

Financial Design and Economic Development

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Jean-Jacques Laffont Lecture
Toulouse, France
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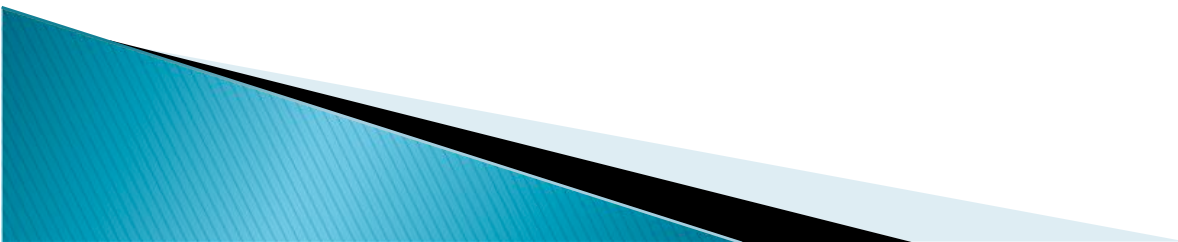
A Tribute To Jean-Jacques Laffont: Theory, Measurement and Economic Development

- ▶ Laffont, Jean-Jacques, and Mohamed Salah Matoussi, “Moral Hazard, Financial Constraints and Sharecropping in El Oulja,” *Review Of Economic Studies*, 1995.
- ▶ Laffont, Jean-Jacques, and David Martimort. *The Theory of Incentives: The Principal-Agent Model*. Princeton, N.J.: Princeton University Press, 2002.
- ▶ Laffont, Jean-Jacques. *Regulation and Development*. Cambridge, UK: Cambridge University Press, 2005.



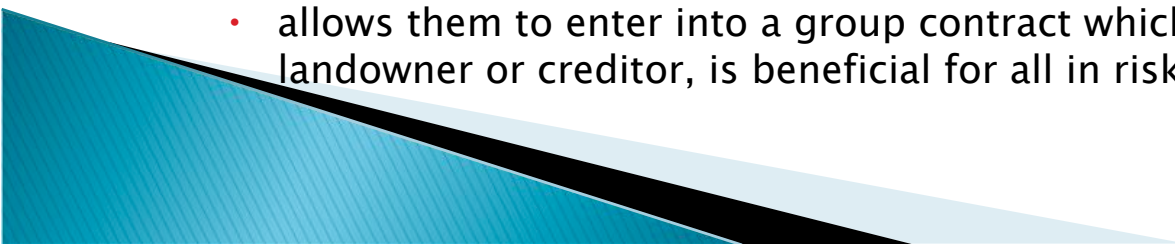
Moral Hazard, Financial Constraints and Sharecropping in El Oulja (Laffont & Matoussi, 1995)

- ▶ Study optimal sharecropping contract when tenant faces financial limit on working capital
- ▶ Main findings:
 - Effort and share of output of tenant higher when less financial constraints
- ▶ Empirical application to Tunisia
 - Estimate production functions
- ▶ Test theory predictions
 - Find that share of output of tenant increases in his financial resources



Mechanism Design and Village Economies: From Credit to Tenancy to Cropping Groups (Townsend & Mueller, 1998)

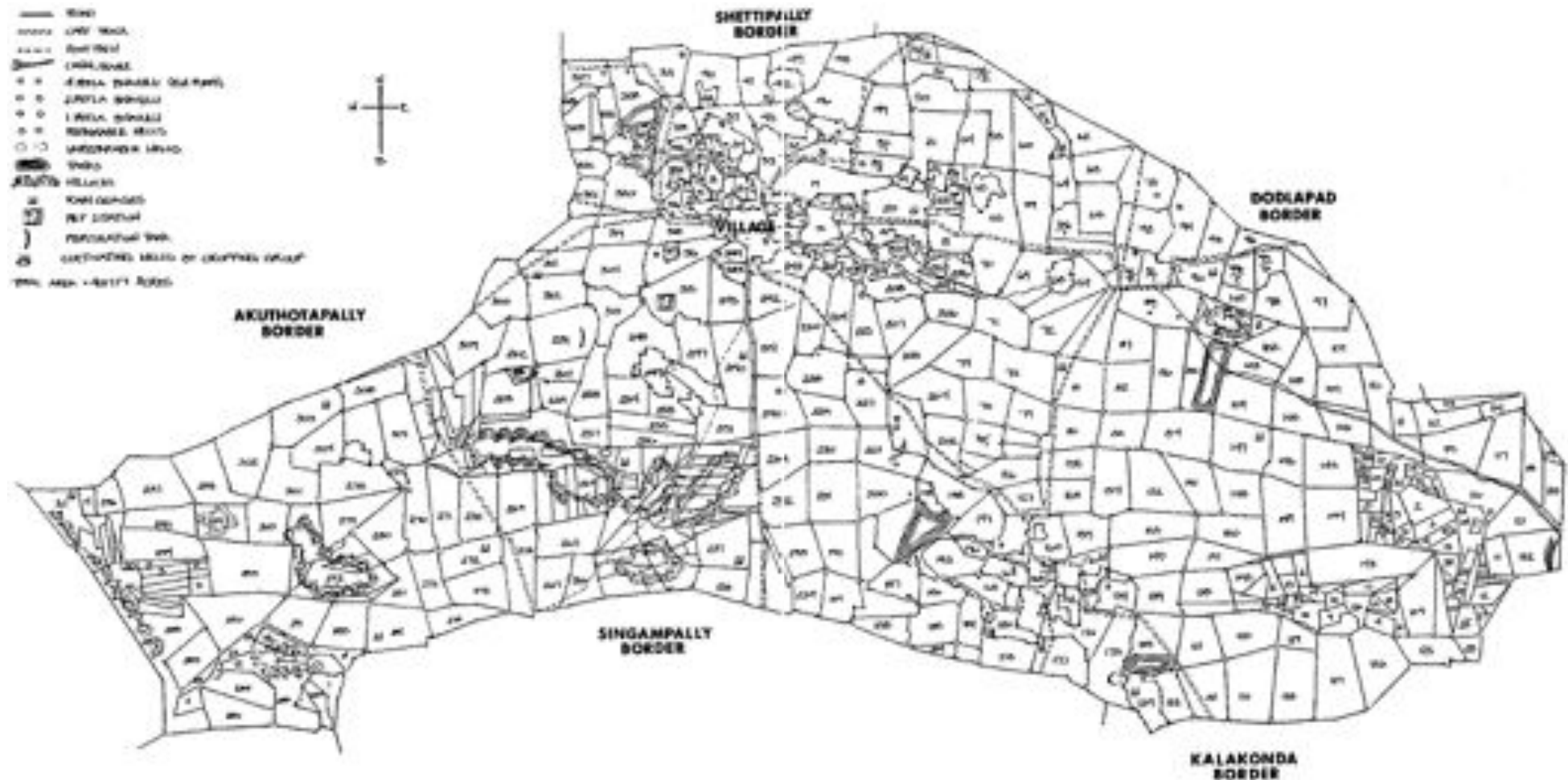
- ▶ Cropping group:
 - Multiple tenants pool risk and resources
 - Jointly farm the land of a single landowner under either a fixed- or shared-rent contract
- ▶ Special survey of an institution and how it operates, using theory
 - Sharecropping and even fixed-rent contracts have implicit and explicit risk contingencies
 - Credit-financed inputs and crop operations are sometimes under the control of a landowner or single outside creditor.
 - not take for granted unobserved side exchange or unrestricted access to credit markets.
 - Interim plot and crop conditions are communicated on a regular basis to
 - participating landowners
 - outside creditors
 - Indirect evidence for information/incentive problems
 - attempts to control them via costly state verification
 - physical monitoring of plot and crop operations by participating landowners
 - But, monitoring by outside creditors is rare
 - Group members tend to work together
 - have good information about one another
 - allows them to enter into a group contract which, despite collusion against the landowner or creditor, is beneficial for all in risk and input reallocation



