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Building from Below: Identifying Real Obstacles

(Lecture 6)

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Lecture 6: Building from Below: Identifying Real Underlying Obstacles (3/12)

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Using Repayment Data To Test Across Theories of Joint Liability Lending

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Objectives

- Main Objectives:
  - Develop *repayment predictions* of four models of joint liability lending, which take different stands on obstacles to trade
  - Use Thai BAAC group data to check which predictions, and models, are supported
- Secondary Objective: What ingredients are important for good repayment rates?

Theories of JL contracts

- Moral Hazard – lender cannot contract on (unobservable) project choice, but borrowers do observe

  Ex. Stiglitz, 1990
  Group = two symmetric borrowers who can costlessly enforce joint decisions

  Ex. Banerjee, Besley, & Guinnane, 1994
  Group = one borrower, one jointly liable monitor engaging in costly monitoring

- Strategic Default/Limited Enforcement – lender cannot fully enforce repayment after project returns are realized

  Ex. Besley & Coate, 1995

  Two symmetric borrowers play repayment game after returns are realized

- Adverse Selection – lender cannot observe risk of the borrower; borrowers can

  Ex. Ghatak, 1999

  Agents of heterogeneous risk-types choose whom to group with and whether to borrow

II) Use models' predictions regarding the repayment rate to distinguish them

In this paper, we take as given group lending is occurring (except in Ghatak) and look at what determines repayment, theoretically and empirically

Theoretical Approach

Each model delivers a function p(X)

p probability of group repayment

X vector of $-M-$ group, contract, and environment characteristics

We sign derivatives $\partial p/\partial X_m$ in the four models

Covariance Restrictions

- Ahlin and Townsend (2007) "Using Repayment Data to Test across Models of Joint Liability Lending"

Theories rationalising joint liability lending are rich in implications for repayment rates. We exploit this fact to test four diverse models. We show that the models' repayment implications do not always coincide. For example, higher correlation of output and borrowers' ability to act cooperatively can raise or lower repayment, depending on the model. Data from Thai borrowing groups suggest that repayment is affected negatively by the joint liability rate (*ceteris paribus*) and social ties, and positively by the strength of local sanctions and correlated returns. Further, the relative fit of the adverse selection versus informal sanctions models varies by region.

Table 1

Repayment Implications

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

	Effect on Repayment			
Variable	Stiglitz	BBG	BC	Ghatak
liability payment q	$\downarrow^{a}$	$\uparrow$		$\downarrow$
positive correlation	$\uparrow^{\ddagger b}$		$\downarrow^{\ddagger b}$	$\uparrow^{\ddagger b}$
cooperative behavior	$\uparrow^{\ddagger}$	$\downarrow^{\ddagger c}$	$\downarrow^{\ddagger d}$	
cost of monitoring		$\downarrow$		
official penalties			$\uparrow$	
unofficial penalties			$\uparrow$	
screening				$\uparrow$
productivity H	$\uparrow^{\ddagger}$	$\uparrow^{\ddagger}$	$\uparrow^{\ddagger}$	$\uparrow^{\ddagger}$
interest rate r	$\downarrow$	$\downarrow$	$\downarrow$	$\downarrow$
loan size L	$\downarrow$	$\downarrow^{\ddagger}$		$\nearrow\searrow^{\ddagger}$

Paulson, Townsend & Kariavanov, JPE 2006

- Financial market imperfections shape economic outcomes in many areas
- Many papers posit a particular financial market imperfection and exclude the possibility of alternative sources of imperfections
- **Goal Here**: identify the source of financial constraints that limit entry into entrepreneurship
- Use structural, nonparametric, and reduced-form techniques to distinguish the source of financial market imperfections using microeconomic data from Thailand.
- The literature identifies two main sources of financial constraints that influence the decision to become an entrepreneur.
- In Evans and Jovanovic (1989), the financial constraint is due to limited liability. Agents can supplement their personal stake in entrepreneurial activities by borrowing. Wealth plays the role of collateral and limits default.

- Low-wealth households may be prevented from borrowing enough to become entrepreneurs, and others that are able to start businesses may be constrained in investment.
- In a limited-liability environment, constrained entrepreneurs borrow more when wealth increases.
- With limited liability, borrowing does not automatically imply being constrained. Some entrepreneurs may be able to borrow enough to invest the optimal amount of capital, as though there were no constraints.
- Financial constraints that arise from moral hazard are the focus of the model of occupational choice featured in Aghion and Bolton (1997).
- Since entrepreneurial effort is unobserved and repayment is feasible only if a project is successful, poor borrowers have little incentive to be diligent, increasing the likelihood of project failure and default.

- In order to break even, lenders charge higher interest rates to low-wealth borrowers.
- Some low-wealth potential entrepreneurs will be unable, or unwilling at such high interest rates, to start businesses at any scale.
- Low-wealth entrepreneurs who do succeed in getting loans will be subject to a binding incentive compatibility constraint that ensures that they exert the appropriate level of effort.
- In contrast to the limited-liability case, when there is moral hazard and wealth increases, constrained entrepreneurs will increasingly self-finance and borrowing diminishes.
- In a moral hazard environment, all entrepreneurs who borrow will be constrained.

