Insurance and Credit: Micro Financial Underpinnings for Entire Economies

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Central Themes of the Talk

- General Equilibrium
  - Asking questions about insurance and credit means asking questions about two sides of a market, or more generally the efficiency of markets and institutions

- Assumed micro financial underpinnings matter
  - Actors/institutions/markets, as well as obstacles to trade, are the key inputs

- Crucial: measure and test these micro financial underpinnings (both)
  - Go beyond theories which make assumptions about markets, institutions, and even outcomes without measurement or testing

- Success in doing this at the village level– and urban communities
  - Follow the same path/method to macro and entire economies: Applied General Equilibrium Development Economics

- Compare this approach with conventional macro aggregate approaches
  - For contrast and clarification
  - In turn, this suggests new directions for both
  - Macro analysis of advanced industrialized countries is benefiting from innovations in development/micro measurement

- New directions: Exploring the nexus of theory/data and micro/macro
  - Formal vs. informal and their interaction, geography, hierarchy/layers, observed and unobserved heterogeneity, identification, testing mechanism design and incomplete markets, industrial organization and development, merging of subfields

- Policy Evaluation and Policy Recommendations
  - Welfare theorems are overall guide to policy, in whether to try to fix something, in the design of markets and institutions, and where systematic regulation or policy intervention might be needed
  - Specific examples are provided
  - The agenda is operational
Outline

1. Understanding the unit of analysis and the data
2. What Applied General Equilibrium Development Economics is (and what it is not)
3. Micro Underpinnings
   1. Insurance
   2. Credit
   3. Obstacles to Trade
4. Putting together micro and macro
5. Conclusion
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Motivation, Starting Point: Village Economies

- India

Townsend (1994) “Risk and Insurance in Village India”

- Using general equilibrium structure, derive efficiency, benchmark standards for outcomes
  - Idiosyncratic shocks are pooled, aggregate must be shared
  - Here, look at “starting point” and outcomes
    - income vs. consumption
  - More generally though, literature now includes other outcomes
    - labor supply (intensive, extensive) margins
    - investment (cash flow)
    - levels of capital (human and physical), occupation choice
Going back in history is another way to get variation

- Focus here is on institutions
  - land holdings, fragmented into long narrow strips!
  - In contrast to village India, doing much more ex ante, for some reason, e.g., private information, do less ex post

But keep general equilibrium perspective

- How it all fits together
- Do not look at landholdings alone
- Do not look at one market or institution in isolation
Method/Approach: How Do We Describe These Village Economies?
Use Language of GE Theory

- Preferences/Endowments/Technology (production, storage)
  - Includes measured obstacles to trade
  - A PET Economy
- But these are intended to be REAL, this is why started in villages in first place!
- Assumptions about underpinnings, micro structures do matter
  - Part of the empirical work!
- Controversies remain, to be resolved
  - Part of structure is inferred, not measured directly
  - Limited by analytic capability of getting closed-form solutions
  - Limited by computational feasibility
  - Identification, how much or how little structure do we need

- Counter to “anything goes” (Sonnenschein–Mantel–Debreu 1973–1974), general equilibrium does impose testable restrictions (Brown and Matzkin 1996)
- Models as Economies, Townsend (1988)
- It is the variation across villages, regions, entire economies, that can attract interest in development economics

Building Toward the Larger Macro Picture: Placing Villages in Context as Small Open Economies—With Paweenawat

- Using the language of international, cross-country economics to think about villages (and regions)
  - Villages’ outputs, GDP
    - Four villages in each province
    - Variation in cross section and over time
  - Allocation of village’s savings
    - Into real and financial investment
  - Balance of payments for representative villages
    - Trade and current account
    - Balancing financial and real flows
Townsend Thai Project: Data From Regions, villages/cities, 15 Year Panel

- Monthly survey: 180 months for selected villages
- Annual Rural Survey and Urban Survey –wider cross section
  - In 2009, survey 3,184 households across 200 villages, towns and cities
  - New Enterprise Survey, including medium and large
  - (includes city neighborhoods as in earlier work on Chicago ethnic neighborhoods)
Measurement: From Local to Global

- Featuring other secondary data on GIS database archive with auto search
  - Here wealth from CDD, archive includes SES, Labor Force Survey, Population Survey, bank location, surveys of industry

