EC9C0 Development Economics

Week 2: Firms
Lecture 3

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Plan

- Basic descriptives on firms in low and middle income countries (LMIC)
- Returns to capital
- Returns to labor
- Technology

Roadmap

Basic facts

Empirical evidence on the returns to capital in small firms

Basic facts

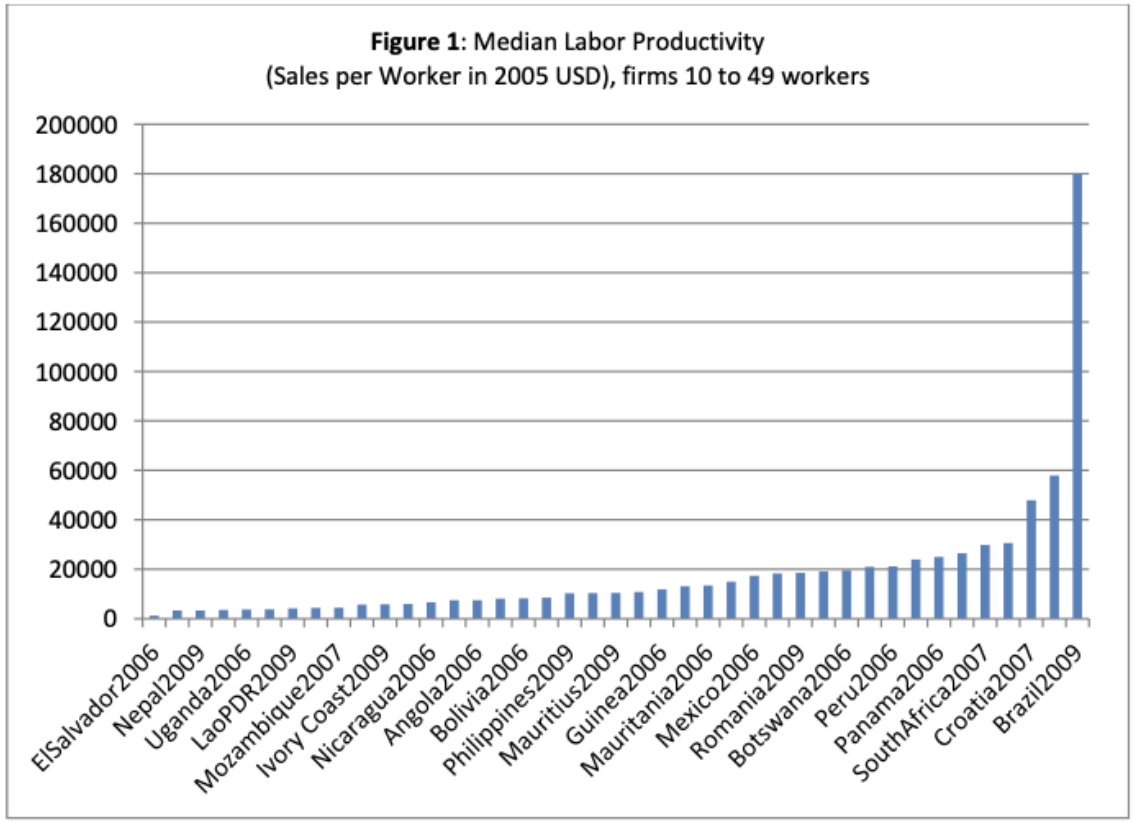
Three central facts about firms in LIMCs which have captured economists' attention:

1. Firm productivity tends to be low and dispersed
2. Firms tend to be small
3. Technology upgrading (e.g. modern management) tends to be limited

Three facts about firms in LIMCs have mostly captured economists' attention:

1. Firm productivity tends to be low and dispersed
2. Firms tend to be small
3. Technology upgrading (e.g. modern management) can be limited

Average productivity is low



From IGC 2013

Average productivity is low

Table 1: Average Firm Labour Revenue Productivity Across Countries

Country	GDP per capita, dollars	Sales per employee, dollars
U.S.	42,736	433,884
U.K.	37,886	457,674
Japan	35,699	428,336
France	35,100	393,024
Germany	33,838	379,341
Greece	22,410	320,859
Poland	7,967	178,525
Brazil	4,787	144,831
Colombia	3,170	150,198
Ecuador	2,814	71,263
Morocco	1,952	105,271
China	1,761	66,885
Indonesia	1,249	80,203
Philippines	1,090	102,975
India	741	120,656

From IGC 2013

And marginal productivity seems to be more dispersed than in richer countries

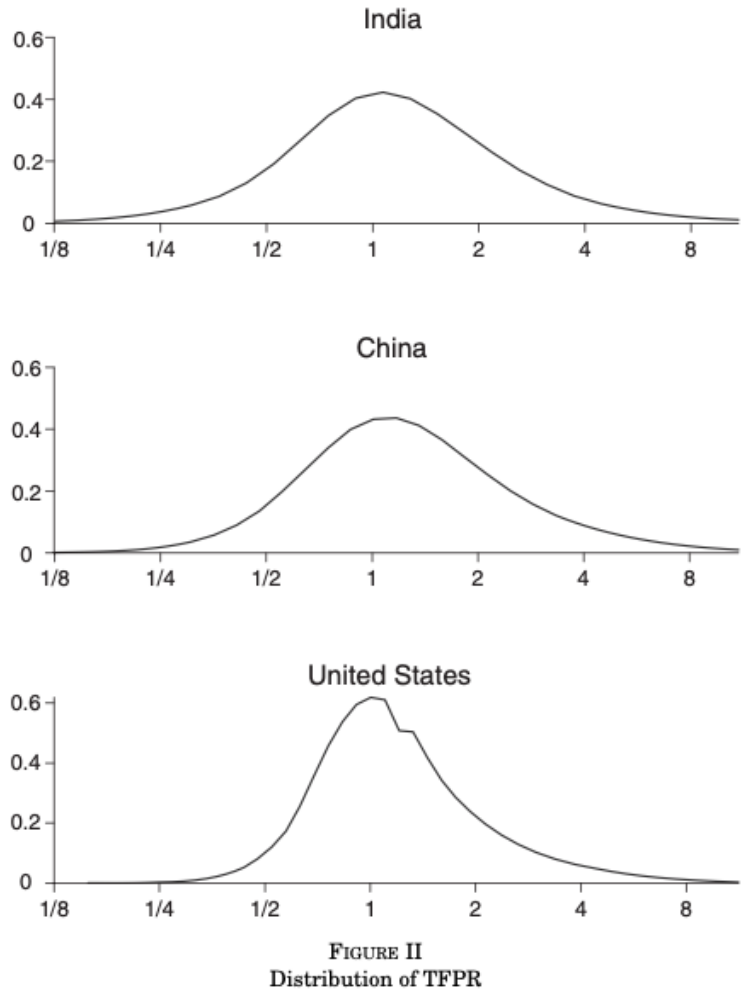


FIGURE II
Distribution of TFPR

From Hsieh and Klenow 2008

Three facts about firms in LIMCs have mostly captured economists' attention:

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3. Technology upgrading (e.g. modern management) tends to be limited