- **Goal**: Is to see whether limited liability can be distinguished from moral hazard in structural estimates using cross-sectional data from a sample of households from Thailand
- Also consider the possibility that both are important
- The estimated models share a common technology, as well as common preferences and assumptions about the distribution of talent. They differ only in the assumed financial constraint.
- The appropriate Vuong (1989) test is used to compare the structural estimates and to determine which single financial constraint is most consistent with the data on entrepreneurial status, initial wealth, and education or if both are important.

- The Thai data come from a socioeconomic survey that was fielded in March–May of 1997 to 2,880 households, approximately 21 percent of which run their own businesses.
- The sample focuses on households living in two distinct regions of the country: rural and semiurban households living in the central region, close to Bangkok, and more obviously rural households living in the semiarid and much poorer northeastern region.
- The data include current and retrospective information on wealth (household, agricultural, business, and financial), occupational history (transitions to and from farm work, wage work, and entrepreneurship)
- **The Conclusion**: The evidence in favor of moral hazard is particularly strong for the wealthier central region. For the poorer northeastern region, we cannot rule out that limited liability may have a role to play, but only in combination with moral hazard.

Model and Implications: Economic Environment

- Households are assumed to derive utility, U, from their own consumption, c, and disutility from effort, z:

$$U(c,z) = \frac{c^{1-\gamma_1}}{1-\gamma_1} - \kappa \frac{z^{\gamma_2}}{\gamma_2} \tag{1}$$

- We assume that utility displays constant relative risk aversion in consumption. The parameter $\gamma_1 \geq 0$ determines the degree of risk aversion. The parameters $\kappa > 0$ and $\gamma_2 \geq 1$ determine the loss in utility from expending effort.
- Consumption, c, and effort, z, must be nonnegative. In discussing the implications of the model, we begin by assuming that agents are risk neutral, in other words, that $\gamma_1 = 0$
- Reintroduce risk aversion in the presentation of the linear programming problem that forms the basis for the structural estimation.

- Three sources of household heterogeneity in the model: initial wealth, A, entrepreneurial talent, θ, and years of education, S.
- All these variables are determined ex ante and can be observed by all the agents in the model.
- Wealth is normalized to lie in the interval $(0, 1]$.
- Talent is lognormally distributed. Specifically,

$$\ln \theta = \delta_0 + \delta_1 \ln(A) + \delta_2 \ln(1 + S) + \eta \tag{2}$$

- where η is normally distributed with mean zero and variance $\sigma_\eta^2 = 1$. In order to avoid the spurious inference that wealth rather than talent is the source of constraints, an individual's expected talent can be correlated with wealth through δ_1. Talent may also be correlated with formal education via δ_2

- Entrepreneurs produce output q from their own effort z and from capital k.
- Output q can take on two values, namely, $q = \theta$, which corresponds to success and occurs with positive probability, and $q = 0$, which is equivalent to bankruptcy and occurs with the remaining prob ability.
- Note that output is increasing in entrepreneurial talent, θ. The technology is stochastic and is written $P(q = \theta | z, k > 0)$, the probability of achieving output q given effort z and capital k.

$$P(q = \theta \mid z, k > 0) = \frac{k^{\alpha} z^{1-\alpha}}{1 + k^{\alpha} z^{1-\alpha}} \tag{3}$$

- Output can be costlessly observed by everyone.
- When $k = 0$, the firm is not capitalized. This means that the household works in the wage sector.

- Earnings, w, in the wage sector are also stochastic and depend on effort. They are equal to one with probability $z/(1+z)$ and equal to zero with the residual probability.
- All households are price takers and take as given the gross cost of borrowing, $r(A, \theta)$, which may vary with wealth and entrepreneurial talent.
- Entrepreneurs who do not borrow (who have $k < A$) and wage workers earn the given, riskless gross interest rate, r, on their net savings.
- Occupational assignments are determined by a social planner who maximizes agents' utility subject to constraints that describe the financial intermediary and any financial market imperfections.
- Equivalent to a situation in which a large number of financial institutions compete to attract clients so that in the end it is as though the agents in the economy maximize their utility subject to the financial institution earning zero profits, and subject, of course, to constraints having to do with financial market imperfections.
- For simplicity, assume intermediations are risk neutral and care only about expected profits

- In sum, when agents are risk neutral, the planner makes an effort recommendation, z, and a capital recommendation, k to solve

$$\max_{z} \left\{ w\frac{z}{1+z} - \kappa\frac{z^{\gamma_2}}{\gamma_2} + rA \right\} \text{ if } k = 0,$$
$$\max_{z} \left\{ \theta\frac{k^{\alpha}z^{1-\alpha}}{1+k^{\alpha}z^{1-\alpha}} - \kappa\frac{z^{\gamma_2}}{\gamma_2} + r(A-k) \right\} \text{ if } k > 0, k \leq A,$$
$$\max_{z} \left\{ \theta\frac{k^{\alpha}z^{1-\alpha}}{1+k^{\alpha}z^{1-\alpha}} - \kappa\frac{z^{\gamma_2}}{\gamma_2} + r(A,\theta)(A-k)\frac{k^{\alpha}z^{1-\alpha}}{1+k^{\alpha}z^{1-\alpha}} \right\} \text{ if } k > A \quad (4)$$

- Agents have three possibilities: (1) working for wages, which corresponds to $k = 0$; (2) becoming an entrepreneur but not borrowing, which happens when capital is positive and less than or equal to wealth, $k > 0$ and $k \leq A$; or (3) becoming an entrepreneur and borrowing, which happens when capital is positive and exceeds wealth, $k > 0$, $k > A$.

