

Lecture 1

Finance, Growth, Volatility

Theory, data, and the formulation of policy

Finance and Growth

Finance Causes Growth: the Story

King and Levine (1993) “Finance and Growth: Schumpeter Might be Right.” *Quarterly Journal of Economics* 108 (3):717–737.

[View](#) the Abstract.

Rajan and Zingales “Financial Dependence and Growth.” *The American Economic Review* Vol. 88, No. 3 (Jun. 1998), pp. 559–586.

[View](#) the Abstract.

Levine. “Finance and Growth: Theory and Evidence.” In *Handbook of Economic Growth: Edition 1*, Volume 1, Chapter 12. pp. 865–934. Elsevier, 2005. [View](#) the Abstract.

Finance and Growth: Theory and Evidence – Ross Levine (2005)

Importance of Research to Policy:

“Research that clarifies our understanding of the role of finance in economic growth will have policy implications and shape future policy-oriented research. Information about the impact of finance on economic growth will influence the priority that policy makers and advisors attach to reforming financial sector policies. Furthermore, convincing evidence that the financial system influences long-run economic growth will advertise the urgent need for research on the political, legal, regulatory, and policy determinants of financial development.”

BUT Specific Policy Implications are not Immediate:

However, it is not necessarily immediate to go from the general idea to policy guided by the way financial systems actually work: the empirical proxies for “financial development” frequently do not measure very accurately the concepts emerging from theoretical models. We are far from definitive answers to the questions of whether finance cause growth, and if it does, how?

Finance and Growth: Theory and Evidence – Ross Levine (2005)

Role of Financial Systems: Five categories are helpful in organizing a review of the theoretical literature and tying this literature to the history of economic thought on finance and growth.

- Produce information ex ante about possible investments and allocate capital
- Monitor investments and exert corporate governance after providing finance
- Facilitate the trading, diversification, and management of risk
- Mobilize and pool savings
- Ease the exchange of goods and services

Each of these financial functions may influence savings and investment decisions and hence economic growth.

Issue: Levels, Steady State Transitions: So the thesis is that intermediation matters and thus changes in intermediation matter. But this begs the issue of whether growth happens as levels of intermediation systems change gradually or a good, fixed level today can influence rates of growth in the future.

Finance and Growth: Theory and Evidence – Ross Levine (2005)

Some theoretical caveats:

1. Growth accounting literature, is long run growth more about technology improvement – he says yes, but this leaves out transitions, which could be important, or even poverty traps, systems get stuck.
2. Savings rates are not monotone with increases in return, or improved risk bearing, it can go the other way.
3. Levine (2011): Finance promotes economic growth primarily by improving the efficiency of capital allocation, not by increasing investment. Thus, finance should not be viewed as a plumbing system, where pouring more credit in one end yields more growth at the other. Rather, finance is like an economy's central nervous system, choosing where to allocate resources and it's the latter thing that matters.

So does finance cause growth, reduced inequality, lower ? Not necessarily:

“Theory provides conflicting predictions concerning the relationship between financial development and both income distribution and poverty alleviation. Some theories claim that financial intermediary development will have a disproportionately beneficial impact on the poor. Banerjee and Newman (1993), Galor and Zeira (1993) and Aghion and Bolton (1997). Other models posit a non-linear relationship between finance and income distribution. Greenwood and Jovanovic (1990) show how the interaction of financial and economic development can give rise to an inverted U-shaped curve of income inequality and financial intermediary development.”

Unfortunately, despite his appeal to theory, the econometrics does not make the link (yet).

