Microcredit: New Directions

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The Miracle of Microfinance?

- Success of microfinance: showed that it is possible to lend to the poor in a self-sustaining manner (i.e., with high repayment rates, enabling MFIs to break even)
- What impact does it have on the lives of the borrowers — does it enable them to improve their living standards, increase incomes and assets, and break out of poverty?
- This is harder to assess, without careful econometric research: problems in identifying causal impact of access to MFI loans on income
- Debates concerning impact of Grameen bank loans between Pitt and Khandker (JPE, 1998) and Morduch (working papers, Roodman-Morduch (JDS 2013)) using household survey data, involving technical econometric issues (robustness to outliers, estimators and error distribution assumptions)

Excerpt from Center for Global Development blogsite

1991--92. With funding from the World Bank, and in cooperation with the Bangladesh Institute for Development Studies, economists Mark Pitt and Shahidur Khandker field a survey of some 1,800 households in Bangladeshi villages, visiting each three times, in three successive seasons.

1996. Pitt and Khandker (PK) circulate a World Bank working paper analyzing this data using complex mathematics and concluding that microcredit increases household spending, especially when given to women.

1998. The study appears in the prestigious *Journal of Political Economy* and becomes the leading analysis of the impact of microcredit. "[A]nnual household consumption expenditure increases 18 taka for every 100 additional taka borrowed by women...compared with 11 taka for men." But a young economist named Jonathan Morduch circulates a draft paper that applies much simpler methods to the data and reaches different conclusions. Microcredit does not seem to increase spending, but it does appear to smooth it out from season to season. Morduch questions key assumptions in PK.

1999. Pitt retorts, seeming to rebut Morduch's criticisms one by one. Neither Pitt nor Morduch uses the other's methods, so no direct confrontation between the seemingly contradictory results occurs. For interested bystanders, the exchange is as enlightening as two nuclear engineers arguing over obscure

Enter Randomized Controlled Trials (RCTs)

- AEJ:Applied January 2015 symposium issue: six related RCTs in different countries (Bosnia, Ethiopia, India, Mexico, Mongolia, Morocco) on effectiveness of MF in reducing poverty
- Similar (but not identical) designs
- Some with IL loans (Bosnia, Mongolia, featuring selection by loan officers and use of collateral)
- Mixture of rural/urban settings
- Below market interest rates (ranging 12-25% APR)

Range of Treatments in AEJ App 2015 symposium

Study:	Bosnia and Herzegovina (1)	Ethiopia (2)	India (3)	Mexico (4)	Mongolia (5)	Morocco (6)
Loan term length	Average 14 months	12 months	12 months	4 months	3–12 months group (average 6 months); 2–24 months individual (average 8 months)	3–18 months (average 16 months)
Repayment frequency	Monthly	Borrowers were expected to make regular deposits and repayments	Weekly	Weekly	Monthly	Weekly, twice monthly, or monthly
Interest rate[c]	22 percent APR	12 percent APR	24 percent APR (12 percent nondeclining)	110 percent APR	26.8 percent APR	14.5 percent APR
Market interest rate[b]	27.3 percent APR	24.7 percent APR	15.9 percent APR	145.0 percent APR	42.5 percent APR	46.3 percent APR
Liability	Individual lending	Group (joint liability)	Group (joint liability)	Group (joint liability)	Two treatment arms: group (joint liability) and individual	Group (joint liability)
Group size	No data	No data	6–10 people	10–50 people	7–15 people	3–4 people
Collateralized	Yes (77 percent)	Yes (majority asked to provide)	No	No	Yes (100 percent) for group loans, often for individual loans	No (yes for few individual loans)
Loan loss rate at baseline[b]	No data	0.3 percent (Oromiya), 0.0 percent (Amhara)	2.0 percent	3.2 percent	0.1 percent	0.5 percent
Initial treatment loan size (local currency)	Average 1,653, median 1,500 (2009 BAM)	Median 1,200 (2006 birr)	10,000 (2007 Rs)	Average 3,946 (2010 peso)	Average group: 320,850 (per borrower), average individual: 472,650 (2008 MNT)	Average 5,920 (2007 MAD)

AEJApp Symposium: Summary of Findings

- Impacts are modest, 'not transformative'
- Low take-up of loans (15-30%), lowering statistical precision; difficult to predict take-up, treatment estimates are intent-to-treat (ITT)
- Insignificant (positive but statistically insignificant, even at 10%) ITT effects on household income, consumption, child schooling, measures of female empowerment
- Some effects are statistically significant: on investment, occupational pattern (towards entrepreneurship away from wage employment)
- Reduction of spending on 'temptation' goods (recreation, entertainment, celebrations..)

Explanation?