- The planner's problem is subject to a constraint that guarantees that the expected rate of repayment on such loans covers the cost of outside funds, so that lenders break even:

$$r(A,\theta)\frac{k^{\alpha}z^{1-\alpha}}{1+k^{\alpha}z^{1-\alpha}} = r \text{ for } k > A, \forall\theta, \forall A \tag{5}$$

- NOTE: This contracting problem is in partial equilibrium, in that the wage w and interest rate r are fixed from the outside and taken as given here

Financial Environment

- When financial markets are "first-best" and are subject to neither limited liability nor moral hazard, no further constraints are imposed.
- **Limited liability**— households can borrow up to some fixed multiple of their total wealth, but no more.
- The maximum amount that can be invested in a firm is equal to λA, and the maximum amount that a household can borrow is investment minus wealth, or given by $(\lambda - 1)A$, that $k - A = \lambda A - A = (\lambda - 1)A$.
- When limited liability is a concern, the planner's maximization problem will be subject to

$$k \leq \lambda A \tag{6}$$

- in addition to equation (5).

- **Moral hazard**.—When there is moral hazard, entrepreneurial effort is unobservable and the financial contract cannot specify an agent's effort.
- In terms of the planner's problem, this translates into a requirement that the capital assignment and the interest rate schedule are compatible with the effort choice that a borrowing entrepreneur would have made on his or her own.
- In other words, the capital assignment and the interest rate schedule must not violate the first-order condition with respect to effort of the entrepreneur's own maximization problem.

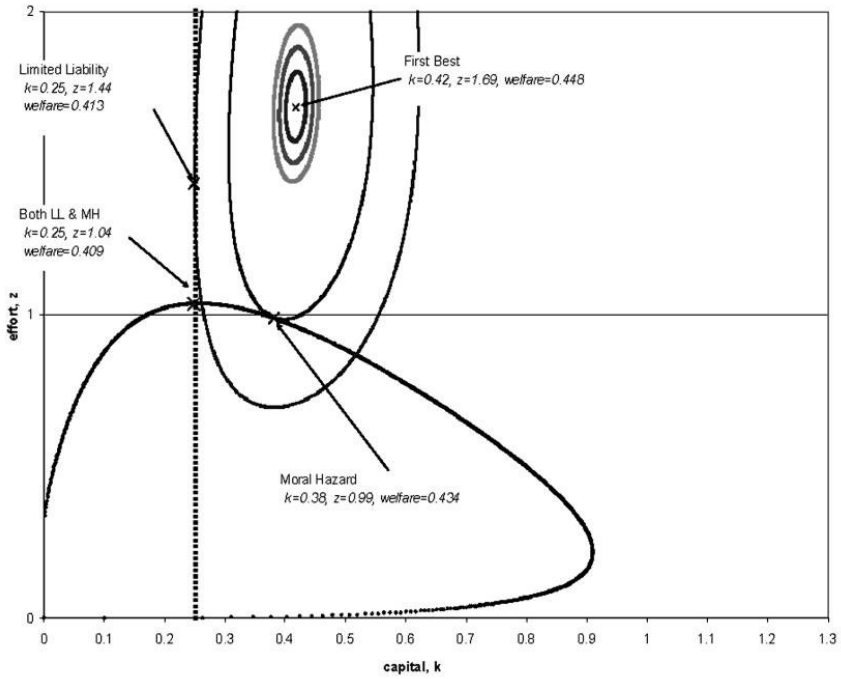
$$[\theta - r(A,\theta)(k-a)]\left[\frac{(1-\alpha)k^{\alpha}z^{-\alpha}}{(1+k^{\alpha}z^{1-\alpha})^2}\right] - kz^{\gamma_2 - 1} = 0 \tag{7}$$

- which is an entrepreneurial household's first-order condition for effort, z, for a given interest rate schedule and capital, k.
- Differentiate equation (4) with respect to z

- Equation (7) requires that the planner's effort recommendation equate the marginal benefit of effort with the marginal cost of effort plus a term that represents the marginal impact of effort on loan repayment, through the effect of effort on the probability that an entrepreneurial project will be successful: $k^{\alpha} z^{1-\alpha}/(1+k^{\alpha} z^{1-\alpha})$.
- Note that when agents are risk neutral, moral hazard is an issue only for entrepreneurs who borrow.
- The lack of observability of effort is assumed not an issue for wage workers and also entrepreneurs who self-finance. The planner can assign effort to them, the latter without having to satisfy the incentive compatibility constraint, equation (7), because there is no moral hazard problem when the optimal capital investment does not require borrowing.
- **Moral hazard and limited liability**.— the possibility that credit markets are characterized by both moral hazard and limited liability.
- Modeled by assuming that the entrepreneurial choice problem is subject to both equation (6) and equation (7) in addition to equation (5).