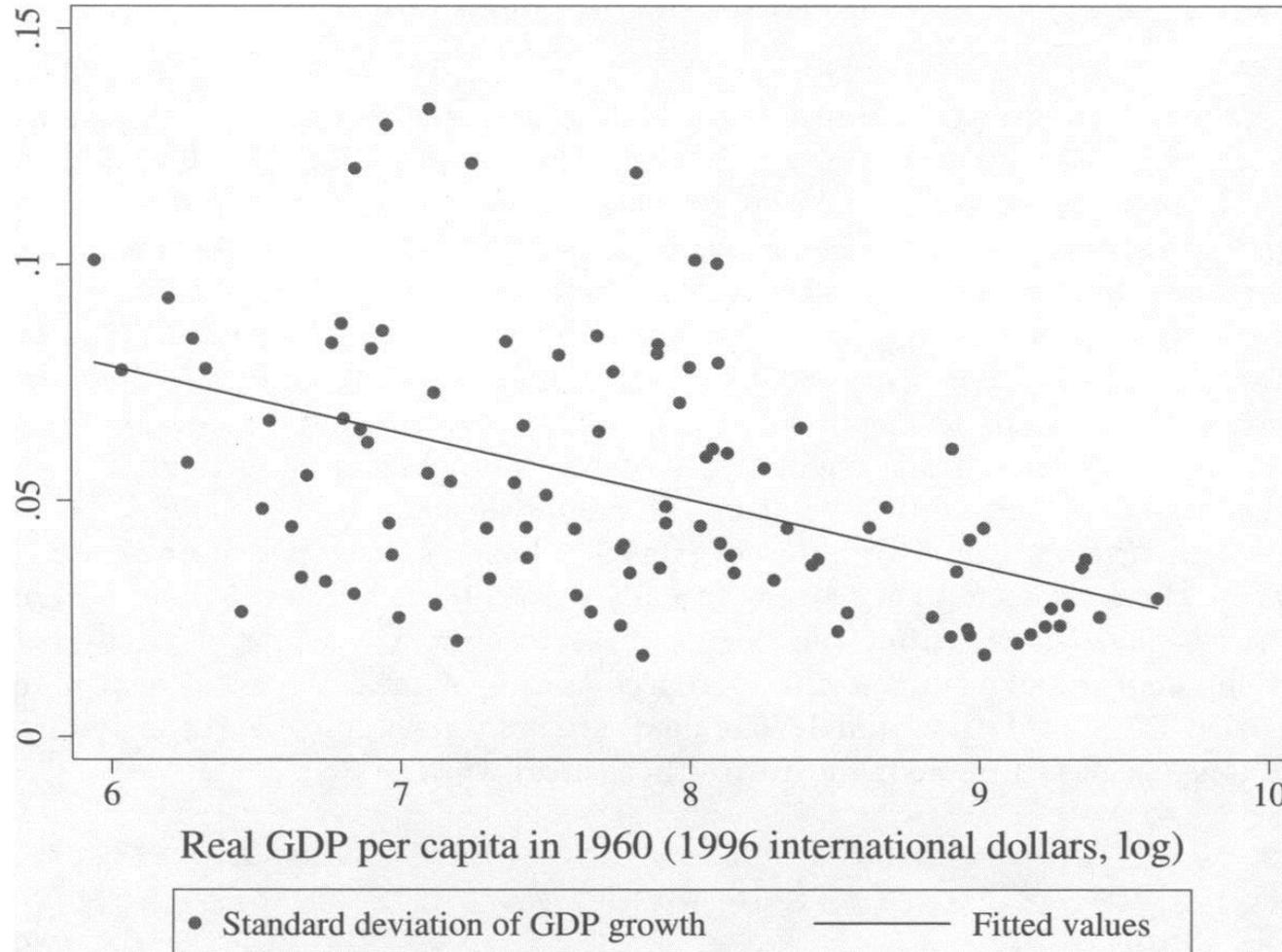
Volatility and Growth

Volatility

Some facts about volatility – these are important before we start thinking that all volatility is coming from the financial system. More specifically, there may be links to the financial system and hence implications for policy, but we need to get specific in order to know how to think productively about finance, volatility, and policy.

Koren and Tenreyro . “Volatility and Development.” *The Quarterly Journal of Economics* (2007) 122 (1): 243–287. [View](#) the abstract.

Volatility and the level of Development



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Quantification as a Precursor to Policy

Why important? Because policy comes from looking at the underpinnings, in this case sectors: helps to point out the potential areas to which risk management efforts should be directed. If, for example, a large part of a country's volatility is accounted for by high exposure to a few high-risk sectors, then policies aimed at mitigating volatility (or its consequences) should probably focus on the development and strengthening of financial institutions and, perhaps, on the diversification of the economy. If, instead, most of the volatility is due to country-specific shocks, then attention should probably be directed to macroeconomic policy (i.e., excessive volatility might reflect inadequate aggregate domestic policies).

Quantification: 60% is country specific, 40% is sectoral, so the latter is nontrivial. Data informs theory: if diversification is limited, then one might think the correct thing to do is to concentrate on developing safe sectors first. However, there is no tradeoff in the data between mean returns and risky returns so this might not be the correct way of thinking.

Express innovations in the growth rate of GDP per worker in country j , denoted by q_j , as the weighted sum of the innovations in the growth rates of value-added per worker in every sector, y_{js} , with $s = 1, \dots, S$:

$$q_j = \sum_s a_{js} y_{js},$$

where the weights a_{js} denote the share of employment in sector s of country j .

To separate the role of domestic aggregate risk from that of the sectoral composition of the economy, we can further breakdown innovations to a sector's growth rate, y_{js} , into three disturbances:

$$y_{js} = \lambda_s + \mu_j + \epsilon_{js}.$$

A Model in which Volatility is Inevitable, Optimal

Acemoglu and Zilibotti (1997) “Was Prometheus Unbound by Chance? Risk, Diversification, and Growth.”

A model which explains why poor countries are and remain volatile even as they grow. It's very costly to have sectors/projects/assets which cover all shocks and the optimal investment strategy leaves holes for a while. There is an optimal financial policy which involves building pooling resources and limits re-trade but does not escape the proposition that diversification is costly.