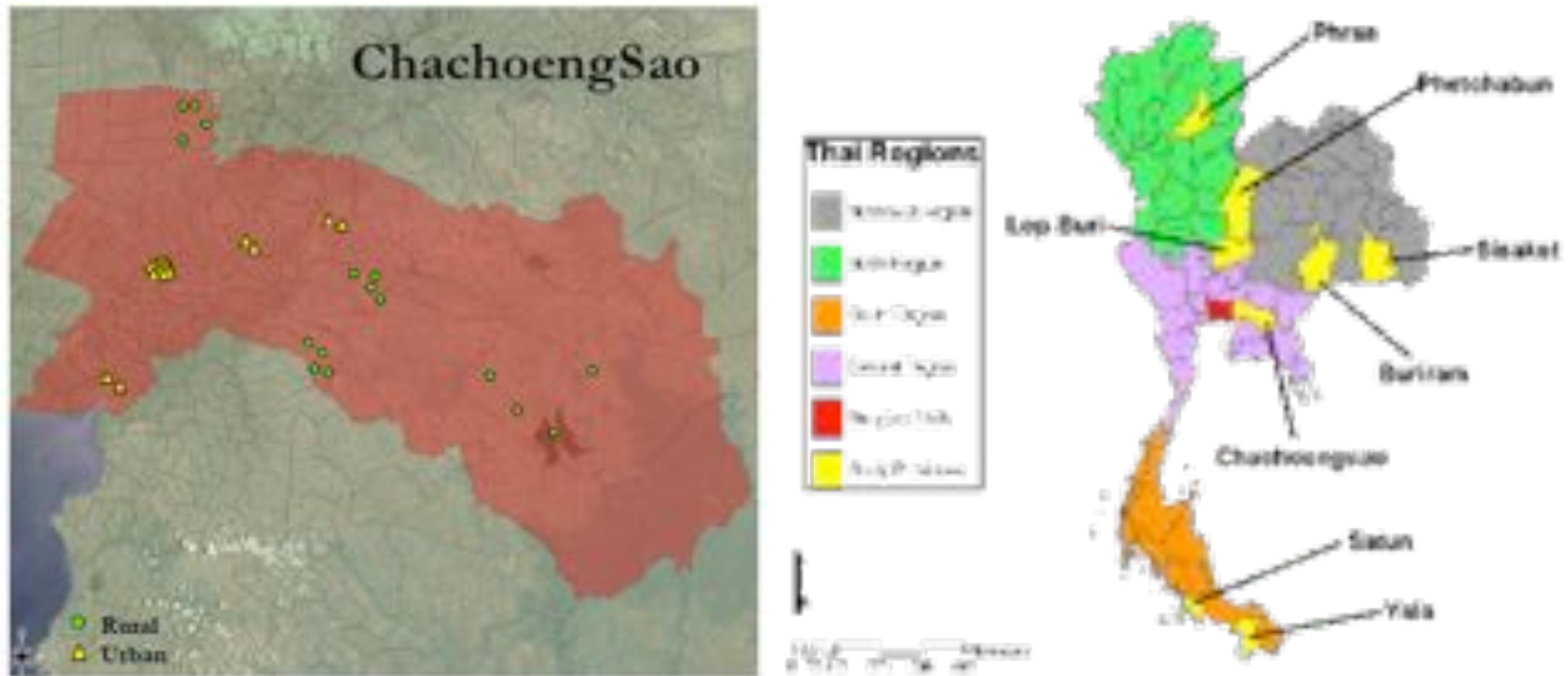


Cropping Groups >>

Aurepalle Village: Cultivating Wells of the Cropping Groups



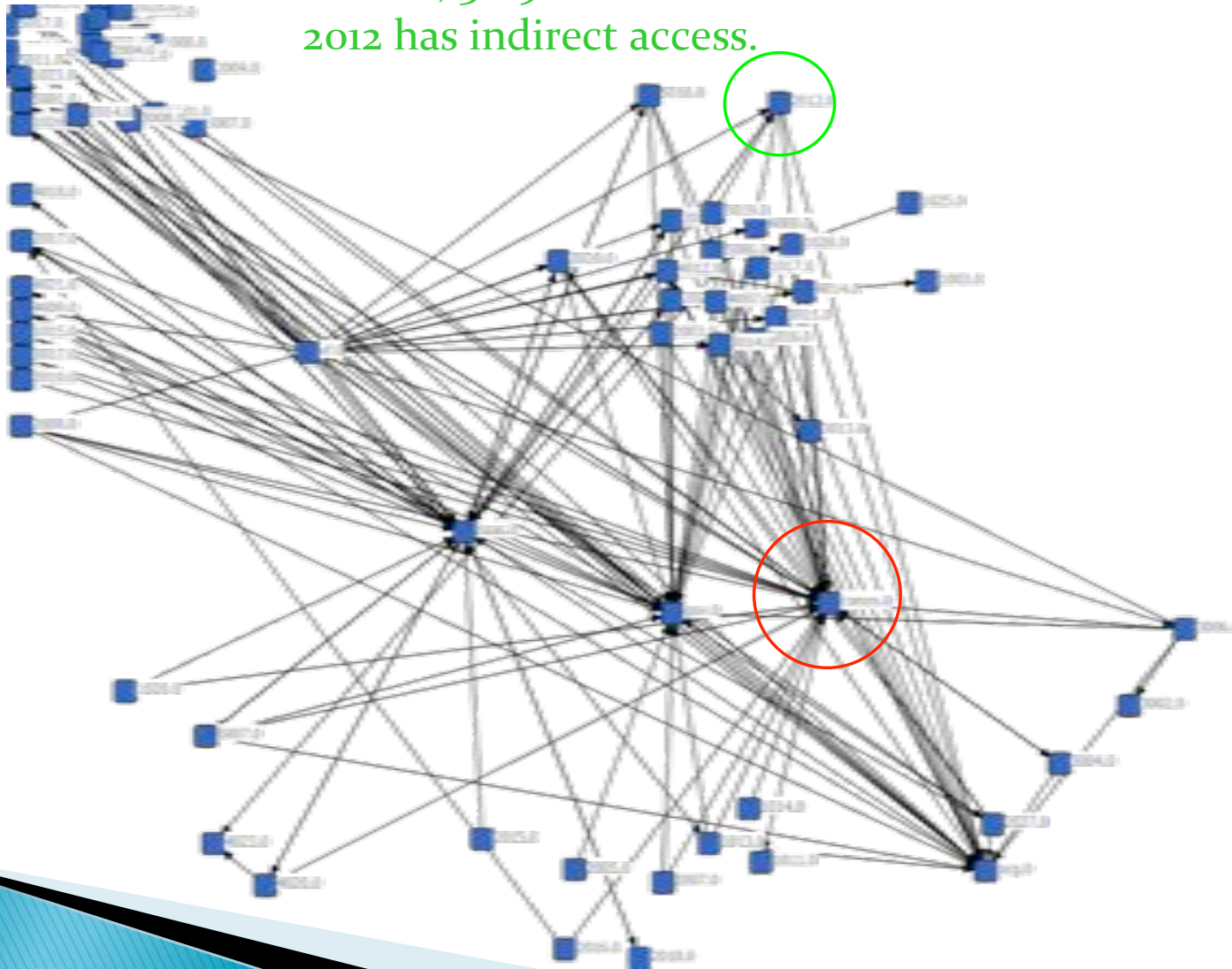
Data From Urban/Rural and from Every Region



Villages are clustered by design
Urban is towns and cities (capital of province)

Villages as a Unit: Local Networks

In turn, 3019 borrows from Commercial Bank. As such, 2012 has indirect access.