Characterization of Solutions

- Risk-neutral case.—Figure 2



- Fig. 2.—Assignments of capital (k) and effort (z) for the entrepreneurs in the risk-neutral model: moral hazard, limited liability, and both moral hazard and limited liability assumptions: $\theta = 2.56$, $A = 0.10$, $\alpha = 0.78$, $\kappa = 0.08$, $\gamma_2 = 1.00$, $r = 1.10$, and $\lambda = 2.50$.

Regional Findings

- The results for the central region favor moral hazard and are very similar to the results for the whole sample.
- The likelihood of being a borrower is predicted to be 13 percentage points higher among constrained business households in the central region
- 1,000,000-baht increase in wealth is predicted to increase net savings by 48,000 baht in the central region, which we would expect if moral hazard were a concern.
- Being constrained has no statistically significant effect on the likelihood of borrowing for businesses in the Northeast. When financial markets are characterized by limited liability, the probability of borrowing should not be so related to wealth, which is consistent with the findings for the Northeast.

Karaivanov and Townsend, 2014

- how good an approximation are the various models of financial markets access and constraints across the different literatures?

- what would be a reasonable assumption for the financial regime if it were taken to the data as well?
  - many ways in which markets can be incomplete
  - financial constraints affect investment and consumption jointly (no separation with incomplete markets)
  - it matters *what* the exact source and nature of the constraints are
  - can we distinguish and based on what and how much data?

What we do

- formulate and solve a wide range of *dynamic* models/regimes of financial markets sharing common preferences and technology
  - **exogenously incomplete** markets regimes – financial constraints assumed / exogenously given (autarky, A; saving only, S; borrowing or lending in a single risk-free asset, B)
  - **mechanism-design** (endogenously incomplete markets) regimes – financial constraints arise endogenously due to asymmetric information (moral hazard, MH; limited commitment, LC; hidden output; unobserved investment)
  - complete markets (full information, FI)

Mechanism design models (FI, MH, LC)

- allow state- and history-contingent transfers, τ

- dynamic optimal contracting problem between a risk-neutral lender and the household

$$V(w,k) = \max_{\{\pi(\tau,q,z,k',w'|k,w)\}} \sum_{T\times Q\times Z\times K'\times W'} \pi(\tau,q,z,k',w'|k,w)[q-\tau+(1/R)V(w',k')]$$

s.t. *promise-keeping:*

$$\sum_{T\times Q\times Z\times K'\times W'} \pi(\tau,q,z,k',w'|k,w)[U(\tau+(1-\delta)k-k',z)+\beta w'] = w,$$

and s.t. Bayes-rule consistency, adding-up, and non-negativity as before.

Moral hazard

- additional constraints – *incentive-compatibility*, $\forall(\bar{z}, \hat{z}) \in Z \times Z$

$$\sum_{T \times Q \times K' \times W'} \pi(\tau, q, \bar{z}, k', w' | k, w)[U(\tau + (1-\delta)k - k', \bar{z}) + \beta w'] \geq$$

$$\geq \sum_{T \times Q \times K' \times W'} \pi(\tau, q, \bar{z}, k', w' | k, w) \frac{P(q|\hat{z}, k)}{P(q|\bar{z}, k)} [U(\tau + (1-\delta)k - k', \hat{z}) + \beta w']$$

- we also compute a moral hazard model with unobserved k and k' (UI) – adds dynamic adverse selection as source of financial constraints

Application to Thai data

- Townsend Thai Surveys (16 villages in four provinces, Northeast and Central regions)
  - balanced panel of 531 rural households observed 1999-2005 (seven years of data)
  - balanced panel of 475 urban households observed 2005-2009

- data series used in estimation and testing
  - **consumption expenditure** (c) – household-level, includes owner-produced consumption (fish, rice, etc.)
  - **assets** (k) – used in production; include business and farm equipment, exclude livestock and household durables
  - **income** (q) – measured on accrual basis (Samphantharak and Townsend, 09)
  - **investment** (i) – constructed from assets data, $i \equiv k' - (1-\delta)k$