Volatility as Necessary for Growth

Key fact: Growth may come at the expense of financial volatility/crises, i.e., without credit busts, countries do not grow.

This statement is not causal, but if we take correlation of finance and growth seriously, then we should take this seriously too.

Systemic Crises and Growth – Rancièrè, Tornell, and Westermann (2008)

[View](#) the abstract.

Some more details on the measures used: crises are the principal source of negative skewness once we have controlled for major exogenous shocks such as wars and large scale deterioration in the terms of trade. “We choose not to use variance to capture the uneven progress associated with financial fragility because high variance captures not only rare, large, and abrupt contractions, but also frequent or symmetric shocks.”

Systemic Crises and Growth – Rancière, Tornell, and Westermann (2008)

Content removed due to copyright restrictions. View Figure 1 from Rancière et. al. (2008).
<http://qje.oxfordjournals.org/content/123/1/359.full.pdf+html>

“Thailand and India illustrate the choices available to countries with weak institutions. Whereas India followed a path of slow but steady growth, Thailand experienced high growth, lending booms, and crisis (see Figure 1). GDP per capita grew by only 114% between 1980 and 2002 in India, whereas Thailand’s GDP per capita grew by 162%, despite the effects of a major crisis.”

Systemic Crises and Growth – Rancière, Tornell, and Westermann (2008)

How their model works: it's political economy, misregulation:

“Here, we present a stochastic growth model where growth depends on the nature of the financial system. We consider an economy where imperfect contract enforceability generates borrowing constraints, as agents cannot commit to repay debt. This financial bottleneck leads to low growth because investment is constrained by firms' internal funds...”

Policy conclusion is nuanced:

“Crises are costly. Widespread bankruptcies entail severe deadweight losses. Furthermore, the resultant collapse in internal funds depresses new credit and investment, hampering growth. But is it possible for systemic risk taking to increase long-run growth by compensating for the effects of enforceability problems? Yes...”

Finance and Volatility

Finance and Volatility

Both Acemoglu et al. and Rancièrè et al. suggest that volatility can (should) diminish at higher levels of output.

However, to the extent that growth and volatility are correlated, the bilateral pairings of topics are not all consistent with one another, i.e. finance causes growth, growth comes with volatility, but finance reduced volatility.

There is related empirical work trying to sort this out: **Dabla-Norris and Srivisal (2013), “Revisiting the Link Between Finance and Macroeconomic Volatility”**

[Read](#) the summary of the article.

Policy Conclusions Being Discussed Today, Post Recent Financial Crisis

These policy conclusions seem to leave the context of the above review of the literature, forgetting lessons learned: empirical patterns in the aggregate data, need to sectoral/micro data, needs to integrate data analysis is theory. Some examples

Levine (2011) “Regulating Finance and Regulators to Promote Growth”

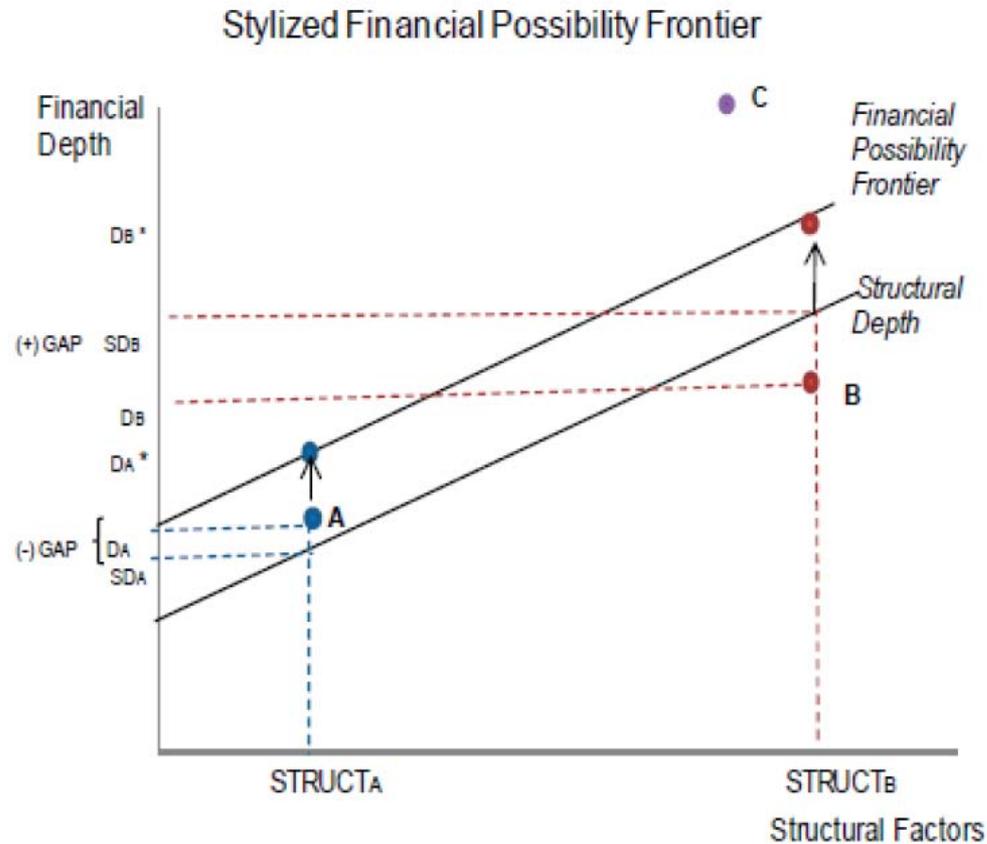
Contrast with his earlier paper and with the literature that argues that some volatility is inevitable:

