rose to 9 percent. The third column shows the coefficient on village size in a village fund credit regression, respectively, which also shows an increase. Thus, our assumption that households viewed this as a lasting credit program rather than a short-lived gift is not unfounded.

Second, the program led to an even larger long term expansion of overall credit, though default also became more prevalent. The fourth column shows the significant increase in overall short-term credit. The ratios of the impacts on overall credit to village fund credit fluctuate between 1.6 and 2.7. The prevalence of default on any credit decreases in the first year, and the increases thereafter, with significantly higher default in alternating years.

Third, the increase in consumption is short lived, lasting only the first four years, and it also show an alternating pattern, where consumption is higher in years where default is higher. The increase in consumption is not significant under this specification, however. In the two-stage specification, the response of consumption to village fund credit is significantly positive as in Table 1 but only in the first two years. A transitory increase in consumption is consistent with bufferstock savings dynamics in response to a relaxed borrowing constraint. Finally, the point estimates on log assets is positive in all years but insignificant, while the impact on net income appears to follow the alternating years pattern, where high income coincides with high consumption and default. Nevertheless, only the initial impact on income is significant. In sum, the program seemed to have large persistent impacts on credit, but transient impacts on consumption and income. Finally, we note the drop in credit, consumption, and income and the dramatic increase in default during the last year. This increase in default amounts to almost a doubling of default rates. This was the year of unrest following the coup and ousting of Thaksin, which appears to have affected repayment.

In sum, the increase in credit appears to have been persistent (at least until the coup), but the impacts on consumption and income were short-lived. These results are robust to the inclusion of GIS controls for average village size in surrounding villages, although these controls do yields significant estimates in later years. Specifically, villages surrounded by large villages showed an increase in income and consumption. While these controls tended to lower standard errors, the point estimates were quite similar and not statistically distinguishable. Results are available in the on-line appendix.

5 Conclusions

The Million Baht Village Fund injection of microcredit in villages had the desired effect of increasing overall credit in the economy. Households responded by borrowing more and consuming more, yet earning more as well. The village fund credit had a short-term effect of increasing future incomes, and making business and market labor more important sources of income. The increased borrowing and short-lived consumption response, despite no decline in interest rates, point to a relaxation of credit constraints. The increased labor income and especially wage rates indicate important spillover effects that may have also affected non-borrowers.

The large increase in borrowing and consumption are broadly consistent with buffer stock models of credit constrained households. Our companion paper develops this link more explicitly and in a quantitative fashion, but the reduced form analysis of this paper shows that the composition of consumption increases is not only toward luxury goods but also repairs. Similarly, the increase in income, and the increasing importance of business and labor income are consistent with models of intermediation and growth. The GE impact on wages that we discover offers more credence to these models, where rising wages play an important role.

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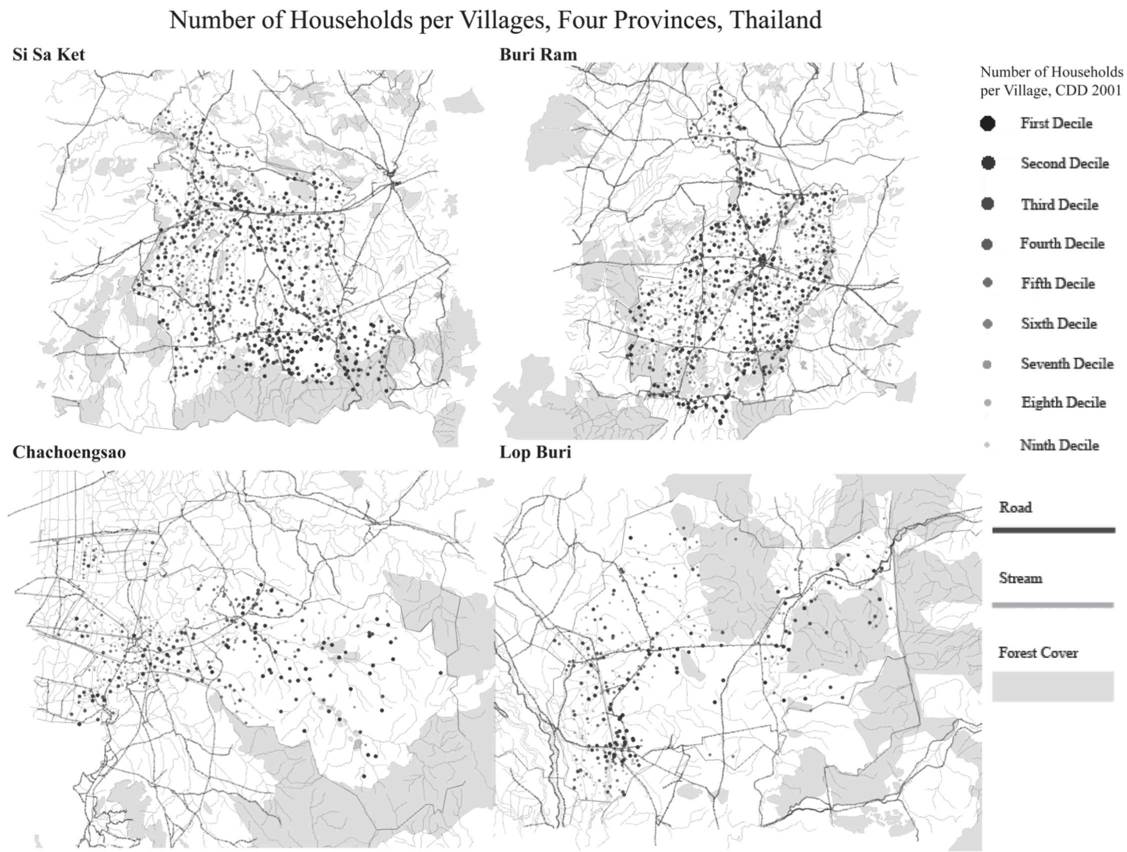
Number of Households per Villages, Four Provinces, Thailand
Si Sa Ket
Buri Ram
Chachoengsao
Lop Buri
Number of Households per Village, CDD 2001
First Decile
Second Decile
Third Decile
Fourth Decile
Fifth Decile
Sixth Decile
Seventh Decile
Eighth Decile
Ninth Decile
Road
Stream
Forest Cover

Figure 1.

Table 1

Summary Statistics of Relevant Household Level Data, 1997–2003

	No of Obs.	Mean	Std Dev	Cross-Sectional Std. Dev.
Short-Term Credit Variables				
New Short-Term Credit (Total)	5,831	20,900	50,600	34,200
Village Fund Credit, Post-program	*1,666*	*9,000*	*10,300*	*8,800*
Vill. Fund Loan Received Dummy, Post-progran	*1,666*	*0.54*	*0.50*	*0.43*
BAAC/Ag Coop Credit	5,831	11,000	30,900	18,900
Commercial Bank Credit	5,831	300	7,000	2,900
Informal Credit	5,831	5,600	31,800	21,700
Credit for Agricultural Investment	5,831	1,400	10,000	4,500
Credit for Business Investment	5,831	3,600	31,900	23,000
Credit for Fertilizer, Pesticides, etc.	5,831	10,100	33,200	21,600
Credit for Consumption	5,831	8,300	24,600	13,500
Credit Market Indicators				
Average Short-Term Credit Interest Rate	2,982	0.095	0.139	0.104
Dummy for Credit in Default	5,831	0.23	0.42	0.19
Consumption Variables				
Total Consumption	5,767	75,300	101,500	68,300
Education	5,784	5,200	11,000	8,300
Grain	5,767	8,900	11,300	5,200
Dairy	5,767	2,100	4,400	2,600
Meat	5,767	4,100	4,700	2,900
Alcohol at Home	5,767	1,900	4,800	3,200
Alcohol Out of home	5,767	900	3,600	2,200
Fuel	5,767	5,000	11,400	7,500
Tobacco	5,767	1,100	3,000	2,100
Ceremony	5,767	5,200	13,000	5,400
House Repair	5,784	6,300	37.000	15,300
Vehicle Repair	5,784	2,100	8,100	4,300
Clothes	5,784	1,500	2,500	1,700
Eating Out	5,784	1,900	5,400	3,100
Income and Asset Variables				
(Total) Net Income	5,825	96,900	193,500	144,400
Business Income	5,825	16,500	148,600	97,200
Wage and Salary Income	5,808	31,500	65,000	57,900
Gross Income from Rice Farming	5,808	20,800	37,000	31,100
Gross Income from Other Crops	5,808	21,200	95,100	60,200
Gross Income from Livestock	5,808	6,956	50,600	36,400
Gross Assets (incl. savings)	5,614	1,577,000	4,108,000	2,774,500

	No of Obs.	Mean	Std Dev	Cross-Sectional Std. Dev.
Investment and Input Uses Variables				
Number of New Businesses	5,823	0.05	0.24	0.10
Business Investment	5,831	3,400	48,400	29,600
Agricultural Investment	5,824	3,300	28,600	13,300
Expenditure on Fertilizer, Pesticides, etc.	5,825	9,100	20,700	14,500
Total Wages Paid	5,825	8,400	32,900	22,600
Other Control Variables				
Male Head of Household Dummy	5,790	0.73	0.44	0.42
Age of Head	5,790	53.7	13.4	12.9
Years of Education of Head	5,679	6.15	3.17	2.99
Number of Male Adults in Household	5,790	1.45	0.90	0.75
Number of Female Adults in Household	5,790	1.56	0.76	0.62
Number of Kids in Household	5,790	1.54	1.20	1.03
Farming Dummy for Household Head’s Primary Occupation	5,831	0.61	0.49	0.38
Instrument				
Inverse Village Size	5,831	0.010	0.006	0.006

Table 2

Sample Regression – Two-Stage Household Fixed-Effect Estimate of the Impact of Current Level of Village Fund Credit on New Short-Term Credit Level

First Stage: Village Fund Credit on Instruments	Coeff.	Std. Err.	z-statistc
Year=1998 Dummy	40	210	0.18
Year=1999 Dummy	110	240	0.48
Year=2000 Dummy	60	240	0.25
Year=2001 Dummy	120	240	0.49
Year=2002 Dummy	4,020 **	1680	2.40
Year=2003 Dummy	1,450	1040	1.40
Number of Adult Males in Household	−90	160	−0.59
Number of Adult Females in Household	610 **	210	2.90
Number of Children (< 18 years) in Household	180	150	1.19
Male Head of Household	1040 *	570	1.84
Head of Household’s Primary Occupation is Farming	20	280	0.06
Age of Head	260 **	130	2.01
Age of Head Squared	−2.55 **	1.10	−2.33
Years of Education – Head of Household	−2.64	70	0.04
Interaction of Inverse Village Size and Year=2002 Dummy	463,900 **	192,500	2.4
Interaction of Inverse Village Size and Year=2003 Dummy	853,700 **	98,300	8.7
Number of Observations/Groups		4,960 / 715	
Second Stage: New Short-Term Credit on Predicted Village Fund Credit			
Year=1998 Dummy	7,300 **	2,190	3.33
Year=1999 Dummy	8,660 **	2,700	3.21
Year=2000 Dummy	6,180 **	3,110	1.99
Year=2001 Dummy	7,960 **	3,620	2.20
Year=2002 Dummy	−3,000	6,280	−0.48
Year=2003 Dummy	−4,580	7,020	−0.65
Number of Adult Males in Household	2,420 **	1,590	1.93
Number of Adult Females in Household	1670	1,030	1.05
Number of Children (< 18 years) in Household	550	880	0.53
Male Head of Household	12,010 **	5,740	2.09
Head of Household’s Primary Occupation is Farming	−3530	2,090	−1.69
Age of Head	100	1,320	0.02
Age of Head Squared	−0.32	10.00	−0.01
Years of Education - Head of Household	−350	500	−0.82
Village Fund Credit (predicted)	1.92 **	0.67	2.85

First Stage: Village Fund Credit on Instruments	Coeff.	Std. Err.	z-statistc
Number of Observation/Groups		4,960 / 715	

Note:

** indicates significance at 5%,

* indicates significance at 10%

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Table 3

Summary: The Impact of Village Fund Credit

Response Variable / Technique	New Short-Term Credit Level	Consumption Level	Asset Growth Rate	Net Income Growth Rate
OLS Regression	1.28** (0.13)	0.22 (0.20)	−1.08e-6 (2.77e-6)	1.16e-5** (3.82e-6)
Baseline IV Regression: Only Villages With 50–200 Households	1.92** (0.67)	1.71** (0.88)	−7.30e-6 (1.63e-5)	7.37e-5** (3.30e-6)
IV Regression using All Villages	1.38** (0.37)	2.40** (0.63)	−2.09–5** (9.89e-6)	2.11e-5 (1.32e-5)
IV Regression without 1% Outliers	1.39** (0.46)	1.47** (0.57)	−1.31e-5 (1.40e-5)	6.99e-5** (3.04e-5)

** Significant at 5% level

* Significant at 10% level

The independent variables are year dummies, household fixed effect dummies, male head of household dummy, number of adult males, number of adult females, number of kids, age of head and age of head squared, and years of schooling of head. The treatment variable is the level of short-term village fund credit. The additional instruments in the first-stage are the inverse village size interacted with a dummy variable for year=2002 and year=2003. Standard errors for are robust standard errors clustered by village-year.

Table 4

Impact of Village Fund Credit on Other Credit, Interest Rate, and Default

Response Variable	New Short-Term Credit	Other Formal Credit		Stated Reasons for Borrowing				Credit Market Indicators					
								Year Borrowing			Year After Borrowing		
Technique		BAAC/Ag. Coop Credit	Commercial Bank Credit	Credit for Agricultural Investment	Credit for Business Investment	Credit for Fert., Pest., etc.	Credit for Consumption	Avg. Short-Term Credit Interest Rate	Probability of Short-Term Credit in Default	Informal Credit	Avg. Short-Term Credit Interest Rate†	Probability of Short-Term Credit in Default†	Informal Credit†
OLS Regression	1.28** (0.13)	0.25** (0.10)	−0.00 (0.01)	0.08 (0.05)	0.18* (0.09)	0.52** (0.13)	0.56** (0.11)	−5.93e-7 (3.97e-7)	−2.52e-8 (1.07e-6)	−0.01 (0.07)	1.37e-9 (4.48e-7)	1.10e-6 (1.79e-6)	0.01 (0.09)
Baseline IV Regression: Only Villages With 50–200 Households	1.92** (0.67)	0.80 (0.69)	0.08 (0.07)	0.00 (0.15)	0.27 (0.26)	0.80 (0.66)	0.80** (0.38)	−7.90e-8 (2.32e-6)	6.37e-6 (5.31e-6)	−0.22 (0.28)	2.06e-7 (5.50e-6)	1.38e-5 (1.01e-5)	−0.47 (0.59)
IV Regression using All Villages	1.38** (0.37)	0.51* (0.31)	0.01 (0.05)	0.03 (0.07)	0.15 (0.14)	0.63** (0.30)	0.70** (0.22)	1.05e-6 (1.06e-6)	1.03e-6 (3.29e-6)	−0.27 (0.18)	2.49e-6 (1.84e-6)	6.67e-6* (3.77e-6)	−0.20 (0.22)
IV Regression without 1% Outliers	1.39** (046)	0.37 (0.49)	0.08 (0.07)	0.02 (0.12)	0.16 (0.23)	0.17 (0.34)	0.72** (0.28)	5.72e-7 (1.84e-6)	††	−0.11 (0.26)	2.10e-6 (4.82e-6)	††	−0.40 (0.59)

** Significant at 5% level

* Significant at 10% level

The independent variables are year dummies, household fixed effect dummies, male head of household dummy, number of adult males, number of adult females, number of kids, age of head and age of head squared, and years of schooling of head. The treatment variable is the level of short-term village fund credit. The fertilizer credit regressions also contain the area of cultivated land as an explanatory variable. The additional instruments in the first-stage are the inverse village size interacted with a dummy variable for year=2002 and year=2003. Standard errors for are robust standard errors clustered by village-year.

† Regressions are based on specification (3), where the treatment variable is the level of *lagged* village credit.

Table 5

Impact of Village Fund Credit on Consumption and its Components

Response Variable	Total	Components of Consumption											
Technique		**Education**	**Grain**	**Dairy**	**Meat**	**Alcohol Home**	**Alcohol Out**	**Fuel**	**Tobacco**	**Ceremony**	**House Repair**	**Vehicle Repair**	**Clothes**	**Eating Out**
OLS Regression	0.22 (0.20)	0.02 (0.02)	−0.02 (0.02)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.00 (0.01)	0.06** (0.02)	−0.00 (0.01)	−0.01 (0.02)	−0.02 (0.13)	0.03 (0.03)	0.00 (0.00)	−0.01 (0.01)
Baseline IV Regression: Only Villages With 50–200 Households	1.71** (0.88)	0.11 (0.09)	0.04 (0.09)	0.05 (0.04)	0.06* (0.04)	0.08** (0.03)	0.02 (0.04)	−0.07 (0.12)	0.03* (0.02)	−0.02 (0.12)	1.33** (0.62)	0.18** (0.07)	−0.00 (0.02)	0.05 (0.03)
IV Regression using All Villages	2.40** (0.63)	0.07 (0.06)	0.05 (0.05)	0.06* (0.03)	0.04 (0.03)	0.03 (0.04)	0.03 (0.03)	0.11 (0.09)	0.03 (0.02)	−0.04 (0.07)	0.70* (0.36)	0.14** (0.07)	0.02 (0.01)	−0.00 (0.03)
IV Regression without 1% Outliers	1.47** (0.57)	0.04 (0.07)	−0.03 (0.05)	0.03 (0.04)	0.03 (0.03)	0.06** (0.03)	0.03 (0.03)	0.03 (0.07)	0.03* (0.01)	−0.04 (0.04)	0.56** (0.26)	0.06** (0.02)	0.01 (0.01)	0.05** (0.02)

** Significant at 5% level

* Significant at 10% level

The independent variables are year dummies, household fixed effect dummies, male head of household dummy, number of adult males, number of adult females, number of kids, age of head and age of head squared, and years of schooling of head. The treatment variable is the level of short-term village fund credit. The additional instruments in the first-stage are the inverse village size interacted with a dummy variable for year=2002 and year=2003. Standard errors for are robust standard errors clustered by village-year.

Table 6

Impact of Village Fund Credit on Productive Activities

Response Variable	Components of Income					Investment and Input Uses						
Technique	**Business Profits**	**Wage and Salary**	**Rice Farming**	**Other Crops**	**Livestock**	**Number of New Businesses**	**Amount of Business Investment**	**Probability of Business Investment**	**Amount of Agric. Investment**	**Probability of Agric. Investment**	**Total Wages Paid**	**Fert., Pest., etc. Expenditures**
OLS Regression	0.69 (0.46)	0.18** (0.09)	0.19* (0.10)	0.40 (0.39)	0.16 (0.17)	−1.10e-6* (6.33e-7)	0.01 (0.10)	−8.94e-8 (5.82e-7)	−0.10 (0.10)	5.99e-7 (7.34e-7)	0.04 (0.08)	0.10 (0.06)
Baseline IV Regression: Only Villages With 50–200 Households	1.07 (1.61)	1.25* (0.66)	0.21 (0.56)	1.03 (1.14)	1.89 (2.09)	3.67e-6 (3.06e-6)	−0.33 (0.40)	6.52e-7 (2.93e-6)	−0.04 (0.38)	1.94e-6 (3.18e-6)	−0.24 (0.31)	−0.13 (0.31)
IV Regression using All Villages	1.64** (0.70)	0.66* (0.39)	−0.10 (0.24)	−0.02 (0.63)	0.67 (0.83)	8.39e-7 (2.18e-6)	−0.12 (0.19)	−3.18e-8 (2.14e-6)	−0.15 (0.18)	4.33e-6* (2.70e-6)	−0.22 (0.16)	−0.30 (0.24)
IV Regression without 1% Outliers	0.97 (1.32)	1.26** (0.65)	0.36 (0.40)	−0.98 (1.28)	0.88 (0.60)	3.67e-6 (3.06e-6)	−0.01 (0.17)	--	0.25 (0.25)	--	0.11 (0.16)	−0.11 (0.15)

** Significant at 5% level

* Significant at 10% level

The independent variables are year dummies, household fixed effect dummies, male head of household dummy, number of adult males, number of adult females, number of kids, age of head and age of head squared, and years of schooling of head. The treatment variable is the level of short-term village fund credit. The additional instruments in the first-stage are the inverse village size interacted with a dummy variable for year=2002 and year=2003. The fertilizer expenditure regressions also contain the area of cultivated land as an explanatory variable. Standard errors for are robust standard errors clustered by village-year.

Table 7

Impact on Log Wages in the Monthly Panel

Response Variable	Overall Log Wage Rate	Log Wage Rates by Occupation							
Technique		**Agriculture**	**Factory**	**Merchant**	**Govt. and Prof.**	**General Non-Agric.**	**Constr. Within Village**	**Constr. Outside County**	**Other**
Number of Observations	12,283	2123	2069	109	3101	934	311	119	2605
OLS Regression	6.64e-7 (1.41e-6)	1.06e-6 (3.23e-6)	−3.75e-6* (2.11e-6)	−6.10e-6 (5.34e-6)	−4.92e-7 (1.54e-6)	1.49e-6 (5.41e-6)	3.06e-6 (3.38e-6)	−1.19e-5 (1.56e-5)	4.70e-6* (2.55e-6)
Baseline IV Regression	7.43e-6** (2.62e-6)	−1.08e-5* (5.76e-6)	−3.77e-6** (1.90e-6)	−1.17e-5 (9.85e-06)	6.69e-6 (6.60e-6)	1.71e-5** (7.34e-6)	2.87e-5** (1.39e-5)	−7.00e-6 (2.0e-5)	−4.33e-7 (4.80e-6)
IV Regression without 1% Outliers	9.17e-6** (2.47e-6)	−1.46e-5** (4.86e-6)	−3.62e-6** (1.83e-6)	6.38e-6 (6.63e-6)	7.66e-6 (6.66e-6)	1.57e-5** (6.78e-6)	1.16e-5 (8.88e-6)	−5.48e-6 (1.96e-5)	1.91e-6 (4.30e-6)

** Significant at 5% level

* Significant at 10% level

The independent variables are year dummies, household fixed effect dummies, and assets and assets squared. The latter is a substitute for the lack of time-varying data on household composition and head-of-household characteristics, which we lack in these data. The treatment variable is the 12-month-lagged stock of short-term village fund credit. The additional instruments in the first-stage are the inverse village size interacted with dummy variables for months after the fund was started. Standard errors for are robust standard errors clustered by village.

Table 8

Differential Impact of Village Fund Credit on Income Sources and Consumption Components of Female-Head Household

Response Variable	Income		Components of Consumption						
Technique	**Business Profits**	**Wage and Salary**	**Education**	**Meat**	**Alcohol Home**	**Alcohol Out**	**House Repair**	**Vehicle Repair**	**Clothes**
OLS Regression: Only Villages With 50–200 Households	−0.90 (0.69)	0.08 (0.18)	−0.01 (0.03)	0.02 (0.02)	0.00 (0.01)	−0.03* (0.01)	−0.37** (0.14)	0.00 (0.05)	0.01 (0.01)
Baseline IV Regression: Only Villages With 50–200 Households	−0.77 (0.61)	0.31 (0.40)	−0.01 (0.06)	0.07* (0.03)	0.04* (0.02)	−0.05** (0.02)	−0.01 (0.38)	0.01 (0.07)	0.02 (0.01)
IV Regression using All Villages	−0.90* (0.52)	0.40 (0.31)	0.02 (0.06)	0.07** (0.02)	0.04 (0.02)	−0.04** (0.02)	−0.14 (0.32)	0.05 (0.067	0.03** (0.01)
IV Regression without 1% Outliers	−0.61 (0.38)	0.39 (0.40)	−0.02 (0.04)	0.04** (0.02)	0.03* (0.02)	−0.03** (0.01)	−0.25** (0.12)	0.01 (0.02)	0.00 (0.01)

** Significant at 5% level

* Significant at 10% level

The independent variables are year dummies, household fixed effect dummies, male head of household dummy, number of adult males, number of adult females, number of kids, age of head and age of head squared, years of schooling of head, and inverse number of households in village. The treatment variable is the change in short-term village fund credit. The additional instruments in the first-stage are the inverse village size interacted with a dummy variable for year=2002 and year=2003.

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Table 9

Long Term Impacts

Response Variable	Amount of Village Fund Credit per Household	Fraction of Village Fund Credit in Default	Response Variables					
Year			Village Fund Credit	New Short-Term Credit Level	Probability in Default	Consumption Level	Log Assets	Level of Net Income
Year 1 (2002)	810	0.01	0.52** (0.20)	1.25** (0.55)	−1.41e-5 (9.86e-6)	0.93 (0.76)	--	--
Year 2 (2003)	990	0.03	0.95** (0.12)	1.51** (0.67)	1.02e-5* (5.33e-6)	1.47 (0.91)	4.25e-6 (7.81e-6)	3.61** (1.37)
Year 3 (2004)	1600	0.02	1.40** (0.28)	2.92** (1.10)	9.18e-7 (4.64e-6)	0.39 (1.00)	1.23e-5 (8.29e-6)	−2.12 (1.74)
Year 4 (2005)	1840	0.09	1.69** (0.22)	4.08** (1.21)	1.06e-5** (3.77e-6)	1.54 (1.05)	2.65e-6 (7.62e-6)	2.35 (2.39)
Year 5 (2006)	1910	0.04	1.70** (0.20)	4.60** (1.44)	4.30e-6 (3.58e-6)	−0.00 (0.92)	1.62e-6 (8.80e-6)	0.96 (1.32)
Year 6 (2007)	1140	0.04	0.94** (0.15)	1.74** (0.69)	1.96e-5** (6.66e-6)	−0.00 (0.74)	9.54e-6 (1.04e-5)	−1.43 (1.77)

** Significant at 5% level

* Significant at 10% level

The independent variables are year dummies, household fixed effect dummies, male head of household dummy, number of adult males, number of adult females, number of kids, age of head and age of head squared, years of schooling of head, gross assets and gross assets squared, income, and inverse number of households in village. The treatment variable is the level of short-term village fund credit. The additional instruments in the first-stage are the inverse village size interacted with a dummy variable for year=2002 and year=2003.

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A Structural Evaluation of a Large-Scale Quasi-Experimental Microfinance Initiative

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Abstract

This paper uses a structural model to understand, predict, and evaluate the impact of an exogenous microcredit intervention program, the Thai Million Baht Village Fund program. We model household decisions in the face of borrowing constraints, income uncertainty, and high-yield indivisible investment opportunities. After estimation of parameters using pre-program data, we evaluate the model's ability to predict and interpret the impact of the village fund intervention. Simulations from the model mirror the data in yielding a greater increase in consumption than credit, which is interpreted as evidence of credit constraints. A cost-benefit analysis using the model indicates that some households value the program much more than its per household cost, but overall the program costs 20 percent more than the sum of these benefits.

1 Introduction

This paper uses a structural model to understand, predict, and evaluate the impact of an exogenous microcredit intervention program, the Thai Million Baht Village Fund program. Understanding and evaluating microfinance interventions, especially such a large scale government program, is a matter of great importance. Proponents argue that microfinance allows the provision of credit that is both effective in fighting poverty and more financially viable than other means; detractors point to high default rates, reliance on (implicit and explicit) subsidies, and the lack of hard evidence of their impacts on households. The few efforts to evaluate the impacts of microfinance institutions using reduced form methods and plausibly exogenous data have produced mixed and even contradictory results.1 To our knowledge, this is the first structural attempt to model and evaluate the impact of microfinance. Three key advantages of the structural approach are the potential for quantitative interpretation of the data, counterfactual policy/out of sample prediction, and well-defined normative program evaluation.

The Thai Million Baht Village fund program is one of the largest scale government microfinance initiatives of its kind.2 Started in 2001, the program involved the transfer of one million baht to each of the nearly 80,000 villages in Thailand to start village banks. The transfers themselves sum to about 1.5 percent of Thai GDP and substantially increased available credit. We study a panel of 960 households from sixty-four rural Thai villages in

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[1]Pitt and Khandker (1998), Pitt et al (2003), Morduch (1998), Coleman (1999), Gertler, Levine and Moretti (2003), Karlan and Zinman (2006), and Banerjee et al (2009) are examples. Kaboski and Townsend (2005) estimates positive impacts of microfinance in Thailand using non-experimental data.

the Townsend Thai Survey (Townsend et al, 1997). In these villages, funds were founded between the 2001 and 2002 survey years, and village fund loans amounted to eighty percent of new short-term loans and one third of total short-term credit in the 2002 data. If we count village funds as part of the formal sector, participation in the formal credit sector jumps from 60 to 80 percent.

Though not a randomized treatment, the program is viewed as a quasi-experiment that produced plausibly exogenous variation in credit over time and across villages. The program was unanticipated and rapidly introduced. More importantly, the total amount of funding given to each village was the same (one million baht) regardless of the number of households in the village. Although village size shows considerable variation within the rural regions we study, villages are administrative geopolitical units and are often subdivided or joined for administrative or political purposes. Indeed, using GIS maps, we have verified that village size patterns are not much related to underlying geographic features and vary from year to year in biannual data. Hence, there are a priori grounds for believing that this variation and the magnitude of the per capita intervention is exogenous with respect to the relevant variables. Finally, village size is not significantly related to pre-existing differences (in levels or trends) in credit market or relevant outcome variables.

Our companion paper, Kaboski and Townsend (2008), examines impacts of the program using a reduced form regression approach and many of the impacts are puzzling without an explicit theory of credit-constrained behavior.[3] In particular, households increased their borrowing and their consumption roughly one for one with each dollar put into the funds. A perfect credit model, such as a permanent income model, would have trouble explaining the large increase in borrowing, since reported interest rates on borrowing did not fall as a result of the program. Similarly, even if households treated loans as a shock to income rather than a loan, they would only consume the interest of the shock (roughly seven percent) perpetually. Moreover, households were not initially more likely in default after the program was introduced, despite the increase in borrowing. Finally, household investment is an important aspect of household behavior. We observe an increase in the frequency of investment, but, oddly, impacts of the program on the *level* of investment were difficult to discern. This is *a priori* puzzling in a model with divisible investment, if credit constraints are deemed to play an important role.

The structural model we develop in this paper here sheds light on many of these findings. Given the prevalence of income shocks that are not fully insured in these villages (see Chiappori et al. (2008)), we start with a standard precautionary savings model (e.g., Aiyagari (1994), Carroll (1997), Deaton (1991)). We then add important features central to the evaluation of microfinance but also key characteristics of the pre-program data: borrowing, default, investment, and growth. Short-term borrowing exists but is limited, and so we naturally allow borrowing but only up to limits. Similarly, default exists in equilibrium, as does renegotiation of payment terms, and so our model incorporates default. Investment is relatively infrequent in the data but is sizable when it occurs. To capture this lumpiness, we allow households to make investments in indivisible, illiquid, high yield projects whose size follows an unobserved stochastic process.[4] Finally, income growth is high but variable, averaging 7 percent but varying greatly over households, even after

[2]The Thai program involves approximately $1.8 billion in initial funds. This injection of credit into the rural sector is much smaller than Brazilian experience in the 1970s, which saw a growth in credit from about $2 billion in 1970 to $20.5 billion in 1979. However, in terms of a government program implemented through village institutions and using micro-lending techniques, the only comparable government program in terms of scale would be Indonesia's KUPEDES village bank program, which was started in 1984 at a cost of $20 million and supplemented by an additional $107 million in 1987. (World Bank, 1996)

[3]This companion paper also provides additional evidence on the exogeneity of village size, examines impacts in greater detail, and looks for general equilibrium effects on wages and interest rates.

controlling for life cycle trends. Allowing for growth requires writing a model that is homogeneous in the permanent component of income, so that a suitably normalized version attains a steady state solution, giving us time-invariant value functions and (normalized) policy functions.

In an attempt to *quantitatively* match central features of the environment, we estimate the model using a Method of Simulated Moments (MSM) on only the *pre-program* data. The parsimonious model broadly reproduces many important aspects of the data, closely matching consumption and investment levels, and investment and default probabilities. Nonetheless, two features of the model are less successful, and the overidentifying restrictions of the model are rejected.5

For our purposes, however, a more relevant test of the estimated model's usefulness is its ability to predict out-of-sample responses to an increase in available credit, namely the village fund intervention. Methodologically, we model the microfinance intervention as an introduction of a borrowing/lending technology that relaxes household borrowing limits. These limits are relaxed differentially across villages in order to induce an additional one million baht of short-term credit in each village; hence, small villages get larger reductions of their borrowing constraint.

Given the relaxed borrowing limits, we then simulate the model with the stochastic income process to create 500 artificial datasets of the same size as the actual Thai panel. These simulated data do remarkably well in reproducing the above impact estimates. In particular, they predict an average response in consumption that is close to the dollar-to-dollar response in the data. Similarly, the model reproduces the fact that effects on average investment levels and investment probabilities are difficult to measure in the data.

In the simulated data, however, these aggregate effects mask considerable heterogeneity across households, much of which we treat as unobservable to us as econometricians. Increases in consumption come from roughly two groups. First, hand-to-mouth consumers are constrained in their consumption either because they have low current liquidity (income plus savings) or are using current (pre-program) liquidity to finance lumpy investments. These constrained households use additional availability of credit to finance current consumption. Second, households who are not constrained may increase their consumption even without borrowing, since the increase in available credit in the future lowers their desired bufferstock savings. Third, for some households, increased credit induces them to invest in their high yield projects. Some of these households may actually reduce their consumption, however, as they supplement credit with reduced consumption in order to finance sizable indivisible projects. (Again, the evidence we present for such behavior in the pre-intervention data is an important motivation for modeling investment indivisibility.) Finally, for households who would have defaulted without the program, available credit may simply be used to repay existing loans and so have little effect on consumption or investment. Perhaps most surprising is that these different types of households may all appear *ex ante* identical in terms of their observables.

The estimated model not only highlights this underlying heterogeneity, but also shows the quantitative importance of these behaviors. Namely, the large increase in consumption

[4]An important literature in development has examined the interaction between financial constraints and indivisible investments. See, for example, Banerjee and Newman (1993), Galor and Zeira (1993), Gine and Townsend (2004), Lloyd-Ellis and Bernhardt (2001), and Owen and Weil (1997).

[5]The income process of the model has trouble replicating the variance in the data, which is affected by the Thai financial crisis in the middle of our pre-intervention data, and the borrowing and lending rates differ in the data but are assumed equal in the model. Using the model to match year-to-year fluctuations is also difficult.

indicates the relative importance of the first two types of households, both of whom increase their consumption. Also, the estimated structural parameters capture the relatively low investment rates and large skew in investment sizes. Hence, overall investment relationships are driven by a relatively few, large investments, and so very large samples are needed to accurately measure effects on average investment. The model generates these effects but for data that are larger than the actual Thai sample. Second and related, given the lumpiness of projects, small amounts of credit are relatively unlikely to change investment decisions on the large projects that drive aggregate investment.

Finally, our normative evaluation compares the costs of the Million Baht program to the costs of a direct transfer program that is equivalent in the sense of providing the same utility benefit. The heterogeneity of households plays an important role, and indeed the welfare benefits of the program vary substantially across households and villages. Essentially, there are two major differences between the microfinance program and a well-directed transfer program. First, the microfinance program is potentially *less* beneficial because households face the interest costs of credit. In order to access liquidity, households borrow more, and while they can always carry forward more debt into the future, they are left with larger interest payments. Interest costs are particularly high for otherwise defaulting households, whose debts is augmented to the more liberal borrowing limit, and so they bear higher interest charges. On the other hand, the microfinance program is potentially *more* beneficial than a direct transfer program because it can also provide more liquidity to those who potentially have the highest marginal valuation of liquidity by lowering the borrowing constraint. Hence, the program is relatively more costeffective for non-defaulting households with urgent liquidity needs for consumption and investment. Quantitatively, given the high frequency of default in the data[6] and the high interest rate, the benefits (i.e., the equivalent transfer) of the program are twenty percent less than the program costs, but this masks the interesting variation among losers and gainers.

Beyond the out-of-sample and normative analyses, we also perform several alternative exercises that build on the strengths of the structural model: long run out-of-sample predictions showing the time-varying impacts; a counterfactual “investment contingent credit” policy simulation that underperforms the actual policy; and re-estimation using the pooled sample, which confirmed the robustness of our exercise.

The paper contributes to several literatures. First, we add a structural modeling approach to a small literature that uses theory to test the importance of credit constraints in developing countries (e.g., Banerjee and Duflo (2002)). Second, we contribute to an active literature on consumption and liquidity constraints, and the bufferstock model, in particular. Studies with U.S. data have also found a high sensitivity of consumption to current available liquidity (e.g., Zeldes (1989), Souleles and Gross (2002), Aaronson, Agarwal, and French (2008)), but like Burgess and Pande (2005), we study this response with quasi-experimental data in a developing country.[7] Their study used a relaxation of branching requirements in India that allowed for differential bank expansion across regions of India over twenty years in order to assess impacts on poverty headcount and wage data. Third, methodologically, our quasi-experimental analysis builds on an existing literature that has used out-of-sample prediction, and experiments in particular, to evaluate structural models (e.g., Lise et al., (2005a, 2005b), Todd and Wolpin (2006)). Finally, we contribute to the literature on measuring and interpreting treatment effects (e.g., Heckman, Urzua, and Vytlacil (2004)), which has

[6]Default rates on short-term credit overall were 19 percent of households, but less than 3 percent of village fund credit was in default, and one- fourth to one-third of households reported that they borrowed from other sources to repay the loans.
[7]Banerjee et al (2009) find large impacts on durable expenditures using a randomized microfinance experiment in Hyrabad, India.

emphasized unobserved heterogeneity, non-linearity and time-varying impacts. We develop an explicit behavioral model where all three play a role.

The remainder of the paper is organized as follows. The next section discusses the underlying economic environment, the Million Baht village fund intervention, and reviews the facts from reduced form impact regressions that motivate the model. The model, and resulting value and policy functions, are presented in Section 3. Section 4 discusses the data and presents the MSM estimation procedure and resulting estimates. Section 5 simulates the Million Baht intervention, performs policy counterfactuals, and presents the welfare analysis. Section 6 concludes.

2 Thai Million Baht Credit Intervention

The intervention that we consider is the founding of village-level microcredit institutions by the Thai government, the Million Baht Fund program. Former Thai Prime Minister Thaksin Shinawatra implemented the program in Thailand in 2001, shortly after winning election. One million baht (about $24,000) was distributed to each of the 77,000 villages in Thailand to found self-sustaining village microfinance banks. Every village, whether poor or wealthy, urban[8] or rural was eligible to receive the funds. The size of the transfers alone, about $1.8 billion, amounts to about 1.5 percent of GDP in 2001. The program was overwhelmingly a credit intervention; no training or other social services were tied to the program, and although the program did increase the fraction of households with formal savings accounts, savings constituted a small fraction (averaging 14,000 baht or less than two percent) of available funds, and we measured no effect on the actual levels of formal savings during the years we study.

The design of the program was peculiar in that the money was a grant program to village funds (because no repayment was expected or made), yet the money reaches borrowers as microcredit loans with an obligation to repay to the fund. As noted earlier default rates to these funds themselves were low (less than 3 percent up through available 2005 data), and all village funds in the sample we use continue in operation, indicating that the borrowers obligation to repay was well understood in the rural villages we study. (In contrast, default rates to village funds in urban areas are substantially higher, roughly 15 percent.) Also, the quasi-experiment is quite different and less clean than typical randomizations, since the villagers themselves get to organize the funds, and in randomizations there is typically much greater control over what happens. Thus, one must be careful not to extrapolate our results across all environments and microfinance interventions. We are not evaluating a microfinance product via randomized trials.

The design and organization of the funds were intended to allow all existing villagers equal access to these loans through competitive application and loan evaluation handled at the village level. Villages elected committees who then drew up the rules for operation. These rules needed to satisfy government standards, however, and the village fund committees were relatively large (consisting of 9–15 members) and representative (e.g., half women, no more than one member per household) with short, two year terms. In order to obtain funds from the government, the committees wrote proposals to the government administrators outlining the proposed policies for the fund.[9] For these rural villages, funds were disbursed

[8]The village (moo ban) is an official political unit in Thailand, the smallest such unit, and is under the sub-district (tambon), district (amphoe), and province (changwat) levels. Thus, “villages” can be thought of as just small communities of households that exist in both urban and rural areas.

[9]These policies varied somewhat, but were not related to village size. For example, some funds required membership fees but all were under 100 baht ($2.50), interest rates averaged 7 percent, but the standard deviation was 2 percent, the number of required guarantors varied with an average of 2.6 and a standard deviation of one.

to and held at the Thai Bank of Agriculture and Agricultural Cooperatives, and funds could only be withdrawn with a withdrawal slip from the village fund committee. Residence in the village was the only official eligibility requirement for membership, and so although migrating villagers or newcomers would likely not receive loans, there was no official targeting of any sub-population within villages. Loans were uncollateralized, though most funds required guarantors. Repayment rates were quite high; less than three percent of funds lent to households in the first year of the program were 90 days behind by the end of the second year. Indeed, based on the household level data, ten percent more credit was given out in the second year than in the first, presumably partially reflecting repaid interest plus principal. There were no firm rules regarding the use of funds, but reasons for borrowing, ability to repay, and the need for funds were the three most common loan criteria used. Indeed many households were openly granted loans for consumption. The funds make short-term loans – the vast majority of lending is annual – with an average nominal interest rate of seven percent. This was about a five percent real interest rate in 2001, and about five percent above the average money market rate in Bangkok.[10]

2.1 Quasi-Experimental Elements of the Program

As described in the introduction, the program design was beneficial for research in two ways. First, it arose from a quick election, after the Thai parliament was dissolved in November, 2000, and was rapidly implemented in 2001. None of the funds had been founded by our 2001 (May) survey date, but by our 2002 survey, each of our 64 villages had received and lent funds, lending 950,000 baht on average.[11] Households would not have anticipated the program in earlier years. We therefore model the program as a surprise. Second, the same amount was given to each village, regardless of the size, so villages with fewer households received more funding per household. Regressions below report a highly significant relationship between household's credit from a village fund and inverse village size in 2002 after the program.

Our policy intervention is not a clean randomized experiment, and so we cannot have the same level of certainty about the exogeneity of the program. Several potential problems could contaminate the results. First, variables of interest for households in small villages could differ from those in large villages even before the program. Second, different trends in these variables across small and large villages would also be problematic, since the program occurs in the last years of the sample. If large villages had faster growth rates, we would see level differences at the end of the period and attribute these to the intervention during those years. Third, other policies or economic conditions during the same years could have affected households in small and large villages differentially.[12]

Other issues and caveats arise from all of our variation coming at the village level. On the one hand, village-level variation has important benefits because, in many ways, each village is viewed as its own small economy. These village economies are open but not entirely integrated with one another and the rest of the broader economy (nearby provinces, regions, etc.) in terms of their labor, credit, and risk-sharing markets and institutions. This gives us confidence that program impacts are concentrated at the village level.[13] On the other hand, one could certainly envision potential risks involved with our use of village size. For example, even if credit itself were exogenous, its impact could differ in small and large

[10] More details of the funds and program are presented in Kaboski and Townsend (2009).

[11] We know the precise month that the funds were received, which varies across villages. This month was uncorrelated with the amount of credit disbursed, but may be an additional source of error in predicting the impacts of credit.

[12] Other major policies initiated by the Thaksin government included the "30 Baht Health Plan" (which set a price control at 30 baht per medical visit), and "One Tambon-One Product" (a marketing policy for local products). However, neither were operated at the village level, since the former is an individual level program while the latter is at the tambon (sub-district) level.

[13] GIS analysis including neighboring villages in Kaboski and Townsend (2009) support this claim.

villages. Small villages might be more closely connected, with better information or less corruption, and so might show larger impacts not only because they received more credit per household but because the credit was used more efficiently. Conversely, small villages might have smaller markets and so credit might have smaller impacts. Keeping this caveat in mind, our approach is to take a stand on a plausible structural model in Section 3. Within this structural model, village size will be fully excluded from all equations. So that when we introduce the policy in Section 4, the only role of village size will be in determining the expansion of credit. We are encouraged that the simple model does well in replicating the out-of-sample patterns in the data.

Despite the potential risks and caveats, there are both a priori and a posteriori reasons for pursuing our exclusion restriction and accepting inverse village size as exogenous with respect to important variables of interest.

First, villages are geopolitical units, and villages are divided and redistricted for administrative purposes. These decisions are fairly arbitrary and unpredictable, since the decision processes are driven by conflicting goals of multiple government agencies. (See, for example, Pugenier (2002) and Arghiros (2001)), and splitting of villages is not uncommon. Data for the relevant period (1997–2003 or even the years directly preceding this, which might perhaps be more relevant) are unavailable, but growth data is available for 1960–2007 and for 2002–2007, so we know that the number of villages grew on average by almost one percent a year both between 1960 and 2007 and during the more recent period. Clearly, overall trends in new village creation are driven in part by population growth, but the above literature indicates that the patterns of this creation are somewhat arbitrary.

Second, because inverse village size is the variable of interest, the most important variation comes from a comparison among small villages (e.g., between 50 and 250 households). Indeed, the companion paper focuses its baseline estimates on these villages, but show that results are robust to including the whole sample. That is, the analysis is not based on comparing urban areas with rural areas, and we are not picking up the effects of other policies biased toward rural areas and against Bangkok.

Third, village size is neither spatially autocorrelated, nor correlated with underlying geographic features like roads or rivers, which might arise if village size were larger near population centers or fertile areas. Using data from Community Development Department (CDD), Figure 1 shows the random geographical distribution of villages by decile of village size in the year 2001 over the four provinces for which we have Townsend Thai data (Chachoengsao, Lopburi, Buriram and Sisaket). The Moran spatial autocorrelation statistics in these provinces are 0.019 (standard error of 0.013), 0.001 (0.014), 0.002 (0.003), and 0.016 (0.003), respectively.[14] Only the Sisaket autocorrelation is statistically significant, and the magnitudes of all of them are quite small. For comparison, the spatial autocorrelation of the daily wage in villages ranges from 0.12 to 0.21. We also checked whether village size was correlated to other underlying geographic features by running separate regressions of village size onto distance to nearest two-lane road or river

[14] The general formula for Moran's statistic is:

$$I=\frac{n}{\sum_{i=1}^{n}\sum_{j=1}^{n}w_{ij}}\left(\frac{\sum_{i=1}^{n}\sum_{j=1}^{n}w_{ij}(z_i-\overline{z})(z_j-\overline{z})}{\sum_{i=1}^{n}\sum_{j=1}^{n}(z_i-\overline{z})^2}\right)$$

where n is the number of observations (villages), z_i is the statistic for observation i (village size of village i), and w_{ij} is the weight given villages depending on their spatial distance. Here we use inverse cartesian distance between villages.

(conditioning on changwat dummies). The estimated coefficients were 0.26 (standard error of 0.32) and −0.25 (0.24), so neither was statistically significant. Small villages did tend to be located closer to forest areas however, where the coefficient of 0.35 (0.03) was highly significant, indicating that forest area may limit the size of villages.[15] Nonetheless, these regressions explain at most five percent of the variation in village size, so the variation is not particularly well explained by geographic features. We have included roads, rivers, and forest in Figure 1.

Finally, the regression analysis in our companion paper, Kaboski and Townsend (2009), strengthens our a posteriori confidence in the exogeneity of village size. Specifically, we present reduced form regressions on a large set of potential outcome variables. Using seven years of data (1997–2003, so that t=6 is the first post-program year, 2002), we run a first-stage regression to predict village fund credit of household *n* in year *t*, $VFCR_{n,t}$:

$$VFCR_{n,t}=\sum_{j=6,7}\alpha_{1,VFCR,j}\frac{1{,}000{,}000}{\#\text{ HHs in village}_{v,6}}\mathcal{I}_{t=j}+\alpha_{2,VFCR}Control_{n,t}$$
$$+\boldsymbol{\gamma}_{VFCR}\mathbf{X}_{nt}+\theta_{VFCR,t}+\theta_{VFCR,n}+\varepsilon_{VFCR,nt}$$

and second-stage outcome equation of the form:

$$Z_{nt}=\alpha_{1,Z}VFCR_{n,t}+\alpha_{2,Z}Control_{n,t}+\boldsymbol{\gamma}_{Z}\mathbf{X}_{nt}+\theta_{Z,t}+\theta_{Z,n}+\varepsilon_{Z,nt} \quad (1)$$

where Z_{nt} represents an outcome variable of interest for household *n* in year *t*. Comparing the two equations, the crucial variable in the first stage is inverse village size in the post-intervention years (the latter captured by the indicator function $\mathcal{I}_{t=j}$), since it creates variation in $VFCR_{n,t}$, but is excluded from the second stage outcome equation. Although there is heterogeneity across households and non-linearity in the impact of credit, $\hat{\alpha}_{1,z}$ captures (a linear approximation of) the relationship between the average impact of a dollar of credit on the outcome of Z_{nt}.

The sets of controls in the above equations are X_{nt}, a vector of demographic household controls, year fixed effects ($\theta_{VFCR,t}$ and $\theta_{Z,t}$), household fixed effects ($\theta_{VFCR,t}$ and $\theta_{Z,t}$), and $Control_{n,t}$, which captures the general role of village size, in order to emphasize that the impact identified is specific to the post-intervention years.

We used two alternative specifications for $Control_{n,t}$, $\frac{1{,}000{,}000}{\#\text{ HHs in village}_{v,6}}$ and $\frac{1{,}000{,}000}{\#\text{ HHs in village}_{v,6}}*t$. Given the first-specification, $\hat{\alpha}_{2,Z,\text{“levels”}}$ would capture the relationship between village size and the *level* of the outcome that is common to both the pre- and post-intervention years. In the latter specification, $\hat{\alpha}_{2,Z,\text{“trends”}}$ captures the relationship between village size and the *trend* in the outcome variable. The level specification is of less interest, since our results are unlikely to be contaminated by levels differences; Household fixed effects $\theta_{Z,t}$ already capture persistent level differences (across households and villages), and our analysis will utilize household fixed effects. Moreover, the $\hat{\alpha}_{2,Z,\text{“levels”}}$ is only identified from within-village variation in village size (i.e., the sizes of given villages varying over the years of the panel), which constitutes only 5 percent of the total variation in village size, and our analysis will only use village size in one year, the first year of the intervention (t = 6). The trend specification is therefore of more relevance.

[15]Forest conservation efforts have driven some redistricting decisions but these decisions have been largely haphazard and unsystematic. For discussions, see Pugenier (2001) and Gine (2005).

Table I presents $\hat{\alpha}_{2,Z,\text{“trends”}}$ results for the 37 different outcome variables Z_{nt} from Kaboski and Townsend (2009), and three additional variables relevant to this study: investment probability, default probability, and total consumption. Together, these regressions cover the details of household income, consumption, investment, and borrowing activities. Only two of these 40 estimates are significant, even at a conservative 10 percent level; smaller villages were associated with higher growth in the fraction of income coming from rice and faster growth in the amount of credit from commercial banks. In terms of economic significance, this would mean that for the average village the rice fraction would fall by 1 percentage point a year less than in the largest village. Similarly, the amount of commercial bank credit would rise by 500 baht (12 dollars) a year more than in the largest village.16 Though not presented in the table, the estimates for $\alpha_{2,Z,\text{“levels”}}$ also show few significant relationships. 17 We also note that our results are robust to whether or not these controls are included. Thus, we have a measure of confidence that pre-existing differences in levels or trends associated with inverse village size are few and small.

2.2 Reduced Form Impacts

The above regressions produce several interesting "impact" estimates $\hat{\alpha}_{1,Z}$ as reported in detail in our companion paper, Kaboski and Townsend (2009).18 With regard to credit, the program expanded village fund credit roughly one for one, with the coefficient $\hat{\alpha}_{1,VF\ CR}$ close to one. Second, total credit overall appears to have had a similar expansion, with an $\hat{\alpha}_{1,Z}$ near one and there is no evidence of crowding out in the credit market. Finally, the expansion did not occur through a reduction in interest rates. Indeed the $\hat{\alpha}_{1,Z}$ is positive, though small for interest rates.

Household consumption was obviously and significantly affected by the program, with a $\hat{\alpha}_{1,Z}$ point estimate near one. The higher level of consumption was driven by non-durable consumption and services, rather than durable goods. While the frequency of agricultural investments did increase mildly, total investment showed no significant response to the program. The frequency of households in default increased mildly in the second year, but default rates remained less than 15 percent of loans. Asset levels (including savings) declined in response to the program, while income growth increased weakly.19

Together, these results are puzzling. In a perfect credit, permanent income model, with no changes in prices, unsubsidized credit should have no effect, while subsidized credit would simply have an income effect. If credit did not need to be repaid, this income effect would be bounded above by the amount of credit injected. Yet repayment rates were actually quite high, with only 3 percent of village fund credit in default in the last year of the survey. But again, even if credit were not repaid, an income effect would produce at most a coefficient of the market interest rate (less than 0.07), i.e., the household would keep the principle of the one-time wealth shock and consume the interest. The fact that households appear to have

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[16]More generally, one million divided by the number of household averages roughly 10,000 in our sample, so the economic magnitude on a per year basis is the coefficient multiplied by 10,000.
Note that the coefficient on investment probability is positive an order of magnitude larger than our results in Section 5, but the standard deviation is two orders of magnitude larger and so it is insignificant.

[17]Again using a more conservative ten percent level of significance only 3 out of 39 coefficients (8 percent) were significant. Small villages tended to have higher levels of short-term credit in fertilizer ($\hat{\alpha}_{2,Z,\text{“levels”}}$ =1.14 with a standard error of 0.50) and higher shares of total income from rice (8.3e-6, std. error 3.0e-6) and other crops (4.1e-6, std. error 2.2e-6). Thus, as villages grow, they appear to become somewhat less agrarian.

[18]The sample in Kaboski and Townsend (2009) varies slightly from the sample in this paper. Here we necessarily exclude 118 households who did not have complete set of data for all seven years. To avoid confusion, we do not report the actual Kaboski and Townsend (2009) estimates here.

[19]Wage income also increased in response to the shock, which is a focus of Kaboski and Townsend (2009). The increase is quite small relative to the increase in consumption, however, and so this has little promise in explaining the puzzles. We abstract from general equilibrium effects on the wage and interest rate in the model we present.

simply increased their consumption by the value of the funds lent is therefore puzzling. Given the positive level of observed investment, the lack of a response to investment might point to well-functioning credit markets, but the large response of credit and consumption indicate the opposite. Thus, the coefficients overall require a theoretical and quantitative explanation.

2.3 Underlying Environment

Growth, savings/credit, default, and investment are key features in the Thai villages during the pre-intervention period (as well as afterward). Households income growth averages 7 percent over the panel, but both income levels and growth rates are stochastic. Savings and credit are important buffers against income shocks (Samphantharak and Townsend (2008)), but credit is limited (Puentes (2008)). Income shocks are neither fully insured nor fully smoothed (Chiappori et al (2008)), and Karaivanov and Townsend (2008) conclude that savings and borrowing models and savings only models fit the data better than alternative mechanism design models. High income households appear to have access to greater credit. That is, among borrowing households, regressions of log short-term credit on log current income yield a coefficient of 0.32 (std. err.=0.02).

Related, default occurs in equilibrium, and appears to be one way of smoothing against shocks. In any given year, 19 percent of households are over three months behind in their payments on short-term (less than on year) debts. Default is negatively related to current income, but household consumption is substantial during periods of default, averaging 164 percent of current income, and positively related to income. Using only years of default, regressions of log consumption on log income yield a coefficient of regression of 0.41 (std. error=0.03).

Finally, investment plays an important role in the data, averaging 10 percent of household's income. It is lumpy, however. On average only 12 percent of households invest in any given year. Investment is large in years when investment occurs and highly skewed with a mean of 79 percent of total income and a median of 15 percent. When they invest, high income households make larger investments; a regression of log investment on the (log) predictable component of income yields a significant regression coefficient of 0.57 (std. error=0.15).20 High income households still invest infrequently, however, and indeed the correlation between investment and predictable income is 0.02 and insignificant. Related, investment is not concentrated among the same households each year. If the average probability of investing (0.12) were independent across years and households, one would predict that ($1 - 0.88^5 =$)47 percent of households would invest at least once over the five years of pre-intervention data. This is quite close to the 42 percent that is observed.

The next section develops a model broadly consistent with this underlying environment.

3 Model

We address these key features of the data by developing a model of a household facing permanent and transitory income shocks and making decisions about consumption, low yield liquid savings, high yield illiquid investment and default. The household is infinitely-lived, and, in order to allow for growth, tractability requires that we make strong functional form assumptions.21 In particular, the problem is written so that all constraints are linear in the permanent component of income, so that the value function and policy functions can all be normalized by permanent income. We do this to attain a stationary, recursive problem.

[20]These predictions are based on a regression of a regression of log income on: age of head of household, squared age, number of males, number of females, number of kids, and log assets.

3.1 Sequential Problem

At $t + 1$, liquid wealth L_{t+1} includes the principle and interest on liquid savings from the previous period $(1 + r)\ S_t$ (negative for borrowing) and current realized income Y_{t+1}:

$$L_{t+1} \equiv Y_{t+1} + S_t(1+r) \tag{2}$$

Following the literature on precautionary savings (e.g., Zeldes, 1989, Carroll, 1997, Gourinchas and Parker, 2001), current income Y_{t+1} consists of a permanent component of income P_{t+1} and a transitory one-period shock, U_{t+1}, additive in logs:

$$Y_{t+1} \equiv P_{t+1} U_{t+1} \tag{3}$$

We follow the same literature in modeling an exogenous component of permanent income that follows a random walk (again in logs) based on shock N_t with drift G. Meghir and Pistaferri (2004) have presented strong evidence for the importance of permanent income shocks in the U.S., and we believe that the standard ideas of permanent income shocks (e.g., long term illness or disability, obsolescence of specialized human capital, shocks affecting the profitability of businesses or capital) are at least as important in a developing country context. Nonetheless, our innovation in this paper is to also allow for endogenous increases in permanent income through investment.22 Investment is indivisible – the household makes a choice $D_{I,t} \in \{0, 1\}$ of whether to undertake a lumpy investment project of size I_t^* or to not invest at all. In sum,

$$P_{t+1} = P_t G N_{t+1} + R D_{I,t} I_t^* \tag{4}$$

Investment is also illiquid and irreversible, but again it increases permanent income, at a rate R, higher than the interest rate on liquid savings, r, and sufficiently high to induce investment for households with high enough liquidity. Having investment increase the permanent component of future income simplifies the model by allowing us to track only P_t rather than multiple potential capital stocks.23 While we have endogenized an important element of the income process, we abstract from potentially endogenous decisions such as labor supply, and the linearity in R abstracts from any diminishing returns that would follow from a non-linear production function.

Project size is stochastic, governed by an exogenous shock i_t^* and proportional to the permanent component of income:

21We model an infinitely-lived household for several reasons. Using a life-cycle approach in the U.S., Gourinchas and Parker (2001) show that life-cycle savings plays a relatively smaller role until the last ten years before retirement. In the rural Thai context, there is no set retirement age or pension system, and households often include family from multiple generations. Deaton and Paxson (2000) show that profiles of household head age vs. household savings do not fit the life cycle theory well.

22Low et al (forthcoming) endogenize permanent income in the U.S. context through participation and occupational mobility decisions.

23This approach ignores many issues of investment "portfolio" decisions and risk diversification. Still, the lumpy investment does capture the important portfolio decision between a riskless, low yield, liquid asset and a risky, illiquid asset, which is already beyond what is studied in a standard bufferstock model. We can show this by defining $A_t \equiv P_t/R$ and using (2), (3), (4), and (7) to write:

$$A_t + S_t = (RU_t + GN_t)A_{t-1} + S_{t-1}(1+r) - C_t]$$

Physical assets A_t pay a stochastic gross return of $(RU_t + GN_t)$, while liquid savings pay a fixed return of $(1 + r)$.

$$I_t^* = i_t^* P_t \quad (5)$$

We assume that investment opportunities I_t^* are increasing in permanent income P_t, which the data seem to support. A more flexible specification would be $I_t^* = i_t^* P_t^{\omega}$. A regression of log investment on the log of the component of income predicted by observables (a proxy for P_t) yields a coefficient of 0.57 indicating an $\varpi < 1$. Still, our assumption of linearity ($\varpi = 1$) will be necessary for analytical tractability, and it will yield results consistent with investment decisions being uncorrelated with the predictable component of income (as described in Section 2.3).24 The linearity we assume is consistent with the empirical literature, where large firms invest higher amounts, and so investment is typically scaled by size.

Liquid savings can be negative, but borrowing is bounded by a limit which is a multiple $\underline{s}$ of the permanent component of income. That is, when $\underline{s}$ is negative, borrowing is allowed, and the more negative it is, the more can be borrowed. This is the key parameter that we calibrate to the intervention:

$$S_t \geq \underline{s} P_t \quad (6)$$

For the purposes of this partial equilibrium analysis, this borrowing constraint is exogenous. It is not a natural borrowing constraint as in Aiyagari (1994) and therefore somewhat ad hoc, but such a constraint can arise endogenously in models with limited commitment (see Wright (2002)) or where lenders have rights to garnish a fraction of future wages (e.g., Lochner and Monge-Naranjo (2008)). Most importantly, it allows for default (see below), which is observed in the data and of central interest to microfinance interventions.

In period 0, the household begins with a potential investment project of size I_0^*, a permanent component of income P_0, and liquid wealth L_0 all as initial conditions. The household's problem is to maximize expected discounted utility by choosing a sequence of consumption $C_t > 0$, savings S_t, and decisions $D_{I,t} \in \{0, 1\}$ of whether or not to invest:

$$\begin{gathered} V(L_0, I_0^*, P_0; \underline{s}) = \max_{\substack{\{C_t>0\} \\ \{S_{t+1}\} \\ \{D_{I,t}\}}} E_0 \left[\sum_{t=0}^{\infty} \beta^t \frac{C_t^{1-\rho}}{1-\rho} \right] \\ \text{subject to (2), (3), (4), (5), (6), and} \\ C_t + S_t + D_{I,t} I_t^* \leq L_t \end{gathered} \quad (7)$$

The expectation is taken over sequences of permanent income shocks N_t, transitory income shocks U_t, and investment size shocks i_t^*. These shocks are each i.i.d. and orthogonal to one another:

24Households policies will be to invest in all project below a threshold I_t^*, call it $\widetilde{I}_t^*$. If investment opportunities did not increase with P_t, i.e., $\omega = 0$, then high P_t households would invest at a higher rate than poor households, since the threshold $\widetilde{I}_t^*$ would be higher for high P_t. We cannot solve this case, but we conjecture that it would be quantitatively important, since given the relatively low frequency of investment (12 percent) the cutoff $\widetilde{I}_t^*$ would typically fall on the left-tail of the log normal i_t^* distribution where the density and inverse Mills ratio are high.

- N_t is random walk shock to permanent income. $\ln N_t \sim N(0, \sigma_N^2)$.
- U_t is a temporary (one period) income shock. $u_t \equiv \ln U_t \sim N(0, \sigma_u^2)$.
- i_t^* is project size (relative to permanent income). $\ln i_t^* \sim N(\mu_i, \sigma_i^2)$

If $\underline{s} < 0$, an agent with debt, i.e., $S_{t-1} < 0$, and a sufficiently low income shock may need to default. That is, with $L_t = Y_t + S_{t-1}(1 + r)$, even with zero consumption and investment, the liquid assets budget constraint (7) could imply $S_t < \underline{s}P_t$. Essentially, given (6), a bad enough shock to permanent income (i.e., a low N_t) can produce a "margin call" on credit that exceeds current liquidity.

In this case, we assume default allows for a minimum consumption level that is proportional to permanent income ($\underline{c}P_t$). Defining the default indicator, $D_{def,t} \in \{0, 1\}$, this condition for default is expressed:

$$D_{def,t} = \begin{cases} 1, & \text{if } (\underline{s}+\underline{c})P_t < L_t \\ 0, & \text{otherwise} \end{cases} \quad (8)$$

and the defaulting household's policy for the period becomes:

$$\begin{aligned} C_t &= \underline{c}P_t \\ S_t &= \underline{s}P_t \\ D_{I,t} &= 0 \end{aligned}$$

This completes the model. The above modeling assumptions are strong and not without costs. Still, as we have seen, they are motivated by the data, and they do have analytical benefits beyond allowing us to deal easily with growth. First, the model is simple and has limited heterogeneity, but consequently has a low dimension, tractable state space $\{L, I^*, P\}$ and parameter space $\{r, \sigma_N, \sigma_u, G, \underline{c}, \beta, \rho, \mu_i, \sigma_i, \underline{s}\}$. Hence, the role of each state and parameter can be more easily understood. Furthermore, the linearity of the constraints in P_t reduces the dimensionality of the state space to two, which allows for graphical representation of policy functions (in Section 5.2). The next subsection derives the normalized, recursive representation.[25]

3.2 Normalized and Recursive Problem

Above, we have explicitly emphasized the value function's dependence on s, since this will be the parameter of most interest in considering the microfinance intervention in Section 5. We drop this emphasis in the simplifying notation that follows. Using lower case variables to indicate variables normalized[26] by permanent income, the recursive problem becomes:

[25]Since all conditions are linear P_t, we avoid the problems that unbounded returns lead to in representing infinite horizon models in recursive fashion (see Stokey, Lucas, and Prescott (1989)). In particular, the conditions for the equivalence of the recursive and sequential problems and existence of the steady state are straightforward extensions of conditions given in Alvarez and Stokey (1998) and Carroll (2004). In particular, for $\rho < 1$, G and $RE\,[i^*]$ must be sufficiently bounded.

[26]Here the decision whether to invest d_i is not a normalized variable and is in fact identical to D_I in the earlier problem. We have denoted it in lower case to emphasize that it will depend only on the normalized states l and i^*.

$$\begin{aligned} &V(L, I^*, P) \equiv P^{1-\rho} v(l, i^*) \\ &v(l, i^*) = \max_{c,s',d_I} \tfrac{c^{1-\rho}}{1-\rho} + \beta E\left[(p')^{1-\rho} v(l', i^{*\prime})\right] \text{ subject to} \\ &\lambda{:}c + s + d_I i^* \le l \quad \text{from (7)} \end{aligned} \tag{9}$$

$$\begin{aligned} &\varphi{:}s \ge \underline{s} \quad \text{from (6)} \\ &p' = GN' + Rd_I i^* \quad \text{from (4)} \\ &l' = y' + \tfrac{s(1+r)}{p'} \quad \text{from (2)} \end{aligned} \tag{10}$$

$$y' = U' \quad \text{from (3)} \tag{11}$$

We further simplify by substituting l' and y' into the continuation value using (10) and (11), and substituting out s using the liquidity budget constraint (9), which will hold with equality, to yield:

$$v(l, i^*) = \max_{c,d_I} \frac{c^{1-\rho}}{1-\rho} + \beta E\left[(p')^{1-\rho} v\left(U' + \frac{(1+r)(l - c - d_I i^*)}{p'}, i^{*\prime}\right)\right] s.t. \tag{12}$$

$$\varphi{:}(l - c - d_I i^*) \ge \underline{s} \tag{13}$$

$$p' = GN' + Rd_I i^* \tag{14}$$

The normalized form of the problem has two advantages. First, it lowers the dimensionality of the state variable to two. Second, it allows the problem to have a steady state solution. Using * to signify optimal decision rules, the necessary conditions for optimal consumption c_* and investment decisions d_{I*} are:27

$$(c_*)^{-\rho} = \beta(1+r)E\left[(p')^{-\rho} \frac{\partial v}{\partial l}(U' + \frac{(1+r)(l - c_* - d_{I*} i^*)}{p'}, i^{*\prime})\right] + \varphi \tag{15}$$

$$\begin{aligned} &\tfrac{c_*^{1-\rho}}{1-\rho} + \beta E\left[(p')^{1-\rho} v\left(U' + \tfrac{(1+r)(l - c_* - d_{I*} i^*)}{p'}, i^{*\prime}\right)\right] \ge \\ &\tfrac{c_{**}^{1-\rho}}{1-\rho} + \beta E\left[(p')^{1-\rho} v\left(U' + \tfrac{(1+r)[l - c_{**} - (1-d_{I*}) i^*]}{p'}, i^{*\prime}\right)\right] \end{aligned} \tag{16}$$

27Although the value function is kinked, it is differentiable almost everywhere, and the smooth expectation removes any kink in the continuation value.

Equation (15) is the usual credit constrained Euler equation. The constraint φ is only non-zero when the credit constraint (13) binds, i.e., $c_* = l - \underline{s} - d_{I*}i^*$. Equation (16) ensures that the value given the optimal investment decision d_{I*}, exceeds the maximum value given the alternative, $1 - d_{I*}$, c_{**} indicates the optimal consumption under this alternative investment decision (i.e., c_{**} satisfies the analog to (15) for $1 - d_{I*}$).

In practice, the value function and optimal policy functions must be solved numerically, and indeed the indivisible investment decision complicates the computation.28

Figure 2 presents a three-dimensional graph of a computed value function. The flat portion at very low levels of liquidity l comes from the minimum consumption and default option. The dark line highlights a groove going through the middle of the value function surfaces along the critical values at which households first decide to invest in the lumpy project. Naturally, these threshold levels of liquidity are increasing in the size of the project. The slope of the value function with respect to l increases at this point because the marginal utility of consumption increases at the point of investment.29 Consumption actually *falls* as liquidity increases beyond this threshold.

Figure 3, panel A illustrates this more clearly by showing a cross-section of the optimal consumption policy as a function of normalized liquidity for a given value of i^*. At the lowest values, households are in default. At low values of liquidity, no investment is made, households consume as much as possible given the borrowing constraint, and hence the borrowing constraint holds with equality. At higher liquidity levels, this constraint is no longer binding as savings levels s exceed the lower bound $\underline{s}$. At some crucial level of liquidity l_*, the household chooses to invest in the lumpy project, at which point consumption falls and the marginal propensity to consume out of additional liquidity increases. Although not pictured, for some parameter values (e.g., very high R), the borrowing constraint can again hold with equality, and marginal increases in liquidity are used for purely for consumption.30

Panel B of Figure 3 shows the effect of a surprise permanent decrease in $\underline{s}$ on the optimal consumption policy for the same given value of i^*. Consumption increases for liquidity levels in every region, except for the region that is induced into investing by more access to borrowing.

An additional interesting prediction of the model is that for a given level of borrowing ($s_t <$ 0), a household that invests ($d_{I,t} = 1$) has a lower probability of default next period. Conditional on investing, the default probability is further decreasing in the size of investment. Thus, other things equal borrowing to invest leads to less default than borrowing to consume because investment increases future income and therefore ability to repay. The maximum amount of debt that can be carried over into next period (i.e., $-\underline{s}P_t$) is proportionate to permanent income. Because investment increases permanent income, it

28Details of the computational approach and codes are available from the authors upon request.

29Given the convex kink in the value function, households at or near the kink would benefit from lotteries, which we rule out consistent with the idea that borrowing and lending subject to limits is the only form of intermediation.

30Using a bufferstock model, Zeldes (1989) derived reduced form equations for consumption growth, and found that consumption growth was significantly related to current income, but only for low wealth households, interpreted as evidence of credit constraints. We run similar consumption growth equations that also contain investment as an explanatory variable:

$$\ln C_{n,t+1}/C_{n,t} = X_{n,t}\beta_1 + \beta_2 Y_{n,t} + \beta_3 I_{n,t} + \varepsilon_{n,t}$$

For the low wealth sample, we find significant estimates $\beta_2 < 0$ and $\beta_3 > 0$, which is consistent with the prediction of investment lowering current consumption (thereby raising future consumption growth).

increases the borrowing limit *next period*, and therefore reduces the probability of a "margin call" on outstanding debt.

One can see this formally by substituting the definitions of liquidity (2) and income (3), and the law of motion for permanent income (4) into the condition for default (8) to yield:

$$E(D_{def,t+1}|S_t, P_t, D_{I,t}, I_t^*)=\Pr\left[U_{t+1}<(\underline{s}+\underline{c})-\frac{S_t}{(P_tN_{t+1}G+RD_{I,t}I_t^*)}\right] \quad (17)$$

Since S_t is negative and R is positive, the right-hand side of the inequality is decreasing in both $D_{I,t}$ and I_t^*. Since both N_{t+1} and U_{t+1} are independent of investment, the probability is therefore decreasing in $D_{I,t}$ and I_t^*.

4 Estimation

This section addresses the data used and then the estimation approach. The model is quite parsimonious with a total of 11 parameters. Due to poor identification, we calibrate the return on investment parameter, R, using a separate data source. After adding classical measurement error on income with log variance σ_E, we estimate the remaining parameters, $\theta = \{r, \sigma_N, \sigma_u, \sigma_E, G, \underline{c}, \beta, \rho, \mu_i, \sigma_i, \underline{s}\}$ via MSM using the optimal weighting matrix. This estimation is performed using five years (1997–2001) of pre-intervention data, so that $t = 1$ corresponds to the year 1997.