Average firm size is small

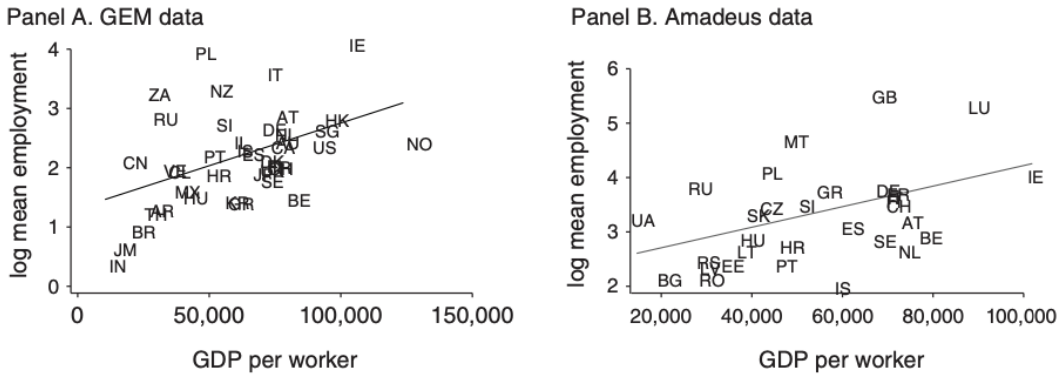


FIGURE 3. AVERAGE EMPLOYMENT AND INCOME PER WORKER

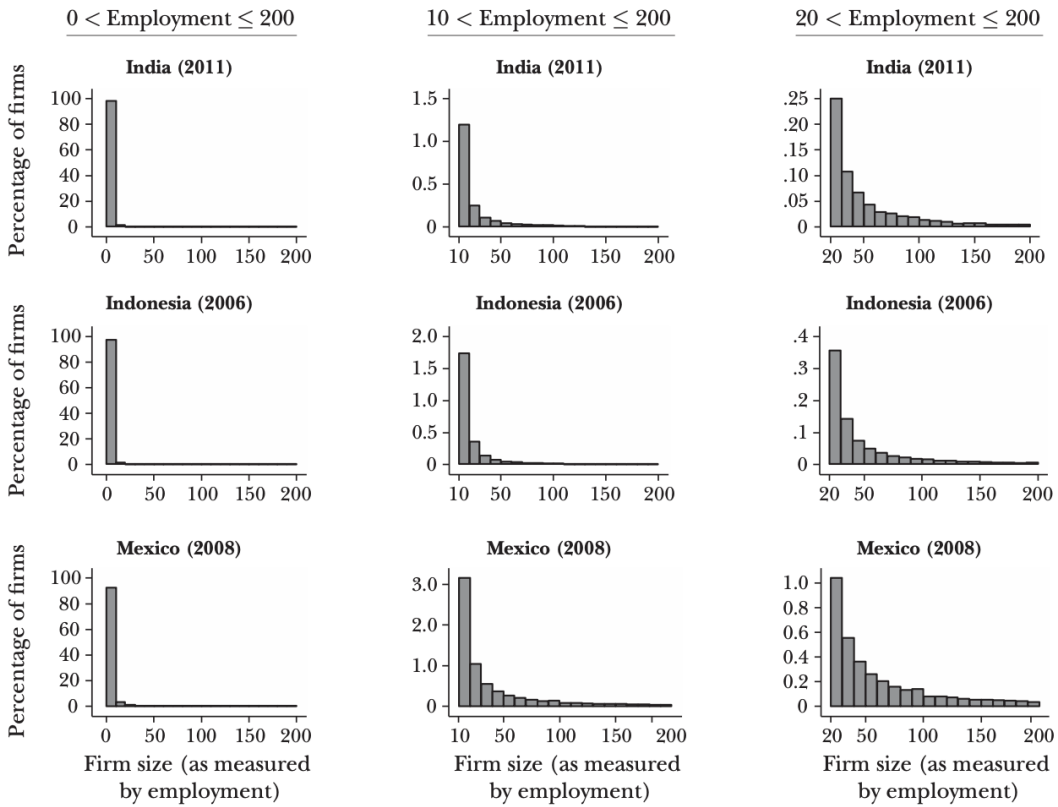
Notes: GDP per worker outside agriculture is computed as real GPD for 2005 at purchasing power parity from the Penn World Tables 8 (Summers and Heston 1991; Heston, Summers, and Aten 2009) minus value added in agriculture, forestry, and fishing (from FAO macro indicators), divided by total persons engaged minus persons engaged in agriculture, also from the FAO. Firm employment data from the GEM for panel A and from Amadeus for panel B. The vertical axis shows log average employment. The lines represent the best linear fits. Regression results are reported in Table 2.

From Poschke 2018

Very small firms are over-represented in the firm size distribution of LMICs

Figure 1

Distribution of Firm Size as Measured by Number of Workers



Source: We use microdata from the manufacturing sector in the Mexican Economic Census, the Indonesian Econ
Sample Survey (Schedule 2). See footnote 1.
Notes: The figure shows distribution of firm size measured by the number of workers. The bin size is 10 workers, a
For all graphs, the y-axis indicates the share of all firms in the specified size. The different columns truncate the

From Hsieh and Olken 2014

Many of these small firms comprise a single self-employed worker

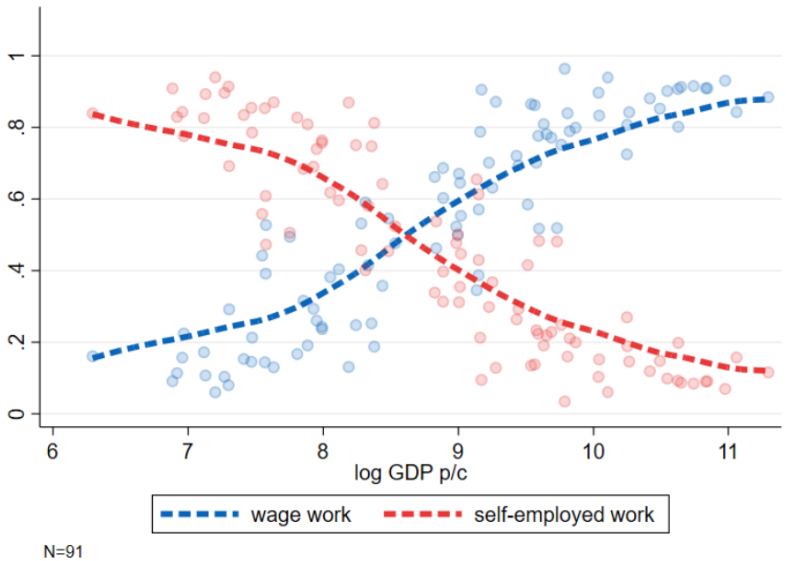
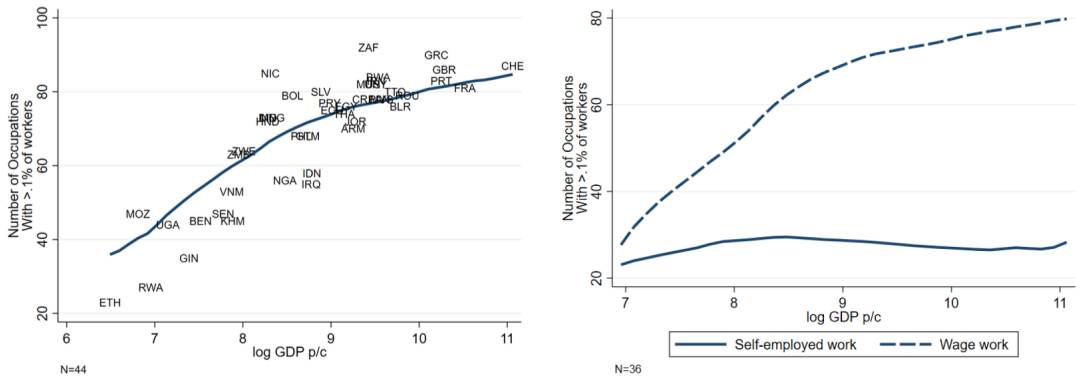


Figure 6: Share in self-employed work and wage work against log GDP per capita

From Bandiera et al. 2022

With minimal occupational variety



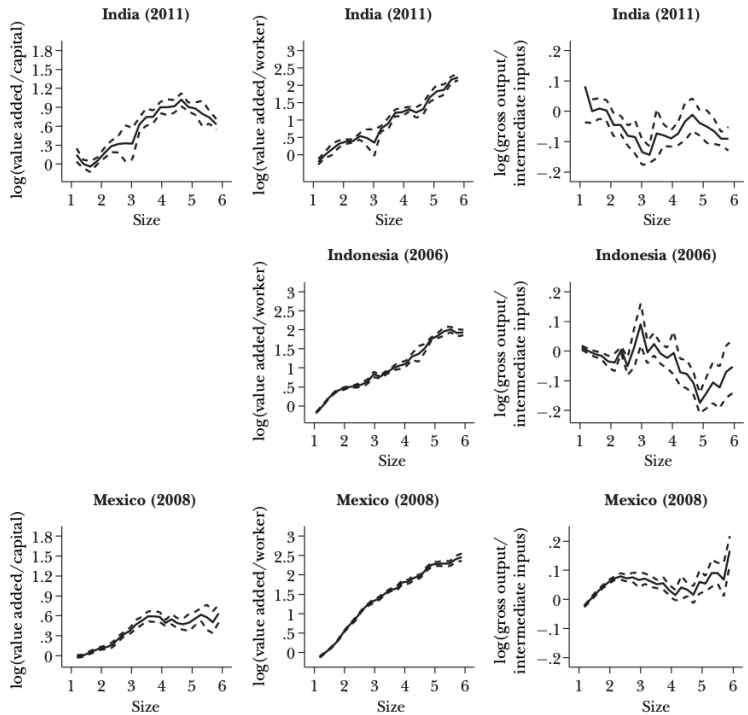
(a) Pooled (b) by Employment Status

Figure 14: Occupational variety and economic development

From Bandiera et al. 2022

Average productivity tends to be higher in larger firms

Figure 3
Average Product and Firm Size
(size measured as log(employment))



Source: See Figure 1 for sources.
Notes: Figure shows local linear regressions of log average product on log employment. We normalize the y-axis by taking the value of the function at log(employment) = 1.4 to be zero. Dashed lines represent 95 percent confidence bounds. Size is measured as log (employment).