Villages surveyed monthly, (and others) with roads

(High wealth in red)
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Review: Hallmarks of This Approach

- Not simple individual maximization in partial equilibrium (as in some versions of permanent income)
  - It is general equilibrium, including endogenous prices such as interest rates

- Not financial products narrowly, i.e., impact on individuals
  - It is efficiency for the entire system
  - It is about improvements using Pareto criterion
  - As distinct from distribution of wealth

- Not fixated on complete markets, nor on incomplete markets
  - It is about empirical tests to determine which, or something in between

- Not Washington Consensus of 1990’s liberalization, or intervention/regulation now
  - But rather using theory and data as guide to policy

- Modeling local and national economies with general equilibrium perspective using measured underpinnings (more on this below)
  - Thailand
    - Townsend (2011) *Financial Systems in Developing Economies*
  - Mexico
    - Harriman, Moreno, Townsend and Zhorin (2012)
  - European history
    - Townsend (1990) *Financial Structure and Economic Organization: Key Elements and Patterns in Theory and History*
Review How To Do Policy with General Equilibrium: Research Policy Algorithm

- **Positive: To explain, understand**
  - Why are some individuals (villages, regions, countries) poor?
  - And what happens when there is growth?

- **Normative: To prescribe, intervene**
  - Workable solutions to alleviate poverty
  - Not just as in targeting individuals, but also more inclusive financial systems
  - Market design, optimal regulation and if/when/how to intervene
  - Example: work towards reconciling financial access (micro, development) with financial stability (macro)

- **Algorithm**
  - Tests of benchmark standards (full or constrained-efficient)
  - If do not reject $\Rightarrow$ leave it alone or build on this base
    - e.g., build formal/national on informal/village
  - If with obstacles to trade (constrained-efficient)
    $\Rightarrow$ reject full efficient
    - but accept constrained-efficient and leave it alone
    $\Rightarrow$ or, alleviate constraints
    - collateral constraints $\Rightarrow$ legal reforms might help
    - moral hazard constraint $\Rightarrow$ possibility of more monitoring

- **If distortion comes from ill-designed regulation $\Rightarrow$ Fix the policy**

- **Not as unlikely as it might seem**
  - “International best practice” typically lacks theoretical/empirical underpinnings
    - A patchwork to fix perceived problems or symptoms when things go wrong
    - Not based on fundamentals
What Is Applied General Equilibrium Development Economics?

- Contrast with “standard” macro general equilibrium models
- First with implicit micro financial underpinnings
- **AGE: Applied General Equilibrium**
  - To compute Walrasian outcome: Scarf (1967)
  - U.S. taxes on capital gains: Shoven & Wally (1972, 1973)
- **CGE: Computable General Equilibrium**
  - Reviews: Kehoe and Kehoe (1994); Dawkin, Srinivasan and Walley (2001)
  - Applications: World Bank policy assessments, climate modeling
  - **Measurement**
    - Drawing on, integrated with, NIPA (HH, Firms, etc.), input/output matrix
  - Key underpinning: Complete markets or equivalent
  - What if not true ⇒ Separation of households/firms fail
- **DSGE: Dynamic Stochastic General Equilibrium**
  - Measurement (drawing on NIPA)
- **Key Underpinning: Gorman aggregation with complete markets**
  - Method does generalize
  - With Pareto weights: Negish (1960)
  - But what if as–if–complete–markets fail, then separation fails
  - Where is the financial modeling?

<table>
<thead>
<tr>
<th>Advantage</th>
<th>Disadvantage</th>
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<tbody>
<tr>
<td>Lots of realistic sectors</td>
<td>Static</td>
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<td></td>
<td>No uncertainty</td>
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<tr>
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<tbody>
<tr>
<td>Dynamics</td>
<td>Assumes representative consumer</td>
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<td></td>
<td>No redistributive wealth effects</td>
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Continuing With the Contrast: Dynamic New Keynesian General Equilibrium Models
Persistence, Amplification, Monetary Phenomena, Credit Channel, Bank Lending Channel

- Bernanke and Gertler (1989, 1990); Bernanke, Gertler and Gilchrist (1998); Kiyotaki and Moore (1997); Christiano, Motto and Rostagno (2003)
- Surveys: Brunnermeier, Eisenbach and Sannikov (2012)
- Sweden: Jacobson, Linde and Roszbach (2005)

