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Debt Structure, Entrepreneurship, and Risk: Evidence from Microfinance

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Conclusions

- Wide interest in determinants of microenterprise growth in LDCs
 - Key constraint reported by micro-entrepreneurs is limited access to credit
- Microfinance Institutions (MFI) increasingly important source of credit for this group
 - By 2008, over 150 million MFI borrowers and over 43 billion USD in outstanding loans¹
- Yet recent evidence that MFI loans have limited impact on business growth²
- Credit constraints unimportant, or does term structure of MFI debt contract influence its economic impact?

¹Microcredit Summit Campaign (2009)

²Banerjee, Duflo, Glennerster, and Kinnan (2009), Karlan and Zinman (2009)

Key features of MFI lending model

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Conclusions

- Group lending, though not necessarily group liability
- Graduated loan size
- Repayment plan involves several small high frequency installments beginning soon after loan disbursement
 - No grace period
 - Very little flexibility accommodated, in terms of default penalties for delinquency

This Research

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- Introduce greater flexibility by allowing clients a two month grace period before repayment begins
- Grace period allows client to invest more in less liquid, higher return projects
- Contract type randomly assigned via field experiment that varied term structure of debt across MFI loan groups

Grace Period Experiment

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Conclusions

- Experimental design:
 - Control group: Start repayment 2 weeks after loan disbursement
 - Treatment group: 2 month grace period before repayment
 - Once repayment began, all clients repaid same amount on fortnightly basis
- Idea: Make MFI loans more like small business loans in US, which have longer grace period *but* also higher default
- Compare investment decisions, long-run profit, default

Preview of Findings

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Conclusions

- Two month delay in start of repayment significantly influences entrepreneurial behavior
 - Increased business spending in short run
 - Higher income and profits in long run
 - Higher variance of income and profits in long run
 - Riskier business practices which are more likely to create short term liquidity concerns
 - Higher default

Partner Organization – Village Financial Services (VFS)

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Conclusions

- Leading micro-finance institution in Kolkata
- Modal loan size in our experiment Rs. 8,000 (\$175)
- Implied annual interest rate of 22%
- Group size 5 clients
- Penalty for default: individual cut off from further loans even if they eventually pay

Research Design

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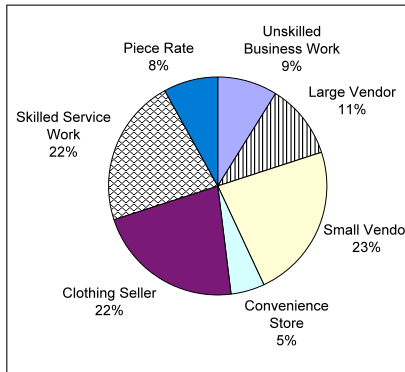
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- Formed 169 groups encompassing 845 borrowers
- After group formation, before loan disbursement, loan officers call project manager to get contract assignment. 84 groups received grace period contract and 85 groups received the regular contract
- Both contracts: 22 equal fortnightly installments, grace period contract installments initiated 2 months later
- Note: Interest amount held constant, so effective interest rate lower for grace period clients (in our calculation we examine whether this effect is important).

Context

- In our sample 77% of MFI clients have a household business
- Very limited financial access: 16% borrowed outside VWS and 33% had any savings
- High incidence of shocks: At baseline 60% report negative income shock; 42% report missed days of work



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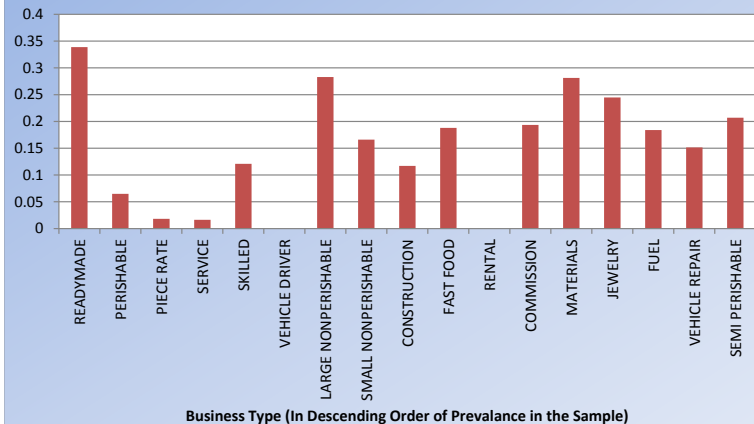
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- Working capital (raw material and inventory) main form of business assets
- Median business allowed customers to buy on credit: 50% of median business sales are on credit (see figure)
- High cost of liquidating: Average business reports liquidation within a day would imply loss of 25%, would take a week to liquidate