From Hsieh and Olken 2014

Three facts about firms in low and middle income countries (LMIC) have mostly captured economists' attention:

1. Firm productivity tends to be low and dispersed
2. Firms tend to be small
3. Technology upgrading can be limited

The measurement of management

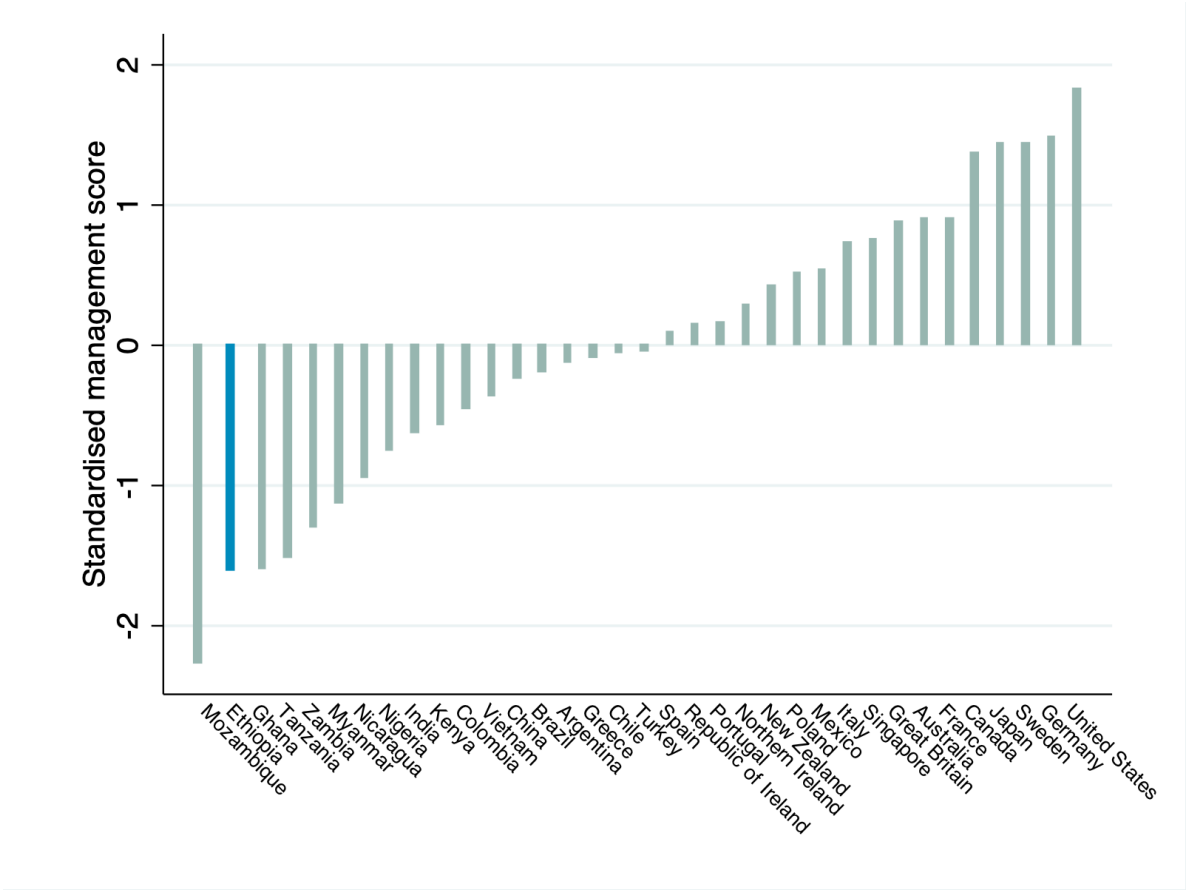
Table 1
The Management Practice Dimensions

Categories	*Score from 1–5 based on:*
1) Introduction of modern manufacturing techniques	What aspects of manufacturing have been formally introduced, including just-in-time delivery from suppliers, autonomation, flexible manpower, support systems, attitudes, and behavior?
2) Rationale for introduction of modern manufacturing techniques	Were modern manufacturing techniques adopted just because others were using them, or are they linked to meeting business objectives like reducing costs and improving quality?
3) Process problem documentation	Are process improvements made only when problems arise, or are they actively sought out for continuous improvement as part of a normal business process?
4) Performance tracking	Is tracking ad hoc and incomplete, or is performance continually tracked and communicated to all staff?
5) Performance review	Is performance reviewed infrequently and only on a success/failure scale, or is performance reviewed continually with an expectation of continuous improvement?
6) Performance dialogue	In review/performance conversations, to what extent is the purpose, data, agenda, and follow-up steps (like coaching) clear to all parties?
7) Consequence management	To what extent does failure to achieve agreed objectives carry consequences, which can include retraining or reassignment to other jobs?
8) Target balance	Are the goals exclusively financial, or is there a balance of financial and nonfinancial targets?
9) Target interconnection	Are goals based on accounting value, or are they based on shareholder value in a way that works through business units and ultimately is connected to individual performance expectations?
10) Target time horizon	Does top management focus mainly on the short term, or does it visualize short-term targets as a "staircase" toward the main focus on long-term goals?
11) Targets are stretching	Are goals too easy to achieve, especially for some "sacred cows" areas of the firm, or are goals demanding but attainable for all parts of the firm?
12) Performance clarity	Are performance measures ill-defined, poorly understood, and private, or are they well-defined, clearly communicated, and made public?
13) Managing human capital	To what extent are senior managers evaluated and held accountable for attracting, retaining, and developing talent throughout the organization?
14) Rewarding high performance	To what extent are people in the firm rewarded equally irrespective of performance level, or are rewards related to performance and effort?
15) Removing poor performers	Are poor performers rarely removed, or are they retrained and/or moved into different roles or out of the company as soon as the weakness is identified?
16) Promoting high performers	Are people promoted mainly on the basis of tenure, or does the firm actively identify, develop, and promote its top performers?
17) Attracting human capital	Do competitors offer stronger reasons for talented people to join their companies, or does a firm provide a wide range of reasons to encourage talented people to join?
18) Retaining human capital	Does the firm do relatively little to retain top talent or do whatever it takes to retain top talent when they look likely to leave?

Note: The full set of questions that are asked to score each dimension are included in Bloom and Van Reenen (2006).

From From Bloom Van Reenen 2010

Management quality correlates tightly with GDP per capita



Data from the World Management Survey.

Key datasets

- World Bank Enterprise Survey
- Global enterpreneurship monitor
- World Management Survey
- Jobs of the World

Roadmap

Basic facts

Empirical evidence on the returns to capital in small firms

- De Mel, McKenzie, Woodruff 2008
- Bari, Malik, Meki, Quinn 2022

De Mel, McKenzie, Woodruff 2008

An RCT to measure marginal returns to capital among small firms

- 618 firms with less than 1,000 USD of capital in Sri Lanka.
  - Focus on 408 firms not affected by the Tsunami.
- Provide either 100 USD or 200 USD of capital
  - Some firms receive this in cash, some in equipment.
- Follow firms for 9 quarters, measuring capital, profits, labor.

A simple framework

$$\underset{\{K,\, B,\, A_K,\, I_K\}}{\text{Max}} \quad \text{EU(c)}$$

subject to:

$$c = \varepsilon f(K, \theta) - rK + r(A - A_K) + (nw - I_K), \tag{3}$$

$$K \leq A_K + I_K + B, \tag{4}$$

$$B \leq \overline{B}, \tag{5}$$

$$A_K \leq A, \tag{6}$$

$$I_K \leq nw, \tag{7}$$

Three benchmarks

With perfect capital and insurance markets:

$$f'(K,\theta) = r \tag{1}$$

With credit constraints and perfect insurance markets:

$$f'(K,\theta) = r + \lambda \tag{2}$$

With perfect capital markets and no insurance:

$$f'(K,\theta)COV(U'(c),\epsilon) = (r - f'(K,\theta))EU'(c) \tag{3}$$

The ITT impacts of the intervention

$$(1) \qquad Y_{it} = \alpha + \sum_{g=1}^{4} \beta_g \text{Treatment}_{git} + \sum_{t=2}^{9} \delta_t + \lambda_i + \varepsilon_{it},$$

The ITT impacts of the intervention

TABLE II

EFFECT OF TREATMENTS ON OUTCOMES

Impact of treatment amount on:	Capital stock (1)	Log capital stock (2)	Real profits (3)	Log real profits (4)	Owner hours worked (5)
10,000 LKR in-kind	4,793*	0.40***	186	0.10	6.06**
	(2,714)	(0.077)	(387)	(0.089)	(2.86)
20,000 LKR in-kind	13,167***	0.71***	1,022*	0.21*	−0.57
	(3,773)	(0.169)	(592)	(0.115)	(3.41)
10,000 LKR cash	10,781**	0.23**	1,421***	0.15*	4.52*
	(5,139)	(0.103)	(493)	(0.080)	(2.54)
20,000 LKR cash	23,431***	0.53***	775*	0.21*	2.37
	(6,686)	(0.111)	(643)	(0.109)	(3.26)
Number of enterprises	385	385	385	385	385
Number of observations	3,155	3,155	3,248	3,248	3,378

Notes: Data from quarterly surveys conducted by the authors reflecting nine survey waves of data from March 2005 through March 2007. Capital stock and profits are measured in Sri Lankan rupees, deflated by the Sri Lankan CPI to reflect March 2005 price levels. Columns (2) and (4) use the log of capital stock and profits, respectively. Profits are measured monthly and hours worked are measured weekly. All regressions include enterprise and period (wave) fixed effects. Standard errors, clustered at the enterprise level, are shown in parentheses. Sample is trimmed for top 0.5% of changes in profits.