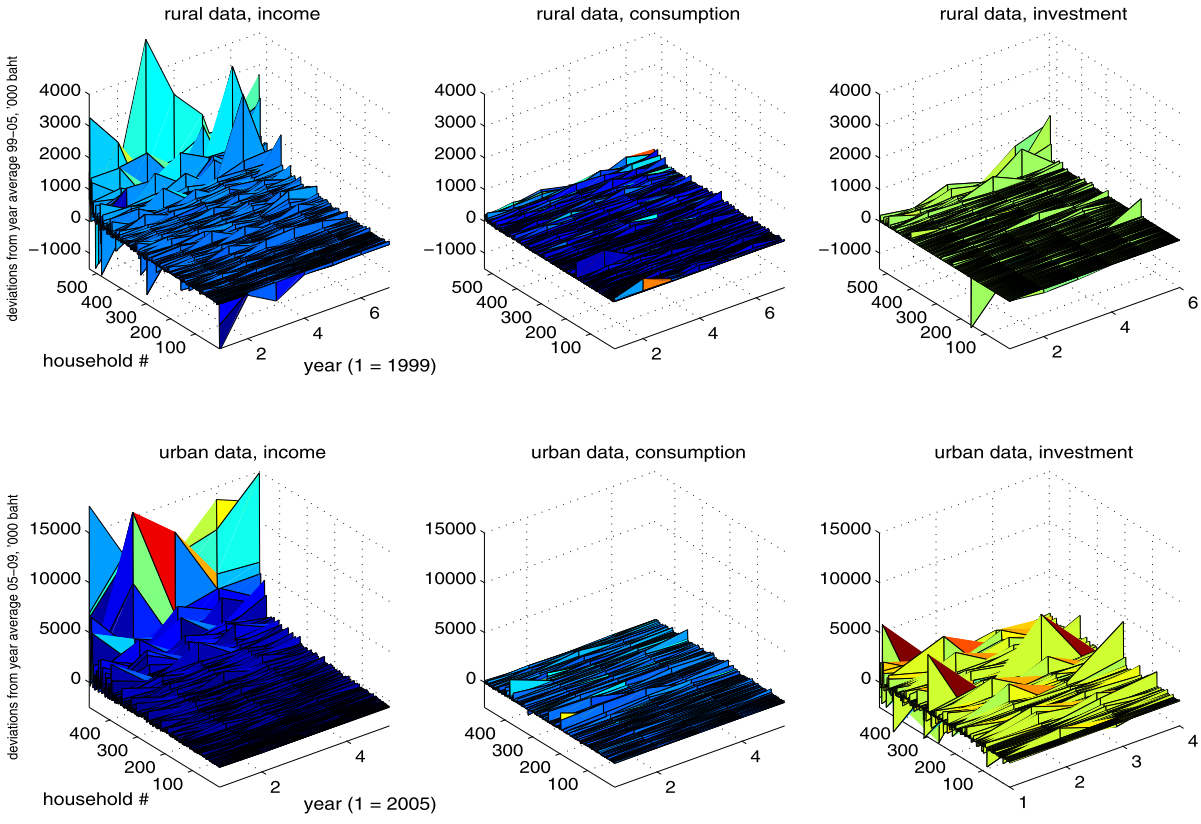


FIGURE 1.—Thai data—income, consumption, and investment comovement. Each panel displays differences from year averages of income, consumption, or investment for each household and year in the Thai rural or urban data. Households are ordered by increasing income in the first sample year.

Thai data – rural sample

Urban sample in addition to rural

- **investment side**: the exogenously incomplete markets regimes (B and S, with ties) fit best (k, i, q) and (c, q, i, k) data
  - consistent with other evidence for imperfect risk-sharing and investment sensitivity to cash flow
- **consumption side**: moral hazard (with ties) best fitting with consumption/income $(c, q$ and c time series) data alone
- using joint consumption, income and investment (c, q, i, k) data pins down the best fitting regime more sharply than consumption/income or investment/income data alone
- autarky (A) is rejected with all types of data