Kinship and Financial Networks, Formal Financial Access and Risk Reduction (Kinnan & Townsend 2011)

- ▶ Gifts from other households in the same village equal 9 percent of average expenditure
- ▶ The average amount borrowed per transaction is 12,200 baht
 - equal to 60% of average monthly household expenditure
- ▶ The average household who ever borrows, borrowing from other villagers
 - 4.75 times over 84 months
- ▶ For borrowing/lending and transfers with other households in the village, the surveyed household is asked to identify the structure (essentially, the address)
- ▶ Matched to a village census
- ▶ Identify the counterparty household for each within-village transaction, even if they are not themselves in the survey
- ▶ Some households are directly connected to banks, while others are indirectly connected

Impact and Quality of Access: Understanding Shocks and Risk in Data

- ▶ Is risk allocated optimally?
- ▶ A benchmark standard based on the theory would say:
 - Idiosyncratic risks are **pooled**
 - Aggregate shocks are **shared**
- ▶ Investment depends on expected productivity but not current cash flow



Impact of Networks

- ▶ Being directly connected to a bank reduces the consumption–income co–movement by 0.1658 baht
- ▶ An indirect connection has a virtually identical impact, reducing the consumption–income co–movement, relative to no connection, by 0.1643 baht
 - net sensitivity of 0.0002, insignificantly different from zero ($p=0.958$)
- ▶ Investment is highly sensitive to cash flow for households without kin in the village, with a one baht income change associated with a 0.6526 baht investment change, significantly different from zero at the 1% level
- ▶ The presence of kin in the village substantially mitigates this sensitivity, reducing the response to a one baht change by 0.4136 baht.
- ▶ Bank connections do not appear to be significantly helpful in smoothing investment, in contrast to their central role in consumption smoothing
- ▶ Investment remains sensitive to cash flow

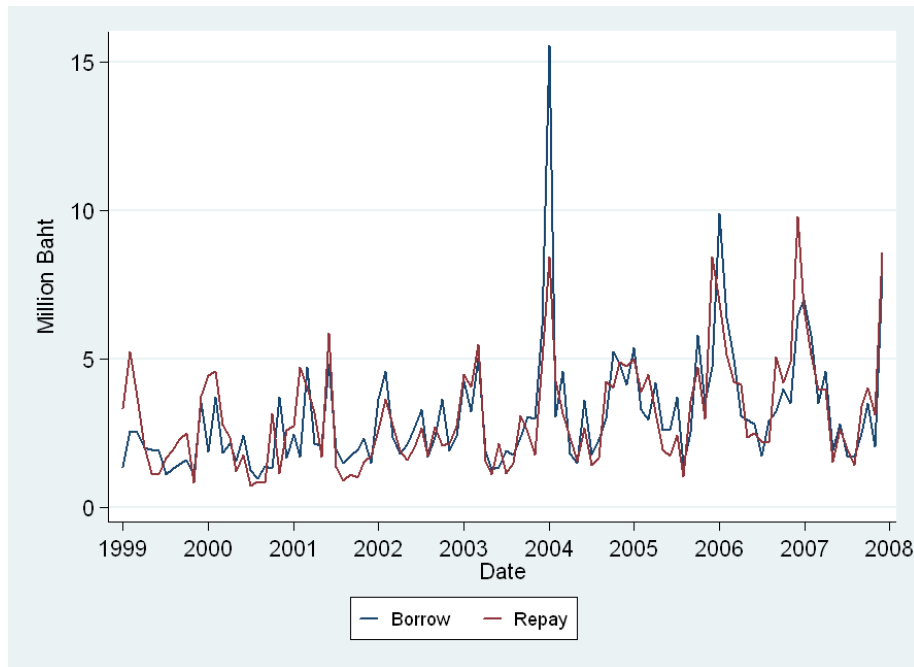
Policy Implications

- ▶ Savings and financial access can understate reach of formal financial system – at least for consumption smoothing
- ▶ Hide true underlying vulnerability
- ▶ Blind us to underlying informal mechanisms

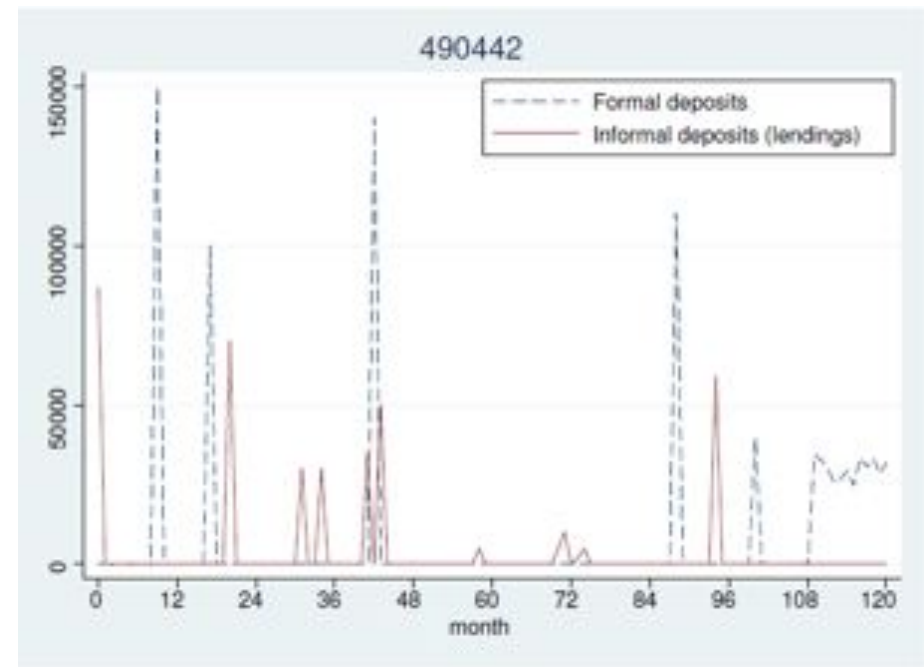


Mechanisms: Bridge Loans

Amount Repaid and Amount Borrowed



Informal Money Market



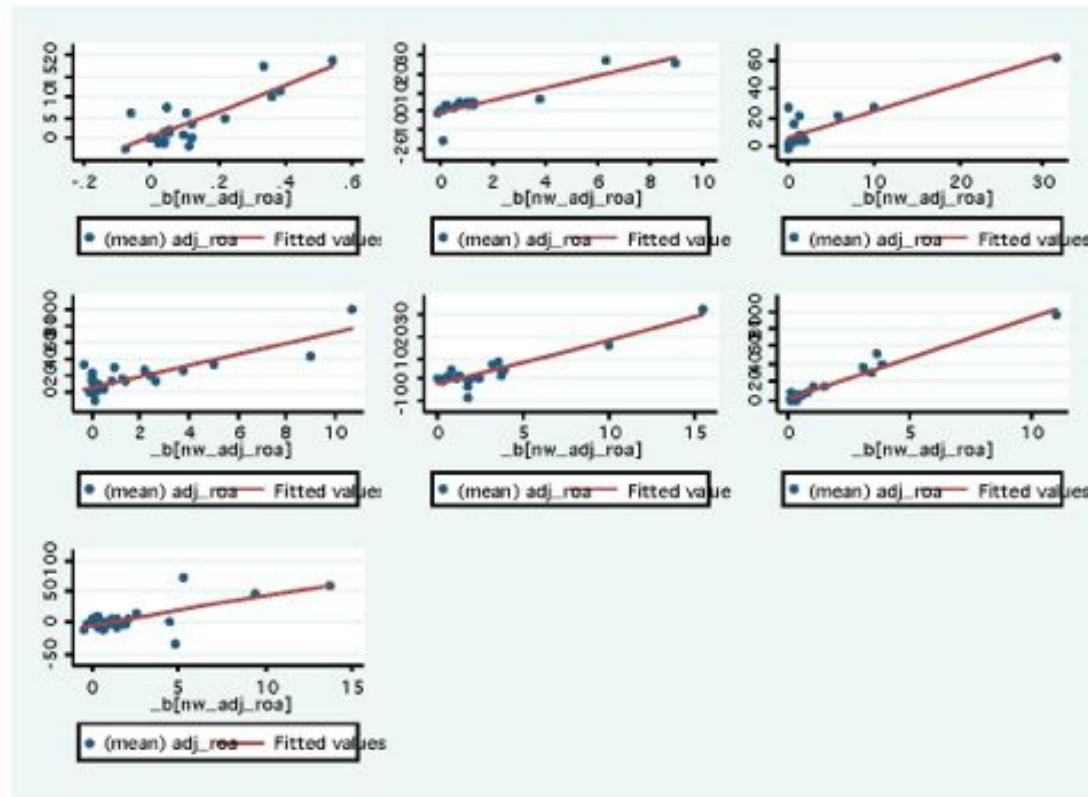
Sophisticated Risk Sharing Labor Syndicates (for some): Response to Idiosyncratic Risk is Small

- ▶ Participation in the labor force:
 - A 1 standard deviation increase in idiosyncratic income decreases participation by:
 - 0.05473126
- ▶ Hours worked:
 - A 1 standard deviation increase in idiosyncratic income decreases hours by
 - 0.00034717



CAPM in Village Networks: Beta and Expected Return

- ▶ Using a capital asset pricing model (CAPM) Samphantharak & Townsend (2010) find that income/asset ratios have rate of return data priced by aggregate risk
- ▶ Idiosyncratic risk also remains



Panel D: Network as Market

Remarks: Horizontal Axis = Beta; Vertical Axis = Expected Return. Each graph represents each of the networks. We treat each network as the market. From left to right and from top to bottom are networks from Buriram (village 14), Lopburi (villages 1, 4, and 6), and Srisaket (villages 1, 6, and 9).