*** $p < .01$, ** $p < .05$, * $p < .1$.

Estimating the returns to capital

$$\text{profits}_{i,t} = \alpha + \beta_i K_{i,t} + \sum_{t=2}^{9} \delta_t + \lambda_i + \varepsilon_{i,t} \quad (2)$$

- How can we estimate β_i?
- What are the key challenges? (there are at least two!)

Estimating the returns to capital

$$\text{profits}_{i,t} = \alpha + \beta_i K_{i,t} + \sum_{t=2}^{9} \delta_t + \lambda_i + \varepsilon_{i,t} \quad (2)$$

- How can we estimate β_i?
- What are the key challenges? (there are at least two!)

The LATE impacts of the intervention

TABLE IV
INSTRUMENTAL VARIABLE REGRESSIONS MEASURING RETURN TO CAPITAL FROM EXPERIMENT

	Real profits IV-FE (1)	Log real profits IV-FE (2)	Real profits 4 instruments (3)	Real profits adjusted (1) IV-FE (4)	Real profits adjusted (2) IV-FE (5)
Capital stock/log capital stock (excluding land & buildings)	5.85**	0.379***	5.16**	5.29**	4.59**
	(2.34)	(0.121)	(2.26)	(2.28)	(2.29)
First-stage					
Coefficient on treatment amount	0.91***	0.33***		0.91***	0.91***
F statistic	27.81	49.26	6.79	27.81	27.81
Observations	3,101	3,101	3,101	3,101	3,101
Number of enterprises	384	384	384	384	384

Notes: Data from quarterly surveys conducted by the authors reflecting nine waves of data from March 2005 through March 2007. Capital stock and profits are measured in Sri Lankan rupees, deflated by the Sri Lankan CPI to reflect March 2005 price levels. Profits are measured monthly. The estimated value of the owner's labor is subtracted from profits in columns (4) and (5), as described in the text. In column (4), the owner's time is valued by regression coefficients from a production function using baseline data; in column (5), we use the median hourly earnings in the baseline sample for each of six gender/education groups. A single variable measuring the rupee amount of the treatment is used as the instrument in columns (1) and (2) and (4) and (5). In column (3), we use four separate variables indicating receipt of each treatment type. Except in column (2), the coefficients show the effect of a 100-rupee increase in the capital stock. All regressions include enterprise and period (wave) fixed effects. Standard errors, clustered at the enterprise level, are shown in parentheses. The *F* statistic is the partial *F* statistic in the first-stage regression on the excluded instruments.
***$p < .01$, **$p < .05$, *$p < .1$.

Heterogeneity analysis: intuitions

With credit constraints and perfect insurance markets:

$$f'(K,\theta) = r + \lambda \tag{4}$$

With perfect capital markets and no insurance:

$$f'(K,\theta)COV(U'(c),\epsilon) = (r - f'(K,\theta))EU'(c) \tag{5}$$

Heterogeneity analysis: intuitions

- Credit constraints more binding for households that can generate less K, or that need more K.

- Missing insurance creates larger distortions for higher risk ϵ or higher risk aversion.

Evidence consistent with credit constraints

TABLE V

TREATMENT EFFECT HETEROGENEITY (DEPENDENT VARIABLE: REAL PROFITS)

					Females	Males
	(1) FE	(2) FE	(3) FE	(4) FE	(5) FE	(6) FE
Treatment amount	5.41***	7.35**	5.29***	4.96**	2.83	6.74**
	(2.09)	(2.86)	(2.15)	(2.19)	(2.39)	(3.09)
Interaction of treatment amount with:						
Female owner		−7.51*				
		(4.02)				
Number of wage workers			−3.69			
			(2.38)			
Household asset index			−2.43**		−2.88**	−3.05
			(1.14)		(1.35)	(2.06)
Years of education			1.56***		0.24	2.03**
			(0.59)		(0.78)	(0.82)
Digit Span Recall			3.80**		7.34***	1.84
			(1.88)		(2.32)	(2.80)
Risk aversion				0.54		
				(1.25)		
Uncertainty				−7.82		
				(7.31)		
Constant	3,824***	3,777***	3,823***	3,840***	2,860***	4,700
	(174)	(179)	(175)	(174)	(211)	(283)
Firm-period observations	3,248	3,084	3,149	3,218	1,484	1,510
Number of enterprises	385	365	369	381	174	176

Notes: Data from quarterly surveys conducted by the authors reflecting 9 waves of data from March 2005 through March 2007. Capital stock and profits are measured in Sri Lankan rupees, deflated by the Sri Lankan CPI to reflect March 2005 price levels. Profits are measured monthly. The sample in column (2) excludes 20 enterprises that are either jointly owned or in which the identity of the owner changes in at least one wave of the survey. The household asset index is the first principal component of variables representing ownership of 17 household durables; digit span recall is the number of digits the owner was able to repeat from memory, ten seconds after viewing a card showing the numbers (ranging from 3 to 11); risk aversion is the CRRA calculated from a lottery exercise described in the text; and uncertainty is the coefficient of variation of expected sales three months from the date of survey. All of the interaction terms are calculated as deviations from the sample mean. The coefficients show the effect of a 100 rupee increase in the capital stock. All regressions include enterprise and period (wave) fixed effects, as well as the interaction of period effects

Did we need an experiment in the first place?

TABLE VII

COMPARING EXPERIMENTAL TO NONEXPERIMENTAL ESTIMATES (DEPENDENT VARIABLE: REAL PROFITS ADJUSTED FOR VALUE OF OWNER'S HOURS WORKED)

	Nonexperimental results			Experimental results
	(1) OLS	(2) Random effects	(3) Firm FE	(4) Firm FE
Invested capital (excluding land and buildings)	2.58***	1.71*	0.07	5.29**
	(0.70)	(1.02)	(1.07)	(2.28)
Age of owner	−45.7***	−38.3*		
	(15.5)	(20.3)		
Education of owner	−215.3***	−105.8		
	(59.7)	(72.9)		
Owner is female	−1,359***	−2,430***		
	(339)	(491)		
Constant	6,485***	5,800***	2,299***	1,487***
	(985)	(1,163)	(300)	(498)
Observations	349	698	698	3,101
Number of enterprises	349	151	151	384

Notes: The sample for the regression in column (1) includes all firms but uses only the baseline (pretreatment) data. The second and third columns use only untreated firms and the first five waves of data. The final column repeats the regression shown in Table IV, column (4). The coefficients show the effect of a 100-LKR increase in the capital stock. The second through fourth regressions include period (wave) fixed effects, and the third and fourth include period and enterprise fixed effects. Standard errors, clustered at the enterprise level, are shown in parentheses.

***$p < .01$, **$p < .05$, *$p < .1$.

Summary

- Documented returns to capital among micro-enterprises are really high: 4.6-5.3% per month, or 60% per year.
- Some evidence of credit constraints.
- But if returns are so high, why can't micro-enterprises save capital gradually?
- And why does micro-credit have on average small business growth impacts?