Motivation is financial crisis: “Following the global financial crisis of 2008, countries stabilized their financial systems and attempted to bolster regulatory systems to protect against systemic risks. Disappointing rates of recovery, however, have shifted the policy focus to growth. How important is the operation of the financial system for economic growth and which financial regulatory reforms will improve financial sector operations and promote growth?”

[Read](#) the abstract and the article.

Financial Possibility Frontier: Understanding Structural and Policy Gaps in Financial Systems – Beck (2012)

The idea is that by looking at the data, and controlling for various factors, we can draw policy conclusions.



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Financial Possibility Frontier: Understanding Structural and Policy Gaps in Financial Systems – Beck (2012)

“Understand where financial system is relative to financial possibility frontier.” It’s a good idea to have a notion of a frontier, i.e., for a given country, the utility possibilities frontier. Being on the frontier means Pareto optimal (it does take data, but also conceptual frameworks, to determine this). Beck's financial possibility frontier is in contrast almost exclusively empirical.

He distinguishes structural, from institutional, from policy:

- ❑ Structural problems holding back frontier
- ❑ Institutional deficiencies holding back frontier – country-specific analysis of binding constraints
- ❑ Policy restrictions keeping country below frontier
- ❑ Cross-country comparison that can identify policies that can explain country's position relative to frontier

Somehow the empirical frontier is used as a metric warning: Being beyond frontier might indicate overshooting. Benchmarking analysis can serve as additional crisis indicator.

An important comment on policy and implementation problems in the end: all financial sector reform is local! Ignore political economy at your own risk.

Policies for Macroeconomic Stability: How to Deal with Credit Booms – Dell’Ariccia, G. et al. (2012)

Another policy paper that concentrates on credit booms and is motivated by the recent financial crisis.

[Read](#) the Executive Summary.

There is the view that financial liberalization is a cause: first, credit booms are often triggered by financial reform, capital inflow surges associated with capital account liberalizations, and periods of strong economic growth insistence on understanding trade off and prescribing policy but its largely a policy of preventing booms. This note explores past credit booms with the objective of assessing the effectiveness of macroeconomic and macro prudential policies in reducing the risk of a crisis or, at least, limiting its consequences. For instance, Basel III introduced a capital buffer range that is adjusted “when there are signs that credit has grown to excessive levels” (Basel Committee on Banking Supervision, 2010).

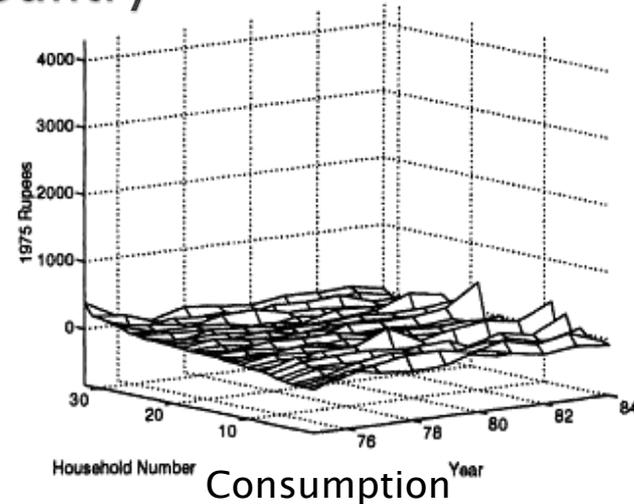
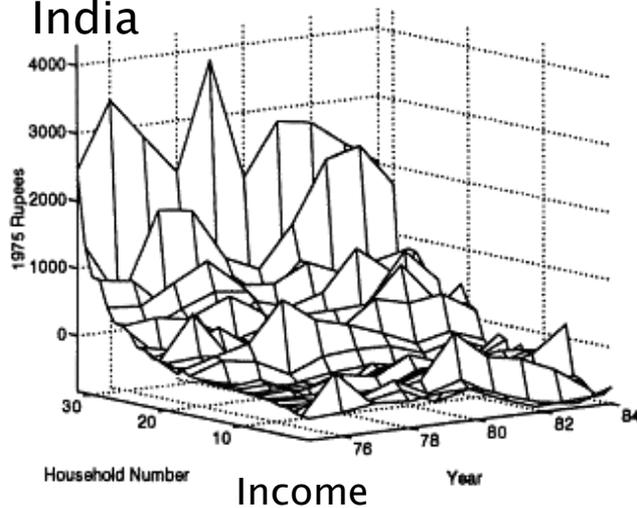
See individual sections on monetary policy, fiscal policy, macro prudential: it’s a literature review but policies are not tied that tightly to models and not getting beneath the surface of aggregated evidence.