4.1 Data

The data come from the Townsend Thai data project, an ongoing panel dataset of a stratified, clustered, random sample of institutions (256 in 2002), households (960 each year, 715 with complete data in the pre-experiment balanced panel used for estimation, and 700 in 2002 and 2003, respectively, which are used to evaluate the model's prediction), and key informants for the village (64, one in each village). The data are collected from sixty-four villages in four provinces: Buriram and Srisaket in the Northeast region, and Lopburi and Chachoengsao in the Central region. The components used in this study include detailed data from households and household businesses on their consumption, income, investment, credit, liquid assets and the interest income from these assets, as well as village population data from the village key informants. All data has been deflated using the Thai consumer price index to the middle of the pre-experiment data, 1999.

The measure of household consumption we use (denoted $\tilde{C}_{n,t}$ for household n at time t) is calculated using detailed data on monthly expenditure data for thirteen key items, and scaled up using weights derived from the Thai Socioeconomic Survey.31 In addition, we include household durables in consumption, though durables play no role in the observed increases in consumption. The measure of investment ($\tilde{I}_{n,t}$) we use is total farm and business investments, including livestock and shrimp/fish farm purchases.

We impute default each year for households who report one or more loans due in the previous 15 months that are outstanding at least three months. Note that (i) this includes all loans, and not just short-term, since any (non-voluntary) default indicates a lack of available liquidity, and (ii) due dates are based on the original terms of the loan, since changes in duration are generally a result of default.32 This only approximates default in the model,

[31] The tildes represent raw data which will be normalized in Section 4.3.1.

and it may underestimate default because of underreporting, but overestimate default as defined in the model or to the extent that late loans are eventually repaid.

The income measure we use (denoted $\tilde{Y}_{n,t}$) includes all agricultural, wage, business and financial income (net of agricultural and business expenses) but excludes interest income on liquid assets such as savings deposits as in the model. Our savings measure ($S_{n,t}$) includes not only savings deposits in formal and semi-formal financial institutions, but also the value of rice holdings in the household. Cash holdings are unfortunately not available. The measure of liquid credit ($CR_{n,t}$) is short-term credit with loan durations of one year or less. The measurement of interest income on liquid savings ($EARNED\_INT_{n,t}$) is interest income in year t on savings in formal and semi-formal institutions. The interest owed on credit ($OWED\_INT_{n,t}$) is the reported interest owed on short-term credit.

While the data is high quality and detailed, measurement error is an important concern. Net income measures are complicated when expenditures and corresponding income do not coincide in the same year, for example. If income is measured with error, the amount of true income fluctuations will be overstated in the data, and household decisions may appear to be less closely tied to transitory income shocks, hence credit constraints may not appear to be important. Consumption and investment may also suffer from measurement error, but classical measurement error will just add additional variation to these endogenous variables will not effect the moments, only the weighting matrix. A major source of measurement error for interest is that savings and borrowing may fluctuate within the year, so that the annual flow of both earned and paid interest may not accurately reflect interest on the end-of-year stocks contained in the data. This measurement error will assist in the estimation.

Table II presents key summary statistics for the data.

4.1.1 Adjusting the Data for Demographic and Cyclical Variation—The model is of infinitely lived dynasties that are heterogeneous only in their liquidity, permanent income, and potential investment. That is, in the model, the exogenous sources of variation among households come from given differences in initial liquidity or permanent income, and histories of shocks to permanent income, transitory income, and project size. Clearly, the data, however, contain important variation due to heterogeneity in household composition, business cycle and regional variation, and unmodeled aspects of unobserved household heterogeneity. Ignoring these sources of variation would be problematic. For household composition, to the extent that changes in household composition are predictable, the variance in income changes may not be capturing uncertainty but also predictable changes in household composition. Likewise, consumption variation may not be capturing household responses to income shocks but rather predictable responses to changes in household composition. Failure to account for this would likely exaggerate both the size of income shocks and the response of household consumption to these shocks. In the data, the business cycle (notably the financial crisis in 1997 and subsequent recovery) also plays an important role in household behavior, investment and savings behavior in particular. Although our post-program analysis will focus on the across-village differential impacts of the village fund program, and not merely the time-changes, we do not want to confound the impacts with business cycle movements. Finally, differences in consumption, for example, across households may tell us less about past and current income shocks, and more about unobserved differences in preferences or consumption needs.

[32]According to this definition, default probability is about 19 percent, but alternative definitions can produce different results. The probability for short-term loan alone is just 12 percent, for example. On the other hand, relabeling all loans from non-family sources that have no duration data whatsoever as in default yields a default probability of 23 percent. Our results for consumption and default hold for the higher rates of default.

A common approach in structural modeling is to account for these sources of heterogeneity and predictable variation across households explicitly in the model and estimation (see Keane and Wolpin (1994, 1997, 2001)). These methods have the advantage of incorporating this heterogeneity into the household decision making process, but they typically require finite horizons and discretizing the choice variables (e.g., consumption or savings). Within the bufferstock literature, a common approach has been to instead purge business cycle and household composition variation from the data (e.g., Gourinchas and Parker (2001), Carroll and Samwick, (1998)). Though the former approach is certainly of interest, given the continuity of consumption, our infinite horizon, and the precedent within the buffer stock literature, we follow the latter approach. We return to the issue of heterogeneity in the concluding section.

Specifically, we run linear regressions of log income, log consumption, and liquidity over income. (We do not take logs of liquidity, since it takes both positive and negative values, but instead normalize by income so that high values do not carry disproportionate weight.)33 The estimated equations are:

$$\begin{gathered}\ln\tilde{Y}_{n,t}=\boldsymbol{\gamma}_Y\mathbf{X}_{n,t}+\theta_{Y,j,t}+e_{Y,n,t}\\ \tilde{L}_{n,t}/\tilde{Y}_{n,t}=\boldsymbol{\gamma}_L\mathbf{X}_{n,t}+\theta_{L,j,t}+e_{L,n,t}\\ \ln\tilde{C}_{n,t}=\boldsymbol{\gamma}_C\mathbf{X}_{n,t}+\theta_{C,j,t}+e_{C,n,t}\\ \ln\tilde{D}_{n,t}=\boldsymbol{\gamma}_D\mathbf{X}_{n,t}+\theta_{D,,j,t}+e_{D,n,t}\end{gathered}$$

where $\mathbf{X}_{n,t}$ is a vector of household composition variables (i.e., number of adult males, number of adult females, number of children, male head of household dummy, linear and squared terms of age of head of household, years education of head of household, and a household-specific fixed effect) for household n at time t and $\theta_{.,j,t}$ is a time t-specific effect that varies by region j and captures the business cycle. These regressions are run using only the pre-program data, 1997–2001, which ensures that we do filter out the effects of the program itself. Unfortunately, the pre-program, time-specific effects cannot be extrapolated for the post-program data, so we rely on across village, within-year variation to evaluate the model's predictions. The R^2 values for the four regressions are 0.63, 0.34, 0.76, and 0.31, respectively, so the regressions are indeed accounting for a great deal of heterogeneity and variation.

For the full sample, 1997–2003, we construct the adjusted data for a household with mean values of the explanatory variables ($\bar{\mathbf{X}}$ and $\bar{\theta}_{.,j}$) using the estimated coefficients and residuals:

$$\begin{gathered}\ln Y_{nt}=\widehat{\boldsymbol{\gamma}}_Y\overline{\mathbf{X}}+\overline{\theta}_{Y,j}+g_Y(t-1999)+\widehat{e}_{Y,n,t}\\ L_{nt}/Y_{nt}=\widehat{\boldsymbol{\gamma}}_L\overline{\mathbf{X}}+\overline{\theta}_{L,j}+\widehat{e}_{L,n,t}\\ \ln C_{nt}=\widehat{\boldsymbol{\gamma}}_C\overline{\mathbf{X}}+\overline{\theta}_{C,j}+g_C(t-1999)+\widehat{e}_{C,n,t}\\ D_{nt}=\widehat{\boldsymbol{\gamma}}_D\overline{\mathbf{X}}+\overline{\theta}_{D,j}+\widehat{e}_{D,n,t}\end{gathered}$$

where g_y and g_c are the average growth rates of the trending variables, income and consumption, respectively, in the pre-program data. Next, we use a multiplicative scaling term to ensure that average income, liquidity ratios, consumption, and default are equal in

33As noted before, 79 of the original 960 households realized negative income (net of business and agricultural income) at some point in the pre-intervention sample. The model yields only positive income, and so these households were dropped.

the raw and adjusted data. Finally, we construct investment data $I_{n,t}$ by multiplying the measured investment/income ratios ($\tilde{I}_{nt}/\tilde{Y}_{nt}$) by the newly constructed income data $Y_{n,t}$.

4.2 Returns on Investment

In principle, income growth and investment data should tell us something about the return on investment, R. In practice, however, the parameter cannot be well estimated because investment data itself is endogenous to current income, and also because investment occurs relatively infrequently. We instead use data on physical assets rather than investment, and we calibrate R to match cross-sectional relationship between assets and income.

To separate the effect of assets and labor quality on income, we assume that all human capital investments are made prior to investments in physical assets. Let $t - J$, indicate the first year of investing in physical assets. That is, substituting the law of motion for permanent income, equation (4), J times recursively into the definition of actual income, equation (3), yields:

$$Y_t = \underbrace{\left[P_{t-J} G^J \prod_{j=1}^{J} N_{t+1-j}\right] U_t}_{\text{income of investment prior to } t-J} + \underbrace{R\left[\sum_{j=1}^{J} I_{t-j} G^{j-1} \prod_{k=1}^{j} N_{t+1-k}\right] U_t}_{\text{income from investment after } t-J}$$

The first term captures income from the early human capital investments, which we measure by imputing wage income from linear regressions of wages on household characteristics (sex, age, education, region). The second term involves the return R multiplied by the some of the past J years of investments (weighted by the deterministic and random components of growth.) We measure this term using current physical assets. That is, R is calibrated using the following operational formula:

$$\varepsilon_R = Y_t - \text{imputed labor income}_t - R\,(\text{physical assets}_t)$$

We have the additional issue of how to deal with the value of housing and unused land. Neither source of assets contributes to Y_t, so we would ideally exclude them from the stock of assets.[34] Using data on the (i) value of the home, (ii) value of the plot of land including the home, and (iii) the value of unused or community use land, we construct three variants of physical assets.

We use a separate data set, the Townsend Thai Monthly Survey, to calibrate this return. The data is obtained from different villages, but the same overall survey area, and the monthly has the advantage of including wage data used to impute the labor income portion of total income.

We us a procedure which is analogous to GMM. We choose R to set the average ε_R to zero in the sample of households. The baseline value (which excludes categories (i)–(iii) from assets) yields $R = 0.11$, while including (iii), or (ii) and (iii), yield $R = 0.08$ and $R = 0.04$, respectively. If we choose R to solve $\varepsilon_R = 0$ for each household, then the median R values are identical to our estimates. Not surprisingly, R substantially varies across households, however. This is likely due in part because permanent shock histories and current transitory shocks differ across households, but also in part because households face different ex ante returns to investment.

[34]Our measure of Y_t does not include imputed owner occupied rent.

4.3 Method of Simulated Moments

In estimating, we introduce multiplicative measurement error in income which we assume is log normally distributed with zero log mean and standard deviation σ_E. Since liquidity L_t is calculated using current income, measurement error will also produce measurement error in liquidity.

We therefore have eleven remaining parameters $\theta = \{r, G, \sigma_N, \sigma_u, \sigma_E, \underline{c}, \beta, \rho, \mu_i, \sigma_i, \underline{s}\}$, which are estimated using a Method of Simulated Moments. The model parameters are identified jointly by the full set of moments. We include, however, an intuitive discussion of the specific moments that are particularly important for identifying each parameter.

The first two types of moments help identify the return to liquid savings, r:

$$\varepsilon_s(X, r) = EARNED\_INT_t - rS_{t-1}$$
$$\varepsilon_{cr}(X, r) = OWED\_INT_t - rCR_{t-1}$$

In ε_s, S_{t-1} is liquid savings in the previous year, while $EARNED\_INT_t$ is interest income received on this savings. Likewise, in ε_{cr}, CR is outstanding short-term credit in the previous year, and $OWED\_INT$ is the subsequent interest owed on this short-term credit in the following year.35

The remaining moments require solving for consumption, $C(L_t, P_t, I_t^*; \theta) = P_t c(l_t, i_t^*; \theta)$, investment decisions, $D_I(L_t, P_t, I_t^*; \theta) = d_I(l_t, i_t^*; \theta)$, and default decisions, $D_{def}(L_t, P_t; \theta) = d_{def}(l_t; \theta)$, where we have now explicitly denoted the dependence of policy functions on the parameter set θ. We observe data on decisions, C_t, I_t, $D_{def,t}$, and states L_t and Y_t. Our strategy is to use these policy functions to define deviations of actual variables (policy decisions and income growth) from the corresponding expectations of these variables conditional on L_t and Y_t.36 By the Law of Iterated Expectations, these deviations are zero in expectation and therefore valid moment conditions. With simulated moments, we calculate these conditional expectations by drawing series of shocks for U_t, N_t, i_t^*, and measurement error for a large sample, simulating, and taking sample averages. Details are available upon request.

The income growth moments help to identify the income process parameters and are derived from the definition of income and the law of motion for permanent income, equations (3) and (4).37 Average income growth helps identify the drift component of growth income growth, G:

$$\varepsilon_g(L_t, Y_t, Y_{t+1}; \theta) = \ln(Y_{t+1}/Y_t) - E[\ln(Y_{t+1}/Y_t) | L_t, Y_t]$$

The variance of income growth over different horizons (k =1…3-year growth rates, respectively) helps identify standard deviation of transitory and permanent income shocks, σ_u and σ_N, since transitory income shocks add the same amount of variance to income growth regardless of horizon k, whereas the variance contributed by permanent income shocks increases with k. The standard deviation of measurement error σ_E will also play a strong role in measured income growth. The deviations are defined as:

35 In the data there are many low interest loans, and the average difference between households interest rates on short term borrowing and saving is small, just 2 percent.

36 Since L_t requires the previous years savings S_{t-1}, these moments are not available in the first year.

37 Carroll and Samwick (1997) provide techniques for estimating the income process parameters G, σ_N, and σ_u without solving the policy function. These techniques cannot be directly applied in our case, however, since income is depends on endogenous investment decisions.

$$\varepsilon_{v,k}(L_t, Y_t, Y_{t+k};\theta)=\left[\begin{array}{c}\ln(Y_{t+k}/Y_t)\\ -E[\ln(Y_{t+k}/Y_t)|L_t, Y_t]\end{array}\right]^2 - E\left[\left[\begin{array}{c}\ln(Y_{t+k}/Y_t)\\ -E[\ln(Y_{t+k}/Y_t)|L_t, Y_t]\end{array}\right]^2 \Big| L_t, Y_t\right]$$
$$\text{for } k=1, 2, 3$$

We identify minimum consumption, $\underline{c}$; the investment project size distribution parameters μ_i andσ_i; the preference parameters β and ρ, and the variance of measurement error σ_E using moments on consumption decisions, investment decisions, and the size of investments. Focusing on both investment probability and investment size should help in separately identifying the mean (μ_i) and standard deviation (σ_i) of the project size distribution. Focusing on deviations in log consumption, investment decisions, and log investments (when investments are made):

$$\begin{array}{c}\varepsilon_C(C_t, L_t, Y_t;\theta)=C_t - E[C_t|L_t, Y_t]\\ \varepsilon_D(D_{I,t}, L_t, Y_t;\theta)=D_{I,t} - E[D_{I,t}|L_t, Y_t]\\ \varepsilon_I(D_{I,t}, I_t, L_t, Y_t;\theta)=D_{I,t}I_t - E[D_{I,t}I_t^*|L_t, Y_t],\end{array}$$

we are left with essentially three moment conditions for five parameters:

$$E[\varepsilon_C]=0 \quad E[\varepsilon_D]=0 \quad E[\varepsilon_I]=0$$

However, we gain additional moment conditions by realizing that since these deviations are conditional on income and liquidity, their interaction with functions of income and liquidity should also be zero in expectation. Omitting the functional dependence of these deviations, we express below the remaining six valid moment conditions:

$$\begin{array}{ccc}E[\varepsilon_C \ln Y_t]=0 & E[\varepsilon_D \ln Y_t]=0 & E[\varepsilon_I \ln Y_t]=0\\ E[\varepsilon_C(L_t/Y_t)]=0 & E[\varepsilon_D(L_t/Y_t)]=0 & E[\varepsilon_I(L_t/Y_t)]=0\end{array}$$

Intuitively, in expectation, the model should match average log consumption, probability of investing, and log investment across all income and liquidity levels, e.g., not over-predicting at low income or liquidity levels, while underpredicting at high levels. These moments play particular roles in identifying measurement error shocks σ_E and $\underline{c}$, in particular. If the data shows less response of these policy variables to income then predicted, that could be due to a high level of measurement error in income. Similarly, high consumption at low levels of income and liquidity in the data would indicate a high level of minimum consumption $\underline{c}$.

Finally, given $\underline{c}$, default decision moments are used to identify the borrowing constraint $\underline{s}$, which can be clearly seen from equation (8):

$$\varepsilon_{def}(L_t, Y_t, D_{def,t})=D_{def,t} - E[D_{def,t}|L_t, Y_t]$$

In total, we have 16 moments to estimate 11 parameters.

4.4 Estimation Results

Table III presents the estimation results for the structural model as well as some measures of model fit. The interest rate $\hat{r}$ (0.054) is midway between the average rates on credit (0.073) and savings (0.035), and is quite similar to the six percent interest rate typically charged by village funds. The estimated discount factor $\hat{\beta}$ (0.915) and elasticity of substitution $\hat{\rho}$ (1.16) are within the range of usual values for bufferstock models. The estimated standard deviations of permanent $\hat{\sigma_N}$ (0.31) and transitory $\hat{\sigma_U}$ (0.42) income shocks are about twice those for wage earners in the United States (see Gourinchas and Parker, 2002), but reflect the higher level of income uncertainty of predominantly self-employed households in a rural, developing economy. In contrast, the standard deviation of measurement error $\hat{\sigma_E}$ (0.15) is much smaller than that of actual transitory income shocks, and is the only estimated parameter that is not significantly different from zero. The average log project size $\hat{\mu_i}$ greatly exceeds the average size of actual investments (i.e., *log* I_t/Y_t) in the data (1.47 vs. −1.96), and there is a greater standard deviation in project size $\hat{\sigma_i}$ than in investments in the data (2.50 vs. 1.22). In the model, these difference between the average sizes of realized investment and potential projects stem from the fact that larger potential projects are much less likely to be undertaken.38 The estimated borrowing constraint parameter $\hat{\underline{s}}$ indicates that agents could borrow up to about 8 percent of their annual permanent income as short-term credit in the baseline period. (In the summary statistics of Table II, credit averages about 20 percent of annual income, but liquid savings net of credit, the relevant measure, is actually positive and averages 9 percent of income.) The value of $\hat{\underline{c}}$ indicates consumption in default is roughly half of the permanent component of income.

Standard errors on the model are relatively small. We attempt to shed light on the importance of each of the 16 moments to identification of each the 11 parameters, but this is not trivial to show. Let $\boldsymbol{\varepsilon}$ be the (16-by-1) vector of moments and $\boldsymbol{W}$, the (16-by-16) symmetric weighting matrix, then the criterion function is $\boldsymbol{\varepsilon}'\boldsymbol{W}\boldsymbol{\varepsilon}$ and the variance-covariance matrix is $[\boldsymbol{\varepsilon}'\boldsymbol{W}\boldsymbol{\varepsilon}]^{-1}$. The minimization condition for the derivative of the criterion function is then $2\boldsymbol{\varepsilon}'\boldsymbol{W}\frac{\partial\varepsilon}{\partial\theta}=0$. Table IV presents $\frac{\partial\varepsilon}{\partial\theta}$, a 16-by-11 matrix showing the sensitivity of each moment to any given parameter. The influence of the parameter on the criterion function involves $2\boldsymbol{\varepsilon}'\boldsymbol{W}$, which has both positive and negative elements, however. Hence, the magnitudes of the elements in Table IV very substantially across parameters and moments. $\boldsymbol{W}$ is also not a simple diagonal matrix so that the parameters are jointly identified. Some moments are strongly affected by many parameters (e.g., income growth and variances), while some parameters have strong effects on many moments (e.g., r, G, and β).

Still, the partial derivatives confirm the intuition above, in that the moments play a role in pinning down the parameters we associate with them. In particular, the interest rate r is the only parameter in the interest moments (rows ε_S and ε_{CR}). While σ_N is relatively more important for the variance of two and three-year growth rates (rows $\varepsilon_{V,2}$ and $\varepsilon_{V,3}$), σ_U is important for the variance of one-year growth rates (row $\varepsilon_{V,1}$). σ_E has important effects on the variance of income growth (rows $\varepsilon_{V,1}$, $\varepsilon_{V,2}$ and $\varepsilon_{V,3}$), but also the interaction of consumption and investment decisions with Y ($\varepsilon_C * \ln Y$, $\varepsilon_D * \ln Y$, and $\varepsilon_I * \ln Y$) and L/Y (rows $\varepsilon_C * L/Y$, $\varepsilon_D * L/Y$, and $\varepsilon_I * L/Y$). (These moments are even more strongly affected by r, σ_N, G, β, and ρ, however.) The utility function parameters β and ρ have the most important effect on consumption and investment moments (rows ε_c–$\varepsilon_{I*L/Y}$). Also, while μ_i and σ_i also affect income growth variance (rows $\varepsilon_{V,1}$, $\varepsilon_{V,2}$ and $\varepsilon_{V,3}$), the investment probability and investment level moments (rows ε_D–$\varepsilon_I * L/Y$) also help identify them. Finally, both $\underline{s}$ and $\underline{c}$ affect default similarly, but have opposite-signed effects on the interaction of measured income and liquidity ratios with investment (rows $\varepsilon_D * \ln Y$, $\varepsilon_D * L/Y$, $\varepsilon_I * \ln Y$, and $\varepsilon_I * L/Y$) and, especially, consumption (rows $\varepsilon_C * \ln Y$ and $\varepsilon_C * L/Y$) decisions.

In terms of fit, the model does well in reproducing average default probability, consumption, investment probability and investment levels (presented in Table III), and indeed deviations

[38]In the model, the average standard deviation of log investment (when investment occurs) is 1.37, close to the 1.22 in the data.

are uncorrelated with log income or liquidity ratios. Still, we can easily reject the overidentifying restrictions in the model, which tells us that the model is not the real world. The large J-statistic in the bottom-right of Table III is driven by two sets of moments.[39] First, the estimation rejects that the savings and borrowing rates are equal.[40] Second, the model does poorly in replicating the volatility of the income growth process, yielding too little volatility.

We suspect this is the result of the income process and our statistical procedures failing to adequately capture cyclical effects of income growth, in particular the Thai financial crisis and recovery of 1997 and 1998 (survey years 1998 and 1999, respectively). Only *mean* time-varying volatility is extracted from the data using our regression techniques, but the crisis presumably affected the variance as well.[41] Excluding the crisis from the pre-sample is not possible, since it would leave us just one year of income growth to identify both transitory and permanent income shocks. An alternative estimation that uses only data from 2000 and 2001, except for 1999 data used to create two-year income growth variance moments, produced estimates with wide standard errors that were not statistically different from the estimates above. The only economically significant difference was a much lower borrowing constraint ($\hat{\underline{s}} = -0.25$), which is consistent with an expansion of credit observed in the Thai villages even pre-intervention. Recall that this trend is not related to village size, however.

Another way of evaluating the within-sample fit of the model is to notice that it is comparable to what could be obtained using a series of simple linear regressions estimating 11 coefficients (rather than 11 parameters estimated by the structural model). By construction, the nine moments defined on consumption, investment probability, and investment levels could be set equal to zero by simply regressing each on a constant, log income, and liquidity ratios. This would use nine coefficients. The two remaining coefficients could simply be linear regressions of growth and default on constant terms (i.e., simple averages). These linear regressions would exactly match the eleven moments that we only nearly fit. On the other hand, these linear predictors would predict no income growth volatility, and would have nothing to say about the interest on savings and credit.

So the result on the fit of the model are mixed. However, we view the model's ability to make policy predictions on the impact of credit as a stronger basis for evaluating its usefulness. We consider this in the next section.

5 Million Baht Fund Analysis

This section introduces the Million Baht fund intervention into the model, examines the model's predictions relative to the data, presents a normative evaluation of the program, and then presents alternative analyses using the structural model.

[39]The J-statistic is the number of households (720) times $\boldsymbol{\varepsilon}'\boldsymbol{W}\boldsymbol{\varepsilon}$. Since, $\boldsymbol{W}$ is symmetric, we can rewrite this as $\tilde{\boldsymbol{\varepsilon}}'\tilde{\boldsymbol{\varepsilon}}$. The major elements of the summation $\tilde{\boldsymbol{\varepsilon}}'\tilde{\boldsymbol{\varepsilon}}$ are 0.02 (ε_s), 0.02 (ε_{cr}), 0.03 ($\varepsilon_{v,1}$), 0.04 ($\varepsilon_{v,2}$), while the others are all less than 0.01.

[40]It would be straightforward to allow for different borrowing and saving rates. This would lead to a kink in the budget constraint, however. The effect would that one would never observe simultaneous borrowing and saving and there would be a region where households neither save nor borrow. In the data, simultaneous short-term borrowing and saving is observed in 45 percent of observations, while having neither savings nor credit is observed in only 12 percent.

[41]We know from alternative estimation techniques that the model does poorly in matching year-to-year fluctuations in variables. In the estimation we pursue, we construct moments for consumption, investment, etc., that are based only on averages across the four years. For income growth volatitility, the moments necessarily have a year-specific component.

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5.1 Relaxation of Borrowing Constraints

We incorporate the injection of credit into the model as a surprise decrease in $\underline{s}$.42 That is, for each of sixty four villages, indexed by v, we calibrate the new, reduced constraint under the million baht fund intervention $\underline{s}_v^{mb}$ as the level for which our model would predict one million baht of additional credit relative to the baseline at $\underline{s}$. We explain this mathematically below.

Define first the expected borrowing of a household n with the Million Baht Fund intervention:

$$E[B_{n,t,v}^{mb}|L_{n,t},Y_{n,t};\underline{s}_v^{mb}]=E\left\{\mathcal{I}_{<0}\left[L_t-C(L_t,P_t,I_t^*;\underline{s}_v^{mb})-D_I(L_t,P_t,I_t^*;\underline{s}_v^{mb})I_t^*\right]|L_{n,t},Y_{n,t}\right\}$$

and in the baseline without the intervention:

$$E[B_{n,t,v}|L_{n,t},Y_{n,t};\underline{s}]=E\left\{\mathcal{I}_{<0}\left[L_t-C(L_t,P_t,I_t^*;\underline{s})-D_I(L_t,P_t,I_t^*;\underline{s})I_t^*\right]|L_{n,t},Y_{n,t}\right\}$$

where $\mathcal{I}_{<0}$ is shorthand notation for the indicator function that the bracketed expression is negative (i.e., borrowing and not savings). On average, village funds lent out 950,000 baht in the first year, so we choose $\underline{s}_v^{mb}$ so that we would have hypothetically predicted an additional 950,000 baht of borrowing in each village in the pre-intervention data:43

$$\frac{1}{\mathcal{N}}\sum_{n=1}^{\mathcal{N}}\left\{E[B_{n,t,v}^{mb}|L_{n,t},Y_{n,t};\underline{s}_v^{mb}]-E[B_{n,t,v}|L_{n,t},Y_{n,t};\underline{s}]\right\}=\frac{950,000}{\#\,\text{HHs in village}_v}$$

Here $\mathcal{N}$ represents the number of surveyed households in the pre-intervention data.

The resulting $\underline{s}_v^{mb}$ values average −0.28 across the villages, with a standard deviation of 0.14, a minimum of −0.91 and a maximum of −0.09. Hence, for most villages, the post-program ability to borrow is substantial relative to the baseline ($\underline{s}$ = −0.08), averaging about one-fifth of permanent income after the introduction of the program.44

5.2 Predictive Power

Using the calibrated values of borrowing limits, we evaluate the model's predictions for 2002 and 2003 (i.e., t = 6 and 7) on five dimensions: log consumption, probability of investing, log investment levels, default probability, and income growth. Using the observed liquidity ($L_{n,5}$) and income data ($Y_{n,5}$) for year five (i.e., 2001), the last pre-intervention year, we draw series of $U_{n,t}$, $N_{n,t}$, $i_{n,t}^*$, and measurement error shocks from the estimated distributions, and simulate the model for 2002 and 2003. We do this 500 times, and combine the data with the actual pre-intervention data, in order to create 500 artificial datasets.

42Microfinance is often viewed as a lending technology innovation which is consistent with the reduction in $\underline{s}$. An alternative would be to model the expansion of credit through a decrease in the interest rate on borrowing, but recall that we did not measure a decline in short-term interest rates in response to the program.

43Since 1999 is the base year used, the 950,000 baht is deflated to 1999 values. Predicted results are similar if we use the one million baht which might have been predicted ex ante.

44These large changes are in line with the size of the intervention, however. In the smallest village, the ratio of program funds to village income in 2001 is 0.42. If half the households borrow, this would account for the 0.83 drop in $\underline{s}$.

We then ask whether reduced-form regressions would produce similar impact estimates using simulated data as they would using the actual post-intervention data, even though statistically the model is rejected. We do not have a theory of actual borrowing from the village fund, so rather than using a first-stage equation for village fund credit, we put $\frac{950,000}{\#\,\text{HHs in village}_v}$, the average injection per household, directly into the outcome equations in place of predicted village fund credit. The following reduced form regressions are then:

$$
\begin{aligned}
C_{n,t} &= \sum_{j=6,7} \alpha_{C,j} \frac{950{,}000}{\#\,\text{HHs in village}_v} \mathcal{I}_{t=j} + \theta_{C,t} + e_{C,n,t} \\
D_{n,t} &= \sum_{j=6,7} \alpha_{D,j} \frac{950{,}000}{\#\,\text{HHs in village}_v} \mathcal{I}_{t=j} + \theta_{D,t} + e_{D,n,t} \\
I_{n,t} &= \sum_{j=6,7} \alpha_{I,j} \frac{950{,}000}{\#\,\text{HHs in village}_v} \mathcal{I}_{t=j} + \theta_{I,t} + e_{I,n,t} \\
DEF_{n,t} &= \sum_{j=6,7} \alpha_{DEF,j} \frac{950{,}000}{\#\,\text{HHs in village}_v} \mathcal{I}_{t=j} + \theta_{DEF,t} + e_{DEF,n,t} \\
\ln\left(Y_{n,t}/Y_{n,t-1}\right) &= \sum_{j=6,7} \alpha_{\Delta \ln Y,j} \frac{950{,}000}{\#\,\text{HHs in village}_v} \mathcal{I}_{t=j} + \theta_{\Delta \ln Y,t} + e_{\Delta \ln Y,n,t}
\end{aligned}
$$

Here $\hat{\alpha}_{C,j}$, $\hat{\alpha}_{D,j}$, $\hat{\alpha}_{I,j}$, $\hat{\alpha}_{DEF,j}$, and $\hat{\alpha}_{\Delta \ln Y,j}$ would be estimates of the year j impact of the program on consumption, investment probability, average investment, default probability, and log income growth, respectively. Beyond replacing village fund credit ($VFCR_{n,t}$) and its first-stage regression with $\frac{950,000}{\#\,\text{HHs in village}_v}$, the above equations differ from the motivating regressions, equation (1), in two other ways. First, impact coefficients $\alpha_{Z,j}$ are now vary by year j. Second, the regressions above omit the household level controls and household fixed-effects, but recall Section 4.1.1, where we filtered the data of variation correlated with household level demographic data. We also filtered year-to-year variation out of the pre-program data, so the year fixed effects will be zero for the pre-program years. For the post-program years, however, the year fixed-effects will capture the aggregate effect of the program as well as any cyclical component not filtered out of the the actual post-program data. We run these regressions on both the simulated and actual data and compare the estimates and standard errors.

Table V compares the regression results of the model to the data, and shows that the model does generally quite well in replicating the results, particularly for consumption, investment probability, and investment.

The top panel presents the estimates from the actual data. These regressions yield the surprisingly high, and highly significant, estimates for consumption of 1.39 and 0.90 in the first year and second year, respectively. The estimate on investment probability is significant and positive, but only in the first year. For a village, with the average village fund credit per household of 9600, the point estimate of 6.3e-6 would translate into an increase in investment probability of six percentage points. Nonetheless, and perhaps surprising in a world without lumpy investment, the regressions find no significant impact on investment, and very large standard errors on the estimates. The impact effects on default are significant, but negative in the first year and positive in the second year reflecting transitional dynamics. Finally, the impact of the program on log income growth is positive and significant, but only in the second year. Again, given the average village fund credit per household, this coefficient would translate into a ten percentage point higher growth rate in the second year.

The second panel of Table V presents the regressions using the simulated data. The first row shows the average (across 500 samples) estimated coefficient and the second row shows the average standard error on these estimates. The main point is that the estimates in the data are typical of the estimates the model produces for consumption, investment probability, and investment. In particular, the model yields a large and significant estimate of the coefficient on consumption that is close to one in the first year, and a smaller though still large estimate in the second year. The standard errors are also quite similar to what is observed. The model also finds a comparably sized significant coefficient on the investment probabilities, although its average coefficients are more similar in both the first and second years, whereas the data show a steep drop off in the magnitude and significance after the first year.

The model's predictions for default and income volatility growth are less aligned with the data. For default, both the model and data show a marked and significant decrease in default in the first year, though the model's is much larger. While the data show a significant increase in default in the second year, the model produces no effect.45 The data also shows a significant increase in income growth in the second year, whereas regressions from the model measure no impact on income growth. Perhaps, both of these shortcomings are results of the model's inability to fully capture year to year fluctuations in the volatility of the income growth process in the estimation.

The final panel shows formally that the estimates from the model are statistically similar to those in the data. It shows the significance level of a Chow test on the combined sample between the actual post-program data and the simulated post-program data (from all simulations), where the null is no structural break between the actual and simulated data. Using a five (or even ten) percent level of significance, the Chow test would not detect a structural break in any of the regressions.

One further note is that while the impact coefficients in the data are quite similar to those in the simulated structural model, they differ substantially from what would be predicted using reduced form regressions. For example, if we added credit ($CR_{n,t}$) as a right-hand side variable in a regression on consumption, a reduced form approach might use the coefficient (say δ_1) on credit to predict the per baht impact of the village fund credit injection. That is, we might predict a change in consumption of $\delta_1 \frac{950,000}{\#\,\text{HHs in village}_v}$. However, in the following regression:

$$C_{n,t}=\delta_1 CR_{n,t}+\delta_2 \frac{950,000}{\#\,\text{HHs in village}_v} I_{t=j}+\theta_{C,t}+e_{C,n,t}$$

an F-test does indeed reject that $\delta_1 = \delta_2$. Parallel regressions that replace credit with consumption, investment probability, or default also reject this restriction, and these restrictions are also rejected if credit is replaced with liquidity or income.

In sum, we measure large average effects on consumption and insignificant effects on investment, but the structural model helps us in quantitatively interpreting these impacts. First, these average coefficients mask a great deal of unobserved heterogeneity. Consider Figure 4 which shows the estimated policy function for consumption (normalized by permanent income) c as a function of (normalized) project size i^* and (normalized) liquidity l. Again, the cliff-like drop in consumption running diagonally through the middle of the graph represents the threshold level of liquidity that induces investment. In the simulations,

45For the alternative definition of default, where all loans not from relatives with an unstated duration are considered in default, the data actually show a small decrease in the second year.

households in a village are distributed along this graph, and the distribution depends on the observables (Y and L), and stochastic draws of the shocks (i^* and U, since $P=\frac{Y}{U}$).

We have plotted examples of five potential households, all of whom could appear ex ante identical in terms of their observables, Y and L. (i.e., their state) constant, but resembles a leftward shift in the graphed decision (recall Figure 3, panel (b)). A small decrease in $\underline{s}$ can yield qualitatively different responses to the five households labeled. Household (i)'s income is lower than expected, and so would respond to small decrease in $\underline{s}$ by borrowing to the limit and increasing consumption. Household (ii) is a household that had higher than expected income. Without the intervention, the household invests and is not constrained in its consumption. Given the lower $\underline{s}$, it does not borrow, but nevertheless increases its consumption. Given the lower borrowing constraint in the future, it no longer requires as large a bufferstock today. Household (iii), though not investing, will similarly increase consumption without borrowing by reducing its bufferstock given a small decrease in $\underline{s}$. Thus, in terms of consumption, Household (i)–(iii) would increase consumption, and Households (ii) and (iii) would do so without borrowing. If these households were the only households, the model would deliver the surprising result that consumption increases more than credit, but Households (iv) and (v) work against this. Household (iv) is a household in default. A small decrease in $\underline{s}$ would have no affect on its consumption or investment, but simply increase the indebtedness of the household and reduce the amount of credit that would have been defaulted. Finally, Household (v) is perhaps the target household of microcredit rhetoric a small increase in credit would induce the household to invest. But if (as drawn) the household would invest in a sizable project, it would finance this by not only increasing its borrowing but also by reducing its current consumption. One can also see that the effects of changes in $\underline{s}$ are not only heterogeneous, but also nonlinear. For example, if the decrease in $\underline{s}$ were large enough relative to i^*, Household (v) would not only invest but also increase consumption.

Quantitatively, draws from the distributions of i^* and U (together with the empirical distribution of L/Y) determine the scattering of households in each village across Figure 3. The high level of transitory income growth volatility lead to a high variance in U, hence a di use distribution in the L/P dimension (given L/Y). We know that in the baseline distribution the model calibrates that 19 percent of households are in default (like Household (iv)), and an additional 26 percent are hand-to-mouth consumers (like Household (i), though 3 of the 26 percent are investing).46 Based on the pre-sample years, the relaxation of $\underline{s}$ would lead to fewer defaulters (12 percent of households) but the same number of hand-to-mouth consumers (26 percent total, 4 percent of which are investing). Hence, the large share of hand-to-mouth consumers, together with the large share (51 percent) of unconstrained households (like Households (ii) and (iii)) who drive down their buffer stocks, explains the big increase in consumption.

Similarly, the low investment probability but sizable average investment levels in the data lead to high estimated mean and variance of the i^* distribution. Given these estimates, most households in the model have very large projects (with a log mean of 6.26), but investment is relatively infrequent (11.6 percent of observations in the model and data). The median investment is 14 percent (22 percent) of annual income in the data (model), so that most investments are relatively small, but these constitute only 4 percent (8 percent) of all investment in the data (model).47 In contrast, a few very large i^* investments (e.g., a large

[46]Many bufferstock models (e.g., Aiyagari (1994)) yield very low level of constrained households in equilibrium. Relative to these models, our model has three important differences. First, we allow for default with minimum consumption, which is empirically observed, so the costs of being liquidity constrained are much lower. Second, investment also causes households to be constrained. Third, we are not modeling a stationary, general equilibrium, but estimating parameters in a partial equilibrium model.

truck or a warehouse) have large effects on overall investment levels. For example, the top percentile of investments accounts for 36 percent (24 percent) of all investment in the data (model). Hence, while some households lie close enough to the threshold that changes in $\underline{s}$ induce investment (4 percent of households in the pre-sample years), the vast majority of these investments are small. That is, the density of households resembling Household (v) is low, especially for large investments (high levels of i^*).

Since a lower $\underline{s}$ can never reduce investment, the theoretical effect of increased liquidity on investment levels is clear. It is simply that the samples are too small to measure it. Given enough households, a small amounts of credit available will eventually decide whether a very large investment is made or not, and this will occurs more often the larger the decrease in $\underline{s}$. Indeed, when the 500 samples are pooled together, the pooled estimates of 0.40 (standard error=0.04) for $\gamma_{I,2002}$ is highly significant. The estimate is also sizable. Given the average credit injection per household, this would be an increase in investment of 3800 baht per household (relative to a pre-sample average of 4600 baht/household).

5.3 Normative Analysis

We evaluate the benefits of the Million Baht program by comparing its benefits to a simple liquidity transfer. As our analysis of Figure 4 indicates reductions in $\underline{s}$ (leftward shifts in the policy function from the Million Baht program) are similar to increases in liquidity (rightward shifts in the households from the transfer). Both provide additional liquidity.

The advantage of the Million Baht program is that it provides more than a million baht in potential liquidity ($-(\underline{s}_v^{mb} - \underline{s})\, P$). That is, (by construction) borrowers choose to increase their credit by roughly a million baht, but non-borrowers also benefit from the increased potential liquidity from the relaxed borrowing constraint in the future. More generally, those that borrow have access to a disproportionate amount of liquidity relative to what they would get if the money were distributed *equally* as transfers.

The disadvantage of the Million Baht program is that it provides this liquidity as credit, and hence there are interest costs which are substantial given $r = 0.054$. A household that receives a transfer of, say, 10,000 baht earns interest on that transfer relative to a household that has access to 10,000 baht in credit, even if it can be borrowed indefinitely.

The relative importance of these two differences depends on household's need for liquidity. Consider again the household in Figure 3. Household (ii) and (iii), who are not locally constrained (i.e., their marginal propensity to consumer is less than one), benefit little from a marginal decrease in $\underline{s}$, since they have no need for it in the current period, and may not need it for quite some time. Households (iv), who is defaulting, is actually hurt by a marginal reduction in $\underline{s}$, since the household will now hold more debt, and be forced to pay more interest next period. On the other hand, Households (i) and (v) benefit greatly from the reduction in $\underline{s}$, since both are locally constrained, in consumption and investment respectively.

A quantitative cost benefit analysis is done by comparing the cost of the program (the reduction in $\underline{s}$) to a transfer program (an increase in l) that is equivalent in terms of providing the same expected level of utility (given $L_{n,t}$ and $Y_{n,t}$ in 2001, just before the program is introduced). That is, we solve the equivalent transfer T_n *for each household* using the following equation:

[47]An alternative interpretation of the data is that most households do not have potential projects that are of the relevant scale for microfinance. Households with unrealistically large projects may correspond, in the real world, to households that simply have no potential project in which to invest.

$$E[V(L,P,I^*;\underline{s}_v^{mb})|Y_{n,5,v},L_{n,5,v}]=E[V(L+T_n,P,I^*;\underline{s})|Y_{n,5,v},L_{n,5,v}]$$

The *average* equivalent liquidity transfer per household in the sample is just 8200 baht which is about twenty percent less than the 10,100 baht per household that the Million Baht program cost.48 Again, this average masks a great deal of heterogeneity across households, even in expectation. Ten percent of households value the program at 19,500 baht or more, while another ten percent value the program at 500 baht or less. 28 percent of households value the program at more than its cost (10,100 baht), but the median equivalent transfer is just 5900 baht. Thus, many households benefit disproportionately from the program because of the increased availability of liquidity, but most benefit much less. Although the Million Baht program is able to offer the typical household more liquidity (e.g., in the median village, $(-(\underline{s}_v^{mb}-\underline{s})P)=13,400$ baht for a household with average income, while the average cost per household in that village is 9100 baht), this benefit is swamped by the interest costs to households.

5.4 Alternative Structural Analyses

The structural model allows for several alternative analyses including comparison with reduced form predictions, robustness checks with respect to the return on investment R, estimation using post-intervention data, long run predictions and policy counterfactuals. We briefly summarize the results here, but details are available upon request.

5.4.1 Return on Investment—Our baseline value of R was 0.11. Recall that two alternative calibrations of the return on assets were calculated based on the whether our measure of productive assets included uncultivated or community use land (R = 0.08) or the value the plot of land containing the home (R = 0.04). We redid both the estimation and simulation using these alternative values. For R = 0.08, the estimates were quite similar; only a higher β (0.94), a lower r (0.032); and a lower risk aversion (1.12) were statistically different than the baseline. The model had even more difficulty matching income growth and volatility, so that the overall fit was substantially worse (J-statistic=200 vs. 113 in the baseline). The simulation regression estimates were nearly identical. For the low value of R = 0.04, the estimation required that the return on liquidity be substantially lower than in the data (r = 0.018), and that β be substantially higher (0.97) than typical for bufferstock models. The fit was also substantially worse (J-statistic=324). Finally, the regression estimates on the simulated data were qualitatively similar but smaller (e.g., a consumption coefficient of 0.68 in the first year.) Indeed, only the reduction of default in the first year was statistically significant at a 0.05 percent level.

5.4.2 Estimation Using Ex Post Data—In this analysis, rather than use the post-intervention data to test the model using calibrated borrowing constraints, we use it to estimate the new borrowing constraints and better identify the other parameters in the model. We proceed by specifying a reasonably flexible but parametric function for $\underline{s}_{mb}$ in the post-program years:

$$\underline{s}_{mb,v}=\underline{s}_1+\underline{s}_2\left(\frac{1}{\#\,\text{HHs in village}_v}\right)^{\underline{s}_3}$$

48This includes only the seed fund, and omits any administrative or monitoring costs of the village banks.

where $\underline{s}_1$, $\underline{s}_2$, and $\underline{s}_3$ are the parameters of interest.[49] The moments for the post-program years cover: interest on savings and borrowing (two moments); income growth (two) and income growth volatility (three); consumption (two), investment probability (two), investment (two), and their interactions with measured income and liquidity ratios (twelve); and default (two). All but the interest moments are year-specific, and the only use of pre-program data is to construct the four income growth moments that require income in 2001. In total, the estimation now includes 27 moments and 14 parameters.

The estimated results from the sample are strikingly similar to the baseline estimates from the pre-program sample and the calibration from the post-program sample, all with two standard deviation bands.[50] The resulting estimates are $\hat{\underline{s}}_1 = -0.07$, $\hat{\underline{s}}_2 = -47$, and $\hat{\underline{s}}_3 = -1.20$. The model fit is comparable to the baseline, performing well along the same dimensions and not well at all along the same dimensions. Finally, the average, standard deviation, minimum and maximum of $s_{mb,v}$ implied by the estimates are −0.26 (−0.28 in baseline calibration), −0.14 (−0.14), −0.86 (−0.91), and −0.07 (−0.09) respectively. The correlation between the two is very close to one by construction, since both increase monotonically with village size. That is, the estimated $\underline{s}_{mb,v}$ are quite similar to the calibrated values. The fact that the estimates and calibrated values are quite close indicates that cross-sectionally the simulated predictions of the model on average approximate a best fit to the variation in the actual data.

5.4.3 Long Run Predictions—The differences between $\hat{\alpha}_{Z,j}$ estimates in the first and second year (i.e., $j = 1, 2$) of the program indicate that impacts are time-varying, since there are transitional dynamics as households approach desired bufferstocks. The structural model allows for simulation and longer run horizon estimates of impact. We therefore simulate datasets that include five additional years of data and run the analogous regressions. Seven years out, none of the $\hat{\alpha}_{Z,7}$ estimates are statistically significant on average. While the average point estimates are quite small for investment probability (0.23), investment (0.10), and default probability (0.01) relative to the first year, the average $\hat{\alpha}_{Z,7}$ for consumption remains substantial (0.58) and close to the estimate in the second year (0.73). In the model, the impacts on consumption fall somewhat after the first year, but there remains a substantial persistent effect. Still, alternative regression estimates that simply measure a single (common for all post-program years j) coefficient α_Z do not capture any statistically significant impact on consumption when seven years of long run data are used. This shows the importance of considering the potential time-varying nature of impacts in evaluation.

5.4.4 Policy Counterfactual—From the perspective of policymakers, the Million Baht Village Fund Program may appear problematic along two fronts. Its most discernible impacts are on consumption rather than investment, and it appears less cost-effective than a simple transfer mainly because funds may simply go to prevent default and the increased borrowing limit actually hurts defaulting households. An alternative policy that one might attempt to implement would be to only allow borrowing for investment. We would assume that the village can observe investment, but since money is fungible, it would be unclear whether these investments would have been undertaken even without the loans, in which case the loans are really consumption loans. Since defaulting households cannot undertake

[49] If all households borrowed every period and had identical permanent income, then the extra borrowing per household (950, 000/# HHs in village$_v$) would translate into borrowing constraints with $\underline{s}_1 = \underline{s}$ (the pre-intervention borrowing constraint), $\underline{s}_2 = \frac{950{,}000}{P}$, and $\underline{s}_3 = 1$.

[50] For comparison, the point estimates of the full-sample (baseline) estimation are $\hat{r} = 0.060$ (0.054), $\hat{\sigma}_N = 0.35$ (0.31), $\hat{\sigma}_U = 0.51$ (0.42), $\hat{\sigma}_E = 0.28$ (0.15), $\hat{G} = 1.052$ (1.047), $\hat{\underline{c}} = 0.53$ (0.52), $\hat{\beta} = 0.926$ (0.926), $\hat{\rho} = 1.21$ (1.20), $\hat{\mu}_i = 1.24$ (1.47), $\hat{\sigma}_i = 2.56$ (2.50), and $\hat{\underline{s}} = -0.12$ (−0.08).

investments, it would prevent households in default from borrowing. Nevertheless, such a policy would also eliminate households like Household (i) in Figure 4 from borrowing.

The ability to model policy counterfactuals is another strength of a structural model. In a model with this particular policy, households face the constraint $\underline{s}_v^{mb,alternative}$ in any period in which they decide to invest, while facing the baseline $\underline{s}$ if they decide not to invest. The default threshold is also moved to $\underline{s}_v^{mb,alternative}$, however, to prevent households from investing and borrowing in one period, and then purposely not investing in the next period in order to default. Under this policy, the new borrowing constraints are even lower with wider variation (a maximum, minimum, and mean of −0.16, −4.78, and −0.67, respectively, vs. −0.09, −0.91 and −0.28 for the actual policy) but only for those who borrow.

The policy increases both the impact on consumption and increase the impact on investment. Pooling all 500 simulated samples yields a significant estimate for consumption that is similar to the actual million baht intervention (1.40 vs. 1.38 in the first year). It also yields a much larger and significant estimate for investment levels (0.62 in the first year), which is expected since the borrowing constraints of investors are much lower under this policy. Naturally, this policy offers less flexibility for constrained households who would rather not invest, but the relatively larger benefits to defaulters and investors help outweigh this loss. There is much more variation in the benefits across households (e.g., the standard deviation of the equivalent transfer is 14,000 baht in this counterfactual vs. 11,000 in the baseline policy), but the average equivalent transfer is actually lower (7500 vs. 8200).

6 Conclusions

We have developed a model of bufferstock saving and indivisible investment, and used it to evaluate the impacts of the Million Baht program as a quasi-experiment. The correct prediction of consumption increasing more than one for one with the credit injection is a "smoking gun" for the existence of credit constraints, and is strong support for the importance of bufferstock savings behavior. Nevertheless, the microfinance intervention appears to be less cost effective on average than a simpler transfer program because it saddles households with interest payments. This masks considerable heterogeneity, however, including some households that gain substantially. Finally, we have emphasized the relative strengths of a quasi-experiment, a structural model, and reduced form regressions.

One limitation of the model is that although project size is stochastic, the quality of investments, modeled through R, is assumed constant across projects and households. In the data, R varies substantially across households. Heterogeneity in project quality may be an important dimension for analysis, especially since microfinance may change the composition of project quality. Ongoing research by Banerjee, Breza, and Townsend find that high return households do borrow more from the funds, but they also invest less often, which indicates that the data may call for a deeper model of heterogeneity and, related, a less stylized model of the process for projects sizes. Potential projects may not arrive each year, they may be less transient (which allows for important anticipatory savings behavior as in Buera, 2008), or households might hold multiple projects ordered by their profitability. Such extensions might help explain the investment probability results in the second year of the program: a positive impact in the model but no impact in the data.

Related, the analysis has also been purely partial equilibrium analysis of household behavior. In a large scale intervention, one might suspect that general equilibrium effects on income, wage rates, rates of return to investment, and interest rates on liquidity may be important (see Kaboski and Townsend, 2009). Finally, we did not consider the potential interactions between villagers or between villages, nor were the intermediation mechanism or default contracting explicitly modeled. These are all avenues for future research.

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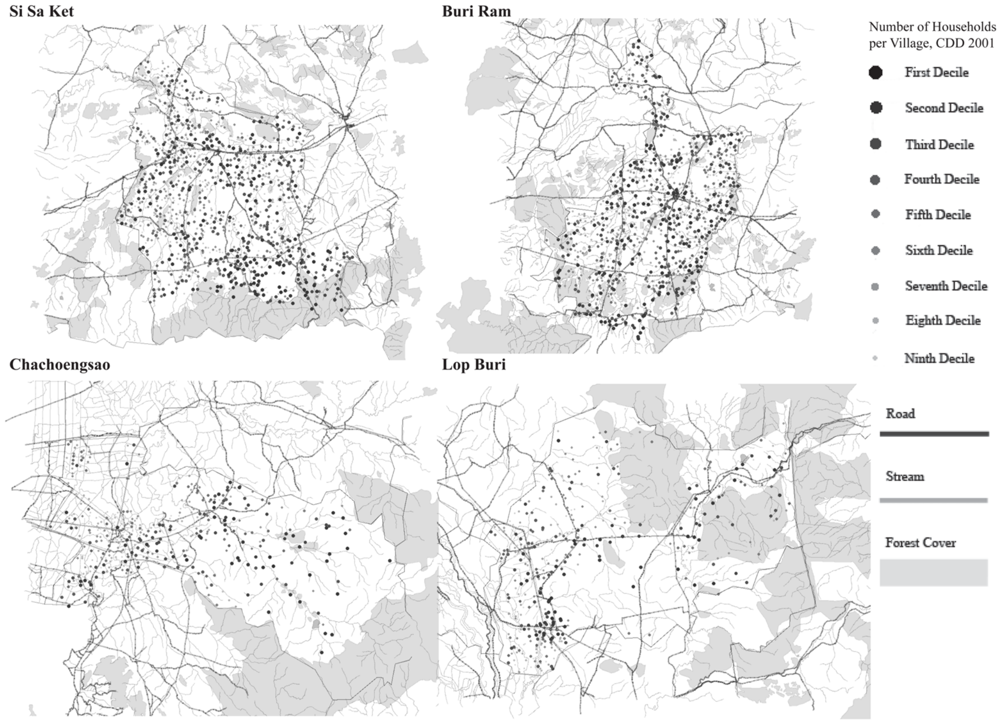

Figure 1.
Number of Households per Villages, Four Provinces, Thailand

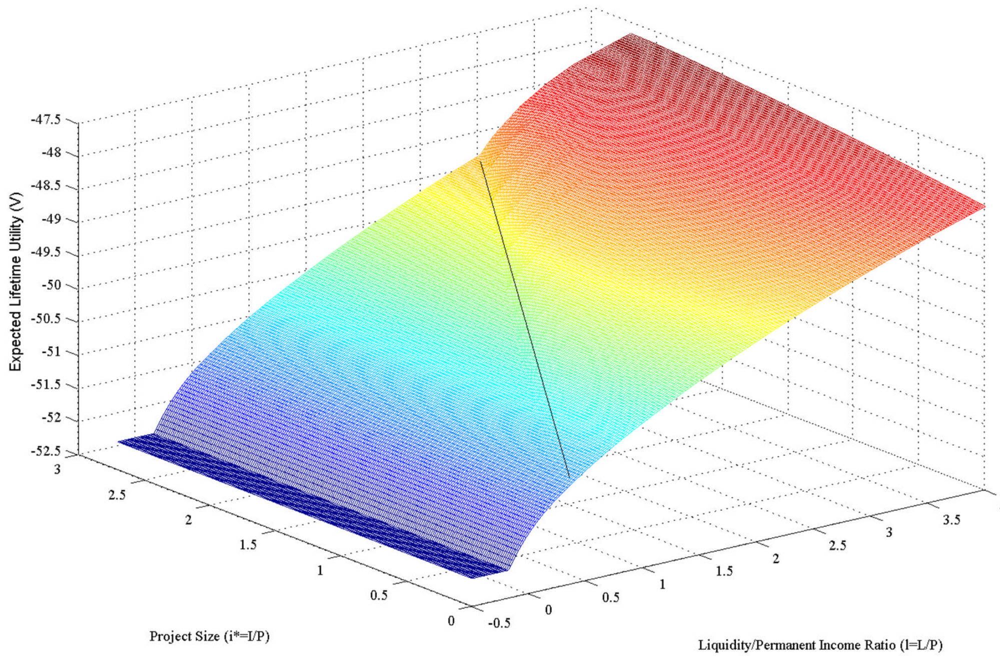

Figure 2.
Value Function vs. Liquidity Ratio & Project Size

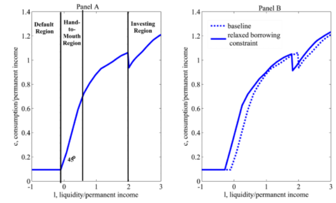

Figure 3.
Consumption Policy for Fixed i*, Baseline and Reduced Borrowing Constraint

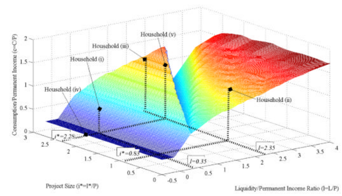

Figure 4.
Consumption Policy as a Function of Liquidity and Project Size

TABLE I

PRE-EXISTING TRENDS BY INVERSE VILLAGE SIZE

Outcome Variable, Z	$\alpha_{2,Z,\text{“trends”}}$	Outcome Variable, Z	$\alpha_{2,Z,\text{“trends”}}$
Village fund short-term credit	0.01 (0.02)	Business investment	0.03 −0.19
Total short-term credit	0.09 (0.15)	Agricultural investment	0.04 (0.13)
BAAC credit	0.04 (0.10)	Investment probability	5.1e-5 (2.1e-4)
Commercial bank credit	0.05[b] (0.03)	Fertilizer expenditures	−0.04 (0.06)
Agricultural credit	−0.07 (0.04)	Total wages paid to laborers	0.19 (0.12)
Business credit	0.04 (0.10)	Consumption	0.19 (0.27)
Fertilizer credit	0.14 (0.10)	Nondurable Consumption	0.09 (0.21)
Consumption credit	0.05 (0.08)	Grain consumption	−0.03 (0.04)
Short-term interest rate	−1.6e-7 (5.3e-7)	Milk consumption	0 (0.01)
Probability in default	−9.8e-7 (1.3e-6)	Meat consumption	0.01 (0.01)
Credit in default	−1.1e-6 (1.5e-6)	Alcohol cons. in the house	−0.01 (0.01)
Informal credit	0.00 (0.09)	Alcohol cons. outside of the house	−0.01 (0.01)
Income growth	−7.2e-6 (4.5e-6)	Fuel consumption	−0.02 (0.03)
Fraction of net income from business	2.0e-7 (3.9e-7)	Tobacco consumption	−0.01 (0.01)
Fraction of income from wages	9.1e-7 (6.1e-7)	Education Expenditures	0.03 (0.02)
Fraction of income from rice	1.0e-6[a] (5.6e-7)	Ceremony expenditures	−0.01 (0.03)
Fraction of income from other crops	7.9e-8 (4.1e-7)	Housing repair expenditures	0.06 (0.14)
Fraction of income from livestock	6.2e-8 (3.8e-7)	Vehicle repair expenditures	0.00 (0.03)
Log Asset growth	6.0e-7 (2.9e-6)	Clothes expenditures	0.00 (0.01)
Number of new businesses	4.9e-7 (1.1e-6)	Meals expenditures away from home	0.00 (0.01)

[a]significant at a 10% level

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TABLE II

SUMMARY STATISTICS OF PRE-INTERVENTION HOUSEHOLD DATA

Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Median**	**Max**
Primary Variables:						
Non-Interest Household Income[a]	3575	87200	202000	500	50300	6255500
Log Growth of Income[a]	2860	0.04	0.98	−4.94	0.01	10.28
Household Consumption[a]	3575	75200	93000	750	49800	1370300
Dummy Variable for Agr/Business Investment	3575	0.12	0.34	0	0	1
Value of Agr./Business Investment[a]	3575	4760	30200	0	0	715700
Dummy Variable for Short-Term Default	2860	0.194	0.395	0	0	1
Short-Term Credit[a]	3575	17900	51100	0	0	1021000
Interest Paid[a]	3575	1300	3900	0	0	108400
Liquid Savings[a]	2860	25000	132000	0	5100	4701600
Interest Earned[a]	3575	700	7200	0	0	18000
Number of Households in Village	3575	166	295	21	110	3194
Regressors for Demographic/Cylical Variation:						
Number of Male Adults	3575	1.46	0.9	0	1	7
Number of Female Adults	3575	1.56	0.75	0	1	6
Number of Children	3575	1.59	1.21	0	1	9
Dummy Variable for Male Head of Household	3575	0.74	0.44	0	1	1
Years of Education of Head of Household	3575	6	3	0	7	15
Age of Head of Household	3575	41	15	22	40	84

[a] All values are in baht deflated to 1999. The 1999 PPP conversion rate is 31.6 baht/dollar.

TABLE III

PARAMETER ESTIMATES AND MODEL FIT

Parameter Estimates			Pre-Intervention Averages		
Parameter	**Estimate**	**Std. Err.**	**Variable**	**Data**	**Model**
Borrowing/savings interest rate - r	0.054	0.003	C_t	75,200	75,800
Deviation of log permanent income shock - σ_N	0.31	0.11	D_t	0.116	0.116
Deviation of log transitory income shock - σ_U	0.42	0.07	I_t	4600	4600
Deviaion of log measurement error shock - σ_E	0.15	0.09	DEF_t	0.194	0.189
Exogenous income growth - G	1.047	0.006	$\ln(Y_{t+1}/Y_t)$	0.044	0.049
Minimum consumption - $\underline{c}$	0.52	0.01			
Discount factor - β	0.926	0.006	**Test for Overidentifying Restrictions**		
Intertemporal elasticity - ρ	1.20	0.01		Actual Value	0.05% Value
Mean log project size - μ_i	1.47	0.09			
Deviation of log project size - σ_i	6.26	0.72			
Borrowing limit - $\underline{s}$	−0.08	0.03	**J-Statistic**	113.5	12.6

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TABLE IV

IDENTIFICATION - PARTIAL DERIVATIVES OF MOMENTS WITH RESPECT TO PARAMETERS

		Parameters										
		r	**σ_N**	**σ_U**	**σ_E**	**G**	**$\underline{c}$**	**β**	**ρ**	**μ_i**	**σ_i**	**$\underline{s}$**
Moments	**Savings interest - ε_S**	−6.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Credit interest - ε_{CR}	−10.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Income growth - ε_g	−0.6	2.5	−0.5	−0.8	−4.4	−0.2	1.5	0.2	−1.8	−1.5	−1.6
	1-year variance - $\varepsilon_{V,1}$	1.3	−0.1	1.1	−0.8	0.3	2.0	−2.4	−1.1	−2.4	0.8	−0.4
	2-year variance - $\varepsilon_{V,2}$	1.0	0.3	−1.1	−1.4	−0.2	0.6	−2.3	1.0	−1.0	−0.6	0.7
	3-year variance - $\varepsilon_{V,3}$	0.5	−0.3	0.8	−2.1	0.8	2.2	−0.3	−2.3	−2.4	−2.5	−0.1
	Consumption - ε_C	1.4	0.8	0.1	−0.3	−2.0	−0.5	13.3	−7.1	0.0	0.0	0.7
	Income covariance - ε_C*lnY	−3.7	−2.2	−0.2	0.9	5.3	1.4	−35.0	18.6	0.0	0.0	−1.9
	Liquidity covariance - ε_C*L/Y	−0.1	−0.1	0.0	0.0	0.2	0.1	−1.4	0.8	0.0	0.0	−0.1
	Investment probability - ε_D	51.5	18.7	−0.8	−0.2	−40.0	−0.7	−16.1	1.4	−0.5	0.1	0.2
	Income covariance - ε_D*lnY	−155.2	−55.9	2.5	0.5	120.0	1.9	47.9	−4.1	1.3	−0.3	−0.6
	Liquidity covariance - ε_D*L/Y	−23.2	−11.0	2.1	0.0	18.1	0.4	9.4	−0.6	0.3	−0.1	−0.1
	Investment level - ε_I	28.0	10.0	0.1	−0.2	−22.1	−0.3	−8.6	0.6	−0.7	0.1	0.1
	Income covariance - ε_I*lnY	−80.0	−28.5	−0.2	0.6	63.1	0.8	24.5	−1.7	1.9	−0.4	−0.2
	Liquidity covariance - ε_I*L/Y	−9.9	−2.8	0.1	0.5	8.2	0.1	4.3	−1.6	0.1	0.0	0.0
	Default - ε_{DEF}	0.0	0.0	−1.6	0.2	0.0	−3.6	0.0	0.0	0.0	0.0	−3.6

TABLE V

REDUCED FORM REGRESSION ESTIMATES: ACTUAL DATA VS. "MILLION BAHT" SIMULATED DATA

	Consumption		Investment Probability		Investment		Default Probability		Income Growth	
Actual Data	$\gamma_{C,2002}$	$\gamma_{C,2003}$	$\gamma_{D,2002}$	$\gamma_{D,2003}$	$\gamma_{I,2002}$	$\gamma_{I,2003}$	$\gamma_{DEF,2002}$	$\gamma_{DEF,2003}$	$\gamma_{\Delta \ln Y,2002}$	$\gamma_{\Delta \ln Y,2003}$
"Impact" Coefficient[a]	**1.39**	**0.90**	**6.3e-6**	−0.2e-6	−0.04	−0.17	**−5.0e-6**	**6.4e-6**	−9.4e-6	**12.6e-6**
Standard Error	**0.39**	**0.39**	**2.4e-6**	2.4e-6	0.19	0.19	**2.4e-6**	**2.4e-6**	6.1e-6	**6.1e-6**
Simulated Data										
Average "Impact" Coefficient[a]	**1.10**	0.73	**5.6e-6**	3.6e-6	0.41	0.35	**−9.0e-6**	−0.2e-6	0.3e-6	0.3e-6
Average Standard Error	**0.48**	0.48	**2.5e-6**	2.5e-6	0.23	0.23	**2.3e-6**	2.3e-6	5.9e-6	5.9e-6
Chow Test Significance Level[b]	0.55		0.51		0.99		0.27		0.30	

[a]The impact coefficient is the coefficient on 950,000/number of households in the village interacted with a year dummy, the credit injection per household.

[b]This is the significance level of a Chow test on the actual post-intervention data and the pooled simulated data, where the null hypothesis is no structural break in the impact coefficients.

Bold face represents significance at a 5 percent level.

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Microfinance in Rural and Urban Thailand: Policies, Social Ties and Successful Performance

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Abstract

It has been well documented in the theoretical economic literature that joint liability group-based lending helps to overcome the hurdles of adverse selection, moral hazard, auditing cost and enforcement by exploiting local information embodied in specific social networks. Much less attention has been given to explain how other features of microcredit contracts have opened up possibilities for microfinance. In this paper I study a joint liability lending program in Thailand to analyze how social ties and policies such as compulsory savings and training contribute to explain the success of the program in terms of repayment rates in rural and urban communities. I use a novel panel dataset on household loans constructed from household, institutional and community-level data from the Townsend Thai Data Collection. Empirical results are consistent with the repayment predictions of existing theories on joint liability lending. The findings suggest that joint liability may prosper in areas in which social ties are strong enough to permit individuals to costlessly enforce agreements in their community, and the threat of social sanctions exists and is credible. Additionally, I find evidence that suggests that households in rural areas have some knowledge about the customs and characteristics of people and institutions in the region which varies across communities and predicts success and failure of the microfinance program. The estimation results also indicate that the degree of joint liability in the fund is negatively associated with repayment; and that practices such as requiring compulsory savings and providing training or information to borrowers are positive predictors of repayment in both rural and urban environments. The findings are robust to a number of specification checks.

JEL Classification: D82, G21, O12, O16, O17, R51

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1 Introduction

Different studies have documented evidence of the positive effects of financial development and improved access to credit on economic growth, poverty alleviation and income distribution.[1] Nevertheless, throughout the world, poor people still face partial or full exclusion from the financial sector and cannot take advantage of the opportunities that come together with having access to finance. Microfinance institutions have played a fundamental role delivering broader access to financial services such as credit, savings and insurance to the poor; however, it is still unclear what policies allow microfinance institutions to successfully offer these services and whether or not the success of such policies depends on the socioeconomic environment in which the institution operates. In this sense, the purpose of this research is to investigate how existing social ties and the use of policies such as compulsory savings and training contribute to explain successful lending practices to individuals with limited access to formal financial markets in rural and urban environments.

The vast majority of studies in the microfinance literature have focused on the mechanisms behind the success of the group lending model that is used by the Grameen Bank in Bangladesh and by many other microfinance institutions around the world. On the theoretical side researchers have studied how joint liability contracts help to overcome the problems of adverse selection (Ghatak 1999; Sadoulet 2000; Armendariz de Aghion and Gollier 2000), moral hazard (Stiglitz 1990; Varian 1990), and enforcement (Besley and Coate 1995).[2] Some theories view the existing level of social capital as critical to the performance of group lending, and state that joint liability contracts can improve repayment because borrowers have better information about each other's type; can more easily monitor each other's investment; and can make use of social sanctions to force people to pay back a loan. Other theories contend that joint liability lending may succeed whether or not the contract is implemented among borrowers with high levels of social capital. Empirical studies show mixed results. Some of them provide evidence that social pressure or social cohesion are positively associated to the group performance (Wenner 1995; Zeller 1998; Abbink *et al.* 2006; Karlan 2005); while others show that strong social ties within borrowing groups make it more difficult to pressure members to repay loans (Wydick 1999; Ahlin and Townsend 2007).

Much less attention has been given to the use of compulsory savings or training components to secure high repayment rates. The inclusion of these components can serve different purposes.

[1] See Gine and Townsend (2004), Beck, Demirgüç-Kunt, and Levine (2007), among others.

[2] An overview of the theory of group lending is provided by Ghatak and Guinnane (1999).

For instance, saving on a regular basis requires discipline which perhaps makes borrowers more reliable. Savings also provides information about the debt capacity of the borrower and can be used as collateral. In this way, savings accumulation might facilitate self-selection, screening and enforcement (Reinke 2006). Similarly, the advantages of including a training component as a requirement to borrow are many. Training can contribute to strengthen the knowledge base of clients and thus improve business outcomes; this, in turn, may increase the demand for funds and reduce the likelihood to default on a loan (Karlan *et al.* 2007).[3]

In this respect, this research explores the experiences of the denominated "One Million Baht Fund Program" (henceforth Village Fund Program) in Thailand to assess whether social ties play a fundamental role explaining the success of the program in terms of repayment rates.[4] In addition, it analyzes the effect on repayment behavior of using a compulsory savings or a training component together with joint liability.[5] To do this, I use household, institutional and community level annual panel data from the Townsend Thai Data Collection which is one of the longest panels available in developing countries and is characterized by its high level of detail. In particular, I construct a unique panel database on household loans from the Village Fund Program.[6] The panel covers a random sample of 64 rural communities from 2003 to 2010, and 64 urban communities from 2005 to 2009. The database includes information on the characteristics of loans held by a sample of 1,920 households, as well as data on their economic and demographic features. In addition, it includes information on the socioeconomic characteristics of the communities, and on the policies and practices used by the village funds established in these communities under the Village Fund Program.[7]

This empirical investigation differs from other studies that analyze repayment behavior under joint liability lending in four important ways. First, it uses panel data which results in higher variability of data compared to a cross-section design. Additionally, it permits to capture not only the variation that emerges through time or space, but the variation of these two dimensions simultaneously. Second, the analysis uses a sample of rural communities and a sample of urban communities which are located in similar geographic regions. Therefore, it is possible to analyze whether or not rural and urban differences affect the determinants of repayment behavior.

[3] Reinke (2006) points out the fact that most people are unaware of their lack of abilities and thus are unlikely to seek training on their own. Therefore, providing training to borrowers may enhance the loan productivity.

[4] The official name of the program is the Village and Urban Community Fund program.

[5] The request of co-signers by the village funds is used as evidence of joint-liability practices in the program.

[6] The Village Fund Program was implemented in 2001.

[7] There is one village fund per community.

Specifically, this investigation is the first one that studies the long panel of rural and urban annual data from the Townsend Thai Data Collection. Third, I use information on baseline surveys to construct a proxy measure for social cohesion. In particular, the baseline survey in rural areas was conducted before the program was implemented; accordingly, the proxy measure for social cohesion is exogenous to repayment behavior. And fourth, the data shows wide variation in the use of the policies that are analyzed in this study. In practice most microfinance institutions use the same type of contract terms and policies, thus it is hard to identify the effect on repayment behavior using a cross-section of loans. Arguably, the variation in policies observed among the village funds in the sample contribute to explain the variation observed in repayment behavior.

The empirical analysis is motivated by existing theories on joint liability lending and their predictions on repayment behavior.[8] The success of the program is defined dichotomically, depending on whether a borrower fully pays back the credit to the fund or not at the maturity date of the loan. In addition, I analyze the severity of default defined as the number of months the borrower has been late in repaying the loan.

Using pooled cross-section probit regression analysis the paper estimates the probability of repayment in rural and urban communities using as explanatory variables a set of proxy variables that measure the strength of social ties (such as cooperative behavior and social sanctions) and a set of variables that measure institutional characteristics and policies (such as the use of compulsory savings and training, the quality of institutions, and the degree of joint liability). In addition, the estimation includes variables describing the loan contract terms (such as loan size and interest rate); the characteristics of the community in which the fund operates (such as average land, schooling level, wealth and income variability, and the availability of other sources of credit); and the socioeconomic traits of borrowers (such as age, gender, schooling level and the role of the individual in the job).