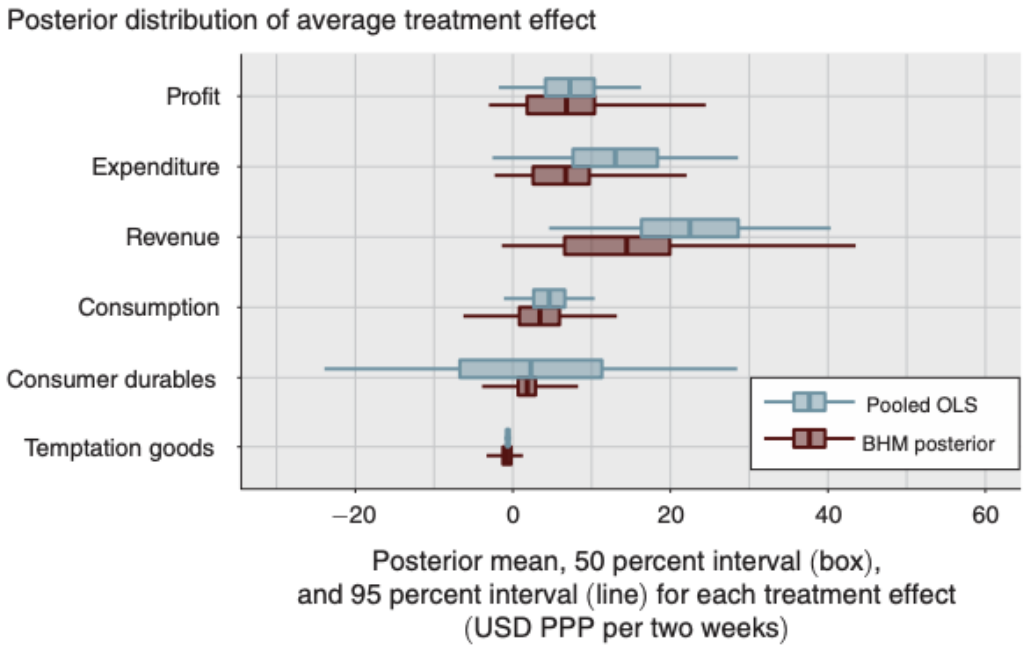


FIGURE 1. GRAPH OF POSTERIORS FOR EACH τ FROM THE MAIN SPECIFICATION OF THE JOINT BAYESIAN HIERARCHICAL MODEL (BHM), WITH THE FULL POOLING OLS INTERVALS FOR COMPARISON

From Meager 2019

TABLE 1—LENDER AND STUDY ATTRIBUTES BY COUNTRY

Country	Bosnia and Herzegovina	Ethiopia	India	Mexico	Mongolia	Morocco	The Philippines
Study citation	Augsburg et al. (2015)	Tarozzi, Desai, and Johnson (2015)	Banerjee, Duflo, Glenneister, and Kinnan (2015)	Angelucci, Karlan, and Zinman (2015)	Attanasio et al. (2015)	Crépon et al. (2015)	Karlan and Zinman (2011)
Treatment	Lend to marginally rejected borrowers	Open branches	Open branches	Open branches, promote loans	Open branches, target likely borrowers	Open branches	Lend to marginal applicants
Randomization level	Individual	Community	Community	Community	Community	Community	Individual
Urban or rural?	Both	Rural	Urban	Both	Rural	Rural	Urban
Target women?	No	No	Yes	Yes	Yes	No	No
MFI already operates locally?	Yes	No	No	No	No	No	Yes
Microloan liability type	Individual	Group	Group	Group	Both	Group	Individual
Collateralized?	Yes	Yes	No	No	Yes	No	No
Any other MFIs competing?	Yes	No	Yes	Yes	Yes	No	Yes
Household panel?	Yes	No	No	Partial	Yes	Yes	No
Interest rate (intended on average)	22% APR	12% APR	24% APR	100% APR	24% APR	13.5% APR	63% APR
Sampling frame	Marginal applicants	Random sample	Households with at least 1 woman age 18–55 of stable residence	Women ages 18–60 who own businesses or wish to start them	Women who registered interest in loans and met eligibility criteria	Random sample plus likely borrowers	Marginal applicants
Study duration	14 months	36 months	40 months	16 months	19 months	24 months	36 months

Notes: The construction of the interest rates here is different to the construction of Banerjee et al. (2015); they have taken the maximal interest rate, whereas I have taken the average of the intended range specified by the MFI. In practice, the differences in these constructions are numerically small.

From Meager 2019

Bari, Malik, Meki, Quinn 2022

An RCT on relaxing maximum borrowing constraints

- 757 microenterprise owners who had completed an MFI loan and wanted to borrow more.
- Controls offered a standard loan of maximum value $475 (18 months repayment, 7% interest).
- Treated offered a higher-purchase contract for an asset worth $1,999 (18 months repayment, $\approx$ 7% interest).
  1. Vary whether repayment is fixed or flexible
  2. If default, asset sale proceeds shared according to ownership.

An example of fixed payment option (for an asset worth $1000)

Table 1: **Contract repayment schedule**

MONTH	MFI OWNERSHIP	PAYMENT RENT	PAYMENT OWNERSHIP	TOTAL PAYMENT
1	90.0%	9.00	50.00	59.00
2	85.0%	8.50	50.00	58.50
3	80.0%	8.00	50.00	58.00
4	75.0%	7.50	50.00	57.50
5	70.0%	7.00	50.00	57.00
6	65.0%	6.50	50.00	56.50
7	60.0%	6.00	50.00	56.00
8	55.0%	5.50	50.00	55.50
9	50.0%	5.00	50.00	55.00
10	45.0%	4.50	50.00	54.50
11	40.0%	4.00	50.00	54.00
12	35.0%	3.50	50.00	53.50
13	30.0%	3.00	50.00	53.00
14	25.0%	2.50	50.00	52.50
15	20.0%	2.00	50.00	52.00
16	15.0%	1.50	50.00	51.50
17	10.0%	1.00	50.00	51.00
18	5.0%	0.50	50.00	50.50
TOTAL		85.50	900.00	985.50

Note: This table provides an example of the required payment structure under the fixed-repayment contract for an asset costing $1,000, where the client has paid $100 to initially purchase 10% of the asset. A nominal annual rental rate of 12% implies monthly rent of 1% of the asset's value, which is $10. In addition to the rent, the client is also obliged to purchase 5% of the MFI's ownership share each month, based on the initial asset value of $1,000, which implies an amount of $50.

- Pay 10 pct upfront
- Purchase 5 percent of asset every month, plus 1pct rent

Regression model

$$y_{it} = \beta_0 + \beta_1 \cdot \mathtt{T}_i + \beta_2 \cdot y_{i0} + \phi_{s_i} + \varepsilon_{it}. \tag{1}$$

Pools outcome data collected at 5 points in time (3, 6, 12, 18, 24 months after treatment)