But the Poor Without Family Are More Vulnerable to Shocks – Annual

- ▶ Annual Townsend Thai data show that consumption is close to that predicted by optimal allocation of risk bearing and it is optimal overall, but **not for the poor without family** who are quite vulnerable

Risk Sharing Regressions by Wealth

	Overall	Central	NE
<u>Consumption</u>			
Poor 30%	.333***	.145**	.368***
Middle 40%	.131***	.141***	.056
Rich 30%	.030	.091**	-.020
<u>Investment</u>			
Poor 30%	2.89***	-.233***	2.88***
Middle 40%	.072***	.072***	.072***
Rich 30%	.074***	.070***	.226***

Table 4: Effect of household income on household consumption for households not in any kinship network.

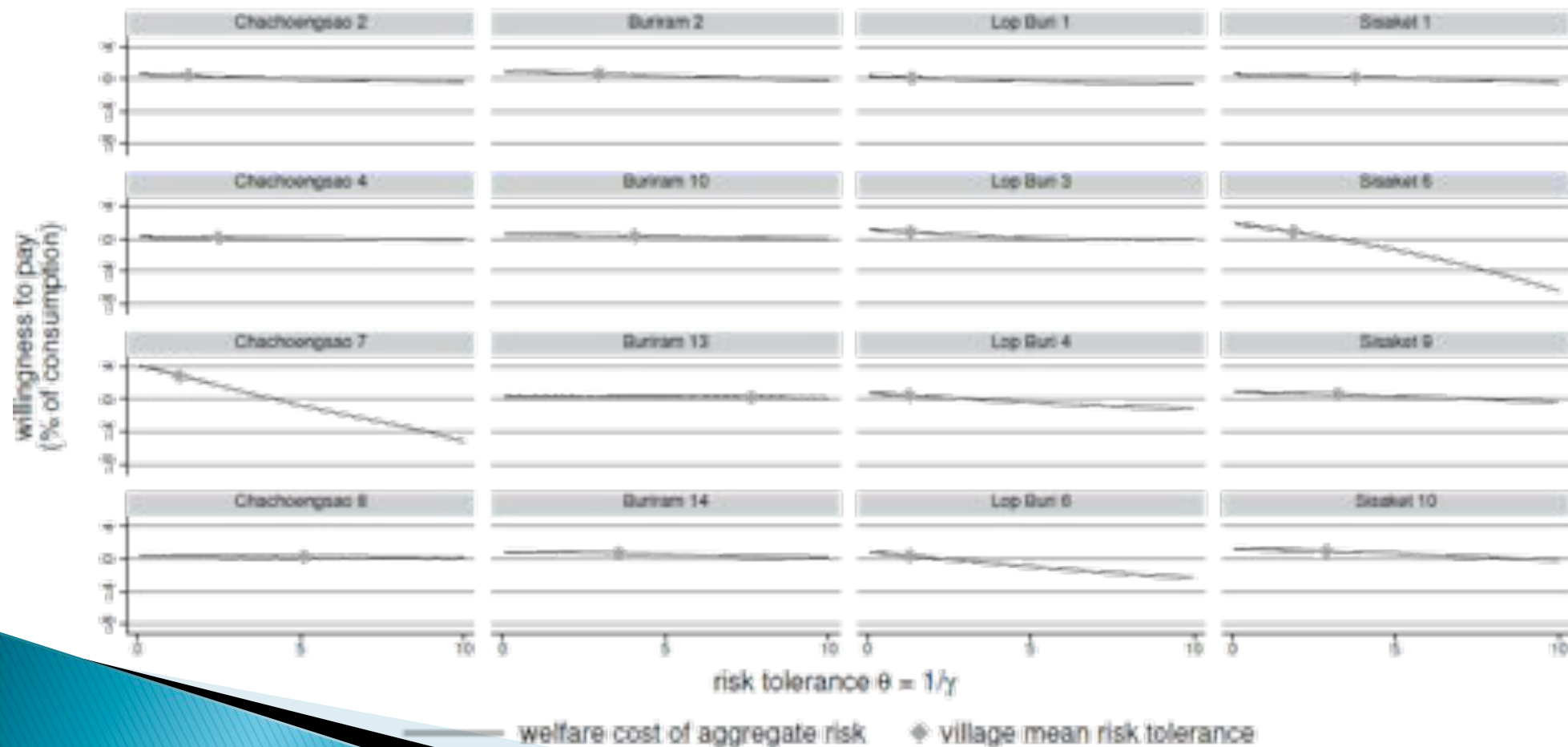
	Δ consumption			
	annual	semiannual	quarterly	monthly
<i>B. All households, with controls for household size</i>				
Δ income	0.033*	0.018	0.014	0.001
	(0.013)	(0.011)	(0.008)	(0.007)
partial R^2 :				
agg. shocks, household size	0.111	0.115	0.098	0.094
income	0.020	0.004	0.003	0.000
Observations/households	954/159	2,054/158	4,104/152	11,122/134
<i>D. Bottom income quartile, with controls for household size</i>				
Δ income	0.177*	0.140*	-0.022	-0.072*
	(0.035)	(0.049)	(0.014)	(0.017)
partial R^2 :				
agg. shocks, household size	0.240	0.275	0.260	0.337
income	0.169	0.050	0.000	0.001
Observations/households	210/35	455/35	891/33	2,407/29

- ▶ Participation in the labor force: A 1 standard deviation increase in idiosyncratic income decreases participation by 0.14140841 (was 0.05473126)
- ▶ Hours worked: A 1 standard deviation increase in idiosyncratic income decreases hours by 0.02040001 (was 0.00034717)
- ▶ Some remain vulnerable

Policy Remedy: Offer Insurance but a Caveat

The Obvious Remedy Is Not So Obvious

- Welfare costs of aggregate risk
- Positive numbers mean the household has a welfare loss from aggregate risk and is willing to pay to eliminate risk; negative numbers mean the household has a welfare gain from aggregate risk.
- Even poor households can have high risk tolerance, so get hurt with external insurance



Estimating Financial Regimes: Endogenous vs. Exogenous Obstacles

Table 5 - Model Comparisons^{1,2} using Thai Rural Data - Baseline Vuong Test Results