Empirical results are consistent with the predictions of existing theories on joint liability lending. I find that repayment is positively associated with cooperative behavior and with the quality of institutions in rural areas. These two variables are measured at the community-level and come from a poll among the surveyed households in a subdistrict; in particular, the variables represent the percentage of households in the subdistrict that voted for the community as the best community in the area in terms of cooperation among people and the quality of institutions, respectively. These two variables are constructed using data from the original baseline surveys which were conducted

[8] Following Ahlin and Townsend (2007), I focus on four of the best-known and most representative papers in the literature: Stiglitz (1990), Banerjee *et al.* (1994), Besley and Coate (1995), and Ghatak (1999).

before the program was implemented. Thus, the findings suggest that those communities that were rated as the best communities in the area are communities which show the highest repayment rates on loans from the village fund. This further suggests that households in rural areas have some knowledge about the customs and characteristics of people and institutions in the region which varies across communities and predicts success and failure of the microfinance program. This result only holds in rural areas, perhaps because the setting is more stable on rural socioeconomic environments as there is less mobility of people compared to urban areas. In addition, I find that the strength of social sanctions is positively correlated with repayment in both rural and urban areas. Both cooperation and sanctions are common in environments in which social cohesion is strong. Hence, these results suggest that joint liability lending may prosper in areas in which social ties are strong enough to permit individuals to costlessly enforce agreements in their community, and in which the threat of social sanctions exists and is credible. The evidence also suggests that the use of a compulsory savings or a training component with joint liability lending is positively correlated with repayment in both socioeconomic environments. Finally, the degree of joint liability in the fund is negatively associated with repayment in both rural and urban environments. Using pooled OLS regression analysis, the empirical results on the severity of default confirm those on repayment behavior.

The policy relevance of this study is clear. Assessing the role of the existing level of social capital in the performance of joint liability lending programs could shed some light on whether joint liability based mechanisms can work only in very cohesive rural environments, or whether they can work in more urban environments where local information or social enforcement mechanisms may be weaker. Similarly, determining the role and significance of practices such as compulsory savings and training, as well as identifying other determinants of repayment performance, can assist in improving program design and operation.

The study has some limitations which are clearly venues for future research. First, the Village Fund Program is not a universal program. Instead, households decide whether to become members of the fund or not; and if they become members then they have to decide whether to borrow from the fund or not. This investigation takes as given the selection process of households into the program to explain repayment behavior. Additionally, there is the possibility that the differences across communities may have unobserved characteristics (by the econometrician) that influence the choice of policies. Under this scenario, the relationship between repayment behavior and policies would be explained by an omitted variable. For instance, it could be the case that policies are chosen by funds precisely because they have additional information that indicates that people in the community would not make reliable borrowers. In this context, the policies are used to strengthen the discipline and knowledge of potential borrowers. Note that this additional information may be correlated with the choice of policies and also with repayment; thus, standard estimates would be biased downward.[9] Moreover, from interviews conducted during fieldtrip in Thailand, it seems that the observed differences in the policies chosen by the funds are at some extent explained by the fact that people in the communities interpreted differently a sample guideline of policies that was published and distributed by the Thai government at the beginning of the program together with the manuals describing the objectives of the program, the process to apply for and establish the fund, and the regulation. Although the guideline of policies was shown as an example, many committee members mentioned that the policies were chosen following the regulation on the manuals they got at the time of foundation.[10] In addition, it seems that officers from the Community Development Department (CDD) also made suggestions on how to organize the funds.[11] Perhaps this situation ameliorates the endogeneity bias. In any case, further investigation could help to assess the magnitude of this potential endogeneity problem, especially considering this is a common problem among similar empirical studies.

The paper is organized as follows. The literature is summarized in Section 2. Section 3 presents the theoretical background. Section 4 describes the microfinance program in Thailand, and the characteristics of the village funds. In Section 5, I describe the empirical methodology and the data, discuss the results, and present the robustness checks that were carried out to evaluate the sensitivity of the empirical results. Section 6 concludes the investigation with implications for policy.

2 Review of the Literature

There are a number of theories in the economic literature that seek to explain the high repayment rates frequently associated with joint liability lending. Ghatak and Guinnane (1999) summarize the theories by identifying the four major problems joint liability may help institutions to overcome.

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[9] Similarly, the ability of committee members may have contributed to the choice of policies. In this context, more able officers choose the policies as they have better information about the traits that characterize a successful institution. Under this scenario, standard estimates would be biased upward as the officers' ability may be also correlated with repayment.

[10] It seems that the variation in policies is observed only in those cases in which there were two or more possibilities presented in the guideline. For example, in the case of the interest rate the suggestion was to charge a positive interest rate; and in the case of the number of committee members the suggestion was to choose between 10 and 15 people. In these cases, all members of the fund voted to decide the level of the interest rate and the number of committee members in the first fund meeting.

[11] The CDD operates at the province level.

These problems are: (1) to ensure borrowers will use the loan properly or *ex-ante moral hazard* (Stiglitz (1990), Varian (1990), and Banerjee *et al.* (1994)); (2) to ascertain the riskiness of borrowers or *adverse selection* (Sadoulet (1998), Van Tassel (1999), Ghatak (1999), and Armendariz de Aghion and Gollier (2000)); (3) to make sure borrowers will report their true ability to repay once returns are realized or *auditing costs*; and (4) to find ways to force borrowers to repay the loan in case they are reluctant to do so or *enforcement* (Besley and Coate (1995), Armendariz de Aghion (1999), and Laffont and N'Guessan (2001)).[12]

These theories on joint liability take different stands on the role the existing level of social capital among borrowers plays to the performance of group lending. Cassar *et al.* (2007) identifies three categories: (1) theories that focus on the relational aspects of social capital; (2) theories that focus on the informational aspects of social capital; and (3) theories in which social capital plays no role in explaining the performance of group lending.

The first category of theories is based on the view that relational capital promotes trust that other group members will fulfill the terms of the contract; thus, group members have incentives to repay. In the Besley and Coate (1995) model, for example, borrowers decide whether to repay or not after the project returns are realized by comparing the repayment amount with the severity of the official and unofficial penalties for default. It is precisely the possibility of using social sanctions which offers group lending advantages over individual lending. Along these lines, stronger social ties between group members facilitate social sanctions, which results in higher loan repayment rates. Other papers in this category are Stiglitz (1990), Varian (1990), Banerjee *et al.* (1994), and Armendariz de Aghion (1999) which focus on peer monitoring to explain the successful financial performance of joint liability programs. Stiglitz (1990) and Varian (1990) show how peer monitoring induces the right effort or choice of project among borrowers. Banerjee *et al.* (1994) show that a co-signer can monitor her peers more effectively than the lender as she has local information and can impose higher penalties on borrowing members in case of default. Armendariz de Aghion (1999) develops a model of enforcement in which borrowers can verify at some cost the true project return of their partners and impose sanctions in case their partner chooses to default strategically. A common characteristic among these models is that strong social ties facilitate the task of peer monitoring and the ability to penalize in case of default.

Studies in the second category explain the success of joint liability programs in terms of the local information embodied in specific social networks. For instance, Van Tassel (1999) and Ghatak

[12] In the economic literature, the enforcement problem is also described as strategic default or ex-post moral hazard.

(1999, 2000) discuss the role of peer selection in improving repayment rates by means of mitigating adverse selection. The studies explain how group lending can take advantage of inside information that only borrowers have about each other to attract relatively safer borrowers. Consequently, repayment rates are higher and the outcome is more efficient under group lending than under individual lending contracts.

In the third category of theories the success is merely attributed to the characteristics of joint liability contracts. For example, Armendariz de Aghion and Gollier (2000) develop an adverse selection model in which borrowers are uninformed about their partners, and auditing is costly for the lender. The authors show that group lending can reduce the interest rate as it acts as a cross subsidy between low- and high-risk borrowers. In this way, group lending acts as a risk pooling mechanism; and thus, attracts safer borrowers and induces higher repayment rates relative to individual lending.

The empirical research has lagged behind theoretical work. Moreover, the results of the existing evidence are mixed.[13] Wenner (1995) studies the repayment behavior of 25 groups from a lending program in Costa Rica, and finds evidence that delinquency rate decreases when groups have written rules stating how members should behave. The rules covered measures of screening, monitoring and enforcement activities that take place within the group. Similarly, using data of 146 groups in Madagastar, Zeller (1998) demonstrates that groups with internal rules have higher repayment rates. In addition, the author finds evidence that group performance is positively correlated to social cohesion and to the variance of risky assets of the group members. Wydick (1999) uses data from rural and urban borrowing groups in Guatemala to test the relative importance of social ties, group pressure, and monitoring in explaining repayment performance. His econometric results confirm the evidence that peer monitoring is positively related to repayment performance. However, they also indicate that social ties may create a conflict of interest as it makes more difficult to pressure other group members to repay loans. Paxton, *et al.* (2000) uses data of 140 groups from a lending program in Burkina Faso, and shows that repayment problems are more likely to occur in groups in which members are more homogenous (in terms of their ethnicity, age, gender, income level, occupation, etc.) as they may have lower incentives to monitor and enforce repayment.

Most empirical studies fail to explain their empirical results in terms of the theories on joint liability lending. To address this limitation, Ahlin and Townsend (2007) derive and test the repayment predictions of four major theoretical models, namely Stiglitz (1990), Banerjee *et al.* (1994),

[13] Hermes and Lensink (2007) summarize the empirical evidence on joint liability group lending.

Besley and Coate (1995), and Ghatak (1999).[14] To test these predictions, the authors use detailed information on 262 groups of the Bank for Agriculture and Agricultural Cooperatives (BAAC) in Thailand. Their findings suggest that cooperation and the degree of joint liability are negatively associated with repayment; while correlation between borrower returns and the strength of social sanctions are positively associated with repayment. In particular, the authors find evidence in support of the model by Besley and Coate in the poorer regions of Thailand, and of the model by Ghatak in the wealthier region.

Only a few empirical studies have investigated the importance of compulsory savings and training in the performance of group lending programs. Results in Wydick (2000) support that training sessions contribute to the performance of group lending; in particular, those training sessions in which members are encouraged to monitor and pressure one another to make timely payments, and to support one another in the event of misfortune. Paxton, *et al.* (2000) also finds evidence that training can lead to higher loan repayment rates. On the other hand, Zeller (1998) finds evidence that savings contribute to improve repayment. The author favors the role of savings in promoting financial discipline and as loan collateral. Wenner (1995) also supports this view.

3 Theoretical Background

The analysis in this paper is motivated by existing theories on joint liability lending. Following Ahlin and Townsend (2007), I focus on four of the best-known and most representative papers in the literature to motivate my empirical work. These papers are: Stiglitz (1990), Banerjee *et al.* (1994), Besley and Coate (1995), and Ghatak (1999). In this section, I briefly describe the repayment implications of these four joint liability lending models using the corresponding extended version of the models developed and tested empirically by Ahlin and Townsend (2007). Accordingly, I focus on the mechanics and intuition behind the repayment implications of each model. Note that not all of the repayment implications that are analyzed in this study correspond to the theoretical results of the original models. Some of these implications are derived in Ahlin and Townsend (2002, 2007). Additionally, to assess the effect of practices such as requiring compulsory savings and providing training to borrowers on repayment, I introduce the variables in the models in a relatively general way. The repayment implications of these lending policies are described in Section 3.5.

[14] The authors show that some of the repayment predictions differ between models; specifically, they find contradictory predictions for the role of cooperation or social capital; the correlation between the returns of the borrowers; and the degree of joint liability.

In general, the theories that are analyzed below assume that groups consist of two borrowers and that both of them face the same contract terms. Table 1 summarizes the repayment implications of the models.

3.1 Moral Hazard Model of Stiglitz (1990)

The theoretical model by Stiglitz (1990) shows how peer monitoring under joint liability lending can help to mitigate ex-ante moral hazard. In this model, all individuals receive a loan L and choose to undertake a risky or a safe project. If successful, the risky project will yield a return of $Y_R(L)$ with probability p_R, while the safe project will yield a return of $Y_S(L)$ with probability $p_s > p_R$. If a project fails, returns are zero. The model assumes that the safe project yields a higher expected return than the risky project, but it yields a lower return when successful. Individuals maximize their expected utility, where utility is a standard utility function that depends on the net return of the project. Limited liability implies that the lender will get rL from a borrower who succeeds, and zero from a borrower who fails. Thus, limited liability increases the incentives to choose the risky project. To mitigate this problem, the lender offers a joint liability contract in which he gets nothing from a borrower who fails; rL from a borrower who succeeds; and an additional payment qL from a borrower who succeeds and whose partner fails. In addition, the author imposes symmetry in the choice of project and assumes borrowers behave cooperatively; that is, borrowers decide together whether to undertake the safe or the risky project.

Stiglitz (1990) shows the repayment rate decreases with the interest rate and the size of the loan. In both cases, success becomes a less attractive outcome compared to the case in which the project fails; therefore, an increase in the interest rate or in the size of the loan causes the risky project to dominate the safe project. In addition, Ahlin and Townsend (2007) show that the repayment rate is lower for groups with higher degree of joint liability and higher for groups acting cooperatively. First, higher joint liability reduces the payoff of risky and safe projects; however, the reduction in the payoff of safe projects is larger than the reduction in the payoff of risky projects as choosing the safe project implies paying for delinquent borrowers more often and during times in which the returns are lower. Therefore, an increase in the degree of joint liability encourages the choice of risky projects. Similarly, if borrowers do not act cooperatively regarding the choice of the type of the project then both of them have incentives to deviate to risky projects and free-ride on their partner's safe behavior. Hence, when groups do not act cooperatively they choose risky projects more often; this in turn reduces the repayment rate.

3.2 Moral Hazard Model of Banerjee *et al.* (1994)

Banerjee *et al.* (1994) also studies how joint liability lending can help to overcome the problem of ex-ante moral hazard. The authors introduce monitoring and demonstrate how local information facilitates the role of borrowers as monitors since they can impose higher penalties on their peers in case of default. Groups consist of one borrower and one cosigner, who assumes the role of monitor. The borrower receives one unit of capital and chooses a project with probability of success p. The return of the project is a function of the probability of success, and is equal to zero if the project fails. If the project succeeds, the borrower pays the interest to the lender; if the project fails, the cosigner has to respond for the borrower.

As in Stiglitz (1990), limited liability increases the incentives to choose riskier projects. The model assumes the cosigner acts as a monitor and has the ability to penalize the borrower in case she opts for a risky project. The more the cosigner monitors, the less likely she will end up paying back the borrower's loan; however, monitoring is costly. The monitor chooses the optimal project riskiness so as to maximize his payoff. In this context, a higher degree of joint liability increases the benefit from monitoring; and, as a result, repayment rates are higher. This result contradicts the prediction of the Stiglitz model. In addition, Ahlin and Townsend (2007) show repayment rates are lower for groups with larger loans or higher interest rates. Both cases make more attractive to repay the loan less often; so the borrower has incentives to choose riskier projects. Similarly, the authors introduce cooperation in the model and find that repayment rates are higher for groups that cooperate and enforce a joint agreement as long as the marginal cost of penalizing is greater than one; otherwise, the non-cooperative case results in higher repayment rates as it is cheaper for the monitor to enforce a higher probability of repayment.

3.3 Strategic Default Model of Besley and Coate (1995)

Besley and Coate (1995) analyze the borrowers' decision regarding whether to repay the loan or not after the project returns are realized. This decision depends on the cost of repayment (*i.e.* the gross interest rate, r) and the severity of the penalties imposed by the lender and the group or community. In this model, each borrower undertakes a project that requires one unit of capital and yields Y units of income. The model assumes that returns are drawn independently on $[0, \bar{Y}]$ from distribution $F(Y)$; thus, repayment decisions are made non-cooperatively. Under the joint liability contract, if the lender does not receive the full repayment amount from the group, he imposes a penalty on each borrower. Clearly, this feature of the contract introduces interdependence between the borrowers' decisions. It is assumed that the penalty is increasing on the project return; consequently, borrowers who realize high returns will choose to repay and borrowers who realize low returns will choose to default. The authors identify situations in which there is disagreement in the borrower's decision to repay or not the loan and in which neither borrower is willing to bail out the group; as a result, the group default. They show how unofficial penalties can increase the willingness to repay of the low-return borrower in these situations of disagreement. The severity of these penalties will depend on the partner's desire to repay which is assumed to be proportional to his gain from repayment relative to default.

Besley and Coate's model predicts that repayment rates increase with the severity of official and unofficial penalties, as these penalties raise the cost of default and do not affect the cost of repayment; and that repayment rates decrease with the gross interest rate as this implies an increase in the cost of repayment. The extended model by Ahlin and Townsend (2007) includes cooperation; their analysis shows that repayment rate is lower for groups acting cooperatively if unofficial penalties are greater than the loss of the non-defaulting borrower from default, and vice versa.

3.4 Adverse Selection Model of Ghatak (1999)

As in Stiglitz (1990) and Banerjee *et al.* (1994), limited liability makes borrowing more attractive to risky than to safe borrowers; and thus less profitable to lenders as risky borrowers default more often. Ghatak (1999) analyzes how joint liability lending programs take advantage of local information that borrowers have about each other's projects through self-selection of group members. In this model, a borrower is characterized by the probability of success of her project $p \in \left[\underline{p}, 1\right]$; the type of project is fixed and is observable among borrower, but not to the lender; and the return of a type p project is a random variable which takes two values, $Y(p) > 0$ if successful and 0 otherwise. Also, it is assumed the contract stipules an individual liability component r, and a joint liability component q. Thus, given the limited liability restriction, if the project fails the borrower pays nothing to the lender; however, if the project is successful then the borrower has to pay her own debt plus an additional joint liability payment per member of the group whose project has failed.

Under this economic environment, a borrower has two decisions to make. First, she has to decide with whom to borrow. Ghatak shows that the self-selection process results in homogenous groups, which make the market more attractive for safer borrowers who would otherwise have been excluded from the market. Second, a borrower has to decide whether or not to borrow. The model assumes all borrowers get the same expected return; however, safer borrowers exhibit higher expected repayment as they succeed more often. Hence, borrowers will choose to borrow if their expected net return is higher or equal to their non-borrowing outside option. This implies that only borrowers riskier than some cutoff risky-type will borrow; and safer borrowers will opt for the outside option. Note that any change that makes borrowing more attractive draws in more safer borrowers, which increases repayment rates.

Ghatak's model predicts that repayment rates decrease with the degree of joint liability, as higher joint liability makes borrowing a less attractive option for safer borrowers. In addition, the repayment predictions of the extended version of the model developed by Ahlin and Townsend (2007) are as follows: first, if borrowers cannot screen other borrowers, the matching process in groups is random; this makes borrowing less attractive to safer borrowers since their projects succeed more often. Second, a higher loan size makes borrowing more attractive relative to the outside option; this attracts a greater number of safer borrowers and, in turn, increases repayment rates. However, the authors note that at large loan sizes, a higher loan size decreases repayment rates. This is explained by the fact that, under diminishing returns to capital, the borrower's marginal product is low; and observing a large loan implies that the borrower's cost of capital is even lower than her marginal product. Since the cost of capital declines with risk, as the loan size increases the pool of borrowers becomes riskier which, in turn, reduces repayment rates. And third, a higher correlation of project returns results in higher group repayment rates. In particular, higher correlation means that if a borrower is successful her partners is more likely to be successful; this makes borrowing more attractive compared to the outside option and more safer borrowers are drawn into the market.

3.5 Policies: Compulsory Savings and Training

In this section, I analyze the effect on repayment of two practices that can be used with joint liability lending to ensure timely repayment. In particular, in light of the joint liability models presented above, I examine the effect of using compulsory savings to secure loans; and the effect of providing training to borrowers to enhance the project's probability of success.

3.5.1 Including a Compulsory Savings Component

Assume the lender requires borrowers to accumulate savings prior to borrowing or during borrowing, and that savings are used to secure loans. In the Stiglitz model, introducing a compulsory savings component decreases the payoff of safe and risky projects, but the reduction in the payoff of risky projects is larger than the reduction in the payoff of safe projects. This is explained by the fact that choosing the risky project implies defaulting on the loan more often; and, therefore, losing the accumulated savings that are used to secure the loan. Consequently, using a compulsory savings scheme promotes the choice of safe projects; which in turn results in higher repayment rates.

Similarly, in Banerjee *et al* (1994) a compulsory savings scheme increases the incentives to choose safer projects. In this model, the minimum penalty needed to enforce a project with probability of success p decreases by requiring the borrower to accumulate savings. This is because if the project fails, the borrower loses her accumulated savings. A decrease in the size of the additional penalty needed to lower cost reduces the cost of monitoring without affecting the benefit. Hence, using a compulsory savings component increase the incentives of the borrower for performing well which results in choosing more often safer projects.

In the strategic default model of Besley and Coate (1995), requiring borrowers to accumulate savings is similar to increasing official and unofficial penalties. First, official penalties increase as the borrower consequentially loses her savings in case of default. Likewise, unofficial penalties increase as the desire to repay of the borrower's partner increases for the same reason. In both cases, the cost of default increases, while the cost of repayment remains constant. Hence, repayment rates increase when the lender uses a compulsory savings component.

3.5.2 Including a Training Component

Next assume the lender requires borrowers to undergo training on basic financial concepts that may be useful to cope with the managerial aspects of their projects. This educational component may help borrowers to increase their loan productivity. In this way, the effect on repayment of including a training component into the models of joint liability is similar to the effect of borrower productivity analyzed by Ahlin and Townsend (2002). The authors show that the four models predict that repayment rates increase with borrower productivity; thus, including a training component may increase repayment rates. In particular, in Stiglitz (1990) and Banerjee *et al* (1994) the result is explained by the fact that higher borrower productivity increases the payoff of safe projects relative to risky projects. Thus, training may encourage the choice of safer projects.

In the model by Besley and Coate (1995), the effect of training on repayment can be explained by the fact that both official and unofficial penalties are increasing on the project return; hence, a training component increases the cost of default and does not affect the cost of repayment. This in turn results in higher repayment rates. Finally, in the Ghatak model, higher productivity makes the borrowing option more attractive compared to the outside option; this draws safer borrowers into the market and, consequently, results in higher repayment rates.

4 Microfinance in Rural and Urban Thailand

In this section, I provide a brief description of the Village Fund Program, as well as the experiences and characteristics of the funds.[15] In particular, I describe the founding of the funds, and their experience regarding membership, savings and lending services in both rural and urban areas.

4.1 The Village Fund Program[16]

The Village Fund Program is a microcredit project of the government of Thailand, which was created in 2001 when the government agreed to provide one million baht (approximately 22.5 thousand US dollars)[17] to every village and urban community in the country as working capital for a locally run rotating credit organization.

The program is described as one of the government strategies to fight poverty for sustainable development. The objectives are to develop the ability of communities to manage funds; encourage awareness and self-reliance for communities; benefit low-income families; and stimulate the economic performance in the region. Basically, the fund is aimed to be used as star-up capital to develop occupations and target new income-generating activities.

The project was put into effect in approximately 6 months. The government issued the policy before the parliament in February 2001; three months later, the Village and Urban Community Fund Bill was established; and by July 2001, the first set of funds were transferred to organizations to start up the fund. According to official figures, in October 2002 there were 73.8 thousand funds already established which represented about 98.6 percent of the program's targeted communities.[18] Thus, the total initial injection of capital into the economy involved about 75 billion baht, which is approximately 1.8 billion US dollars or 1.5 percent of Thailand GDP. Because of its scale, the Village Fund program is considered one of the most ambitious interventions in microcredit in the world.

The process for a fund to start operations is as follows. First, communities have to set up a local committee to administrate the fund and to decide on the membership, savings and lending

[15] This information is based on data from the Townsend Thai Project Data Collection; government materials from the National Village and Urban Community Fund office; and informal interviews of committee members of funds and National Village and Urban Community Fund officers in the summer of 2010. Approximately 50 fund committees were interviewed in ChachoengSao, LopBuri, Buriram and Sisaket.

[16] See Kaboski and Townsend (2009) for additional information regarding the program.

[17] In 2001 the exchange rate was about 44.5 baht per US dollar.

[18] Out of the 73.8 thousand funds, 71.4 thousand were founded in rural communities.

policies of the institution. Second, the committee submits an application for the fund to the government. Third, if the application is accepted, the committee has to open an account at the BAAC or at the Government Savings Bank (GSB); and the government deposits the money into this account.[19] Fourth, the committee evaluates the loan applications of members and decides who may borrow and the loan conditions. Fifth, borrowers open an account at the BAAC or the GSB (as applicable) to which the loan is transferred. And sixth, the borrower repays the loan under the conditions that were established by the committee. Repayments are collected by committee members or are deposited directly in the fund's account at the BAAC or the GSB. Once repayments are collected, the committee evaluates the new loan applications and the lending process starts again.

The government distributed manuals describing the program, its goals and regulations to communities through the CDD offices. In addition, the guidebooks included an example of policies to operate a village fund. Kaboski and Townsend (2009) explains that although the policies were shown as an example, it appears, from their interviews, that many committees felt that these suggested policies were fixed regulations for all funds. I had a similar impression during my interviews with committee members of approximately 50 funds, as most of them explained that the policies were set by regulation; this suggests that committee members viewed the policies that were offer as an example as a requirement of the government to actually participate in the village fund program. This subject will be discussed in more detail in the next section.

According to the regulation, the fund committee is chosen in a meeting in which at least three of four households in the community must be present. The committee should have between 10 and 15 members; and a similar ratio of male and female must be considered during the committee selection. In addition, committee members must have been living in the area for at least two years and must be at least 20 years old.[20] The term of service is two years, but members can be reelected by the majority of the fund members.[21] Local funds have freedom in governing their finance and business decisions. The role of the government is merely to supervise the funds and provide guidance. In particular, the funds have some discretion in setting the terms of the loan such as the interest rates, the length of the loan, and the loan size. However, funds must charge a positive interest rate; all debts must be paid within a year; and loans must not be over 20,000 baht ($449 in 2001 US dollars). Only under special circumstances a loan may be over 20,000 baht, but not more

[19] The BAAC operates only in rural and semi-urban areas; while the GSB operates mostly in urban areas.

[20] The regulation also mentions committee members must be ethical; never have been imprisoned or convicted of a crime; never have been fired from a job; must exercise on a regular basis their democratic rights; and must not be involved in any political activity.

[21] However, a committee member may only serve for two consecutive terms.

than 50,000 baht ($1,123 in 2001 US dollars). In addition, it is recommended to require each loan applicant to present at least two guarantors for the loan.

To encourage improvement, village funds are awarded additional grants based on performance which is evaluated using an array of efficiency and social criteria. In 2005, for example, funds that were rated as excellent managed funds (or AAA) were awarded 100,000 baht ($2,483 in 2005 US dollars). Similarly, in 2009 the government announced an additional award for village funds with good performance records that are registered as a juristic person under Thai law. In this case, the size of the award is determined by the number of members in the fund and ranges between 100,000 and 300,000 baht (this is, between $2,900 and $8,700 in 2009 US dollars).

Furthermore, successful village funds have the option of getting a loan from the BAAC or the GSB to increase financial access in their communities. The size of these loans is determined by the lender based on their own evaluation criteria. Nevertheless, only a small number of funds have taken this option as it seems committee members must guarantee the loans.[22]

The plan for the village funds is to gradually develop into community banks. The purpose of this expansion is to offer people an institution they can trust with their money; promote public and community welfare; and promote financial discipline. The National Village and Urban Community Fund Office indicated there are some village funds that have already developed as community banks, but the number is small. The project is still in its test phase.

4.2 Description of Village Funds

Most of the funds started operations within a year of the announcement of the program. Before the funds were established, formal sources of credit were limited in rural communities. There were more financial options in urban areas, but households had limited access to credit mainly because of the lack of collateral. According to figures from the Townsend Thai Data, the most common institutions providing financial services before the village fund program were BAACs, agricultural cooperatives, GSBs, and commercial banks. A number of respondents in the surveys mentioned they had to rely on their family members; use their savings; or borrow money from non-relatives or moneylenders because they could not secure a loan from a formal source of credit.

[22] A number of committee members mentioned that the original one million baht was not enough to cover the financial needs of people in the community, but they did not want to get a loan from the BAAC or the GSB because of the risk of going bankrupt.

The policies chosen by the village funds are described in further detail below. Table 2 shows the proportion of funds in both rural and urban areas that make use of each of the policies. It is important to mention that some of the policies were stipulated in the rules and regulations issued by the National Village and Urban Community Fund Committee on the establishment and administration of the village fund in 2001; while other policies were set by the village funds themselves, based on examples from printed materials or from suggestions from CDD officers.[23]

4.2.1 Training

The vast majority of village funds organized training sessions for officers at the time of foundation, whereas only some of them offered training for members. In most cases the training was given by CDD officers from the district or subdistrict level. Moreover, some funds offered additional training for officers and/or for members in the subsequent years of operation.[24] The objective of training sessions is to teach borrower about the rules and policies regarding late payment and ways to avoid loan repayment problems. The sessions are generally short, between one and three days; and they include topics such as basic accounting; loan management; strategies for savings and investment; and the advantages for the community of the institution.

4.2.2 Membership

In general, village funds are small in size. According to official figures, the average number of members is 99.[25] In principle, any adult living in the village is eligible for membership; thus, it is common to observe households with multiple village fund members.[26]

Funds have different policies in place that address issues surrounding effective recruitment. For instance, to get information on applicants some funds use membership application forms and/or interviews;[27] to select new members they use different criteria to evaluate the applicants such

[23] As it was noted above, from interviews, it seems people felt the policies that were suggested in materials distributed by the government were part of the regulation.

[24] About 100 percent of funds provided training to officers at the time of foundation, while only 46 percent provided training to members. Similarly, approximately 92 percent of funds provided additional training to officers, while only 35 percent offered additional training for members.

[25] On average funds in rural communities started with 94 members, while funds in urban communities started with 132 members. The median initial number of members in rural and urban communities was 83.5 and 101.5, respectively. In rural areas, the smallest fund had 50 members, while the largest one had 275. In urban areas, the smallest fund had 43, whereas the largest one had 544 members.

[26] However, members from the same household cannot guarantee each other.

[27] The funds that do not interview applicants mentioned they know all the applicants and get the information they need in the application form.

as the applicant's expected amount of savings, or her occupation; and to pay for any administrative cost some of them charge a fee to applicants or a fee to members.[28] Table 2 shows that the vast majority of funds screen applicants either by using a membership application fund or by using interviews as a screening device (92 percent in rural areas and 98 percent in urban areas). The funds that do not screen members mentioned that committee members know all people in the community; in addition, these funds charge an application fee which can serve as a screening device. Similarly, most of the funds charge a fee to cover their administrative cost (95 percent of funds in rural areas and 98 percent of funds in urban areas).

4.2.3 Internal savings

In rural areas, around 70 percent of funds offered savings facilities to its members at the time of foundation, while in urban areas 98 percent of funds did. Funds only accept cash deposits, and the savings services they offer are pledged savings accounts. This type of savings required the agreement of members to deposit a certain amount of money on a specific date; pledge savings are generally required on a monthly basis. In addition, some funds required members to buy shares only one time when they open their account with the fund.[29] None of the funds offer flexible savings account to members; therefore, if a fund offers saving facilities then the number of savers in the fund is equal to the number of members. Table 2 shows that 61 percent of funds in rural areas and 53 percent of funds in urban areas use a compulsory savings scheme; while 28 and 44 percent of funds, respectively, require members to buy shares when they open their account with the fund.

The median total initial savings deposits in the funds were around 9,400 and 12,100 baht ($211 and $272 in 2001 US dollars) in rural and urban areas, respectively; finally, the median initial savings deposits were approximately 100 and 122 baht ($2.2 and $2.7 in 2001 US dollars) in rural and urban funds, respectively.

4.2.4 Internal lending

All funds provide lending facilities to its members since the year they started operations. The loans are made in cash, and non-members are not allowed to borrow from the fund. By regulation, members are required to fill in an application loan;[30] the committee cannot approve loans of more

[28] The average fee to applicants and to members is 30 baht (or $0.67 in 2001 US dollars).

[29] The average total share value is 100 baht ($2.25 in 2001 US dollars).

[30] Table 2 shows that 100 percent of the funds in rural and urban areas screen loan applicants either by using a loan application form (as it is required by regulation) or by interviewing loan applicants. Note that only half of the funds in

than 20,000 baht ($449 in 2001 US dollars);[31] the committee must charge a positive interest rate; and the loan term must not exceed one year. Fund committees have the freedom to determine the rest of the conditions of the loans. According to the Townsend Thai Data Collection, the average size of loans is 15,500 and 17,700 baht in rural and urban areas, respectively; the average interest rate is 7 percent in rural areas and 8 percent in urban areas; the average loan term is 12 months; and payments have to be made once a year at the end of the loan term.

Another suggestion is to require each loan applicant to present at least two guarantors for the loan, who have to be also members of the fund. In general, this is a practice that most of the funds follow.[32] Fund committees generally approve all loan applications, but they use a variety of criteria to determine the terms of the loan contract. The most common decisive factors are the purpose of loan; the ability to repay; the occupation; and the amount of savings in the fund (see Table 2). Finally, in addition to the regular loans for income generating activities, some funds offer emergency loans (only 38 percent of rural funds and 34 percent of urban funds).[33]

5 Empirical Analysis

In this section I describe my empirical results from data on household loans from a joint liability program in rural and urban communities in Thailand. In Section 5.1 I present the estimation methodology. Section 5.2 describes the data and the resulting dataset I use in the empirical analysis. Section 5.3 presents the estimation results. In Section 5.4, I report the robustness checks carried out in order to evaluate the sensitivity of the empirical results reported in the previous section. Finally, in Section 5.5, I discuss some empirical concerns.

5.1 Empirical Specification

The empirical analysis is motivated by the theoretical predictions about repayment behavior under joint liability lending presented in Section 3. The analysis focuses on investigating whether or not

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urban areas interview applicants; the reason committee members gave for this is that all information they need is already in the loan application form and that they know all of their applicants because they are members of the community.

[31] The regulation stipulates that special loans can be larger than 20,000 baht, but cannot be more than 50,000 baht.

[32] Both the Townsend Thai Data Collection and the interviews suggest that at least all surveyed funds follow this practice.

[33] Emergency loans are of smaller size than regular loans -the average size is 4,700 baht ($106 in 2001 US dollars). Funds also require members to present two or more guarantors for this type of loans. Emergency loans are generally authorized for a five-month period; and payments are usually scheduled as to be made every month or just as a one-time payment at the end of the loan term.

social ties and a number of institutional characteristics and policies are associated with the repayment behavior of borrowers under joint liability loan contracts. I analyze two different repayment outcomes: one is the incidence of repayment and the other one is the severity of default.

I define default as the inability to comply with the terms of the loan. Thus, a loan is considered to be in default when payment has not been made in full after the maturity date. Using this description, repayment is defined as a binary indicator (not in default/default); and the incidence of repayment is estimated by means of probit models. As a starting point for the analysis of the panel dataset on household loans, I consider a pooled cross-section probit model. Accordingly, the probability of repayment can be written as

$$P\left(R_{ijt}=1\right)=\beta_1' \, Social\,Ties+\ \beta_2' \, Policy+\ \gamma' X+\theta_t+\theta_R+\varepsilon_{ijt}$$

where R_{ijt} is the repayment outcome of household i to village fund j at time t; $Social\,Ties$ is a set of variables that measure the strength of social ties; $Policy$ includes a set of dummy variables indicating whether a village fund uses a policy or not; X includes a set of variables that measure observable loan, household, institutional and community characteristics; and θ_t and θ_R denote time and region fixed effects (namely, province- and subdistrict-specific fixed effects).

Repayment behavior is also measured as the severity of default, which is defined as the time period a loan has been in default. In this case, I use a pooled OLS regression to estimate the effect of social ties, policies and the vector of explanatory variables X on the severity of default. The specification includes the variables listed above, as well as time and region fixed effects.

5.2 Data

The empirical analysis is based on a novel panel dataset constructed from the Townsend Thai Data Collection. In particular, I use household, institutional, and community level survey data for rural and urban communities in Thailand.[34] The initial surveys were conducted in 1997 in rural areas, and in 2005 in urban areas; however, both surveys include retrospective information. Follow-up surveys

[34] The household survey provides an extensive and detailed array of socioeconomic and demographic information such as household composition; education and occupation history; household, agricultural and business assets; land holdings; income and expenditures; financial activity involving borrowing, lending and saving; and organizational involvement. The institutional survey includes information on the policies used by the funds; their experiences regarding membership, savings and lending; the characteristics of the officers of the funds, including schooling level, occupation and experience; and the internal structure of the institution. Finally, the community-level survey is administered to the village headman to get information on the general characteristics of the community. Among other things, it includes information on settlement, population and migration; the history of institutions and organizations; and the status of the transportation and communication systems.

have been carried out every year until 2010. The surveys covered two distinct regions of Thailand: the fertile and industrialized Central region and the semi-arid and relatively poor Northeast. There were four provinces chosen within these two regions: LopBuri and Chachoengsao in the Central region; and Sisaket and Buriram in the Northeast region. Figure 3 shows the geographic location of the four provinces included in the survey. Within each of the provinces, 32 communities were selected: 16 in rural areas and 16 in urban areas. Hence, there are 64 rural and 64 urban communities included in the surveys. An important characteristic of the selected communities is that each of them received one million baht under the Village Fund Program. Figure 4 shows the geographical location of the surveyed communities. Finally, within each of the 128 communities, 15 households were selected at random. Therefore, the household survey was administered to 960 households in rural and 960 households in urban areas every year since the year of the initial survey.

The panel dataset includes information on all household loans from the village fund, which represent 42 percent of the total number of loans in rural areas; and, 70 percent of the total number of loans in urban areas.[35] The rural sample includes household loans from 2003 to 2010, while the urban sample includes loans from 2005 to 2009. In total, there are 4,796 and 2,498 loans in the rural and urban samples, respectively. The variables used in this study are described in further detail below. Unless otherwise noted, variables are constructed using data from the household survey. It is also important to note that the data does not identify members of borrowing groups; hence, the relevant group variables are constructed at the fund level and not at the group level. The summary statistics for the entire rural and urban samples are reported in Tables 3 and 4. In addition, Tables 5 and 6 report the summary statistics of time varying variables in the rural and urban samples, respectively.

There are two dependent variables analyzed in this study. One is *repayment* which is a binary variable that equals one if the borrower pays the loan before or by the maturity date and zero otherwise. The other, is *months in default* which is the number of months the borrower has been late in repaying the loan. The latter variable provides additional information about the severity of default. Figure 1 shows the repayment performance by year in rural and urban areas. Note that borrowers in urban areas are more likely to default on a loan than borrowers in rural areas.

The role of social ties is investigated by looking at indicators of cooperation, and official and unofficial penalties in the communities. First, cooperation is measured by two different variables: *best*

[35] Beside the village fund, the more common formal sources of credit are BAACs, Production Credit Groups (PCGs), agricultural cooperatives, commercial banks, and poverty eradication programs; and the more common informal sources of credit are relatives, neighbors and moneylenders.

cooperation and *sharing with people*. The variable *best cooperation* represents the percentage of households in the subdistrict that voted for the community as the best community in the subdistrict in terms of cooperation among people. To avoid partiality in people's judgment, I exclude the votes of households choosing their own community as the best community in the subdistrict. Households in the rural sample voted in 1997, before the fund program was established; accordingly, the proxy measure for cooperation is plausibly exogenous to repayment behavior. The variable *sharing with people* is an index constructed with information from the household survey. The index equals the number of positive responses to twelve yes-or-no sharing questions, which investigate whether or not the household helps or receives help from relatives or/and non-relatives in terms of work equipment, free labor, or money.

Following Ahlin and Townsend, I measure official and unofficial penalties using two community-level variables constructed from household data. Official penalties are proxied using the variable *best institutions* which represents the percentage of households in the subdistrict that voted for the community as the best community in the subdistrict in terms of availability and quality of institutions.[36] Unofficial penalties are measured by the variable *social sanctions* which is the percentage of loans in a community in which the borrower indicates that in case of default she would not be able to access credit not only from the actual lender, but also from alternative sources of credit in the community.

The peer monitoring variable indicates the extent to which group members can acquire information about each other. Following the argument that the cost of monitoring members decreases if they undertake the same economic activity, I use the variable *similarity in occupations* to proxy for peer monitoring. The variable is defined as the probability that two members selected at random from the same village fund have the same occupation. In principle, the more homogenous the group of members of the fund in terms of occupation, the easier it is for them to monitor each other.

The degree of joint liability variable reflects the likelihood that members of the group end up paying for a delinquent borrower. I use the percentage of members in the fund that owns no land as a proxy variable for the degree of joint liability. The hypothesis is that the higher the percentage of members that are landless in the fund, the higher the likelihood a borrower may end up paying in case his partner defaults on the loan. In urban areas, I also use the percentage of members that own no house in the fund to proxy for the degree of joint liability.

[36] This variable is also constructed using data from the original baseline surveys which in rural areas were conducted before the program was implemented.

The contract terms include the annual interest rate and the size of the loan. The variable *interest rate* is calculated using information on the loan amount, the loan term, and the total payment amount that is due at the end of the loan term. The *LN loan size* represents the natural logarithm of the loan amount.

The institutional policies that are analyzed in this paper are: (i) the use of a compulsory savings component; and (ii) the requirement for borrowers to attend a training session before loans are disbursed. I use two dummy variables to indicate whether a fund uses the institution policy or not; these variables are constructed using information from the institutional survey. The *compulsory savings* dummy variable is equal to one if the fund requires members to save a fixed amount of money every year, and zero otherwise; and the *training* dummy variable is equal to one if the fund requires borrowers to attend a training session in which CDD or BAAC officers cover basic accounting and financial concepts, and loan management practices; and talk about the advantages for the community of having a healthy financial institution.

The community-level controls include information on the community average land, schooling level, wealth and variability of income. First, *average land* is the average amount of land per household in rai.[37] Second, the *average schooling* variable is the average number of years of schooling of the household heads in the community. The number of years of schooling is constructed using information on the highest grade completed and the education track chosen by the individual.[38] Third, the *average wealth* is calculated as the average wealth of households surveyed in the community. Household wealth is constructed using detailed information on all household, agricultural and business assets a household owns in a given year, as well as its land holdings.[39] And the average variability of income in a community is measured by the *average risk* variable. To compute this variable, I use household information to construct the coefficient of variation of income for all households in the sample, and calculate the community average.

[37] One rai is equivalent to 0.395 acres.

[38] The schooling system in Thailand offers both academic and vocational tracks. The academic track is divided into primary education (P1 – P6); secondary education (M1 – M3); and high school education (M4 – M6). Students who choose the academic track have the option to pursue a bachelor degree after completing their high school education. The vocational track is similar to the academic track, except that students have to attend vocational upper secondary schools after completing their secondary education. This track offers students two options: to get a technical education certificate (PWT1 – PWT2) or to get vocational high school education (PWC1 – PWC3). Students who opt for vocational high school education can get a higher vocational education certificate (PWS1 – PWS3) after completing the PWC3 grade; and a bachelor degree (in two years) after completing the PWS3 grade. This schooling system has been in place since 1978.

[39] It is assumed that household, agricultural and business assets depreciate at a 10% rate.

In addition, I include two variables to measure outside borrowing opportunities in the community: *PCG membership* and *bank membership*. These variables indicate the percentage of household surveyed in the community who are members of a Production Credit Group (PCG) or a commercial bank, respectively.[40] Controlling for official and unofficial sanctions, more outside borrowing opportunities could result in lower repayment rates.

Finally, household-level controls include information on the head of the household such as gender, age, age squared, years of schooling, a dummy variable indicating the relevant schooling system, and a set of dummy variables indicating the role of the head in the job.[41] In addition, I include controls for household wealth, BAAC membership, and the variability of household income.

5.3 Results

The empirical results are presented in Tables 7 to 12. Tables 7 to 9 show the marginal effects on the probability of repayment in rural and urban communities; while Tables 10 to 12 show the pooled OLS estimates of the severity of default. The rural sample includes around 4,800 loans between the years 2003 and 2010, while the urban sample includes about 2,500 loans between 2005 and 2009. All regressions include year and province fixed effects. Additionally, to focus on within-subdistrict variation, I include specifications with subdistrict dummies. In Tables 8, 9, 11 and 12, regressions [4] to [8] include community-level controls; and regressions [5] to [8] include household-level controls. Standard errors are clustered at the community-year level.

First, I analyze the empirical results presented in Tables 7 to 9. I use two variables to proxy cooperation among people in the community. One is a the net percentage of households in the subdistrict naming the community best in the subdistrict in terms of cooperation among people and the other is a measure of sharing among related and unrelated people in the community. These two measures of cooperation can be interpreted as the opportunity of people to costlessly enforce agreements in their community. The community cooperation poll shows a positive relationship with repayment, but this relationship is only significant in rural areas. The relationship between the measure of sharing and repayment is not significant. In general, these results seem to favor the Stiglitz model as they indicate a positive relationship between cooperation and repayment rates. He indicates that borrowers acting in a cooperative way tend to choose safe

[40] Production credit groups are locally-run organizations that promote saving habits and offer lending services at the community level. PCG loans are usually smaller than 10,000 baht and are granted for a 2-, 6-, or 12-month period. The loan interest rate is relatively higher than the interest rate charge by Village Funds.

[41] The categories for the type of worker in the job are: inactive, unpaid family worker, employee (daily or monthly wage, or piece rate), government worker, and business owner. The business owner type is used as the reference category.

projects over risky projects more often, which in turn results in higher repayment rates.[42] Hence, communities in which people behave in a cooperative way may choose to repay more often rather than default on a loan (assuming the pressure to repay and/or the penalties for defaulting on a loan are constant). Additionally, note that both official and unofficial penalties seem to be good predictors of repayment, especially in rural areas. Ahlin and Townsend (2007) find a similar result regarding the effect of penalties on repayment to the BAAC in rural areas. These results confirm the role of penalties in the Besley and Coate model. The fact that the community cooperation and quality of institutions polls are constructed using information from the original baseline survey in 1997 in rural areas suggests that those communities that were rated as the best communities in the subdistrict in 1997 are the ones which have the hither repayment rates. Accordingly, this suggests that households in rural areas may have some information about local conditions which varies across communities and predicts success and failure of the program.

Also, note that the evidence does not support results in Banerjee *et al.* model regarding the cost of monitoring. The proxy for peer monitoring is negatively associated to repayment in the rural sample; and positively associated but not significant in the urban sample. The argument for using a measure for similarity in occupations to proxy peer monitoring is that the cost of monitoring members decreases if they undertake the same economic activity. Perhaps this proxy variable does not capture the ability of people to obtain information about their peers especially if their workplaces are located far away from one another. As an alternative, I use the percentage of relatives in the community and find that the relationship with repayment is positive but not significant.[43] In contrast, Ahlin and Townsend find some evidence in favor of Banerjee *et al.* model.[44]

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[42] These results are not in line with previous results by Ahlin and Townsend (2007) regarding the effect of cooperation on repayment to the BAAC in rural areas. Perhaps the reason is that people perceive differently the role of the BAAC and the village fund in the community. During the interviews, it was common to hear committee members (especially in rural areas) say that the village fund belong to the community; that it was their only affordable source of credit; and that they were aware that if the fund failed they were not going to receive any further assistance from the Thai government.

[43] This result is not shown in the paper but is available upon request.

[44] The authors use two different variables to proxy the cost of monitoring: one is the percentage of group living in village which they find is positively associated with repayment; and the other is the percentage of members with a relative in the group which they show is negative associated with repayment.

The degree of joint liability is proxied as the landless fraction of members in the fund. In both, rural and urban areas, it has a significantly negative effect on repayment.[45] Also, note that the effect seems to be stronger in urban communities. In rural areas, a one percentage point increase in the fraction of landless members in the fund decreases repayment in about 0.07 to 0.08 percentage points; while in urban areas, a one percentage point increase in the fraction of landless members in the fund decreases repayment in 0.17 to 0.28 percentage points. These results are consistent with the Stiglitz and Ghatak models. In the Stiglitz model, higher joint liability lowers the payoff of both the safe and risky projects; however, the payoff under the safe project is hurt more than the payoff under the risky project as it implies paying for delinquent borrowers more often and during times when returns are lower. Therefore, an increase in the degree of joint liability encourages the choice of risky projects and decreases repayment. In the Ghatak model, higher joint liability makes borrowing a relatively less attractive option relative to the outside option; and thus, safer borrowers decide to stay out of the market.

To analyze the use of compulsory savings and training components on repayment rates I include two dichotomous variables that indicate whether a loan is granted under the policy or not. In both, rural and urban areas, these policies seem to positively predict repayment.[46] These results seem to confirm the predictions of the extended models analyzed in this paper. First, it is assumed that compulsory savings increases the burden of default on the loan as the amount of savings can be used as collateral in case of default; because of this, compulsory savings is expected to increase repayment. Second, it is assumed that providing information to borrowers on the terms of the loan or the benefits of the fund, or offering training on basic accounting and administrative concepts may result in an increase in the project's return in case of success.[47] An empirical concern with these results is the possibility that intrinsic socioeconomic differences across communities may have contributed to determine the lending policies that were actually implemented by the funds. In this situation, the estimation results would be biased. In Section 5.5, I discuss in more detail this potential endogeneity problem.

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[45] This result holds even after controlling for the average land area in the community. In addition, in urban areas, I also proxy the degree of joint liability as the fraction of members in the fund that own no house. The variable also shows a significant negative effect on repayment.

[46] These results remain robust even after controlling for the average schooling level and wage of the official of the fund; the average schooling level in the community; and the schooling level of the borrower.

[47] This increase in output can be explained either by a reduction in the time spend to administrate the loan or by an increase in effort after experiencing the benefits of repaying and maintaining a good status in the fund.

In all regressions, the coefficients of the interest rate and the size of the loan are not significantly different from zero. Of the community-level control variables, the average schooling level in the community exhibits a significantly positive correlation with repayment in rural communities, but not in urban communities. Moreover, commercial bank membership is negatively correlated with repayment in urban areas. This last result is consistent with Ghatak story, as it seems that having more outside options makes loans from the village fund relatively less attractive (keeping the degree of joint liability constant), which drives out of the market the safe type borrowers. In addition, note that there is evidence that community income variability predicts higher repayment in both rural and urban communities (even after controlling for the household income variability). The relationship is also positive and significant when the average variability of income of fund members is considered. These variables can be viewed as a measure of diversification in income and occupational activities among members of the fund. In this way, the positive and significant relationship with repayment can indicate that as the variability of income in the community (or in the fund) increases the portfolio of the fund is diversified and less vulnerable to covariate shocks.[48]

Of the household-level control variables, the gender of the head of the household, BAAC membership, and variability of income exhibit a robust correlation with repayment in rural areas.[49] Similar to other studies, the estimation results suggest that repayment is higher for households with a female head. The same relationship holds true for households with membership to the BAAC; perhaps because there is a strong link between village funds and BAACs in rural areas, so defaulting on a village fund loan reduces access to credit from the BAAC. Finally, the coefficient of variation of household income is negatively correlated with repayment; this result only confirms that risky borrowers default on a loan more often.

Using pooled OLS regression analysis, the empirical results on the severity of default confirm those on repayment behavior (see Tables 10 to 12). I find a significant negative association between the community cooperation poll and the number of months the loan has been on default in rural areas, but not in urban areas. The proxy for official and unofficial sanctions also shows a negative significant relationship with the severity of default in both rural and urban areas (see Table 10); however, once I include the community-level controls only the estimate for social sanctions remains robust (see Tables 11 and 12). This result again supports the Besley and Coate story about

[48] Zeller (1998) finds a similar result. He shows that repayment rates of group-lending schemes significantly improve with an increasing variability of risky asset holdings among members. The author argues that his results indicate that groups exploit scale economics of risk by pooling risks and by entering into informal insurance contracts.

[49] The coefficients of these variables exhibit the similar signs for the urban sample, but are not significant. These results are not shown in Tables 8 or 9, but are available upon request.

the role of social sanctions. Thus, even that it may be difficult for a microfinance institution to apply sanctions against delinquent borrowers because of the lack of collateral, there can be strong social sanctions against those who default if social ties among members are strong enough; as a result, social ties ameliorate the enforcement problem. The compulsory savings and training variables show a negative and significant relationship with the number of months in default (with the exception of the coefficient of training which, once I include community and household controls, is not statistically different from zero in the rural sample).

Note that the degree of joint liability predicts a greater severity of default in both rural and urban communities. The estimated coefficients indicate that a ten percentage points increase in the degree of joint liability increases in 3 to 5 days the number of days a loan is in default in rural areas; while it increases in 22 to 47 days in urban areas. Furthermore, the variability of income exhibits a significant and negative relationship with the severity of default in urban areas. The estimate indicates that a one percentage point increase in the average risk of the community decreases severity of default in 4 to 6 days.

In summary, the empirical results indicate that repayment increases with cooperative behavior as in the Stiglitz model; and with the strength of official and unofficial sanctions as in the Besley and Coate model. This in turn suggests that social ties play a central role in explaining performance under joint liability lending. Moreover, repayment decreases with the degree of joint liability in both rural and urban communities as the Stiglitz and Ghatak model predict. The findings further indicate that the use of compulsory savings and training components with joint liability are good predictors of loan repayment in rural and urban areas. And finally, an interesting finding in this study is the effect of the variability of income among members on repayment behavior as it seems that it improves repayment rates.

5.4 Robustness Checks

In this section I report the robustness checks that were carried out in order to evaluate the sensitivity to the empirical results reported in the previous section. Tables 8 and 9 report the estimation results of different specifications that, in addition to year and province fixed effects, include subdistrict fixed effects and a set of community- and household-level control variables. These inclusions do not affect much the estimation results. Additionally, Appendix Tables 1 to 3 report the estimation results of a number of robustness checks that were performed using the rural and urban samples, respectively. I describe these below.

First, instead of using the probit model, I use the linear probability and the logit model to estimate the effect of the explanatory variables on repayment. Regression [1] reports the estimates using the linear probability model, while Regression [2] reports the estimates using the logit model. The signs of the relevant variables are not affected, but some coefficients lose significance. The coefficients that lose significance using the linear probability model are the ones for the variables that measure penalties for default, joint liability and training in rural areas; and social sanctions in urban areas. Using logit regressions, the coefficients that lose significance are the coefficients for the joint liability variable in rural areas, and for the social sanctions variable in urban areas.

Second, I include a set of controls to capture the level of development of the community. These variables are the number of households; the distance to the main road; the fraction of households with electricity; the fraction of households with telephone; the fraction of households with television; and the fraction of households in rice farming. In general, the signs are consistent with the results reported in the previous section, but the coefficients for the proxy variables for penalties for default and joint liability lose significance in rural areas (see Regression [3]).

Third, I add two variables to control for the characteristics of village fund officials. These variables are the average schooling level of committee members and the amount of money they get paid for administering the fund (see Regression [4]). Fourth, I added a set of dummy variables to control for the actual use of the loan (see Regression [5]). In both cases, the results are robust for the rural and urban samples.

Fifth, I use an alternative proxy for joint liability. Instead of using the percentage of landless households in the fund, I use the percentage of households in the fund that owns no house (see Regression [6]). The estimates are significant in both the rural and urban samples.

Sixth, I assess the robustness of the results to the definition of default. In particular, I define repayment equal to one if the loan was paid within 30, 60 or 90 days of the maturity date. These results are presented in Regression [7] to [9], respectively. The empirical results show consistent signs, but some of them lose significance.

Finally, to focus on within-community variation, I include community-specific fixed effects. In this latter case, it is not possible to estimate the effect of cooperation or best institutions because the variation of these variables is only at the community level. Appendix Table 3 shows the estimated coefficients of the policies under this specification. It is worth to notice that the estimated coefficients for compulsory savings and training are robust across the different specifications, but there are some exceptions for the coefficient of training in rural areas.

5.5 Empirical Concerns

The study has some limitations that need to be taken into account when interpreting the estimation results. However, these limitations can be seen as fruitful avenues for future research under the same topic. First, the Village Fund Program is not a universal program. The number of members of the fund is relatively similar to the number of households in the community, but not all the members apply for loans. Village fund clients are more educated and richer than the typical household in rural areas; and less educated and poorer than the typical household in urban areas. However, this investigation does not attempt to explain the determinants of borrowing decisions among members. Instead, it takes as given the selection of households into the program. Clearly, this assumption can be relaxed in future studies.

Second, an empirical concern associated to standard estimation methods is the possibility that intrinsic socioeconomic differences across communities in the sample may have contributed to determine the policies that were implemented by the funds. Under this scenario, the relationship between repayment behavior and policies would be explained by an omitted variable that is unobserved by the econometrician but not by the members of the fund. One possibility is that policies are chosen by funds precisely because committee members have additional information about the quality of potential borrowers in the community which indicates people would not make reliable borrowers. Hence, they choose certain policies to screen members and to strength the discipline and knowledge of potential borrowers. Note that the quality of borrowers may be correlated not only with the choice of policies, but also with their repayment behavior; thus, standard estimates would be biased downward. Another possibility is that the ability of committee officers may have contributed to the choice of policies; that is, more able officers may have better information about the set of policies that can be used to start and run a successful local organization. Note that committee members' ability may be also correlated with repayment behavior; thus, standard estimates would be biased upward.

From interviews conducted during fieldtrip in Thailand, it seems that intrinsic socioeconomic differences across communities did not play a fundamental role in determining the policies chosen by the funds. Committee members mentioned that at the time of foundation they got a set of manuals from the Thai government describing the program and the regulation; and in order for them to apply for the fund, they had to follow a list of requirements that was included in the manuals. This was a common story in all the interviews. In fact, it seems that the variation in policies is observed only in those cases in which there were given two or more possibilities; or in those cases in which the suggestion was over a wide range of alternatives (as in the case of the interest rate or the number of committee members). For instance, the sample guideline recommended the use of co-signers to guarantee loans. The data shows that all surveyed funds follow this option as there was no other alternative. The sample guideline also suggested the use of a membership application form and charging a fee to applicants or members; most of the funds followed these policies (see Table 2). In the case of savings the guideline suggested to offer savings services, and two different terms were used to describe the products that they could offer: pledge shares and pledge savings. In general, all the funds in the sample decided for either one of these products or for both of them based on the way they interpreted the "regulation". However, the way the funds implemented the policy varies across funds. In addition, there were cases in which committee members mentioned that they did not include either product because they did not have to do it as there was already another institution providing savings facilities in the community. This suggests that the differences in policy choices are explained at some extent by the way in which committee members interpreted the sample list of policies. Under this scenario, the endogeneity problem may not be particularly severe. In any case, further investigation can help to assess the magnitude of the problem. These limitations must be taken into account when interpreting the results in this investigation.

6 Conclusions

This paper uses a novel panel dataset on household loans from the Village Fund Program in rural and urban communities in Thailand to investigate how social ties and the use of policies such as compulsory savings and training contribute to explain successful lending practices under joint liability to individuals with limited access to formal financial markets. Specifically, the panel dataset is constructed using household, institutional and community-level annual data from the Townsend Thai Data Collection, which is one of the longest panel data in developing countries and is characterized by its high level of detail. Successful performance is defined in terms of repayment rates. This investigation differs from other empirical studies that analyze repayment behavior under joint liability lending in four important ways: (i) it uses a panel dataset on household loans from the microfinance program; (ii) it uses a sample of households in rural communities and a sample of households in urban communities; (iii) the proxy variable for social cohesion is constructed using information from the baseline surveys which in the case of the rural sample is conducted before the program started; thus, the proxy measure for social cohesion is exogenous to repayment behavior in rural areas; and (iv) the data shows wide variation in the use of the policies that are analyzed in this study.

The empirical analysis is motivated by the repayment predictions of existing theories on joint liability lending. The central findings of this investigation are consistent with the predictions of some of these models. The results suggest that repayment is positively associated with cooperative behavior in rural areas as predicted by the Stiglitz model; and with the strength of social sanctions in rural and urban areas as predicted by the Besley and Coate model. Both cooperative behavior and the ability to use social sanctions are common in environments in which social cohesion is strong. In this context, these findings suggest that social ties play a central role in explaining performance under joint liability lending. The findings also point out that the use of a compulsory savings or a training component with joint liability lending is positively correlated with repayment. From the perspective of the microfinance institution, the benefits of including these practices into the design of the program are many. For example, the amount of accumulated savings can serve as loan collateral; and training can be used for capacity building so as to enhance the loan productivity.

Moreover, there is evidence that repayment decreases with the degree of joint liability in both rural and urban communities as the Stiglitz and Ghatak model predict; and with the availability of formal sources of credit in urban communities as in the Ghatak model. Finally, an interesting finding in this study is the positive relationship between the average variability of income among members of the fund and repayment in both rural and urban areas. Perhaps this suggests that the more diversified the portfolio of the fund the less vulnerable to covariate shocks.[50]

The descriptive analysis of the founding and the organization of the funds, and the econometric analysis of the repayment performance of village fund clients in rural and urban communities lead to a number of conclusions for the design of microcredit programs and for the type of services provided by financial institutions. First, the evidence suggest that joint liability lending may prosper in areas in which social ties are strong enough to permit individuals to costlessly enforce agreements in their community, and in which the threat of social sanctions exists and is credible. Second, the findings suggest that households in rural areas have some knowledge about the customs and characteristics of people and institutions in the region which predicts success and failure of the microfinance program. This local knowledge should be exploited in the design of new programs. In the case of the Village Fund Program, this information can be used to decide the optimal scale of the funds, and their transformation into community banks. Third, it seems that

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[50] This result was previously documented by Zeller (1998).

including policies such as compulsory savings or training is beneficial for the lender as it results in higher repayment rates. However, in order to determine whether any of these policies should be implemented, it is necessary to compare the cost and benefits of implementation so as to assess whether or not including the component represents a profitable innovation for the program. And fourth, lending to a less homogenous group of borrowers in terms of economic activity may also be advantageous for the lender as it seems that a more diversified pool of borrowers is less vulnerable to shocks.

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Figure 1. Default rates by borrowing year in rural and urban areas

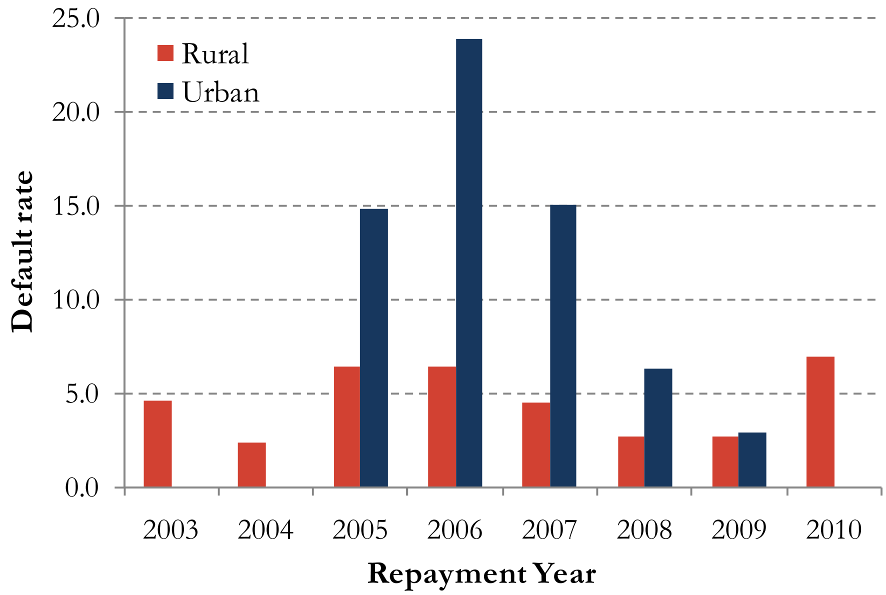


Figure 2. Thailand Provinces included in the samples

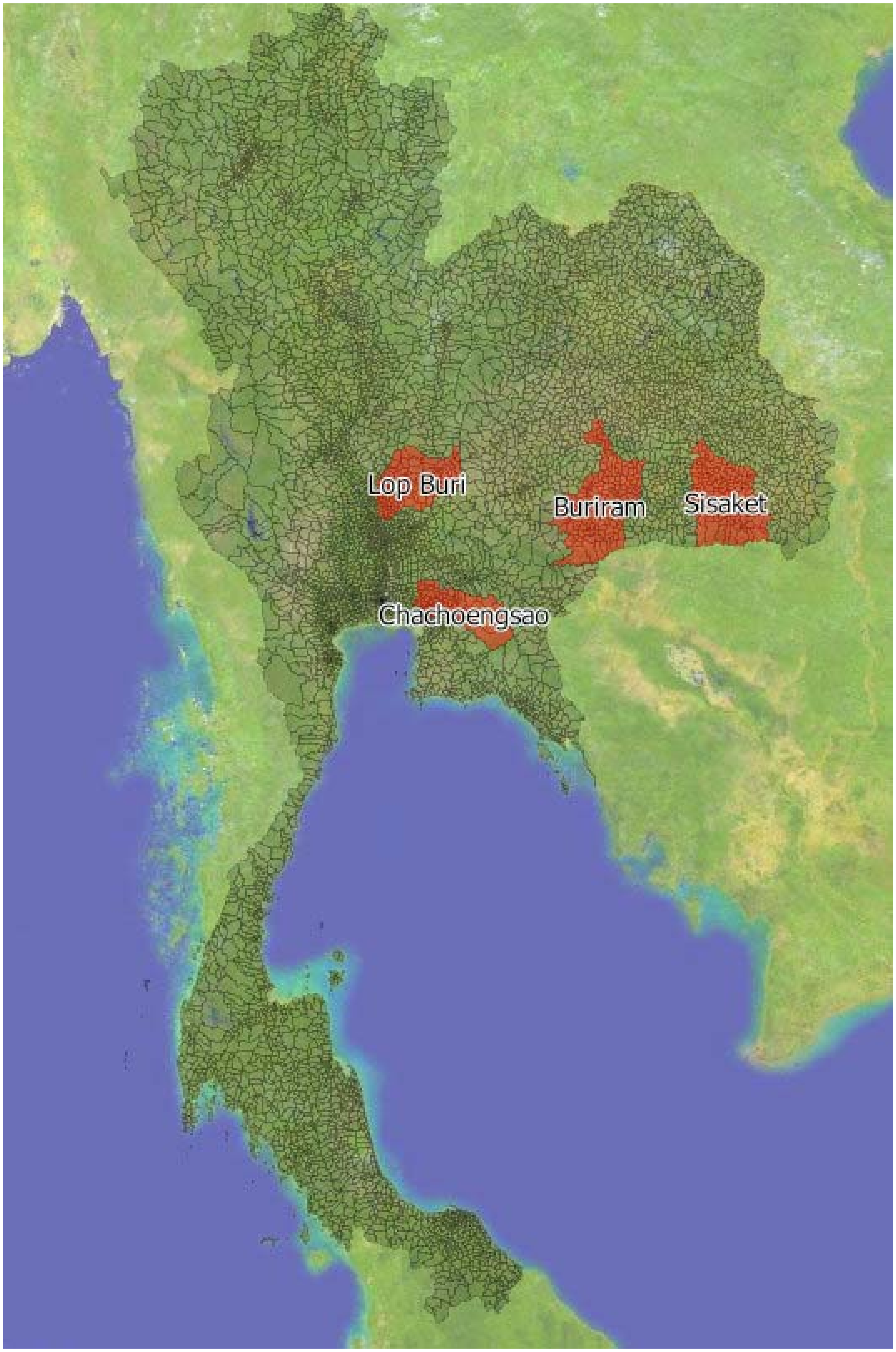
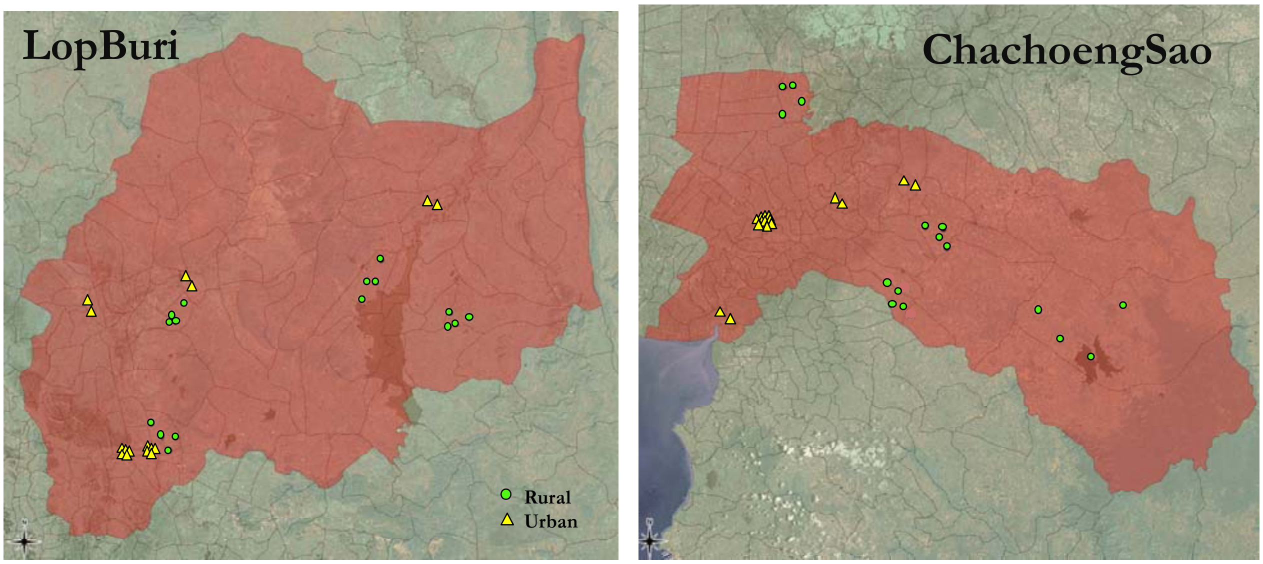


Figure 3. Communities in rural and urban samples

Central Region



Northeast Region

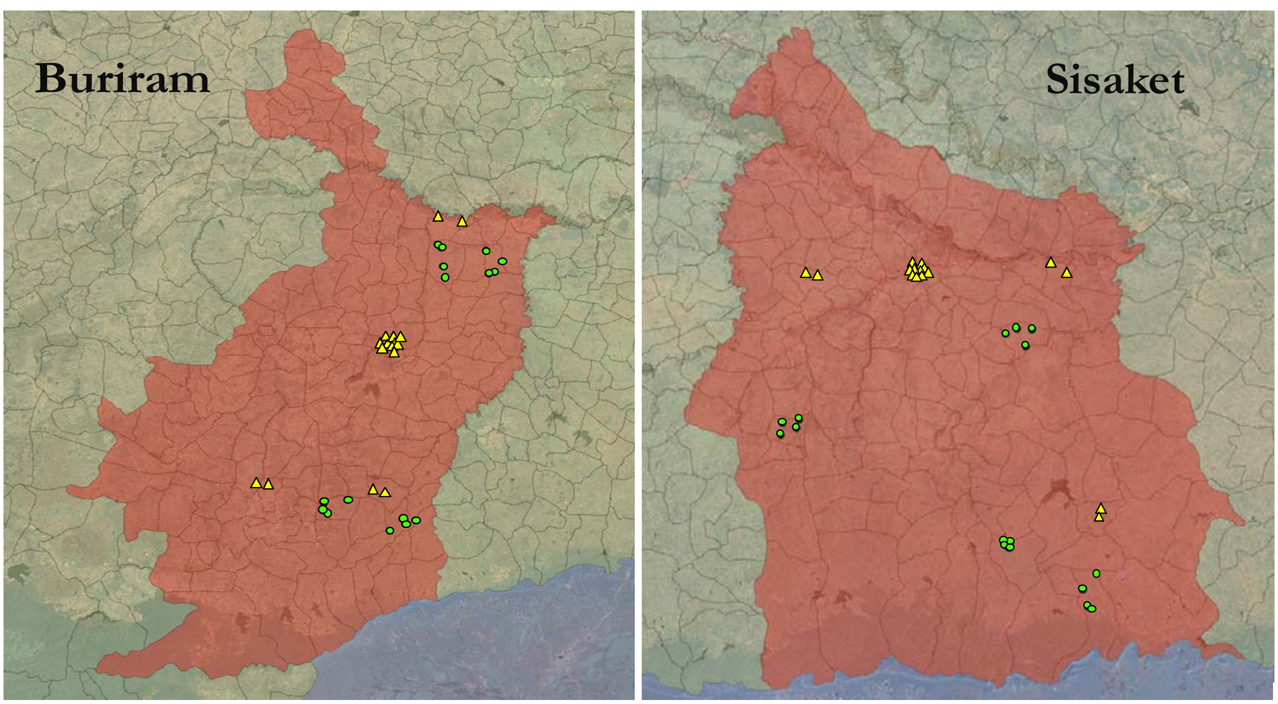


Table 1. Repayment implications of joint liability models

Variable	Effect on repayment			
	Stiglitz (1990)	Banerjee *et al.* (1994)	Besley and Coate (1995)	Ghatak (1999)
Degree of joint liability	Negative^{+}	Positive^{+}		Negative^{+}
Cooperative behavior	Positive^{++}	Negative^{++}	Negative^{++}	
Cost of monitoring		Negative^{+}		
Official sanctions			Positive^{+}	
Unofficial sanctions			Positive^{+}	
Interest rate^{+}	Negative	Negative	Negative	Negative
Loan size	Negative^{+}	Negative^{++}		Pos - Neg^{++}
Training^{+++}	Positive	Positive	Positive	Positive
Compulsory Savings^{+++}	Positive	Positive	Positive	Positive

Source: Ahlin and Townsend (2002, 2007).