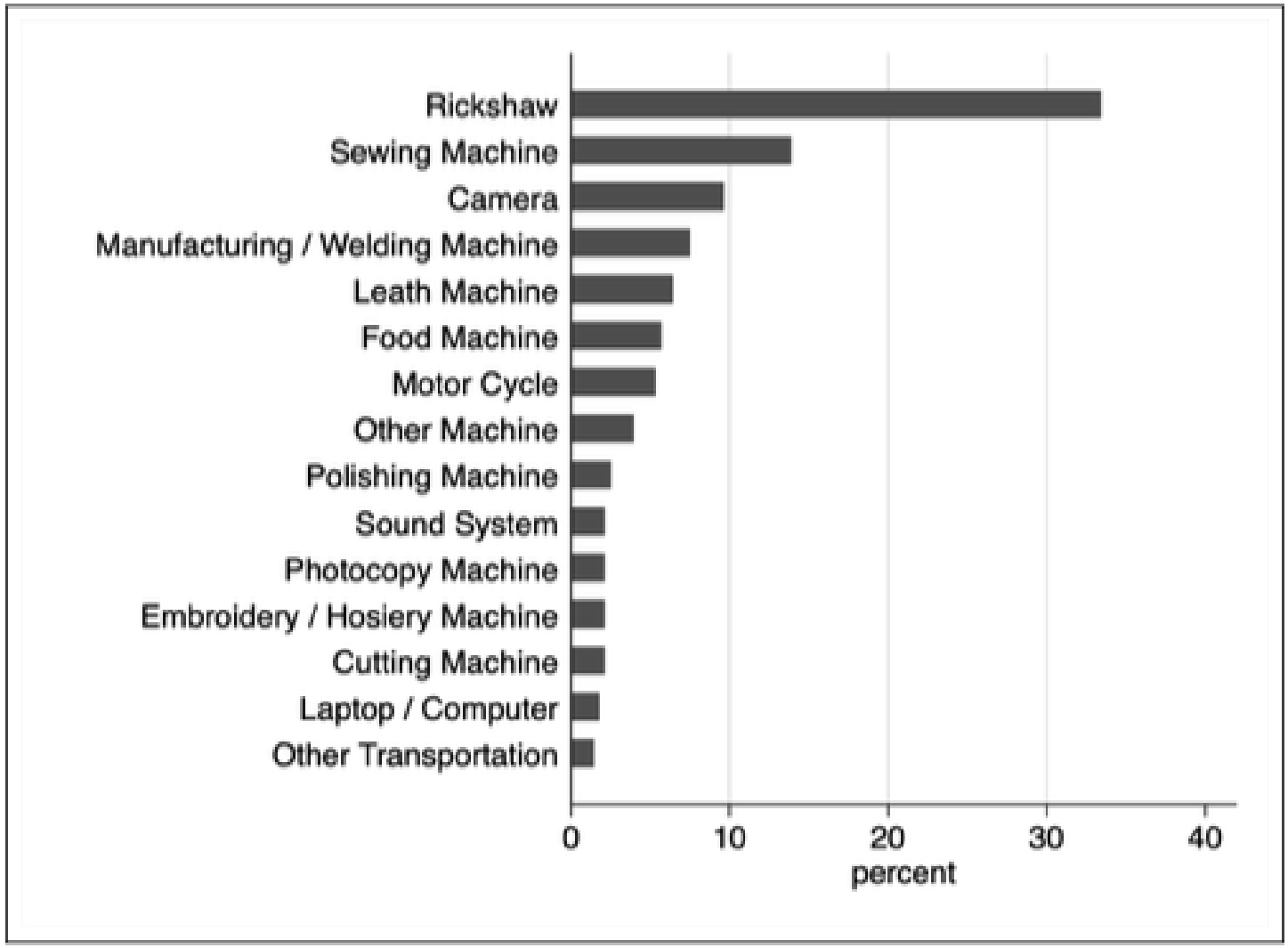
Table 2: **Take-up and borrowing**

	(1) Any loan	(2) Any loan	(3) Cash Loan	(4) Cash Loan	(5) Asset loan	(6) Asset loan	(7) Fixed-repayment	(8) Flexible-repayment	(9) Total borrowing	(10) Total borrowing
Assignment	0.48***		-0.08***		0.56***				821.42***	
	(0.030)		(0.023)		(0.022)				(36.947)	
Assignment: Fixed		0.44***		-0.09***		0.53***	0.53***			748.87***
		(0.038)		(0.024)		(0.031)	(0.031)			(50.440)
Assignment: Flexible		0.52***		-0.07***		0.59***	0.09***	0.50***		897.21***
		(0.037)		(0.025)		(0.031)	(0.018)	(0.032)		(52.714)
Control mean	0.13	0.13	0.13	0.13	0.00	0.00	0.00	0.00	40.46	40.46
Observations	757	757	757	757	757	757	757	757	757	757

Note: We report take-up indicators and borrowing amounts for any type of loan (cash or asset-based) from all participants within the first three months of them entering the experiment, using administrative data from the MFI. In Appendix Table A.4, we conduct a similar exercise without restricting the time period to be the first three months of the experiment (i.e. using administrative data on borrowing throughout the project). *Assignment* refers to assignment to either of the two asset finance contracts (fixed- or flexible-repayment). In columns 1 and 2, the dependent variable equals one if participants took up any new loan, in columns 3 and 4 the dependent variable is a dummy for taking up any cash loan, and in columns 5 and 6 it is take-up of an asset-based loan. In column 7, the dependent variable is a dummy for take-up of the fixed-repayment contract, and in column 8 it is a dummy for take-up of the flexible-repayment contract. In columns 9 and 10, the dependent variable is the total borrowing amount, combining both loan types, in USD. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

What was the money spent on?

Figure A.1: **Types of asset funded**



Note: This figure illustrates the different categories of asset chosen by the 281 clients who accepted a treatment contract.

Table 4: **Overall business outcomes**

	(1) Runs a buiness	(2) Number of businesses	(3) Business total assets	(4) Business revenue	(5) Business profits	(6) Business employees
Assignment	0.09	0.10	401.22	1.82	26.93	0.04
	(0.02)	(0.02)	(89.94)	(39.65)	(9.93)	(0.06)
	[0.00]***	[0.00]***	[0.00]***	[0.96]	[0.01]***	[0.54]
	{0.00}***	{0.00}***	{0.00}***	{0.47}	{0.01}***	{0.28}
Control mean (follow-up)	0.80	0.82	1003.34	689.65	249.31	0.56
Observations	3,608	3,608	3,608	3,608	3,608	3,608

Note: We report the *intent-to-treat* estimates of the combined treatment on primary outcomes, obtained by least-squares estimation. Below each coefficient, we report a standard error in parenthesis, a p-value in brackets, and a q-value in curly braces. Business total assets is defined as the sum of total fixed assets and total current assets in the form of cash, accounts receivable, and inventory. Standard errors allow for clustering at the level of the individual. q-values are obtained using the sharpened procedure of (Benjamini et al., 2006). We denote significance using $*$ for 10%, $**$ for 5% and $***$ for 1%.

Table 5: **Business assets**

	(1) Total fixed assets	(2) Current assets: cash	(3) Current assets: accounts receivable	(4) Current assets: inventory
Assignment	438.05	2.68	-0.59	-29.76
	(67.15)	(1.77)	(1.47)	(34.53)
	[0.00]***	[0.13]	[0.69]	[0.39]
	{0.00}***	{0.25}	{0.53}	{0.36}
Control mean (follow-up)	660.19	31.38	9.93	250.77
Observations	3,608	3,608	3,608	3,608

Note: We report the *intent-to-treat* estimates of the combined treatment on primary outcomes, obtained by least-squares estimation. Below each coefficient, we report a standard error in parenthesis, a p-value in brackets, and a q-value in curly braces. Standard errors allow for clustering at the level of the individual. q-values are obtained using the sharpened procedure of (Benjamini et al., 2006). We denote significance using $*$ for 10%, $**$ for 5% and $***$ for 1%.

Table 6: **Household outcomes**

	(1) Total household income	(2) Household consumption expenditure	(3) Total household savings	(4) Household assets
Assignment	31.47	12.95	16.44	20.33
	(12.66)	(3.37)	(19.16)	(14.03)
	[0.01]**	[0.00]***	[0.39]	[0.15]
	{0.02}**	{0.00}***	{0.24}	{0.11}
Control mean (follow-up)	357.35	220.40	113.03	681.79
Observations	3,608	3,608	3,608	1,410

Note: We report the *intent-to-treat* estimates of the combined treatment on primary outcomes, obtained by least-squares estimation. Below each coefficient, we report a standard error in parenthesis, a p-value in brackets, and a q-value in curly braces. Standard errors allow for clustering at the level of the individual. q-values are obtained using the sharpened procedure of (Benjamini et al., 2006). We denote significance using $*$ for 10%, $**$ for 5% and $***$ for 1%.

A dynamic model of an entrepreneur that:

- Derives utility from consumption c_t
- Has access to physical capital κ_t and financial capital f_t
- produces output $e^{(\mu+\epsilon_t)}\kappa_t^{\alpha}$
- $\epsilon_{t+1}|\epsilon_t \sim N(\rho\epsilon_t, \sigma^2)$
- faces interest rate r and capital depreciation rate δ
- has an investment opportunity ψ_t with probability ω, and capital sale costs a_t

$$V_n(k_t, f_t, \varepsilon_t, \psi_t) = \max_{k_{t+1}, f_{t+1}} \mathbb{E}_{(\varepsilon_{t+1}, \psi_{t+1}) \,|\, (\varepsilon_t, \psi_t)} \left[\frac{c_t^{1-1/\gamma}}{1-1/\gamma} + \beta \cdot V_n \left(k_{t+1}, f_{t+1}, \varepsilon_{t+1}, \psi_{t+1} \right) \right] \tag{2}$$

subject to

$$c_t = (1-\tau) \cdot \exp(\mu + \varepsilon_t) \cdot k_t^{\alpha} - \Delta k_t - \delta \cdot k_t - s_t - a_t > 0; \tag{3}$$

$$s_t = f_{t+1} - (1+r) \cdot f_t; \tag{4}$$

$$\varepsilon_{t+1} \,|\, \varepsilon_t \sim \mathcal{N}\left(\rho \cdot \varepsilon_t, \sigma^2 \right). \tag{5}$$

Two main frictions: credit constraints and lumpiness

1. No credit in absence of microfinance: $f_t \geq 0$.

2. there is a minimum amount of physical capital κ that can be sold/purchased.

$$\Delta k_t \in \begin{cases} \{[-(1-\delta)\cdot k_t, -\kappa],\ [-\delta \cdot k_t, 0]\} & \text{if } \psi_t = 0; \\ \{\underbrace{[-(1-\delta)\cdot k_t, -\kappa]}_{\text{sell}},\ \underbrace{[-\delta \cdot k_t, 0]}_{\text{repair}},\ \underbrace{[\kappa - \delta \cdot k_t, \infty)}_{\text{buy}}\} & \text{if } \psi_t = 1. \end{cases} \tag{6}$$