**Advantages** | **Limitations**
--- | ---
Built on micro underpinning | Initially addressing only aggregate micro data
Costly State Verification (Townsend 1978) | Retains and adds actors
Key is credit, financial accelerator | Micro assumptions not tested

Recent directions: Moving toward incorporating micro development
- Christiano, Motto, Rostagno (2012)

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<tr>
<td>Using more micro data</td>
<td>Still creating economic actors not intending to match to data</td>
</tr>
<tr>
<td>Firm size data: Influence of development (Hsieh and Klenow 2009)</td>
<td>Implicitly assuming separation</td>
</tr>
<tr>
<td>Financial variables</td>
<td>Households, separate from firms, even with financial imperfections</td>
</tr>
<tr>
<td>Bankruptcy</td>
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Application of CMR 2003 to Indian Economy, RBI

Central Bank → Fiscal Agent → Government Consumption → Retailers

Households → Entrepreneurs → Capital

Rest of World → Borrowing → Entrepreneurs

Rest of World → Interest Rate → Fiscal Agent

Imports → Labor Wages → Entrepreneurs

Lending/Borrowing → Capital Producers → Entrepreneurs

Investment → Home → Households

Consumption Profits → Hedge

Intermediate Goods → Investment
Households run enterprises and make high contribution to GDP
- Not just small is beautiful, small is important quantitatively
- More than any other sector in Thailand up to the 1990’s and to TFP, productivity change: Jeong and Townsend (2004)

Measurement
- Use corporate financial accounting but apply to households: Samphantharak and Townsend (2010)
- Can be applied to surveys more generally

Some key measured micro underpinnings, examples:
  - Amplifier depends on limited commitment vs. moral hazard
- Firm financing: Albuquerque and Hopenhayn (2002); Clementi and Hopenhayn (2006); Meisenzahl (2011)
  - Distinguish limited commitments, moral hazard, costly state verification

Underpinnings do matter
- Things are rarely monotonic: Matsuyama (2007)
  - Same theory with application to a wide variety of sub-fields
- Perverse steady states with costly state verification: Boyd and Smith (1994)
- Endogenous credit constraint can attenuate North/South flows: Gertler and Rogoff (1990)

Applied General Equilibrium Development Economics
- Exemplars of micro and macro coming together: details to follow
  - Gine and Townsend (2004); Banerjee and Duflo (2005); Ueda and Townsend (2006)—more literature described below
Adjustment and equilibrium in asset demand and supply (or policy) equations
- India: Green, Moore, Murinde and Suppakitjarak (2012) building on Brainard and Tobin (1968)

VAR’s distinguish firms, households in response to monetary shock:
- Christiano, Eichenbaum and Evans (2006)
- Indonesia: Ridhwan, de Groot, Rietveld and Nijkamp (2011)

In the U.S., and cross-country, but much in the tradition of households as firms
- Credit crisis and liquidity trap: Guerrieri and Lorenzoni (2011)
- Inflation and prices of real assets: Piazzesi and Schneider (2010)
- Consumer bankruptcy: Chatterjee, Corbae, Nakajima, Rios–Rull (2007); Livshits, MacGee, Tertilt (2007)
- Wealth distribution and international capital flows: Mendoza, Quadrini and Rios–Rull (2009)

Distribution within firm sector, self–finance and dividends vs. borrowing firms:
- Chari, Christiano and Kehoe (2008); Armenter and Hnatkovska (2011)

CFSP projects underway: Measure and Model
- Flow of funds in Thailand, Mexico, Brazil
- But distinguish SME’s from large corporate, urban vs. rural, geographic flows
- Transactions outside formal banking system
Can Create Models Based On Flows, At Any Level, But Still Need Tests of Micro Underpinnings

- Flow of funds from financial corporate sector

- Flow of funds between a village in Chachoengsao and the other sectors, in November 2009

- Flow of Funds: Townsend Thai Survey Data (Srivisal, in progress)
- VARs to assess quantitative impact of monetary policy shocks
- Models of money: Lim/Townsend (1998), Alvarez/Pawasutipaisit/Townsend (in progress)
- Impact will depend on financial regimes within villages and across regions
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Tests of Micro Underpinnings I: Insurance