$^{+}$ Variables included in the original model; $^{++}$ Variables included in the extended models developed by Ahlin and Townsend (2002, 2007); $^{+++}$ New variables (policies).

Table 2. Proportion of funds by policy choices

Policy	Rural	Urban
Screening members	92.2	98.4
Membership application form	84.4	96.9
Interviews	85.9	57.8
Criteria to evaluate applicants		
Expected amount of savings	78.1	85.9
Occupation	26.6	26.6
Fee	95.0	98.4
Application fee	68.8	48.4
Membership fee	39.1	56.3
Type of savings		
Pledge savings	60.9	53.1
Shares	28.1	43.8
Screening loans	100.0	100.0
Loan application form	98.4	100.0
Interviews	100.0	54.7
Criteria to evaluate applicants		
Amount of savings	9.4	56.3
Purpose of loan	96.9	90.6
Ability to repay	95.3	85.9
Occupation	40.6	64.1
Number of funds	64	64

Table 3. Summary statistics

Variable	Rural		Urban	
	Mean	SD	Mean	SD
Repayment	0.96	0.21	0.85	0.35
Months in default	0.58	4.33	2.70	8.60
Cooperation				
Best cooperation	0.55	0.22	0.42	0.19
Sharing w/people	5.22	3.87	2.90	3.02
Penalties for default				
Best institutions	0.28	0.28	0.20	0.21
Social sanctions	0.09	0.20	0.01	0.02
Peer monitoring				
Similar occupation	0.30	0.16	0.22	0.09
Degree of joint liability				
Percent landless in village	0.44	0.20	0.38	0.22
Percent houseless in village	0.38	0.16	0.28	0.20
Contract terms				
Interest rate	0.06	0.04	0.08	0.06
Loan size	17,148	7,466	18,448	6,348
Community-level controls				
Average land value*	1.43	1.37	1.40	1.44
Average land area**	17.81	10.29	4.82	4.53
Average schooling level	4.36	0.89	7.18	1.62
Average wealth	1.63	1.45	1.65	1.57
Average risk	0.21	0.10	0.12	0.05
PCG membership	0.30	0.31	0.27	0.23
Bank membership	0.67	0.23	0.86	0.14
Observations	4,796		2,498	

* In millions of 2009 baht.
** In rai (1 rai = 0.395 acres).

Table 4. Summary statistics

Variable	Rural		Urban	
	Mean	SD	Mean	SD
Individual-level controls				
Gender (Female = 1)	0.29	0.45	0.46	0.50
Age	54.34	11.80	52.55	10.89
Schooling level	4.43	2.69	7.10	4.16
Schooling system	0.16	0.37	0.30	0.46
Type of worker on the job				
Inactive	0.07	0.25	0.05	0.21
Unpaid worker	0.03	0.18	0.08	0.27
Worker (wage and piece-rate)	0.20	0.40	0.21	0.41
Government worker	0.01	0.12	0.09	0.28
Business owner	0.69	0.46	0.58	0.49
Wealth*	1.73	4.96	1.48	4.38
Risk	0.21	0.17	0.13	0.14
BAAC membership	0.41	0.49	0.15	0.35
Policies				
Compulsory savings	0.56	0.50	0.70	0.46
Training	0.18	0.38	0.15	0.35
Payment year				
Payment year = 2003	0.12	0.32		
Payment year = 2004	0.12	0.32		
Payment year = 2005	0.12	0.33	0.24	0.43
Payment year = 2006	0.14	0.35	0.26	0.44
Payment year = 2007	0.15	0.36	0.21	0.41
Payment year = 2008	0.14	0.35	0.17	0.38
Payment year = 2009	0.13	0.34	0.11	0.31
Payment year = 2010	0.08	0.26		
Observations	4,796		2,498	

* In millions of 2009 baht.

Table 5. Summary statistics of time varying variables (means)
Rural sample

Variable	2003	2004	2005	2006	2007	2008	2009	2010
Repayment	0.95	0.98	0.94	0.94	0.96	0.97	0.97	0.93
Months in default	0.35	0.15	0.79	1.62	0.58	0.41	0.15	0.30
Cooperation								
Share w/people	5.64	5.25	5.03	5.87	5.43	5.68	3.70	4.96
Penalties for default								
Sanctions	0.08	0.09	0.08	0.09	0.08	0.09	0.10	0.09
Peer monitoring								
Similar occupation	0.29	0.29	0.29	0.29	0.28	0.25	0.30	0.32
Phone service	0.36	0.50	0.56	0.62	0.66	0.71	0.77	0.80
Degree of joint liability								
Percent landless	0.41	0.41	0.41	0.43	0.44	0.46	0.47	0.50
Percent houseless	0.34	0.34	0.35	0.37	0.39	0.40	0.41	0.45
Terms of the contract								
Interest rate	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06
Loan size	15,182	16,979	17,591	16,939	17,566	17,428	17,998	17,322
Community-level controls								
Average land value*	1.60	1.57	1.48	1.38	1.43	1.41	1.33	1.19
Average land area**	17.9	18.4	18.4	17.8	18.6	17.2	17.2	16.5
Average schooling level	4.14	4.08	4.16	4.17	4.37	4.56	4.68	4.84
Average wealth	1.79	1.78	1.67	1.57	1.63	1.60	1.52	1.39
Average risk	0.31	0.32	0.27	0.20	0.15	0.14	0.13	0.14
PCG membership	0.34	0.30	0.35	0.30	0.27	0.29	0.29	0.22
Bank membership	0.73	0.72	0.70	0.68	0.67	0.63	0.63	0.59
Individual-level controls								
Gender (Female = 1)	0.29	0.26	0.29	0.30	0.27	0.32	0.29	0.34
Age	54.0	53.8	54.4	54.4	54.3	54.7	54.6	54.8
Schooling level	4.13	4.15	4.20	4.20	4.49	4.59	4.81	5.02
Schooling system (New = 1)	0.12	0.12	0.13	0.13	0.15	0.19	0.21	0.26
Type of worker on the job								
Inactive	0.09	0.08	0.08	0.07	0.07	0.07	0.05	0.04
Unpaid worker	0.01	0.02	0.02	0.02	0.04	0.04	0.06	0.08
Worker (wage or piece-rate)	0.17	0.15	0.21	0.17	0.23	0.24	0.21	0.19
Government worker	0.03	0.02	0.01	0.01	0.02	0.01	0.01	0.02
Business Owner	0.71	0.74	0.68	0.73	0.65	0.64	0.68	0.67
Wealth*	1.62	1.93	1.92	1.77	1.69	1.85	1.46	1.53
Risk	0.31	0.32	0.28	0.21	0.15	0.14	0.14	0.14
BAAC membership	0.39	0.41	0.39	0.40	0.41	0.42	0.44	0.41
Observations	568	554	598	691	715	669	637	364

* In millions of 2009 baht. ** In rai (1 rai = 0.395 acres).

Table 6. Summary statistics of time varying variables (means)
Urban sample

Variable	2005	2006	2007	2008	2009
Repayment	0.84	0.76	0.85	0.94	0.97
Months in default	3.22	4.25	2.94	0.95	0.16
Cooperation					
Share w/people	2.78	3.18	3.03	2.90	2.26
Penalties for default					
Sanctions	0.01	0.01	0.00	0.00	0.00
Peer monitoring					
Similar occupation	0.20	0.22	0.21	0.23	0.27
Phone service	0.87	0.89	0.90	0.90	0.91
Degree of joint liability					
Percent landless	0.28	0.37	0.42	0.44	0.44
Percent houseless	0.20	0.30	0.31	0.32	0.32
Terms of the contract					
Interest rate	0.08	0.08	0.07	0.07	0.07
Loan size	16,964	16,920	17,983	17,193	17,175
Community-level controls					
Average land value*	1.64	1.62	1.30	1.07	1.06
Average land area**	5.35	4.90	4.91	4.22	4.27
Average schooling level	7.27	7.15	7.29	7.02	7.08
Average wealth*	1.95	1.87	1.55	1.27	1.27
Average risk	0.17	0.11	0.11	0.12	0.10
PCG membership	0.28	0.24	0.27	0.28	0.28
Bank membership	0.98	0.88	0.81	0.78	0.78
Individual-level controls					
Gender (Female = 1)	0.45	0.47	0.46	0.45	0.46
Age	51.6	52.0	52.7	53.7	54.0
Schooling level	7.01	7.00	7.37	6.98	7.19
Schooling system (New = 1)	0.26	0.30	0.31	0.30	0.34
Type of worker on the job					
Inactive	0.06	0.06	0.03	0.03	0.02
Unpaid worker	0.06	0.07	0.06	0.10	0.14
Worker (wage or piece-rate)	0.21	0.22	0.21	0.20	0.20
Government worker	0.08	0.07	0.11	0.08	0.09
Business Owner	0.60	0.58	0.59	0.58	0.56
Wealth*	1.60	1.71	1.48	1.18	1.10
Risk	0.19	0.10	0.12	0.10	0.10
BAAC membership	0.13	0.15	0.14	0.16	0.17
Observations	609	656	526	431	276

* In millions of 2009 baht. ** In rai (1 rai = 0.395 acres).

Table 7. Marginal effect on the probability of repayment in rural communities

Dependent Variable: Binary variable equal to one if loan was paid by the maturity date	Rural						Urban					
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Cooperation												
Best cooperation	0.113***						0.088					
	(0.037)						(0.061)					
Sharing w/people	0.000						0.001					
	(0.001)						(0.003)					
Penalties for default												
Best institutions		0.376***						0.151				
		(0.126)						(0.114)				
Social sanctions		0.081*						0.828*				
		(0.046)						(0.474)				
Peer monitoring												
Similarity in occupations			-0.002						0.042			
			(0.045)						(0.145)			
Policies												
Compulsory savings				0.046**		0.046**				0.083***		0.086***
				(0.023)		(0.023)				(0.027)		(0.028)
Training					0.027***	0.028***					0.070**	0.076**
					(0.011)	(0.011)					(0.030)	(0.029)
Observations	4796	4796	4796	4796	4796	4796	2498	2498	2498	2498	2498	2498
Chi-squared	29.56	31.05	19.87	23.49	23.57	29.39	109.36	109.38	109.85	111.80	108.26	117.65
Pseudo R-squared	0.100	0.114	0.058	0.076	0.062	0.081	0.118	0.121	0.116	0.129	0.119	0.132

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year and province fixed effects.
* indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Table 8. Marginal effect on the probability of repayment in rural communities

Dependent Variable: Binary variable equal to one if loan was paid by the maturity date

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Cooperation							
Best cooperation	0.079**	0.073**	0.074***	0.072***	0.058**	0.068**	0.054*
	(0.037)	(0.029)	(0.026)	(0.027)	(0.028)	(0.027)	(0.028)
Sharing w/people	0	0	0	0	0	0	0
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Penalties for default							
Best institutions	0.247***	0.210***	0.178**	0.167*	0.187**	0.163*	0.183**
	(0.086)	(0.079)	(0.091)	(0.092)	(0.094)	(0.091)	(0.092)
Social sanctions	0.090**	0.067	0.069*	0.070*	0.074**	0.063*	0.064*
	(0.041)	(0.042)	(0.037)	(0.037)	(0.035)	(0.037)	(0.035)
Peer monitoring							
Similarity in occupations	0.018	-0.095*	-0.079*	-0.075	-0.066	-0.074	-0.065
	(0.041)	(0.051)	(0.047)	(0.047)	(0.045)	(0.046)	(0.045)
Degree of joint liability	-0.078**	-0.070*	-0.082**	-0.077*	-0.073*	-0.077*	-0.073*
	(0.034)	(0.040)	(0.041)	(0.041)	(0.044)	(0.041)	(0.044)
Contract terms							
Interest rate	0.167	-0.008	-0.006	-0.001	-0.013	0.007	-0.007
	(0.232)	(0.084)	(0.077)	(0.079)	(0.048)	(0.085)	(0.050)
LN Loan size	0	0.006	0.01	0.009	0.008	0.009	0.009
	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Community-level controls							
Average schooling level			0.013*	0.014*	0.013*	0.015**	0.014**
			(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Average wealth			0.026	0.026	0.033	0.022	0.03
			(0.032)	(0.032)	(0.033)	(0.033)	(0.033)
Average risk			0.239***	0.264***	0.284***	0.249***	0.266***
			(0.084)	(0.087)	(0.088)	(0.087)	(0.088)
PCG membership			-0.04	-0.040*	-0.013	-0.038	-0.01
			(0.025)	(0.024)	(0.026)	(0.024)	(0.026)
Bank membership			-0.067	-0.071	-0.092	-0.079	-0.105*
			(0.053)	(0.053)	(0.057)	(0.053)	(0.057)
Policies							
Compulsory savings					0.042**		0.043**
					(0.017)		(0.017)
Training						0.020*	0.023**
						(0.011)	(0.011)
Subdistrict FE		Yes	Yes	Yes	Yes	Yes	Yes
Community-level controls			Yes	Yes	Yes	Yes	Yes
Household-level controls				Yes	Yes	Yes	Yes
Observations	4796	4796	4796	4796	4796	4796	4796
Chi-squared	59.58	97.82	133.39	176.93	201.88	182.77	200.73
Pseudo R-squared	0.139	0.208	0.228	0.236	0.245	0.238	0.248

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year and province fixed effects. Community-level controls include the community average land, schooling level, wealth, and variability of income; and membership to PCGs and commercial banks. Household-level controls include information on the head of the household and on the household. The head of the household controls are gender, age, age squared, years of schooling, a dummy variable indicating the relevant school system, and a set of dummy variables indicating the role of the worker in the job; the household controls are wealth, a dummy variable indicating BAAC membership, and the variability of income. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Table 9. Marginal effect on the probability of repayment in urban communities

Dependent Variable: Binary variable equal to one if loan was paid by the maturity date	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Cooperation							
Best cooperation	0.012	-0.021	0.008	0.025	0.044	0.046	0.072
	(0.079)	(0.105)	(0.119)	(0.120)	(0.116)	(0.118)	(0.115)
Sharing w/people	0	-0.002	-0.003	-0.003	-0.003	-0.003	-0.003
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Penalties for default							
Best institutions	0.125	-0.11	-0.195	-0.228	-0.199	-0.252	-0.226
	(0.139)	(0.202)	(0.237)	(0.239)	(0.243)	(0.235)	(0.243)
Social sanctions	0.686	0.717*	0.684*	0.653*	0.561	0.728*	0.641*
	(0.468)	(0.406)	(0.404)	(0.397)	(0.378)	(0.394)	(0.373)
Peer monitoring							
Similarity in occupations	0.078	0.074	0.009	0.025	-0.024	0.014	-0.039
	(0.146)	(0.131)	(0.122)	(0.122)	(0.122)	(0.121)	(0.121)
Degree of joint liability	-0.174***	-0.196**	-0.277***	-0.263***	-0.212**	-0.280***	-0.229***
	(0.064)	(0.080)	(0.087)	(0.086)	(0.086)	(0.082)	(0.082)
Contract terms							
Interest rate	-0.148	-0.02	-0.008	-0.012	0.004	-0.021	-0.004
	(0.105)	(0.086)	(0.089)	(0.085)	(0.086)	(0.087)	(0.088)
LN Loan size	-0.008	0.003	-0.002	-0.005	-0.003	-0.004	-0.002
	(0.018)	(0.020)	(0.020)	(0.022)	(0.021)	(0.022)	(0.021)
Community-level controls							
Average schooling level			-0.004	-0.004	-0.004	-0.003	-0.002
			(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Average wealth			0.009	0.008	0.005	0.006	0.003
			(0.008)	(0.007)	(0.008)	(0.007)	(0.008)
Average risk			0.665**	0.732***	0.583**	0.801***	0.654**
			(0.261)	(0.267)	(0.276)	(0.271)	(0.277)
PCG membership			0.072	0.072	0.044	0.074	0.046
			(0.054)	(0.056)	(0.055)	(0.055)	(0.055)
Bank membership			-0.400***	-0.406***	-0.338**	-0.404***	-0.332**
			(0.131)	(0.129)	(0.137)	(0.128)	(0.138)
Policies							
Compulsory savings					0.064**		0.070**
					(0.027)		(0.029)
Training						0.073**	0.081***
						(0.033)	(0.030)
Subdistrict FE		Yes	Yes	Yes	Yes	Yes	Yes
Community-level controls			Yes	Yes	Yes	Yes	Yes
Household-level controls				Yes	Yes	Yes	Yes
Observations	2498	2498	2498	2473	2473	2473	2473
Chi-squared	131.53	204.34	217.96	433.00	450.32	456.45	457.60
Pseudo R-squared	0.132	0.188	0.208	0.212	0.219	0.215	0.223

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year and province fixed effects. Community-level controls include the community average land, schooling level, wealth, and variability of income; and membership to PCGs and commercial banks. Household-level controls include information on the head of the household and on the household. The head of the household controls are gender, age, age squared, years of schooling, a dummy variable indicating the relevant school system, and a set of dummy variables indicating the role of the head in the job; the household controls are wealth, a dummy variable indicating BAAC membership, and the variability of income. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Table 10. Pooled OLS estimates of the severity of default in rural communities

Dependent Variable: Number of months the loan has been on default	Rural						Urban					
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]
Cooperation												
Best cooperation	-2.227**						-2.035*					
	(1.131)						(1.113)					
Sharing w/people	0.01						-0.108					
	(0.019)						(0.070)					
Penalties for default												
Best institutions		-4.209***						-3.662*				
		(1.538)						(2.117)				
Social sanctions		-1.241**						-38.731***				
		(0.491)						(11.200)				
Peer monitoring												
Similarity in occupations			0.421						0.972			
			(0.895)						(2.972)			
Policies												
Compulsory savings				-1.833**		-1.843**				-3.280***		-3.317***
				(0.794)		(0.796)				(1.035)		(1.039)
Training					-0.322**	-0.385**					-1.393**	-1.610**
					(0.158)	(0.184)					(0.594)	(0.655)
Constant	1.262**	0.688***	0.018	1.830***	0.261	1.968***	4.027***	3.257***	2.396**	3.815***	2.919***	4.216***
	(0.522)	(0.252)	(0.460)	(0.634)	(0.273)	(0.665)	(0.959)	(0.827)	(1.003)	(0.850)	(0.781)	(0.936)
Observations	4796	4796	4796	4796	4796	4796	2498	2498	2498	2498	2498	2498
F-stats	0.83	1.04	1.07	0.87	1.42	0.99	7.55	7.76	8.25	8.60	9.27	8.17
R-squared	0.040	0.038	0.027	0.051	0.028	0.052	0.105	0.112	0.102	0.127	0.104	0.130

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year and province fixed effects.
* indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Table 11. Pooled OLS estimates of the severity of default in rural communities

Dependent Variable: Number of months the loan has been on default

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Cooperation							
Best cooperation	-1.886	-2.948**	-3.166**	-3.218**	-2.804**	-3.214**	-2.792**
	(1.158)	(1.257)	(1.319)	(1.326)	(1.112)	(1.332)	(1.116)
Sharing w/people	0.009	0.007	0.01	0.009	0.01	0.009	0.009
	(0.018)	(0.018)	(0.016)	(0.017)	(0.016)	(0.016)	(0.016)
Penalties for default							
Best institutions	-2.031***	-2.015*	-0.809	-0.453	-1.162	-0.449	-1.151
	(0.753)	(1.061)	(1.402)	(1.431)	(1.326)	(1.421)	(1.320)
Social sanctions	-1.069**	-0.828**	-1.047***	-0.986***	-1.281***	-0.980***	-1.264***
	(0.453)	(0.327)	(0.384)	(0.377)	(0.440)	(0.379)	(0.440)
Peer monitoring							
Similarity in occupations	0.107	2.869*	3.259**	3.159**	3.298**	3.158**	3.296**
	(0.850)	(1.664)	(1.581)	(1.558)	(1.440)	(1.560)	(1.441)
Degree of joint liability	1.665**	1.101**	1.144**	1.020**	0.909*	1.021*	0.912*
	(0.644)	(0.500)	(0.527)	(0.519)	(0.546)	(0.521)	(0.548)
Contract terms							
Interest rate	-2.384	-0.382	0.023	0.132	0.23	0.127	0.215
	(1.885)	(0.703)	(0.669)	(0.680)	(0.779)	(0.698)	(0.789)
LN Loan size	0.128	-0.02	-0.068	-0.003	0	-0.003	-0.001
	(0.116)	(0.104)	(0.111)	(0.111)	(0.110)	(0.111)	(0.110)
Community-level controls							
Average schooling level			-0.452**	-0.434**	-0.393**	-0.435**	-0.395**
			(0.200)	(0.190)	(0.169)	(0.187)	(0.166)
Average wealth			-0.912**	-0.906**	-1.568***	-0.902**	-1.557***
			(0.375)	(0.377)	(0.459)	(0.372)	(0.456)
Average risk			0.156	-0.124	-1.149	-0.095	-1.068
			(2.891)	(2.727)	(2.499)	(2.935)	(2.702)
PCG membership			1.755***	1.823***	0.429	1.820***	0.42
			(0.658)	(0.665)	(0.435)	(0.671)	(0.442)
Bank membership			0.187	0.176	0.965	0.186	0.993
			(0.810)	(0.795)	(0.761)	(0.821)	(0.782)
Policies							
Compulsory savings					-2.212***		-2.213***
					(0.632)		(0.632)
Training						-0.026	-0.071
						(0.266)	(0.264)
Constant	-0.365	1.277	2.648	2.988	4.666**	2.981	4.507*
	(1.122)	(1.246)	(1.840)	(2.173)	(2.345)	(2.215)	(2.494)
Subdistrict FE		Yes	Yes	Yes	Yes	Yes	Yes
Community-level controls			Yes	Yes	Yes	Yes	Yes
Household-level controls				Yes	Yes	Yes	Yes
Observations	4796	4796	4796	4796	4796	4796	4796
F-stats	0.97	0.93	0.90	1.00	1.15	1.00	1.15
R-squared	0.049	0.128	0.138	0.142	0.164	0.142	0.164

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year and province fixed effects. Community-level controls include the community average land, schooling level, wealth, and variability of income; and membership to PCGs and commercial banks. Household-level controls include information on the head of the household and on the household. The head of the household controls are gender, age, age squared, years of schooling, a dummy variable indicating the relevant school system, and a set of dummy variables indicating the role of the worker in the job; the household controls are wealth, a dummy variable indicating BAAC membership, and the variability of income. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Table 12. Pooled OLS estimates of the severity of default in urban communities

Dependent Variable: Number of months the loan has been on default							
	[1]	[2]	[3]	[4]	[5]	[6]	[7]
Cooperation							
Best cooperation	0.041	3.11	2.858	3.05	3.022	1.988	1.852
	(1.503)	(2.152)	(2.493)	(2.539)	(2.487)	(2.441)	(2.394)
Sharing w/people	-0.037	-0.017	0.013	-0.004	0.001	0.003	0.008
	(0.064)	(0.055)	(0.057)	(0.057)	(0.056)	(0.057)	(0.055)
Penalties for default							
Best institutions	-4.209	-3.609	0.113	-0.085	-4.522	0.116	-4.504
	(2.738)	(3.455)	(4.173)	(4.351)	(5.374)	(4.271)	(5.317)
Social sanctions	-31.129***	-32.518***	-29.990***	-28.924***	-25.580***	-32.477***	-29.334***
	(10.363)	(9.917)	(10.582)	(10.066)	(9.599)	(10.386)	(9.792)
Peer monitoring							
Similarity in occupations	0.297	-1.041	-0.992	-0.981	1.741	-0.291	2.626
	(2.873)	(2.441)	(2.000)	(1.968)	(2.125)	(1.947)	(2.202)
Degree of joint liability	7.321***	11.071***	13.997***	14.216***	12.585***	15.538***	13.963***
	(2.408)	(3.535)	(2.997)	(3.015)	(2.946)	(3.020)	(2.912)
Contract terms							
Interest rate	5.709	1.586	0.801	0.844	-0.387	0.793	-0.499
	(4.674)	(2.544)	(2.147)	(2.207)	(2.081)	(2.277)	(2.162)
LN Loan size	0.07	-0.222	-0.091	-0.044	-0.047	-0.145	-0.158
	(0.449)	(0.530)	(0.500)	(0.524)	(0.518)	(0.524)	(0.518)
Community-level controls							
Average schooling level			0.178	0.254	0.287	0.155	0.18
			(0.224)	(0.208)	(0.198)	(0.205)	(0.195)
Average wealth			-0.328	-0.317	-0.19	-0.23	-0.088
			(0.303)	(0.304)	(0.313)	(0.300)	(0.315)
Average risk			-19.888**	-19.284***	-13.843**	-20.438***	-14.861**
			(7.932)	(7.099)	(6.810)	(7.347)	(6.967)
PCG membership			-3.473**	-3.362**	-2.505	-3.351**	-2.454
			(1.452)	(1.486)	(1.528)	(1.475)	(1.527)
Bank membership			14.091**	14.333**	11.716*	14.372**	11.637*
			(5.698)	(5.588)	(5.932)	(5.632)	(5.986)
Policies							
Compulsory savings					-2.786**		-2.914**
					(1.164)		(1.172)
Training						-3.194***	-3.513***
						(0.861)	(0.911)
Constant	1.017	6.609	-6.219	-13.888	-9.653	-11.702	-7.053
	(4.514)	(4.846)	(7.612)	(8.754)	(9.093)	(8.945)	(9.379)
Subdistrict FE		Yes	Yes	Yes	Yes	Yes	Yes
Community-level controls			Yes	Yes	Yes	Yes	Yes
Household-level controls				Yes	Yes	Yes	Yes
Observations	2498	2498	2498	2473	2473	2473	2473
F-stats	5.89	13.44	19.62	23.20	19.30	22.39	18.16
R-squared	0.136	0.190	0.217	0.224	0.237	0.230	0.244

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year and province fixed effects. Community-level controls include the community average land, schooling level, wealth, and variability of income; and membership to PCGs and commercial banks. Household-level controls include information on the head of the household and on the household. The head of the household controls are gender, age, age squared, years of schooling, a dummy variable indicating the relevant school system, and a set of dummy variables indicating the role of the worker in the job; the household controls are wealth, a dummy variable indicating BAAC membership, and the variability of income. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Appendix

Table 1. Marginal effect on the probability of repayment in rural communities

Dependent Variable: Binary variable equal to one if loan was paid before or by the maturity date									
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Cooperation									
Best cooperation	0.142***	0.043	0.047*	0.073**	0.055**	0.044	0.011	0.004	0.009
	(0.055)	(0.028)	(0.028)	(0.028)	(0.028)	(0.027)	(0.023)	(0.021)	(0.014)
Sharing w/people	0.000	0.000	0	0.000	0.000	0.000	0.000	-0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Penalties for default									
Best institutions	0.092	0.235**	0.152	0.155*	0.180**	0.191**	0.221***	0.243***	0.101**
	(0.080)	(0.115)	(0.102)	(0.088)	(0.091)	(0.087)	(0.085)	(0.089)	(0.043)
Social sanctions	0.057	0.063*	0.054	0.058*	0.067*	0.071**	0.046	0.076***	0.068***
	(0.043)	(0.035)	(0.034)	(0.034)	(0.035)	(0.034)	(0.028)	(0.028)	(0.022)
Peer monitoring									
Similarity in occupations	-0.147**	-0.046	-0.067	-0.073	-0.063	-0.06	-0.035	-0.015	-0.021
	(0.071)	(0.053)	(0.046)	(0.046)	(0.045)	(0.044)	(0.032)	(0.032)	(0.021)
Degree of joint liability	-0.097	-0.07	-0.054	-0.075*	-0.075*	-0.079*	-0.070*	-0.064	-0.015
	(0.062)	(0.047)	(0.044)	(0.045)	(0.043)	(0.048)	(0.040)	(0.043)	(0.032)
Community-level controls									
Average schooling level	0.022**	0.015**	0.015**	0.016**	0.014**	0.015**	0.006	0	-0.001
	(0.009)	(0.008)	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.005)
Average wealth	0.054	0.03	0.028	0.036	0.028	0.035	0.041	0.039	0.097**
	(0.043)	(0.035)	(0.033)	(0.034)	(0.033)	(0.033)	(0.029)	(0.029)	(0.038)
Average risk	0.244**	0.282***	0.244***	0.256***	0.260***	0.274***	0.116*	0.084	0.097**
	(0.117)	(0.091)	(0.085)	(0.085)	(0.085)	(0.086)	(0.064)	(0.063)	(0.046)
PCG membership	-0.049	-0.013	-0.01	-0.024	-0.011	-0.009	0.041*	0.019	0.003
	(0.037)	(0.025)	(0.026)	(0.027)	(0.025)	(0.024)	(0.021)	(0.020)	(0.012)
Bank membership	-0.097*	-0.120*	-0.121**	-0.098*	-0.101*	-0.108**	-0.135**	-0.081	0.014
	(0.054)	(0.065)	(0.059)	(0.057)	(0.056)	(0.055)	(0.055)	(0.053)	(0.033)
Policies									
Compulsory savings	0.063**	0.047**	0.045***	0.045**	0.042**	0.045***	0.060***	0.078***	0.058***
	(0.025)	(0.019)	(0.017)	(0.018)	(0.017)	(0.017)	(0.017)	(0.020)	(0.014)
Training	0.013	0.025**	0.028**	0.023**	0.023**	0.021*	0.027***	0.015	0.003
	(0.015)	(0.012)	0.047*	(0.011)	(0.011)	(0.011)	(0.008)	(0.009)	(0.009)
Constant	0.686***								
	(0.153)								
Observations	4796	4796	4796	4796	4796	4796	4796	4446	4391
Chi-squared/F-stats	1.48	282.98	205.93	198.14	302.15	201.33	242.66	296.68	424.16
Pseudo R-squared/R-squared	0.124	0.258	0.256	0.252	0.254	0.248	0.276	0.307	0.369

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year and province fixed effects. Community-level controls include the community average land, schooling level, wealth, and variability of income; and membership to PCGs and commercial banks. Household-level controls include information on the head of the household and on the household. The head of the household controls are gender, age, age squared, years of schooling, a dummy variable indicating the relevant school system, and a set of dummy variables indicating the role of the worker in the job; the household controls are wealth, a dummy variable indicating BAAC membership, and the variability of income. Regression [1] reports the estimates using the linear probability model. Regression [2] reports the estimates using the logit model. Regression [3] includes a set of variables to control for the level of development of the community. Regression [4] includes a set of variables to control for village fund officers characteristics. Regression [5] includes a set of variables to control for the use of the loan. In regression [6], the percentage of members in the fund that owns no house is used to proxy for the degree of joint liability. In regressions [7] to [9] the definition of default is relaxed: repayment is equal to one if loan was paid within 30, 60, and 90 days of the maturity date, respectively. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Appendix

Table 2. Marginal effect on the probability of repayment in urban communities

Dependent Variable: Binary variable equal to one if loan was paid before or by the maturity date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Cooperation									
Best cooperation	-0.006	0.089	0.01	0.042	0.071	0.012	-0.011	0.025	0.03
	(0.097)	(0.137)	(0.098)	(0.108)	(0.113)	(0.105)	(0.105)	(0.109)	(0.105)
Sharing w/people	-0.003	-0.002	-0.004*	-0.003	-0.003	-0.004	-0.003	-0.002	-0.002
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Penalties for default									
Best institutions	-0.061	-0.249	-0.08	-0.177	-0.236	-0.125	-0.16	-0.244	-0.22
	(0.197)	(0.286)	(0.217)	(0.230)	(0.242)	(0.218)	(0.217)	(0.231)	(0.226)
Social sanctions	0.765	0.634*	0.745**	0.591	0.672*	0.59	0.593*	0.429	0.605*
	(0.473)	(0.385)	(0.334)	(0.377)	(0.380)	(0.382)	(0.341)	(0.309)	(0.351)
Peer monitoring									
Similarity in occupations	-0.038	-0.018	-0.033	-0.049	-0.047	0.001	-0.16	-0.16	-0.151
	(0.109)	(0.133)	(0.119)	(0.125)	(0.122)	(0.118)	(0.117)	(0.118)	(0.115)
Degree of joint liability	-0.365***	-0.241***	-0.313***	-0.263***	-0.232***	-0.348***	-0.270***	-0.232***	-0.244***
	(0.106)	(0.083)	(0.096)	(0.082)	(0.081)	(0.074)	(0.070)	(0.069)	(0.065)
Community-level controls									
Average schooling level	-0.005	-0.001	0.015	-0.003	-0.003	0.005	-0.003	-0.005	-0.004
	(0.010)	(0.008)	(0.009)	(0.007)	(0.008)	(0.007)	(0.007)	(0.006)	(0.006)
Average wealth	0.01	0.002	0.003	0.003	0.003	0.001	0	-0.002	-0.004
	(0.012)	(0.008)	(0.009)	(0.008)	(0.008)	(0.006)	(0.007)	(0.007)	(0.007)
Average risk	0.434*	0.631**	0.641**	0.642**	0.651**	0.749***	0.517**	0.645***	0.606**
	(0.226)	(0.294)	(0.271)	(0.278)	(0.273)	(0.285)	(0.249)	(0.242)	(0.248)
PCG membership	0.063	0.049	-0.033	0.064	0.05	0.072	0.056	0.067	0.078
	(0.066)	(0.058)	(0.051)	(0.052)	(0.056)	(0.047)	(0.051)	(0.049)	(0.048)
Bank membership	-0.515***	-0.331**	-0.382***	-0.358***	-0.335**	-0.445***	-0.372***	-0.364***	-0.347***
	(0.169)	(0.145)	(0.134)	(0.138)	(0.140)	(0.135)	(0.125)	(0.126)	(0.127)
Policies									
Compulsory savings	0.086**	0.064**	0.055**	0.066**	0.070**	0.056**	0.060**	0.065**	0.066**
	(0.036)	(0.030)	(0.025)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.029)
Training	0.094**	0.088***	0.060*	0.077**	0.079***	0.068**	0.080***	0.068**	0.080***
	(0.043)	(0.032)	(0.031)	(0.030)	(0.030)	(0.030)	(0.029)	(0.030)	(0.028)
Constant	1.428***								
	(0.323)								
Observations	2473	2473	2473	2473	2472	2473	2473	2473	2473
Chi-squared/F-stats	16.84	456.53	489.72	488.90	676.35	474.02	635.55	889.91	921.18
Pseudo R-squared/R-squared	0.197	0.223	0.25	0.224	0.228	0.234	0.254	0.28	0.287

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year and province fixed effects. Community-level controls include the community average land, schooling level, wealth, and variability of income; and membership to PCGs and commercial banks. Household-level controls include information on the head of the household and on the household. The head of the household controls are gender, age, age squared, years of schooling, a dummy variable indicating the relevant school system, and a set of dummy variables indicating the role of the worker in the job; the household controls are wealth, a dummy variable indicating BAAC membership, and the variability of income. Regression [1] reports the estimates using the linear probability model. Regression [2] reports the estimates using the logit model. Regression [3] includes a set of variables to control for the level of development of the community. Regression [4] includes a set of variables to control for village fund officers characteristics. Regression [5] includes a set of variables to control for the use of the loan. In regression [6], the percentage of members in the fund that owns no house is used to proxy for the degree of joint liability. In regressions [7] to [9] the definition of default is relaxed: repayment is equal to one if loan was paid within 30, 60, and 90 days of the maturity date, respectively. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Appendix

Table 3

Marginal effect on the probability of repayment in rural and urban communities

Dependent Variable: Binary variable equal to one if loan was paid before or by the maturity date	Rural				Urban			
	[Baseline]	[1]	[2]	[3]	[Baseline]	[1]	[2]	[3]
Compulsory savings	0.043**	0.095***		0.094***	0.070**	0.046+		0.061*
	(0.017)	(0.036)		(0.036)	(0.029)	(0.030)		(0.035)
Training	0.023**		0.015	0.013	0.081***		0.064**	0.078**
	(0.011)		(0.020)	(0.020)	(0.030)		(0.032)	(0.031)
Observations	4796	3677	3677	3677	2473	2201	2201	2201
Pseudo R-squared	0.248	0.291	0.277	0.291	0.223	0.301	0.301	0.304

Pooled OLS estimates of the severity of default in rural and urban communities

Dependent Variable: Number of months the loan has been on default	Rural				Urban			
	[Baseline]	[1]	[2]	[3]	[Baseline]	[1]	[2]	[3]
Compulsory savings	-2.213***	-2.594***		-2.608***	-2.914**	-2.152*		-2.694*
	(0.632)	(0.896)		(0.900)	(1.172)	(1.271)		(1.375)
Training	-0.071		0.133	0.265	-3.513***		-2.439**	-3.247**
	(0.264)		(0.322)	(0.354)	(0.911)		(1.164)	(1.334)
Observations	4796	4796	4796	4796	2473	2473	2473	2473
R-squared	0.164	0.246	0.231	0.246	0.244	0.409	0.408	0.413

Standard errors clustered at the community-year level are reported in parenthesis. All regressions include year, province and community-specific fixed effects except the baseline regressions which include year, province and tambon-specific fixed effects (the baseline regressions correspond to regression [8] in Tables 8, 9, 11 and 12). Community-level controls include the community average land, schooling level, wealth, and variability of income; and membership to PCGs and commercial banks. Household-level controls include information on the head of the household and on the household. The head of the household controls are gender, age, age squared, years of schooling, a dummy variable indicating the relevant school system, and a set of dummy variables indicating the role of the worker in the job; the household controls are wealth, a dummy variable indicating BAAC membership, and the variability of income. + indicates significance at 15%; * significance at 10%; ** significance at 5%; *** significance at 1%.

Policies and Impact: An Analysis of Village-Level Microfinance Institutions
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POLICIES AND IMPACT: AN ANALYSIS OF VILLAGE-LEVEL MICROFINANCE INSTITUTIONS

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Abstract
This paper uses variation in policies and institutional characteristics to evaluate the impacts of village-level microfinance institutions in rural Thailand. To identify impacts, we use policies related to the successful/unsuccessful provision of services as exogenous variation in effective financial intermediation. We find that institutions, particularly those with good policies, can promote asset growth, consumption smoothing and occupational mobility, and can decrease moneylender reliance. Specifically, cash-lending institutions—production credit groups and especially women's groups—are successful in providing intermediation and its benefits to members, while buffalo banks and rice banks are not. The policies identified as important to intermediation and benefits: the provision of savings services, especially pledged savings accounts; emergency services; and training and advice. Surprisingly, much publicized policies such as joint liability, default consequences, or repayment frequency had no measured impacts. (JEL: 012, 016)

1. Introduction

Both macrotheory and macro-evidence point to the importance of financial intermediation on growth, especially in the context of developing economies. Given this evidence, one would expect to find access to financial intermediation playing important roles on the microlevel as well. Indeed, these expected micro-impacts are the justification for efforts by government and nongovernment organizations to improve access to financial intermediation, including the booming expansion of microfinance initiatives.[1] Despite the prevalence of such initiatives, there has

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1. There are an estimated 9000 microfinance initiatives worldwide sponsored by a variety of organizations, including the World Bank, United Nations, USAID, and many charitable NGOs.

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been little empirical examination of their impacts.[2] In contrast to previous work, this study examines a large set of heterogeneous village-level microfinance institutions, links impacts on households to variation in the characteristics and policies of these institutions, and evaluates whether the observed impacts of these types of intermediation are consistent with what theories predict.

The theories that motivate our analysis are two structural general equilibrium models of growth that make strong predictions on the ways in which financial intermediation can affect households with limited access to credit and/or savings services. The first model, due to Lloyd-Ellis and Bernhardt (2000), is a growth model with occupational choice, investment, and credit constraints.[3] Gine and Townsend (2003) get strong predictions from the exogenous introduction of a credit market into this model: intermediated households have higher asset growth rates and higher levels of entrepreneurship/occupational mobility. The second model is Greenwood and Jovanovic's (1990) model of endogenous financial intermediation, project investment, and growth, as generalized by Townsend and Ueda (2003). The model predicts higher (though time varying) asset growth rates and improved risk sharing for intermediated households. The two models jointly predict financial intermediation to have impacts on household's assets, risk sharing, occupations, entrepreneurship, and credit constraints. Furthermore, the two models together lead us to consider a broad definition of financial intermediation, including credit, savings, and informational advantages.

The villages we study are located in rural and semi-urban Thailand, a promising environment to look for the microimpacts of financial intermediation. That is, the Thai growth experience has been both qualitatively and quantitatively consistent with the above models of growth and financial intermediation (see Jeong and Townsend 2003). Despite this growth, there are still important segments of the population in the Thai data with limited access to formal financial intermediation. The fact that our institutions are operated at the village level is also a virtue. Since the institutions uncovered in the survey are promoted by a variety of agencies and ministries, our data shows a great deal of important variation in institutional types and policies. This variation is related to an institution's success in providing financial services (lending, savings, and membership). Essentially, we use this variation as an instrument that allows us to identify impacts (see Section 4).

2. The few serious efforts to evaluate the impacts of microfinance institutions (e.g., Pitt and Khandker 1998; Morduch 1998; Coleman 1999; Ravicz 2000; Aportela 1998) have produced mixed or contradictory results. These existing studies have focused on a single, or at most a handful, of larger organizations, such as the Grameen Bank, BRAC and BRBD in Bangladesh or BRI/BKK in Indonesia.

3. The works of Aghion and Bolton (1997), Banerjee and Newman (1993), Evans and Jovanovic (1989), Feder et al. (1991), Paulson and Townsend (2002), and Pikkety (1997) are important and related contributions.

The results of our analysis, highlighted here, are predominantly consistent with theory.

1) We find evidence in support of theory for positive impacts of village institutions on asset growth, especially among those institutions and policies that were associated with successful provision of intermediation services. That is, institutions that seem to succeed in membership, savings mobilization, and lending are institutions that have higher positive impact on households. In particular, cash loans are associated with the stability or expansion of services, while rice lending institutions and buffalo banks are associated with contraction or failure. PCGs and women's groups, institutions that typically lend cash, had positive impacts on asset growth, while buffalo banks and to a lesser extent rice banks appear to have had, if any, negative impacts. The results are significant only for the maximum likelihood estimation, and not for two-stage least squares regressions, however. Also, three specific policies associated with institutional success (offering training services, savings services, and pledged savings accounts) were each individually associated with faster asset growth rates. Institutions with these policies yielded 5–6% higher annual growth in assets to their villagers.
2) Institutions with certain policies can help to smooth responses to income shocks. These policies include offering emergency services, training services, and various savings-related policies. While both standard (i.e., flexible) and pledged (i.e., restrictive) savings accounts help with smoothing, flexible accounts appear more helpful. Households in villages with these beneficial policies were 10–29 percentage points less likely to reduce consumption/input use in a year with a bad income shock. Nevertheless, the average institution does not appear to alleviate risk and may increase the probability of having had to reduce consumption, buffalo banks and perhaps rice banks in particular. Though the overall lack of a positive impact on alleviating risk is troubling, the fact that institutions associated with diminishing services had perverse (if any) impacts,[4] and the polices correlated with successful intermediation had positive impacts is in line with what theory suggests.
3) We find some evidence in support of the theories of constrained occupational choice, but more so for job mobility per se than entering into business. Women's groups do seem to increase job mobility. Pledged savings accounts (associated with successful intermediation) appear to increase the probability

4. Though we do not wish to emphasize the perverse estimated impacts of rice banks and buffalo banks, the results are not implausible given the high failure and contraction rates of these institutions. Namely, buffalo bank loans seemed to be high risk (given the possibility that the buffalo either dies or does not produce offspring) and low return (given the high failure/contraction rates of the institutions), and so it is plausible that they prevented asset accumulation and consumption smoothing. Likewise, given the high failure rates of rice banks, the average member may have lost rice deposits that could have been saved privately to buffer income shocks.

of switching jobs, and possibly starting a business, while traditional savings accounts (associated with diminishing intermediation) seem to have the opposite impact. Nevertheless, the evidence is not fully in harmony with the theory, since PCGs decrease the probability of switching jobs and also perhaps the probability of starting a business, and emergency services also lower the probability of starting a business.

4) The most robust result is that institutions overall help reduce reliance on moneylenders, our indirect measure of the prevalence of formal credit constraints. The effect on the average villager is to reduce the probability of becoming a moneylender customer by 8 percentage points. Our interpretation is that village institutions loosen households' constraints on formal credit, at least to credit that could be acquired alternatively from moneylenders. Other than women's groups, there is no strong evidence of any particular institution or policy associated with this impact, however.

We emphasize that the results overall show that institutions and policies correlated with the success and stability of services are also significantly associated with positive impacts on households. This is our "smoking gun," as it were: If our data and statistical techniques allow us to gauge impact on client households and businesses, then we would expect institutions that eventually fail to have zero or perverse impacts. That such institutions continue to appear in our data, giving the needed exogenous variation, is a peculiarity of the Thai political environment.

The remainder of the paper is organized as follows. Section 2 gives a theoretical background for the study and places it within the research program on credit constraints, financial intermediation and growth, especially within the context of Thailand. Section 3 describes the data and the types of village institutions. In Section 4 we discuss the estimation equations and robustness checks. Section 5 organizes the results and main findings, while Section 6 summarizes and concludes.

2. Theoretical Background

An explicit theoretical model encompassing all of the outcomes and policy variations that we examine is beyond the scope of the paper. Nevertheless, the analysis is motivated by existing theory on the importance of credit markets and access to financial intermediation on household outcomes. Here we briefly discuss the two structural models that motivate our empirical work. The first is a theory of growth based on occupational transitions, particularly movement out of subsistence agriculture and into agribusiness and nonfarm business, as modeled by Lloyd-Ellis and Bernhardt, or LEB (2000).[5] The second model, Greenwood and Jovanovic,

5. Of course this is not the only possible model of credit-constrained occupation choice. The moral hazard models of Aghion and Bolton (1997) and the collateral constraints model of Banerjee and

or GJ (1990), could also be interpreted as a model of occupational choice, but emphasizes the risk sharing benefits and the endogenous participation decision in financial intermediation.

LEB model household occupational choice among subsistence agriculture, employed labor, and entrepreneurship. Each household has initial beginning-of-period wealth but no access to credit. The household can earn income during the period in agriculture or earn an equivalent income as an unskilled laborer for a firm, and save its beginning-of-period wealth in a backyard storage technology. Alternatively, the household can invest some or all of that wealth in covering fixed costs to start or maintain a business. These costs are inversely related to the level of talent. Residual wealth for those running business can be put into a neoclassical production technology with diminishing return to capital. For all households, end-of-period earnings on wealth and income from the choice of occupation can be either consumed or saved for the next period (at a fixed rate). Given the lack of a credit market, the model implies a positive relationship between initial wealth and business starts (transitions within the period from wage earnings and subsistence agriculture), a positive relationship between wealth and the level of investment in business or agribusiness, a negative relationship between wealth and marginal rates of return in business, and a negative relationship between wealth and those households who say they could make more profits in business or agriculture if they had more wealth (or could borrow).

A limitation of this analysis is the exogeneity of the intervention. The GJ model deals in a structured way with endogenous financial deepening. In this model, households (villages, regions) of varying initial wealth choose whether or not to join the financial system, and this comes at a cost, either paid directly or covered by fees. An advantage of the financial sector is its ability to reallocate the risk of idiosyncratic shocks and to provide information for the reallocation of capital toward optimal investments. In autarky, households (villages, regions) do not have these advantages and decide how much to save and how much to invest in nonfarm business or agribusiness, with a risky return, or in subsistence agriculture with a low but safe return. Financial intermediation leads to risk sharing, higher average returns on investment, and higher (though time varying) growth rates of wealth.

3. Description of Data and Institutions

The analysis here is based on household and institution level data from a survey conducted in May 1997 (before the financial crisis) in four provinces (*changwats*) of Thailand—the semi-urban changwats of Chachoengsao and Lopburi in the

Newman (1993) also deliver growth with increasing inequality. Paulson and Townsend (2002) and Karaivanov (2003) estimate various versions of these models with the Thai data.

Central region relatively near Bangkok, and the more rural Sisaket and Buriram in the poorer Northeast region. The survey design was based in part on the results of prior field research in the Northern region (see Townsend 1995). We utilize three subcomponents of this survey: the institutional module, the household module, and the key informant module. In the rest of this paper, we continue to refer to this collective data set simply as the Townsend Thai data (Townsend et al. 1997).

The institutional survey was given to all known microfinancing institutions that were encountered in the villages at the time of the household survey. In total, records for 161 institutions were obtained across 108 of the villages. Geographically, the institutions surveyed are well distributed across the 192 villages, although villages in the poorer, more rural Northeast region were about twice as likely to have institutions as those in the semi-urban Central region. The survey questions focused on both the individual policies and the experiences of the institutions, including their founding, membership, and saving and lending services.

The institutions are quasi-formal institutions. That is, they keep records and often have bank accounts, but do not in general have their own office, for example. Although administered at the local level, most have some relationship to the Thai government, most often the CDD (Community Development Department). Many institutions receive initial funding from these sources, and the government agencies also offer advice, training, and end-of-the-year accounting assistance.

As the word "microfinance" suggests, the institutions are fairly small. Funds typically started with between 30 and 40 members. (The median size of a survey village is about 500 people, with household size averaging 4.5.) The services offered are also small scale. For example, for lending services, the median "typical loan size" was 3500 baht ($140)[6] in 1997, while the median loan duration was one year. (For comparison, the median annual household income in the survey is 48,500 baht or $1940). Typical annual interest rates were 14–19%. Also, the institutions rarely require collateral on loans, but often use guarantors. For saving services, the median "typical annual deposits" was 500 baht ($20), and the return on these savings averaged 8%.

As stated earlier, village institutions operate at the local level. The vast majority (91%) operate at the village level, while the remainder operate at the next organizational level—the subdistrict (*tambon*), which typical contains 12 villages. Both the membership and administration is thus confined to the local level.[7] In different villages, and within the same village, institutions take different forms that are distinguished by their memberships, the services they offer, their purposes,

6. The precrisis (i.e., before July, 1997) fixed exchange rate was 25 baht/dollar.

7. Still, as noted, most of the institutions have some relationship with the Thai government, most often the CDD, or other institutions, such as Catholic Relief Services. Indeed, without being prompted, 84% of the institutions mentioned government involvement in their founding and 60% mentioned the CDD specifically. Many institutions receive funding from these sources, and, as noted, the government agencies also offer advice, training, and end-of-the-year accounting assistance.

and their level of funding. These include production credit groups (PCGs), rice banks, women's groups, and buffalo banks.

PCGs are the most common type of institution. Members of PCGs are relatively less likely to be the poorest in the village and are more likely to be mostly women. They typically lend cash. They are often promoted by the CDD, which calls them "village savings funds" because they aim to promote "good savings habits" within the village. Although more PCGs offered lending services than saving services, compared to other institutions, they were relatively more likely to offer saving services and less likely to offer loans. Given this dual nature and the fact that they lend cash, PCGs operate much like village savings and loan cooperatives, but are not linked into any larger intermediation network.

The second most common village institution is a rice bank, which usually makes small, short-term, emergency consumption loans intended primarily for consumption smoothing over time. These loans are rice and are made at higher interest rates than other institutions make. They are often promoted by the Ministry of Agriculture and are used as vehicles for introducing high yield varieties of seed. Members are generally required to deposit or donate a given amount of rice at the founding of the institution to build an initial (hopefully, self-sustaining) fund. Thus, compared to other institutions, rice banks are significantly more likely to lend, and less likely to accept ongoing savings. Their membership is relatively more likely to consist of primarily poor people and to be male. Rice banks are concentrated in the poorer, more rural provinces of Sisaket and Buriram.

As a category, women's groups are distinguished more by their female membership than by their financial activities or policies (see Kaboski and Townsend 2000). While women participate in PCGs and other groups (not only as members but also in leadership positions), the women's groups are groups that specifically target women for membership. Many of the groups are also linked with training and funding for occupational promotional activities that might allow women new ways of bringing income into their households. For example, in the Northeast women's groups have been founded in order to introduce silk production to the women in the village.

Buffalo banks are institutions that are formed to lend out buffalo or cattle. The loan is repaid when the initial buffalo gives birth and the young buffalo is returned to the fund. Once lent out, if the buffalo dies or does not give birth, no further loans can be made. One common problem is that the initial "fund" of buffalo may be beyond reproductive age. Thus, many buffalo banks made loans initially but were not (or no longer) lending at the time of the survey. Buffalo banks do not generally accept savings since their loans and repayments are in the form of livestock.

The form or type of the institution is not the lone dimension of variation among establishments in the institutional survey. The institutional survey also contains independent data on the services, policies and characteristics of the institutions, which vary across the sample. Finally, the survey contains the historical experiences of the institution including membership, lending, and saving data drawn from the institutions' own record books. These experiences vary greatly across institutions. Some experience dramatic growth rates of membership and services, others maintain their levels, while still others experience sharp declines or even cease operation.

An analysis of the relationship between successful and unsuccessful experiences and the observable characteristics of the institutions (i.e., the type of institution, their membership, and the policies they choose) is given in an earlier working paper, Kaboski and Townsend (2000). The paper shows that a significant fraction of institutions failed in the first year or the first five years,[8] while others showed dramatic growth (over 10% annually) in membership, lending services, and saving services. Kaboski and Townsend use an indicator variable to distinguish institutions that showed declines from those that were either stable or showed growth along these dimensions and highlight policies and institutional types that were significantly correlated with growth experiences. Common policies associated with group lending such as individual/group liability, default consequences, payment frequency or monitoring frequency did not prove to be significant. However, many other individual policies and institutional characteristics were significantly correlated with growth or failure.

A summary of these significant relationships is reproduced in Table 1. Among these relationships, we note:

1) Buffalo banks tended to have negative growth in lending services.
2) Institutions that made rice loans were more likely to have negative growth in lending.[9] In contrast, cash loans were positively correlated with lending growth.
3) The provision of agricultural training was positively correlated with lending growth and the provision of non-agricultural advice/consultation was positively correlated with growth in savings.
4) In general, more stringent policies such as requiring minimum initial deposits and having pledged savings accounts were positively related to growth of membership and saving, while more flexible policies such as savings being optional for membership and having standard (save and withdraw as desired) accounts were negatively related to growth. One exception is that institutions with time deposit savings accounts—an inflexible account—were more likely to have negative savings growth.

8. Of those institutions founded in 1992 or before, about 25% stopped lending by five years after their founding, while about 10% had ceased saving and either failed completely or lost all membership. These members are likely lower bounds, as the survey certainly did not capture all defunct institutions.

9. Rice banks themselves were not significantly related to lending growth, however.

TABLE 1. Summary of significant correlations between relevant institution types policies and growth failure.

Correlations with membership growth		Correlations with savings growth		Correlations with lending growth	
Positive	Negative	Positive	Negative	Positive	Negative
Offer lending services	Saving is optional	Require minimum initial deposit	Standard savings accounts	Provide agricultural training	Institution is a buffalo bank
Require minimum initial deposit		Have membership application forms	Time deposit savings	Make cash loans	Make rice loans
		Pledged savings accounts	Only villagers can be members	Amount of savings used as evaluation criteria	
		Provide nonagricultural consultation or advice			
		Provide emergency assistance			

Note: Other policies that were tested include among others: collateral required, guarantors required, payment frequency of six months or less, monitoring frequency of six months or less, borrowers who default can't reborrow, and all borrowers are monitored. These did not have significant relationships with growth.

These policies[10] will be examined in Section 5 to see if institutions with successful (unsuccessful) policies had larger (negative) impacts on household/ business outcomes. We do this using the institutional data by finding villages in which there is only one institution or in which every institution in the village has the same particular policy. We thus create village-level policy indicators that are linked to the household data in these villages.

The household survey was administered to 2,880 Thai households—15 households in each of 192 survey villages. The villages were divided evenly across the four provinces and selected in a stratified, clustered, random sample (see Binford, Lee, and Townsend 2004). Households provided an extensive array of demographic and socioeconomic information, including current data on income, borrowing, saving and lending, as well as retrospective histories of occupation, assets (divided among household, agricultural and business assets),[11] and organizational involvement/membership. Summary statistics for the household-level variables used in this study are presented in Table 2.

The study has several sources of village-level data. Several village-level variables (average wealth, average wealth squared, fraction of households in rice farming, and average years of education) were constructed by creating averages from the Townsend household data. These village levels vary slightly across individual households since each household's average excludes the household itself. In addition, the key informant survey, a survey of a key informant (generally, the headman) of each survey village, contains general data on the village and was used in this study to gain retrospective knowledge of the presence and absence of various types of institutions in the village during different years. Summary statistics for the village-level variables from the Townsend Thai data are given in Table 3.

Thailand's CDD data set provides a biannual census collected by Rural Development Committee (RDC) at the village level. The data are collected in two steps.

10. Three other policies that were significantly correlated with negative lending growth. Two of these policies (long loan periods, poverty eradication programs) involved institutions that were part of a government poverty program instituted in 1996. Since these poverty initiatives had much longer loan periods, most loans had not been paid at the time of survey, so lending had appeared to decrease for these institutions. Given this, and the fact that the poverty programs did not exist over most of the period of impact assessment, these relationships are not addressed in this study. Finally, the amount of collateral required was positively correlated with growth. Unfortunately, since most institutions did not require collateral, we had very little variation in this variable and could not use it in our assessment of impacts.

11. The past value of real assets is found by depreciating the purchase price of the asset (in 1997 baht) from the time of purchase to what it would have been worth six years ago. We assume that the depreciation rate for all household and agricultural assets is 10% per year. One exception is land, the value of which we do not depreciate over time.

The retrospective wealth levels are incomplete in (at least) two respects. The first issue is that we only have information on household and agricultural assets that the household still owns. The second concern is that we do not have any information on past financial assets and liabilities. Fortunately, financial assets and liabilities tend to make up a small fraction of current household wealth, and so were probably also a small fraction of past wealth.

TABLE 2. Summary statistics of relevant Townsend Thai household-level data.

	No. of obs.	Mean or fraction	Stand. Dev.
Impact variables			
Asset growth, 1991–1997	2422	0.607	1.192
Reduced consumption in worst income year, 1992–1997*	2331	0.689	0.463
Became a moneylender customer, 1991–1997*	2725	0.148	0.355
Started a business, 1991–1997*	2874	0.128	0.334
Switched primary occupation, 1991–1997*	2480	0.188	0.391
Demographic variables			
Age of head	2841	51.4	13.6
Age of head squared	2841	2829.5	1466.0
Years of education—Head of household	2822	4.1	2.6
Male head of household	2841	0.77	0.42
Number of adult females in household	2870	1.59	0.85
Number of adult males in household	2870	1.44	0.90
Number of children (<18 years) in household	2870	1.54	1.25
Wealth variables			
Wealth†	2875	1.08	4.04
Wealth squared†	2875	17.51	215.2
Non business wealth†	2875	1.08	4.04
Non business wealth squared†	2875	17.45	215.0
Occupational dummy variables			
Business owner*	2875	0.078	0.269
Inactive no occupation*	2686	0.045	0.207
Rice farmer*	2686	0.481	0.500
Farmer, other crop*	2686	0.191	0.393
Shrimp farmer*	2686	0.034	0.180
Construction*	2686	0.034	0.181
Business/Skilled trade*	2686	0.068	0.251
Professional administrative*	2686	0.036	0.187
General worker, cleaner, janitor*	2686	0.084	0.278
Other*	2686	0.028	0.165
Member/Customer in organization/institution			
Formal financial institution‡	2875	0.176	0.381
Village institution/organization*	2875	0.123	0.328
Agricultural organization (BAAC or Agricultural cooperative)*	2875	0.270	0.444
Moneylender*	2875	0.040	0.196

Notes: * Binary variable.
† Wealth is made up of the value of household assets, business assets, agricultural assets, and land. Nonbusiness wealth excludes business assets. Wealth levels were divided by 1,000,000 to rescale estimates into convenient numbers. The sample excludes the top 1% of households by wealth.
‡ Formal financial institutions include commercial banks, the government savings bank, insurance companies, and finance companies.
All variables are for the year 1990 except for the impact variables (as noted) and the demographic variables, which are 1997.

TABLE 3. Summary statistics of relevant Townsend Thai village-level data.

	No of obs.	Mean or fraction	Stand dev.
Townsend village controls			
Average wealth†	2875	1.08	1.57
Average wealth squared†	2875	3.63	12.04
Fraction of households with rice farming as primary occupation	2686	0.481	0.201
Average years of schooling–head of household	2822	4.11	0.87
Townsend Thai data institutional presence			
Village has institution*	192	0.607	0.488
Village has rice bank*	192	0.151	0.358
Village has buffalo bank*	192	0.105	0.306
Village has PCG*	192	0.083	0.276
Village has women's group	192	0.231	0.421
Institutional data—All village institutions in village have specified policy			
Offer lending services*	49	0.837	0.373
Amount of savings used to evaluate loans*	51	0.314	0.469
Offer emergency services*	46	0.087	0.285
Offer training, advice, or consultation*	47	0.234	0.428
Offer savings services*	51	0.431	0.500
Offer pledged savings accounts*	48	0.229	0.425
Offer traditional (Deposit and withdraw as desired) savings accounts*	50	0.040	0.198
Saving is optional to members*	50	0.261	0.442
Saving requires minimum initial deposit*	49	0.306	0.466
Loans require collateral*	39	0.128	0.339
Loans require guarantors*	40	0.650	0.483
High loan repayment frequency (More than one payment per year)*	37	0.135	0.347
Frequent monitoring of loans (More than once per loan period)*	27	0.370	0.492
All borrowers are monitored*	26	0.577	0.503

Notes: * Binary variable.
† Wealth is made up of the value of household assets, business assets, agricultural assets, and land. Levels were divided by 1,000,000 to rescale estimates into convenient numbers. The sample excludes the top 1% of households by wealth. All variables are for the year 1990 except for average years of schooling–head of household. Given the average age of these heads of household (51.4), this 1997 schooling variable is likely quite close to its 1990 counterpart.

In the first step, members of the RDC fill in the questionnaire by themselves using the existing data from the Tambon office. After that, for each village, a meeting with the village headman and village committee is held and the missing information is collected.

The data include over 650 variables from which 19 were used as village controls in our robustness studies (see Table 4). The choice of these 19 variables was designed to capture the level of development, remoteness of the village along several dimensions, the occupational composition of the village, the financial institutions present in the village, and the role of government initiatives in the village. The variables are: (1) a dummy variable for municipal location; (2) typical travel

TABLE 4. Summary statistics of relevant CDD village-level data.

	No. of obs.	Mean or fraction	Stand. dev.
CDD village controls[‡]			
Municipal location*	174	0.017	0.131
Typical travel time to district office (in minutes)	172	38.67	22.82
Typical travel time to market (in minutes)	171	40.56	27.42
Number of households	176	121.7	146.7
Economic status of village relative to other villages in subdistrict (1,2,3)**	178	2.06	0.52
Development level of village relative to other villages in the district (1,2,3)**	177	2.08	0.518
Fraction of households with piped water supply*	176	0.049	0.179
Fraction of households with State-supplied electricity*	178	0.076	0.300
Fraction of households with members working in agriculture only	178	0.333	0.360
Fraction of households with members working in multiple occupations	178	0.504	0.367
Fraction of households engaged in cottage industries	178	0.001	0.012
Fraction of rice-farming households using government-promoted varieties	178	0.497	0.398
Households migrate of the village for labor*	175	0.943	0.233
Fraction of households with members working outside the subdistrict	173	0.290	0.237
Fraction of households that are members of an agricultural bank/cooperative	178	0.807	0.394
Use of a commercial Bank	178	0.236	0.423
Use of the agricultural Bank (BAAC)	178	0.865	0.343
Level of government aid relative to other villages in district (1,2,3)**	177	2.10	0.49
Village has assembly hall*	178	0.390	0.488
CDD data institutional presence			
Village has rice bank*	177	0.232	0.422
Village has buffalo bank*	178	0.146	0.353
Village has PCG*	178	0.112	0.316
GIS-predicted institutional presence			
Probability of village having rice bank	192	0.210	0.354
Probability of village having buffalo bank	192	0.134	0.299
Probability of village having PCG	192	0.125	0.281

Notes: * Binary variable.
** Qualitative variable with 1 = above average, 2 = average, and 3 = below average.
[‡] From over 650 variables, these 19 village control variables were examined (see Section 4).
All variables are for the year 1990.

time to district office; (3) typical travel time to market; (4) number of households; (5) economic status of village relative to other villages in the subdistrict; (6) the development level of the village relative to other villages in the district; (7) fraction of households with piped water supply; (8) fraction of households with electricity; (9) fraction of households exclusively in agriculture; (10) fraction of households engaged in multiple occupations; (11) fraction of households engaged in cottage industries; (12) fraction of rice farming households using promoted varieties; (13) a dummy variable for outmigration of labor from village; (14) fraction of households with members working outside the subdistict; (15) the fraction of households that are members of an agricultural cooperative; (16) use of commercial bank; (17) use of the BAAC (agricultural bank); (18) level of government aid relative to other village in subdistrict; and (19) a dummy variable for whether the village has an assembly hall. Of these, five are used in the results explicitly displayed in the tables.

Variables on institutional presence of village savings funds, livestock banks, and paddy banks are also used. These names correspond to PCGs (identical), buffalo banks (nearly identical), and rice banks (identical) in the Townsend data. Unfortunately, no corresponding variable for women's groups exists in the CDD data.

The census includes data for all villages in Thailand and not just the 192 villages included in the cross-sectional survey described above. We use the data on all villages in each of the four changwats in our analysis here coupled with positioning data from a GIS system in order to create spatially predicted probabilities of institutional presence in the Townsend survey villages. The methods used to construct these variables are explained in detail in Section 4.

4. Method

The focus of this study is whether microfinance produce the impacts of financial intermediation predicted by theory. Unfortunately, we have no complete measure of financial intermediation provided by the village institutions we study, certainly not at the household level. Even if we had such a measure, it would likely suffer from endogeneity problems. Our approach instead is to estimate impact using variables associated with financial intermediation, whose variation is either exogenous, or endogenous in ways that can be controlled.

The variables we use are the presence of (or membership in) the institution, the different types of institutions, and the different policies. We examine two sets of policies—the first set is the group of policies associated with successful financial intermediation in the data (recall Section 3), while the second set involve policies such as group liability, dynamic incentives, or better monitoring technologies, policies predicted to be important by theory (e.g., Ahlin and Townsend 2000; Alexander 2000; Banerjee, Besley, and Guinnane 1994; Besley and Coate 1995; Conning 1999; Ghatak 1999; Jain and Mansuri 2003; and Stiglitz 1990). For policies, we lack independent membership data, and so we can only look at the effect of institutions with these policies on outcomes of the average villager, not just members. For institutions overall, and each of the different types of institutions (rice banks, buffalo banks, PCGs, and women's groups), we do have membership data and so can look at the impacts of institutions on members.

The focus on membership introduces the issue of household-level selection bias. Households that are members of village institutions (in villages with institutions) may differ systematically from nonmember households in the same villages. If these differences are the result of biased selection into the institutions (whether on the part of the household demand or the institution supply) they should not be attributed to the impact of the institution. Our use of the presence of the institution in the village (a village-level) variable as an instrument for membership addresses this problem in a simple intuitive way. Namely, we add to the outcome equation, a membership equation that includes the presence of an institution as an explanatory variable. We then use the presence of the institution (in 1990) to identify the impact of membership (in 1990). The years examined are not crucial to either the results or methods used. For alternative choices of timing see the robustness subsection later.

We introduce membership to the analysis, where possible, because theory suggests that most aspects of financial intermediation are linked to the direct use of services. If the institutions also have external positive (negative) impacts on nonmembers in the village, which is plausible,[12] our instruments would overestimate or underestimate the impact of membership. However, introducing the presence of the institution directly into the outcome equation would still yield good measures of they average impacts (including members and nonmembers) of the various institutions.[13]

12. LEB suggests, for example, general equilibrium wage effects from intermediation, and GJ suggest that savings rates of non-members may increase in anticipation of joining financial intermediation in the future. In addition, given the presence of informal loans among neighbors and family, intermediation may be passed on to nonmembers.

13. Using the notation below, we assume that institutional presence I effects membership D_M, which in turn effect financial intermediation F:

$$\begin{aligned} y &= \beta F + \varepsilon_y \\ F &= \alpha D_M + \varepsilon_F \\ D_M &= \delta I + \varepsilon_F. \end{aligned}$$

For simplicity we assume a linear relationship between membership and financial intermediation. The assumption here is that α is positive (for successful institutions), but unknown. That is, membership in a successful institution yields a positive, but unknown amount of financial intermediation. Given this model, instrumental variables (I instrumenting for D_M) gives a consistent estimate of $\beta\alpha$, the effect of membership on outcomes.

Instead we might propose that the presence of the institution I itself influences the financial intermediation along with membership D_M:

$$\begin{aligned} y &= \beta F + \varepsilon_y \\ F &= \alpha_1 D_M + \alpha_2 I + \varepsilon_F \\ D_M &= \delta I + \varepsilon_F. \end{aligned}$$

In sum, we are not able to independently quantify impacts of membership from external impacts (without assuming away external impacts). We are also not able separately identify the two stages of the channel: the impact of policies on financial intermediation versus the impact of financial intermediation on outcomes. Consequently, we limit our quantitative interpretation to the average effects of institutional presence or policies on villagers. Nevertheless, several caveats should be noted. First, interpreting the magnitudes of coefficients in the linear probability models is problematic. Second, the policies and institutions we analyze are correlated with one another, so we do not have enough data to truly quantify the independent effects of these policies. Third, the confidence intervals of the results are typically wide.

The second form of selection bias involves the possible endogeneity of the presence of the institution in the village. That is, programs may exist in a biased sample of villages, and therefore a biased sample of households, because of either biased program placement or possibly biased program survival. We address this village-level selection using a wide range of village-level controls from the Townsend Thai and CDD data sets and using GIS spatial techniques that isolate "surprise" (i.e., exogenous) innovations in program placement. The robustness of our results give us confidence that our village controls adequately account for village-level selection.

An additional way that we account for unobserved heterogeneity is by focusing on changes over time, after 1990 to the date of interview, all of which can be interpreted as allowing for household fixed effects. Our five outcome variables for measuring impact are: (1) growth in assets (1991–1997);[14] (2) the probability of reducing consumption or input in a year with a bad income shock (1992–1997);[15] (3) probability of starting a business (1991–1997);[16] (4) the probability

A simple regression of y on I would yield a consistent estimate of $\delta\beta\alpha_1 + \beta\alpha_2$. This is simply the effect of the institution on villagers. The first term is the effect of membership ($\beta\alpha_1$) times the probability of being a member given an institution δ, and the second term is the external effect of the institution on all villagers.

14. The growth in assets variable is calculated using households current (1997) surveyed levels of business, agricultural and household assets and by constructing retrospective past (1991 and 1990) asset stocks.

15. That is, we do not look simply at the cross-sectional variability of consumption relative to income but examine this impact over time. Household respondents were asked which year (if any) of the past five (i.e., 1992–1997) had been the worst in terms of household income. Those who gave a specific year were then asked a series of possible responses to this shock, including (among others) whether or not they had reduced consumption or the use of inputs.

16. We have retrospective knowledge of the date businesses were started only for businesses that still existed at the time of the survey. Thus, our data may omit businesses that were started but failed before the time of survey.

of switching primary occupation (1991–1997);[17] and (5) the probability of becoming a moneylender customer (1991–1997).[18]

Each of these can be thought of as allowing for underlying unobserved heterogeneity on a primary "level" variable (i.e., level of assets, level of consumption/input use, probability of being a business owner, probability of being a rice-farmer, and probability of borrowing from a moneylender), whose value depends on past access to financial intermediation F. For assets, business ownership, occupation, and moneylender reliance, the equations in the primary variables of household n would take the form:

$$\tilde{y}_{n,t} = \sum_{j=1}^{\infty} \beta F_{n,t-j} + \theta_n + \tilde{\varepsilon}_{y,n,t}. \tag{1}$$

Here, $\tilde{y}_{n,t}$ represents the "level" variable of household n at time t, β, the effect of intermediation,[19] θ_n a household-specific fixed effect, and $\tilde{\varepsilon}_{y,n,t}$, the error term. Time differencing eliminates θ_n and yields:

$$y_n = \beta F_{n,t-1} + \varepsilon_{y,n} \tag{2}$$

where we have defined new notation $y_n \equiv \tilde{y}_{n,t} - \tilde{y}_{n,t-1}$ and $\varepsilon_{y,n} \equiv \tilde{\varepsilon}_{y,n,t} - \tilde{\varepsilon}_{y,n,t-1}$. In our study, t is considered 1997, while $t-1$ is 1991.

The equation for consumption/input use assumes no change in access to financial intermediation between the years of interest[20] ($F_{n,t-1} = F_{n,t-2} \equiv F_n$) and postulates an interaction effect between current income ($Y_{n,t}$) and membership:

$$\tilde{y}_{n,t} = \alpha \tilde{Y}_{n,t} + \beta \tilde{Y}_{n,t} F_{n,t-1} + \theta_n + \tilde{\varepsilon}_{y,n,t}.$$

Again, time differencing yields:

$$y_n = \alpha Y_n + \beta F_n Y_n + \varepsilon_{y,n} \tag{3}$$

17. We have full retrospective histories of primary and secondary occupations for each member of the household over age 10. Here we use the primary occupation of the head-of-household. The majority of job changes indicate upward mobility. The most common job change was out of rice farming and into a different type of farming (e.g., livestock, corn, orchards). Aggregated tables of these job changes are given in Appendix A. Table A.1 contains all of the job changes, while Table A.2 contains only those of member households of institutions.