Moral hazard fits best in urban

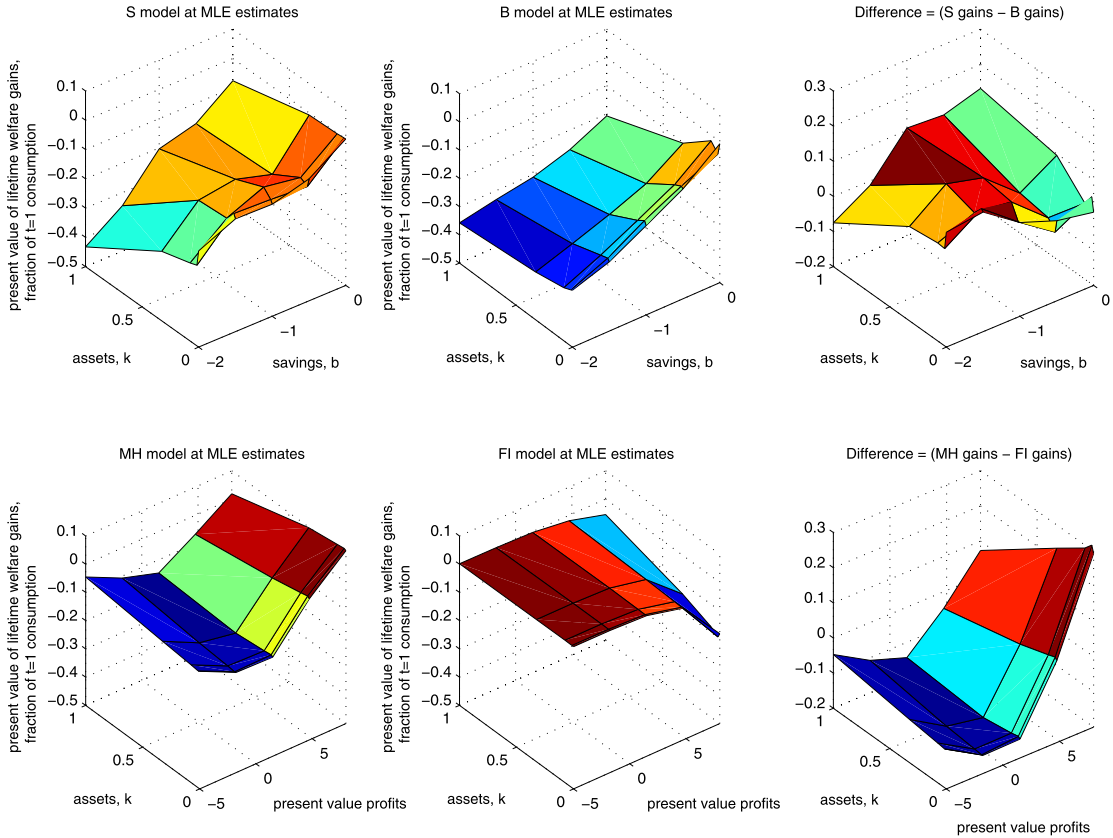


FIGURE 7.—Policy experiment—reduction in the gross interest rate R from 1.05 to 1.025. Data simulated from the S, B, MH, and FI models are at the MLE estimates from run 3.1 in Table V with 1999 (c, q, i, k) data.

Dynamic Model of CSV

- We also impose the truth telling constraint to make sure that it is optimal for agent 2 to tell the truth.

the truth telling constraint, $\forall(\bar{z}, \bar{q}, \hat{q} \neq \bar{q} \in Z \times Q \times Q)$

$$\sum_{\tau,k',w'} \pi(\tau, \bar{q}, \bar{z}, k', w', d = 0|k, w)[U(\bar{q} + \tau + (1-\delta)k - k', \bar{z}) + \beta w'] +$$
$$\sum_{\tau,k',w'} \pi(\tau, \bar{q}, \bar{z}, k', w', d = 1|k, w)[U(\bar{q} + \tau + (1-\delta)k - k' - \kappa, \bar{z}) + \beta w'] \geq$$
$$\sum_{\tau,k',w'} \pi(\tau, \hat{q}, \bar{z}, k', w', d = 1|k, w)[U(0, \bar{z}) + \beta\Omega(k)] +$$
$$\sum_{\tau,k',w'} \pi(\tau, \hat{q}, \bar{z}, k', w', d = 0|k, w)[U(\bar{q} + \tau + (1-\delta)k - k', \bar{z}) + \beta w']$$

Compare four financial regimes

- Build the structural model of four financial regimes: savings only, saving/borrowing, moral hazard, and costly state verification.
- We estimate 6 parameters: Υme, $б$, θ, μw, γw , κ. Υme is for the measurement error(S.E.), μw, γw are the distribution parameters for ω (mean and S.D. of initial distribution of unobserved heterogeneity in ω). κ is the verification cost.
- Use Townsend Thai monthly survey data from 1998 to 2011 in 16 villages from 4 provinces in rural Thailand. Estimate the four regimes respectively and use Voung test to compare them.
- For 25% poorest households, costly state verification regime has the best fitting from 2002 to 2011, following Thai village fund program in 2001)

The financial regimes (CSV vs. others) for poor households

- For bottom 25% households, CSV dominates others after the village fund in 2011

Table 2: Comparison among four financial regimes on the poorest 25% households

Panel A: 1999 to 2001

	stde	sigma	theta	mu	gamma	κ	MLE
MH	0.1952	0.3123	4.9461	0.5041	0.0100		-6.5126
S*	0.1204	1.2295	2.0000	0.0005	0.6020		-6.3185
LB*	0.1203	1.3862	2.0376	0.0019	0.6377		-6.3223
CSV	0.298652	2.860451	0.057812	0.80014	0	0.31532	-7.5245

Vuong test	CSV vs. B	Z-Stats	Prob
		16.608	0.000

Panel B: 2002 to 2011

	stde	sigma	theta	mu	gamma	κ	MLE
MH	0.2532	0.0145	0.5967	0.3484	0.0463		-6.7557
S	0.1543	1.0757	2.1138	0.0280	0.9983		-6.4317
LB	0.1539	1.2607	2.1716	0.0002	0.9995		-6.4117
CSV*	0.104324	0.147309	0.122625	0.152894	0.141101	0.172141	-6.2859

Vuong test	CSV vs. B	Z-Stats	Prob
		-4.8564	0.000

Enhanced Informal Network

- First, we use variance-covariance decomposition to study the funding sources for household deficits.
  - Gifts play an important role to finance investments. DID analysis shows that this role of gifts is more pronounced after the village fund in 2001.
  - Suggestive evidence shows that gifts are exchanged via kinship networks to finance household deficits. DID analysis shows that this role of kinship networks are enhanced after the village fund in 2001.
- Second, in CSV model, we find that the verification costs κ are significantly smaller for the households with kinship in the village. DID analysis shows that kinships are associated with significantly lower verification costs after the village fund in 2001.