Comparison	MH v FI	MH v LC	MH v B	MH v S	MH v A	FI v LC	FI v B	FI v S	FI v A	LC v B	LC v S	LC v A	B v S	B v A	S v A	Best Fit
1. Using (k,l,q) data																
1.1 years: 1999-00	MH*	tie	B***	S***	A***	tie	B***	S***	A***	B***	S***	A***	S***	B***	S***	S
1.2 years: 2004-05	FI***	MH***	B***	S***	A***	FI**	B***	S***	A***	B***	S***	A***	tie	B***	S***	B,S
2. Using (c,q) data																
2.1 year: 1999	MH***	MH**	MH**	tie	MH***	FI*	tie	tie	FI***	tie	tie	LC**	S***	B***	S***	MH,S
2.2 year: 2005	tie	MH***	tie	tie	tie	FI***	tie	S***	tie	B**	S***	tie	S**	tie	S***	S,MH
3. Using (c,q,l,k) data																
3.1 years: 1999-00	tie	MH***	B***	S***	A**	FI***	B***	S***	A**	B***	S***	A***	S***	tie	S***	S
3.2 years: 2004-05	FI***	MH***	B***	S***	A***	FI***	B***	S***	A**	B***	S***	A***	S***	tie	S**	S
4. Two-Year Panel																
4.1 (c,q) data, years: 1999 and 00	MH***	MH***	B***	S***	MH**	FI**	B***	S***	tie	B***	S***	tie	tie	B***	S***	S,B
4.2 (c,q) data, years: 1999 and 05	MH***	MH***	tie	tie	MH***	FI***	B***	S***	tie	B***	S***	tie	tie	B***	S***	B,S,MH
5. Dynamics																
5.1 99 k distribution & 04-05 (c,q,l,k)	FI***	MH***	B***	tie	tie	FI***	B***	tie	FI*	B***	S***	A***	B***	B***	S**	B
5.2 99 k distribution & 05 (c,q)	tie	MH***	tie	tie	MH***	FI***	tie	tie	FI***	B***	S***	A***	tie	B***	S***	S,B,FI,MH
5.3 99 k distribution & 04-05 (k,l,q)	FI***	LC***	B***	S**	MH**	tie	B***	S*	FI**	B***	S*	LC**	B***	B***	S***	B

Table 6 - Model Comparisons^{1,2} using Thai Urban Data - Vuong Test Results

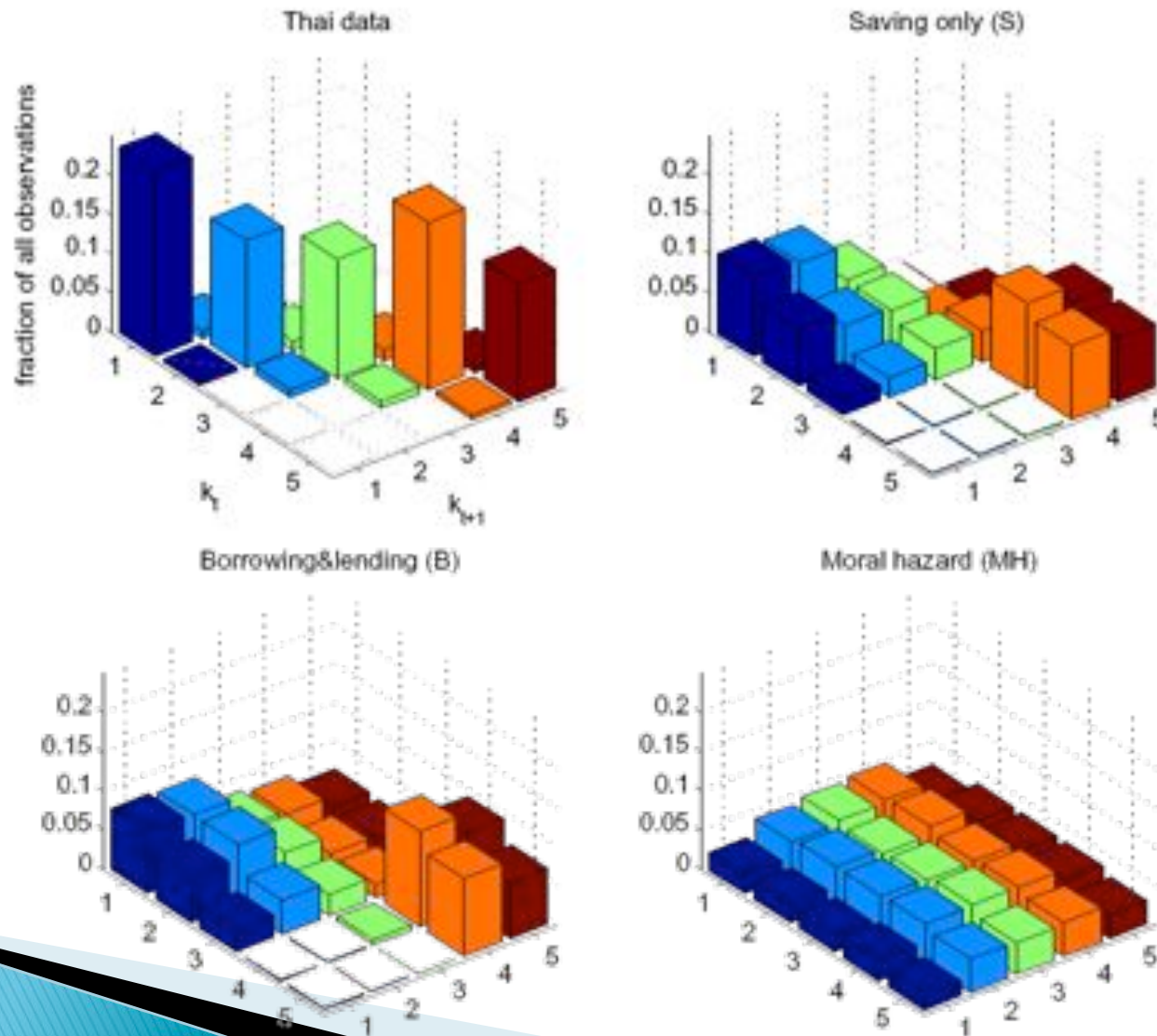
Comparison	MH v FI	MH v LC	MH v B	MH v S	MH v A	FI v LC	FI v B	FI v S	FI v A	LC v B	LC v S	LC v A	B v S	B v A	S v A	Best Fit
1. Using (c,q,l,k) data																
1.1. years: 2005-06	MH***	MH***	MH***	MH***	MH***	FI***	B***	S***	FI*	B***	S***	A***	S***	B***	S***	MH
1.2. years: 2008-09	MH***	MH***	MH***	MH***	MH***	FI***	B***	S***	tie	B***	S***	A***	S***	B***	S***	MH
2. Using (c,q) data																
2.1. year: 2005	tie	MH**	MH***	MH**	MH***	tie	FI***	FI**	FI***	LC***	tie	LC***	S***	B***	S***	MH,FI
2.2. year: 2009	MH*	MH***	tie	MH*	MH***	FI***	tie	tie	FI***	B***	S***	A***	tie	B***	S***	MH,B
3. Using (k,l,q) data																
3.1. years: 2005-06	tie	MH***	tie	S***	tie	FI**	tie	S***	tie	B***	S***	tie	S***	tie	S**	S
3.2. years: 2008-09	FI*	tie	B***	S***	A***	FI**	B***	S***	tie	B***	S***	A**	tie	tie	S*	S,B
4. Two-year panel																
4.1. (c,q) data, years: 2005 and 06	tie	MH***	MH***	tie	MH***	FI***	FI***	tie	FI***	tie	S***	tie	S***	B**	S***	S,MH,FI
4.2. (c,q) data, years: 2005 and 09	MH***	MH***	MH***	MH***	MH***	FI***	FI***	FI***	FI***	LC***	tie	LC***	S***	B***	S***	MH

Notes: 1. *** = 1%, ** = 5%, * = 10% two-sided significance level, the better fitting model abbreviation is displayed; 2. Vuong statistic results: >2.575 = ***, >1.96 = **, >1.645 = *, <1.645 = "tie"

Rural: Things Are Not Fitting It's on the Investment Side of Things

Persistence

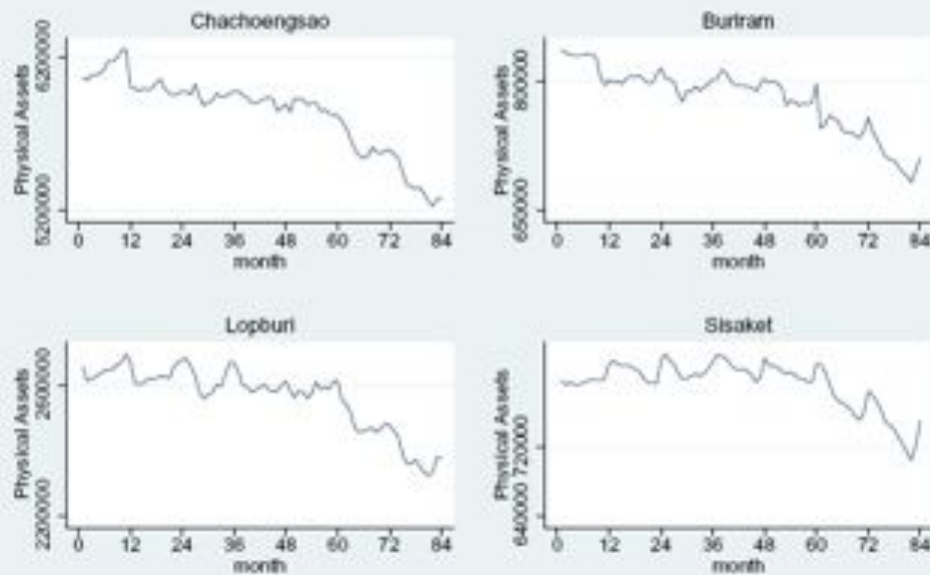
Figure 3: Thai vs. simulated data; business assets transition matrix