18. Again, this is constructed using retrospective data from the household survey. Households that were already money lender customers in 1991 were excluded from the sample.

19. Although the theories in GJ and LEB impacts would vary across households depending on observables, we simply do not have enough data to estimate interaction effects. We simplify the empirics by assuming that β is common to all households, and that selection biases result from other sources. In this case, the "treatment" effect of the institutions is common to all agents and the standard parameters of interest (average treatment effect, treatment on the treated, local average treatment effect, marginal treatment effect) are all equal (Heckman, Lalonde, and Smith 1999).

20. In GJ, which motivates the risk-sharing outcome measure, the decision to enter the intermediated sector is once-and-for-all.

using the additional notation, $Y_n \equiv \tilde{Y}_{n,t} - \tilde{Y}_{n,t-1}$. As explained later for consumption/input use, t is a year (between 1992 and 1997) with low income, while $t-1$ is the previous year. Thus, with $\beta < 0$, past financial intermediation lowers the coefficient on (idiosyncratic) income variation.

Below, we add household and village control variables, X_n and Z_n, respectively, and interpret each of our outcome regressions in light of the preceding equations:

1) The asset growth interpretation is a straightforward analysis of the differenced variable.
2) The starting a business and becoming a moneylender customer variables are analyses of the differenced variables, conditional on the initial value. That is, we include only households for which $\tilde{y}_{n,t-1} = 0$.
3) For occupations, instead of using the probability of switching out of a low-income occupation like rice farming (i.e., the change in the probability of working in rice farming conditional on working in rice farming at $t-1$), we measure the probability of switching occupations overall, and show that these changes are overwhelmingly toward higher-income jobs.
4) Unfortunately, we do not have panel income and consumption data in differences to measure the response of consumption/input use to current cash flow (conditional on other controls for lifetime wealth and the consumption needs, such as household demographics and education).
   Instead, we measure this using data on whether a household reduced consumption/input use in a year of relatively low income. That is, for one year, we have an indicator variable $\chi_{y_n} < 0 | Y_n < 0$.[21]

Differencing eliminates household heterogeneity θ_n, but we do not argue that differencing is our fundamental way of accounting for selection, nor that it precludes the use of an instrument/exclusion restriction. If we used the primary variable $\tilde{y}_{n,t}$ directly, our regressions would still appropriately account for individual-level selection as long as our instruments I_n were independent of the idiosyncratic component of $\tilde{y}_{n,t}$ after controlling for observable heterogeneity using controls X_n and Z_n, i.e., $I_n \perp (\theta_n + \tilde{\varepsilon}_{y,n,t} | X_n, Z_n)$. We instead use the differenced variables y_n because it seems more plausible that the instrument is independent of changes in the idiosyncratic component of the underlying variables, i.e., $(I_n \perp \varepsilon_{n,t} | X_n, Z_n)$. We return to the discussion of instruments and controls momentarily.

21. Imperfect consumption smoothing implies $\alpha > 0$. Financial intermediation assisting in consumption smoothing would imply that intermediation would reduce the response, $\beta < 0$, and $\beta F_n \in (-\alpha, 0)$. Assuming orthogonality of the error term $\varepsilon_{y,n}$ to income shocks, the probability that a household reduces consumption in a bad income year $P(y_n < 0 | Y_n < 0) = P[\varepsilon_{y,n} < -(\alpha + \beta F_n) Y_n < 0]$ would be decreasing in financial intermediation F_n, if an only if $\beta < 0$.

Impact estimation involved several different regressions, each of which is explicitly discussed below. We begin with the overall impact regression, next discuss regressions that incorporate GIS variables, then explain the impact estimation using specific policies, and close by a discussion of our robustness checks.

4.1. Impact by Type of Institution

We start with a simple model where the presence of an institution (of a given type) in a village influences whether a household is a member of such as institution, and membership m_n is a proxy for the access to financial intermediation F_n that influences outcomes. We uses two different sets of regression equations to try and model this. The first is a two-stage least squares approach that assumes linear membership and outcome equations. The second is a simultaneous equation, maximum likelihood approach that accounts for the binary nature of the membership variable and each of the outcome variables except asset growth. It also uses the possible correlation of error terms between the membership and outcome equations in the estimation.

4.1.1. Two-stage least squares. Again, let y_n be the outcome variable and M_n the membership variable for household n:

$$y_n = \sum_{i=1}^{I} \alpha_i X_{i,n} + \sum_{j=1}^{J} \tau_j Z_{j,n} + \beta M_n + u_{y,n} \tag{4}$$

$$M_n = \sum_{i=1}^{I} \gamma_i X_{i,n} + \sum_{j=1}^{J} \phi_j Z_{j,n} + \delta I_n + u_{m,n}. \tag{5}$$

Again, membership M_n affects outcomes y_n additively and the presence of the institution in the village I_n affects membership additively. The $X_{i,n}$ are sets of household-specific variables and $Z_{j,n}$ are sets of village specific-variables for household n.

We assume that $u_{y,n}$ and $u_{m,n}$ are independent of $X_{i,n}$ for all i. We are interested in the parameter β in equation (4) as our measure of membership impact.[22]

Since membership M_n may be potentially endogenous (i.e., correlated with $u_{y,n}$), we use the presence of an institution as an instrument for membership via the membership equation. Although, institutions may also be present in a based set of villages, we assume that our observable village characteristics $Z_{j,n}$ control for this village selection bias. That is, given the village-level observables, we assume I_n is uncorrelated with $u_{y,n}$ and is therefore a valid instrument for two-stage least squares estimation.

22. Here β denotes the impact of the *proxy* for financial intermediation, not the impact of financial intermediation F itself as in (2) and (3).

4.1.2. Simultaneous equation MLE. One problem with two-stage least squares is that it assumes linearity of relationships that are clearly nonlinear. For example, the membership variable M_n is binary, but first stage estimation will give us not only intermediate values, but also values less than zero and greater than one. Similarly, for all but asset growth, the outcome variables are binary as well. Given this, we use a second model specification that allows us to account for these nonlinearities, though it requires us to assume a (normal) distribution for the errors terms.

Let the binary variables $D_{y,n}$ and $D_{M,n}$ be determined by continuous latent indexes y_n^* and M_n^*, respectively:

$$\begin{aligned} y_n &= 1, \text{for } y_n^* > 0 \\ y_n &= 0, \text{for } y_n^* \leq 0 \end{aligned} \tag{6}$$

and

$$\begin{aligned} M_n &= 1, \text{for } M_n^* > 0 \\ M_n &= 0, \text{for } M_n^* \leq 0. \end{aligned} \tag{7}$$

Now, we assume linear empirical relationships for these two latent unobserved indexes, and avoid imposing linear relationships for the binary outcome variable and membership variable themselves:

$$y_n^* = \sum_{i=1}^{I} \alpha_i X_{i,n} + \sum_{j=1}^{J} \tau_j Z_{j,n} + \beta M_n + u_{y,n} \tag{8}$$

$$M_n^* = \sum_{i=1}^{I} \gamma_i X_{i,n} + \sum_{j=1}^{J} \phi_j Z_{j,n} + \delta I_n + u_{m,n}. \tag{9}$$

We again assume that both $u_{y,n}$ and $u_{m,n}$ are independent of the $X_{i,n}$ and $Z_{j,n}$. However, we explicitly model the dependence of membership M_n and $u_{y,n}$ through the correlation between $u_{m,n}$ and $u_{y,n}$. That is, we assume a joint normal distribution of $u_{m,n}$ and $u_{y,n}$ with a correlation of ρ:

$$(u_{m,n}, u_{y,n}) \sim \text{Bivariate Standard Normal}(0, 0; \rho). \tag{10}$$

The normalization of variances to unity is possible since y_n^* and M_n^* are unobserved indexes, with zero being the only critical value.

Equations (6)–(10) can be estimated as a system of simultaneous equations with the village presence variable I_n playing the role of an exclusion restriction, instead of an instrument as in the 2SLS. Given the assumption of normality, we write down the joint likelihood equations and estimate the parameters by maximizing the likelihood. The actual likelihood equations are given in Appendix B.[23]

Again, the advantage of the simultaneous MLE approach is that we account explicitly for the bounded, non-linear conditional expectation of the binary outcome and membership variables. The weakness of the approach is its reliance on the assumed joint normality that cannot be justified a priori. The strength of the 2SLS approach is that we avoid making distributional assumptions. Its weakness is that we propose a linear fit to a conditional expectation function that is clearly nonlinear. Both approaches are used, since neither approach clearly dominates and we want to make sure our assessment of impact is not peculiar to a particular technique.

4.1.3. Direct impact of institution. A third approach is to introduce the presence of the institution I_n directly into the outcome equation. That is, instead of measuring the effect of intermediation on members only, we estimate its average effect on all sampled households in the village, or more succinctly on an average villager as discussed earlier. This approach would in theory capture any external effect that the institution might have on nonmembers. The equation used is:

$$y_n = \sum_{i=1}^{I} \alpha_i X_{i,n} + \sum_{j=1}^{J} \tau_j Z_{j,n} + \beta I_n + u_{y,n}. \tag{11}$$

Again, β here represents the direct impact of institutional presence on the outcomes of households in the village, not the impact of membership. These regressions produced results that are generally smaller, less significant or insignificant, but not strikingly different than the membership impacts using the above methods. We therefore omit the detailed results but note the exceptions where these estimates were highly significant.

4.1.4. Actual estimation. The household-level independent variables ($X_{i,n}$) used in the regressions are: age of head, age of head squared, years of education of head, male head (dummy), number of adult males in household, number of adult females, number of children (under 18 years), total wealth, wealth squared, customer of formal financial institution (dummy), and member of agricultural organization (dummy). In addition to these controls, dummy variables for occupation

23. The simultaneous equation, maximum likelihood approach to the estimation of the asset growth equation differs slightly from the above equations, since the outcome variable itself is continuous. We instead replace the latent index variable y_n^* in the equation above with the actual observed outcome (asset growth). The standard deviation of $u_{y,n}$ must then be estimated instead of normalized, since asset growth is directly observed. The resulting likelihood equations for asset growth are also presented in Appendix B.

of the household head are used for the "asset growth," "becoming money lender customer," and "reduce consumption in a bad year" regressions. The village-level controls from the Townsend Thai data include average household wealth in the village, average wealth squared, fraction of village households in rice farming, and average years of schooling of household heads. Those from the CDD data are the fraction of households with members working in agriculture, the fraction of households in multiple occupation, presence of a village assembly hall (dummy), village economic status relative to other villages in the subdistrict, and the level of government aid relative to other villages in the district. This list of village-level controls was chosen since these variables were most often significant in regressions with larger sets of controls (see Table 4 and the following robustness section).

The impact is measured by the coefficient $\hat{\beta}$ on institutional presence or membership in 1990. Our measure of I_n, the impact variable itself or as instrument for membership, is the presence of an institution in the household's village in 1990 as indicated in the retrospective key informant survey. Since the linear probability model produces heteroskedastic error terms, we report White–Huber robust standard errors.

Examples of the regression equations (4) and (5) are presented in Table 5 using "becoming a moneylender customer" as an outcome variable. This outcome is shown since it proved to have the most robust impact using the full-sample of institutions.

The instrument (i.e., village institutional presence) is shown to be sizable and extremely significant in the membership equation. The results are fairly comparable using either the 2SLS or maximum likelihood estimation. Maximum likelihood produces a significant correlation $\hat{\rho}$ between the error terms in the outcome and membership equations, which is reported at the bottom of the table. The membership impact variable is negative (reduces moneylender reliance) according to both estimates.

In the 2SLS, the first-stage membership regression is the same membership regression used for each outcome as in Table 5. The instrument is strongly significant with a t-statistic of 10.2, and the first-stage regression has an R^2 of 0.08. The first stage regressions for individual group membership (e.g., rice banks, PCGs) are similar with t-statistics on institutional presence ranging from 3.0 (buffalo banks) to 8.9 (rice banks), and R^2 ranging from 0.03 (buffalo bank) to 0.13 (rice banks). The one exception is women's groups, which had a relatively weak relationship in the first-stage of the 2SLS (t-statistic $= 1.1$ and $R^2 = 0.01$).

Table 8 presents only the impact estimate $\hat{\beta}$ results for all five outcome equations using both estimation techniques. This table is discussed in Section 5.

4.2. *Membership Impact Estimation Using GIS*

In the previous subsection, we accounted for village-level selection by the use of controls of observable village-level characteristics $Z_{j,n}$. In this section, we utilize an additional method by controlling for the probability of a particular type of institution, given its geographic location. The general robustness of our results to the inclusion of these controls, even when significant, gives us added confidence in the reliability of estimates using only the earlier sets of controls. These results can therefore be thought of as a robustness check.

We posit that the presence of an institution I_n consists of a predictable component $\bar{I}_n$ and an exogenous error component or "surprise" e_n. The predictable component is allowed to influence household outcomes y_n. Modifying the linear probability model equations presented previously, we have:

$$y_n = \sum_{i=1}^{I} \alpha_i X_{i,n} + \sum_{j=1}^{J} \tau_j Z_{j,n} + \eta \bar{I}_n + \beta M_n + \varepsilon_{y,n} \tag{12}$$

$$M_n = \sum_{i=1}^{I} \gamma_i X_{i,n} + \sum_{j=1}^{J} \phi_j Z_{j,n} + \delta I_n + u_{m,n} \tag{13}$$

$$= \sum_{i=1}^{I} \gamma_i X_{i,n} + \sum_{j=1}^{J} \phi_j Z_{j,n} + \delta \bar{I}_n + \delta e_n + u_{m,n}. \tag{14}$$

From the preceding equations, we see that our identifying instrument (or excluded variable) is no longer the institutional presence I_n, but the "surprise" component e_n.[24] We are now able to weaken our identifying assumption, allowing I_n to be correlated with $u_{y,n}$ (i.e., $u_{y,n} = \eta \bar{I}_n + \varepsilon_{y,n}$) as long as this is through the predictable component $\bar{I}_n$. We do assume, however, that the surprise component e_n is not correlated with $\varepsilon_{y,n}$. In words, we argue that after controlling for observable village characteristics, variation in villages' institutional presence (either with or without institutions) that differs from the institutional presence of surrounding villages, is exogenous variation that is unrelated to the future outcomes of the village households except through the impact of the institutions themselves.

To develop this control variable, we utilize a Geographic Information System (GIS) using the CDD census data. For virtually every village in Thailand, we have biannual data of whether PCGs, rice banks, or buffalo banks were present in the village in 1990 (or other even numbered years). (Women's groups were not included in the census data.) Given this data, for every village in the Townsend Thai survey, we create the predicted probabilities of it having each of these types of institutions, one at a time. These probabilities are created nonparametrically, by applying a geographical kernel smoother on CDD records of the institutional presence of surrounding villages (whether included in the Townsend Thai data or not).

The results presented use a neighborhood defined as the nearest 12 villages, where neighboring villages are weighted in proportion to their inverse distance to the village in question. Knowing that too small a neighborhood or too much damping would simply reproduce the original data, while too large of a neighborhood or too little damping would remove important variation, a scheme was chosen that yielded strong variation in probabilities (i.e., intermediate probabilities that differ from zero or one). Nevertheless, estimation was remarkably robust to changes in the size of the neighborhood and damping weights of the GIS variable. The robustness of the weighting scheme was examined by changing the power (0.1, 0.5, 2, and 3) on the inverse distance in constructing the weights.[25] We also examined changing the neighborhood definition from "nearest 12 villages"; we examined the "nearest 5" and "nearest 20" villages as neighborhoods. We also defined the neighborhood as "all villages (minimum of two) within a given radius." The different radii that were examined were 2, 5, 10 and 20 kilometers.

24. Note that the identical coefficient δ multiplies both $\bar{I}_n$ and e_n, so that only the actual I_n need be entered into equation (14).

25. The probabilities used are given for geographic pixels representing 500 meter by 500 meter squares of land. Automated programs in ArcInfo search outward under the designated criteria from the center of each pixel and thus assign a probability value to the entire pixel. Thus, the odds of an infinite weight—where the village lies at the center of a pixel—are negligible.

The radii of 10 and 20 kilometers usually contained more than 12 villages, while less than 12 villages usually existed within a 2-kilometer radius.

Visual examples of the GIS output for PCG presence are given in Figures 1 and 2. Figure 1 presents the data for the changwat of Sisaket in the Northeast. The actual CDD village data are represented by the points (dark for no reported village fund access in 1990 and light for access), while the shading shows the predicted probabilities (where, for contrast, the lighter shading represents the lower probabilities of access). Figure 2 gives a more detailed view of the northern portion of Sisaket. Here we highlight the villages of the Townsend Thai survey data, while still presenting CDD data (dark dots again represent no access in 1990, while dark squares now represent access) and the GIS output, that is, the probability surface. The numerical values are the actual probabilities $\bar{I}_n$ used in the impact estimation. One can see that the probability surface retains many of the features of the underlying data. White areas with low probability have many villages reporting no access. On the other hand, "surprise" villages do exist. For example, the dark square labeled 0.444 in the east is a village that actually did have an institution located in an area that gave it just a 0.444 probability of having an institution. Conversely, the black dot labeled 0.702 in the upper north had a 0.702 probability of having a village institution, but did not actually have one.

We replicate the results from the previous section using this GIS control variable for the institutions for which we have CDD data. For the MLE, the distributional assumption is now made over $\varepsilon_{y,n}$ and $u_{m,n}$, instead of $u_{y,n}$ and $u_{m,n}$. An example of the regression where "becoming a money lender customer" is the outcome variable and membership in a rice bank is the treatment is presented in Table 6. The results are very similar to those in the earlier section. Rice bank presence remains significant in the membership equation and highly predictive (the presence of an institution increases the probability of being a member by 13%.)[26] Indeed, the GIS variable, predicted presence of a rice bank, is actually insignificant in this impact regression indicating that the GIS control is not doing additional work beyond the other village level controls. Still, in some regressions, the GIS variable $\bar{I}_n$ is significant. For PCGs, the variable is significant in the equations for asset growth, reducing consumption in a bad year, starting a business, and changing jobs. For buffalo banks, the GIS variable $\bar{I}_n$ is significant in the regressions for starting a business and reducing consumption. For rice banks, the GIS variable is never significant. The impact results for all of these regressions are presented in Table 9 and discussed in Section 5. Comparing with the corresponding results in Table 8, the GIS results are strongly consistent with the asset growth results, ambiguous in other cases, and only contradict the earlier result of PCGs impact on starting a business.

26. The presence of buffalo banks and PCGS are also significant in their respective membership equations.

FIGURE 1. 1990 CDD villages, grey-scaled by those reporting access to village saving funds overlaid on top of interpolated probability surface.

FIGURE 2. Northern Sisaket close-up view. Distribution of villages in Townsend survey. Symbol-coded by 1990 reported access/no access to village savings funds. Also labelled with their probability of access values, (obtained from interpolated access probability surface). Overlaid on access probability surface.

4.3. Impact by Policy

We do not have direct evidence of membership of households in institutions with different policies because policy information is taken form the institutional survey and the household survey only records membership in an institution, not its policy. So, instead of using the presence of an institution as an instrument for membership, we again use the direct impact equation (11).

Our proxy for intermediation, I_n, is now a dummy variable for whether all the institutions in a village had a particular policy or whether no institution in the village had a particular policy. The coefficient β again represents our parameter of impact and is an estimate of the average impact of the intermediation on members and nonmembers.[27]

Though we also ran probits for the binary outcome variables, we present here the linear regressions which allowed for a fuller use of the sample and clearer results (see footnote 34). Here X_i and Z_j are again the household- and village-level controls, respectively. Households in villages that had multiple institutions

27. See again footnote 13.

that differed in the relevant policy or had an institution for which the relevant policy was unclear were not used in the regression.[28]

Since membership is no longer used, we do not have the issue of household-level selection in these policy impact regressions. As long as I_n is independent of $u_{y,n}$ in (11), after controlling for village observables Z_n, we do not have a problem with village-selection either. We have many reasons for believing this a justified assumption and that policy variation is primarily exogenous, as discussed earlier in the introduction.

An example of the regression for becoming a money lender customer on the policy of offering pledged savings accounts is given in Table 7. Again, in all tables we report White–Huber robust standard errors to account for the heteroskedasticity of linear probability models. The full results are presented in Tables 10 and 11. Table 10 shows the impacts of the policies in Table 1 associated with institutional growth or failure, while Table 11 shows the impact of the policies traditionally mentioned in the microfinance literature. Since the sample sizes for the policy estimation are somewhat smaller, we also report significance at a 10% level, in addition to the 10% standard used in the previous tables.

4.4. Robustness

Beyond the use of three different estimators (2SLS, MLE, direct impact estimator) and the aforementioned regressions using GIS, many more robustness checks were run. We discuss these in turn.

First, we checked the results to see if the specific year chosen was unusual. In the regressions presented we focus on six-year changes (1991–1997), using 1990 membership as a treatment. We also looked at five-year impacts (1992–1997) using 1990 membership as a treatment, and four-year impacts (1993–1997) using 1992 as a treatment. (GIS estimates require use of the biannual CDD census data). The results were robust. Four-year impacts were slightly less significant, but this might be expected if impacts grow over times as in (1).

Second, geographic fixed effects were added.[29] Dummy variables for the more rural Northeast region (*Sisaket* and *Buriram*) versus the Central region

28. This makes sample sizes markedly smaller. The major problem with probits and small sample sizes occurs when a given value of a binary independent variable perfectly predicts the value of the regressor. Using a probit estimate, the coefficient on this independent variable tends toward positive or negative infinity (in order to increase the conditional probability of the event to one or zero). Given the lack of an internal solution to this likelihood problem, the probit subroutines drop the independent variable and the relevant observations form the estimation. To preserve the valuable information of these regressors, and maintain comparability across estimations, we present the OLS estimates.

29. We could not add village fixed effects to the regression since the identifying variable (I_n) is a village-level variable. A linear combination of village dummies would be perfectly collinear with our identifying instrument/excluded variable.

(*Lop Buri* and *Chachoengsao*) did not greatly affect the results. Nor did inclusion of province (*changwat*)-specific fixed effects, except for lower levels of significance. Using subdistrict (*tambon*)-specific fixed effects, results were also consistent, but again occasionally lost a measure of significance.

Third, we ran regressions with additional village controls 19 in total), as well as a subset of these controls altogether different form the ones presented. The original list of 19 CDD control variables (see Section 2 for the list) were selected to capture the level of development, remoteness of the village along several dimensions, the occupational composition of the village, the financial institutions present in the village, and the role of government initiatives in the village. Unfortunately, many of these variables are highly collinear. Regressions with all

19 variables produced estimated with consistent signs on the impact coefficient $\hat{\beta}$, but the precision of estimates was greatly lowered and many lost significance. We present the results for the subset of these controls that were often significant in the regressions with all 19 control variables. (They were also frequently significant in the regressions presented.) A second, alternative subset of controls (i.e., level of development relative to the district, the fraction of households with piped water supply, the time to the district office, the use of the agricultural bank (BAAC) or an agricultural cooperative in the village, the fraction of rice farmers using government-promoted varieties, and the fraction of households with members who migrate for labor) also gave extremely consistent results in terms of both sign and significance.

Fourth, we added cubic and quadratic age, wealth, and average village wealth terms to the regressions. These terms were not significant and did not effect the results.

Fifth, we ran policy impact regressions for the binary outcome variables using probit regressions instead of linear regressions as mentioned in footnote 34. The results were robust. However, in a few cases, one-sided correlation of a binary independent variable with the dependent variable forced its omission form the regression. To keep the list of dependent variables consistent across regressions, we decided to report the linear results.

Sixth, we attempted a semi parametric approach to estimation suggested by Abadie (2003), which allows for covariate controls. Unfortunately, the predictive power of the first stage of this two-stage approach was very weak. Not a single variable of any kind showed significance in the impact equation using this estimator, so the semi-parametric approach was abandoned.

Finally, we ran regressions using the growth of institutions (membership, lending services, or saving services) directly in regressions of impact. The effect of institutional growth did not show up as significant, though the samples were sometimes greatly reduced since villages with multiple institutions occasionally had conflicting measures of success. We view these regression results as confirmation of the endogeneity of more direct measures of financial intermediation and the importance of our policy and institution type variation in estimation impacts.

In the next section, we highlight the most salient results included in Tables 8, 9, 10, and 11. Again, these results are robust to the above checks except where noted.

5. Results and Findings

In this section we highlight the significant impacts of interest and evaluate them in terms of the predictions of the LEB and GJ models. We measure significance of relationships at the 5% level. The results are organized by the respective outcome measures (asset growth; consumption/input use smoothing; entrepreneurship and job mobility; and money lender reliance).

5.1. Asset Growth

Both the LEB and GJ theories discussed in Section 2 predict that increased financial intermediation leads to higher asset growth rates. In support of these theories, there is some evidence that institutions, especially those institutions with stability or expansion of services, promote asset growth among members.

In general, the 2SLS and MLE results are consistent in sign, but only the MLE results are significant. For institutions overall, we focus on the first two rows of Table 8. Both the 2SLS and MLE estimate positive impacts of membership on asset growth, but only the MLE is significant.

Only those institutions that did not tend to diminish services have positive impacts; the institutions associated with declining services have negative impacts on asset growth. Specifically, Table 8 shows that rice banks and buffalo banks tend to have negative impacts on asset growth, while PCGs and women's groups have positive impacts. Again, the results are only significant using the MLE, however. Looking at Table 9 to see the results for the regressions using the GIS variable, we see a similar pattern with MLE estimates: a significant positive effect of PCGs and negative effect of rice banks and buffalo banks.

The sign of the 2SLS estimate is consistent with this result for PCGs, but not for rice banks and buffalo banks. The negative affect of rice banks was less strongly supported in the robustness checks. Indeed, OLS regressions of the direct effect of institutional presence on asset growth of members and nonmembers yielded a small, but significant, positive effect of rice banks. Thus, the positive impact of

PCGs is perhaps the strongest result, while the impact of rice banks is perhaps the most ambiguous.

The divergence between the 2SLS and MLE estimates is a bit troubling, especially since the linear model should be consistent despite the fact that membership is binary. It could be that these results would indeed turn significant given more data, however, and the MLE incorporates more information (i.e., the correlation of error terms in the membership and outcome equations) into its estimation. For the results in Table 8 and Table 9, these estimated correlations are both sizable and significant). Nevertheless, these MLE results also rely on the distributional assumption of normality.

Tables 10 and 11 show that the policies correlated with growth have positive impacts on asset growth, but the policies traditionally mentioned in the literature as important to successful microfinance intermediation do not. Providing training or advice, offering savings services, and offering pledged savings accounts in particular are associated with significant positive impacts on households.

Quantitatively, these impacts are sizable. Ceteris paribus, households in villages with institutions that offered savings services had 26% higher growth in assets over six years (about 4% per year) than households in villages that did not (see Table 10). Institutions that offered savings services yielded 25% higher growth (again, about 4% per year), and institutions offering pledged savings accounts in particular yielded 32% higher growth (5% per year).

5.2. Consumption Smoothing

Recall that the measure of consumption smoothing is whether or not households were forced to reduce consumption or input use in a bad year. The GJ model predicts that financial intermediation will reduce idiosyncratic risk through risk sharing and aggregate risk through the better use of information. We find that some policies associated with the growth of intermediation services, especially savings growth, can reduce risk, though institutions on average, especially buffalo banks and rice banks, which are associated with declining services, can lead to higher risk.

The positive policy results are highlighted in Table 10. Not surprisingly, institutions that offer emergency services significantly reduce the probability of reducing consumption/input use in a bad year. Other things equal, households in villages with these institutions were 20 percentage points less likely to have to reduce consumption/input use in a bad year. Savings policies appear to play a particular role in consumption smoothing as well. Institutions that offered savings services, required minimum initial deposits to start saving, and used savings to evaluate loan applications lower the probability of having to lower consumption/input use in response to a bad shock by 12–18 percentage points. Perhaps these savings policies induce or enable households to build up a buffer stock to protect against bad shocks.

Within types of savings services, pledged savings accounts, associated with the growth in savings services, had significant positive benefits to risk sharing, making households 12 percentage points less likely to have to reduce consumption in a bad year. Still, from the more flexible traditional savings accounts (which are associated with declines in saving services) the benefit is at least as strong and more significant. We posit that the rigidness of pledged accounts may lead to increased savings (one aspect of intermediation) that has its own benefits, at the cost of easy liquidity (another type of intermediation) that aids in consumption smoothing. Savings being optional to members, another policy associated with declining services, also may allow for more flexibility/liquidity, since it too improved consumption smoothing.

Finally, the provision of training or advice is marginally significant (at the 10% level).

Table 8 shows that the impact for institutions overall (any village institution) is perverse according to both estimates, but only significant in the MLE. This result is only true for institutions associated with declining services, however; in Table 8, buffalo banks and rice banks follow the pattern of institutions overall.

The evidence on rice banks is less strong though, given the GIS results in Table 9. The MLE estimate for rice banks is no longer significant, and the 2SLS impact estimate is actually of the opposite sign.[30]

The evidence that buffalo banks increase the likelihood of reducing consumption or input use in a bad year are bit stronger.[31] The MLE results for the regression without the GIS variable (Table 8) is significant while the 2SLS estimate is nearly

30. The OLS result of the direct effect of rice bank presence using the GIS variable is also the opposite sign (negative), and significant at a 10% level.

31. Indeed, the direct effect OLS regressions also yielded a significant, though small perverse effect of institutional presence on the likelihood of smoothing consumption and input use.

significant (significant at a 10% level), and the estimates for regressions with the GIS variable, though insignificant, agree in sign.[32]

The traditional policy variable results are not generally significant, but there is an important exception. The policy of monitoring all borrowers shows a positive effect on consumption/input use smoothing significant at the 10% level.

5.3. Starting a Business and Changing Jobs

The LEB model (and a particular interpretation of the GJ model) also predict that intermediation, or its introduction, should increase occupational mobility and entrepreneurship. The results for changing jobs are more consistent with these theories than are the results for entrepreneurship.

For occupational mobility, we find some evidence that women's groups increase job mobility among member households (Table 8), as do pledged savings accounts (Table 10). In contrast, institutions with the flexible savings accounts (associated with contraction of services) decreased occupational mobility.

In Table 8, the measured impact of women's groups on changing jobs is positive in both the 2SLS and MLE, but significant only in the MLE. The results using the GIS variable in Table 9, however, show a significant perverse impact of PCGs on changing jobs using both the 2SLS and MLE. The signs of these impacts are consistent with the results without the GIS control in Table 8.

Table 10 shows that the pledged savings accounts had significant positive effects on job mobility, while those with the less successful traditional savings accounts have negative impacts on mobility. Pledged savings accounts made households 13 percentage points more likely to change jobs, while traditional savings accounts made them 26 percentage points less likely. Since, these policies were also correlated (positively and negatively, respectively) with the growth in savings services, we interpret this as evidence that successful provision of savings services is important for job mobility.

The results for starting a business are weak and not consistent with theory. Offering emergency services in Table 10 lowered the probability of starting a business by 10 percentage points, though emergency services were associated with success. The lone significant relationship from the institutional membership regressions is in Table 9; the 2SLS estimate using the GIS control indicates that PCG membership reduces the probability of starting a business.[33] While the sign is

32. Though the 2SLS estimates with the Townsend Thai key informant data were not significant, the direct effect of the institutional presence in an OLS regression yielded a significant, though small perverse effect.

33. In addition, the direct effect regressions produced a positive significant impact of buffalo bank presence using the GIS variable. This contrasted the results for the impacts on members.

confirmed by the MLE estimate in Table 9, this sign is dependent on the inclusion of the GIS control (compare Table 8). Thus, the result is fairly weak.

The distinction between the impacts on occupational mobility and entrepreneurship is somewhat problematic. Since self-employment is quite common in the data, it is often difficult to distinguish households who have switched occupations from households who have started a business. The only agricultural enterprises that we designate as business are shrimp or fish farms, while raising new crops or livestock as the primary source of income is viewed as an occupational shift. We also have no clear explanation for the different impacts of women's groups and PCGs, except that women's groups are often geared toward teaching new occupational skills or promoting certain trades, while PCGs may be used to support more traditional agriculture.

5.4. Moneylender Reliance

As mentioned in the introduction, the most robust and salient result is that membership in institutions reduce moneylender reliance, that is, the probability of households becoming moneylender customers. We interpret this as evidence that institutions improve access to formal credit, allowing households to avoid costly borrowing from moneylenders. Table 8 shows that this negative relationship for (any) village institution is significant using either the 2SLS or MLE estimates. Table 10 also shows that the baseline effect of institutions (regardless of policy) was to lower the probability that the average household in the village became a moneylender customer by 8 percentage points.

The results on the impact on money lender reliance by institution, or by policy type, are much weaker. According to both the estimates with (Table 9) and without (Table 8) the GIS controls, PCGs and buffalo banks have no significant impacts on moneylender use.[34] The MLE estimation without the GIS controls (Table 8) showed that rice banks increased the probability of moneylender use. The significance disappeared after the GIS control was used (Table 9) and was not present in the 2SLS results.[35] Women's groups, on the other hand, do have negative impacts on the use of moneylenders according to Table 8. Both the 2SLS and MLE estimates are negative, and the MLE result is significant. The results by policy yield that pledged savings accounts decrease the probability of becoming a moneylender customer.

34. The OLS estimate of the direct effect of buffalo bank presence using the GIS data was significant and perverse.

35. The OLS estimate of the direct effect of institutional presence using the Townsend Thai data was negative (lowering moneylender reliance), though insignificant.

It should be noted that moneylender reliance was the one outcome variable for which the direct impact regressions of the form (11), which omit membership, also produced strongly significant results, significant at levels comparable to the estimates that included membership. Indeed, OLS estimates using the GIS data for buffalo banks yielded a significant direct effect of institutional presence, while the 2SLS using membership were insignificant. If these direct effect regressions are indeed picking up external effects of the institutions on the moneylender reliance of nonmembers, then our instrument for membership would be invalid and the estimated impacts of membership would be inconsistent. That credit offered to members could reduce the moneylender reliance of nonmembers is a distinct possibility, since loans to neighbors and especially relatives are not uncommon. That is, as noted earlier, we may not be measuring the effect of institutions directly on members, but rather some combination of their effects on members and nonmembers.

6. Conclusions

Our analysis of the impacts of different institutions and policies produced evidence of the micro-impacts consistent with Thailand's experience of growth and financial intermediation and in harmony with the models of occupational choice of Lloyd-Ellis and Bernhardt (2000) and financial deepening of Greenwood and Jovanovic (1990). Several of the key findings uncovered also lead to interesting considerations or areas for future research. Specifically, we have used the policies and institutions associated with the successful provision of intermediation services to identify impacts on households, but the question remains as to why certain types of institutions or institutions with certain policies are successful and others not.

For example, cash lending institutions were associated with stable or expanding provision of services. Women's groups and PCGs, the institutions that lend cash, had positive impacts on asset growth, while women's groups also promoted job mobility. The particularly strong impact of women's institutions is of considerable interest. As mentioned in Section 3, the only (observed) way that women's groups differ significantly from the other groups is their female membership. The impact findings would seem to indicate that there may be something special about gender. The finding of greater impacts for women's groups is consistent with Pitt and Khandker's (1998) study of Grameen Bank lending which found higher impacts on households for loans issued to women, than impacts for loans issued to men, and leads one to consider theories in which households do not operate as unitary families or single-agent optimizers (see Becker 1981; Bourgignon et al. (1994); and Browning and Chiappori 1998).

In contrast, rice lending institutions and buffalo banks were more likely to see reductions in services, and also had smaller, in fact, perverse impacts. The open ended answers in the institutional survey indicate that the high risk of buffalo banks, and the indivisibility of a relatively large investment relative to the scale of the institution, play a role in their unsuccessful experiences. For example, if a buffalo dies or is infertile, this greatly reduces lending, even causing failure in the case of a one-buffalo fund. Similarly, some rice banks indicated that aggregate village shocks played a role in their decline or failure.

Of the policies, providing training and advice and emergency services are most closely associated with growth of intermediation and beneficial impacts. Perhaps these are crucial auxiliary services in financial intermediation.

The special role of some savings policies is also of great interest. Using savings to evaluate loans, offering savings accounts, and savings requiring a minimum deposit are each associated with both institutional success and better consumption smoothing.

Offering pledged savings accounts (associated with growth) versus more flexible savings policies (associated with contraction) is perhaps the most important policy distinction measured. Offering pledged savings accounts[36] was the single policy associated with the largest, most significant, and most positive impacts. Institutions with pledged savings accounts promote higher asset growth rates and more job mobility. There is also evidence that they may promote business starts and reduce moneylender reliance. On the other hand, the one outcome for which the flexible policies (traditional accounts and optional savings) produced better results was in smoothing bad shocks. Though the impact of pledged accounts is still positive, the effect is smaller and much less significant than the impact of institutions with the flexible policies, where consumers could access funds more easily and presumably decide whether or not and how much of a buffer stock of savings to maintain. But again, except in the area of smoothing shocks, it appears that the more flexible policies have less impact on households than the restrictive policies, such as tying loans to savings, requiring minimum initial deposits, and, most especially, pledged savings accounts.

What might explain the importance of and different effects of these savings policies? One possible explanation comes from the behavioral economics literature (see Benartzi and Thaler 2004 and Laibson 1996, for example), where

36. It may appear puzzling that savings that cannot be accessed, given the restrictive nature of pledged savings accounts, could have strong effects on outcomes. The limited access to pledged savings, however, is somewhat overstated. First, loans are often linked to the amount of savings (and this policy is associated with positive impacts as we have seen). That is, the funds can be effectively accessed through loans. (Lending itself was not associated with impacts, however, but this may be due too little variation in this policy since most institutions made loans.) Secondly, savings might be used as collateral for loans from other sources, since virtually all of the survey villages use multiple sources of credit. Finally, savings can be used as collateral for others via cosigned loans.

it has been argued that internal conflict and time inconsistencies cause people to save less than they would like to, and savers would actually like to bind themselves to higher forced savings rates. A related explanation is that these conflicts or time inconsistencies may be internal to the household, but not the individual. Pledged savings accounts may then be a commitment technology in household bargaining between members who differ in their level of impatience or desired savings. A second possible explanation is that the growth of the institution drives the impacts on households. Pledged savings plans seem to have several organizational and accounting advantages over standard savings accounts (Kaboski and Townsend 2000). Organizationally, infrequent deposit and withdrawal times allow funds to avoid either the (crime and interest) costs of holding large amounts of money in the village or the transportation costs of repeated trips to the formal, outside bank that holds the savings. In addition, pledged savings accounts (often only allowing a standard pledge rate) allow for very simple accounting procedures and so self-managed funds may be easier to maintain.[37]

The paucity of results on the impacts of policies traditionally mentioned in the literature also leave open paths for future research. We do not view our findings as strong evidence against the importance of these policies. Indeed monitoring may facilitate risk sharing. More generally, there are several caveats. Our data showed little variation in these policies, especially in the policies of providing lending services, requiring frequent payments, monitoring frequently, and monitoring every loan. Furthermore, there may have been a great deal of measurement error in all of these policies.[38] While we do not view the negative results on these traditional microfinance policies as strong evidence against the importance of these policies, they do help to highlight the potential importance of the policies that do show strong results.

We hope that these findings can lead to not only future research, but specific recommendations to Thai policymakers and microfinance practitioners more generally.

37. A further possible explanation is that benefits may not be altogether positive—institutions may be forcing households to save at a higher-than-desired rate. Of course, in the case of requiring an initial deposit, the policy was positively correlated with membership growth, so one might wonder why people are joining if the institutions are welfare reducing.

38. Three examples of possible measurement issues are: (1) lending services is a simple binary variable and allows for no measure of the intensity of credit provision; (2) loans that do not require collateral but link loans to savings are (at least partially) collateralized in effect, but we designate them as not requiring collateral; and (3) the frequent payments dummy variable was constructed using one payment as a cutoff. That is, any loan that required a payment before the loan was due in full was considered to require frequent payments. The same is true for loan monitoring. These weak conditions were necessary in order to get any meaningful variation in the data but do not perfectly match the ideas of frequent payment and monitoring that have been the focus of the literature.

Appendix A

TABLE A.1. Percentage distribution of occupational changes over past six years.

New occupation of household head / Old occupation of household head	Rice farmer	Farmer, other crop	Shrimp farmer	Construction	Business/ Skilled trade	Professional/ Administrative	General worker, Cleaner/Janitor	Other	Total
Inactive/No occupation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Rice farmer	0.2	7.1	7.3	6.7	7.9	0.8	4.7	2.8	37.5
Farmer, other crop	1.4	15.4	2.8	1.0	3.9	0.2	1.8	1.4	27.8
Shrimp farmer	0.0	1.2	2.0	0.2	0.6	0.0	0.0	0.2	4.1
Construction	0.2	0.6	0.4	0.2	1.0	0.2	0.4	0.4	3.4
Business/Skilled trade	1.4	1.2	2.0	0.8	4.9	0.4	1.2	0.6	12.4
Professional/Administrative	0.0	0.6	0.0	0.0	0.6	0.4	0.4	0.4	2.4
General worker, Cleaner/Janitor	0.8	1.8	1.0	1.8	1.6	0.0	0.8	0.6	8.3
Other	0.8	1.0	0.0	0.2	1.2	0.0	0.4	0.4	3.9
Total	4.7	29.0	15.4	10.9	21.7	2.0	9.7	6.9	100.0

Note: Positive entries in diagonal elements indicate within category occupational transitions or multiple temporal transitions.

TABLE A.2. Percentage distribution of occupational changes over past six years, only institution member households in 1990.

New occupation of household head Old occupation of household head	Rice farmer	Farmer, other crop	Shrimp farmer	Construction	Business/ Skilled trade	Professional/ Administrative	General worker, Cleaner/Janitor	Other	Total
Inactive/No occupation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rice farmer	0.0	17.0	6.4	2.1	12.8	4.3	4.3	2.1	48.9
Farmer, other corp	0.0	6.4	4.3	0.0	2.1	2.1	0.0	2.1	17.0
Shrimp farmer	0.0	0.0	4.3	0.0	2.1	0.0	0.0	0.0	6.4
Construction	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	2.1
Business/Skilled trade	0.0	0.0	0.0	0.0	6.4	0.0	0.0	0.0	6.4
Professional/Administrative	0.0	2.1	0.0	0.0	2.1	2.1	0.0	4.3	10.6
General worker, Cleaner/Janitor	0.0	0.0	0.0	4.3	0.0	0.0	0.0	0.0	4.3
Other	2.1	0.0	0.0	0.0	0.0	0.0	2.1	0.0	4.3
Total	2.1	27.7	14.9	6.4	25.5	8.5	6.4	8.5	100.0

Note: Positive entries in diagonal elements indicate within category occupational transitions or multiple temporal transitions.

Appendix B

Here we present the log-likelihood functions used in the MLE. We look first at those used for the regressions with binary outcomes (reducing consumption/input use in a bad year, becoming moneylender customer, starting a business, and changing jobs). The continuous outcome variable for asset growth is developed last.

B.1. Binomial Evaluation Criteria

Recall that y_n and M_n are indicator functions for the binary impact and membership, respectively. The observations for impact and membership are binary events, and so there are thus four combinations of possible observations. Denoting the CDF of the bivariate standard normal as Φ_2 (.,.;.), the log-likelihood function for the entire population (for all combinations) can be succinctly written: from equations (9), (8), and (10):

$$\ln \pounds = \sum_{n=1}^{N} \ln \Phi_2 \left(\begin{array}{c} (2y_n - 1)\left\{ \sum_i \alpha_i X_{i,n} + \sum_j \tau_j Z_{j,n} + \beta M_n \right\}, \\ (2M_n - 1)\left\{ \sum_j \gamma_n X_{j,n} + \delta I_n \right\};\rho \end{array} \right). \tag{15}$$

Given this model, the log-likelihood function is now correctly specified. Hence, maximum likelihood estimation is consistent and efficient. We present the estimates of the coefficients themselves, since measures of marginal probability were often problematic when evaluated at the sample means. The actual regressions were performed using the *biprobit* subroutine in Stata 6.0.

B.2. Continuous Evaluation Criterion

For assets, the evaluation criterion is not binary, but continuous. In this case, we interpret the equation for y_n to be the actual criterion (asset growth) instead of merely an index. The stochastic component of this equation, $u_{y,n}$ can no longer be simply normalized to have a variance of one. We therefore consider a general bivariate normal function:

$$(u_{y,n}, u_{m,n}) \sim \text{Bivariate Normal}(0, 0, \sigma_y, \sigma_m, \sigma_{ym}). \tag{16}$$

Since the membership equation is still just an index based on whether the index is greater than zero or not, we are still free to normalize $\sigma_m = 1$. We thus write

(16) without loss of generality:

$$(u_{y,n}, u_{m,n}) \sim \text{Bivariate Normal}(0, 0, \sigma_y, 1, \rho). \tag{17}$$

The likelihood function for assets can be written:

$$\mathcal{L} = \left[\prod_{n=1}^{N} P\big(M_n^* > 0 | y_n^*\big) P\big(y_n^*\big)\right]^{M_n} \left[\prod_{n=1}^{N} P\big(M_n^* \leq 0 | y_n^*\big) P\big(y_n^*\big)\right]^{1-M_n}. \tag{18}$$

In words, the joint probability of the survey results is the probability of all members being members given their asset growth levels y_n^* times the probability of their asset growth rates, while the second product is the counterpart for nonmembers. The log-likelihood is naturally:

$$\log \mathcal{L} = \sum_{n=1}^{N} \left\{ \begin{array}{c} M_n[\ln P\big(M_n^* > 0|y_n^*\big) + \ln P\big(y_n^*\big)] + \\ (1 - M_n) \ln P\big(M_n^* \leq 0|y_n^*\big) + \ln P\big(y_n^*\big) \end{array} \right\} \tag{19}$$

$$\begin{aligned} &= \sum_{n=1}^{N} \ln P\big(y_n^*\big) + M_n \ln P\big(M_n^* > 0|y_n^*\big) \\ &\quad + (1 - M_n) \ln P\big(M_n^* \leq 0|y_n^*\big). \end{aligned} \tag{20}$$

The unconditional density of y_n^* is simply a normal density function with standard deviation σ_y. Given equation (8) this is just:

$$P\big(y_n^*\big) = \phi\left(y_n^* - \left[\sum_i \alpha_i X_{i,n} + \sum_j \tau_j Z_{j,n} + \beta M_n\right]; \sigma_y\right). \tag{21}$$

With a bivariate normal where $\sigma_m = 1$, the conditional distribution of $u_{m,n}$ (given $u_{y,n}$), is normal with mean:

$$\frac{\rho}{\sigma_y}\left(y_n^* - \left(\sum_i \alpha_i X_{i,n} + \sum_j \tau_j Z_{j,n} + \beta M_n\right)\right)$$

and variance $1 - \rho^2$. Using this distribution, along with equations (21), (8), and (9), yields the final log likelihood function:

$$\ln \mathcal{L} = \sum_{n=1}^{N} \ln \phi \left(y_n^* - \left[\sum_i \alpha_i X_{i,n} + \sum_j \tau_j Z_{j,n} + \beta M_n \right] ; \sigma_y \right)$$

$$+ \sum_{n=1}^{N} M_n \ln \Phi \left(\frac{\sum_j \gamma_n X_{j,n} + \sum_j \phi_j Z_{j,n} + \delta I_n + \frac{\rho}{\sigma_y} \left(y_n^* - \left(\sum_i \alpha_i X_{i,n} + \sum_j \tau_j Z_{j,n} + \beta M_n \right) \right)}{1 - \rho^2} \right)$$

$$+ \sum_{n=1}^{N} (1 - M_n) \ln \Phi \left(\frac{\sum_j \gamma_n X_{j,n} + \sum_j \phi_j Z_{j,n} + \delta I_n + \frac{\rho}{\sigma_y} \left(y_n^* - \sum_i \alpha_i X_{i,n} - \sum_j \tau_j Z_{j,n} - \beta M_n \right)}{-(1 - \rho^2)} \right).$$

The first summation is the log-likelihood of observed sample of asset growths, the second summation is the log-likelihood of observing members given asset growth, and the final summation is the log-likelihood of observing nonmembers given asset growth. The actual estimation is carried out using the *treatreg* command in Stata 6.0. □

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“Occupational Choice, Financial Frictions, and Trade across Thai Villages”

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Abstract

We disentangle the impacts of real factors (relative prices) and financial factors (interest rates and credit/asset ratios) on households running farm/business projects or providing wage labor in diverse, small village economies that are open to trade and capital flows. To do so we construct a two-sector occupation choice/trade/financially-constrained open economy model; estimate/calibrate key parameters and initial conditions of the model in diverse regions; simulate and judge model performance against the data; and run some counterfactual exercises, namely, freezing real or financial factors at their initial values and comparing to the baseline simulations, or more radically, making the economies closed with respect to trade, to capital flows, or to both. We find through these counterfactual model-based exercises that the impact of real and financial factors can be heterogeneous and large, generating both gains and losses and non-monotone impact across wealth classes and occupations (even allowing for occupation shifts).

Chapter 1
Introduction

1.1 Townsend Thai Data

The data used in this paper comes from the monthly household-level panel survey, which is a part of the Townsend Thai project. The monthly survey is being conducted in two provinces in the Central region, Chachoengsao and Lop Buri, and in two provinces in the Northeast region, Buri Ram and Si Sa Ket. In each province, four villages in the rural and semi-urban areas are randomly picked. Then, approximately 45 households per village are sampled. The survey began in August 1998 with the baseline survey, which collects the data on the status of the sampled household, including household's composition, wealth, and the occupations of its members. Then, in the monthly resurvey, the same households are being interviewed for any activities within the household, including changes in its wealth, inputs, outputs, and any income received during the past month. The resurvey was started in September 1998 and is still being conducted, making this one of the longest household-level panel survey. The results reported in this paper are drawn from 84-month period (months 5-88). This period covers from January 1999 to December 2005.

At the beginning of the survey, there are approximately 45 households per village. However, during the 88-month period covered in our survey, the migration of village resident is unavoidable. For every household in our survey that moves out of the village, a replacement household is added. However, for the purpose of constructing the village accounts, we decide to use the balanced panel data and consider only households that stay for the entire 88-month period.

1.2 Overview of the Thai Economy

Since the financial crisis in 1997, Thailand went through a considerable change in its financial environment, from the devaluation of Thai baht in 1997, to the decision to change from the Monetary Targeting framework to the Inflation Targeting framework in 2000, to the introduction of one-million-baht village funds in 2001, which is one of the largest microfinance program in the world.[1] Over the same period, trade costs and other trade barriers, both domestic and international, have been significantly decreasing. The combined value of export and import have been increased from 95% of GDP in 1997 to 140% of GDP in 2016. The average travel time to district office has decreased by roughly 20% between 1996 and 2005.[2]

Traditional international trade models predict that, with decreasing trade costs, the ratios of factor prices across economies should converge. However, in the Townsend Thai data, the differences in the ratios of wage rates and interest rates across provinces have become bigger over time. Therefore, in this research, we develop an occupational-choice trade model with financial frictions in an attempt to capture these factor-price convergences and to explain the development in the patterns of trade and production in these villages over time.

1.3 Research Overview

We disentangle the impacts of real factors (movement in sectoral relative prices) and financial factors (lower interest rates, more liberal credit/asset ratios) on households running farm/business projects or providing wage labor in diverse, small village economies that are open to trade and capital flows. We follow much of the literature and create an occupational choice, wage-earner vs. enterprise model (see for example, Lloyd-Ellis and Bernhardt, 1999; and its empirical implementation in Giné and Townsend, 2003; Jeong and Townsend, 2008; as well as a growing influential literature such as Buera et al., 2011; Buera and Kaboski, 2012; and Song et al., 2011) but with two sectors, for production of the agricultural and manufactured good, respectively. The model is simplified in having myopic savings rates for end of period wealth (not forward-looking), but the within-period wealth distribution plays a key role, not only in the determination of interest income but also through household-varying borrowing limits (the usual indebtedness or collateral ratios). Wealth evolution is determined by within-period

[1] As reported in Kaboski and Townsend (2011), the size of the initial funds of this program is about 1.5 percent of the Thai GDP in 2001.

[2] Community Development Department (CDD).

earnings and (exogenous end-of-period) savings rates. Labor endowments are fixed and common over households and time, and the wage rate is determined by the local demand and supply for labor. Local economies are entirely open to capital and can borrow and lend at outside-determined interest rates. In sum, in this model, borrowing limits and relative prices determine jointly the occupational choices and equilibrium wage rates.

To calibrate the model, we act as if interest rates are accurately measured and taken as given (small open economy). We do not believe we see accurate measures of either local relative prices or borrowing limits, so these two variables are calibrated, to match agricultural/manufacturing profit shares and the wage rate, respectively. This is true as well for initial conditions though we have as well a matched/centered two parameter version of the observed distribution of wealth (capital). We are able to match perfectly the wage rate and profit shares.

We run some counterfactual exercises, namely, freezing real (relative prices) and then financial factors (interest rates and borrowing limits) at their initial values, with the other variables (financial and then real, respectively) free, comparing in turn to the baseline simulations where both real and financial factors are allowed to vary to match the wage and profit shares we see in the data. When either only financial factors or only relative prices are varied in Buri Ram, for example, the wage rate is higher than in the baseline scenario.

In a more austere counterfactual we make the economies closed with respect to trade, to capital flows, or to both at the same time. When closed with respect to trade, the local demand for each type of good must be equal to the local supply, changing relative prices. So it matters if the economy was initially exporting labor-intensive (or capital-intensive) good. This can cause the wage to drop (increase), if for example, the price of the labor-intensive good is lowered (raised). When closed with respect to external finance, the local demand for capital must equal the local supply. The latter can cause large downward (upward) movements in the interest rate if the economy had been exporting savings (or borrowing from abroad), so to speak. Thus, wage earners and/or owners of capital suffer large losses. But on occasion, as with shutting down both real and financial, some in the population gain; sometimes it is the middle wealth segment, the middle class so to speak, that is hit the hardest. Finally, endogenous wealth accumulation can mitigate losses over time and radically change the pictures of winners and losers by occupational and sectoral shifts.

Chapter 2
Literature Review

We have a lot in common with the widely cited, seminal review of Goldberg and Pavcnik (2007), not only in the topic we study but also in the overall conclusions. Goldberg and Pavcnik study the impact of reductions in tariff barriers, arguing for a causal link between trade openness and changes in inequality. But they also believe that by the 1990's increased capital flows from financial liberalization were playing a co-determining role. They found this worrisome, as one is no longer look at the impact of trade alone. We thus emphasize our attempt to disentangle (through measurement and the model) real trade factors from financial factors. We also study the impact on particular regional economies over a period of time, one region at a time, rather than cross sectional comparisons. We do have the panel data from a continuously implemented survey to do this. Goldberg and Pavcnik also abstract from the growth channel and macro dynamics. We in contrast do have some endogenous wealth dynamics and hence time-varying impacts, but on the other hand, we abstract from TFP growth, and variation in TFP across firms and regions, though there is some evidence those things do play a role (indeed a lead role in many other models). One way to look at what we do is to try to see how far we can get without TFP shocks, focusing instead on the endogenous dynamics related to the interaction of real and financial factors. Finally we do identify several, diverse channels through which trade and financial openness can have impact. As Goldberg and Pavcnik (2007) and Feenstra (2008) emphasize the popular notion that relatively abundant factors in a country would be aided by exports and the consequent increase in factor prices turned out to be naïve and the standard Heckscher–Ohlin predictions turn out to be naïve in the context of our model, and data, as well. Their conclusion, and ours, is that attempts to understand, anticipate or alleviate the distributional effects of within-country openness need to be grounded in a careful study of regional circumstances. We document this extensively.

More recent papers continue to try to exploit exogenous policy variation in conjunction with theory. Brambilla et al. (2012) study exports, export destinations, and skill utilization by firms. Using the exogenous changes in exports and export destinations brought about by an Argentine 1999 devaluation, they find that Argentine firms exporting to high-income countries hired a higher proportion of skilled workers and paid higher average wages than other exporters (to non high-income countries) and domestic firms. We too are using exogenous policy variation, in particular variation in credit in the data associated with a government financial intervention (though other things were happening at the same time, and we use our model to sort this out).

On the other hand, unlike Brambilla et al. (2012) we do not focus at all on skills variation within the labor sector, heterogeneity among firms in a given sector in terms of exporting or not, nor the source of demand for those exports. There is of course a large and growing literature emphasizing this kind of heterogeneity, for example, Bustos (2011), Melitz (2003), and Verhoogen (2008). Indeed, as reviewed by Harrison et al. (2011), the poor performance of the Stolper–Samuelson mechanism, has led Feenstra and Hanson (1996), Helpman et al. (2011), Frías et al. (2012), and Burstein et al. (2014) to study different channels through which trade effects the distribution of earnings: outsourcing, labor market frictions, quality upgrading, or capital-skill complementarity. Here we take a different tact and incorporate financing frictions into a 2x2 HO model. This is another way to overturns the Stolper–Samuelson mechanism, a point made rather dramatically in Antràs and Caballero (2009) in their model of North-South trade and globalization, though their study was not empirical.

In emphasizing local within-country impacts associated with initial conditions, our paper shares much in common with Autor et al. (2013). They find impacts on local labor markets from rising Chinese import substitutes (unemployment, lower labor force participation, and reduced wages), and account for up to one quarter of declines in manufacturing employment. We too find impacts on factor prices and occupation, for us from changes in relative prices arguably associated with international and interregional trade. Related is McLaren and Hakobyan (2010), who find using US Census data for 1990-2000 at a quite disaggregated level the NAFTA-induced effects on US wages by industry and by geography, measuring each industry's vulnerability to Mexican imports and each locality's dependence on vulnerable industries. They find large distributional effects (larger than aggregate welfare effects estimated by other authors). Related in turn are the earlier papers of Topalova (2007), who constructed an employment-weighted average tariff for each Indian district to identify the differential effects of local labor-market shocks on different locations. Kovak (2010) uses a similar technique for Brazil. These studies indicate significant location-specific effects of trade shocks on wages, which of course implies mobility costs of some sort for workers that prevent them from arbitraging wage differences across locations. We too make these explicit assumptions about the local labor market, and we too document effects on wages. We go beyond these papers in taking an explicitly structural approach, which in turn allows us to conduct a number of counterfactual exercises. Though we stop short of introducing heterogeneity in labor skills, the matching of labor to task and worker-specific capital, or costs of adjustment, we find nevertheless enormous heterogeneity in impact.

As in the recent paper Fajgelbaum and Khandelwal (2013), we complement a literature which views the distributional impact of international trade as one of the central tasks to be pursued by international economists. Fajgelbaum and Khandelwal find that trade has relatively adverse effects for low-income consumers in more than half of the countries that they consider and that the distributional effects of trade are often large relative to the aggregate effects. They focus on the demand side and heterogeneity in demand elasticities. We shut down that mechanism entirely by assuming Cobb-Douglas, aggregable consumer and focus instead on the distribution of welfare gains and losses associated with factor endowments, varying factor intensities across sectors, and household-specific credit constraints related to wealth. As with a labor mobility literature, we find that occupation shifts can play a role in mitigating adverse impact, or facilitating gains, but the distribution of gains and losses even with this mechanism can be heterogeneous and large.

Chapter 3
The Model

Consider a two-good two-factor trade model with financial friction. The two factors of production are labor and capital. And there are two production sectors, which differ in their factor intensity. Let A denote the labor-intensive sector and let B denote the capital-intensive sector. In this economy, there is a continuum of infinitesimal agents who are different in their wealth level and in their "entrepreneurial ability". In each period, agents choose to be a wage worker or choose to run a business as an entrepreneur in one of the two sectors. An entrepreneur utilizes the factors of production and produces consumption goods. A worker provides inelastic labor supply[3] $\bar{L}$ at the market wage rate w_t. We assume that workers can move freely across sectors but cannot move across regions.

3.1 Preference, Entrepreneurial Ability, and Technology

In each period, agents save a fraction s of their income and consume the rest. Agent i derives the utility from consuming goods A and B through the instantaneous utility function

$$U_{it} = \left(\frac{C_{it}^A}{\mu}\right)^{\mu} \left(\frac{C_{it}^B}{1-\mu}\right)^{1-\mu}$$

where U_{it} is the utility of agent i in period t, C_{it}^A is agent i's consumption of good A in period t, and C_{it}^B is agent i's consumption of good B in period t.

Agents accumulate their wealth by holding capital, which is produced by combining goods A and B according to the production function

$$\Delta K_{it} = \left(\frac{I_{it}^A}{\mu}\right)^{\mu} \left(\frac{I_{it}^B}{1-\mu}\right)^{1-\mu}$$

where ΔK_{it} is the new capital produced, I_{it}^A is agent i's investment of good A in period t, and I_{it}^B is agent i's investment of good B in period t. The price of capital q is therefore equal to

$$q = (p_A)^{\mu}(p_B)^{1-\mu}$$

where p_A is the price of good A and p_B is the price of good B. The capital will be use as the numéraire and therefore $q = 1$.

[3] The estimated wage elasticities in the data are quite low (see Bonhomme et al., 2012).

In this model, agents are endowed with different “entrepreneurial ability”, which affect each agent’s output as an entrepreneur. If agent i chooses to become an entrepreneur in sector A, he produces good A using the following technology:

$$Y_{it}^{A} = A_i K_{it}^{\alpha_K} L_{it}^{\alpha_L}$$

where Y_{it}^{A} is the level of good A produced by agent i, A_i is the total factor productivity (TFP) of agent i in sector A, K_{it} is the level of capital used, and L_{it} is the level of labor employed.

Similarly, if agent i chooses to become an entrepreneur in sector B, the technology available to him is

$$Y_{it}^{B} = B_i K_{it}^{\beta_K} L_{it}^{\beta_L}$$

where Y_{it}^{B} is the level of good B produced by agent i and B_i is the TFP of agent i in sector B.

I assume that sector A is relatively labor-intensive, i.e.,

$$\alpha_K/\alpha_L < \beta_K/\beta_L.$$

The TFPs of agent i depend on the sector-average TFP and agent i’s entrepreneurial ability, z_i. That is

$$\ln(A_i) \equiv a_i = \bar{a} + z_i$$

and

$$\ln(B_i) \equiv b_i = \bar{b} + z_i$$

where $\bar{A}$ and $\bar{B}$ are the averages of log TFP for sectors A and B, respectively.

3.2 Borrowing Limits

Due to an imperfect financial market, the amount of capital than an entrepreneur can utilize depend on his wealth level. We assume that the maximum level of capital that an entrepreneur i with wealth W_{it} can use in period t is $C_t W_{it}$. In other words, we assume that an entrepreneur i can borrow at most $(C_t - 1)$ times of his wealth level.

3.3 Occupational Choice

An entrepreneur i in sector A with wealth W_{it} and ability z_i solves the following maximization problem:

$$\max_{(K_{it},L_{it})} p_A A_i K_{it}^{\alpha_K} L_{it}^{\alpha_L} - r_t K_{it} - w_t L_{it}$$

subject to the borrowing constraint

$$K_{it} \leq C_t W_{it}.$$

Let $\pi_t^A(W_{it}, z_i)$ denote the net profit of an entrepreneur i in sector A with wealth W_{it} and ability z_i in period t. Similarly, an entrepreneur i in sector B with wealth W_{it} and ability z_i solves the following maximization problem:

$$\max_{(K_{it},L_{it})} p_B B_i K_{it}^{\beta_K} L_{it}^{\beta_L} - r_t K_{it} - w_t L_{it}$$

subject to the borrowing constraint

$$K_{it} \leq C_t W_{it}.$$

And let $\pi_t^B(W_{it}, z_i)$ denote the net profit of an entrepreneur i in sector B with wealth W_{it} and ability z_i in period t.

Therefore, we can summarize the within-period income of agents in each group as follows:

$$\pi_t(W_{it}, z_i) = \begin{cases} w_t\bar{L} + r_t W_{it} & \text{for a worker} \\ \pi_t^A(W_{it}, z_i) + r_t W_{it} & \text{for an entrepreneur in sector } A \\ \pi_t^B(W_{it}, z_i) + r_t W_{it} & \text{for an entrepreneur in sector } B \end{cases} \quad (3.1)$$

3.4 Markets for Capital and Labor

In this model, we assume that the market for capital is completely open and the market for labor is completely closed. In equilibrium, the wage rate w_t adjusts so that the local demand for labor equals the local supply of labor. This assumption might seem extreme at first. However, it is not unreasonable in practice. In the data, interest rates are closer across provinces than wage rates.

3.5 Mechanics of the Model

Borrowing limits and relative prices will jointly determine the occupational choices and the equilibrium wage rate. An increase in borrowing limit will increase the demand for capital and labor for the constrained entrepreneur. This will, in turn, increase the real wage rate.

The effect of increasing the borrowing limit on the number of workers vs. entrepreneurs is less obvious. On the one hand, an increase in borrowing limit increases the size and the profits of the constrained entrepreneurs. On the other hand, increasing wage rate makes being a worker become more attractive. An increase in borrowing limit also benefits the entrepreneurs in sector B (capital-intensive) more than the entrepreneurs in sector A (labor-intensive).

Chapter 4
Calibration

4.1 Production Function Estimation

In Townsend Thai data, households' production activities can be classified as one of the four sectors; business, cultivation, fish and shrimp, or livestock. We estimate the production function of each sector using the following specification:

$$\ln(Y_{it}) = \delta_K \ln(K_{it}) + \delta_L \ln(L_{it}) + \varepsilon_{it} \tag{4.1}$$

where the error term ε_{it} captures the household i's specific productivity in period t.

If the households in our data expand their production size when they observe positive productivity shocks, the levels of capital and labor might be correlated with the error term and the OLS estimators could be biased. Therefore, we use the estimation method in Levinsohn and Petrin (2003) to obtain the consistent estimators and use the level of intermediate input as a proxy variable. Table 4.1 reports the estimation results. Cultivation activity is the most labor-intensive, while fish and shrimp activity is the least labor-intensive.

In the data, fish and shrimp activity basically appears only in Chachoengsao and later years in Si Sa Ket. Similarly, livestock activity appears primarily in Lop Buri and Si Sa Ket. Therefore, we use the factor shares of cultivation activity for sector A and use the factor shares of business activity for sector B in our calibration exercises.

Table 4.1 – Estimation of Production Functions

	Cultivation	Business	Livestock	Fish & Shrimp
δ_K	0.2313 (0.0390)	0.3061 (0.0975)	0.3099 (0.1967)	0.5306 (0.1892)
δ_L	0.4564 (0.0375)	0.3922 (0.0873)	0.2260 (0.1052)	0.0660 (0.0963)

Note: Standard errors are in parentheses.

To estimate sector-average TFP and household's entrepreneurial ability, we start by estimating household-specific TFP from the regression residual as follows:

$$a_i = \frac{1}{T}\sum_{t=1}^{T} \varepsilon_{it} \tag{4.2}$$

where a_i denotes the log TFP of household i. Then, we decompose the household-specific TFP into the sector-average TFP and the household's entrepreneurial ability, i.e.,

$$a_i = \bar{a} + z_i \tag{4.3}$$

where z_i is assume to have a normal distribution with mean zero and standard deviation σ_z. Table 4.2 reports the sector-average TFP and σ_z for each activity.

Table 4.2 – Estimated Sector-Average TFP and Ability Dispersion

	Cultivation	Business	Livestock	Fish & Shrimp
$\bar{a}$	4.1244	3.7464	4.6071	3.1648
σ_z	0.8409	0.9644	1.4057	1.8448

4.2 Assumptions

4.2.1 Saving Rate

In the model, all of the savings is invested in capital. We assume that every household saves 10% of its income in each period based on the Thai macro data (9.3% saving rate). However, recent literatures (e.g., Buera and Shin, 2013) show that, the productive entrepreneurs with low wealth tend to have higher saving rate. One advantage for us is that the occupational choice is determined in an almost static sense which helps us disentangle the impact of trade and financial restrictions.

4.2.2 Labor Endowment

We assume that each household is endowed with 3,461 units of labor per year. This number comes from the Townsend Thai data, in which the median number of household members whose age above 15 is 2.4, and from Thai macro data, in which 69.34% of population aged 15 or above work full-time.

4.2.3 Capital Endowment

Households have different level of capital endowment. The distribution of household's capital is assumed to follow Gamma distribution:

$$f(x;k,\theta) = x^{k-1}\frac{e^{-x/\theta}}{\theta^k G(k)} \tag{4.4}$$

where $G(\cdot)$ is the Gamma function.

4.3 Calibration Exercises

As we envisioned this model as a trade model with occupational choice subject to financial constraints, the obvious exogenous variables are the interest rate, the relative price of goods, and the borrowing limit. For the interest rate, we believe we have a good measure of the interest rate in the data, the observed value. For the relative price and the borrowing limit, we don't think we have very good measures of them, so we calibrate theses two variables. Therefore, we need two endogenous variables against which to calibrate. The model suggests that the relative price should be calibrated against the profit share from each sector, and that the borrowing limit should be calibrated against the wage rate.

There are other endogenous variables (i.e., wealth dynamics, BOP, income/asset levels) as the measures of model performance and don't calibrate or vary parameters to fit them. We have thought about doing otherwise, but at this point here is our thinking: For saving rate, the logical thing to do is to use the saving rate in the data. But since many households have negative income or income close to zero, the measure of saving rate (savings/income ratio) in the data is blown up. Therefore, we decided to use the saving rate from Thai macro data instead. That is, we assume that the household saves 10 percent of its income.

For utility function, we could use the detailed information about the composition of household consumption in the data to determine consumption shares, but this remains to be completed.[4] Currently, we assume that μ = 0.5. The assumption does not affect the equilibrium prices and outcomes of the model except for the size of exports and imports. Our current parameter specification could affect the size of gains/losses in the counterfactual exercises as it has to do with demand elasticities (see Arkolakis, Costinot, and Rodríguez-Clare, 2010).

4.3.1 Initial Conditions

We calibrate the initial wealth distribution, the borrowing limit, and the relative price to match the real wage rate and profits share in the first year. Also, we use the wealth distribution in the data to get further moments of that distribution.

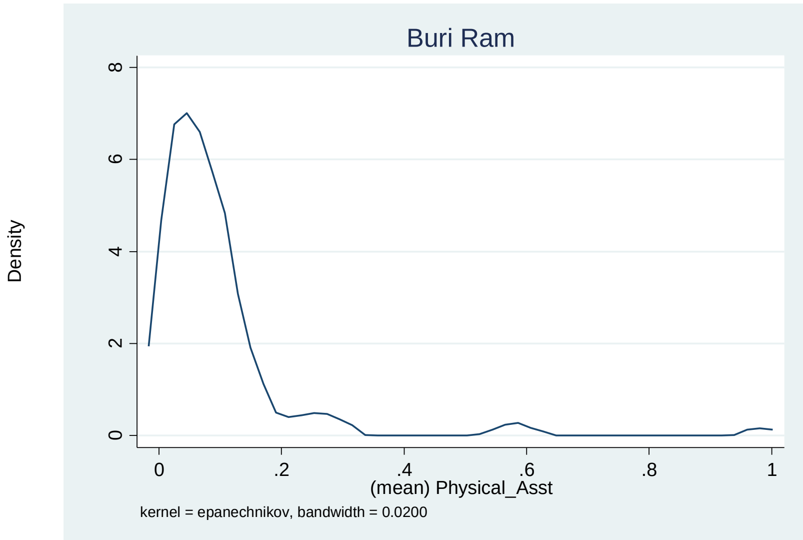
4.3.2 Calibration Procedure

In subsequent years, we adjust the borrowing limit and the relative price jointly to match (i) the real wage rate observed in the data, and (ii) the share of entrepreneurial profits from sector A and sector B.

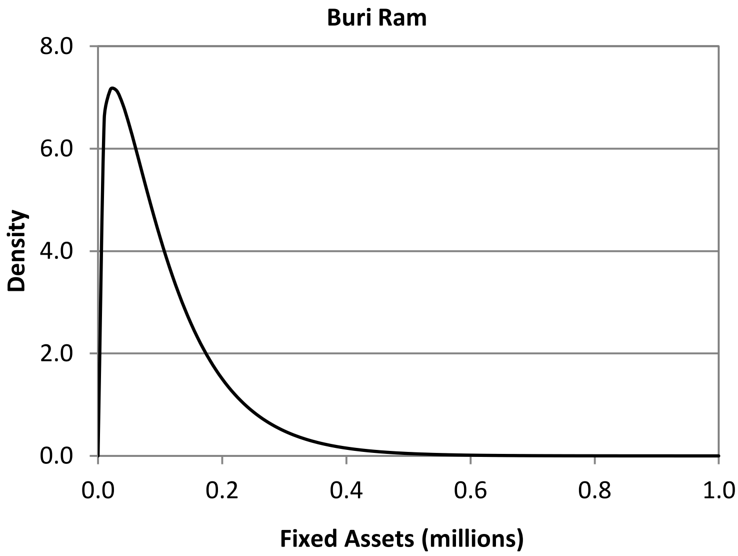
[4] In the model, we use cultivation for labor-intensive sector and we use for livestock, fish and shrimp, and business for capital-intensive sector. When we look at consumption data, we have the consumption of food and non-food, which includes the spending on gas, electricity, clothing, etc. Therefore, we need to decide what to do with the consumption of goods which are not related to the village's production.