An Alternative Approach to Policy

1. Understanding the unit of analysis and the data
2. Applied General Equilibrium Development Economics
3. What it is, and what it is not

Motivation, Starting Point: risk and insurance in Village Economies – been done now at all levels, Entire Country

▶ India



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- ▶ 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

Another Economy, Incomplete sharing: Diversification of Assets, at a Cost

Robert Townsend. *The Medieval Village Economy*. 1993.

- ▶ 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 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)



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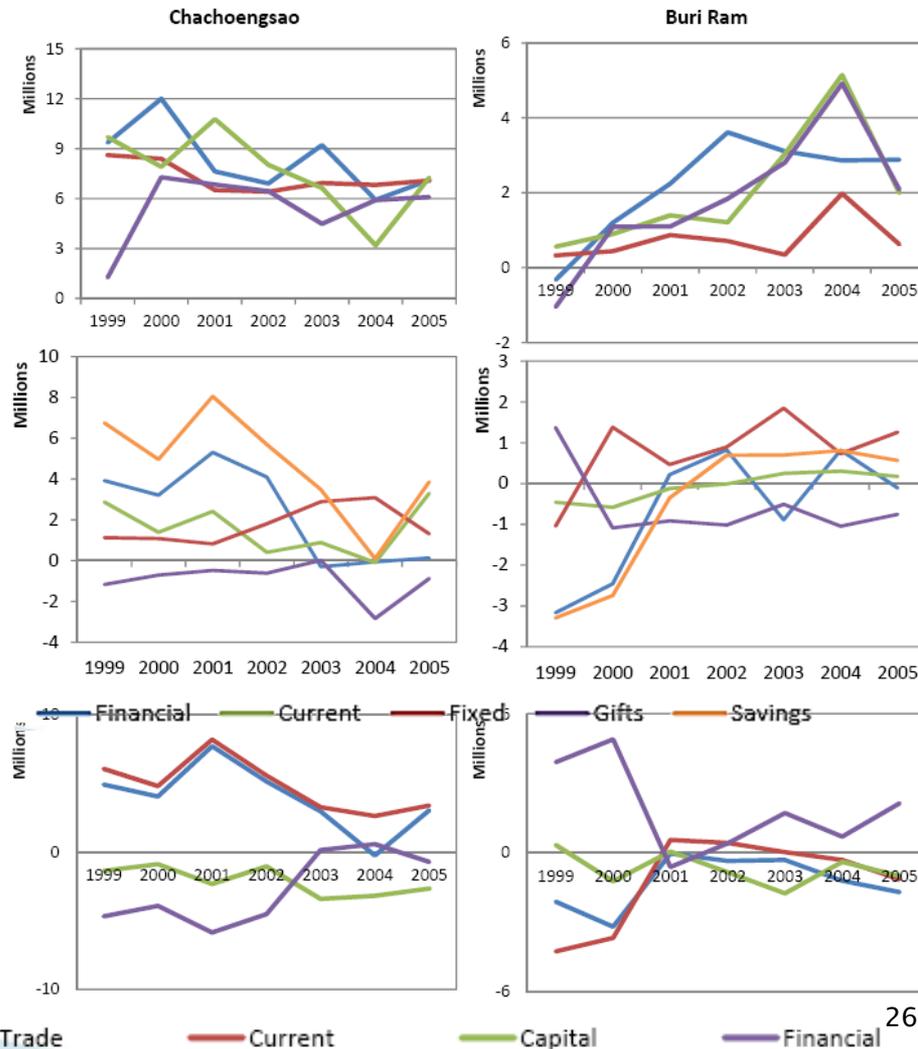
Regions as Small Open Economies and the Country as a Whole– with Paweenawat