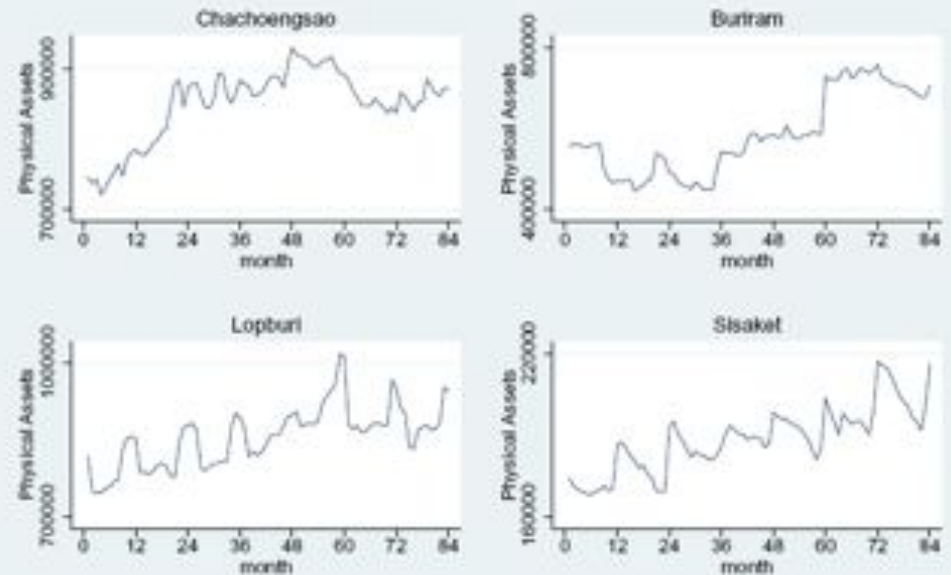
Note: axis labels corresponds to k percentiles; 1 is 10th, 5 is 90th; values larger than 0.005 plotted in color

Self-Investment

Mean Value of Physical Assets
Middle ROA group, different scale



Mean Value of Physical Assets
High ROA group, different scale

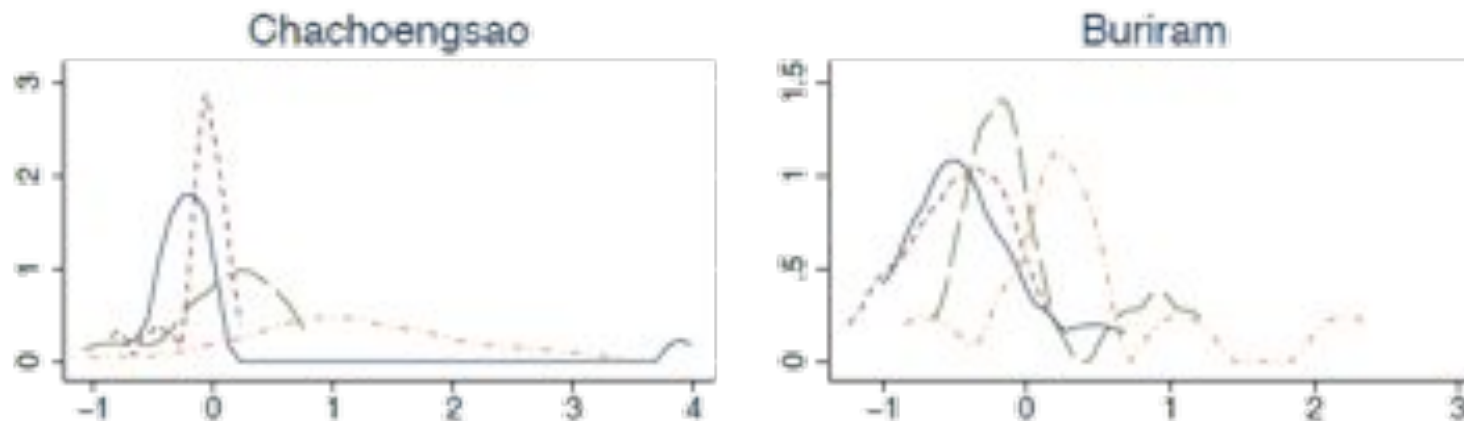


Longer Term Dynamics: Growth of Net Worth

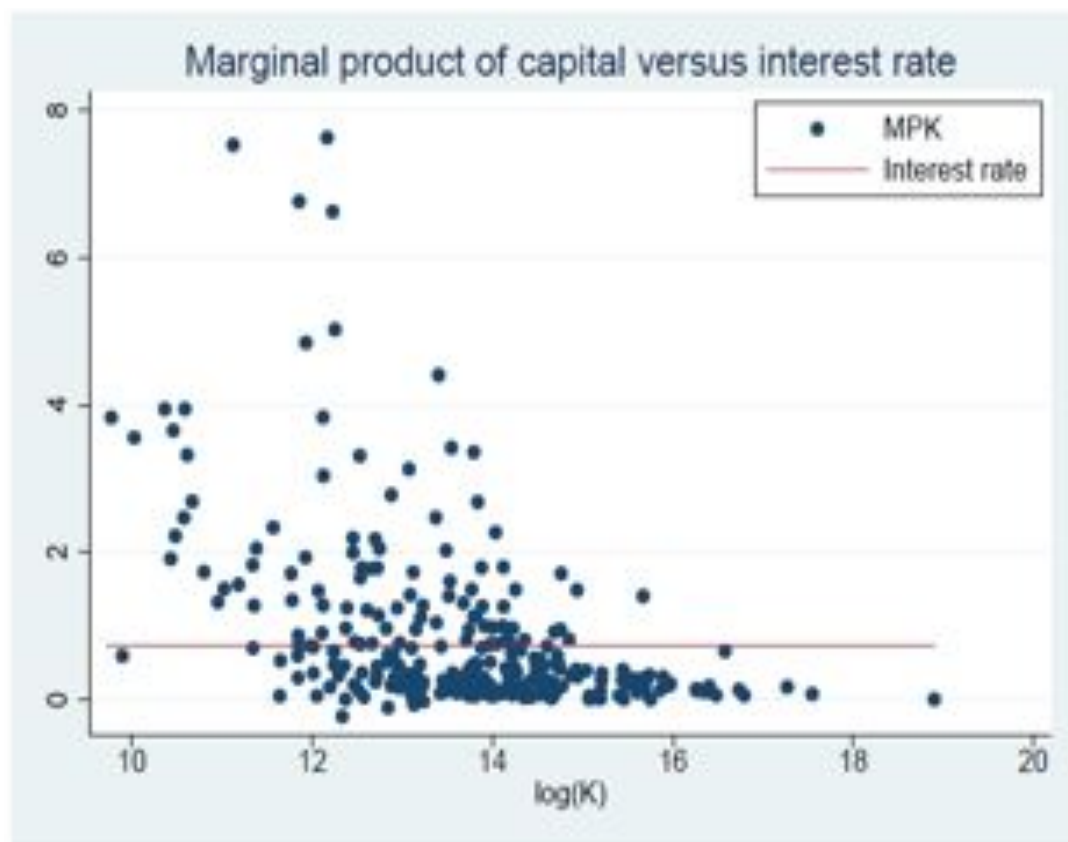
Table 6. Growth of Net Worth by the Initial Wealth Distribution (%)