Liquidation Costs by Industry

Percent of Capital Lost if Forced to Liquidate in 24 Hours



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Case Studies: Sari Seller and Tailor

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Conclusions

- Both clients were second time VFS borrowers and their business had been in operation for at least 3 years
- VFS sole source of formal credit available to them.
 - High Variability of Demand: For sari seller, good month profit between 800 and 1300 Rs. but in low season profit no more than 300 Rs.
- Relevance of Grace Period:
 - Increased investment: No need to set aside money for initial repayment, so more investment and can enjoy economies of scale
 - More willing to take on entrepreneurial risk.
Sari-seller: increase variety of saris sold. Tailor: expand connections in neighboring state

Illustrative Model (Setup)

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Conclusions

- Three periods $t = 0, 1, 2$ and a continuum of MFI clients each with fixed default cost D_i
- Clients utility is $u_i(c_0, c_1, c_2) = c_0 + c_1 + c_2 - I_i D_i$ if $c_0, c_1, c_2 \geq 0$. Clients are borrowing constrained so that $c_t \geq 0$.
- I_i is an indicator = 1 if the client defaults and 0 otherwise
- At $t = 0$ every client receives loan B to be repaid in 2 installments: P_1 at $t = 1$ and P_2 at $t = 2$ such that $P_1 + P_2 = P$.

Model Setup (cont.)

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- Clients have access to two investment technologies:
 - *illiquid, risky* investment that pays off R_g with probability p_g and 0 with probability $1 - p_g$ after 2 periods for each unit invested
 - *liquid* investment that pays off R_L after one period for each unit invested.
- Assume $R_L^2 B \geq P$, $p_g R_g > R_L^2$
- We consider two contracts:
 - *regular* contract with $P_1 > 0$, $P_2 = P - P_1$
 - *grace period* contract where $P_1 = 0$ and $P_2 = P$

Debt Structure and Investment Choice

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Conclusions

- Show that switching to the grace period:
 - Increases amount invested in the risky asset
 - Increases probability of default
 - Increases variance of profits

Data Sources

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Conclusions

- Between April and August 2007 loan groups formed
- Within 2 months, Survey 1 conducted. Randomization check of time invariant characteristics shows balance
- Survey 2 one year later (January and November 2008):
 - Detailed loan use module included amount spent on business
- Survey 3: Long run impacts
 - Between February and July 2010 (two years after loan cycle over): detailed business survey on current investments and profits. 91% tracking rate
- Administrative data on default up to July 2009: Default at both 16 and 24 weeks after loan due in full

Estimation Strategy

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Conclusions

- For all outcomes we estimate regressions of form

$$y_{ig} = \beta D_g + B_g + \delta X_{ig} + \epsilon_{ig}$$

D_g is dummy for assignment to GP intervention and B_g

is stratification dummy.

- Since no drop out, ITT captures average treatment effect

Loan Use Endline Survey

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Table 2: Impact of Grace Period on Loan Use and Business Formation

	Loan Use: Business				Loan Use: Non-business							
	All	Inventory and Raw Materials	Equipment	Operating Costs	All	Home Repairs	Utilities, Taxes, and Rent	Human Capital	Money for Relending	Savings	Food and Durable Consumption	New Business
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
<i>Panel A (loan size controls)</i>												
Grace Period	364.9** (180.1)	337.1 (279.9)	8.786 (234.1)	19.01 (48.37)	-356.1** (172.4)	-208.8** (105.1)	-8.214 (19.90)	-34.97 (90.26)	-27.42 (70.61)	-15.02 (47.12)	-91.79 (94.11)	0.0268** (0.0135)
<i>Panel B (with controls)</i>												
Grace Period	383.9** (185.2)	367.6 (272.8)	-14.40 (227.1)	30.75 (49.38)	-371.6** (178.7)	-222.1** (110.4)	-9.657 (20.66)	-33.06 (91.99)	-30.13 (69.51)	-10.75 (47.48)	-94.73 (97.86)	0.0258* (0.0139)
Observations	845	845	845	845	845	845	845	845	845	845	845	845
Control Mean	6142.4 (162.4)	4521.4 (226.3)	1536.5 (172.4)	84.46 (36.91)	1149.1 (149.1)	557.2 (116.0)	25.95 (15.66)	237.9 (76.88)	197.6 (56.74)	131.6 (35.97)	151 (76.21)	0.0178 (0.00648)