▶ 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

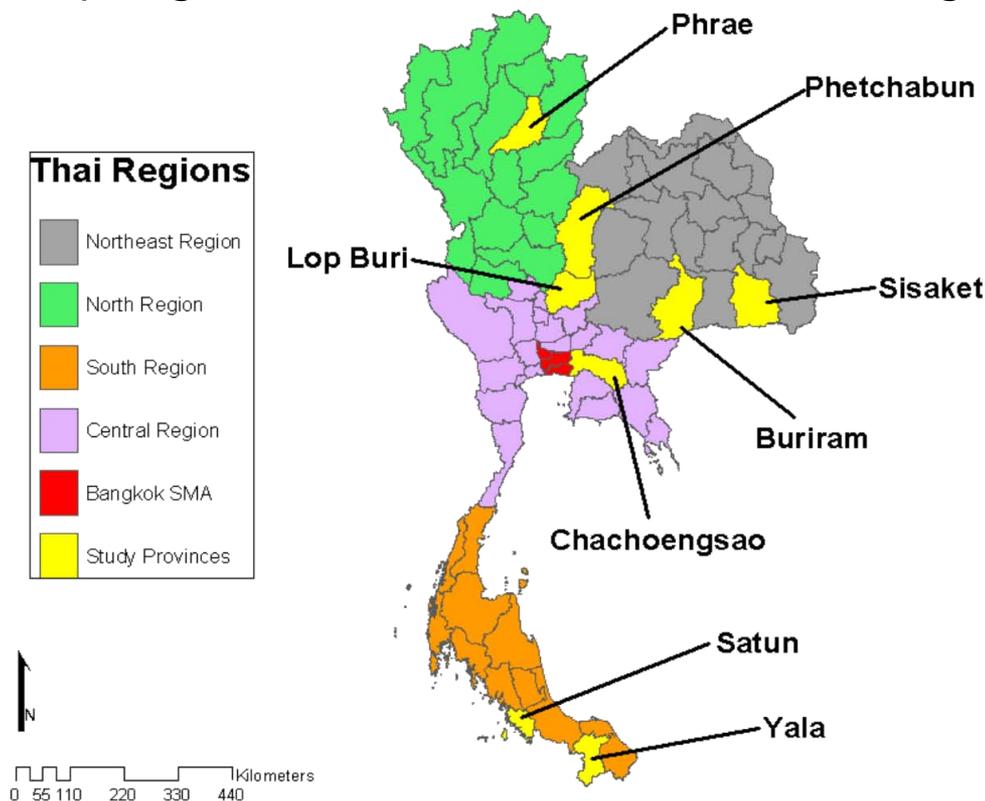
- Allocation of village's savings
 - Into real and financial investment

- Balance of payments for representative villages
 - Trade and current account
 - Balancing financial and real flows

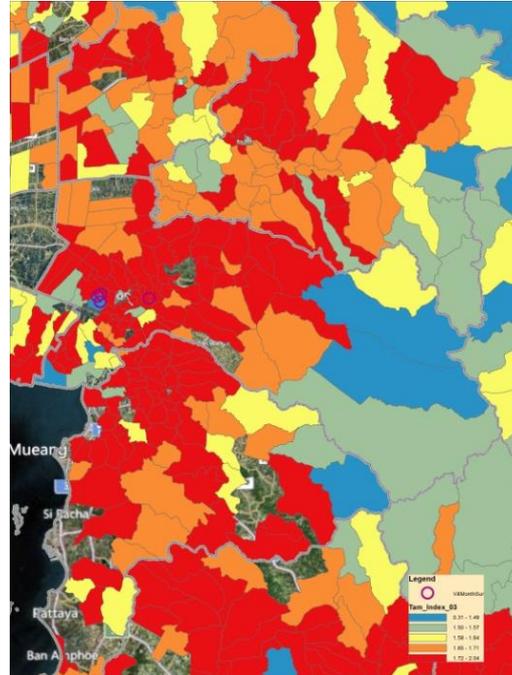


Data for Entire Economy Townsend Thai Project: 15 Year Panel

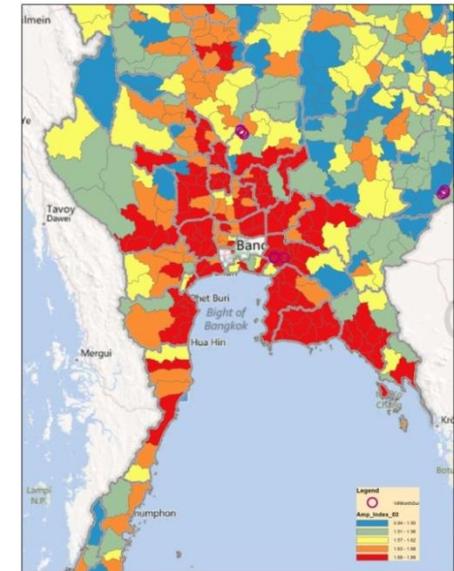
- Monthly survey: 180 months for selected villages
- Annual Rural Survey and Urban Survey –wider cross section
 - In 2009, survey 3,184 households across 200 villages, towns and cities
 - New Enterprise Survey, including medium and large
 - (includes city neighborhoods as in earlier work on Chicago ethnic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