- Investment/consumption effects: borrowers used loans to increase spending on durables (consumer/business investment), co-financed by lowering discretionary consumption; so effects on consumption are ambiguous
- Lack of income effects: no clear explanation
- So a puzzle remains: if MFI loans reduced underinvestment (marginal product of capital exceeded interest rate), income should have increased
- Evidence from a number of other studies regarding high marginal product of capital among micro-entrepreneurs (de Mel, McKenzie and Woodruff (QJE 2007) RCT capital grants to Sri Lanka entrepreneurs showing marginal product of male entrepreneurs in excess of 100%)

Possible Reasons for Limited Income Impact of Traditional Micro-Finance

- *High Repayment Frequency:* limits capacity of borrowers to invest in projects with gestation lags longer than a week or a month
- *Limits on Risk-Taking:* Intense peer pressure and from MFI loan officials to avoid any risk, implies borrowers cannot invest in high-mean-high-risk projects (Fischer (Econometrica, 2013))
- our interviews of MFI clients in West Bengal indicated they wanted to (but could not) invest in agriculture (esp cash crops) but they involved min lag of 3 months between planting and harvest, and were risky

RCT on Effects of Extending Loan Duration

- RCT on extending loan grace period to 2 months in an urban area of WB (Field, Pande, Papp and Rigol (AER 2013))
  - significantly increased investment (6%), business profits (41%) and income (19%) after three years, monthly 11% return
  - but loan default rates **tripled**, raising breakeven interest rate for MFI from 17 to 37%
- This helps explain reluctance of MFIs to extend loan duration, which in turn restricts its impact on borrowers incomes

TRAIL: An Alternative Approach (Maitra et al 2017)

- This paper focuses on adverse selection as an explanation for low impacts on borrower incomes (in conjunction with loan inflexibility)
- JL loans attract both high productivity and low productivity borrowers, resulting in low average impact (compounded by joint liability tax, loan inflexibility)
- Experiments with TRAIL, an alternative approach to utilizing local 'social capital' in improving selection (combined with IL loans of 4 month duration, designed to facilitate cash crop financing)
- RCT comparing TRAIL and traditional JL based micro-credit (GBL) in 48 villages of West Bengal

TRAIL (Trader Agent Intermediated IL Loan) Design

- Borrowers selection delegated to an **agent**: local lender/trader with extensive experience lending within the village
- Agent is incentivized by being paid a commission equal to x% of interest repayments of the clients they recommend, plus forfeit an initial deposit posted by the agent in the event of default
- Idea:
  - the agent knows distribution of productivity across farmers within the village
  - High productivity farmers are less likely to default
  - Agent will recommend high productivity farmers
  - Mechanism is collusion-proof if x is high enough

TRAIL Design, contd.

- Individual liability loans (eliminate joint liability tax), no group meetings (eliminate peer or loan officer monitoring)
- Loan duration: 4 months, timed to coincide with crop cycles
- Facilitation of lending for cultivation of potato, main cash crop (income/acre three times higher than paddy or sesame, but also riskier): insurance against price or local yield shocks, allow loans for storage (repayment in the form of storage receipts)
- Interest rate of 18% (market rate 21-30%, average 26%)
- Dynamic repayment incentives: start with small loans ($40), but credit limit set at 133% of loan repaid in previous cycle; repayment below 50% results in termination (above 50%: increase debt carry over)

Control: GBL (Group Based Loans) Design

- Joint Liability loans: 5 person groups self-form and apply for JL loan
- Monthly group meetings and savings requirements
- MFI receives 75% commission on interest repaid
- All other loan terms same as TRAIL: duration, interest rate, timing, crop insurance, dynamic repayment incentives

Experiment Setting and Details

- Two potato-growing districts of West Bengal
- 48 villages (randomly chosen locations), divided randomly between TRAIL and GBL (24 villages each)
- Agent chosen in TRAIL villages randomly from list of established traders/lenders, recommend 30 borrowers, 10 chosen randomly to receive TRAIL loan offers
- In GBL villages, 5-person borrower groups self-form, group meetings and savings targets for 6 months, then apply for JL loan, two groups randomly chosen to receive GBL loan offer
- Household surveys: random sample of 50 households per village (including treatment and non-treated), baseline Fall 2010, eight cycles (Oct 2010-Aug 2013)

Experimental Results: ATEs on Potato Cultivation and Incomes

Panel A: Potatoes

	Cultivate (%) (1)	Land planted (Acres) (2)	Harvested quantity (Kg) (3)	Cost of Production (₹) (4)	Revenue (₹) (5)	Value Added (₹) (6)	Imputed Profit[a] (₹) (7)	Index of dependent variables[b] (8)
TRAIL Treatment	0.047	0.095***	975.371	1909.738***	4011.624***	2109.242***	1939.494***	0.198***
	(0.032)	(0.028)	(301.124)	(718.799)	(1186.538)	(621.037)	(591.339)	(0.057)
Hochberg p-value								0.003
Mean TRAIL Control 1	0.715	0.333	3646.124	8474.628	14285.467	5739.479	4740.893	
% Effect TRAIL	6.56	28.46	26.75	22.53	28.08	36.75	40.91	
GBL Treatment	0.053	0.052	514.435	1601.298*	2343.964	714.137	553.708	0.111
	(0.044)	(0.035)	(395.082)	(877.219)	(1729.723)	(918.671)	(866.430)	(0.081)
Hochberg p-value								0.861
Mean GBL Control 1	0.620	0.251	2761.127	5992.080	11014.286	4997.446	4018.796	
% Effect GBL	8.59	20.79	18.63	26.72	21.28	14.29	13.78	
Sample Size	6210	6210	6210	6210	6210	6210	6210	