The role of gift in financing investment (before and after the village fund)

Table 3: Variance Covariance Decomposition Analysis (Before and After the 2001 Village Fund)

Panel A: 1999 to 2001

	D=C+I-Y				D=C-Y		
	1st	2nd	3rd		1st	2nd	3rd
deposit	-0.0824861	0	0.3460481	deposit	-0.2239297	0	0.1194653
ROSCA	0	0	0	ROSCA	0	0	0
lending	0	0	0	lending	0	0	0
borrowing	-0.0182476	1.49785	12.54511	borrowing	-1.692076	0.8869588	7.66296
Gift	0.0767256	4.599061	43.41077	Gift	-0.8509698	3.180128	22.88811
Cash	42.16074	78.86375	97.44578	Cash	47.69524	75.68092	98.41447
Median Diff	1.418933						
Z-stats	0.4675	P-Value	0.494				

Panel B: 2002 to 2011

	D=C+I-Y				D=C-Y		
	1st	2nd	3rd		1st	2nd	3rd
deposit	-0.0646792	0.0480596	2.042943	deposit	-0.2285238	0.0138236	0.9103131
ROSCA	0	0	0	ROSCA	0	0	0
lending	0	0	0	lending	0	0	0
borrowing	-0.0832301	0.5687587	4.927176	borrowing	-0.4819735	0.0329142	3.624415
Gift	3.450514	16.63977	41.65852	Gift	1.475973	9.763637	32.68346
Cash	39.51367	70.35097	91.80312	Cash	34.48471	68.08108	91.89435
Median Diff	6.876133						
Z-stats	3.3247	P-Value	0.068				

DID: Median Diff (Investment- w/o Investment) 02-11 - Median Diff (Investment- w/o Investment) 99-01

Median DID	5.4572		
Z-stats	7.4805	P-Value	0.006

The verification costs and kinship network

- The verification costs are significantly lower when the households are connected to the kinship network, especially after the village fund.

Table 5: Informal Kinship Networks and Verification Costs

Panel A: 1999 to 2001

	Kappa	stde	sigma	theta	mu	gamma	MLE
KIN 0 (no relatives)	0.014080	0.225946	0.0039715	0.273718	0.796307	0.023710	7.8443
S.E.	0.002150	0.002574	0.001128	0.003632	0.007326	0.010400	
KIN 1-10	0.004353	0.121607	0.0421057	0.140673	0.290268	0.227749	5.9729
S.E.	0.000369	0.000166	8.363E-05	3.88E-05	0.000423	0.000418	
Kappa (Kin 0 - Kin 1-10)	Diff	SE	T-stats				
	0.009727	0.002177	4.4690499				

Panel B: 2002 to 2011

	Kappa	stde	sigma	theta	mu	gamma	MLE
KIN 0 (no relatives)	0.336663	0.296589	0.114849	0.159671	0.338498	0.047381	7.9868
S.E.	0.003658	0.01096	0.0004186	0.003255	0.028069	0.017703	
KIN 1-10	0.014003	0.198384	0.0111501	0.192743	0.229734	0.098548	6.4459
S.E.	0.041371	0.036364	0.044039	0.021714	0.036892	0.033547	
Kappa (Kin 0 - Kin 1-10)	Diff	SE	T-stats				
	0.32266	0.005362	60.176432				

DID: Mean Diff (Kin 0 - Kin 1-10) in 02-11 - Mean Diff (Kin 0 - Kin 1-10) in 99-01

Mean DID	0.312933		
T-stats	48.58	P-Value	0.00

The verification costs and financial network

- The verification costs are significantly lower when the households are connected to the financial network (via kinship), especially after the village fund.

Table 6: Informal Kinship Networks to Village Fund Borrowers and Verification Costs

Panel A: 1999 to 2001

	Kappa	stde	sigma	theta	mu	gamma	MLE
HH with No Kin to Village Fund Borrowers	0.0106	0.2736	0.0025	0.2206	0.8207	0.0071	8.3660
SE	3.6448E-05	0.00079569	4.2602E-06	0.00409522	0.01241136	0.00097369	
HH with Kin to Village Fund Borrowers	0.1646	0.2054	0.0936	0.1634	0.2000	0.0106	6.3403
SE	0.00052602	3.9617E-05	7.7311E-18	4.3645E-05	0.00305526	0.00181586	
Kappa (HH with no Kin - HH with Kin)	Diff	SE	T-stats				
	-0.154016	0.0003706	-415.58562				

Panel B: 2002 to 2011

	Kappa	stde	sigma	theta	mu	gamma	MLE
HH with No Kin to Village Fund Borrowers	0.7329	0.2456	0.0091	0.2092	0.0436	0.0999	7.5288
SE	0.0020044	0.0037848	0.0002804	0.000054	0.0220414	0.0426913	
HH with Kin to Village Fund Borrowers	0.0729	0.1222	0.0599	0.1493	0.1860	0.1554	6.0314
SE	0.0004576	0.0001817	0.0002322	6.97E-06	0.0049371	0.0083519	
Kappa (HH with no Kin - HH with Kin)	Diff	SE	T-stats				
	0.659971	0.0002654	2486.70386				

DID: Mean Diff (HH with no Kin - HH with Kin) in 02-11 - Mean Diff (HH with no Kin - HH with Kin) in 99-01

Mean DID	0.813987		
T-stats	1795.28	P-Value	0.00

The verification costs and village fund (64 villages)