- **Benchmark standard: Pooling idiosyncratic risks, sharing aggregate risks**
  - Standard methods, from theory: Wilson (1968)
  - Efficiency of village economies: Townsend (1994); Udry (1994)
  - U.S.: Altug and Miller (1990); Mace (1991); Cochrane (1991); Altonji, Hayashi and Kotlikoff (1992)
- **Critiques/Improvements**
  - Fixed effects: Ravallion and Chaudhury (1997)
  - No content to average coefficient/co-movement: Deaton (1990)
  - Noisy income measurement and difficulty of detecting idiosyncratic from aggregate shocks: Alderman and Paxson (1992)
  - Low vs. high frequency, low is worse: Attanasio and Davis (1996)
  - If individual is on his/her own, then back to life cycle: Attanasio and Weber (2010)

- **Heterogeneity in risk preferences: Needs to be included**
  - Schulholfer–Wohl (2008); Chiappori and Paiella (2011); Mazzocco and Saini (2012)
  - Chiappori, Samphantharak, Schulhofer–Wohl and Townsend (2012)
  - Accept null in 15 out of 16 villages; not just pooling idiosyncratic risks, also co-movement with aggregate shocks
Tests of Micro Underpinnings I: Insurance (cont.)

- **Identification, non-parametric: Possible in principle, sample size issue**
  - Mutuality principal, no consumption crossings
  - With labor, unitary household literature: Chiappori (1988, 1992); Chiappori and Eckland (2009)
  - Ordinal and cardinal identification with individual labor supply and consumption data: Bonhomme, Chiappori, Townsend and Yamada (2012)
  - Contrast: infinite family, pseudo islands: Heathcote, Storsletten and Violante (2012)
    - In development, kinship networks, actual village islands, and real space constraints

- **Extension to multiple variables: Should be done systematically**
  - Alem and Townsend (2012)
    - If full risk sharing \( \Rightarrow \) joint implications for consumption and investment
    - Shadow price of aggregate consumption \( \Rightarrow \) as if “risk neutral” firm, maximizing expected profit

- **Extension: Consumption-based capital asset pricing model, contemporary finance meets development**
  - Euler equation delivers expected return and risk premium if there exists co-variation with aggregate shocks: Samphantharak and Townsend (2012)

- **Distinguishing from permanent income, incomplete markets: Can be done**
  - Previously, hard to distinguish: Paxson and Alderman (1992)
  - But now, can distinguish insurance against permanent and transitory shocks, related to excess smoothness literature: Campbell and Deaton (1989); Lim (1992); Blundell, Pistaferri and Preston (2008)
  - New wave of explicit tests across regimes, of risk sharing vs. permanent income model, and in general equilibrium (see below!)
Geography: Key building blocks
- Individual vs. household vs. village, region, nation, cross-countries
  - Kenya: Suri (2011)
  - Cote d’Ivoire; Deaton (1990)
  - Pakistan; Rashid (1990)
  - Thailand: Paweenawat and Townsend (2012) and Kilenthong, Phongthiengtham and Townsend (in progress)

Battery of tests all in one country: Needed, become part of policy toolkit
- Shocks
  - Rainfall: Paxson (1992)
- “Macro markets: Creating institutions to manage society, greatest economic risks” Shiller (1995)
  - But what is really missing: Need these micro tests!

A priori targeting, financial access vs. theory/data tests
- Within village but poor with family ⇒ do well
- Across village still quite good ⇒ remittances and rainfall
- Despite safety net literature, groups not actually vulnerable ⇒ female, elderly: Alem and Townsend (2008)
- Rainfall insurance: Gine (2010); Cole, Gine, Tobacman, Topalova, Townsend and Vickery (2012)
  - Take up is mixed: Lack of underlying test of benchmarks haunts the discussion
  - But see using take up to distinguish models: Karlan, Osei, Osei-Akoto and Udry (2012)
Evaluation of Existing Institutions

- **Formal Institutions: Alem and Townsend (2012)**
  - Joint tests, consumption, cash flow, investment
  - Score card for formal institutions
    - commercial banks, BAAC, credit cooperatives
  - Not what is done in “international best practice”

- **BAAC risk contingency systems, part of operating system, misdiagnosed in Asia crisis**
  - inappropriate capital adequacy ratios (Townsend and Yaron 2001)