Measurement: From Local to Global



(High wealth in red)



(High wealth in red)

- 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

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 ⇒ leave it alone or build on this base
 - e.g., build formal/national on informal/village
 - If with obstacles to trade (constrained–efficient)
⇒ reject full efficient
 - but accept constrained–efficient and leave it alone
 - ⇒ or, alleviate constraints
 - collateral constraints ⇒ legal reforms might help
 - moral hazard constraint ⇒ possibility of more monitoring
- ▶ **If distortion comes from ill–designed regulation ⇒ 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

Other Related General Equilibrium Approaches: Comparison and Contrasts, Especially Financial

- ▶ 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** →

- Predecessor: Johansen (1960) (Monash, Australia and Cambridge, U.K.)
- 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

Advantage	Disadvantage
Lots of realistic sectors	Static
	No uncertainty

- ▶ **DSGE: Dynamic Stochastic General Equilibrium** →

- RBC, Real Business Cycle: Kydland Prescott (1982)
 - Review: Cooley (1995)
 - **Measurement** (drawing on NIPA)

Advantage	Disadvantage
Dynamics	Assumes representative consumer
Shocks	No redistributive wealth effects

- ▶ **Key Underpinning: Gorman aggregation with complete markets**

- Method does generalize
 - With Pareto weights: Negishi (1960)
- But what if as-if-complete-markets fail, then separation fails
- Where is the financial modeling?

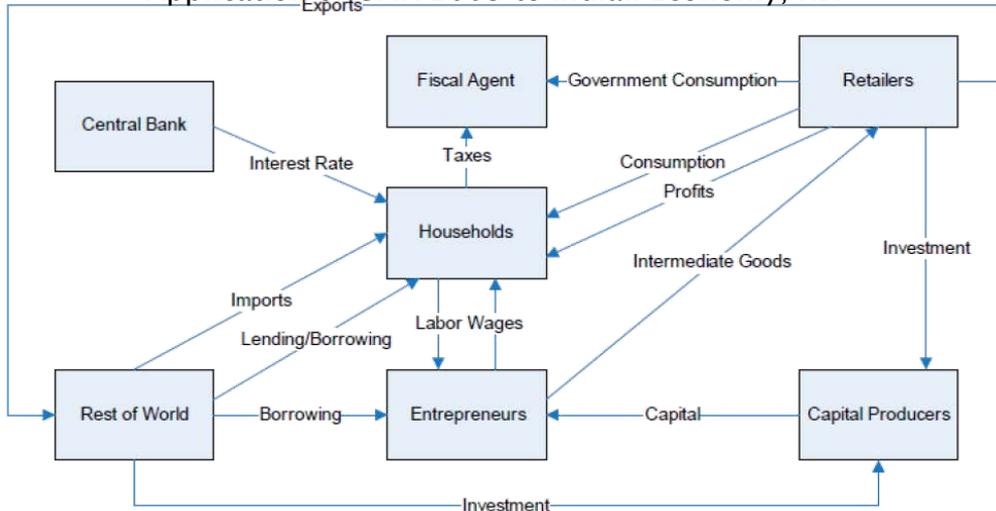
Continuing With the Contrast: Dynamic New Keynesian General Equilibrium Models

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

Application of CMR 2003 to Indian Economy, RBI



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

Advantages	Disadvantages
Using more micro data	Still creating economic actors not intending to match to data
Firm size data: Influence of development (Hsieh and Klenow 2009)	Implicitly assuming separation
Financial variables	Households, separate from firms, even with financial imperfections
Bankruptcy	

Applied General Equilibrium Development Economics

Embrace and Measure Micro Financial, with Implications for Macro

- ▶ 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:
 - Occupational choice/wealth/credit: Paulson, Townsend, Karaivanov (2006)
 - 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

From Samphantharak, Krislert and Robert M. Townsend.
Households as Corporate Firms.
Cambridge University Press,
2009.

"The only way to obtain measures [of income and consumption] is by imposing an accounting framework on the data, and painstakingly constructing estimates from myriad responses to questions about the specific components that contribute to the total." Angus Deaton (1997)