Model estimation

Table 9: **Calibrated structural parameters**

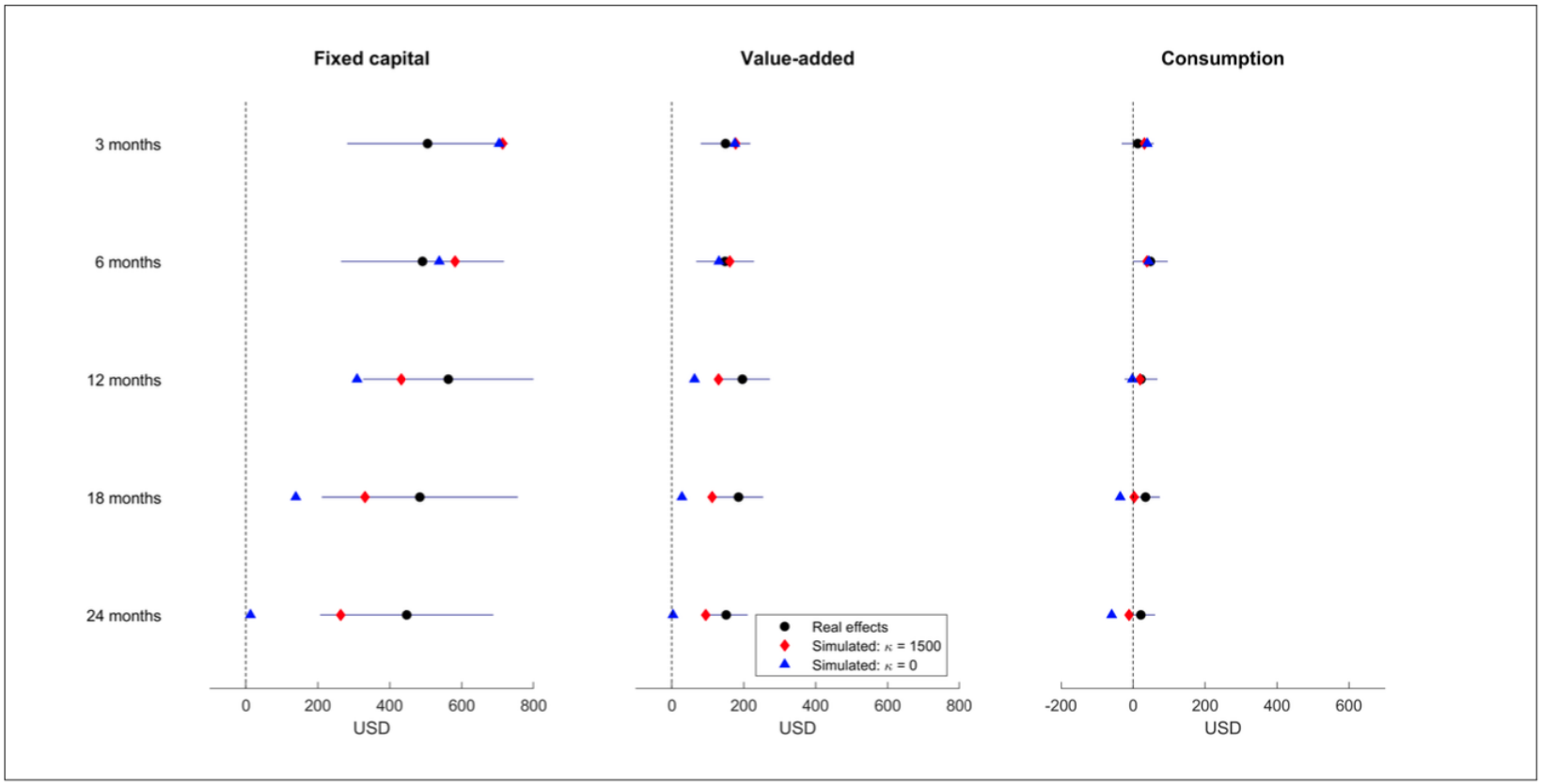
PARAMETER	DESCRIPTION	VALUE	SOURCE
μ	mean of log productivity	5.93	Panel GMM
ρ	quarterly autocorrelation of productivity	0.62	Panel GMM
σ	standard deviation of productivity	0.30	Panel GMM
α	curvature of production	0.16	Panel GMM
r	quarterly real return on saving	-0.0125	Implied by inflation
δ	quarterly depreciation rate	0.05	Incentivised measure
ϕ	partial irreversibility cost	0.25	Incentivised measure
τ	ad-valorem sharing tax	0.15	Baseline accounting
ω	probability of investment opportunity	0.52	Take-up under treatment 1
γ	intertemporal elasticity of substitution	0.35	Assumed
β	quarterly discount factor	0.90	Assumed

Note: This table reports a series of structural parameter values used for our calibration exercise. 'Panel GMM' refers to a quasi-differenced GMM panel estimator; 'incentivised measure' refers to a series of incentivised lab-in-field games conducted at baseline; 'baseline accounting' refers to an accounting exercise using baseline data. We provide further detail in Appendix Section O.

κ is then estimated through minimum-distance estimation, by targeting treatment effects on capital, value added and consumption.