- **Informal networks: Hot topic, rightly so**
  - Lamoreaux (1986); Rosensweig (1988); Mueller Townsend (1998); Munshi (2002); Dercon (2002); Angelucci and DeGeorgi (2009); Fafchamps and Lund; Chandreskar, Kinnan and Larreguy (2011); Banerjee, Chandrasekhar, Duflo, and Jackson (2012);
  - Interaction of formal/informal:

- **Interaction:** Gine (2001), Mobarak and Rosenzweig (2012, Kinnan and Townsend (2010))
  - Indirect connection is as good as direct
  - Those not connected at all ⇒ shown to be much more vulnerable
    - Difference between consumption and investment
    - Modeling investment requires kinship, penalties for reneging
Policy Implications from General Equilibrium

- Insuring aggregate shocks can be damaging to most risk tolerant who were providing insurance to others
  - Chiappori, Samphantharak, Schulhofer-Wohl and Townsend (2012)

- Shadow banking in developing countries
  - Good to have indirect connection
    - financial access
  - Bad to allow re-trade
    - externalities, stability issues

- Need to put the two together
  ⇒ new directions
  - Shadow banking (macro) meets risk sharing (micro)
  - Thus links to ongoing policy debate in US/European context: Karaken and Wallace (1978), Duffie (2010), Gorton (2010), Holmstrom and Tirole (2011), Lucas and Stokey (2012), and others (and see below)
Theory of Endogenous Groups: What Is Done Within a Group vs. Outside It?

- Joint liability is key helpful example in development
- How to test theory/models
  - Using repayment data to test across models of joint liability lending: Ahlin and Townsend (2007 EJ)
  - Testing these theories
    - Project choice: Stiglitz (1990)
    - Reneging: Besley and Coate (1995)
    - Adverse selection: Ghatak (1999)

### Repayment Implications

An entry marked with a "↑" corresponds to a variable not included in the original model.

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<thead>
<tr>
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<th>Effect on Repayment</th>
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<td></td>
<td>Stiglitz</td>
</tr>
<tr>
<td>liability payment q</td>
<td>↑</td>
</tr>
<tr>
<td>positive correlation</td>
<td>↑↑</td>
</tr>
<tr>
<td>cooperative behavior</td>
<td>↑↓</td>
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<tr>
<td>cost of monitoring</td>
<td>↓</td>
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<tr>
<td>official penalties</td>
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<tr>
<td>unofficial penalties</td>
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<tr>
<td>screening</td>
<td>↓</td>
</tr>
<tr>
<td>productivity H</td>
<td>↑↑</td>
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<tr>
<td>interest rate r</td>
<td>↓</td>
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<tr>
<td>loan size L</td>
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- Adverse selection into groups: Ahlin and Townsend (2007 JE)
  - Testing relative performance vs. groups: Holmstrom and Milgrom (1990)
  - Including the distribution of wealth: E.S. Prescott and Townsend (1999)

- Note: This approach is applicable more generally to industrial conglomerates, literature on tunneling, and again formal and informal banking– Bertrand, Mehta Mullainathan (2002), Bond (2004 ), Samphantharak (2003,) Bertrand, Johnson, Samphantharak, Schoar (2008)
Tests of Micro Underpinnings II: Credit Savings, Investment, Rates of Return

- This is a test of financial intermediation
  - GE efficiency of entire economy – our main theme
- Unlike consumption smoothing, here there are dramatic failures
  - Certainly in Thai data
  - And failures robust to heterogeneity, geography, formal/informal institutions
- Benchmark standard
  - Equalizing rates of return on assets (better estimated marginal product, but see below)
    - Literature review: Banerjee and Duflo (2005)
      - Persistence of (some) high rates of return
      - High dispersion in rates
      - Money is not flowing from low to high productivity firms
      - Slow adoption of HYV: Foster and Rosenzweig (1995)
      - High returns on fertilizer: Duflo, Kremer and Robinson (2001)
      - High returns to grants/transfers: McKenzie, De Mel and Woodruff (2007)
      - Coexistence and persistence of productivity differences in the data: Pawasutipaisit and Townsend (2011)
    - Lesson for TFP macro modeling
Impact of Micro Finance: Interventions in Thailand and India

- **Thailand: Kaboski and Townsend (2012, AEJ)**
  - Million Baht Village Funds
  - Quasi natural village variation in per capita household treatment
  - Consumption up, income growth up, asset growth down
  - Increase in within-village wage
    - “Cross-country” experiment, confirming devo GE models below