Table 7: Verification Costs in Small and Large Villages

Panel A: 1997 to 2001

	Kappa	stde	sigma	theta	mu	gamma	MLE
Small Village	0.282826153	0.268118733	0.107049883	0.168945253	0.754306449	0.262139513	-8.082180652
SE	0.008022608	0.001639284	9.91E-18	3.97E-18	0.008164764	0.019944727	
Large Village	0.058982018	0.23509104	0.04163214	0.235574299	0.834302362	0.235520325	-8.193408723
SE	0.001729031	0.0003304	0.0000067	0.0000030	0.0009124	0.0017534	

Kappa (Small-Large)	Diff	SE	T-stats
	0.223844	0.0075724	29.56052705

Panel B: 2002 to 2007

	Kappa	stde	sigma	theta	mu	gamma	MLE
Small Village	0.150167734	0.267625168	0.349630243	0.083958243	0.697924565	0.228167075	-6.4747
SE	0.002505662	0.002343952	3.65E-05	8.11E-05	0.006334235	0.009896955	
Large Village	0.276450131	0.250982775	0.282895191	0.096496325	0.502259598	0.007773151	-6.533
SE	0.0000871	0.0000125	0.0003348	0.0000677	0.0238033	0.0013186	

Kappa (Small-Large)	Diff	SE	T-stats
	-0.126282397	0.0003237	-390.1217093

DID: Mean Diff (Small-Large) in 02-07 - Mean Diff (Small-Large) in 97-01

Mean DID	-0.350127		
T-stats	-30.98	P-Value	0.00

Karaivanov, Saurina and Townsend (2019) "Family Firms, Bank Relationships, and Financial Constraints: A Comprehensive Score Card"

We examine the effect of financial constraints on firm investment and cash flow. We combine data from the Spanish Mercantile Registry and the Bank of Spain Credit Registry to classify firms according to whether they are family-owned, not family-owned, or belong to a family-linked network of firms and according to their number of banking relations (with none, one, or several banks). Our empirical strategy is structural, based on a dynamic model solved numerically to generate the joint distribution of firm capital (size), investment, and cash flow, both in cross sections and in panel data. We consider three alternative financial settings: saving only, borrowing and lending, and moral hazard constrained state-contingent credit. We estimate each setting via maximum likelihood and compare across these financial regimes. Based on the estimated financial regime, we show that family firms, especially those belonging to networks based on ownership, are associated with a more flexible market or contract environment and are less financially constrained than nonfamily firms. This result survives stratifications of family and nonfamily firms by bank status, region, industry, and time period. Family firms are better able to allocate funds and smooth investment across states of the world and over time, arguably done informally or using the cash flow generated at the level of the network. We also validate our structural approach by demonstrating that it performs well in traditional categories, by stratifying firms by size and age, and find that smaller and younger firms are more constrained than larger and older firms.

Attanasio and Pavoni (2011) "Risk Sharing in Private Information Models With Asset Accumulation"

We study testable implications for the dynamics of consumption and income of models in which first-best allocations are not achieved because of a moral hazard problem with hidden saving. We show that in this environment, agents typically achieve more insurance than that obtained under self-insurance with a single asset. Consumption allocations exhibit "excess smoothness," as found and defined by Campbell and Deaton (1989). We argue that excess smoothness, in this context, is equivalent to a violation of the intertemporal budget constraint considered in a Bewley economy (with a single asset). We also show parameterizations of our model in which we can obtain a closed-form solution for the efficient insurance contract and where the excess smoothness parameter has a structural interpretation in terms of the severity of the moral hazard problem. We present tests of excess smoothness, applied to U.K. microdata and constructed using techniques proposed by Hansen, Roberds, and Sargent (1991) to test the intertemporal budget constraint. Our theoretical model leads us to interpret them as tests of the market structure faced by economic agents. We also construct a test based on the dynamics of the cross-sectional variances of consumption and income that is, in a precise sense, complementary to that based on Hansen, Roberds, and Sargent (1991) and that allows us to estimate the same structural parameter. The results we report are consistent with the implications of the model and are internally coherent.

Nikolov, Schmid and Steri (2019) "The Sources of Financing Constraints"

Abstract

In order to identify the relevant sources of firms' financing constraints, we ask what financial frictions matter for corporate policies. To that end, we build, solve, and estimate a range of dynamic models of corporate investment and financing, embedding a host of financial frictions. We focus on limited enforcement, moral hazard, and trade-off models. All models share a common technology, but differ in the friction generating financing constraints. Using panel data on Compustat firms for the period 1980-2015 and a more recent dataset on private firms from Orbis, we determine which features of the observed data allow to distinguish among the models, and we assess which model or model combination performs best at rationalizing observed corporate investment and financing policies across various samples. Our tests, based on empirical policy function benchmarks, favor trade-off models for larger Compustat firms, limited commitment models for smaller firms, and moral hazard models for private firms. Our estimates point to significant financing constraints due to agency frictions and highlight the importance of identifying their relevant sources for firm valuation.

Lecture 6: Building from Below: Identifying Real Underlying Obstacles (3/12)

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