Initial wealth	1 st quartile	2 nd quartile	3 rd quartile	4 th quartile
Growth of Wealth	21.9735	5.2500	3.1597	0.0984

Density of Growth of Net Worth, by ROA Excluding labor households and outliers



Marginal Product of Capital: But Gains Remain

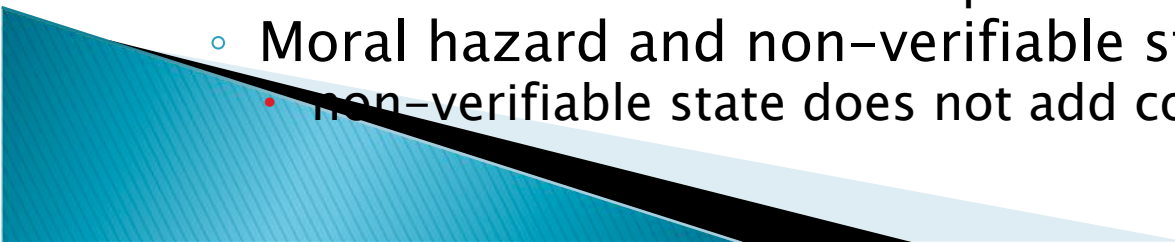


(Pawasutipaisit & Townsend, 2010)

- ▶ Within-network vs out-of-network, some improve
 - Mean ROA of HH with network are higher, and sd is lower relative to those HHs without network
- ▶ Poor investing and saving in own enterprise—long term remedy
- ▶ Note in picture:
 - Matching observed interest rates does not help

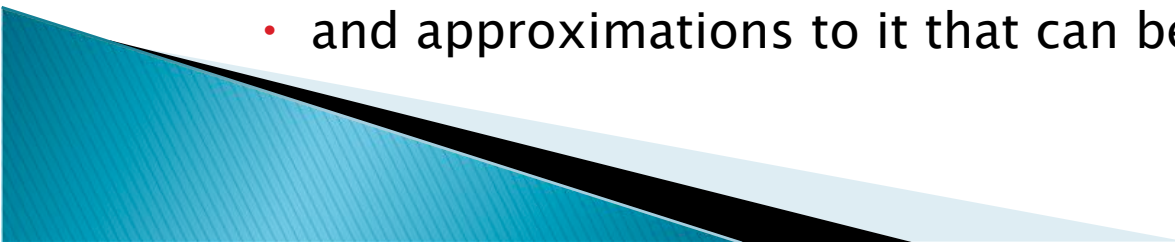
The Theory of Incentives: The Principal-Agent Model (Laffont and Martimort, 2002): Lessons for Interventions?

- ▶ Study mixed models of adverse selection (hidden types) and moral hazard (hidden effort)
- ▶ Very hard to solve analytically and require strong assumptions
- ▶ **Lessons**: depending on setup, allocative efficiency may increase, stay the same or decrease in mixed models relative to simple models
- ▶ They consider three cases:
 - Moral hazard occurs before adverse selection (agent first exerts effort then learns his type)
 - moral hazard exacerbates cost of adverse selection
 - Moral hazard occurs after adverse selection:
 - can reduce cost relative to pure adverse selection
 - Moral hazard and non-verifiable state:
 - non-verifiable state does not add costs)



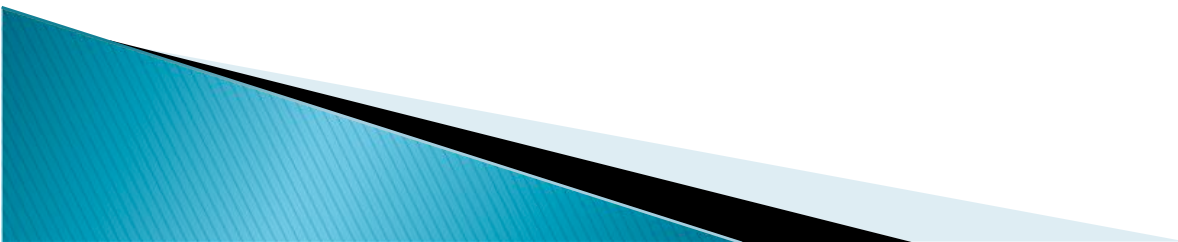
Contract Theory in Credit Contracts

- ▶ Using numerical methods to solve complex problems:
 - Stantcheva and Townsend (2011) extend Laffont and Martimort's original approach
 - adding informational problems in addition to moral hazard and adverse selection
 - limited commitment
 - unobserved investments)
 - Study the problem facing a bank that wants to provide credit to an entrepreneur of unobserved talent
 - Entrepreneur needs to exert effort for project to succeed
 - but can go and borrow secretly from other (informal) agents
 - Once project realized, entrepreneur can run away with the money without repaying
 - Study the optimal contract
 - and approximations to it that can be implemented in practice



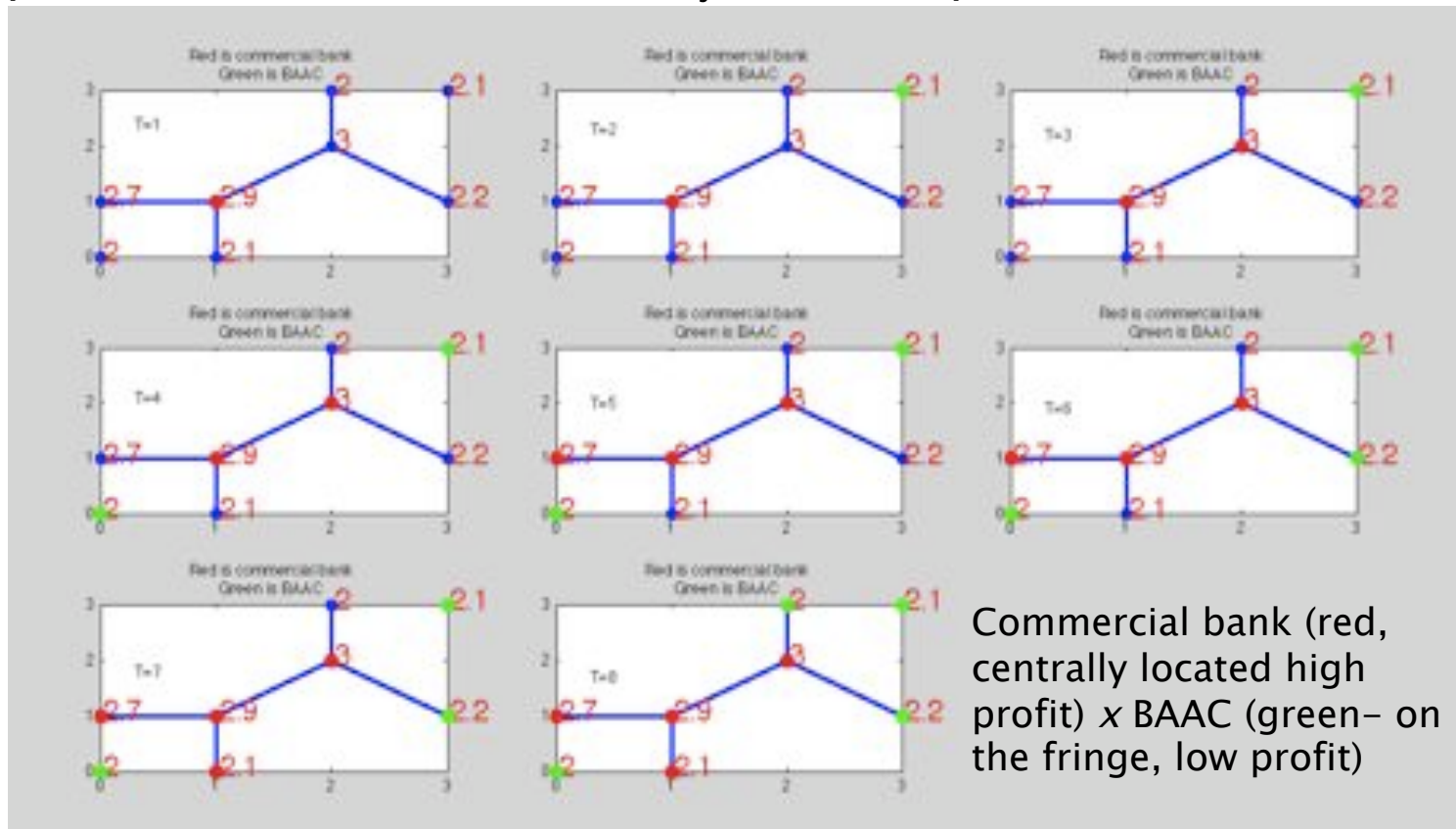
Contract Theory in Credit Contracts (cont.)