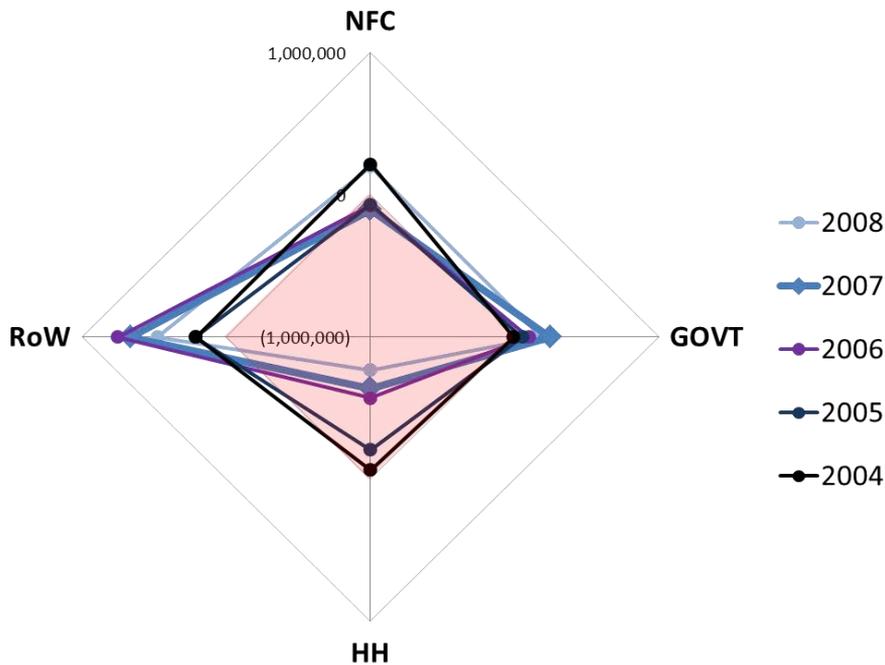
Measurement and Modeling in Applied General Equilibrium Development Economics: Flow of Funds

- ▶ 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 Hnatkowska (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

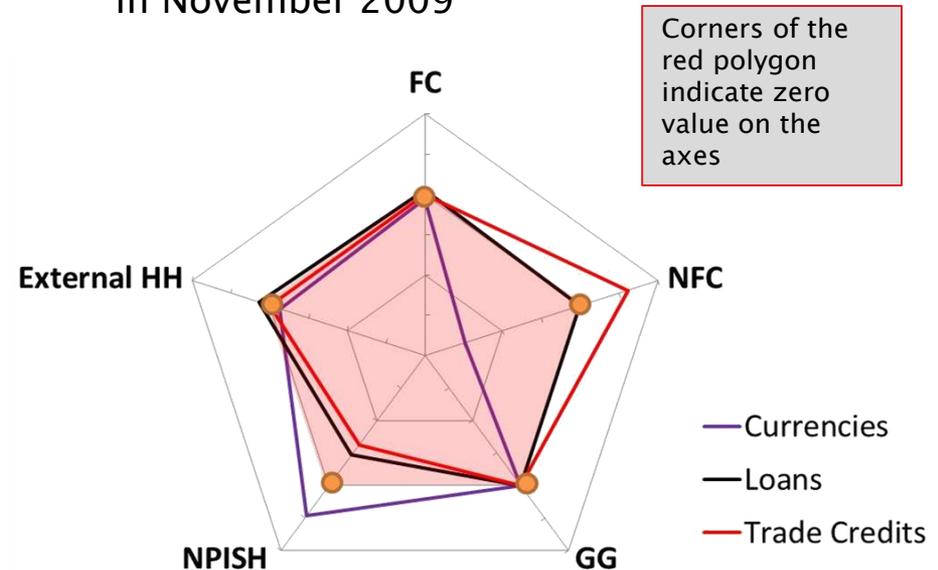


Can Create Models Based On Flows, At Any Level

- ▶ 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

Micro Underpinnings

1. Insurance
2. Credit
3. Obstacles to Trade

Micro Underpinnings III: Obstacles to Trade/Mechanism Design

(We no longer need to assume complete or incomplete markets without looking)

- ▶ Motivating facts: Testing for full insurance in repeated cross-sections/panel/inequality histograms: Deaton and Paxon (1994); Jappelli and Pistaferri (2009)

But, rejects to what?

Exogenous incomplete markets

- Deaton (1987, 1991, 1992); Campbell and Deaton (1989); Carroll (1992); Huggett (1993); Aiyagari (1995); Bewley (1997); Krueger and Perri (2007)

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, Worrall (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, borrow/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),

Summary, Economy–Wide Picture: Applied General Equilibrium Development Economics Using Measured Micro Underpinnings

- ▶ 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
 - Greenwood & Jovanovic (1990) **GJ**;
Bencivenga and Smith (1991)
 - ⇒
 - 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
 - Financial reforms and the persistence of history: Buera and Shin (2010), Peters (2012)
 - Distinguishing two sectors: Kaboski, Buera and Shin (2009)
 - Inequality and growth: Blaum (2012)
 - ▶ Transient misallocations: Moll (2010); Banerjee and Moll (2010)
 - ▶ Financial intermediation, technological progress and costly–state verification: Greenwood, Sanchez and Wang (2012)
 - ▶ Private and public sectors, growing like China: Song, Storesletten and Zilibotti (2011)
 - ▶ Links to “micro” international Helpman, Itskhoki, Muendler, Redding (2012)

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Spring 2013

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