4.4 Calibration Result for Buri Ram

Figure 4.1 compares the actual distribution of household's fixed assets in Buri Ram data and the calibrated distribution in the model. The calibrated values for k and θ are 1.3 and 0.08, respectively.



(a) Actual Distribution



(b) Calibrated Distribution

Figure 4.1 – Comparison between the actual and the calibrated distributions of household's fixed assets.

Figure 4.2 shows the real interest rates in Buri Ram, which we take as given when calibrating the model. Figures 4.3 and 4.4 show the comparisons of real wage rate and the comparison of the share of profits from the capital-intensive sector in the data and in the calibrated model for Buri Ram. The model can match the real wage rate and the profit share with those in the data. The calibrated borrowing limit and the calibrated relative price in Buri Ram are shown in Figures 4.5 and 4.6, respectively. The results suggest that the borrowing limit declined sharply in 2000 and has not recovered since.

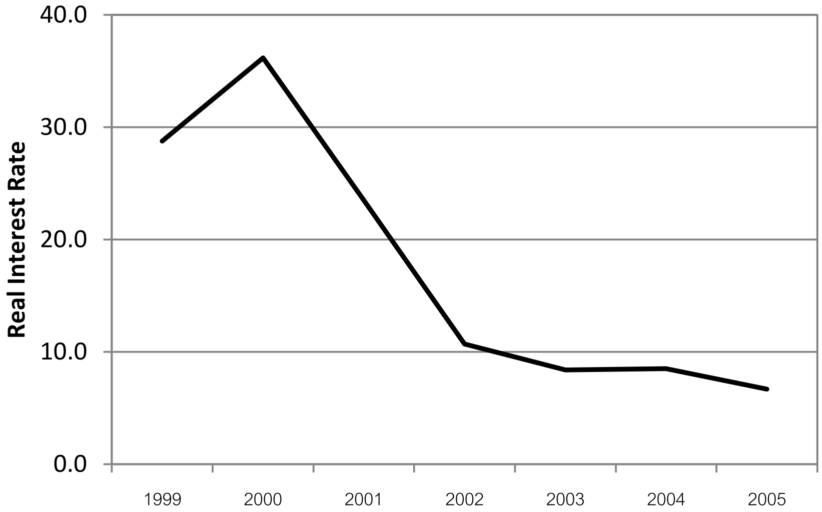


Figure 4.2 – Real interest rate in Buri Ram

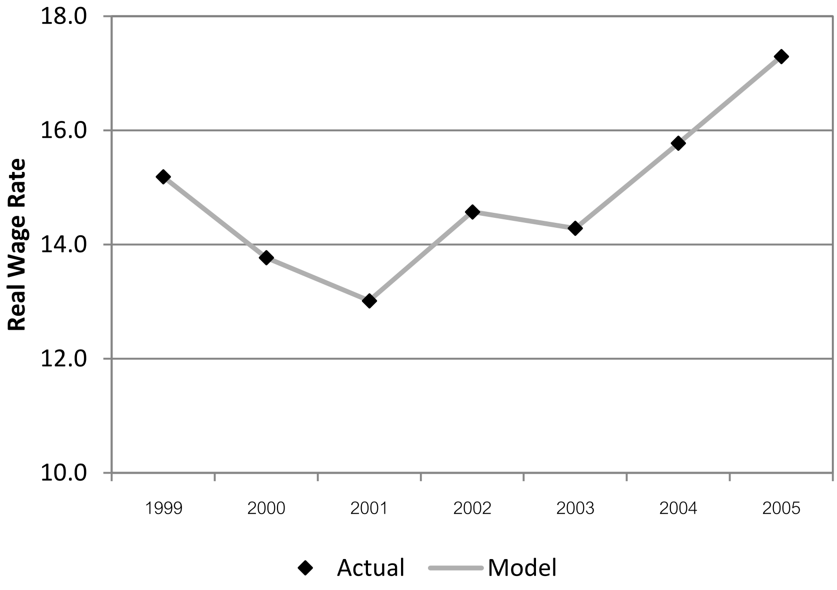


Figure 4.3 – Real wage rate in Buri Ram

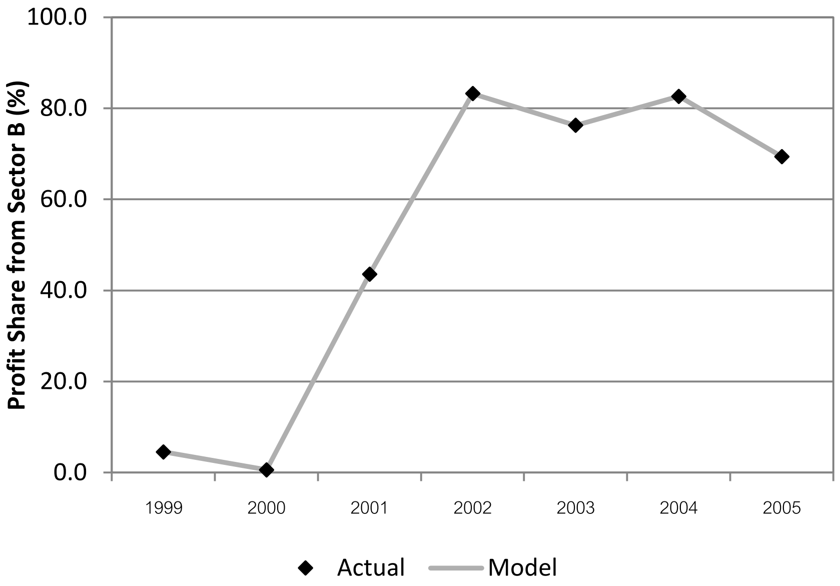


Figure 4.4 – Profit share from sector B in Buri Ram

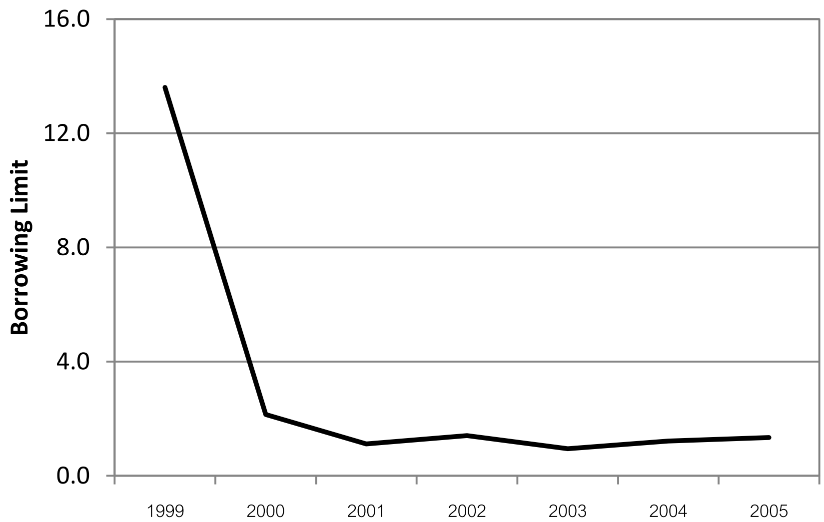


Figure 4.5 – Calibrated borrowing limits in Buri Ram

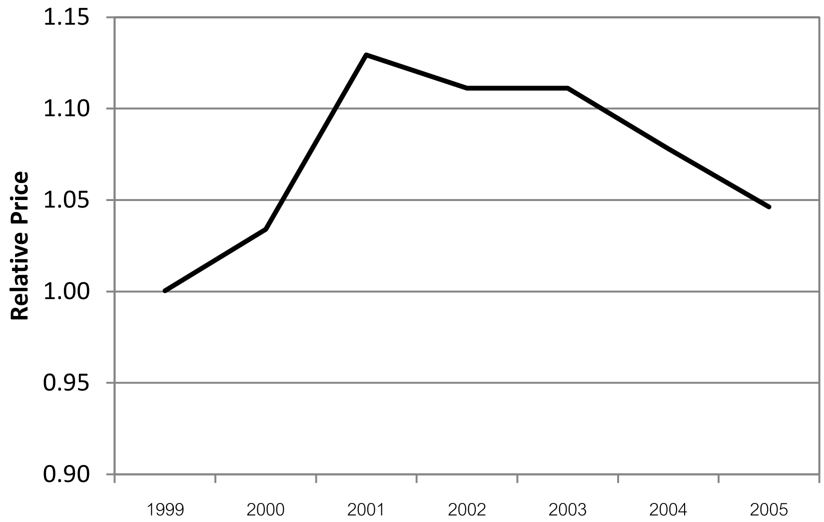


Figure 4.6 – Calibrated relative prices in Buri Ram

Figure 4.7 shows the occupational choices from the calibrated model in Buri Ram in 1999. The horizontal axis represents the initial wealth of the household, while the vertical axis represents the household's entrepreneurial ability. The model predicts that the households with medium-to-low ability will choose to be workers regardless of their wealth level. The households with high ability will be entrepreneurs. The household's choice on sector is determined by the household's ability rather than the household's wealth level.

Figure 4.8 shows the occupational choices from the calibrated model in Buri Ram in 2005. Again, the households with medium-to-low ability will choose to be workers regardless of their wealth level. However, for the households with high ability, their wealth will determine the sector in which they choose to be entrepreneurs. The households with low wealth will choose the labor-intensive sector A, while the households with high wealth will choose the capital-intensive sector B.

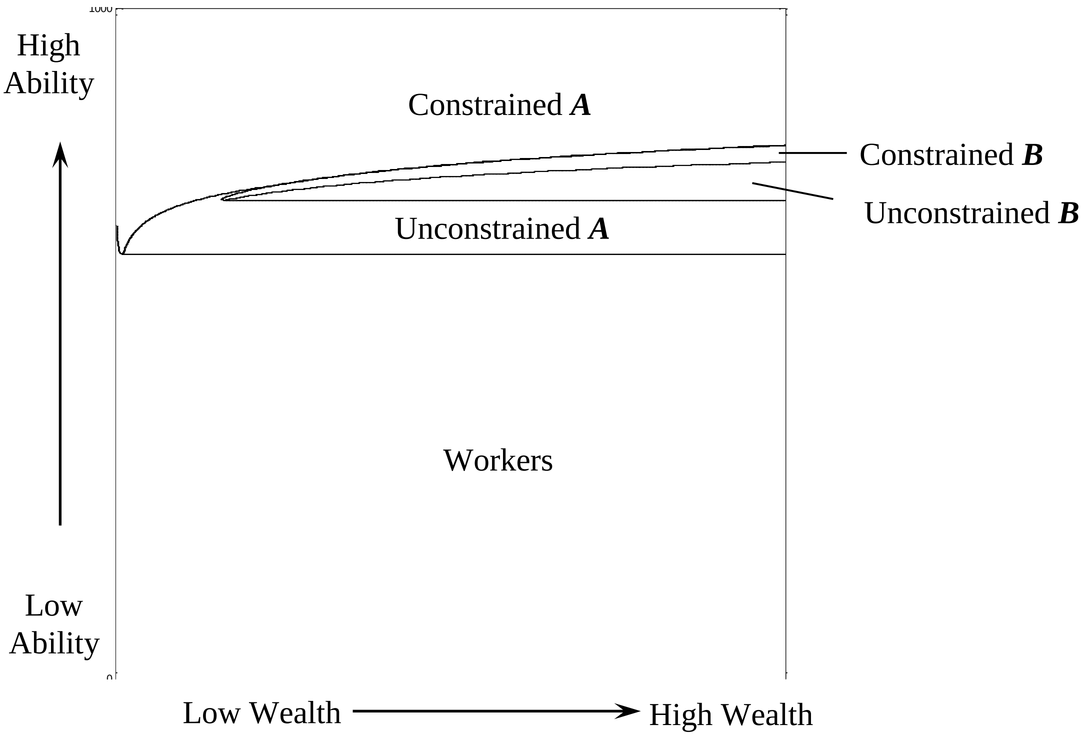


Figure 4.7 – Occupational choices in Buri Ram in year 1999

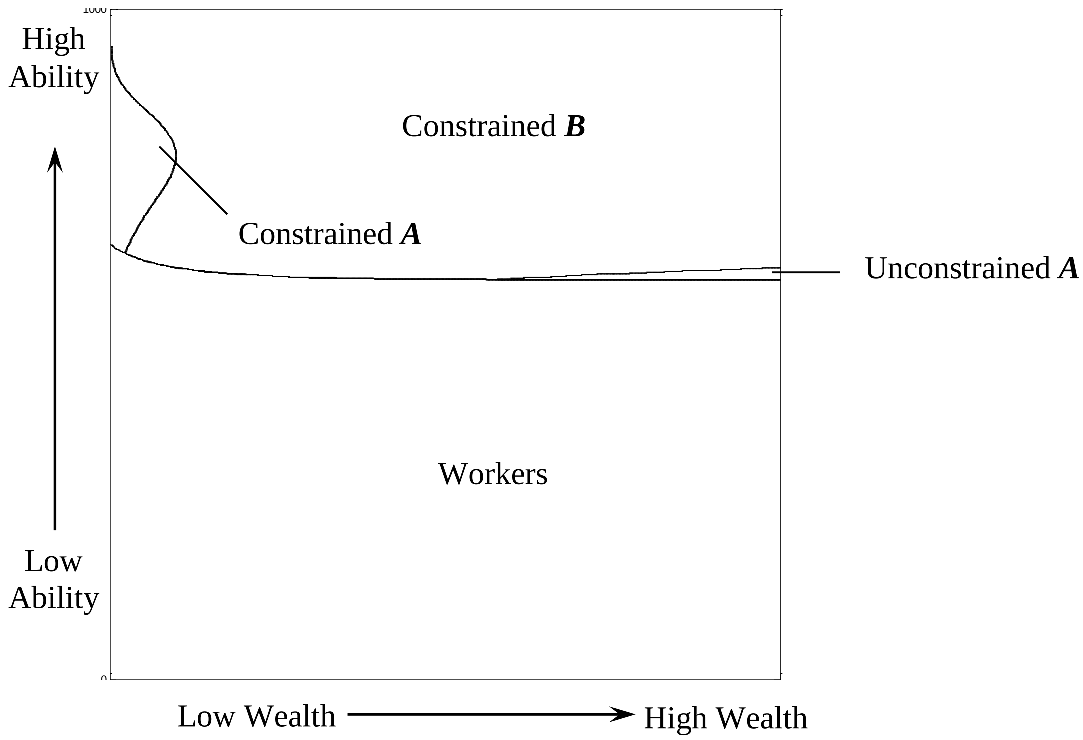
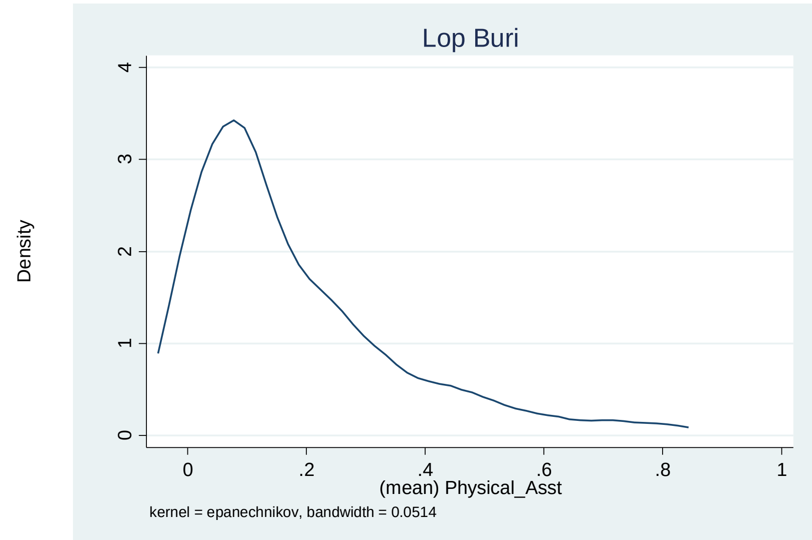


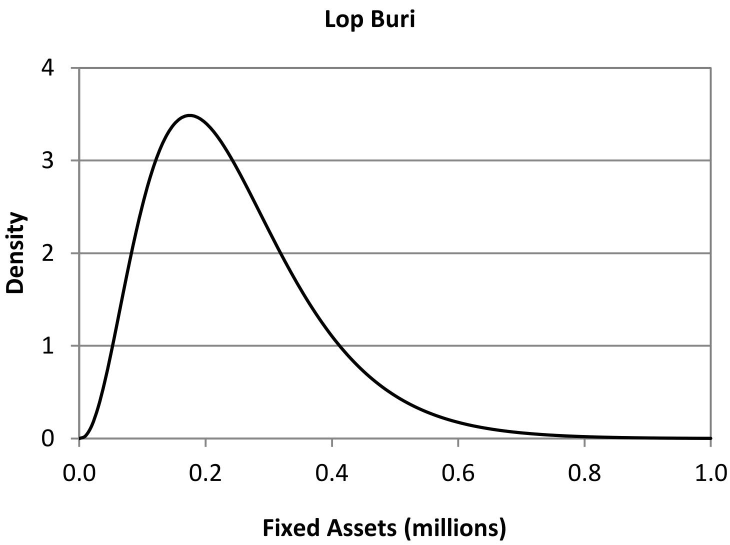
Figure 4.8 – Occupational choices in Buri Ram in year 2005

4.5 Calibration Results for Lop Buri

Figure 4.9 compares the actual initial distribution of household's fixed assets in Lop Buri data and the calibrated distribution in the model. The calibrated values for k and θ are 3.5 and 0.07, respectively.



(a) Actual Distribution



(b) Calibrated Distribution

Figure 4.9 – The actual distribution vs. the calibrated distribution of household's fixed asset in Lop Buri in 1999

Figure 4.10 shows the actual real interest rates in Lop Buri. Figures 4.11 and 4.12 compare the real wage rates and the shares of profits from the capital-intensive sector in Lop Buri data and in the calibrated model. The model can match the real wage rates and the profit shares with those in the data. The calibrated borrowing limits and the calibrated relative prices in Lop Buri are shown in Figures 4.13 and 4.14, respectively.

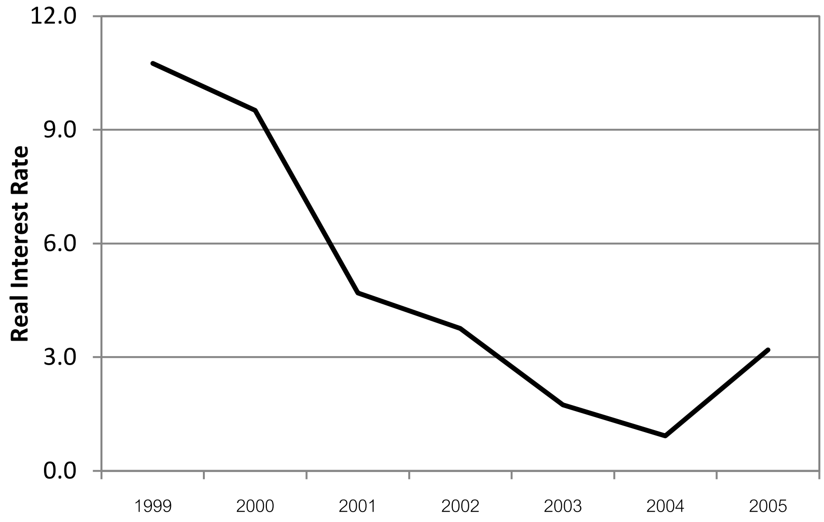


Figure 4.10 – Real interest rate in Lop Buri

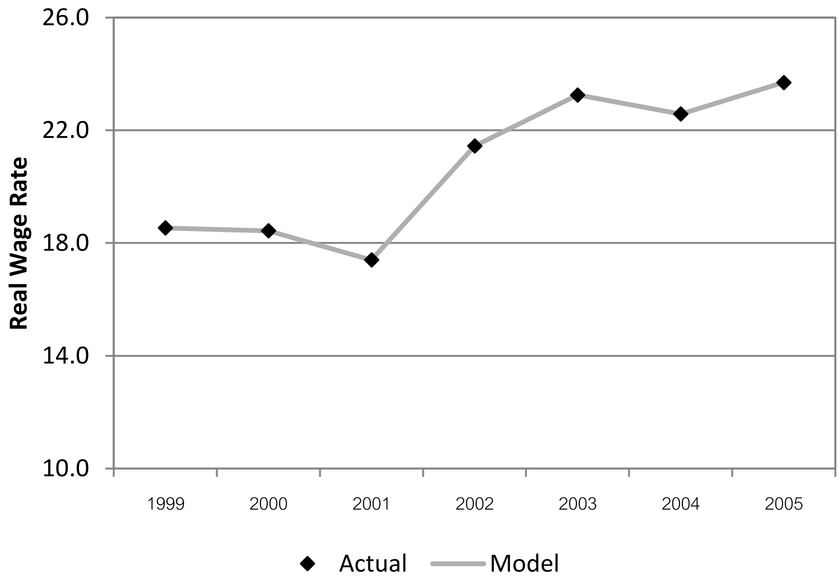


Figure 4.11 – Real wage rates in Lop Buri

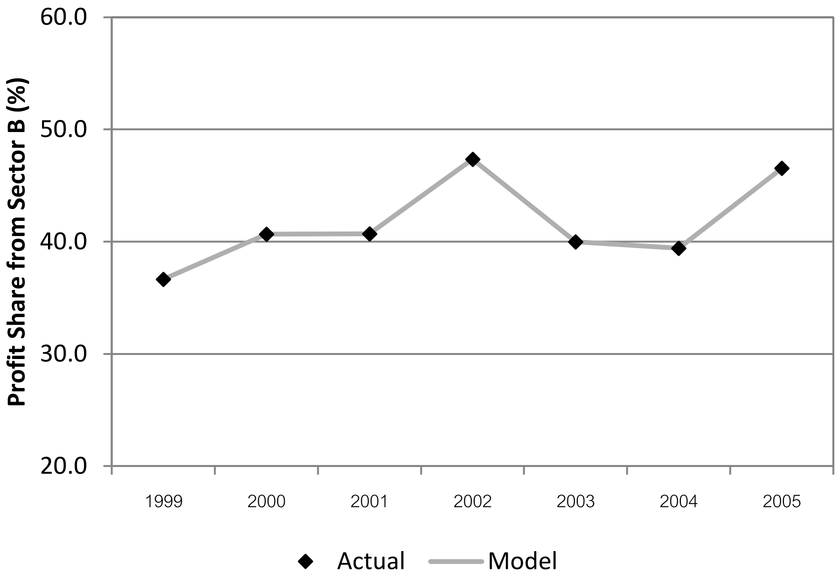


Figure 4.12 – Profit share from sector B in Lop Buri

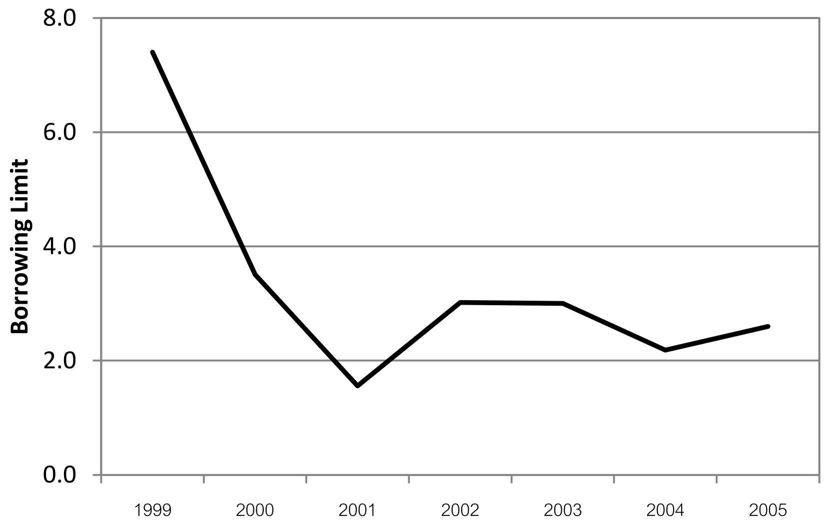


Figure 4.13 – Calibrated borrowing limit in Lop Buri

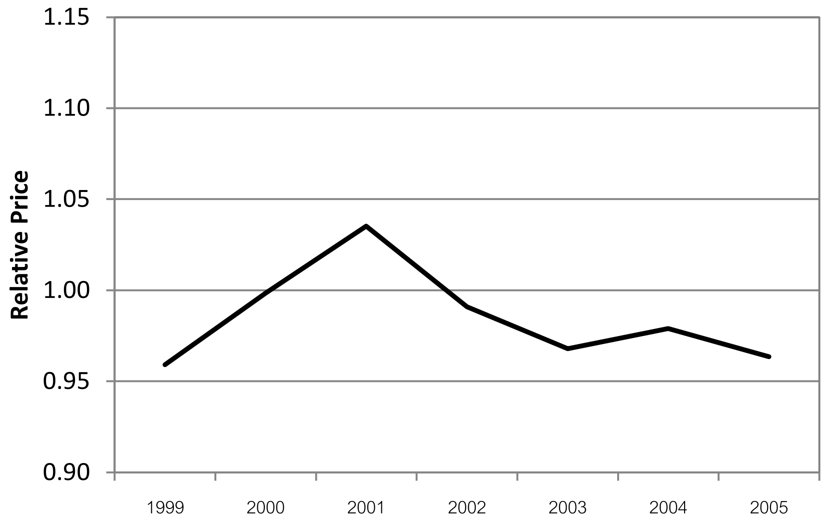


Figure 4.14 – Calibrated relative prices in Lop Buri

Figure 4.15 shows the occupational choices from the calibrated model in Lop Buri in 1999. As in Buri Ram, households with medium-to-low ability will choose to be workers regardless of their wealth level. Households with high ability and high wealth level will choose to be entrepreneurs in sector B, while households with very high ability will choose to be entrepreneurs in sector A.

Figure 4.16 shows the occupational choices from the calibrated model in Lop Buri in 2005. Also similar to Buri Ram in 2005, the households with medium-to-low ability will choose to be workers regardless of their wealth level. And, for the households with high ability, their wealth will determine the sector in which they choose to be entrepreneurs. The households with low wealth will choose the labor-intensive sector A, while the households with high wealth will choose the capital-intensive sector B.

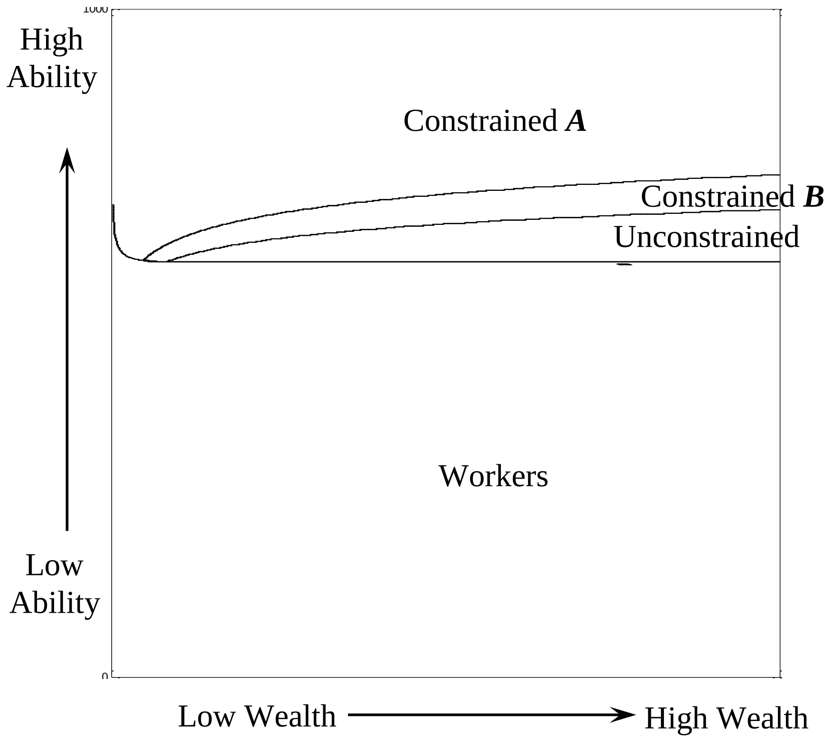


Figure 4.15 – Occupational Choices in Lop Buri in Year 1999

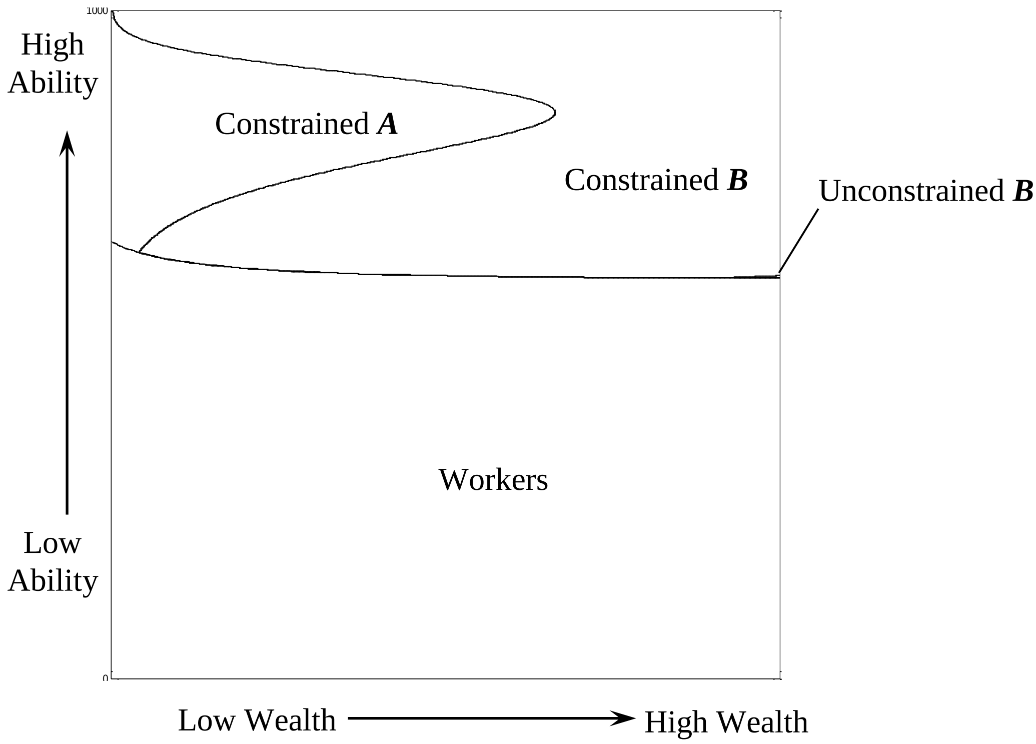


Figure 4.16 – Occupational Choices in Lop Buri in Year 2005

4.6 Evaluating the Model's Performance

In this section, we evaluate the performance of our model by looking at the household's level. We compare the model's prediction on households' occupation, income, and wealth with those in the data.

4.6.1 Household A

We start by considering a household which is relatively high ability and relatively wealthy. First, we compare the occupational choices made by this household with those predicted in the model. The model predicts that this household would choose to be an entrepreneur in sector A in the first two years and choose to be an entrepreneur in sector B in the last five years (Table 4.3). In the data, wages income represents income from being workers, cultivation income represents income from being entrepreneurs in the labor-intensive sector, and business income, fish income, and livestock income represent income from being entrepreneurs in the capital-intensive sector. If we define the household's occupation by the main source of income, the model can correctly predict the occupation of this household in five out of seven years (Table 4.3).

Table 4.3 – The composition of household A's income and the model's prediction of occupational choices

Year	Net Income from the Data					Occupation Prediction
	Wages	Cultivation	Business	Fish & Shrimp	Livestock	
1999	0	7,732	0	0	-6,440	Labor-intensive
2000	1,650	12,500	0	0	-5,474	Labor-intensive
2001	7,700	0	0	0	1,084	Capital-intensive
2002	271,500	17,881	-31,516	0	8,158	Capital-intensive
2003	10,870	26,272	1,089,609	0	5,859	Capital-intensive
2004	13,950	47,510	398,820	300	1,226	Capital-intensive
2005	38,320	47,350	255,027	1,360	1,163	Capital-intensive

Next, we look at how well the model predicts the level of income and assets holding of this household. As seen in Figure 4.17, the model can predict the average level of income for this household quite well (307,287 versus 362,911). However, the model cannot capture the year-by-year fluctuation of this household's income, which is not surprising since there is neither aggregate shock nor idiosyncratic shock in this model. On the other hand, the model tends to underestimate the level of fixed assets of this household (Figure 4.18). One explanation is that this particular household saves at a higher rate than the rate assumed in the model.

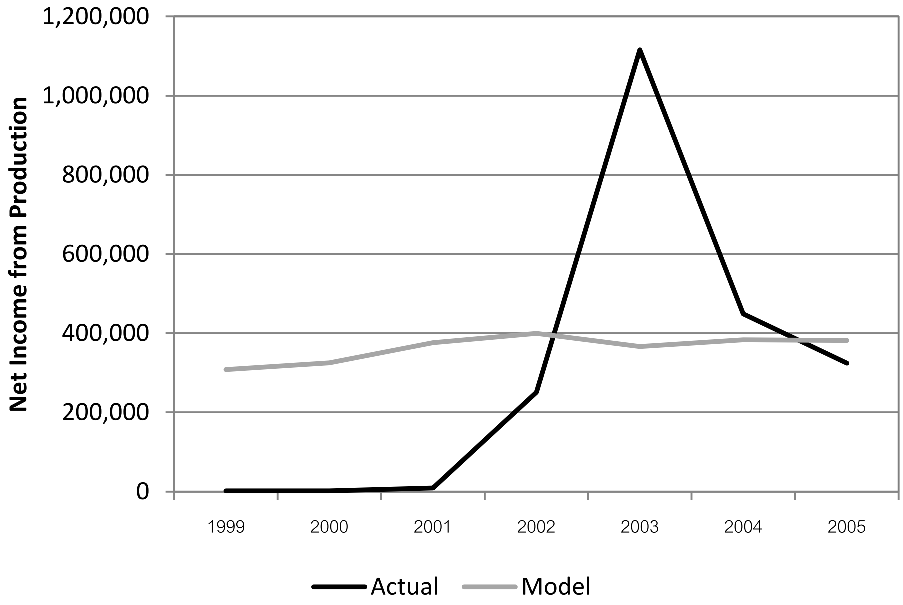


Figure 4.17 – Comparison between the actual net income from production of household A and the predicted income from the model

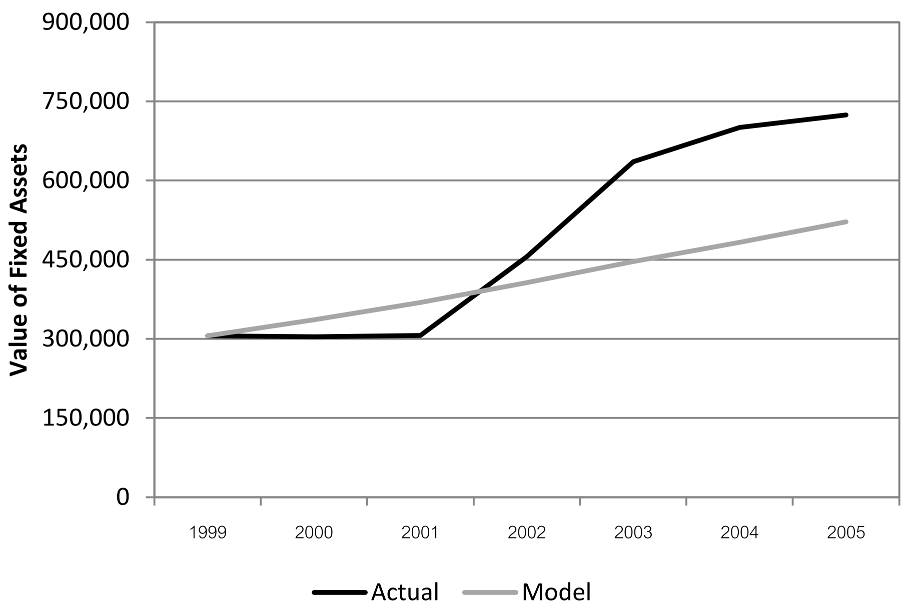


Figure 4.18 – Comparison between the actual value of fixed assets of household A and the predicted value from the model

4.6.2 Household B

Next, we consider a household with intermediate ability and intermediate wealth level. Table 4.4 reports the income composition of this household and the model's prediction of occupation. Comparing to the case of household A, the model performs worse in this case. The model can correctly predict the occupational choice of this household in only two years out of seven years. The predictions overestimate the probability that this household chooses to become a wage earners.

Next, we compare the actual and the predicted level of household B's income and wealth level in Figures 4.19 and 4.20, respectively. On average, the model can predict the income level reasonably well (79,278 vs. 92,925). However, similar to the previous example, the model fails to capture the trend. Also, the model underestimates the change in the wealth level of this household.

Table 4.4 – The composition of household B's income and the model's prediction of occupational choices

Year	Net Income from the Data					Occupation Prediction
	Wages	Cultivation	Business	Fish & Shrimp	Livestock	
1999	7,230	-4,822	3,300	0	-4,541	Worker
2000	7,420	39,972	0	0	-5,538	Worker
2001	37,948	14,619	0	0	-1,897	Worker
2002	36,598	32,744	0	0	-2,374	Worker
2003	19,250	38,468	19,185	0	946	Capital-intensive
2004	29,740	55,397	171,090	600	4,872	Worker
2005	11,600	19,040	60,547	700	1,713	Worker

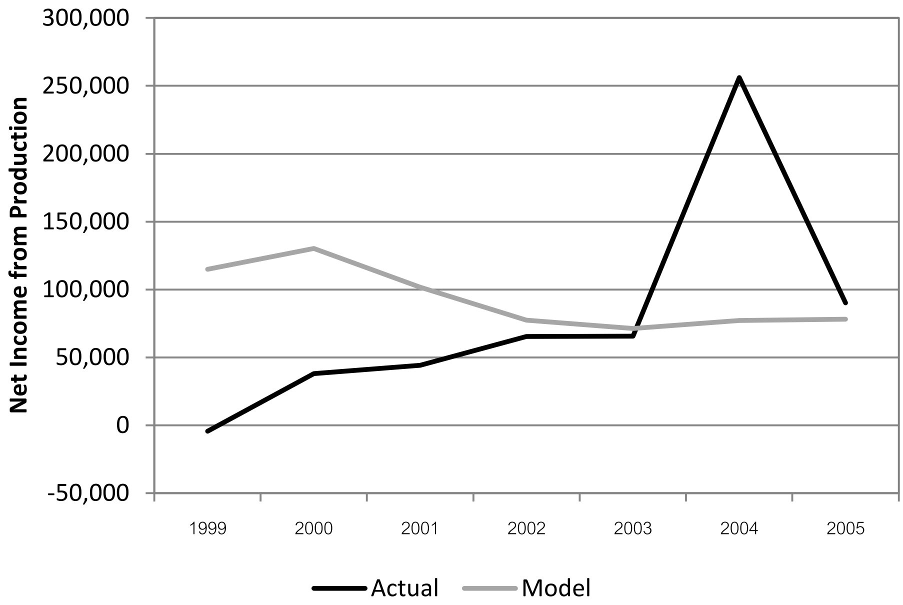


Figure 4.19 – Comparison between the actual net income from production of household B and the predicted income from the model

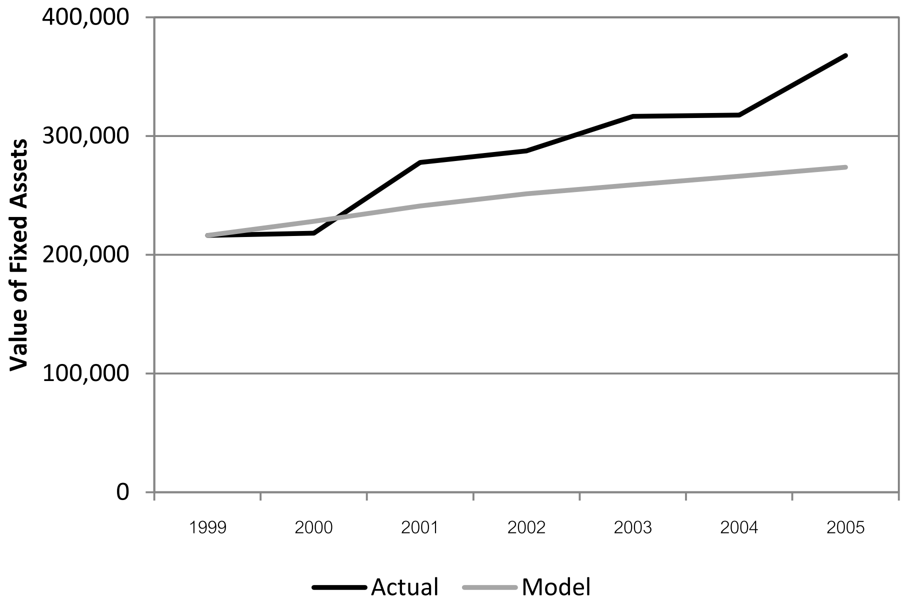


Figure 4.20 – Comparison between the actual value of fixed assets of household B and the predicted value from the model

4.6.3 Household C

As a final example, we consider a household with low ability and intermediate wealth level. The model can predict the occupational choices of this household quite well. That is, it can correctly predict the household's occupation in five out of seven years (Table 4.5). However, as seen in Figure 4.21, the model tends to over-predict the income of this household (75,175 vs. 102,501). And, similar to the previous two examples, the model tends to under-predict the household's wealth level (Figure 4.22).

Table 4.5 – The composition of household C's income and the model's prediction of occupational choices

Year	Net Income from the Data					Occupation Prediction
	Wages	Cultivation	Business	Fish & Shrimp	Livestock	
1999	42,850	6,460	0	0	-1,977	Worker
2000	36,960	4,660	0	0	-1,928	Worker
2001	24,105	3,976	0	0	-961	Worker
2002	82,600	0	0	0	-952	Worker
2003	32,600	0	-9,952	0	-755	Worker
2004	15,760	4,526	45,021	200	-1,872	Worker
2005	85,750	0	111,239	120	-104	Worker

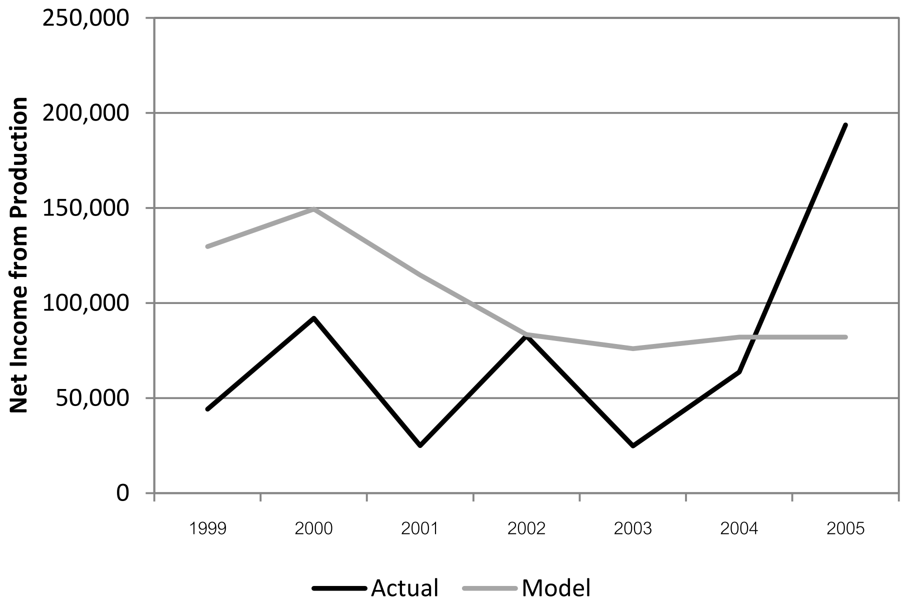


Figure 4.21 – Comparison between the actual net income from production of household C and the predicted income from the model

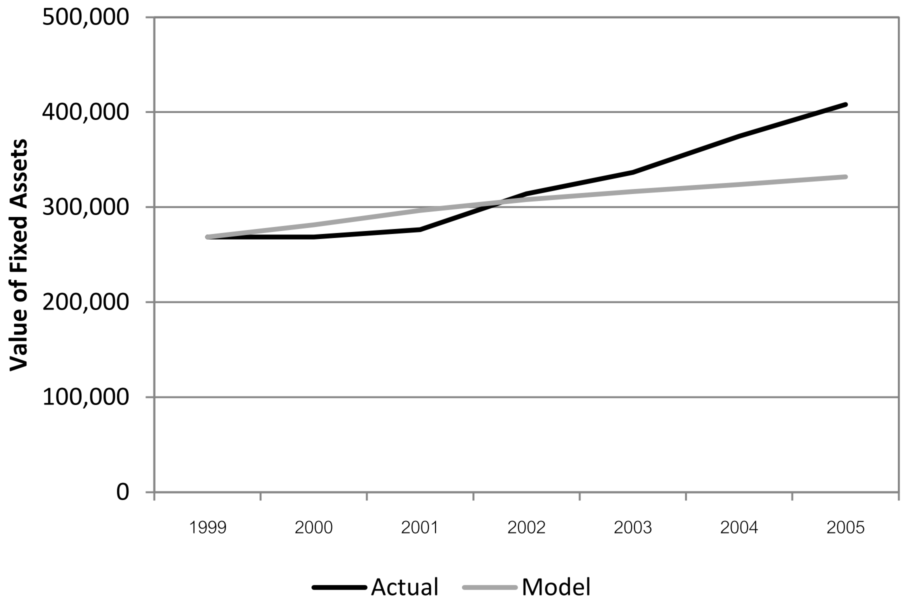


Figure 4.22 – Comparison between the actual value of fixed assets of household C and the predicted value from the model

Chapter 5
Counterfactual Exercises

5.1 Introduction

In this chapter, we consider two counterfactual exercises. In the first exercise, we try to distinguish the effects of real and financial factors by keeping one factor at the initial level and varying another factor. In the second exercise, we consider the effects of shutting down the trade market, the financial market, or both.

5.2 Disentangling Real and Financial Factors

In this exercise, we freeze the relative price at the initial 1999 level and vary the financial variables (i.e., the interest rate and the borrowing limit) using the calibrated values from the baseline scenario. Then, we freeze the financial variables at the initial 1999 levels and vary the relative price instead. Hence, we are disentangling real and financial forces behind the movement over time through the lens of the model.

5.2.1 Buri Ram

In Buri Ram, both interest rate and borrowing limit decrease over time (see Figures 4.2 and 4.5). These changes have opposing effects on wage rate. On the one hand, the lower interest rate raises the marginal product of labor. Thus, wage rate should be higher. On the other hand, the lower borrowing limit lowers the demand for labor, and wage rate as well. Figure 5.1 shows the effects of financial factors on wage rate in Buri Ram. The black line shows the wage rate in baseline scenario, where both real and financial factors are in effect. The grey line shows the wage rate in the counterfactual scenario where only the real factor (i.e., relative price) is considered. Thus, the difference between the black line and the grey line shows the effect of financial factors (i.e., interest rate and borrowing limit). The result suggests that the effect of the borrowing limit dominates since the wage rate is lower in the baseline scenario (which includes the effect of financial factors) than in the “Real-only” counterfactual exercise (which excludes the effect of financial factors).

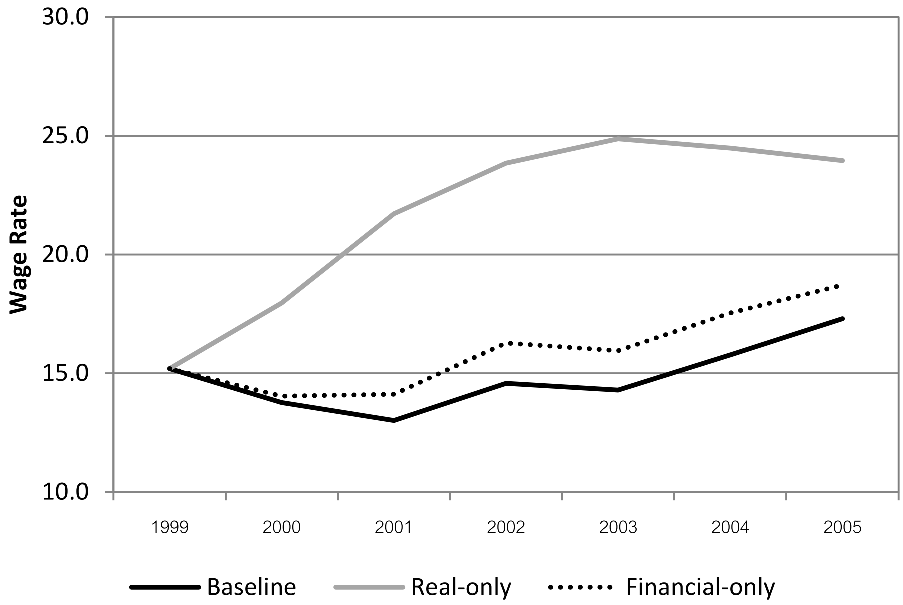


Figure 5.1 – Real wage rates in baseline scenario and counterfactual exercises in Buri Ram

Changes in interest rate and borrowing limit also have opposing effects on the share of profits from each sector. On the one hand, the decreasing interest rate benefits the capital-intensive sector B more than the labor-intensive sector A. Therefore, the share of profits from sector B should increase. On the other hand, the lowering borrowing limit affects the constrained entrepreneurs in sector B more than those in sector A, and thus, the share of profits from sector B should decrease. Figure 5.2 compares the share of profits from sector B in Buri Ram in baseline scenario with those in the counterfactual exercises. Again, the result suggests that the effect from lowering borrowing limit dominates since the share of profits from sector B in the baseline scenario is lower than that in the “Real-only” counterfactual exercise.

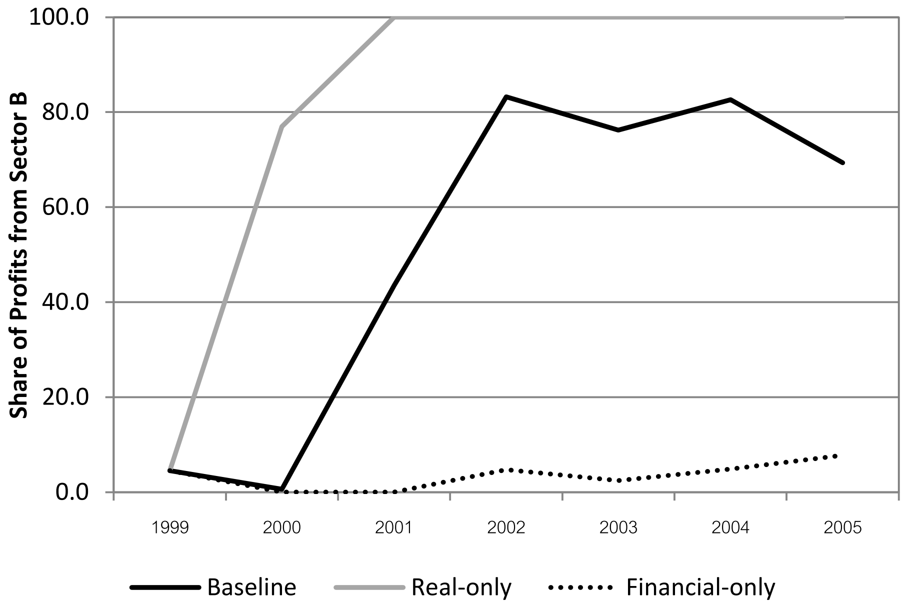


Figure 5.2 – Shares of profits from sector B in baseline scenario and counterfactual exercises in Buri Ram

The calibrated relative price in Buri Ram shows upward trend between 1999 and 2001 and shows downward trend between 2001 and 2005 (see Figure 4.6). However, the calibrated relative price never goes below the initial value in 1999. An increase in relative price would increase the profit from becoming an entrepreneur in sector B and lower the profit from becoming an entrepreneur in sector A. As the marginal entrepreneurs switch from sector A to sector B, the share of profit from sector B would increase. At the same time, the wage rate would decrease due to the lower demand for labor. Therefore, the wage rate in the “Financial-only” counterfactual exercise which does not include the effect from the real factor should be higher than the wage rate in the baseline scenario. At the same time, the share of profits from sector B in baseline scenario should be higher than that in the “Financial-only” counterfactual exercise. Both predictions are supported by the results in Figures 5.1 and 5.2.

5.2.2 Lop Buri

The interest rate and the borrowing limit in Lop Buri have been decreasing since 1999 (see Figures 4.10 and 4.13). As discussed in the case of Buri Ram, these changes have opposing effects on the wage rate and the share of profit from sector B. Figures 5.3 and 5.4 show the effects of financial factors on the wage rate and the sector-B profit, respectively. The results suggest that, similar to the case of Buri Ram, the effect of the decreasing borrowing limit dominates the effect of the decreasing interest rate.

Also, in Lop Buri, the calibrated relative price from 2000 to 2005 are slightly higher than the level in 1999. As discussed in the case of Buri Ram, the higher relative price will lower wage rate and raise the share of profit from sector B. These conjectures are also confirmed in Figures 5.3 and 5.4.

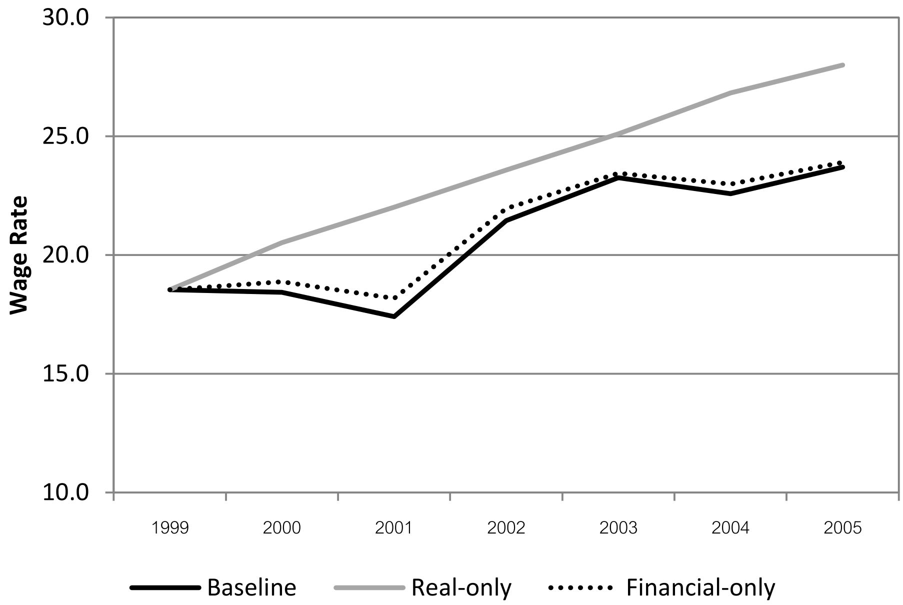


Figure 5.3 – Real wage rates in baseline scenario and counterfactual exercises in Lop Buri

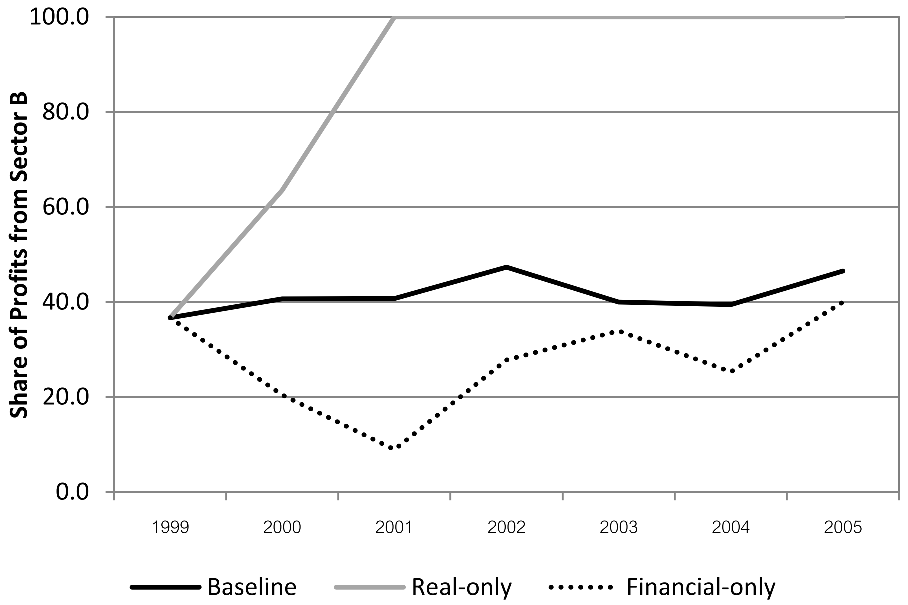


Figure 5.4 – Shares of profits from sector B in baseline scenario and counterfactual exercises in Lop Buri

5.3 Counterfactual Exercises II

In the second counterfactual exercise, we try shutting down trade, shutting down external finance, and shutting down both. When trade channel is shut down, the demand for goods must equal the supply of goods from within the village. When external finance channel is shut down, the local demand for capital must equal the local supply of capital.

5.3.1 Buri Ram

Figure 5.5 shows the value for outputs from both sectors in baseline scenario in Buri Ram. The level of output from labor-intensive sector A is higher than the level of output from capital-intensive sector B between 1999 and 2001. From 2002, however, the level of output from sector B becomes higher. Figure 5.6 shows the demand for and the supply of capital in baseline scenario in Buri Ram. The model predicted that the village has excess supply of capital in every year.

Figure 5.5 – The predicted value of outputs from each sector in Buri Ram

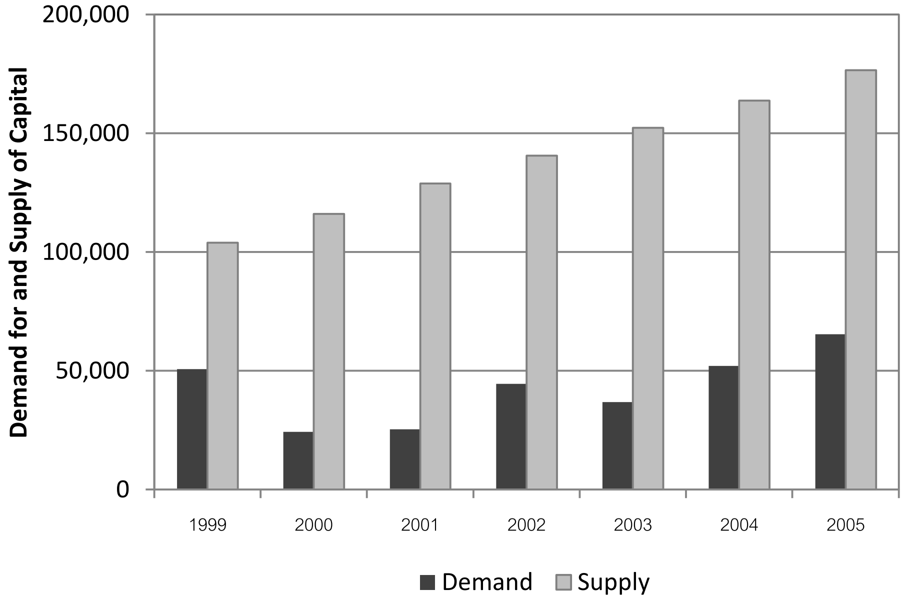


Figure 5.6 – The demand for and the supply of capital in Buri Ram

Figures 5.7, 5.8, 5.9, and 5.10 show real wage rates, real interest rates, relative price, and share of profits from manufacturing sector in baseline scenario and counterfactual exercises, respectively.

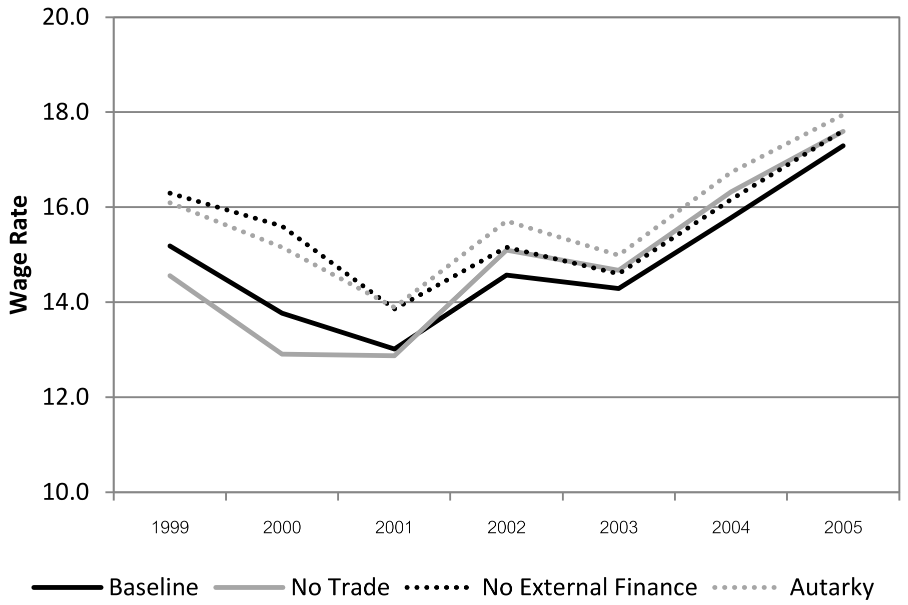


Figure 5.7 – Real wage rates in baseline scenario and counterfactual exercises in Buri Ram

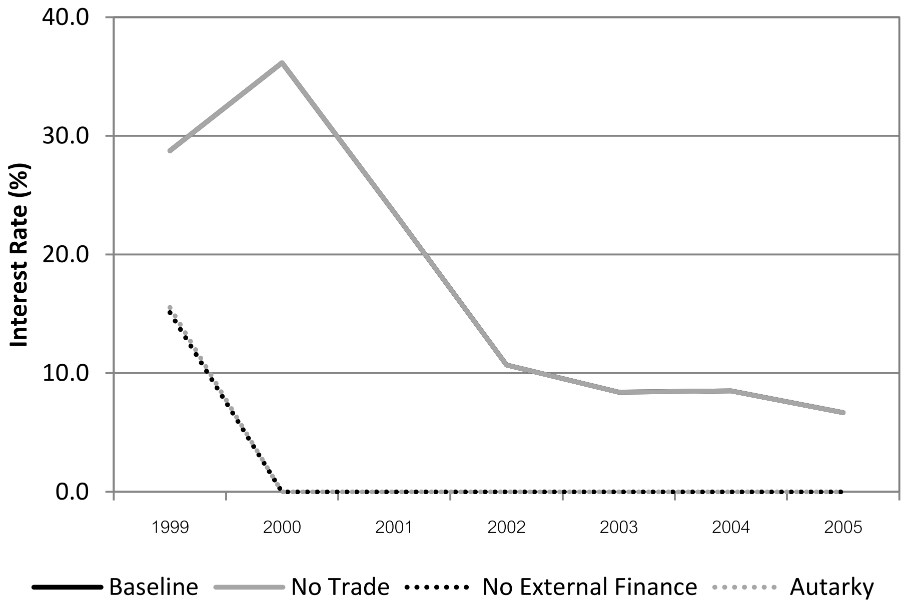


Figure 5.8 – Real interest rates in baseline scenario and counterfactual exercises in Buri Ram

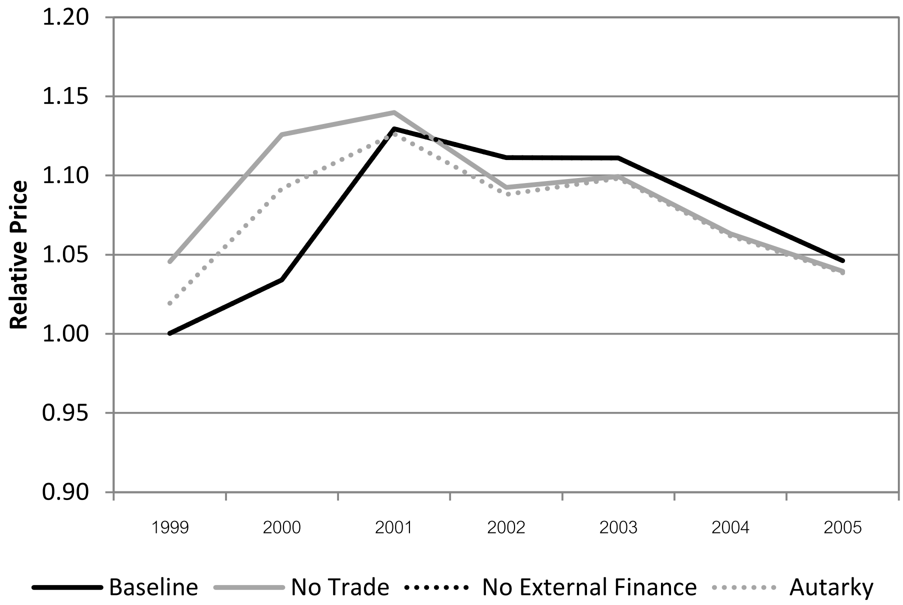


Figure 5.9 – Relative prices in baseline scenario and counterfactual exercises in Buri Ram

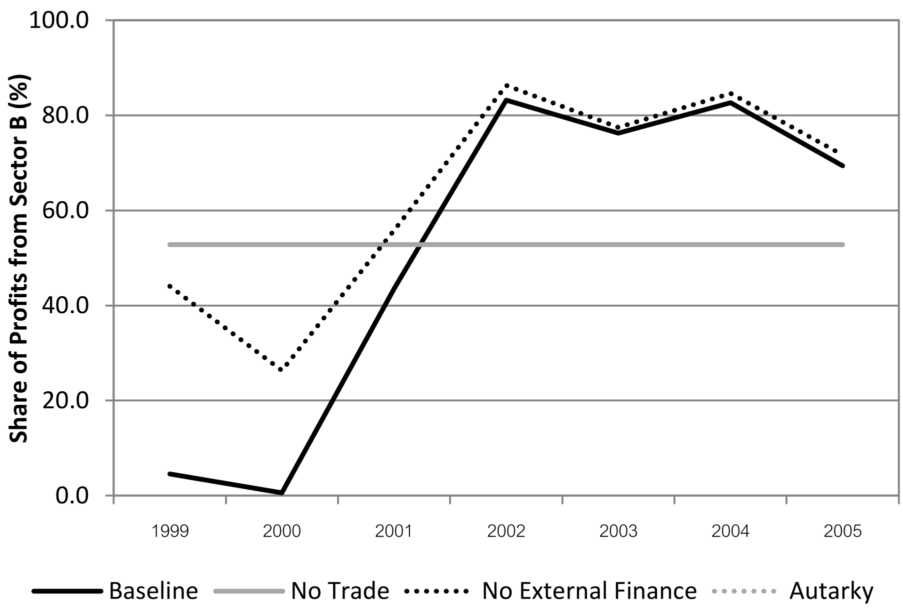


Figure 5.10 – Shares of profits from sector B in baseline scenario and counterfactual exercises in Buri Ram

The effect of shutting down trade channel will depend on the relative output levels in baseline scenario. For example, if the village exports labor-intensive goods and imports capital-intensive goods, as in Buri Ram (1999-2001), shutting down trade will create an excess supply of labor-intensive goods and excess demand for capital-intensive goods. Therefore, relative price p_B/p_A will increase in the counterfactual exercise. Moreover, shifting village's production toward capital-intensive goods will lower the demand for labor and, therefore, the wage rate.

The effect of shutting down external finance channel depends on the excess supply of (or the excess demand for) capital in baseline scenario. If the village has excess supply of capital, as in Buri Ram, shutting down external finance channel will lower interest rate. In the no-external-finance counterfactual exercise in year 2000, for example, there still exists excess supply of capital even though the interest rate dropped to zero due to the borrowing limit. The lower interest rate increases the demand for capital and hence the marginal product of labor and, therefore, the wage rate. Sector B benefits more from the lower interest rate since it is more capital-intensive.

Lastly, the effect of shutting down both trade and external finance channels will tend to reflect the (nonlinear) combination of the effect of shutting down each channel.

5.3.2 Lop Buri

Figure 5.11 shows the value for outputs from both sectors in baseline scenario in Lop Buri. The level of output from labor-intensive sector A is higher than the level of output from capital-intensive sector B in every year. Figure 5.12 shows the demand for and the supply of capital in baseline scenario in Lop Buri. The model predicted that the village has excess supply of capital in every year.

Figures 5.13, 5.14, 5.15, and 5.16 show real wage rates, real interest rates, relative price, and share of profits from manufacturing sector in baseline scenario and counterfactual exercises, respectively.

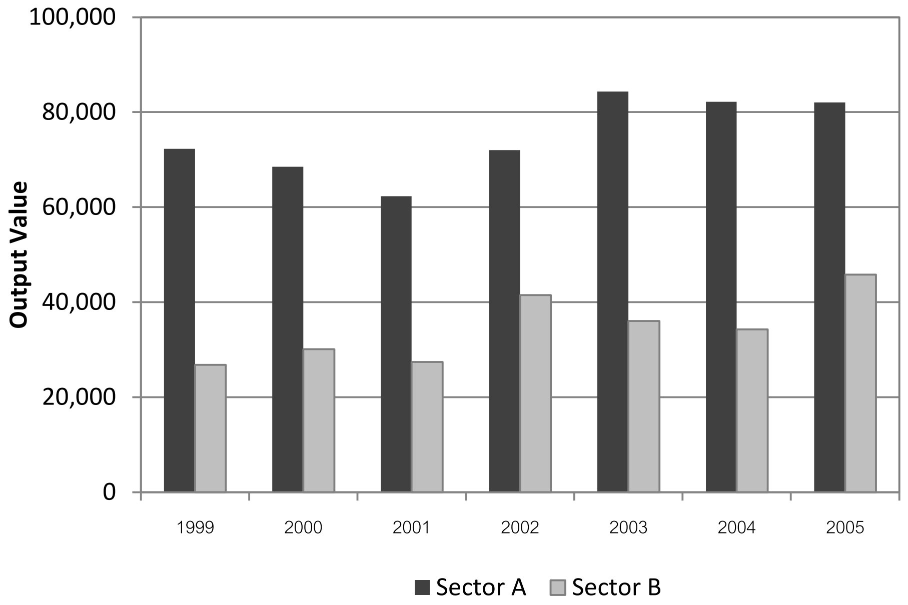


Figure 5.11 – The predicted value of outputs from each sector in Lop Buri

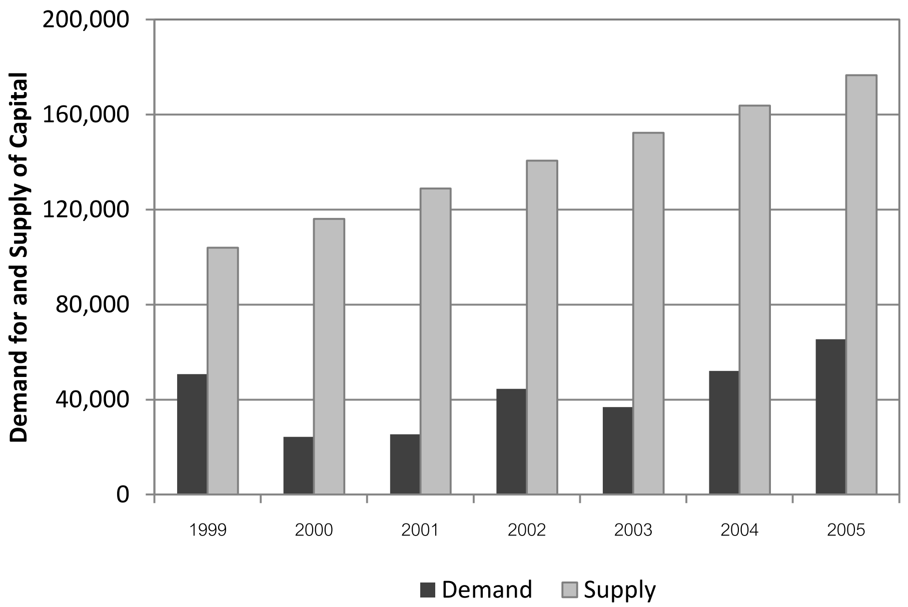


Figure 5.12 – The demand for and the supply of capital in Lop Buri

As discussed above, the village's output from sector A in higher that the village's output from sector B in every year. If trade channel was suddenly shut down, there would be excess demand for goods B and excess supply of goods A. Therefore, the relative price of good B would increase. As a result, the village would increase the production in sector B and reduce the production in sector A. Since sector B is more capital-intensive in relative to sector A, the shift in production would also lower the demand for labor and increase the demand for capital. Therefore, the wage rate in the counterfactual exercise will be lower than that in the baseline scenario. Also, the share of profits from sector B will be higher than that in the baseline scenario.

In baseline scenario, the supply of capital is higher than the demand for capital in all years for the village in Lop Buri. Therefore, if external finance channel was shut down, there would be excess supply of capital and the interest rate would go down. The lower interest rate would increase the marginal product of labor, and the wage rate would go up. Finally, the capital-intensive sector B would benefit more from the lower interest rate. Therefore, the share of profits from sector B would go up.