- **Banerjee, Breza and Townsend (2012)**
  - Strong hints that funds move toward high productivity entrepreneurs

- **Hyderabad: Banerjee, Duflo, Glennerster and Kinnan (2010)**
  - Heterogeneous impact
    - With existing business, durable expenditures up
    - High propensity to start new business, decrease in non-durables
    - Low propensity, increase in non-durables
Kaboski and Townsend (2012, *Econometrica*)

Heterogeneous impact: Key variables are liquidity, size/permanent income, which are unobservable
  - Near default ⇒ consumption flat
  - Binding liquidity ⇒ consumption up
  - Near investment threshold ⇒ consumption drops

Advantage of structural model
  - Can quantify distribution of welfare gains
  - Can do counterfactual policies
  - This is very much like Guerrieri and Lorenzoni (2011), impact of credit tightening in financial crisis (with interest rate effects), mentioned earlier!
  - See also Davila, Hong, Krusell, Rios–Rull (2007) on ge efficiency considerations

Disadvantage: Sensitive to assumed financial structure

On the other hand, with unobserved heterogeneity there are few “theory free” tests ⇒ back to identification

Estimation of impact parameters needs monotonicity, independence
  - Angrist and Imbens (1994); Heckman and Vittacil (2006); Heckman and Urzua (2009)
  - Townsend and Urzua (2009)
    - Cannot cleanly estimate impact on profits of entrepreneurs due to double margin
    - Microfinance (saving and credit) jointly with occupation choice

Future Directions: Where we are and where we need to go
  - Where to put the structure: Attanasio, McGuire and Santiago (2005); Todd and Wolpin (2006)
    - Remedies: Split sample, experimental data
  - Sufficient statistics: Chetty (2009):
    - But not universally applicable as with mechanism design

Data come from an equilibrium: Hotz and Miller (1993); Bajari, Benkard and Levin (2007)
Micro Underpinnings III: Obstacles to Trade/Mechanism Design
(We no longer need to assume complete or incomplete markets without looking)


But, rejects to what?

Exogenous incomplete markets

Endogenous incomplete, mechanism design
- Breakthrough, dynamics: promised utility dynamics: Green (1987); Abre, Pearce and Stacchetti (1986); Spear and Srivastava (1990)

Empirical Implementation
- Numeric, linear programs
  - Phelan and Townsend (1991)
  - Fernandez and Phelan (1991)
  - Doepke and Townsend (2006)
  - Lehnert, Ligon, Townsend (1999)

First order approach
- Moral Hazard: Rogerson (1985)
- Permanent income vs. moral hazard: Ligon (1998)
- Limited commitment: Ligon, Thomas, Worral (2002)
- Moral hazard, unobserved output: Kinnan (2012)
- Permanent income vs. private information: Abraham and Pavoni (2004); Attanasio and Pavoni (2010)

Methods of bringing it back together: Linear programs, dynamic programs, maximum likelihood estimation, fitting histograms, multiple variables (Karaivanov and Townsend, 2012)
- Autarky
- Buffer stock
- Borrowing/lending
- Limited commitment
- Unobserved output
- Moral hazard
- Moral hazard with unobserved capital

Findings
- Consumption smoothing good
- With joint variables
  - Urban, towns ⇒ endogenous mechanism design
  - Rural, villages ⇒ saving, borrowing/lending

Need to reintegrate
- New Dynamic Public Finance: Mirlees (1971)
- Review: Golosov, Tsyvinski and Werning (2006)

Exciting direction!
- Lim (1992), Meh and Quadrini (2006); Ai and Yang (2007); Schmid (2008); Dubois, Julienan and Magnac (2008); Kocherlakota and Pistaferri (2009),
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- **Background**: Finance causes growth, empirical facts
  - Reduced form: King and Levine (1993); Levine (1997); Rajan and Zingales (1998); Beck, Demirguc–Kunt and Levine (2004)

- **Qualitative theory becomes quantitative, theories now estimated in data**
  - Occupation choice, investment and credit
    - Lloyd Ellis Bernhardt (1993) LEB; Galor and Zeira (1993); Banerjee and Newman (1993 ); Aghion and Bolton (1997)
    - Big wage effects on poverty reduction, wage more than doubles: Gine and Townsend (2004)
    - Endogenous TFP in transition 78%: Jeong and Townsend (2005)
  - Risk sharing, insurance and endogenous financial deepening
    - Cannot run regressions on transition data: Townsend and Ueda (2006)
    - Welfare losses from government takeover of banking, up to 28% gain from liberalization: Townsend and Ueda (2010)