New Business: Endline Survey

Table 3: Impact of Grace Period on Loan Use and Business Formation (cont.)

		Whether new business created 30 days prior to 6 months after group formation
		(8)
<i>Panel A</i>		
	Grace Period	0.0288** (0.0145)
	Controls Used	No
<i>Panel B</i>		
	Grace Period	0.0283** (0.0142)
	Controls Used	Yes
	Observations	830
	Control Mean	0.0238 (0.00791)

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Three Year Results

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Conclusions

- Roughly three years after the loan cycle we re-interviewed clients (91% response rate; balanced across treatment and control)
- Profits and household income measured by single question:
 - Average weekly profits now or when business last operational
 - During past thirty days what was total income earned

Long run income

Table 4: Impact of Grace Period Contract on Long Run Income and Profits

	Log (monthly HH)		Average Weekly Profits		Variability of Average Weekly Profits	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Panel A</i>						
Grace Period	0.177** (0.0798)	0.169** (0.0793)	869.9** (384.1)	450.0** (176.8)	4595 (3860)	449*** (149)
Trimmed	No	Yes	No	Yes	No	Yes
Controls Used	No	No	No	No	No	No
<i>Panel B</i>						
Grace Period	0.198** (0.0792)	0.192** (0.0780)	849.0** (333.3)	483.2*** (178.8)	3778 (3066)	421*** (142)
Trimmed	No	Yes	No	Yes	No	Yes
Controls Used	Yes	Yes	Yes	Yes	Yes	Yes
Observations	749	745	752	748	752	748
Control Mean	9.317 (0.0527)	9.305 (0.0534)	1586.9 (121.8)	1513.8 (102.7)	5400 (1985)	345 (494)

Was Business Size Influenced?

Table 5: Impact of Grace Period Contract on Business Size

	Raw Materials and Inventory		Equipment		Number of Employees
	(1)	(2)	(3)	(4)	(5)
<i>Panel A</i>					
Grace Period	4991.5** (2165.3)	3143.5** -1555	24866.3** (10638.7)	14767.4** (6529.4)	0.301 (0.304)
Trimmed	No	Yes	No	Yes	No
Controls Used	No	No	No	No	No
<i>Panel B</i>					
Grace Period	5358.2** (2339.1)	3718.2** (1611.0)	28889.8** (11484.5)	17098.8** (6607.4)	0.282 (0.290)
Trimmed	No	Yes	No	Yes	No
Controls Used	Yes	Yes	Yes	Yes	Yes
Observations	765	761	765	761	755
Control Mean	6586.2 (953.8)	6083.8 (851.3)	29144 (4811.8)	26557.3 (3987.1)	2.534 (0.180)

And Business Turnover?

Table 5: Impact of Grace Period Contract on Business Size (cont.)

	At Least One Business Reported as Closed Between Loan Disbursement and Follow-Up	Sold Goods or Services at a Discount to Make Loan Payment
	(6)	(7)
<i>Panel A</i>		
Grace Period	-0.0647* (0.0328)	-0.0219* (0.0127)
Trimmed	No	No
Controls Used	No	No
<i>Panel B</i>		
Grace Period	-0.0662* (0.0337)	-0.0158 (0.0121)
Trimmed	No	No
Controls Used	Yes	Yes
Observations	770	752

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Willingness to undertake Business Risk

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Table 6: Impact of Grace Period Contract on Business Behavior