Similar to the case of Buri Ram, in the autarky counterfactual exercise, the wage rate, the relative price, and the share of profit from sector B tend to be the combination of the equilibrium values in no-trade counterfactual exercise and no-external-finance counterfactual exercise.

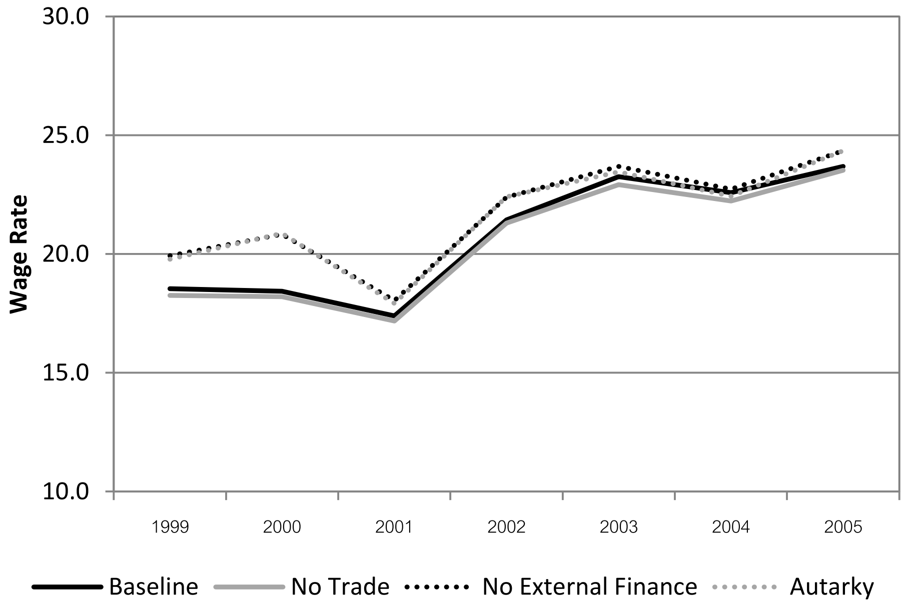


Figure 5.13 – Real wage rates in baseline scenario and counterfactual exercises in Lop Buri

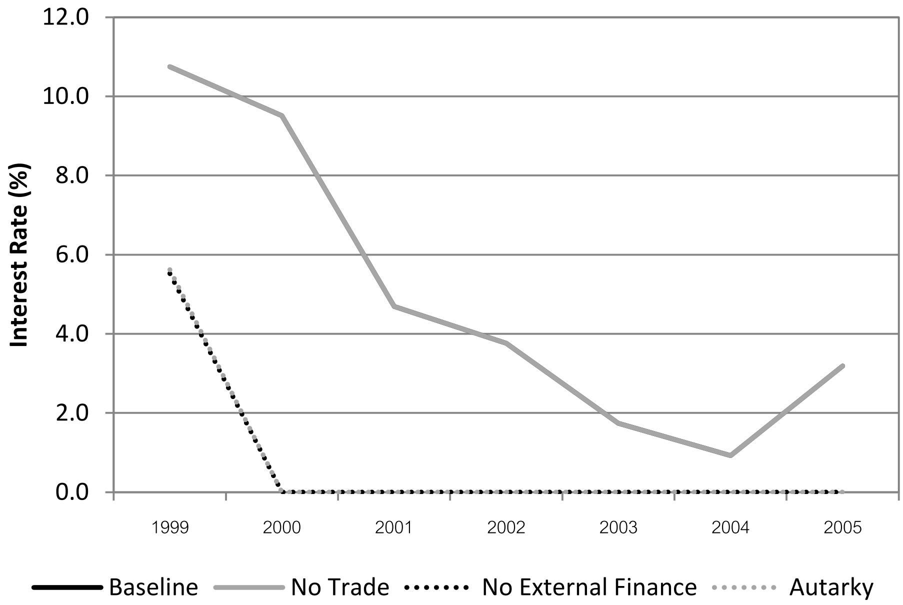


Figure 5.14 – Real interest rates in baseline scenario and counterfactual exercises in Lop Buri

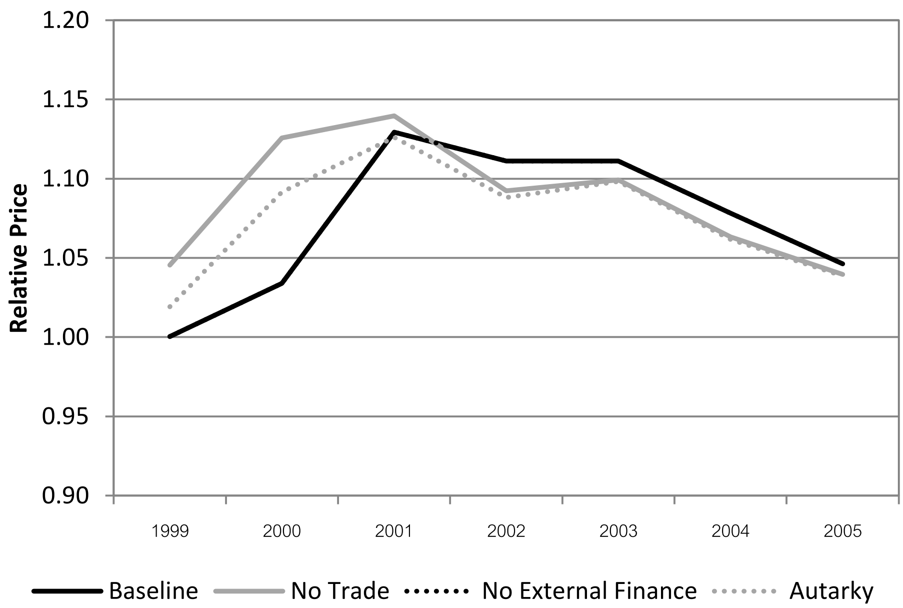


Figure 5.15 – Relative prices in baseline scenario and counterfactual exercises in Lop Buri

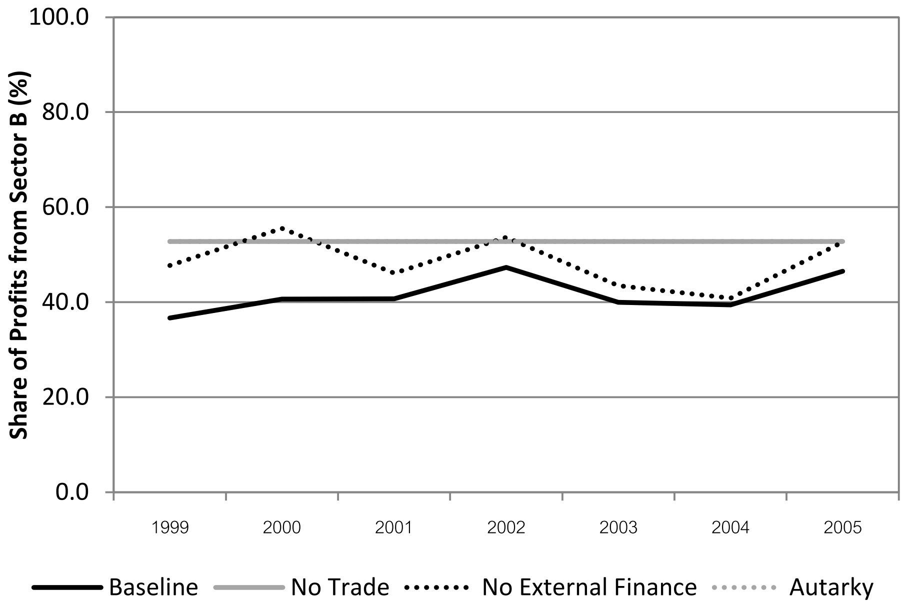


Figure 5.16 – Shares of profits from sector B in baseline scenario and counterfactual exercises in Lop Buri

5.3.3 Welfare Analysis

Finally, we return to our main theme and consider the effects of counterfactual exercises on the income of agents. We pick Buri Ram as a leading example, so as to not overwhelm the reader with too many scenarios and regions. Figure 5.17 shows the income difference between baseline scenario and no-trade counterfactual exercises in Buri Ram in year 1999. Figure 5.18 shows the occupational switch from baseline scenario to no-trade counterfactual exercises in Buri Ram in year 1999. The households are classified into three groups based on their ability; the average-skilled group ($z_i = 0$), the high-skilled group ($z_i = \sigma$), and the very-high-skilled group ($z_i = 2\sigma$).

Shutting down trade channel lowers incomes of all average-skilled and high-skilled households in year 1999. This is because wage rate is lower when trade channel is shut down, and the average-skilled and high-skilled households are workers. At the same time, the very-high-skilled households who are entrepreneurs receive higher profits due to lower wage rate.

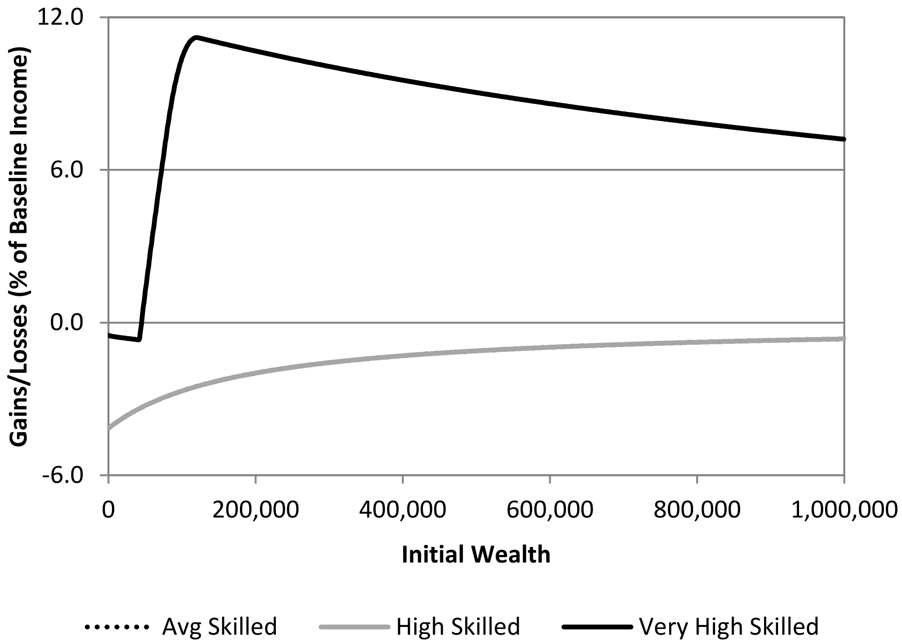


Figure 5.17 – Welfare gains/losses from shutting down trade channel in Buri Ram in 1999

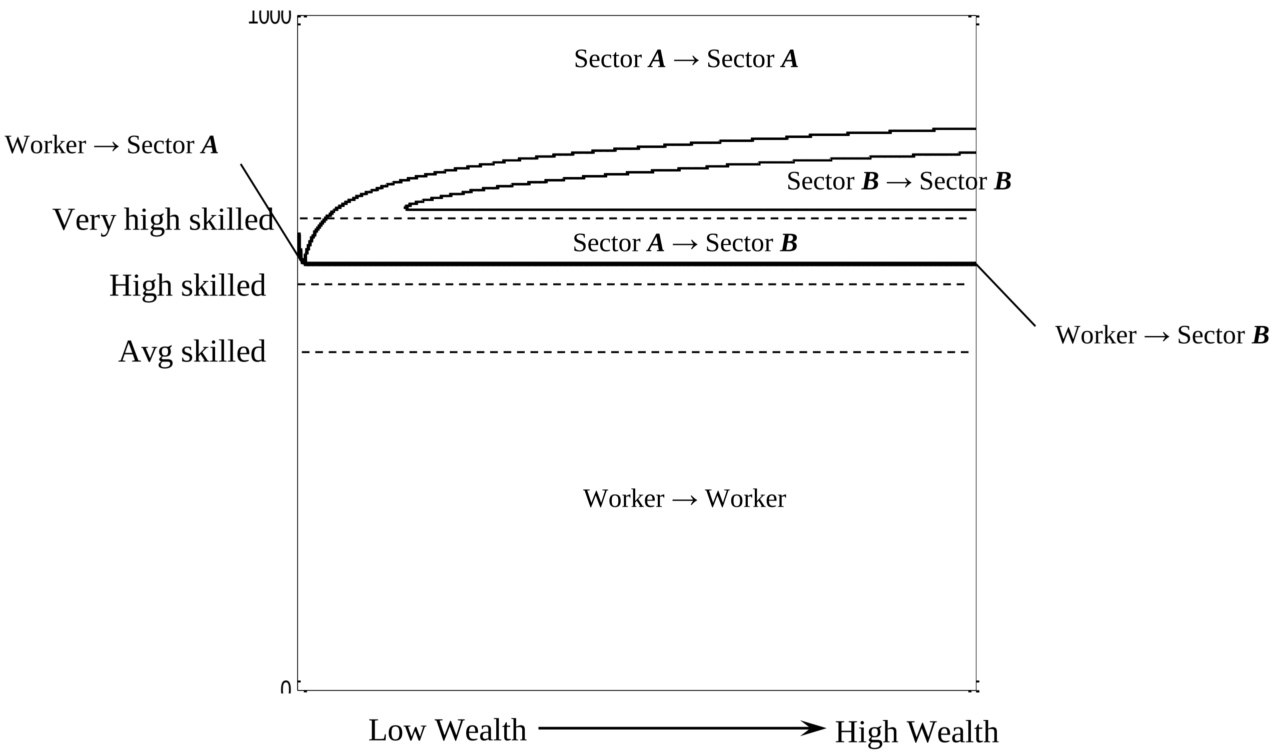


Figure 5.18 – Occupational change from shutting down trade channel in Buri Ram in 1999

On the other hand, shutting down trade channel increases the wage rate in 2002. Therefore, incomes of those who are workers (i.e., the average-skilled households and the high-skilled households with low wealth) increase, while the profits of the very-high-skilled households and the high-skilled households with high wealth (i.e., those who are entrepreneurs) decrease. Figure 5.19 shows the income difference between baseline scenario and no-trade counterfactual exercises in Buri Ram in year 2005. Figure 5.20 shows the occupational switch from baseline scenario to no-trade counterfactual exercises in Buri Ram in year 2002.

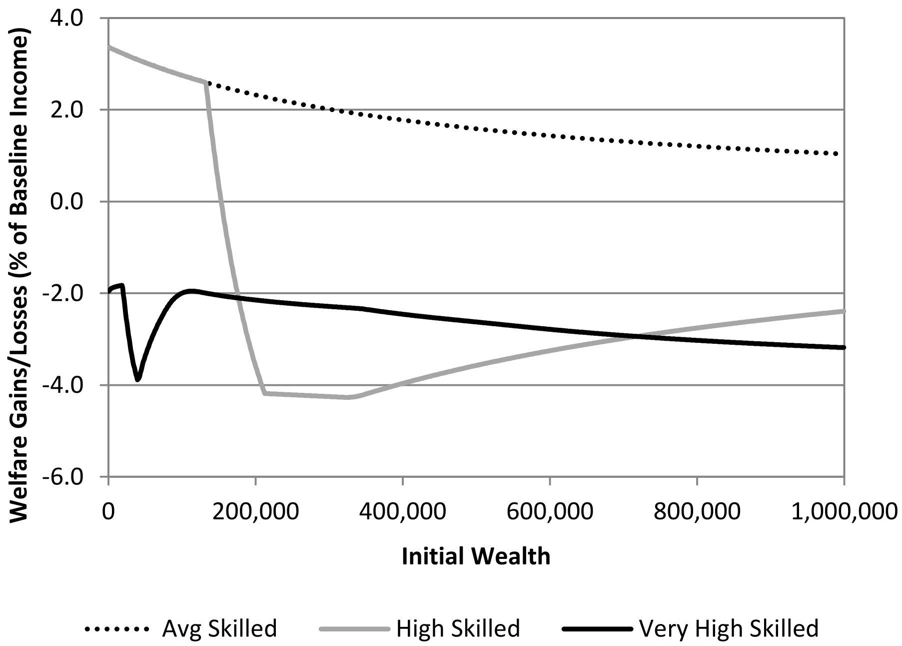


Figure 5.19 – Welfare gains/losses from shutting down trade channel in Buri Ram in 2002

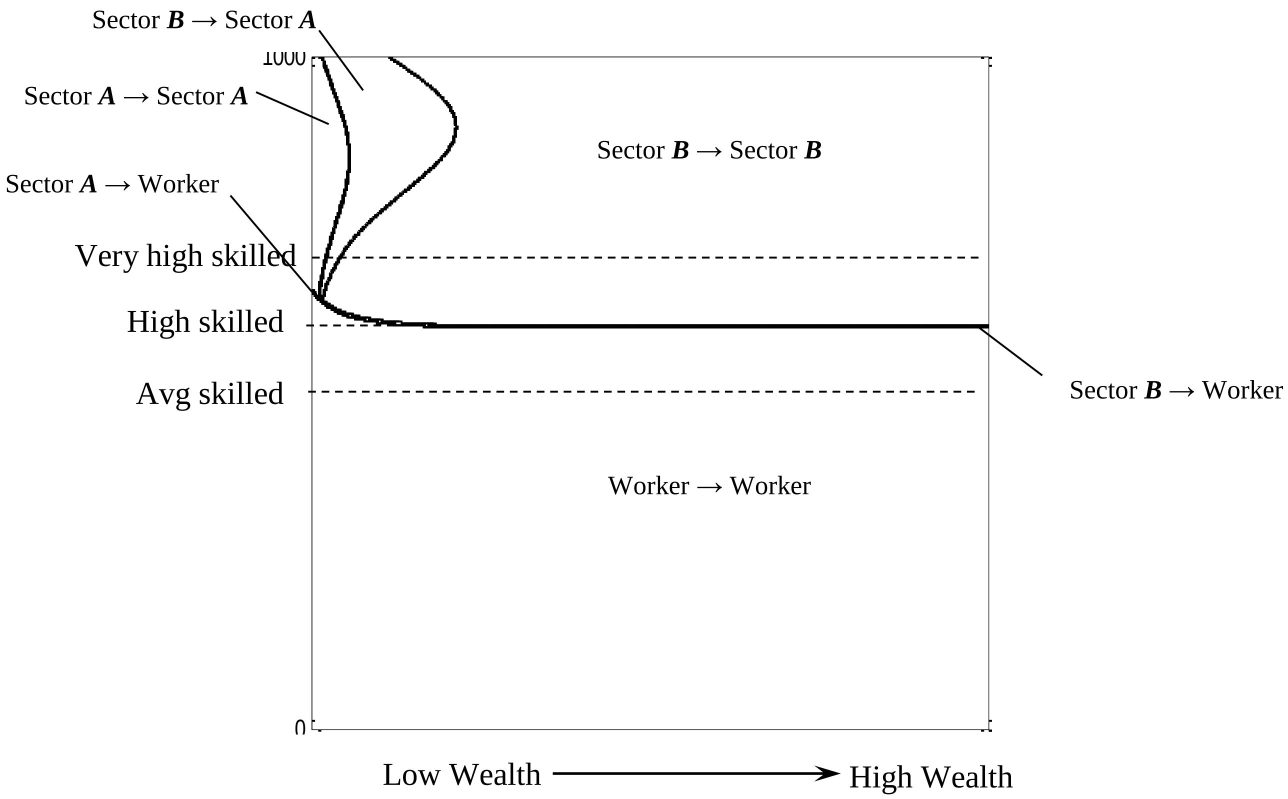


Figure 5.20 – Occupational change from shutting down trade channel in Buri Ram in 2002

Figure 5.21 shows the income difference between baseline scenario and no-external-finance counterfactual exercises in Buri Ram in year 1999. Figure 5.22 shows the occupational switch from baseline scenario to no-external-finance counterfactual exercises in Buri Ram in year 1999. When financial channel is shut down, wage rate increases while interest rate decreases. Therefore, the average-skilled and the high-skilled household with very low wealth have higher income. On the other hand, those with higher wealth get lower income due to lower interest. The very-high-skilled entrepreneurs benefit from the lower interest rate.

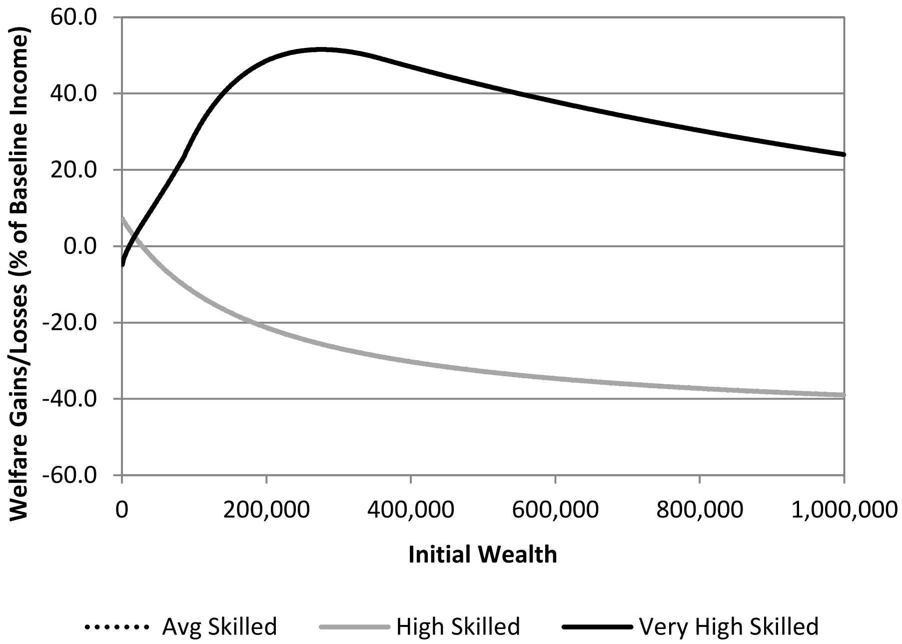


Figure 5.21 – Welfare gains/losses from shutting down external-finance channel in Buri Ram in 1999

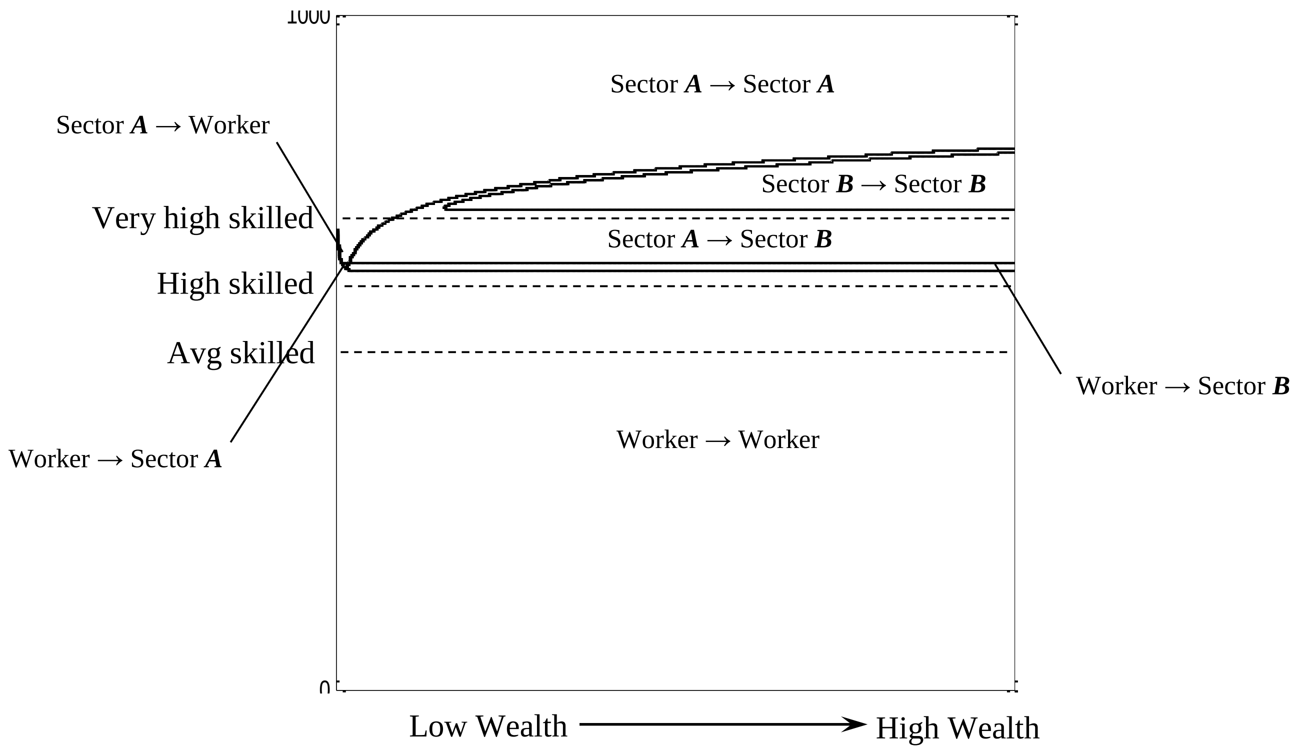


Figure 5.22 – Occupational change from shutting down external-finance channel in Buri Ram in 1999

Figure 5.23 shows the income difference between baseline scenario and no-external-finance counterfactual exercises in Buri Ram in year 2002. Figure 5.24 shows the occupational switch from baseline scenario to no-external-finance counterfactual exercises in Buri Ram in year 2002. High-skilled households who switch from being wage workers to being entrepreneurs receive higher income. High-skilled households who are entrepreneurs in both baseline and counterfactual cases also benefit from the lower interest rate. Similarly, very-high-skilled households benefit from the lower interest rate.

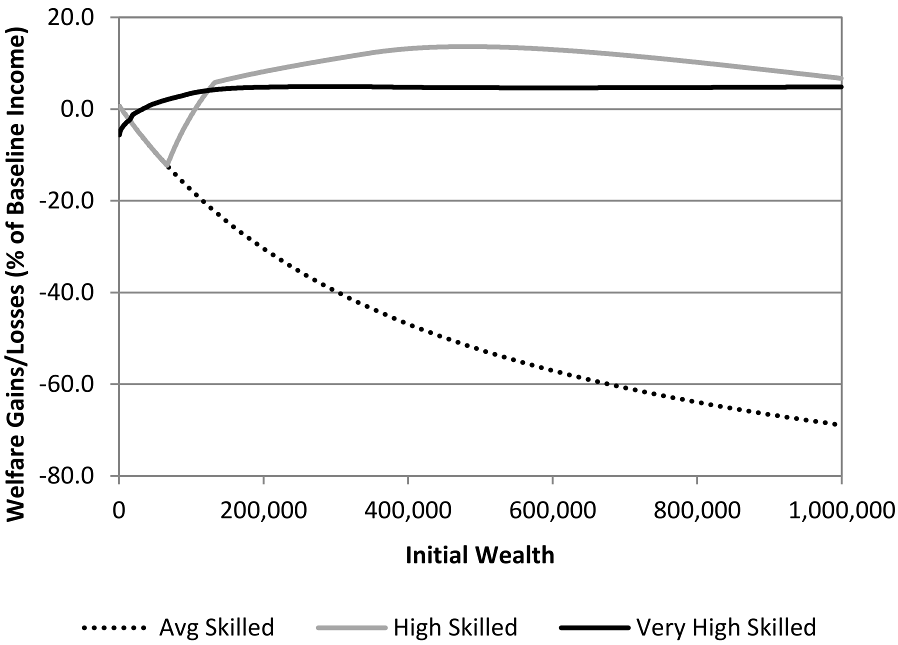


Figure 5.23 – Welfare gains/losses from shutting down external-finance channel in Buri Ram in 2002

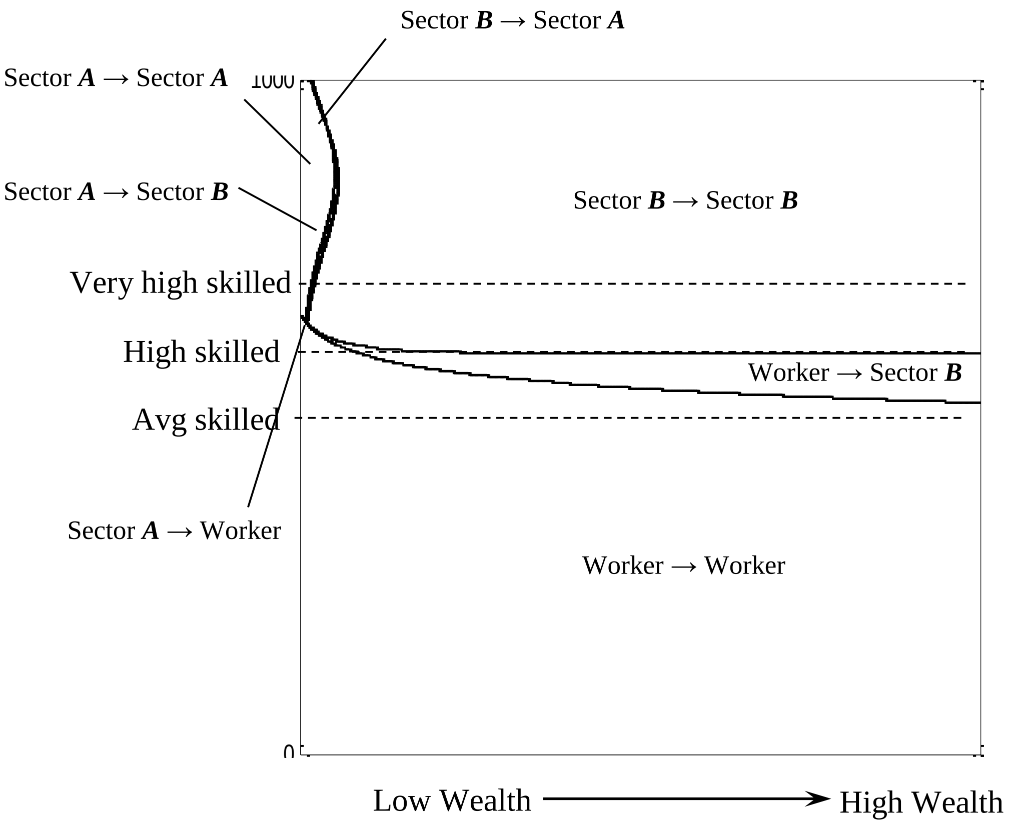


Figure 5.24 – Occupational change from shutting down external-finance channel

in Buri Ram in 2002

Chapter 6
Conclusions and Discussions

6.1 Conclusions

In this paper, we disentangle the impacts of real and financial factors on village economies. To do so, we start by developing a two-factor two-sector trade model with occupational choices and financial frictions. Then, we calibrate our model using both the macro-level stylized facts of Thai economy and the micro-level household data. The calibrated model can perfectly match the village-level stylized facts (i.e., wage rate and the share of profits from each sector).

Then, we evaluate the calibrated model by comparing the occupational choices, income, and wealth level predicted by the model with those in the data. The model can predict the occupational choices of high-ability and low-ability particularly well. However, the model under-predicts entrepreneurs with intermediate ability. Moreover, the model can predict the average-level of household income but fails to predict the change in income due to the lack of income shocks in the model.

Lastly, we conduct two counterfactual experiments. In the first counterfactual experiment, we disentangle the impacts of real and financial factors by keeping one factor at the initial level and varying the others. In the second counterfactual experiment, we make the economies closed with respect to trade, to capital flows, or to both at the same time. The results suggest that the impact of real and financial factors can be heterogeneous and large, generating both gains and losses and non-monotone impact across wealth classes and occupations (even allowing for occupation shifts).

6.2 Discussions

Based on the results presented in this paper, several findings are worth further discussions. First, the calibrated borrowing limits in both provinces are remarkably high in 1999 before drop sharply in 2000. Noted that, at that time, Thailand just came out of the 1997–1998 Financial Crisis, and the results could simply reflect the economy going through an adjustment to the new equilibrium.

Next, Chapter 5 reports the results from the counterfactual experiments. In these counterfactual experiments, when we shut down financial channel or when we shut down both trade and financial channels, there is excess supply of capital and the equilibrium interest rate equals to zero. There are several factors that, when put together, create this result. First, the returns to scale of the estimate production functions are quite low. Therefore, the optimal business size is quite small. Second, in this model, one household can run at most one business at a time. If we allow wealthy households to run more than one business, then we could have positive equilibrium interest rates.

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ภาคผนวก ข

ตัวอย่างรายชื่อนักวิจัยในต่างประเทศที่จะเข้าร่วมเครือข่ายนักวิจัยภายใต้ชุดโครงการพัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย

1. Pierre-André Chiappori, E. Rowan and Barbara Steinschneider Professor of Economics, Columbia University.
2. Fernando Alvarez, Professor of Economics, University of Chicago.
3. Stéphane Bonhomme, Professor of Economics, University of Chicago.
4. Nathaniel Hendren - Assistant Professor of Economics, Harvard University
5. Hiroyuki Yamada, Assistant Professor, Osaka University.
6. Krislert Samphantharak, Associate Professor of Economics, School of International Relations and Pacific Studies, University of California, San Diego.
7. Victor Zhorin, Senior Research Associate, Computational Institute, University of Chicago.
8. Juliano Assunção, Associate Professor of Economics, Pontificia Universidade Catolica, Rio de Janeiro (PUC-Rio).

ภาคผนวก ค

รายละเอียดหัวข้อวิจัยภายใต้ชุดโครงการ “พัฒนาองค์ความรู้ด้านเศรษฐกิจและสังคมของครัวเรือนไทย” ซึ่งพัฒนาร่วมกับ Professor Robert M. Townsend

1. The financial life cycle of Thai households: management of assets, real and financial, saving for older age in theory and in practice. Regional comparison: northeast vs central or rich vs poor households. Related are case studies of the lives of Thai households, including debt management and other issues. Including studies of aging population.

We use detailed income, balance sheet, and cash flow statements constructed for households in a long monthly panel in an emerging market economy, and some recent contributions in economic theory, to document and better understand the factors underlying success in achieving upward mobility in the distribution of net worth. Wealth inequality is decreasing over time, and many households work their way out of poverty and lower wealth over the seven year period. The accounts establish that, mechanically, this is largely due to savings rather than incoming gifts and remittances. In turn, the growth of net worth can be decomposed household by household into the savings rate and how productively that savings is used, the return on assets (ROA). The latter plays the larger role. ROA is, in turn, positively correlated with higher education of household members, younger age of the head, and with a higher debt/asset ratio and lower initial wealth, so it seems from cross-sections that the financial system is imperfectly channeling resources to productive and poor households. Household fixed effects account for the larger part of ROA, and this success is largely persistent, undercutting the story that successful entrepreneurs are those that simply get lucky. Persistence does vary across households, and in at least one province with much change and increasing opportunities, ROA changes as households move over time to higher-return occupations. But for those households with high and persistent ROA, the savings rate is higher, consistent with some micro founded macro models with imperfect credit markets. Indeed, high ROA households save by investing in their own enterprises and adopt consistent financial strategies for smoothing fluctuations. More generally growth of wealth, savings levels and/or rates are correlated with TFP and the household fixed effects that are the larger part of ROA.

The financial lives of rural households in Thailand are quite varied. Many households engage in production activities, while others are traditional wage earners. Households spend this income very differently. Some consume regularly from their own production, while other households have to make out-of-pocket expenditures for their consumption. Likewise, there are both households with high saving rates and households with high borrowing rates. Over time, wealth accumulation and growth rates vary greatly across rural households. We have documented households which see double-digit average annual growth of their wealth, whereas some households have depleted their wealth dramatically. Income and wages from activities such as production and labor are important sources of funds for a majority of households, but a notable portion of the surveyed sample are quite reliant on gifts and remittances. The differences observed in the financial lives of rural households are also observed across provinces. The one commonality across this analysis is that the lives of rural households are rarely simple. Differences within households – as each is composed of members with distinct characteristics – and changes over time – as a given household or its member changes behavior over time – make analysis even more interesting.

2. The role of the village, or community, as an informal network of support and assistance, including the role in gifts and loans in providing insurance, if not credit. Viewing the village or community as a financial market and the theory of portfolio diversification. The interaction of labor market with risk sharing.

Many risks are present in rural developing economies: illness, weather, the sudden need to finance an investment opportunity, etc. Yet for many households in rural developing economies, consumption and investment are insured against short-term, idiosyncratic risks to a large extent, despite limited availability of formal banking and insurance products. The importance of both kinship networks and financial institutions in facilitating consumption smoothing and investment financing has been demonstrated in many settings. Yet, while the importance of kinship networks and financial access are each increasingly well-documented, the channels through which these effects occur and the relationship between kinship networks and financial access are not well understood. We use unique data from rural Thai households to examine this interplay.

We study risk and return of farm and non-farm business enterprises with illiquid capital assets. Using data from a survey conducted in rural and semi-urban villages in Thailand, we find a stark contrast between the quantity of risk, on the one hand, and the impact of risk on risk premia, on the other. Although idiosyncratic risk is by far the dominant factor in total risk, aggregate risk captures a much larger share of total risk premia. The Thai households in the sample have extensive family networks and engage actively in gifts and loans, making the economic environment in these village economies with informal markets and institutions close to the outcome of the standard capital asset pricing model even though there are not formal markets and actively traded assets. Our results, using data from production side and rates of return, are parallel to those in the consumption risk sharing literature. In particular, gifts are shown to be a mechanism mitigating the impact of idiosyncratic risk. Our framework and results have important policy implications: when inferring the degree of financial constraints and possible targeting, and when inferring underling productivity and possible misallocation, we need to consider not only the returns but also risk and risk premia and how these can vary substantially across households running businesses and across production sectors

3. The industrial organization of financial service providers and their use by Thai households and business in their financial strategies. The interaction among government and private sector banks in the location of branches and services.

The theory of the optimal allocation of risk and the Townsend Thai panel data on financial transactions are used to assess the impact of the major formal and informal financial institutions of an emerging market economy. We link financial institution assessment to the actual impact on clients, rather than ratios and non-performing loans.

One project is on the demand side. We derive both consumption and investment equations from a common core theory with both risk and productive activities. The empirical specification follows closely from this theory and allows both OLS and IV estimation. We thus quantify the consumption and investment smoothing impact of financial institutions on households including those running farms and small businesses We present a contract-based model of industrial organization that allows us to consider in a unified way both different information frictions (moral hazard, adverse selection, both) and a variety of market structures (monopoly, imperfect competition, various strategic interactions).

Another project is on the supply side. Dynamic spatial competition models offer a method for understanding geographic patterns of financial service provision over time. By comparing simulations to actual data for spatially distinct markets, we are able to identify how financial service providers make bank location and expansion decisions. The motivating factor behind location decisions can be profit maximization (as might be anticipated for commercial banks) or overall levels of financial access (as might be anticipated for government development banks).

We generalize and combine to show how this method can be applied to the spread of the banking industry in emerging market countries, emphasizing observed transitions, namely the geographic locations of branches. Local collusive monopoly organizations and Bertrand-like competitive environments in location and utility space are considered alongside with frictions affecting the outcome, namely provincial spatial costs and the information structure. Mixed environments with fully informed local incumbents and entrants facing adverse selection are analyzed. Our larger goal, beyond calibrated numerical examples, is to develop a framework with an operational toolkit for empirical work.

4. Obstacles and limitations, needs for improvement: the study of cash management, insurance against long term disability, investment and long term capital flows.

Thai households seem to be holding relatively large amounts of cash for transaction purpose. We will use models and data to quantify this.

The head and principle income earner of a Thai household can suffer disability and lose income for the rest of lives. We will exam and try to quantify impacts of this.

We are re looking again at the hypothesis that funds do not flow readily from low to high return investment projects. We are looking at this within villages and across villages, including regional flow of funds.

5. Local, regional and national development, the role of within country trade and capital flows and quantification of welfare impact. he role of financial deepening.

We disentangle the impact of real factors (movement in sectoral relative prices) and financial factors (lower interest rates, more liberal credit/asset ratios) on households running farm/business projects or providing wage labor in diverse, small village economies that are open to trade and capital flows. To do so we proceed in steps: create the village economic SNA and balance of payments accounts from detailed balance sheets and income statements available from a comprehensive, integrated survey; generate stylized facts on factor prices, factor intensities, financial obstacles, and openness; construct a two-sector occupation choice/trade/financially-constrained open economy model around these facts; estimate/calibrate key parameters and initial conditions of the model in diverse regions; simulate and judge model performance against the data; and run some counterfactual exercises, namely, freezing real or financial factors at their initial values and comparing to the baseline simulations, or more radically, making the economies closed with respect to trade, to capital flows, or to both. We find through these counterfactual model-based exercises that the impact of real and financial factors can be heterogeneous and large, generating both gains and losses and non-monotone impact across wealth classes and occupations (even allowing for occupation shifts).

In a related project we are creating an economic model calibrated for Thailand that predicts interregional flows of capital and labor.

6. ผลกระทบของปัจจัยประชากรต่อสถาบันครอบครัวและชุมชนในชนบท (Effects of Population Structure on Family Institution and Community in Rural Thailand)

ภาวะเจริญพันธุ์ของประชากรไทยลดลงอย่างต่อเนื่องตลอดระยะ 30 - 40 ปีที่ผ่านมา ส่งผลให้ขนาดครอบครัวไทยโดยเฉลี่ยลดลงจาก 5.7 คนต่อครอบครัวในปี 2513 เหลือ 3.1 คนต่อครอบครัวในปี 2553 โครงสร้างครอบครัวและการพึ่งพาอาศัยกันระหว่างบุคคลในครอบครัวจึงมีการเปลี่ยนแปลงไปอย่างมีนัยสำคัญ การเปลี่ยนแปลงดังกล่าวส่งผลกระทบอย่างมากต่อสถาบันครอบครัว

และชุมชนในชนบท ซึ่งจำเป็นต้องมีการศึกษาวิจัยเพื่อให้ทราบข้อเท็จจริงของสถานการณ์ และผลกระทบที่ครอบครัวและชุมชนในชนบทเผชิญอยู่ตั้งแต่อดีตจนถึงปัจจุบัน รวมทั้งหาแนวทางบรรเทาและแก้ไขปัญหา เพื่อนำมาใช้เป็นข้อมูลพื้นฐานในการวิเคราะห์และกำหนดนโยบายและมาตรการสนับสนุนครอบครัวและชุมชนในชนบท ให้เหมาะสมและสอดคล้องกับสถานการณ์จริง เพื่อให้สามารถสร้างความอยู่ดีมีสุขให้กับครอบครัวและชุมชนในชนบทตามยุทธศาสตร์ของร่างกรอบแนวคิดแผนประชากรในการพัฒนาประเทศระยะยาว 20 ปี พ.ศ. 2559 - 2578 ของสำนักงานคณะกรรมการพัฒนาการเศรษฐกิจและสังคมแห่งชาติได้อย่างมีประสิทธิภาพและประสิทธิผลต่อไป

ภาคผนวก ง.

(สรุปรายงานการประชุมชุดโครงการพัฒนาองค์ความรู้เศรษฐกิจ
และสังคมของครัวเรือนไทย)

รายงานการประชุมคณะกรรมการกำกับทิศทางการวิจัยชุดโครงการ
“พัฒนาองค์ความรู้และนโยบายเศรษฐกิจและสังคมของครัวเรือนไทย”
ครั้งที่ 1/2560
เมื่อวันศุกร์ที่ 20 มกราคม 2560 เวลา 13.30 – 16.00 น.
ณ ห้องประชุม 2 สกว. ชั้น 14

<u>คณะกรรมการที่เข้าร่วมประชุม</u>

1. ศ.นพ.สุทธิพันธ์ จิตพิมลมาศ	ที่ปรึกษา
2. รศ.ดร.เสาวณีย์ ไทยรุ่งโรจน์	ที่ปรึกษา
3. ดร.ปัทมาวดี โพชนุกูล	กรรมการ
4. คุณรัจนา เนตรแสงทิพย์	กรรมการ
5. ดร.ปิติ ดิษยทัต	กรรมการ
6. ดร.อิศรา ศานติศาสน์	กรรมการ
7. ดร.วีระชาติ กิเลนทอง	กรรมการ

<u>คณะกรรมการที่ไม่ได้เข้าร่วมประชุม</u>

8. Professor Dr. Robert Townsend	ที่ปรึกษา
9. ดร.อัจนา ไวความดี	ประธานกรรมการ
10. ดร.นิพนธ์ พัวพงศกร	กรรมการ

<u>นักวิจัยและเจ้าหน้าที่ที่เข้าร่วมประชุม</u>

11. ดร.นราพงศ์ ศรีวิศาล	คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย
12. ดร.อาชว์ ปวีณวัฒน์	คณะเศรษฐศาสตร์ มหาวิทยาลัยหอการค้าไทย
13. ดร.อนันต์ ภาวสุทธิไพศิฐ	คณะเศรษฐศาสตร์ มหาวิทยาลัยธรรมศาสตร์
14. คุณพัชรินทร์ รักสัตย์	เจ้าหน้าที่บริหารโครงการ ฝ่ายชุมชนและสังคม สกว.
15. คุณวาสิณี จันทร์ธร	นักวิจัย สถาบันวิจัยเพื่อการประเมินและการออกแบบนโยบาย

เริ่มประชุมเวลา 13.30 น.

<u>วาระที่ 1.</u> เรื่องที่ประธานแจ้งที่ประชุมทราบ

ที่ประชุมรับทราบ

วาระที่ 2. เรื่องรับรองรายงานการประชุม

เลขานุการเสนอรายงานการประชุมครั้งที่ 1/2559 เมื่อวันที่ 3 มิถุนายน 2559 ให้ที่ประชุมรับรอง

มติ ที่ประชุมรับรองรายงานการประชุม

วาระที่ 3. เรื่องที่เสนอให้ที่ประชุมทราบ

3.1 รายงานความก้าวหน้าการวิจัยภายใต้ชุดโครงการ "พัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย"

3.1.1 โครงการฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำเพื่อการวิจัยด้านเศรษฐศาสตร์และสังคม ระยะที่หนึ่ง

- หัวหน้าโครงการ: ผศ.ดร. วีระชาติ กิเลนทอง
- ระยะเวลา: 1 ปี (1 ส.ค. 58 – 31 ก.ค. 59)
- งบประมาณ: 11.5 ล้านบาท (ร่วมทุนกับ ธปท.)
- สถานะ: เสร็จสิ้นและปิดโครงการเรียบร้อย

3.1.2 โครงการฐานข้อมูลบัญชีครัวเรือนเพื่อการวิจัยด้านเศรษฐกิจและสังคม

- หัวหน้าโครงการ: ดร.นราพงศ์ ศรีวิศาล
- ระยะเวลา: 1 ปี (1 พ.ย. 58 – 31 ต.ค. 59) ขอขยายเวลาไปถึง 31 ธ.ค. 59
- งบประมาณ: 1.5 ล้านบาท
- สถานะ: เสร็จสิ้นโครงการเรียบร้อย

3.1.3 โครงการการศึกษาการค้าระดับหมู่บ้านในไทยโดยใช้แบบจำลองการเลือกอาชีพที่มีความไม่สมบูรณ์ของตลาดการเงิน

- หัวหน้าโครงการ: ดร.อาชว์ ปวีณวัฒน์
- ระยะเวลา: 1 ปี (4 ม.ค. 58 – 31 ธ.ค. 59)
- งบประมาณ: 231,000 บาท
- สถานะ: ขอขยายเวลาไปถึง 28 ก.พ. 60

3.1.4 โครงการฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำเพื่อการวิจัยด้านเศรษฐศาสตร์และสังคม ระยะที่สอง

- หัวหน้าโครงการ: คุณสมบัติ ศกุนตะเสฐียร
- ระยะเวลา: 1 ปี (1 ส.ค. 59 – 31 ก.ค. 60)
- งบประมาณ: 11.5 ล้านบาท (ร่วมทุนกับ ธปท.)
- สถานะ: ระหว่างดำเนินงาน

3.1.5 โครงการการเปลี่ยนแปลงของความยากจนในชนบทไทย

- หัวหน้าโครงการ: ดร.อนันต์ ภาวสุทธิไพศิฐ
- ระยะเวลา: 1 ปี (15 ส.ค. 59 – 15 ส.ค. 60)
- งบประมาณ: 556,600 บาท
- สถานะ: ระหว่างดำเนินงาน

3.1.6 โครงการจัดทำฐานข้อมูลแบบตัวอย่างซ้ำจากข้อมูลภาวะการทำงานของประชากร

- หัวหน้าโครงการ: ดร.ภัทรพรรณ อดทน
- ระยะเวลา: 1 ปี (3 ต.ค. 59 – 2 ต.ค. 60)
- งบประมาณ: 709,200 บาท
- สถานะ: ระหว่างดำเนินงาน

มติ ที่ประชุมรับทราบ

3.2 รายงานความก้าวหน้าโครงการ “ฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำเพื่อการวิจัยด้านเศรษฐศาสตร์และสังคม” ปี 2559 (1 สิงหาคม 2559 – 31 กรกฎาคม 2560) ซึ่งมีคุณสมบัติ ศกุนตะเสฐียร เป็นหัวหน้าโครงการ

ตารางแสดงจำนวนครัวเรือนตัวอย่างซ้ำรายเดือนที่ถูกสัมภาษณ์ในรอบ 6 เดือน

เดือน	ฉะเชิงเทรา	ลพบุรี	บุรีรัมย์	ศรีสะเกษ	รวม	เป้าหมาย	จำนวนครัวเรือนที่หายไปจากกลุ่มตัวอย่าง	จำนวนครัวเรือนทดแทน
สิงหาคม 2559	161	177	171	161	670	638	0	0
กันยายน 2559	161	177	171	161	670	638	0	0
ตุลาคม 2559	161	177	171	161	670	638	0	0
พฤศจิกายน 2559	161	177	171	161	670	638	0	0
ธันวาคม 2559	161	177	171	161	670	638	0	0
มกราคม 2560	161	177	171	161	670	638	0	0

มติ ที่ประชุมรับทราบ

วาระที่ 4. เรื่องที่เสนอให้ที่ประชุมพิจารณา

4.1 รายงานฉบับสมบูรณ์ โครงการประสานงาน ชุดโครงการ “พัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย” (1 สิงหาคม 2558 – 31 ตุลาคม 2559) สัญญาเลขที่ RDC58D0002 ซึ่งมี ผศ.ดร.วีระชาติ กิเลนทอง สังกัด สถาบันวิจัยเพื่อการประเมินและออกแบบนโยบาย มหาวิทยาลัยหอการค้าไทย เป็นหัวหน้าโครงการ

ชุดโครงการฯ สนับสนุนการพัฒนาฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำรายเดือน (monthly micro data) ให้มีข้อมูลที่ต่อเนื่องและเป็นประโยชน์ต่อการพัฒนาประเทศ และต่อยอดไปสู่โครงการวิจัยภายใต้การ

ประยุกต์ใช้ฐานข้อมูล Townsend Thai Data รวมทั้งยังสนับสนุนให้เกิดการประยุกต์ใช้ฐานข้อมูลแบบตัวอย่างซ้ำ (panel data) ซึ่ง ณ ปัจจุบัน ประกอบไปด้วย 5 โครงการ ได้แก่

1. โครงการฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำเพื่อการวิจัยด้านเศรษฐศาสตร์และสังคม
2. โครงการฐานข้อมูลบัญชีครัวเรือนเพื่อการวิจัยด้านเศรษฐกิจและสังคม
3. โครงการการศึกษาการค้าระดับหมู่บ้านในไทยโดยใช้แบบจำลองการเลือกอาชีพที่มีความไม่สมบูรณ์ของตลาดการเงิน
4. โครงการการเปลี่ยนแปลงของความยากจนในชนบทไทย
5. โครงการการจัดทำฐานข้อมูลแบบตัวอย่างซ้ำจากข้อมูลภาวะการทำงานของประชากร

นอกจากนี้ รายงานฉบับนี้จะนำเสนอบทความที่เกี่ยวข้องกับข้อมูล Townsend Thai Data จำนวน 6 บทความ ได้แก่

1. "Economic Development, Flow of Funds and the Equilibrium Interaction of Financial Frictions." Benjamin Moll, Robert M. Townsend, Victor Zhorin, 2016 (Formerly as NBER Working Paper No. 19618, 2014.)
2. "Risk and Return in Village Economies." Krislert Samphantharak and Robert M. Townsend, revised 2016; see also NBER Working Paper No. 19738, 2013.
3. บทความเรื่อง "ฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำเพื่อการพัฒนาองค์ความรู้ด้านเศรษฐกิจและสังคม: Townsend Thai Data", กฤษฎ์เลิศ สัมพันธารักษ์ และ วีระชาติ กิเลนทอง, issue 14/2015, 18 Dec 2015, aBRIDGEd articles
4. บทความเรื่อง "บทเรียนจากกองทุนหมู่บ้าน", วีระชาติ กิเลนทอง และ กิตติพงษ์ เรือนทิพย์, issue 1/2016, 16 Jan 2016, aBRIDGEd articles
5. บทความเรื่อง "ข้อจำกัดด้านการกู้ยืมและการตัดสินใจเป็นผู้ประกอบการของครัวเรือนไทย", อาชว์ ปวีณวัฒน์, aBRIDGEd articles
6. บทความเรื่อง "อุปสรรคของการพัฒนาระบบประกันที่สมบูรณ์ในชุมชนชนบทของไทย", นราพงศ์ ศรีวิศาล, aBRIDGEd articles

มติ ที่ประชุมเห็นชอบ และเสนอแนะให้บทความหรืองานวิจัยภายใต้ชุดโครงการฯ ควรมาจากนักวิจัยในโครงการที่ใช้ข้อมูล Townsend Thai Data โดยตรงเท่านั้น

4.2 รายงานฉบับสมบูรณ์ โครงการ "ฐานข้อมูลบัญชีครัวเรือนเพื่อการวิจัยด้านเศรษฐกิจและสังคม" (2 พฤศจิกายน 2558 – 30 ธันวาคม 2559) สัญญาเลขที่ RDG5940003 ซึ่งมี อ.ดร.นราพงศ์ ศรีวิศาล คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย เป็นหัวหน้าโครงการ

โดยโครงการฯ ได้จัดทำบัญชีครัวเรือนซึ่งมีรายละเอียดดังต่อไปนี้

- สำหรับแต่ละครัวเรือน คณะวิจัยได้จัดทำบัญชีครัวเรือนเสร็จแล้วสำหรับข้อมูลจาก Townsend Thai Monthly Micro Data เดือนแรกถึงเดือนที่ 172 (ธันวาคม พ.ศ. 2555)
- บัญชีครัวเรือนจะประกอบด้วย 3 ส่วน ได้แก่ บัญชีทรัพย์สินและหนี้สิน (Balance Sheet), บัญชีรายรับรายจ่าย (Income Statement), และบัญชีการเคลื่อนไหวเงินสด (Statement of Cash Flows)
- คณะวิจัยได้จัดทำตัวแปรเพิ่มเติมเพื่อบอกถึงข้อมูลพื้นฐานทาง ด้านประชากรศาสตร์ (demography) ดังต่อไปนี้

ตัวแปร	ความหมาย
N	จำนวนสมาชิกในครัวเรือน
Nm	จำนวนสมาชิกในครัวเรือนที่เป็นเพศชาย
Nf	จำนวนสมาชิกในครัวเรือนที่เป็นเพศหญิง
Ne	จำนวนสมาชิกในครัวเรือนที่อยู่ในวัยชรา
Nk	จำนวนสมาชิกในครัวเรือนที่อยู่ในวัยเด็ก
headage	อายุของหัวหน้าครัวเรือน
headmale	ตัวแปรหุ่น (dummy variable) มีค่า 1 ถ้าหัวหน้าครัวเรือนเป็นเพศชาย
headedu	จำนวนปีการศึกษาสูงสุดของหัวหน้าครัวเรือน
mean_age	ค่าเฉลี่ยอายุของสมาชิกในครัวเรือน
mean_edu	ค่าเฉลี่ยจำนวนปีการศึกษาของสมาชิกในครัวเรือน
minedu	จำนวนปีการศึกษาต่ำสุดของสมาชิกในครัวเรือน
maxedu	จำนวนปีการศึกษาสูงสุดของสมาชิกในครัวเรือน

นอกจากนี้ ทีมนักวิจัยได้จัดการอบรมการใช้ข้อมูลชุดดังกล่าว สำหรับนักศึกษา นักวิชาการ นักวิจัย และผู้ที่สนใจจะนำไปใช้ประโยชน์ในการทำวิจัยต่อไป ซึ่งจัดขึ้นในวันที่ 6 กุมภาพันธ์ 2560

มติ ที่ประชุมเห็นชอบ

4.3 รายงานความก้าวหน้า โครงการ “การศึกษาการค้าระดับหมู่บ้านในไทยโดยใช้แบบจำลองการเลือกอาชีพที่มีความไม่สมบูรณ์ของตลาดการเงิน” (4 มกราคม 2559 – 30 ธันวาคม 2559) สัญญาเลขที่ RDG5940005 ซึ่งมี อ.ดร.อาชว์ ปวีณวัฒน์ คณะเศรษฐศาสตร์ มหาวิทยาลัยหอการค้าไทย เป็นหัวหน้าโครงการ

นักวิจัยได้สร้างแบบจำลองระบบเศรษฐกิจขนาดเล็กแบบเปิดเพื่อใช้ในการศึกษาระบบเศรษฐกิจในระดับหมู่บ้านในประเทศไทย และปรับเทียบแบบจำลองโดยใช้ข้อมูลระดับครัวเรือนจาก Townsend Thai Project ผลการศึกษาพบว่า ตัวแบบจำลองความไม่สมบูรณ์ของตลาดการเงินที่สร้างขึ้นจากสมการ

$$B_i^{max} = (C-1)W_i$$

เมื่อ B_i^{max} คือจำนวนเงินสูงสุดที่ครัวเรือน i สามารถกู้ได้,

W_i คือระดับความมั่งคั่งของครัวเรือน i และ C คือข้อจำกัดด้านการกู้ยืม

สามารถสะท้อนมูลค่าจำนวนเงินสูงสุดที่ครัวเรือนสามารถกู้ได้และสัดส่วนของทุนต่อแรงงานที่ใช้ในการผลิตกับข้อมูล Townsend Thai Data ได้เป็นอย่างดี

ในขณะที่ตัวแบบการจำลองการเลือกอาชีพภายใต้ข้อจำกัดด้านการกู้ยืม ในแต่ละช่วงเวลา t ครัวเรือน i จะต้องเลือกอาชีพระหว่างเป็นผู้ใช้แรงงานหรือเป็นผู้ประกอบการในภาคการผลิต a หรือ m โดยที่ครัวเรือน i จะเลือกอาชีพที่ทำรายได้รวมสูงสุด รายได้จากการเป็นผู้ประกอบการในภาคการผลิต a สำหรับครัวเรือน i เท่ากับ

$$\pi^a(z_i, W_{it}) = \max_{K_i, L_i}\left[p_t^a A_i^a K_{it}^{\alpha_a} L_{it}^{\beta_a} - r_t K_{it} - w_t L_{it}\right]$$

ภายใต้ข้อจำกัดด้านการกู้ยืม

$$K_{it} \leq CW_{it}$$

เมื่อ p_t^a คือราคาสินค้า a ในช่วงเวลา t, A_i^a คือระดับผลิตภาพของครัวเรือน i ในภาคการผลิต a, K_{it} คือระดับทุนที่ครัวเรือน i ใช้ในการผลิต, L_{it} คือระดับแรงงานที่ครัวเรือน i ใช้ในการผลิต, r_t คืออัตราดอกเบี้ย ณ เวลา t และ w_t คืออัตราค่าจ้างแรงงาน ณ เวลา t

เช่นเดียวกัน รายได้จากการเป็นผู้ประกอบการในภาคการผลิต m สำหรับครัวเรือน i เท่ากับ

$$\pi^m(z_i, W_{it}) = \max_{K_i, L_i}\left[p_t^m A_i^m K_{it}^{\alpha_m} L_{it}^{\beta_m} - r_t K_{it} - w_t L_{it}\right]$$

ภายใต้ข้อจำกัดด้านการกู้ยืม

$$K_{it} \leq CW_{it}$$

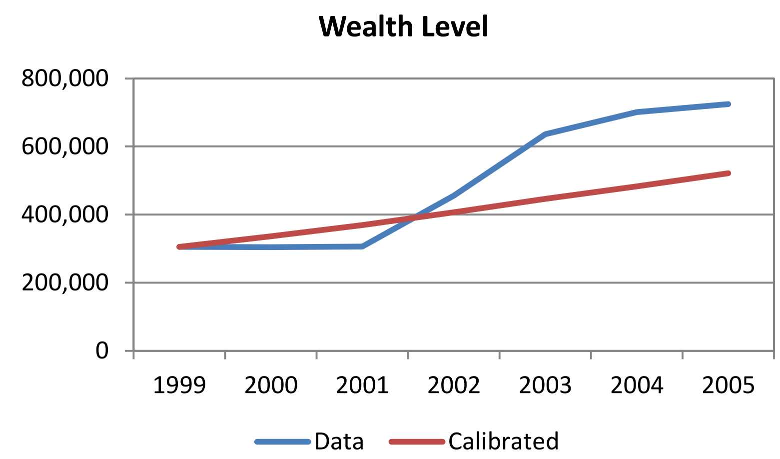
และหากครัวเรือน i เลือกเป็นผู้ใช้แรงงาน ครัวเรือน i จะได้รับค่าจ้างแรงงานเท่ากับ $w_t\bar{L}$ เมื่อ $\bar{L}$ คือจำนวนแรงงานต่อช่วงเวลาที่ครัวเรือน i มี ดังนั้น ครัวเรือนจะเลือกอาชีพที่ทำรายได้สูงสุด

$$\pi(z_i, W_{it}) = \max\{w_t\bar{L}, \pi^a(z_i, W_{it}), \pi^m(z_i, W_{it})\} + r_t W_{it}$$

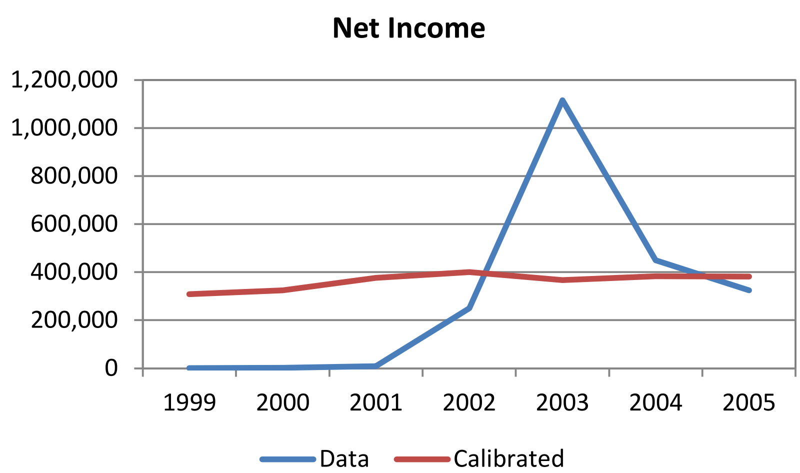
จากการศึกษาตัวแบบดังกล่าว พบว่า ตัวแบบสามารถสะท้อนถึงการเลือกอาชีพของครัวเรือนได้ถูกต้องคิดเป็นสัดส่วน 3 ใน 7 จากการจากใช้ข้อมูล Townsend Thai Data ของจังหวัดบุรีรัมย์ ที่แสดงได้ดังตารางต่อไปนี้

Year	Net Income from the Data					Occupational Choice in the Model
	Labor	Cultivation	Business	Fish & Shrimp	Livestock	
1999	0	7,732	0	0	-6,440	Labor-Intensive
2000	1,650	12,500	0	0	-5,474	Labor-Intensive
2001	7,700	0	0	0	1,084	Capital-Intensive
2002	271,500	17,881	-31,516	0	8,158	Capital-Intensive
2003	10,870	26,272	1,089,609	0	5,859	Capital-Intensive
2004	13,950	47,510	398,820	300	-1,226	Capital-Intensive
2005	38,320	47,350	255,027	1,360	-1,163	Capital-Intensive

กราฟเส้นแสดงค่าความมั่งคั่งในแต่ละปีจากตัวแบบจำลองเมื่อเทียบกับข้อมูลจริง



กราฟเส้นแสดงค่ารายได้สุทธิในแต่ละปีจากตัวแบบจำลองเมื่อเทียบกับข้อมูลจริง



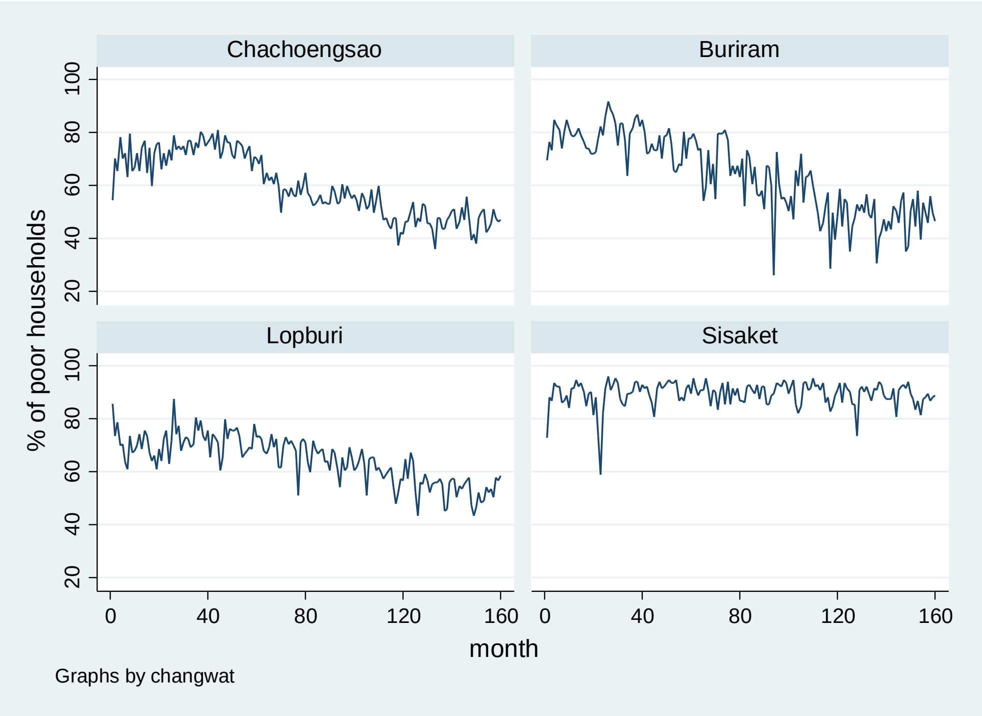
จากกราฟ พบว่าการใช้แบบจำลองในการเลือกอาชีพภายใต้ข้อจำกัดด้านการกู้ยืม ในแต่ละช่วงเวลาให้ค่าความมั่งคั่งและรายได้สุทธิแตกต่างจากข้อมูลจริงอยู่พอสมควร อาจเนื่องมาจากนักวิจัยใช้ค่ากลางของอัตราดอกเบี้ยการกู้ยืม (median borrowing rate) ในการคำนวณตัวแบบจำลอง ดังนั้น นักวิจัยจะทำการศึกษาและวิเคราะห์หาสาเหตุเพิ่มเติมเพื่อหาข้อสรุปดังกล่าว

มติ ที่ประชุมเห็นชอบ และพิจารณาเห็นควรให้เปลี่ยนชื่อโครงการภาษาไทยให้สอดคล้องและสื่อความหมายให้ตรงกับชื่อภาษาอังกฤษ (โดยการทำบันทึกขออนุมัติเปลี่ยนชื่อโครงการภาษาไทยก่อนส่งร่างรายงานฉบับสมบูรณ์)

4.4 รายงานความก้าวหน้า โครงการ “การเปลี่ยนแปลงของความยากจนในชนบทไทย” (15 สิงหาคม 2559 – 20 มกราคม 2560) สัญญาเลขที่ RDG5940037 ซึ่งมี อ.ดร.อนันต์ ภาวสุทธิไพศิฐ คณะเศรษฐศาสตร์ มหาวิทยาลัยธรรมศาสตร์ เป็นหัวหน้าโครงการ

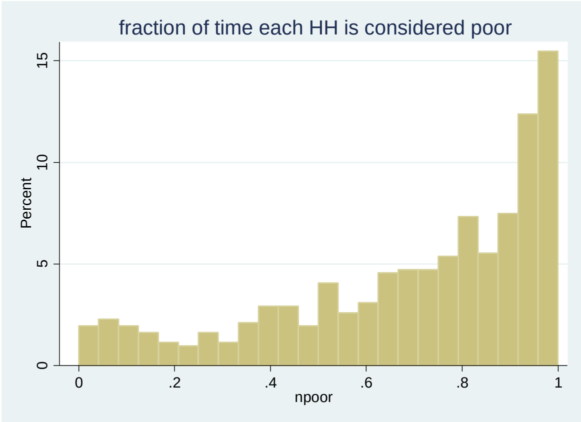
นักวิจัยได้ศึกษาข้อเท็จจริง สถานการณ์ของความยากจนและการเปลี่ยนแปลงของความยากจนในชนบทในช่วงเวลาของการสำรวจ โดยในระยะแรกได้ทำการศึกษาจากข้อมูล Townsend Thai Data Panel ปี 1998-2011 ของจังหวัดฉะเชิงเทรา ลพบุรี บุรีรัมย์ และศรีสะเกษ

กราฟเส้นแสดงสัดส่วนครัวเรือนที่ยากจน ตั้งแต่เดือนที่ 0-160 แยกตามจังหวัด



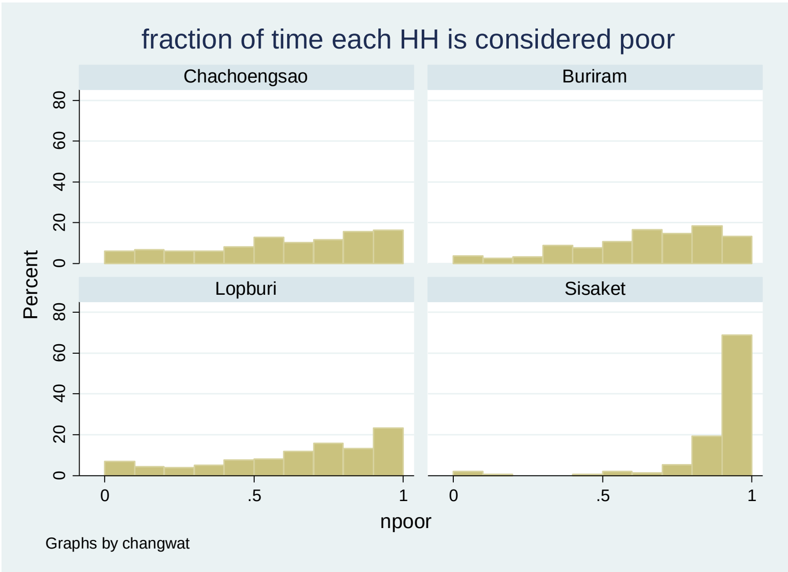
จากกราฟ พบว่า จังหวัดฉะเชิงเทรา ลพบุรี และบุรีรัมย์ มีแนวโน้มสัดส่วนครัวเรือนยากจนลดลง ในขณะที่จังหวัดศรีสะเกษกลับมีสัดส่วนครัวเรือนยากจนคงที่ คิดเป็น 80-90% ของครัวเรือนตัวอย่าง และเมื่อดูในภาพรวมของทั้ง 4 จังหวัด พบว่า สัดส่วนของเวลาที่แต่ละครัวเรือนตกอยู่ภายใต้ความยากจนมีแนวโน้มเพิ่มขึ้น ซึ่งแสดงได้จากกราฟดังต่อไปนี้

กราฟแท่งแสดงสัดส่วนของเวลาที่แต่ละครัวเรือนตกอยู่ภายใต้ความยากจน



ขณะที่เมื่อนักวิจัย ทำการศึกษารายจังหวัดก็พบว่า จังหวัดศรีสะเกษมีสัดส่วนของเวลาของครัวเรือนที่อยู่ภายใต้ความยากจนสูงที่สุดเมื่อเทียบกับอีก 3 จังหวัด แสดงได้จากกราฟต่อไปนี้

กราฟแท่งแสดงสัดส่วนของเวลาที่แต่ละครัวเรือนตกอยู่ภายใต้ความยากจน แยกตามจังหวัด



ขั้นต้น นักวิจัยได้จำแนกประเภทครัวเรือนตามเส้นแบ่งความยากจนออกเป็น 4 กลุ่ม ตามนิยามดังนี้

1. A=(50,50) ยากจนตลอดเวลา
2. B=(50,200) ยากจนชั่วคราว
3. C=(130,50) ยากจนเรื้อรัง
4. D=(200,300) ไม่เคยจน

พบว่า ครัวเรือนส่วนใหญ่ของทั้ง 4 จังหวัดเป็นครัวเรือนยากจนตลอดเวลาและยากจนชั่วคราว ซึ่งนักวิจัยจะทำการศึกษาลักษณะครัวเรือนประเภทต่าง ๆ ตามการจำแนกกลุ่มความยากจน และขั้นตอนต่อไป นักวิจัยจะ

ศึกษาดัชนีแบบต่าง ๆ เพื่อหาเหตุผลของการตกอยู่ภายใต้ความยากจน การออกจากความยากจน การกลับเข้าไปสู่ความยากจน และความแตกต่างระหว่างกลุ่มที่สามารถออกจากความยากจนได้และกลุ่มที่ยังตกอยู่ภายใต้ความยากจน อีกทั้งจะใช้ข้อมูลจาก SES เพื่อทำการเปรียบเทียบต่อไป

มติ ที่ประชุมเห็นชอบ

4.5 ข้อเสนอโครงการวิจัย “บทบาทของสภาพครัวเรือนต่อการพัฒนาคุณภาพกำลังแรงงานในอนาคตของสังคมสูงวัย” โดย อ.ดร.เนื้อแพร เล็กเฟื่องฟู สังกัด คณะเศรษฐศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย เป็นหัวหน้าโครงการ

ยังไม่ได้นำเสนอเนื่องจากเวลามีจำกัด

มติ ที่ประชุมเห็นชอบให้นำเสนอในวันประชุมครั้งถัดไป

4.6 ข้อเสนอโครงการประสานงาน ชุดโครงการ “พัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย” (ปีงบประมาณ 2560) โดย ผศ.ดร.วีระชาติ กิเลนทอง สังกัด สถาบันวิจัยเพื่อการประเมินและออกแบบนโยบาย มหาวิทยาลัยหอการค้าไทย เป็นหัวหน้าโครงการ

- ระยะเวลาดำเนินงาน 12 เดือน (มกราคม 2560 - ธันวาคม 2560)
- วัตถุประสงค์ของโครงการ
  1. เพื่อพัฒนาองค์ความรู้ด้านเศรษฐกิจและสังคมของครัวเรือนไทย
  2. เพื่อสร้างเครือข่ายนักวิจัยทั้งภายในและภายนอกประเทศที่มีความเชี่ยวชาญ สามารถผลิตงานวิจัยเชิงลึกโดยการประยุกต์ใช้ฐานข้อมูล Townsend Thai Data
  3. เพื่อพัฒนาฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำรายเดือน (monthly micro data) ให้มีข้อมูลที่ต่อเนื่องและเป็นประโยชน์ต่อการพัฒนาประเทศ
- งบประมาณโครงการ แยกตามหมวดค่าใช้จ่าย (งบที่ปรับแก้ไขแล้ว)

1. ค่าตอบแทนนักวิจัย	360,000 บาท (หัวหน้าโครงการ)
2. ค่าจ้าง	498,500 บาท (จนท.โครงการ 1, การเงิน 1, บริหารข้อมูล 1)
3. ค่าใช้สอย	264,000 บาท
4. ค่าวัสดุ	30,000 บาท
5. ค่าใช้จ่าย งวด จ.	632,000 บาท (ค่าใช้จ่ายจัด Conference)
6. ค่าบำรุงหน่วยงาน	115,200 บาท
รวมเป็นเงินทั้งสิ้น	1,899,000 บาท

- ผลที่คาดว่าจะได้รับ

  ในระหว่างการดำเนินการวิจัย โครงการจะนำเสนอความก้าวหน้าของโครงการในรูปแบบรายงานการวิจัย รายงานความก้าวหน้าของโครงการ รายงานการสังเคราะห์ข้อมูล และข้อมูลที่เกี่ยวกับการ

ส่งเสริมการกำหนดนโยบายหรืออื่น ๆ ตามความเหมาะสมและความพร้อมของข้อมูลอย่างน้อยปีละ 6 ชิ้น และภายในระยะเวลา 3 ปี (ระยะเวลาของ MOU) โครงการจะสามารถผลิตงานวิจัยเชิงลึกจากฐานข้อมูล Townsend Thai Data ที่สามารถนำไปตีพิมพ์ในวารสารระดับนานาชาติได้อย่างน้อย 1 เรื่องต่อ 1 หัวข้อวิจัย

มติ ที่ประชุมเห็นควรให้พิจารณางบการจัด conference ในหัวข้อถัดไป

4.7 การจัดงาน Townsend Conference ประจำปี 2560

- Conference with distinguished international and national speakers.
- จัดทั้งหมด 2 วัน คือ วันที่ 8 และ 9 มิถุนายน 2560
- สถานที่: ธนาคารแห่งประเทศไทย
- เจ้าภาพร่วม: PIER, RIPED and TRF
- Themes and potential international speakers:
  - Progress Begins with Measurement: Finance and Human Capital
  - Robert M. Townsend (MIT).
  - Chris Udry (Yale)
  - Scott Schuh (FED Boston)
  - Anna Paulson (FED Chicago)
  - Marrying Research with Policy: Financial System and Education
  - Raj Chetty (Stanford),
  - Raghu Rajan (Chicago Booth),
  - Nathan Hendren (Harvard)
  - Flavio Cunha (Rice)
  - Financial Innovations: Innovating Inclusion and Efficiency
  - Rod Garrat (UCSB),
  - Chris Brocom (Lending Club)
  - Xavi Gine (World Bank)
  - Kenneth Singleton (Stanford)
- Discussion Panel on the Value of Data for Research and Policy
- งบประมาณส่วนของ สกว. สำหรับ Conference 632,000 บาท

มติ ที่ประชุมเห็นควรให้แสดงรายการค่าใช้จ่ายทั้งหมดในการจัดประชุม เพื่อให้ทาง สกว. พิจารณาว่ามีรายการไหนสามารถเบิกจ่ายได้ตามระเบียบของสำนักงาน ค่าตั๋วเครื่องบินของ

วิทยากรสามารถเบิกจ่ายได้เป็น Business Class ค่าอาหารและเบรกผู้เข้าร่วมประชุมต่อท่านไม่เกิน 2,500 บาท (รวมค่าสถานที่จัดประชุม)

4.8 แผนการดำเนินงานในระยะต่อไป

- การนำเสนอรายงานฉบับสมบูรณ์ 2 โครงการ
  - รายงานฉบับสมบูรณ์ โครงการ "ฐานข้อมูลบัญชีครัวเรือนเพื่อการวิจัยด้านเศรษฐกิจและสังคม" โดย ดร.นราพงศ์ ศรีวิศาล
  - รายงานฉบับสมบูรณ์ โครงการ "การศึกษาการค้าระดับหมู่บ้านในไทยโดยใช้แบบจำลองการเลือกอาชีพที่มีความไม่สมบูรณ์ของตลาดการเงิน" โดย ดร.อาชว์ ปวีณวัฒน์
- การนำเสนอรายงานความก้าวหน้า 2 โครงการ
  - รายงานความก้าวหน้า โครงการ "การเปลี่ยนแปลงของความยากจนในชนบทไทย" โดย ดร.อนันต์ ภาวสุทธิไพศิฐ
  - รายงานความก้าวหน้า โครงการ "การจัดทำฐานข้อมูลแบบตัวอย่างซ้ำจากข้อมูลภาวะการทำงานของประชากร" โดย ดร.ภัทรพรรณ อดทน
- การนำเสนอข้อเสนอโครงการ 2 โครงการ
  - ข้อเสนอโครงการเรื่อง "บทบาทของสภาพครัวเรือนต่อการพัฒนาคุณภาพกำลังแรงงานในอนาคตของสังคมสูงวัย" โดย ดร.เนื้อแพร เล็กเฟื่องฟู
  - ข้อเสนอโครงการเรื่อง "โครงสร้างการผลิตและพัฒนาการของรูปแบบการผลิตสินค้าเกษตรไทย ระหว่าง ปี พ.ศ. 2541- 2557" โดย ดร.เชาวนา เพชรรัตน์
- การจัด Townsend Thai Data Workshop (คาดว่าจะจัดขึ้นในเดือน ก.พ. 2560)
- การจัดงาน Townsend Conference ประจำปี 2560 ในเดือนมิถุนายน 2560
- ชุดโครงการฯ คาดว่าจะจัดการประชุมนำเสนอรายงานฉบับสมบูรณ์ รายงานความก้าวหน้า และข้อเสนอโครงการครั้งถัดไป ในช่วงเวลาเดียวกัน ประมาณปลายเดือนกุมภาพันธ์ 2560

มติ ที่ประชุมเห็นชอบ

เลิกประชุมเวลา 16.00 น.