- **Evaluation of First Generation Quantitative Models: LEB vs. GJ**
  - Compare and contrast, success and failure: Jeong and Townsend (2008)
    - Roadmap for next generation of models
      - Next wave of models: The literature takes off
        - Distinguishing two sectors: Kaboski, Buea and Shin (2009)
        - Inequality and growth: Blaum (2012)
      - Transient misallocations: Moll (2010); Banerjee and Moll (2010)
      - Private and public sectors, growing like China: Song, Storesletten and Zilibotti (2011)
      - Links to “micro” international Helpman, Itskhoki, Muendler, Redding (2012)
Transitions vs. steady state
- Issues of analytics, computation

Incorporating mechanism design
- Moll, Townsend and Zhorin (2012)
  - Moral hazard vs. limited commitment
    - Urban vs. rural
    - Regional patterns
  - Matters for aggregate TFP, etc.
  - Micro underpinnings matter for aggregation: The premise of this lecture all along

Incorporating Geography
- Financial deepening models: Felkner and Townsend (2011)
  - Zooming back into Thai villages, CDD data
  - Occupation choice: LEB fits geographic patterns of concentration
  - Risk sharing: GJ does not fit observed patterns of financial expansion
- Trade, development and cities
  - Thailand: Paweenawat and Townsend (2012)
  - India: Donaldson (2010); Eaton and Kortum (2012)
  - U.S.: Rossi–Hansberg (2005); Costinot and Donaldson (2012)

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<tbody>
<tr>
<td>GDP</td>
<td>1</td>
<td>0.582</td>
<td>0.614</td>
<td>0.684</td>
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<tr>
<td>TFP</td>
<td>1</td>
<td>0.704</td>
<td>0.720</td>
<td>0.760</td>
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<tr>
<td>Capital Stock</td>
<td>1</td>
<td>0.533</td>
<td>0.623</td>
<td>0.676</td>
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<tr>
<td>Wage</td>
<td>1</td>
<td>0.583</td>
<td>0.641</td>
<td>0.663</td>
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<tr>
<td>Interest Rate</td>
<td>0.007</td>
<td>-0.046</td>
<td>0.006</td>
<td>-0.010</td>
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<tr>
<td>% Entrepreneurs</td>
<td>0.089</td>
<td>0.170</td>
<td>0.133</td>
<td>0.133</td>
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</tbody>
</table>
Modeling financial service providers (supply side, real institutions) to understand transitional financial deepening
- Bangladesh: BRAC vs. Grameen
  - Salim (2008), using Jia (2008)
- Brazil: Agent banking and efficiency scale
- Spain: Liberalization and convergence
  - Keniston, Montes, Saurina and Townsend (in progress) using Bajari, Benkard and Levin (2007)

Industrial organization and mechanism design
- Thailand: Assuncao, Mityakov and Townsend (in progress)
  - Dynamic sequential entry game with GIS
  - Village level and branch data: Direct computation of equilibrium
- Townsend and Zhorin (in progress)
  - Competing in credit/insurance contracts with spatial separation delivers endogenous heterogeneity across providers
## Larger GE Framework for Policy, Using the Two Welfare Theorems

<table>
<thead>
<tr>
<th>Works</th>
<th>May Work</th>
<th>Does not work</th>
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<tbody>
<tr>
<td><strong>Infinite horizon economies</strong></td>
<td>- Externalities and Lindahl Equilibria</td>
<td>- Need Systemic Policy</td>
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<tr>
<td></td>
<td>- Private information:</td>
<td>- OLG, at least in general</td>
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<tr>
<td></td>
<td>- “General Competitive Analysis in an Economy with Private Information”</td>
<td>- Incomplete markets</td>
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<tr>
<td></td>
<td>- “Indivisible labor, lotteries and equilibrium” Rogerson (1988)</td>
<td>- Monetary economies</td>
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<tr>
<td><strong>Indivisibilities</strong></td>
<td>- Collateral constraints and remedies to pecuniary externalities</td>
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<td>- “Information-Constrained Optima with Retrading: An Externality and Its Market-Based Solution” Kilenthong and Townsend (2011)</td>
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<td></td>
<td>- “Market Based, Segregated Exchanges in Securities with Default Risk” Kilenthong and Townsend (2011)</td>
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</tr>
<tr>
<td></td>
<td>- Application 1: Optimal market design in developing countries</td>
<td></td>
</tr>
</tbody>
</table>
Potential failures of implementation, ex post
- Consumers may trade with each other
- Consumers may trade with firms
  - Asset markets for consumers
- Banks cannot have exclusive contracts with firms
  - Asset markets for banks
- Contracts cannot be made contingent on aggregate output