- ▶ Implementing the contracts in the developing world:
 - Stantcheva and Townsend now working with bank partners in Thailand to implement and evaluate optimal contracts derived from theory
 - Goal is to offer new credit and insurance instruments
 - will approximate the optimal contracts
 - Evaluate the impact of those new financial products
 - randomized experiments



Thinking Globally: Financial Service Providers and IO & Development

- One Modeling attempt: Bank Ownership and Expansion of the Financial System in Thailand (with Assunção and Mityakov)



- An altruistic government bank playing with a for-profit, commercial bank
- With cross village movement
- Equilibrium is generally not Pareto Optimal

Overall Vision for Regulation and Policy: Optimal Ex Ante Design

Works

- ▶ Infinite Horizon economies
 - Debreu (1954), "Valuation Equilibrium and Pareto Optimum"
 - Jones (1983), "Existence of Equilibria with Infinitely Many Consumers and Infinitely Many Commodities: A Theorem Based on Models of Commodity Differentiation"
- ▶ Private Information
 - Prescott and Townsend (1984), "General Competitive Analysis in an Economy with Private Information"
- ▶ Indivisibilities
 - Rogerson (1988), "Indivisible labor, lotteries and equilibrium"

May Work

- ▶ Externalities and Lindahl Equilibria
- ▶ Private Information:
 - Prescott and Townsend (1984), "Pareto Optima and Competitive Equilibria with Adverse Selection and Moral Hazard"
 - Bisin and Gottardi (2006), "Efficient Competitive Equilibria with Adverse Selection"
- ▶ Collateral Constraints
 - Kilenthong and Townsend "Moral Hazard, Retrading, Externality, and Its Solution"
 - –, "Market Based, Segregated Exchanges in Securities with Default Risk"

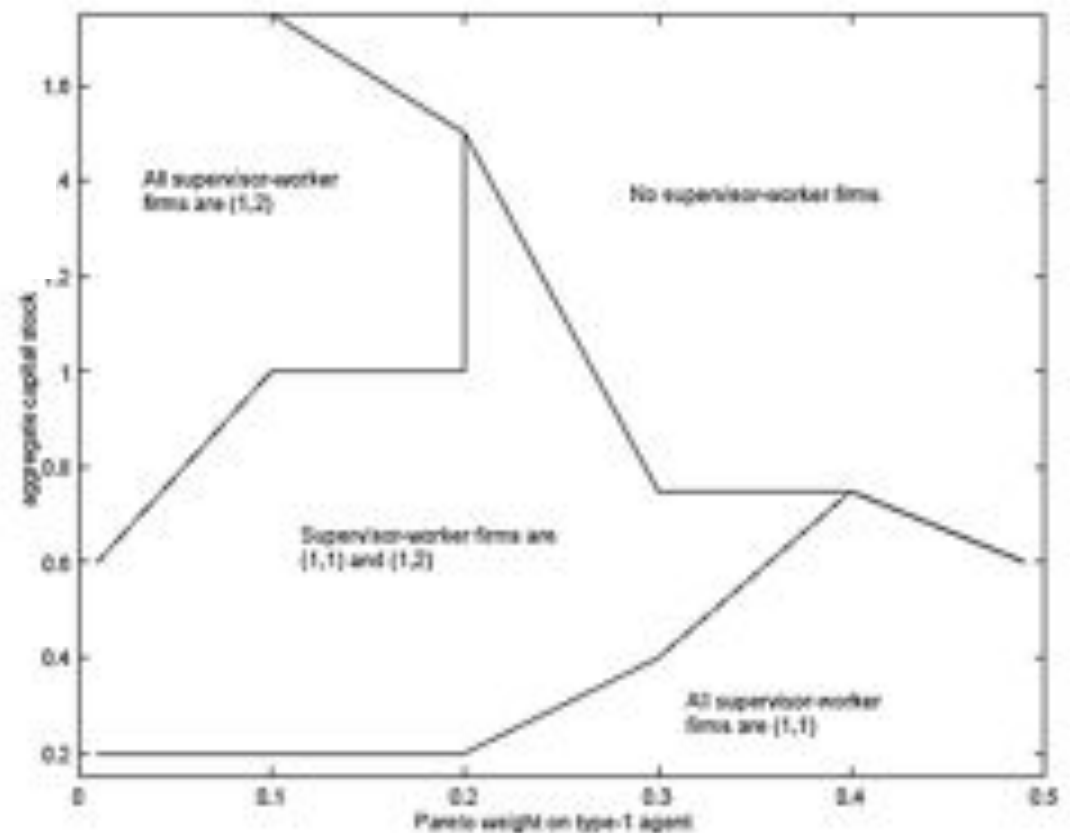
Does not work

- ▶ OLG, at least in general
- ▶ Incomplete markets
- ▶ Monetary economies
 - Manuelli and Sargent (2009), "Alternative Monetary Policies in a turnpike economy"
 - Jack, Suri and Townsend (2010), "Monetary Theory and Electronic Money: Reflections on the Kenyan Experience,"

Cropping Groups Again: Firms as Clubs in Walrasian Markets with Private Information (Prescott and Townsend, 2006)

	Worker	Supervisor
first type of b_2 firm	-0.253	-0.076
second type of b_2 firm	-0.253	0.921

	price
first type of b_1 firm	1.129
second type of b_1 firm	1.295



Optimality of Segregated Markets: Competitive Equilibrium with Price-Islands When There Is Moral Hazard and Ex Post Trade

	traded contracts by ex post types					
	in island $p(z) = 0.3175$			in island $p(z) = 0.4250$		
a	1.0000	1.0000	3.0000	1.0000	1.0000	3.0000
c_1	0.2527	0.2527	0.7842	0.2671	0.2671	0.6791
c_2	0.4486	0.4486	0.4639	0.4096	0.4098	0.3472
q_1	0.1000	1.0000	1.0000	0.1000	1.0000	0.1000
q_2	0.1000	1.0000	1.0000	0.1000	1.0000	0.1000
$p(z)$	0.3175	0.3175	0.3175	0.4250	0.4250	0.4250
$P(a, c, q, z)$	4.1136	-14.5204	-6.0245	4.1954	-14.6733	10.4656
$x(a, c, q, z)$	0.5726	0.0135	0.3683	0.0193	0.0166	0.0154

- ▶ Cost of Segregation: limits insurance transfers across islands. This cost **increases with risk aversion**. That's why there are only two islands.
- ▶ Benefit of Segregation: relaxes the IC constraint.
- ▶ MRS – (ex-post) marginal rate of substitution.
- ▶ $P(a, c, q, z)$ – (ex-ante) price of contract (a, c, q, z) .
- ▶ We grid up the market fundamentals into $p(z) = \{0.2675, 0.3175, 0.3675, 0.375, 0.425, 0.475, 49.5, 50, 50.5\}$. Those few large numbers are included to ensure that the solution will not be stuck at the corner of the grids.

A Broader Question: Can Optimal Contracts be Implemented in Developing Countries?

The Challenges that Laffont Was Predicting

- ▶ *Regulation and Development* (Laffont, 2005)
 - The Townsend Thai project and its associated research point to potential improvements in the financial and economic landscape of developing countries
 - Several ongoing interventions aim at applying lessons learned from theory to practice
 - Yet, obstacles specific to developing countries exist and slow or inhibit the optimal contracts from being implemented
 - Corruption and rent-seeking
 - Interest groups
 - Limited financial access
 - More pronounced informational problems