(นางสาววาสิณี จันทร์ธร)
ผู้จดรายงานการประชุม

รายงานการประชุมการนำเสนอความก้าวหน้าและข้อเสนอโครงการ
ภายใต้ชุดโครงการ “พัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย”
ครั้งที่ 2/2560
เมื่อวันที่ 3 พฤษภาคม 2560 เวลา 9.00 – 15.00 น.
ณ ห้องประชุม 1 สกว. ชั้น 15

<u>คณะกรรมการที่เข้าร่วมประชุม</u>

1. ศ.นพ.สุทธิพันธ์ จิตพิมลมาศ	ที่ปรึกษา คณะกรรมการชุดโครงการฯ
2. ดร.ปัทมาวดี โพชนุกูล	กรรมการชุดโครงการฯ
3. ดร.อัจนา ไวความดี	ประธานกรรมการชุดโครงการฯ
4. คุณรัจนา เนตรแสงทิพย์	กรรมการชุดโครงการฯ
5. ดร.ปิติ ดิษยทัต	กรรมการชุดโครงการฯ
6. ดร.วีระชาติ กิเลนทอง	กรรมการชุดโครงการฯ

<u>นักวิจัยและเจ้าหน้าที่ที่เข้าร่วมประชุม</u>

7. ดร.อนันต์ ภาวสุทธิไพศิฐ	คณะเศรษฐศาสตร์ มหาวิทยาลัยธรรมศาสตร์
8. ดร.ภัทรพรรณ อดทน	นักวิจัย สถาบันวิจัยเพื่อการประเมินและการออกแบบนโยบาย
9. ดร.เชาวนา เพชรรัตน์	คณะเศรษฐศาสตร์ มหาวิทยาลัยเชียงใหม่
10. ดร.เนื้อแพร เล็กเฟื่องฟู	คณะเศรษฐศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
11. ดร.ธัญญ์มัชฌ สรุงบุญมี	คณะเศรษฐศาสตร์ มหาวิทยาลัยขอนแก่น
12. ดร.อาชว์ ปวีณวัฒน์	คณะเศรษฐศาสตร์ มหาวิทยาลัยหอการค้าไทย
13. คุณสมบัติ ศกุนตะเสฐียร	ผู้อำนวยการโครงการวิจัยครอบครัวไทย
14. คุณภวิศณัฏฐ์ ปฐมเจริญสุขชัย	ผู้จัดการโครงการวิจัยครอบครัวไทย
14. คุณพัชรินทร์ รักสัตย์	เจ้าหน้าที่บริหารโครงการ ฝ่ายชุมชนและสังคม สกว.
15. คุณวาสิณี จันทร์ธร	นักวิจัย สถาบันวิจัยเพื่อการประเมินและการออกแบบนโยบาย
16. คุณไฟรุส อับดุลเลาะห์	นักวิจัย สถาบันวิจัยเพื่อการประเมินและการออกแบบนโยบาย

เริ่มประชุมเวลา 9.00 น.

<u>วาระที่ 1</u> เรื่องที่ประธานแจ้งที่ประชุมทราบ

<u>วาระที่ 2.</u> เรื่องรับรองรายงานการประชุม

เลขานุการเสนอรายงานการประชุมครั้งที่ 1/2560 เมื่อวันที่ 20 มกราคม 2560 ให้ที่ประชุมรับรอง

มติ ที่ประชุมรับรองรายงานการประชุม

<u>วาระที่ 3.</u> เรื่องที่เสนอให้ที่ประชุมทราบ

3.1 อนุมัติทุนโครงการประสานงาน ชุดโครงการ "พัฒนาองค์ความรู้เศรษฐกิจและสังคมของครัวเรือนไทย" สัญญาเลขที่ RDC6040003 ซึ่งมี ผศ.ดร.วีระชาติ กิเลนทอง สังกัดสถาบันวิจัยเพื่อการประเมินและออกแบบนโยบาย มหาวิทยาลัยหอการค้าไทย เป็นหัวหน้าโครงการ

- ระยะเวลา: 1 ปี (4 ม.ค. 60 – 3 ม.ค. 61)
- งบประมาณ: 1,899,200 บาท
- สถานะ: ระหว่างดำเนินงาน

มีโครงการได้เซ็นสัญญา 3 โครงการ เป็นวงเงิน 12,765,800 บาท

1. โครงการ "ฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำเพื่อการวิจัยด้านเศรษฐศาสตร์และสังคม" (ระยะที่สอง) โดย คุณสมบัติ ศกุนตะเสถียร เป็นวงเงิน 11,500,000 บาท
2. โครงการ "การเปลี่ยนแปลงของความยากจนในชนบทไทย" โดย ดร.อนันต์ ภาวสุทธิไพศิฐ เป็นวงเงิน 556,600 บาท
3. โครงการ "การจัดทำฐานข้อมูลแบบตัวอย่างซ้ำจากข้อมูลภาวะการทำงานของประชากร" โดย ดร.ภัทรพรรณ อดทน เป็นวงเงิน 709,200 บาท

และโครงการที่อยู่ระหว่างการพัฒนา 2 โครงการ

1. โครงการ "การเปลี่ยนแปลงโครงสร้างการผลิตด้านการเกษตรของครัวเรือนในชนบท: บทเรียนจากข้อมูล Townsend Thai Data" โดย ดร.เชาวนา เพชรรัตน์
2. โครงการ "บทบาทของสภาพครัวเรือนและการอพยพออกต่อการพัฒนาคุณภาพกำลังแรงงานในอนาคตของสังคมสูงวัย" โดย ดร.เนื้อแพร เล็กเฟื่องฟู และ ดร.ธัญมัชฌ สรุงบุญมี

มติ ที่ประชุมรับทราบ

3.2 อนุมัติสิ้นสุดสัญญาโครงการ “ฐานข้อมูลบัญชีครัวเรือนเพื่อการวิจัยด้านเศรษฐกิจและสังคม” สัญญาเลขที่ RDG5940003 ซึ่งมี ดร.นราพงศ์ ศรีวิศาล คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย เป็นหัวหน้าโครงการ

- ระยะเวลา: 1 ปี (1 พ.ย. 58 – 31 ต.ค. 59) ขอขยายเวลาไปถึง 31 ธ.ค. 59
- งบประมาณ: 1.5 ล้านบาท
- สถานะ: เสร็จสิ้นโครงการเรียบร้อย

และเมื่อวันที่ 6 กุมภาพันธ์ 2560 ทางโครงการฯ ได้จัดการอบรมการใช้ Townsend Thai Micro Data ณ ห้องประชุมศูนย์วิจัยมหาวิทยาลัยชิคาโก-มหาวิทยาลัยหอการค้าไทย (UC-UTCC Research Center) อาคาร 21 ชั้น 7 มหาวิทยาลัยหอการค้าไทย โดยมีผู้เข้าร่วมการอบรมทั้งสิ้น 27 คน



มติ ที่ประชุมรับทราบ

<u>วาระที่ 4.</u> เรื่องที่เสนอให้ที่ประชุมพิจารณา

4.1 การจัดงาน Conference ประจำปี 2560 “Finance and Development: Data, Research and Policy Design”

- o เสนอให้มี Knowledge Translation เพื่อให้มี Social Impact
- o เสนอให้ทุกๆ working paper ต้องมี Discussion ออกมา
- o Conference จะแบ่งออกเป็น 3 Session คือ
    - Session 1: Measuring Household and SME Finance
      เป็นการนำเสนอองค์ความรู้ที่เกี่ยวข้องกับการประกอบธุรกิจและการเงินของครัวเรือนไทยที่ได้จาก Townsend Thai Project เพื่อเชื่อมโยงไปยังนโยบายที่เกี่ยวข้องกับระบบการเงิน
    - Session 2: Harnessing Geographic Data for Finance and Policy
      เป็นการนำเสนอแนวคิดและการแสดงผลข้อมูลในรูป Geography เพื่อสะท้อนถึงภาพโดยรวมของนโยบายที่เกี่ยวข้องกับการเงิน
    - Session 3: Research-Based Policy Design
      เป็นการนำเสนอโครงการวิจัยที่มีพื้นฐานมาจากทฤษฎีสำหรับการออกแบบเชิงนโยบาย

มติ ที่ประชุมมีความเห็นว่า

- ควรมีการจัดเลี้ยงต้อนรับ speakers ทุกท่าน รวมทั้งคณะกรรมการของชุดโครงการฯ ในคืนวันที่ 8 มิถุนายน 2560
- ควรมีการจัดสรรเวลาให้สื่อมวลชนสัมภาษณ์ประธานหรือตัวแทนผู้จัดงาน เพื่อบอกกล่าวถึงวัตถุประสงค์และชี้ให้เห็นถึงประเด็นหลักเพื่อสื่อให้คนทั่วไปได้รับทราบ สำหรับการจัด conference ในครั้งนี้ โดยอาจจัดให้มีเวลาการสัมภาษณ์ในช่วงเช้าระหว่าง coffee break ของวันที่ 8 มิถุนายน 2560
- ควรให้มีการจัดประชุมคณะกรรมการชุดโครงการฯ อีกครั้ง ในวันที่ 9 มิถุนายน 2560 ช่วงบ่ายหลังจากเสร็จสิ้น conference ในช่วงกลางวัน

4.2 รายงานความก้าวหน้าโครงการ “การเปลี่ยนแปลงของความยากจนในชนบทไทย” (15 สิงหาคม 2559 – 20 กรกฎาคม 2560) สัญญาเลขที่ RDG5940037 ซึ่งมี ดร.อนันต์ ภาวสุทธิไพศาล สังกัดคณะเศรษฐศาสตร์ มหาวิทยาลัยธรรมศาสตร์ เป็นหัวหน้าโครงการ

วัตถุประสงค์

1. ศึกษาข้อเท็จจริง สถานการณ์ของความยากจนและการเปลี่ยนแปลงของความยากจนในชนบทในช่วงเวลาของการสำรวจ
2. ศึกษาสาเหตุของการตกหรือกลับเข้าไปสู่ความยากจนของครัวเรือนในชนบท
3. วิเคราะห์ความแตกต่างระหว่างกลุ่มที่สามารถออกจากความยากจนได้และกลุ่มที่ยังตกอยู่ภายใต้ความยากจน

ข้อมูล

1. Townsend Thai Data (Panel 1998-2011: ฉะเชิงเทรา ลพบุรี บุรีรัมย์ ศรีสะเกษ)
2. Thai SES (Pooled Cross Sections 1994-2013)

มติ ที่ประชุมมีข้อเสนอแนะว่า

1. ควรเปลี่ยนชื่อโครงการ “การเปลี่ยนแปลงความยากจนในชนบทไทย” เป็น “การเปลี่ยนแปลงความยากจนในชนบทไทยจากกรณีศึกษา Townsend Thai Data” เนื่องจากข้อมูลที่ศึกษาเป็นเพียงบางจังหวัดและบางพื้นที่เท่านั้น (16 หมู่บ้านใน 4 จังหวัด) ซึ่งไม่ได้ครอบคลุมถึงชนบทไทยทั้งหมด
2. ขอให้รีวิวงานวิจัย สกว. โครงการศึกษาพลวัตของความยากจน: กรณีศึกษาครัวเรือนชาวนาในพื้นที่เขตชนบทภาคตะวันออกเฉียงเหนือและภาคกลางของไทย โดย น.ส.อานันท์ชนก สกนธวัฒน์ (สิงหาคม 2554) ซึ่งมีคำถามวิจัยและวัตถุประสงค์ของการศึกษาเดียวกับงานของ อ.อนันต์ อยากให้รีวิวเปรียบเทียบความเหมือน ความต่างของวิธีการศึกษา และข้อค้นพบ งานวิจัยนี้สามารถดาวโหลดได้จากหน้าเว็บไซต์ สกว. TRF e-library

3. เพิ่มการใช้ข้อมูลเชิงคุณภาพในการวิเคราะห์ปัจจัยภายใน และภายนอกที่มีผลต่อการเปลี่ยนแปลงความยากจน
4. ควรตรวจสอบค่า consumption ของข้อมูลว่ามีการรวมค่า durable consumption เข้าไปด้วยหรือไม่
5. ควรเปรียบเทียบเส้นแบ่งความยากจากสภาพัฒน์ด้วย ซึ่งอาจนำเส้นแบ่งความยากจนรายจังหวัดเข้ามาพิจารณาประกอบในการนิยามประเภทของครัวเรือน (ครัวเรือนยากจนชั่วคราว, ครัวเรือนยากจนเรื้อรัง, ครัวเรือนที่อยู่ภายใต้ความยากจนตลอดเวลา และครัวเรือนที่ไม่เคยจน)
6. ควร review การใช้เส้น poverty line ใน discussion
7. ลองแก้ปัญหาการใช้ poverty line ในการเปรียบเทียบกับ consumption ของครัวเรือน โดยการนิยามระยะเวลาในการตกอยู่ภายใต้สภาพความยากจน (spell) ใหม่ ซึ่งการนิยามดังกล่าวไม่น่าจะส่งผลกระทบกับปัจจัยในครัวเรือนที่มีผลต่อการตกอยู่ภายใต้ความยากจน
8. ควรแสดงค่า average consumption ของแต่ละจังหวัดเปรียบเทียบกับค่า consumption จากข้อมูลอื่นๆ ด้วย เช่น SES
9. ควรสรุปผลของปัจจัยหลักที่มีอิทธิพลทั้งในเชิงบวกและลบที่ส่งผลต่อการตกอยู่ภายใต้ความยากจนของครัวเรือน และอยากให้เพิ่มปัจจัยเชิง policy เข้าไปด้วย เช่น การกู้ยืมเงินจาก ธกส. , การรับจำนำข้าว เป็นต้น

4.3 รายงานความก้าวหน้าโครงการ “การจัดทำฐานข้อมูลแบบตัวอย่างซ้ำจากข้อมูลภาวะการทำงานของประชากรไทย” (3 ตุลาคม 2559 – 2 ตุลาคม 2560) สัญญาเลขที่ RDG6040001 ซึ่งมี ดร.ภัทรพรรณ อดทน สังกัดสถาบันวิจัยเพื่อการประเมินและออกแบบนโยบาย มหาวิทยาลัยหอการค้าไทย เป็นหัวหน้าโครงการ

วัตถุประสงค์

1. เพื่อจัดทำฐานข้อมูลภาวะการทำงานของประชากรแบบตัวอย่างซ้ำ (panel data) จากข้อมูลการสำรวจแบบ cross-sectional ในแต่ละไตรมาส
2. เพื่อส่งเสริมให้นักวิจัยได้ใช้ประโยชน์จากข้อมูลรายบุคคลแบบตัวอย่างซ้ำ

มติ ที่ประชุมมีข้อเสนอแนะว่า

1. หากนักวิจัยต้องการเผยแพร่ฐานข้อมูลที่จัดทำขึ้นต่อสาธารณะ ควรปรึกษาหารือกับสำนักงานสถิติแห่งชาติอีกครั้ง เพื่อทำข้อตกลงในการอนุญาตให้เผยแพร่ชุดข้อมูลที่ได้จากงานวิจัยนี้ เนื่องจากผู้เข้าร่วมประชุมเห็นว่าการนำโค้ดคำสั่งไปใช้มีความยุ่งยาก
2. หากนักวิจัยไม่สามารถเผยแพร่ฐานข้อมูลชุดนี้ เห็นควรให้
    - ทางสำนักงานสถิติแห่งชาติเป็นผู้เก็บรวบรวมข้อมูลชุดนี้ไว้ และทำการเผยแพร่ให้กับนักวิจัยที่สนใจใช้งานโดยตรง

- นักวิจัยเผยแพร่ชุดคำสั่งเพื่อให้ผู้ใช้งานนำไปรันด้วยตนเอง
- นักวิจัยเปิดบริการจัดการข้อมูล LFS จากสำนักสถิติแห่งชาติ
- นักวิจัยเผยแพร่ข้อมูลที่มีเฉพาะตัวแปร ID ที่สร้างขึ้นใหม่ เพื่อให้ผู้ใช้นำข้อมูลนี้ไปรวมกับข้อมูล LFS จากสำนักสถิติแห่งชาติด้วยตนเอง

3. ควรสร้าง ID ใหม่ที่ไม่สามารถระบุตัวบุคคลได้ หากมีการเผยแพร่ฐานข้อมูลชุดนี้
4. ควรพิจารณาความสัมพันธ์กับหัวหน้าครัวเรือน กรณีที่ไม่สามารถใช้การเรียงเพศ และอายุในการตรวจสอบได้
5. ควรคิดคะแนน capacity ของตัวแปรอายุ เพศ การศึกษา และตัวแปรอื่นๆ ที่สามารถตรวจสอบได้ว่าข้อมูลตัวอย่างซ้ำที่ได้เป็นรายบุคคลเดียวกัน
6. ควรแสดงกรณีตัวอย่างหลายๆ แบบในการนำเสนอครั้งหน้า เช่น กรณีที่ให้อายุห่างกันไม่เกิน 1 ปี หรือ 2 ปี เป็นต้น
7. ควรเรียนเชิญผู้ดูแลฐานข้อมูลโดยตรงจากสำนักงานสถิติแห่งชาติ (ผอ.รวมพร) เข้าร่วมประชุมในครั้งถัดไป

4.4 ข้อเสนอโครงการ “การเปลี่ยนแปลงโครงสร้างการผลิตด้านเกษตรกรของครัวเรือนไทยในชนบท: บทเรียนจากข้อมูล Townsend Thai Data” โดย ดร.เชวนา เพชรรัตน์ สังกัดคณะเศรษฐศาสตร์มหาวิทยาลัยเชียงใหม่ เป็นหัวหน้าโครงการ

วัตถุประสงค์

1. ศึกษาการเปลี่ยนแปลงโครงสร้างการผลิตด้านเกษตรของครัวเรือนในชนบท โดยให้ความสำคัญกับการผลิตแบบหลากหลาย (diversification) และการผลิตแบบเฉพาะอย่าง (specialization)
2. ศึกษาความแตกต่างของลักษณะครัวเรือน (household heterogeneity) และบทบาทของภาครัฐต่อการเลือกระบบการผลิตแบบหลากหลาย (diversification) และการผลิตแบบเฉพาะอย่าง (specialization)

มติ ที่ประชุมมีข้อเสนอแนะว่า

1. ควร review literature เพิ่มเติม โดยให้มองจากกรอบใหญ่ก่อนว่า โครงสร้างการผลิตคืออะไร มีนิยามอย่างไร ระบุให้ชัดเจน และมีความเกี่ยวเนื่องกับโครงสร้างครัวเรือนอย่างไร
2. ควรเน้นวัตถุประสงค์ข้อ 1 เพื่อศึกษาโครงสร้างการผลิตภาคครัวเรือน ลักษณะครัวเรือนเป็นอย่างไร การใช้ทรัพยากรเป็นอย่างไร พฤติกรรมของครัวเรือนเป็นอย่างไร ตลอดระยะเวลาที่ผ่านมา แล้วค่อยหาปัจจัยที่กระตุ้นให้ครัวเรือนเลือกผลิตสินค้าเกษตร และอะไรเป็นปัจจัยที่ทำให้เกษตรกรเปลี่ยนรูปแบบการผลิต

3. วัตถุประสงค์ข้อที่ 2 ควรศึกษาในกรอบกว้างๆ เพื่อดูลักษณะของครัวเรือนที่ได้จากการศึกษาในวัตถุประสงค์ข้อที่ 1 ก่อน แล้วค่อยระบุปัจจัยที่ส่งผลต่อการเลือกรูปแบบการผลิต โดยไม่จำเป็นต้องระบุถึงตัวแปรที่ใช้ในการศึกษา

4.5 ข้อเสนอโครงการ “บทบาทของสภาพครัวเรือนต่อการพัฒนาคุณภาพกำลังแรงงานในอนาคตของสังคมสูงวัย” โดย ดร.เนื้อแพร เล็กเฟื่องฟู สังกัดคณะเศรษฐศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย เป็นหัวหน้าโครงการ

วัตถุประสงค์

1. เพื่อแสดงโมเดลเชิงเศรษฐศาสตร์ที่แสดงถึงการจัดสรรทรัพยากรภายในครัวเรือนในรูปแบบของ overlapping generation resource transfer เพื่อเป็นแนวทางในการศึกษาทิศทางความสัมพันธ์ระหว่างลักษณะโครงสร้างของครัวเรือนและการลงทุนเชิงทักษะในเด็ก
2. เพื่อสรุปข้อมูลเชิงสถิติเชิงตัดขวางและเชิงพลวัตจากข้อมูลครัวเรือนที่ติดตาม เพื่อแสดงภาพความสัมพันธ์ระหว่างลักษณะโครงสร้างครัวเรือน การจัดสรรทรัพยากรในครัวเรือน และการลงทุนในเด็ก ซึ่งรวมถึงผลลัพธ์ต่อพัฒนาการของเด็กและทักษะโดยรอบ เช่น ภาวะสุขภาพ การศึกษา เป็นต้น

มติ ที่ประชุมมีข้อเสนอแนะว่า

1. ควรอธิบายเพิ่มเติมว่า งานวิจัยชิ้นนี้ต้องการเชื่อมโยงความสัมพันธ์ระหว่างคุณภาพของเด็กกับ aging ของผู้สูงวัย และมีความสัมพันธ์กับโครงสร้างหรือลักษณะครัวเรือนอย่างไร
2. ควรทำการศึกษาว่า มีปัจจัยใดบ้างที่ใช้วัด human capital นอกเหนือจากระยะเวลาที่อยู่ในโรงเรียน

4.6 รายงานความก้าวหน้าโครงการ “ฐานข้อมูลระดับข้อมูลแบบตัวอย่างซ้ำเพื่อการวิจัยด้านเศรษฐศาสตร์และสังคม” (1 สิงหาคม 2559 – 31 กรกฎาคม 2560) สัญญาเลขที่ RDG5940038 โดยมี นายสมบัติ ศกุนตะเสฐียร เป็นหัวหน้าโครงการ

วัตถุประสงค์

1. เพื่อพัฒนาฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำรายเดือน (monthly micro data) ให้มีข้อมูลต่อเนื่องและเป็นประโยชน์ต่อการพัฒนาประเทศ
2. เพื่อสนับสนุนให้เกิดงานวิจัยด้านเศรษฐศาสตร์และสังคมศาสตร์ที่มีคุณภาพ

มติ ที่ประชุมมีข้อเสนอแนะว่า

1. อยากให้เพิ่มงานเขียนในรายงาน โดยบอกถึงเรื่องราวหรือบริบทที่เปลี่ยนแปลงไปของครัวเรือนตั้งแต่เริ่มสำรวจจนถึงปัจจุบัน
2. โครงการจะสิ้นสุดสัญญา เดือน ก.ค. 60 ดังนั้น นักวิจัยต้องเตรียมร่าง proposal ไว้ก่อนเพื่อต่อสัญญาในปี 61 ซึ่งคาดว่าจะคุยกันอีกครั้งในการประชุม steering committee ครั้งถัดไป

3. ระบุแผนการเก็บข้อมูลในส่วนของแผนการดำเนินงาน ซึ่งการเก็บ census จะใช้เวลาประมาณ 4 เดือน ทำให้โครงการต่อเนื่องในปีที่ 3 มีการดำเนินงานตั้งแต่ ส.ค. 60 – ธ.ค. 61 รวมระยะเวลาเป็น 17 เดือน นอกจากนี้ ทีมเก็บข้อมูลจะเพิ่มแบบสอบถามของ census เกี่ยวกับสุขภาพอนามัย เนื่องจากมีกลุ่มตัวอย่างเป็นผู้สูงวัยเยอะพอสมควร
4. ควรมีการถ่ายทอดความรู้ที่ได้จากการเก็บข้อมูลให้แก่คนในชุมชนและหมู่บ้านเพื่อนำไปปรับใช้กับการดำรงชีวิต

4.7 รายงานฉบับสมบูรณ์โครงการ "การศึกษาการค้าระดับหมู่บ้านในไทยโดยใช้แบบจำลองการเลือกอาชีพที่มีความไม่สมบูรณ์ของตลาดการเงิน" (4 มกราคม 2559 – 30 ธันวาคม 2559) สัญญาเลขที่ RDG5940005 ซึ่งมี ดร.อาชว์ ปวีณวัฒน์ สังกัดคณะเศรษฐศาสตร์ มหาวิทยาลัยหอการค้าไทย

วัตถุประสงค์

1. สร้างแบบจำลองระบบเศรษฐกิจขนาดเล็กแบบเปิดเพื่ออธิบายการลู่ออกของสัดส่วนของราคาปัจจัยการผลิตที่พบใน Townsend Thai Data
2. ใช้แบบจำลองที่สร้างขึ้นในการศึกษาผลกระทบของตลาดการค้าและตลาดการเงินต่อระบบเศรษฐกิจในระดับหมู่บ้าน

มติ ที่ประชุมมีข้อเสนอแนะว่า

1. บทที่ 1 ควรมี outline เพิ่มคำอธิบายความสำคัญและที่มาของงานวิจัยชิ้นนี้ บอกว่า research question คืออะไร ทำไมถึงพยายามแก้ปัญหาด้วยวิธีนี้
2. บทสุดท้ายที่เกี่ยวข้องกับ policy มีผลภายใต้เงื่อนไขใดบ้าง เช่น หมู่บ้านนั้นถูก constrain ด้วยปัจจัยอะไร เป็นต้น
3. เพิ่มในส่วนของ discussion ให้เห็นว่าผลลัพธ์ในปีแรกๆ ที่เกิดขึ้นมาจากสาเหตุใด เช่น คนนอกภาคการเกษตรสามารถกู้เงินจาก ธกส. ได้ เป็นต้น

เลิกประชุมเวลา 15.00 น.

(นางสาววาสิณี จันทร์ธร)

ผู้จดรายงานการประชุม

การประชุมปรึกษาหารือ
เรื่องการดำเนินงานของชุดโครงการฯ สำหรับปี 2561
ในวันศุกร์ ที่ 9 มิ.ย. 60 ณ ธนาคารแห่งประเทศไทย

ผู้เข้าร่วมประประชุม

1. ดร.ปัทมาวดี โพชนุกูล	รองผู้อำนวยการด้านการวิจัยเชิงยุทธศาสตร์ สกว.
2. ดร.วีระชาติ กิเลนทอง	หัวหน้าชุดโครงการฯ
3. คุณพัชรินทร์ รักสัตย์	เจ้าหน้าที่บริหารโครงการ ฝ่ายชุมชนและสังคม สกว.
4. คุณวาสิณี จันทร์ธร	นักวิจัย สถาบันวิจัยเพื่อการประเมินและการออกแบบนโยบาย

เริ่มประชุมเวลา 13.30 น.

สรุปประเด็นที่ได้จากการประชุม

1. โครงการฐานข้อมูล HH Data จะสิ้นสุดโครงการปีที่ 2 สิ้นเดือน ก.ค. 60 (สัญญาโครงการ 12 เดือน ตั้งแต่ 1 ส.ค. 59 – 31 ก.ค. 60) ซึ่งคิดว่าอาจจะต้องส่งร่าง proposal โครงการต่อเนื่องในปีที่ 3 ภายในเดือน มิ.ย.60 นี้
2. โครงการฐานข้อมูล HH Data ในปีที่ 3 จะขยายระยะเวลาการดำเนินงานจาก12 เดือน เป็น 17 เดือน ดังนั้น โครงการจะต้องเริ่มขึ้นสัญญาตั้งแต่เดือน ส.ค. 60 – ธ.ค. 61 แต่ยังคงใช้งบประมาณจำนวนเท่าเดิมคือ 11.5 ล้านบาท
3. ชุดประสานงานจะสิ้นสุดโครงการปีที่ 2 ต้นเดือน ม.ค. 61 (สัญญาโครงการ 12 เดือน ตั้งแต่ 4 ม.ค. 60 – 3 ม.ค. 61) ดังนั้น สามารถขึ้นสัญญาโครงการในปีที่ 3 ได้ตั้งแต่เดือน ม.ค. 61 – ธ.ค. 61 ซึ่งจะครอบคลุมการสิ้นสุดสัญญาโครงการฐานข้อมูล HH Data พอดี
4. ทาง สกว. มีประเด็นที่สนใจเกี่ยวกับเรื่อง Health จึงอยากให้ทีมวิจัยเก็บฐานข้อมูลเรื่องนี้ด้วย ดังนั้น สกว. อยากให้ร่าง concept note มาก่อนสัก 2-3 แผ่น (อาจต้อง Email ปรึกษากับทาง Prof. Townsend เกี่ยวกับการทำงานและความร่วมมือในประเด็นนี้) และจำเป็นต้องมีผู้เชี่ยวชาญทางด้านสุขภาพเพื่อทำงานร่วมกับนักเศรษฐศาสตร์ (เช่น คุณหมอยศ, คุณหมอสมศักดิ์ หรือ คุณหมอสุทธิพันธ์ เข้าร่วมด้วย) โดยคาดว่าโครงการนี้น่าจะต้องขึ้นสัญญาในปี 61
5. การขอทุนเพื่อทำโครงการ RIECE ซึ่งเกี่ยวข้องกับการศึกษาจะต้องไปอยู่ในชุดโครงการของ SRI9 โดยมีงบประมาณต่อปี 4 ล้านบาท (รวมค่า survey ค่าแรงงาน และค่าเดินทางแล้ว และจะของบ RA 3 คน) สกว. อยากให้ทีมวิจัยร่าง concept paper ส่งมาก่อน และอาจจะต้องหาผู้สนับสนุนทุนร่วมด้วยเช่น สกว., อบต. ท้องถิ่น, UNFCA, สภาพัฒน์ เป็นต้น นอกจากนี้ อยากให้ทีมวิจัยศึกษาเปรียบเทียบหลักสูตรการศึกษาต่างๆ ที่ใช้อยู่ในปัจจุบัน (comparing curricula)
6. การทำงานในปีต่อไปของทีมงานคุณสมบัติ หลังจากสิ้นสุดโครงการ Townsend Thai Project อาจต้องมีการพูดคุยรายละเอียดกันอีกครั้ง (ควรทำงานภายใต้ สกว. หรือหน่วยงานอื่นๆ หรือไม่อย่างไร)

เลิกประชุมเวลา 14.30 น.

(นางสาววาสิณี จันทร์ธร)

ผู้จดรายงานการประชุม

แผนการดำเนินงานโครงการฐานข้อมูลระดับครัวเรือนแบบตัวอย่างซ้ำเพื่อการวิจัยด้านเศรษฐศาสตร์และสังคม (HH Data) ระยะต่อเนื่องในปีที่ 3 (พ.ศ.2561)

	พ.ศ. 2560					พ.ศ. 2561											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	ส.ค.	ก.ย.	ต.ค.	พ.ย.	ธ.ค.	ม.ค.	ก.พ.	มี.ค.	เม.ย.	พ.ค.	มิ.ย.	ก.ค.	ส.ค.	ก.ย.	ต.ค.	พ.ย.	ธ.ค.
1. การเก็บข้อมูลตัวอย่างซ้ำรายเดือน (Monthly Micro Survey)	←	—	—	—	—	—	→										
- สัมภาษณ์กลุ่มตัวอย่าง	←	—	—	→													
- บันทึกข้อมูลรอบที่ 1 และตรวจสอบข้อมูลรอบที่ 1 (เดือนที่ 228-231)	←	—	—	→													
- ทำจดหมายแจ้งให้ทุกครัวเรือนทราบว่าได้สิ้นสุดการเก็บข้อมูลรายเดือนแล้ว					↔												
- บันทึกข้อมูลรอบที่ 2 และตรวจสอบรอบที่ 2 (เดือนที่ 226-231)	←	—	—	—	—	→											
- เปรียบเทียบและตรวจสอบข้อมูลทั้ง 2 รอบ	←	—	—	—	—	—	→										
2. การเก็บข้อมูลสำมะโน (Census Survey)						←	—	—	—	→							
- ทำจดหมายแจ้งให้ครัวเรือนทราบถึงการเก็บข้อมูลสำมะโน						↔											
- เตรียมทีมงานและอุปกรณ์การเก็บข้อมูล (แผนที่ แบบสอบถาม)						↔											
- เตรียมโปรแกรมการบันทึกข้อมูลและฝึกอบรมพนักงานสัมภาษณ์						↔											
- สัมภาษณ์กลุ่มประชากร							←	—	→								
- บันทึกข้อมูลรอบที่ 1 และตรวจสอบข้อมูลรอบที่ 1							←	—	—	→							
3. การทำความสะอาดข้อมูล (Data Cleaning and Completing)								←	—	—	—	—	—	—	—	—	→
- บันทึกข้อมูล census รอบที่ 2 และตรวจสอบข้อมูลทั้ง 2 รอบ								←	—	—	→						
- ตรวจสอบข้อมูลตัวอย่างซ้ำรายเดือน										←	—	→					
- ตรวจสอบข้อมูลสำมะโน										←	—	→					
- ทำความสะอาดข้อมูลตัวอย่างซ้ำรายเดือนและข้อมูลสำมะโน													←	—	—	—	→
- สิ้นสุดการสำรวจข้อมูล																	↔

รายงานการประชุมผู้ประสานงานฝ่ายชุมชนและสังคม สกว. ประจำปี 2560
ครั้งที่ 1/2560
เมื่อวันจันทร์ที่ 9 ตุลาคม พ.ศ. 2560 เวลา 8.30 – 16.30 น.
ณ ห้องโลตัส โรงแรมรามา การ์เด้นส์ กรุงเทพฯ

เริ่มประชุมเวลา 9.30 น.

วาระที่ 1 ยุทธศาสตร์การวิจัยของประเทศและการสนับสนุนการวิจัยของ สกว. มิติสังคม โดยยุทธศาสตร์หลักของฝ่ายประกอบไปด้วย

1. สร้างองค์ความรู้เกี่ยวกับการเปลี่ยนแปลงทางสังคม
2. สนับสนุนสร้างความคุ้มครองทางสังคม (social protection) ไม่ให้คนตกเข้าสู่ความยากจนและลดความเหลื่อมล้ำ
3. มุ่งสนับสนุนเสริมการสร้างประสิทธิภาพของกลุ่ม องค์กร ที่ทำงานมิติเศรษฐกิจและสังคม เพื่อเพิ่มขีดความสามารถในการจัดการสังคมอย่างยั่งยืน และปรับเงื่อนไขเชิงโครงสร้างที่กดทับการพัฒนาของชุมชนและท้องถิ่น

ชุดโครงการประสานงานภายใต้การดูแลของฝ่ายชุมชนและสังคม

กลุ่ม	**บทบาท/หน้าที่**	**ภาคีความร่วมมือ**	**ผลผลิต/ผลลัพธ์**
การศึกษา	- พัฒนาระบบและกลไก - sQip (SRI5) - อาชีวศึกษา (Credit bank SRI5) - พัฒนากระบวนการเรียนการสอน - เพาะพันธ์ปัญญา - พัฒนาเครือข่ายคุรุศาสตร์ มรภ.	**หน่วยประสานงาน** -สสค. - ม.สงขลานครินทร์ - ประธานคุรุสภา มรภ. และบุคลากรอิสระ - RASM **หน่วยร่วมทุน** - ธ.กสิกรไทย (MOU) - เครือข่าย มรภ. (MOU) - สพฐ. (คูปองครู)	- ปฏิรูปการศึกษา - SEEEM - CCR
สังคม	- การแก้ปัญหา - ที่ดิน - ตำรวจ/การค้ามนุษย์ - การคุ้มครองทางสังคมในเด็กและเยาวชน - การเปลี่ยนแปลงโครงสร้างประชากร (SRI9) - corruption free (ท้าทายไทย) - เศรษฐกิจพอเพียง - SDGd (SRIX) - Capacity building - อปท. - พัฒนานักวิจัย มรภ. – สกว. - พัฒนาเครื่องมือ - Social Impact Assessment for social	**หน่วยประสานงาน** -บชน. - CSPS ม.ธุรกิจบัณฑิต - NIDA - SIAM LAB จุฬา - SDGMove มธ. - คณะเศรฐศาสตร์ มอ. - เครือข่าย สวพ มรภ. หน่วยร่วมทุน - เครือข่าย มรภ. - วช. **หน่วยงานความร่วมมือ** - สถาบันคลังสมอง	- ปฏิรูปที่ดิน - ประกอบแผนประชากร 20 ปี - ปฏิรูปการ corruption - สถานะ SDGs - แผนพัฒนาระบบวิจัย - สร้างโครงการวิจัยเพื่อชุมชน 25 ทุน - คู่มือ SIA

กลุ่ม	บทบาท/หน้าที่	ภาคีความร่วมมือ	ผลผลิต/ผลลัพธ์
	enterprises - Review Internet Studies	- สภาพัฒน์ - UNFPA, มูลนิธิมั่นพัฒนา	
เศรษฐกิจ	- ปรับระบบ - PIT กับความเหลื่อมล้ำ - ทำความเข้าใจเศรษฐกิจนอกภาคทางการ (สู่นวัตกรรมสังคมและนโยบาย) - การค้าข้างทาง - พฤติกรรมมอเตอร์ไซต์รับจ้างกับการออม - เศรษฐกิจครัวเรือนไทย - การปรับตัวชาวนา - พัฒนากระบวนการ - Inclusive Agribusiness	**หน่วยประสานงาน** - เศรษฐศาสตร์ จุฬา - สังคมสงเคราะห์ มธ. - เศรษศาสตร์ UCC - เศรษศาตร์ มก. - สถาบันวิจัยสังคม จุฬา **หน่วยร่วมทุน** - ธปท. (MOU) **หน่วยงานร่วมมือ** - MIT - ธกส. (MOU) - UCC	- ปฏิรูประบบภาษี - สร้างองค์ความรู้ด้านเศรษฐกิจและนโยบาย

<u>วาระที่ 2.</u> ยุทธศาสตร์และนโยบายวิจัย สกว. (2560-2564)

การขับเคลื่อนองค์กรในปัจจุบัน สกว. ได้จัดทำแผนยุทธศาสตร์ พ.ศ. 2560-2564 เพื่อเป็นกรอบแนวทางในการบริหารจัดการทุนวิจัย และการบริหารองค์กรให้ตอบสนองต่อทิศทางการพัฒนาประเทศ และสอดคล้องกับยุทธศาสตร์ชาติ 20 ปี โดยการขับเคลื่อนผ่าน 5 ยุทธศาสตร์สำคัญ ได้แก่

1. สนับสนุนทุนและบริหารจัดการงานวิจัยและพัฒนาในประเด็นสำคัญ มุ่งสร้างองค์ความรู้ใหม่และนวัตกรรมที่ก้าวนำการเปลี่ยนแปลงของโลก สร้างนโยบายและต้นแบบการพัฒนาชุมชน ท้องถิ่น พื้นที่และประเทศเพื่อเป้าหมายการพัฒนาอย่างยั่งยืน
2. สร้างนักวิจัยใหม่และพัฒนาศักยภาพนักวิจัย บุคคากรวิจัย เครือข่ายวิจัย และองค์กรวิจัยในทุกระดับให้เข้มแข็ง เพื่อตอบสนองความต้องการของประเทศ
3. สนับสนุนการพัฒนาระบบวิจัยและนวัตกรรมของประเทศ ร่วมในการปฏิรูประบบวิจัย บูรณาการกับหน่วยงานบริหารงานวิจัยและหน่วยงานสนับสนุนทุนวิจัยในทุกภาคส่วนของประเทศ พัฒนาความร่วมมือกับหน่วยงานบริหารงานวิจัยระดับนานาชาติ
4. บริหารจัดการผลงานวิจัยให้มีการนำไปใช้ประโยชน์และสื่อสารสังคม จนเกิดผลกระทบของงานวิจัย
5. พัฒนาและออกแบบสถาปัตยกรรมองค์กรเพื่อรับรองการเปลี่ยนแปลง

การวิเคราะห์ยุทธศาตร์และนโยบาย สกว.

จุดแข็ง	จุดอ่อน	โอกาส	ความท้าทาย
1. เป็นผู้นำด้านการบริหารจัดการงานวิจัยอย่างมีประสิทธิภาพและมีธรรมาภิบาล มีระบบการสนับสนุนทุนยืดหยุ่นคล่องตัว บริหารจัดการทุนตั้งแต่ต้นน้ำจนถึงปลายน้ำ และครอบคลุมทุกมิติทั้งเศรษฐกิจ สังคม และชุมชน 2. มีเครือข่ายนักวิจัยทุกระดับทั้งในประเทศและระดับนานาชาติ โดยมีทั้งในชุมชนท้องถิ่น สถาบันการศึกษา หน่วยงานต่างๆ รวมทั้งเครือข่ายงานวิจัยในระดับนานาชาติที่เข็มแข็ง 3. งานวิจัยมีคุณภาพมีศักยภาพและนำไปใช้ได้จริง4. เป็นหน่วยงานมีความอิสระทางวิชาการ มีความคล่องตัวและมีความยืดหยุ่นในการทำงาน มีขีดความสามารถในการบริหาร	1. การเชื่อมโยงงานวิจัยสู่การนำไปใช้ประโยชน์ยังไม่	1. ยุทธศาตร์ชาติและนโยบายรัฐมีแนวโน้มสนับสนุนการวิจัย	1. การขับเคลื่อนขึ้นกับเสถียรภาพของนโยบายรัฐ และ

จุดแข็ง	**จุดอ่อน**	**โอกาส**	**ความท้าทาย**
จัดการสูง มีความโปร่งใสในการทำงาน และมีผลการดำเนินงานที่ดี ประเมินจากหน่วยงานภายนอก 5. บุคลากรคุณวุฒิ คุณภาพ และประสิทธิภาพสูง 6. เป็นแหล่งสะสมองค์ความรู้ที่นำเสนอข้อมูลอย่างเป็นกลาง	ครอบคลุมหน่วยงานใช้ประโยชน์ทุกด้าน และขาดความต่อเนื่องในการดำเนินงานเชิงลึก 2. ทิศทางการดำเนินงานไม่ชัดเจน 3. การประเมินผลกระทบของงานวิจัยต่อประเทศยังไม่เข้มข้นเพียงพอ 4. งานวิจัยของ สกว. ยังเป็นที่รู้จักในวงจำกัด 5. ขาดแคลนบุคากรวิจัยในสาขาใหม่	เพิ่มขึ้น 2. ภาครัฐและภาคเอกชนให้ความสำคัญกับงานวิจัยมากขึ้น และการส่งเสริมการนำผลงานวิจัยไปประยุกต์ใช้ได้จริง เกิดการนำผลงานวิจัยไปประยุกต์ต่อยอดให้เกิดการพัฒนาต่อยอด 3. แนวโน้มการสร้างภาคีเครือข่ายทั้งระดับภูมิภาค ประเทศ จนถึงระดับโลก ทำให้เกิดการบูรณาการข้อมูลและสร้างความร่วมมือด้านการวิจัยต่าง ๆ 4. การปฏิรูปประเทศและการปฏิรูปการวิจัย	ระเบียบข้อบังคับที่มีผลต่อการจัดการ 2. นโยบายภาครัฐที่จัดสรรทุนวิจัยตรงไปยังหน่วยงานวิจัยและพื้นที่โดยตรง 3. การเกิดองค์กรที่มีศักยภาพในการสนับสนุนทุนวิจัยอาจส่งผลให้เกิดความซ้ำซ้อนในการสนับสนุนทุนวิจัย

จุดแข็ง	**จุดอ่อน**	**โอกาส**	**ความท้าทาย**
		ส่งผลให้การบริหารจัดการทุนวิจัยมีความคล่องตัวและมีประสิทธิภาพ สร้างโอกาสที่ท้าทายในการปฏิรูปองค์กร 5. ระบบเทคโนโลยีสารสนเทศที่ทันสมัยสนับสนุนการทำงานให้เกิดความรวดเร็ว มีประสิทธิภาพลดต้นทุนในการดำเนินงาน	

วาระที่ 3. การบริหารงานวิจัยด้านสังคมสู่การใช้ประโยชน์

การนำผลงานวิจัยไปใช้ประโยชน์ควรอาศัยแม่ข่าย หรือ agent เพื่อเป็นตัวประสานงานระหว่างการนำผลงานวิจัยจากนักวิจัยไปยังผู้ที่ต้องการใช้ประโยชน์ โดยจำเป็นต้องมีการวางแผนเพื่อให้เกิดผลลัพธ์ที่เห็นได้อย่างชัดเจน ผู้บรรยายได้ยกตัวอย่างขั้นตอนการนำผลงานวิจัยไปใช้ประโยชน์ซึ่งอ้างอิงจากหนังสือชื่อ the Research Impact Handbook โดยประกอบไปด้วยปัจจัยที่ต้องพิจารณา ดังนี้

1. ต้องเห็นการเปลี่ยนแปลงของผลลัพธ์ที่ได้จากงานวิจัย (changes as a result of your research)
2. ผลลัพธ์ของงานวิจัยไม่ควรเป็นเพียงแค่การแก้ปัญหาของนักวิจัยเท่านั้น แต่จำเป็นต้องขยายไปยังผู้ใช้ประโยชน์อย่างแท้จริง
3. สามารถกำหนดผู้ใช้ประโยชน์จากงานวิจัยได้
4. งานวิจัยควรส่งผลลัพธ์ในระยะยาว
5. การใช้ประโยชน์จากงานวิจัยควรเกิดขึ้นในระยะเวลาอันสั้น
6. งานวิจัยควรมีผลลัพธ์ที่ชัดเจนซึ่งส่งผลโดยตรงต่อผู้ใช้ประโยชน์
7. มีตัวอย่างการนำไปใช้ประโยชน์ที่แพร่หลาย

นอกจากนี้ สกว. เองควรเป็นตัวช่วยให้นักวิจัยกับกระทรวง/ทบวง/กรม หรือหน่วยงานเอกชน ได้เชื่อมผ่านกัน เพื่อนำผลงานวิจัยไปใช้ให้เกิดประสิทธิภาพ

<u>วาระที่ 4.</u> เป้าหมายและโจทย์วิจัย การออกแบบกลไกล และการบริหารงานวิจัยสู่การใช้ประโยชน์

<u>กลุ่มการศึกษา</u>

- จะพัฒนาภาพลักษณ์ของอาชีวศึกษาในเชิงบวกอย่างไร
- ควรใช้ระบบทวิภาคีในการเชื่อมโยงอาชีวศึกษากับมหาวิทยาลัย, กศน. กับอาชีวศึกษา และ สพฐ. กับอาชีวศึกษา
- การศึกษาระบบ credit bank กับอาชีวศึกษา
- การพัฒนาบุคคลกรด้านการศึกษาหรือครู
- การพัฒนาโรงเรียนสำหรับเด็กด้อยโอกาสเพื่อลดความเหลื่อมล้ำทางการศึกษา
- บทบาทของคณะกรรมการการศึกษาระดับจังหวัดที่เข้ามามีส่วนช่วยวางนโยบาย

<u>กลุ่มสังคม</u>

- การประยุกต์ใช้เศรษฐกิจพอเพียงกับการอยู่ร่วมกันของชมชุน รวมถึงวัด โรงเรียน และศาสนา
- ระบบการจัดการที่ดินกับ SDGs และกรรมสิทธิ์ในการจัดสรรที่ดิน
- องค์กรที่จะมาดูแลกฎหมายที่ดิน ควรเป็นอย่างไร
- การเสริมสร้างสมรรถนะของ อปท. และการบูรณาการการจัดการของ อปท.
- ผลกระทบที่เกิดขึ้นของ อปท. ในภาวะสังคมผู้สูงวัย
- กระบวนการยุติธรรมของตำรวจ การก่อร้าย ความมั่นคงและ อาชญกรรม computer

<u>กลุ่มเศรษฐกิจ</u>

หัวข้อที่สนใจศึกษาจากฐานข้อมูล Townsend Thai Data (4 จังหวัด บุรีรัมย์ ลพบุรี ฉะเชิงเทรา ศรีสะเกษ)

- Production (เกษตร, น้ำ, ฝน, ดิน)
- Contract (การเช่าที่, การกู้ยืม)
- Health

สิ่งที่ต้องทำ

- ทำ summary statistic ของข้อมูล
- แชร์ฐานข้อมูลและเชิญชวนให้คนมาใช้ฐานข้อมูลมากขึ้น
- อบรมการใช้ฐานข้อมูล
- คิดโจทย์วิจัยที่สามารถนำข้อมูลมาใช้ได้ (ในทีมนักวิจัยอาจจะช่วยตั้งโจทย์กันมาก่อน)

ข้อจำกัด/อุปสรรคของข้อมูล

- มีจำนวนมาก/รายละเอียดแบบสอบถามเยอะ/ใช้ไม่ง่าย
- มีข้อมูลด้านการศึกษาน้อย

โจทย์วิจัย

- การเปลี่ยนแปลงการผลิตของชาวนา เกษตรกร การเพิ่มประสิทธิภาพและยกระดับการผลิต
- การเปลี่ยนแปลง status (สหกรณ์ หรือสถาบัน)

- การเปลี่ยนแปลง consumption, saving, investment ของครัวเรือน
- ผลกระทบของนโยบายภาครัฐต่อครัวเรือน (การจำนำข้าว)
- การเปลี่ยนแปลงอาชีพของครัวเรือน
- ข้อจำกัดของเกษตรรายย่อย
    - การปรับตัวของเกษตร
    - ความสอดคล้องของนโยบาย (รูปแบบของสถาบันที่เหมาะสม)
    - การรวมกลุ่ม/สถาบันเกษตร เชื่อมต่อกับภาคเอกชน
    - Contact farming, benefit, cost, risk
    - ความช่วยเหลือโดยตรงเรื่องคุณภาพสินค้า (การขนส่ง, การบรรจุภัณฑ์)
- เกษตรกรที่ต้องพึ่งทรัพยากรสาธารณะ (การเข้าถึงทรัพยากร, ผลกระทบจากน้ำเสีย, อุตสาหกรรม)
- เกษตรกรปลูกผลไม้ (ปัญหาล้งจีน, การเพิ่มจำนวนผลผลิตที่ก่อให้เกิดรายได้ของเกษตรกร)
- รัฐวิสาหกิจชุมชน ต้องใช้ innovation เพื่อเพิ่มระดับ production สร้าง impact ให้เกิดขึ้น
- นักเศรษฐศาสตร์ควรมีส่วนเข้าไปแก้ปัญหาโดยตรง

<u>วาระที่ 5.</u> พรบ. ระเบียบจัดซื้อจัดจ้าง 2560

การจัดซื้อจัดจ้างแบบเกิดของ สกว. เปรียบเทียบกับ พรบ.

ระเบียบ สกว.	พรบ.
วิธิสอบราคา วิธีประกวดราคา วิธี e-Auction วิธี e-Market, e-Bidding	วิธีประกาศเชิญชวนทั่วไป
วิธีพิเศษ (มากกว่า 1 ราย)	วิธีคัดเลือก
วิธิพิเศษ (1 ราย) / วิธีตกลงราคา	วิธีเฉพาะเจาะจง
วิธีกรณีพิเศษ	วิธีคัดเลือก/วิธีเฉพาะเจาะจง (ออกเป็นกฏกระทรวง)

<u>วิธีการจัดซื้อจัดจ้าง</u>

ให้เลือกใช้วิธีประกาศเชิญชวนทั่วไปก่อน เว้นแต่จะเข้าเงื่อนไขวิธีอื่น **ยกเว้น** หน่วยงานของรัฐในต่างประเทศ จะใช้วิธีคัดเลือกหรือวิธีเฉพาะเจาะจง โดยไม่ใช้วิธีประกาศเชิญชวนทั่วไปก็ได้

1. วิธีเฉพาะเจาะจง (ในกรณีวงเงินไม่เกิน 100,000 บาท)
   ต่ำกว่า 50,000 บาท หัวหน้าโครงการมีอำนาจอนุมัติได้ หากเกินกว่า 50,000 บาท ต้องมีคณะกรรมการดำเนินการ (รายละเอียดตามคู่มือนักวิจัย สกว. หน้า 22 ข้อ 4.3)
2. วิธีการประกาศเชิญชวน/คัดเลือก (กรณีวงเงินเกิน 100,000 บาท)
   - จัดทำราคากลาง
   - จัดทำประกาศในเว็บไซต์ของหน่วยงาน, ส่งจดหมายเชิญ (e-mail), ติดประกาศประชาสัมพันธ์ ฯลฯ
   - จัดมีคณะกรรมการการดำเนินงาน 2 ชุด คือ คณะกรรมการจัดซื้อจัดจ้าง และคณะกรรมการตรวจรับ

- กำหนดให้ผู้มีสิทธิ์เสนอราคาต้องขึ้นทะเบียนผู้ประกอบการกับกรมบัญชีกลางด้วย (ตามมาตรา 53)

<u>ราคากลาง</u>

เป็นราคาที่ได้จากการคำนวณตามหลักเกณฑ์ที่คณะกรรมการราคากลางกำหนด ซึ่งมี 2 ประเภท คือ

1. ราคาอ้างอิง เป็นราคาที่สืบจากราคาท้องตลาด หรือราคาที่เคยซื้อหรือจ้าง
2. ราคามาตรฐาน เป็นราคาตามหลักเกณฑ์อื่น ๆ

<u>บทกำหนดโทษ (มาตรา 120)</u>

หากมีการปฏิบัติหรือละเว้นการปฏิบัติตามพระราชบัญญัตินี้ หรือประกาศที่ออกตามความในพระราชบัญญัตินี้ โดยมิชอบเพื่อให้เกิดความเสียหายแก่ผู้ใดผู้หนึ่ง หรือโดยทุจริต ต้องระวางโทษจำคุกตั้งแต่ 1 ปี ถึง 10 ปี หรือปรับตั้งแต่ 20,000 บาท หรือ 200,000 บาท หรือทั้งจำทั้งปรับ

เลิกประชุมเวลา 16.00 น.

(นางสาววาสิณี จันทร์ธร)
ผู้จดรายงานการประชุม

การประชุมการอบรมการใช้ Townsend Thai Data
ครั้งที่ 2/2560
ณ ห้องประชุมศูนย์วิจัยมหาวิทยาลัยชิคาโก-มหาวิทยาลัยหอการค้าไทย
(UC-UTCC Research Center)
อาคาร 21 ชั้น 7 มหาวิทยาลัยหอการค้าไทย
วันอังคารที่ 26 ธันวาคม 2560 เวลา 9:00 – 12:00

<u>ผู้เข้าร่วมประชุม</u>

1. ธัญมัชฌ สรุงบุญมี	อาจารย์ คณะเศรษฐศาสตร์ มหาวิทยาลัยขอนแก่น
2. อุชุก ด้วงบุตรศรี	อาจารย์ ภาควิชาเศรษฐศาสตร์เกษตรและทรัพยากร คณะเศรษฐศาสตร์ มหาวิทยาลัยเกษตรศาสตร์
3. ชรพล จันทร	นักวิเคราะห์นโยบายและแผนปฏิบัติการ สำนักงานเศรษฐกิจการเกษตร
4. พรชนก เทพขาม	เศรษฐกร ธนาคารแห่งประเทศไทย
5. ศราวุฒิ จตุวิวัฒน์วรกุล	นิสิตจุฬาลงกรณ์มหาวิทยาลัย
6. มุขยวิมล อักษรถึง	นิสิตจุฬาลงกรณ์มหาวิทยาลัย
7. ชญานี ชวะโนทย์	อาจารย์ คณะเศรษฐศาสตร์ มหาวิทยาลัยธรรมศาสตร์
8. กิตติพงษ์ เรือนทิพย์	Senior Economist SCB EIC
9. มณเฑียร สติมานนท์	อาจารย์ คณะเศรษฐศาสตร์ มหาวิทยาลัยธรรมศาสตร์
10. เชาวนา เพชรรัตน์	อาจารย์ คณะเศรษฐศาสตร์ มหาวิทยาลัยเชียงใหม่
11. นราพงศ์ ศรีวิศาล	อาจารย์ คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย
12. อนันต์ ภาวสุทธิไพศิฐ	อาจารย์ คณะเศรษฐศาสตร์ มหาวิทยาลัยธรรมศาสตร์
13. อาชว์ ปวีณวัฒน์	อาจารย์ คณะเศรษฐศาสตร์ มหาวิทยาลัยหอการค้าไทย
14. ก้องเกียรติ ลีฬหบุญเอี่ยม	ผู้ช่วยนักวิจัย จุฬาลงกรณ์มหาวิทยาลัย
15. วาสิณี จันทร์ธร	ผู้ช่วยนักวิจัย สถาบันวิจัยเพื่อการประเมินและออกแบบนโยบาย
16. ไฟรุส อับดุลเลาะห์	ผู้ช่วยนักวิจัย สถาบันวิจัยเพื่อการประเมินและออกแบบนโยบาย

เริ่มประชุมเวลา 9.00 น.

กำหนดการอบรม

8:30 น.	ลงทะเบียน
9:00 น.	ทบทวนโครงสร้างบัญชีครัวเรือน อ นราพงศ์ ศรีวิศาล.ดร.คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย
10:00 น.	ตัวอย่างแนวทางการวิเคราะห์ข้อมูลด้วยบัญชีครัวเรือน อนราพงศ์ ศรีวิศาล.ดร. คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย ออาชว์ ปวีณวัฒน์ คณะเศรษฐศาสตร์ มหาวิทยาลัยหอการค้าไทย.ดร. อ อนันต์.ดร.ภาวสุทธิไพศิฐ คณะเศรษฐศาสตร์ มหาวิทยาลัยธรรมศาสตร์
12:00 น.	รับประทานอาหารกลางวัน

คำถามจากผู้เข้าร่วมอบรม

1. ข้อมูลถามเฉพาะคนที่อยู่ที่บ้านในเวลาที่ทำการสำรวจใช่หรือไม่?

   ตอบ ใช่ และต้องอยู่ในครัวเรือนอย่างน้อย 15 วัน

2. สามารถนับเด็กที่ไปเรียนในจังหวัดอื่นได้ไหม? รู้หรือไม่เด็กย้ายไปเรียนที่อื่น?

   ตอบ นับแต่เด็กที่ครัวเรือนส่งเสีย ถ้าเด็กมีการย้ายออกไปจะไม่นับ ซึ่งอาจต้องตรวจสอบกับแบบสอบถามด้วย

3. ครัวเรือนเป็นผู้ระบุหัวหน้าครัวเรือนเองใช่หรือไม่?

   ตอบ ใช่ แต่หากกำหนดให้หัวหน้าครัวเรือนเป็นผู้ที่มีรายได้หลัก ผู้ใช้ข้อมูลอาจจะแยกหัวหน้าครัวเรือนออกจากกันได้ยาก ถ้าครัวเรือนนั้นมีรายได้มาจากหลายทาง

4. การบริหารทรัพย์สินในบ้านเป็นหน้าที่ของใคร? จะทราบได้หรือไม่?

   ตอบ อาจจะต้องเช็คจากชื่อบัญชี แต่ก็อาจจะมีกรณีที่บัญชีเป็นของสามี แต่ภรรยาเป็นผู้จัดการ หรืออาจจะต้องตรวจดูจากชื่อของผู้ตอบแบบสอบถาม

5. หน่วยของ source of funds statement?

   ตอบ เฉลี่ยต่อครัวเรือน

6. แยกได้ไหมว่าเป็นค่าแรงได้จากแรงงานภาคเกษตร หรือนอกภาคเกษตร?

   ตอบ ต้องดูใน raw data โดยข้อมูลที่จัดทำขึ้นไม่ได้แยกภาคการผลิต ดังนั้นผู้ใช้ข้อมูลอาจจะต้องแยกเองเพื่อทำการจัดกลุ่ม

7. หน่วยที่ใช้ในการจัดทำบัญชีครัวเรือนเป็น nominal ใช่ไหม?

   ตอบ ใช่

8. ใช้รายได้จากส่วนไหน?

   ตอบ Net income

9. รายได้ที่ได้มาจากการเลี้ยงกุ้ง/ปลาในลพบุรีที่มีมากขึ้น เป็นเพราะเหตุใด?

   ตอบ ส่วนดังกล่าวนักวิจัยจะต้องเช็คอีกครั้งในส่วนของ asset

10. Depreciation คิดยังไง?

    ตอบ ใช้ของ IRS (Department of the Treasury Internal Revenue Service)

11. Inventory กับ livestock แยกกันยังไง?

    ตอบ แยกออกจากกันเลย ยกเว้น นม และ ไข่ ที่จะนับรวมอยู่ใน inventory เช่น ถ้าวัวขายไป จะทำให้ livestock ลดลง กลายเป็น cash มูลค่าของวัวก็จะเพิ่มขึ้นตามเวลาที่โตขึ้น

12. ส่วนที่เป็นไก่เนื้อ คิดยังไง?

    ตอบ คิดเหมือนกันกับวัวเนื้อ

13. เป็นข้อมูลเฉลี่ยรายครัวเรือนหรือไม่? Cash holding เป็นเท่าไหร่?

    ตอบ ใช่ และเพราะแบบสอบถามไม่ได้ถามตรงๆ เป็นการคำนวณจากส่วนต่างของ cash in และ cash out แต่ก็อาจจะมีการ saving อื่น ๆ นอกเหนือจากธนาคาร หรือสหกรณ์ (หรือเก็บไว้ที่ใดที่หนึ่งในครัวเรือน)

14. ส่วน wealth ของ land ได้มายังไง?

    ตอบ ถ้าเป็นที่ดินที่ซื้อมาจะมีมูลค่าที่ชัดเจน หากเป็นมรดกหรือตัดขายจะเป็นมูลค่าประเมิน ราคาที่ขึ้นก็จะเห็นอีกทีตอนขายคือมีมูลค่าเพิ่ม ทำให้ stock ของ land ลด และได้ cash เข้ามา

15. ข้อมูลที่เป็น unbalanced panel มีครัวเรือนทดแทนเข้ามาเพิ่มหรือไม่?

    ตอบ มีแค่ช่วงแรก ๆ แต่ช่วงหลังค่อนข้างคงที่แล้ว

16. จะใช้ข้อมูล 4 จังหวัดนี้เป็นตัวแทนประเทศได้หรือไม่?

    ตอบ ไม่สามารถใช้แทนทั้งประเทศได้ แต่ถ้าใช้ข้อมูลนี้กับ model ที่มีอยู่แล้วเพื่อเอาไปทดสอบก็ใช้ได้ แต่ถ้าไม่มี model ก็ต้องใช้เป็น case study หรือไม่งั้นก็ต้องทำเชิงเปรียบเทียบกับข้อมูลอื่น ๆ

17. มีการปรับเรื่องระบบการศึกษาหรือไม่? กรณีของพระสงฆ์?

    ตอบ มีการปรับเทียบโค้ดเรียบร้อยแล้ว (กรณีเปลี่ยนจาก มศ. เป็น ม.)

18. ทำไม cash เพิ่มขึ้นตลอดระยะเวลา?

    ตอบ อาจจะมี under estimate หรือ over อาจจะเป็นเพราะ ครัวเรือนไม่บอกหรือลืมให้ข้อมูลซึ่งอาจจะทำให้เกิดการถือครอง cash มากเกิน

19. คำนวณมูลค่าของ asset ที่ใช้เป็นปัจจัยการผลิตได้อย่างไร?

    ตอบ การเปลี่ยนรูปจากเงินสดไปเป็นโรงเรือน แต่กรณีของรถยนต์อาจจะแยกยาก ว่ารายงานไว้ในหมวดไหน? บางทีครัวเรือนก็ย้ายประเภทของ asset จากธุรกิจมาเป็นของครัวเรือนซึ่งก็จะนับมูลค่าในเวลานั้น

20. คำนวณ income of production อย่างไร?

    ตอบ กรณีของข้าวจะนับตอนที่เก็บเกี่ยว แต่ถ้าไม่ได้ขายก็นับเป็น inventory พอขายไป inventory ก็จะลด ได้ cash เพิ่ม พวกค่าใช้จ่ายก็จะเกิดขึ้นในเวลาเดียวกับที่ได้รายรับเข้ามา

21. ประเภทของแหล่งเงินกู้ดูจากที่ไหน?

    ตอบ ต้องไปดูใน cash flow statement เป็นราย item ถ้าเจาะลึกต้องดูใน raw data

22. ที่ดินที่ถือเอง รวมกับค่าเช่าด้วยหรือไม่?

    ตอบ ใน asset ไม่รวม แต่ถามว่ามีการเช่าหรือไม่ ที่ดินที่เช่าจะอยู่ในตัวแปร IS3_02

23. การ refinance มอเตอร์ไซต์ คิดยอดเงินกู้ยืมอย่างไร?

    ตอบ ต้องปรับค่า borrowing ถ้าได้ cash มา cash ก็จะเพิ่ม

24. การจำนองที่ดิน คิดมูลค่าอย่างไร?

    ตอบ ยังเป็นเจ้าของอยู่ แต่หนี้สินเพิ่ม

25. ข้อมูล balanced panel มีกี่ครัวเรือน?

    ตอบ เฉลี่ยแล้วแต่ละจังหวัดเกิน 100 ครัวเรือน

26. Gift และ transfer คิดมาจากส่วนไหน?

    ตอบ มาจากคนที่ออกไปทำงาน แล้วส่งเงินกลับมาให้ครัวเรือน กรณีที่ถ้าอยู่บ้านแค่เสาร์และอาทิตย์ซึ่งไม่ถึง 15 วัน ก็จะไม่นับว่าเป็นสมาชิกในครัวเรือน

27. การกระจายตัวของข้อมูลตัวอย่างเป็นอย่างไร?

    ตอบ สุ่มมาจากตำบล แต่ว่ามาจากตำบลเดียวกันทั้งหมด โดยเฉลี่ยมีประมาณ 100 ครัวเรือนตัวอย่างต่อจังหวัด