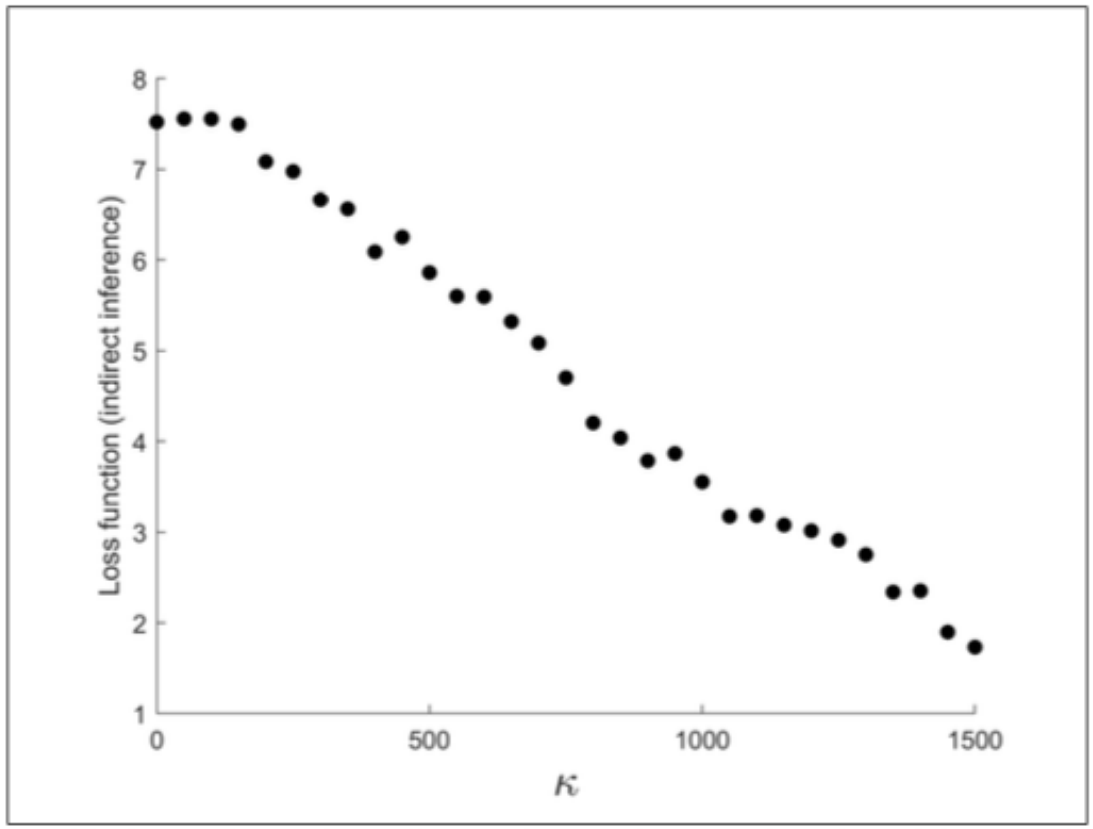
Model fit

Figure A.7: **Model fit: Targeted treatment parameters**



The importance of adjustment costs

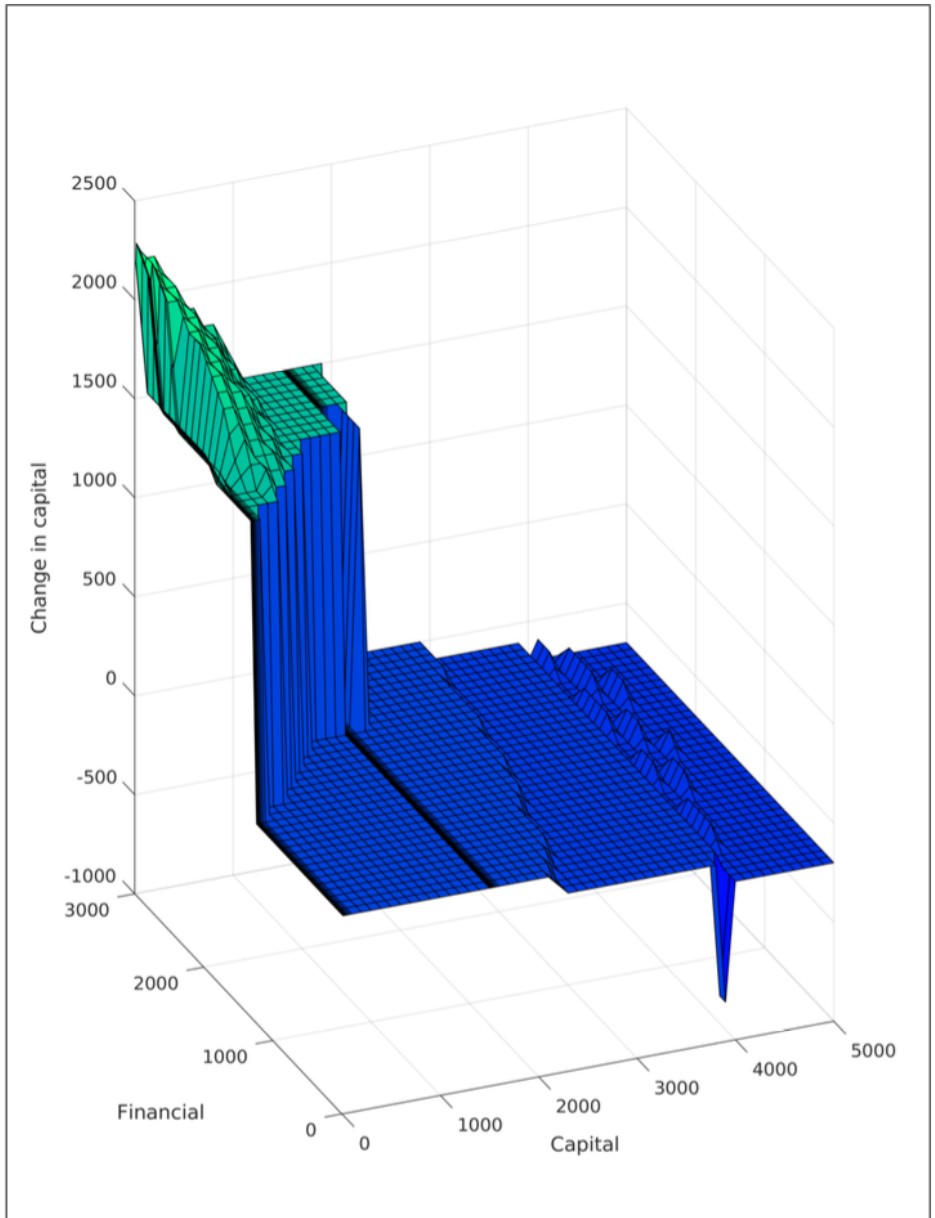
Figure 4: **Model fit and non-convex adjustment costs**



Note: This figure shows the Indirect Inference loss as a function of the magnitude of the non-convex capital adjustment cost, κ.

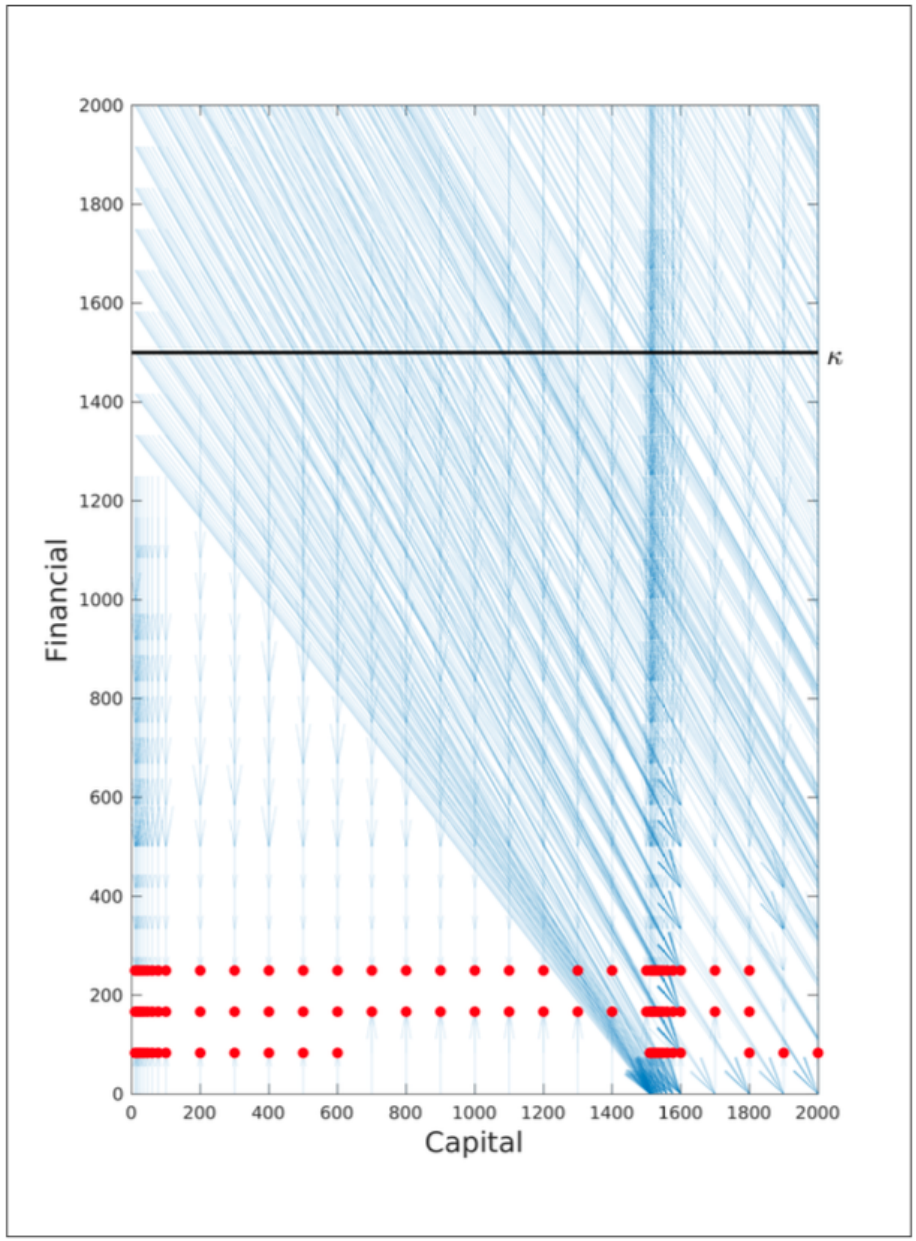
Key intuition from the model (no credit case)

POLICY FUNCTION: $k^*_{t+1}(k_t, f_t)$



Key intuition from the model (with microfinance)

Figure A.11: **Phase diagram in (k, f) space**



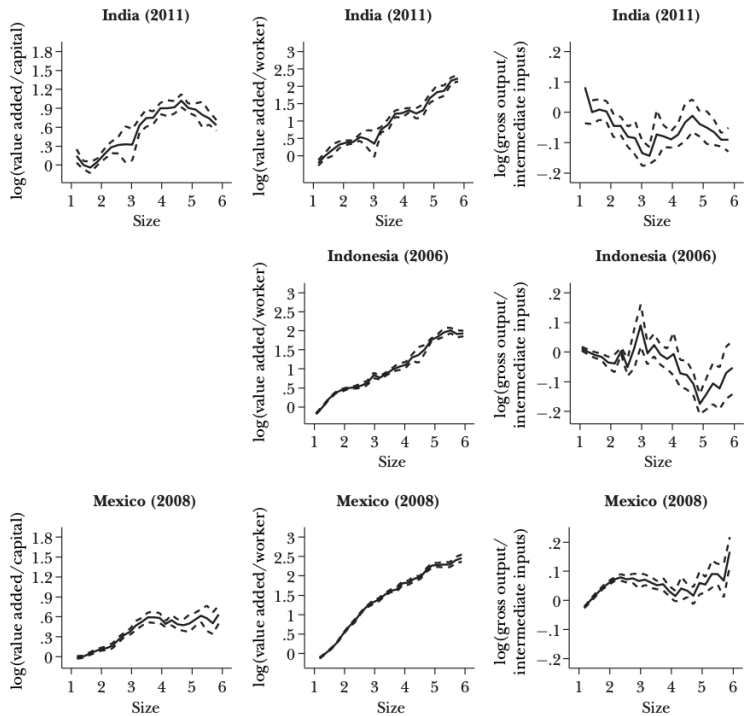
This helps us reconcile three facts on microentepreneurs

- High returns to capital.
- Small adjustment to physical capital stock.
- Small wealth stored in cash.

Also helps explain findings on grace periods (Field et al. 2013) and (to some extent) repayment flexibility (Battaglia et al. 2023)

Should we re-interpret this figure in the light of Bari et al.'s findings?

Figure 3
Average Product and Firm Size
(size measured as log(employment))



Source: See Figure 1 for sources.
Notes: Figure shows local linear regressions of log average product on log employment. We normalize the y-axis by taking the value of the function at log(employment) = 1.4 to be zero. Dashed lines represent 95 percent confidence bounds. Size is measured as log (employment).

From Hsieh and Olken 2014