Ex ante
- Regulations make coordination across service providers deficient (or illegal)

Acemoglu and Zilibotti (1997)
Diamond and Dybvig (1983)
Pesendorfer (1995)
Makowski (1983)
Prescott and Townsend (1984)

Townsend and Xandri (in progress)
Money, financial deepening, and economic growth
- Wicksell (1935); Cass and Yaari (1966); Lucas (1980); Townsend (1983)

Real bills vs. quantity theory, inside and outside money; inflation and growth are not appropriate welfare targets
- Townsend (1980); Sargent and Wallace (1982); Manuelli and Sargent (2009), Howitt (2003)

Money as a communication device for history, shocks
- Townsend (1987); Ireland (1994); Kocherlakota and Wallace (1998); Cavalcanti and Wallace (1999); Kocherlakota (2005)

Circulating private debt, need for a coordinating device
- Townsend and Wallace (1982)

Models of settlement, limited market participation, monetary policy
  - Actual optimal liquidity management
  - Friedman and Schwartz (1963)
    - Interest rates and agricultural cycle in the U.S. prior to and need for Federal Reserve
  - Freeman (1996); Green (1999)
1. Understanding the unit of analysis and the data
2. What Applied General Equilibrium Development Economics is (and what it is not)
3. Micro Underpinnings
   1. Insurance
   2. Credit
   3. Obstacles to Trade
4. Putting together micro and macro
5. Conclusion
Conclusions: Understanding

- Micro financial underpinnings are key for understanding
  - Village, regional and macro financial phenomena
  - Welfare/policy analysis
- Well-measured and tested micro underpinnings are needed
  - Choices made in model construction do matter
- Have created a platform, method of analysis, which goes beyond development
- New directions that emerged as we explored the interface of theory and data, micro and macro
  - Formal vs. informal, and their interaction
  - Geography
  - Hierarchy/layers
    - villages as open economies
    - endogenous liability groups
  - Heterogeneity
  - Identification
  - Mechanism design
  - The merging of subfields (macro, finance, development, io)
Conclusions: Policy

- Policy evaluation and policy recommendations emerged
  - Diverse impact of interventions with heterogeneity
  - Indirect GE effects are large
  - Endogenous TFP with improved intermediation
  - Welfare losses from government takeover of banking systems
  - New approach to targeting
    - Use scorecard/rating for financial institutions
  - Policymakers help create and improve crucial flow of funds (and other) accounts
  - Not blind “international best practice” to regulation of financial institutions
  - The two fundamental theorems of welfare economics provide an overall guide to policy
    - Recommendations for the overall optimal market design and regulation
    - Systematic monetary interventions with the advent of e-Money
Conclusions: Operational Agenda

- We are on the ground doing it, not just abstract theory talk
- Thailand: Incorporation of key variables in BoT Financial Access Survey
- World Bank–IMF Spring Meeting on Financial Inclusion, G20, April, 2012: Financial access
  - Some do not need insurance
    - Informal networks in village
  - Guidance for targeting
    - Poor without family in village
  - Some risks covered, some not
    - Rain vs. rubber prices
  - Access and quality (efficiency) are distinct concepts
- Consortium on Financial Systems and Poverty–CFSP
  - Country-specific MOU’s, partnerships
    - Design of payment systems: Mexico
    - Flow of funds: Mexico (CNBV); Thailand (NESDB)
    - Micro financial models of macro economy: Brazil (BACEN)
- Conference on “Financial Deepening, Macro–Stability, and Growth in Developing Countries”
  - Co–hosted by the International Monetary Fund, the World Bank, the Consortium for Financial Systems and Poverty, and the UK Department for International Development, September 24, 2012, Washington DC