	Customers Buy on Credit	Percent of Customers that Buy on Credit	Customers Pre- Order Goods or Service	Percent of Customers that Pre- Order Goods or Services	Number of Goods and Services Business Provides
	(1)	(2)	(3)	(4)	(5)
<i>Panel A</i>					
Grace Period	0.0962*** (0.0364)	5.589** (2.421)	0.101*** (0.0360)	4.882* (2.906)	5.789** (2.625)
Controls Used	No	No	No	No	No
<i>Panel B</i>					
Grace Period	0.116*** (0.0369)	6.204*** (2.370)	0.113*** (0.0359)	5.751* (2.963)	6.614** (2.948)
Controls Used	Yes	Yes	Yes	Yes	Yes
Observations	769	769	769	769	769
Control Mean	0.432 (0.0270)	20.65 (1.601)	0.395 (0.0236)	23.65 (1.981)	5.571 (0.476)

Default outcomes

Table 7: Impact of Grace Period Contract on Default

	Full loan not repaid within 8 weeks of due date	Full loan not repaid within 24 weeks of due date	Full loan not repaid within 52 weeks of due date
	(1)	(2)	(3)
<i>Panel A</i>			
Grace Period	0.0851** (0.0336)	0.0670** (0.0275)	0.0643** (0.0252)
Controls Used	No	No	No
<i>Panel B</i>			
Grace Period	0.0839** (0.0332)	0.0649** (0.0266)	0.0636** (0.0252)
Controls Used	Yes	Yes	Yes
Observations	845	845	845
Control Mean	0.0424 (0.0142)	0.0212 (0.0101)	0.0165 (0.00899)

Summary of Findings

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- A two month delay in start of repayment significantly influences entrepreneurial behavior
 - Increased business spending in the short run
 - Higher income and profits in the long run
 - Riskier business practices which are more likely to create short term liquidity concerns
 - Higher default

Three Back of the Envelope Calculations

- Present value of loan payments for grace period clients less than present value for regular clients. Can difference explain results?
No, even conservative assumption regarding ratio of consumption to income (0.5) predicts only 19% of difference in capital stock at endline
- Grace period clients less likely to repay loan and therefore have more cash. Is extra money from default enough to explain results?
No, extra cash from default less than 2% of observed capital stock differential
- Mechanism in model is differential returns on investment lead to differential capital stock at endline. Can reasonable differential in returns generate observed capital stock differences?
Yes ...

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How large of a differential in returns is required to generate observed endline capital stock differences?

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- Suppose average grace period client invests Rs. 6,500 while regular client invests Rs. 6,100 (as we observe)
- Grace period clients earn net monthly return of $(X + Z)\%$ compared with $X\%$ for regular clients
- Assume all returns re-invested so that three years later capital stock differential is:
$$(1 + X + Z)^3 66500 - (1 + X)^3 66100$$
- With $X = .04$ and $Z = .02$, capital stock difference at endline is 28,000, as observed

Differential Investment Returns and Returns to Capital

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- Assume a marginal propensity to consume out of investment income of 0.50
- Assume a return on capital of 4% for non-grace period clients over the course of the loan contract, followed by a return of 12% during the subsequent period, and a return of 12% for grace
- the differential in capital stock at endline will be 18,000 Rupees (same order of magnitude as seen in data).

Conclusions

- Introduction of a grace period into a MFI contract influenced client investment choices and their long-run economic outcomes.
- Recently, there has been a lot of discussion about how MFIs should be regulated. For instance, Yunus writes in NYT

The maximum interest rate should not exceed the cost of the fund – meaning the cost that is incurred by the bank to procure the money to lend – plus 15% of the fund. That 15% goes to cover operational costs and contribute to profit. In the case of Grameen Bank, the cost of fund is 10%. So, the maximum interest rate could be 25%. However, we charge 20% to the borrowers. The ideal 'spread' between the cost of the fund and the lending rate should be close to 10%.

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- Our results suggest that capping interest rates (and therefore MFI ability to price risk) will influence how default-averse they are.
- It will tend to push MFIs towards contracts that restrict risk-taking
 - Indian subcommittee on MFIs has recommended both capping interest rates *and* introducing a grace period. Likely to affect sustainability of MFIs?
- Open questions
 - How does introducing a grace period change client selection ?
 - How did it change long-run credit access?

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