Experimental Results: ATEs on Farm Incomes and Estimated Rates of Return

	Farm Value Added	Non-Agricultural Income	Index of dependent variables[b]	Rate of Return[a]	
				Potato Cultivation	Farm Value Added
	(₹)	(₹)			
	(1)	(2)	(3)	(4)	(5)
TRAIL Treatment	2239.22***	−608.000	0.095**	1.10[c]	1.01[c]
	(717.75)	(4153.557)	(0.043)	(0.02)	(0.02)
Hochberg p-value			0.113		
Mean TRAIL Control 1	10142.06	40115.81			
% Effect TRAIL	22.1	−1.52			
GBL Treatment	−105.2	−6092.631	−0.032	0.45	−0.07
	(1037.82))	(4959.88)	(0.046)	(1.10)	(0.58)
Hochberg p-value			>0.999		
Mean GBL Control 1	9387.6	45645.10			
% Effect GBL	−1.1	−13.35			
TRAIL vs GBL p-value	0.064	0.393			
TRAIL vs GBL (90% CI)				[−1.410, 1.418]	[−3.40, 2.56]
Sample Size	6204	6210			

Experimental Results: Loan Take-up and Repayment Rates

Table 7
Loan performance.

	Repayment (1)	Take up (2)	Continuation (3)
Panel A: Sample Means			
TRAIL	0.954	0.856	0.805
	(0.006)	(0.008)	(0.009)
GBL	0.950	0.746	0.691
	(0.007)	(0.011)	(0.011)
Difference	0.004	0.110***	0.114***
	(0.009)	(0.014)	(0.014)
Panel B: Regression Results			
TRAIL	0.009	0.117*	0.116*
	(0.009)	(0.067)	(0.067)
Constant	1.002***	0.838***	0.827***
	(0.0006)	(0.053)	(0.053)
Mean GBL	0.950	0.747	0.694
Sample Size	2406	3226	3512

Explaining ATE Differences: Theory

- TRAIL and GBL differ with respect to both *selection* and *incentives*: develop model and estimate it to separate their respective roles
- Theoretical model extends Ghatak (2000) to incorporate informal lenders and variable scale of cultivation
- Farmer type $i = H, L$, p_i probability of success ($1 > p_H > p_L$), production function $\theta_i f(I)$ where TFP $\theta_H > \theta_L$, $I \geq 0$ is chosen scale of cultivation
- Local informal lenders fully informed about borrower type, engage in Bertrand competition (but have high lending costs ρ)
- MFI has lower cost of capital than ρ, offers loans at rate $r_T < \rho$ which supplement informal loans

Model Predictions: Selection and Incentive Differences

- Superior selection in TRAIL (returns to cultivation higher) because:
  - TRAIL agent selects high productivity farmers (because they are less likely to default)
  - GBL attracts borrowers of both types, MFI has no way to distinguish between them
  - Ghatak argument for positive assortative matching does not extend with variable scale of cultivation
- Superior incentives in TRAIL (treatment effect on cultivation scale is higher), because it avoids joint liability tax (interest obligation of TRAIL loan is r_T, of GBL loan is $r_T(1 + (1 - p_j))$

Testing and Estimating Role of Selection and Incentive Effects

- Use farm panel data (8 cycles, 3 years) to estimate TFP of each farmer, wide dispersion within villages (TFP top to bottom ratio is 10:1)
- TFP distribution in TRAIL first order stochastically dominates GRAIL distribution
- Heterogenous treatment effects estimated, used to decompose ATE difference into Selection and Incentive Effects
- Lower bound estimate of role of Selection: 30-40%

Related Work: Eliciting Community Information to Select Beneficiaries (Hussam, Rigol and Roth 2017)

- Hussam et al (2017) conduct a RCT in Amravati, a town in Maharashtra (India), with about 1400 micro-entrepreneurs in 8 neighborhoods of the town
- Form 274 neighborhood peer groups of 5 entrepreneurs who live near each other, have close family/social links
- Ask each entrepreneur to rank their peers with respect to expected rate of return to a cash grant of USD 100
- Provide grants randomly (lottery tickets distributed), in one *high stakes* treatment partly on the basis of the peer reports (bias lottery ticket distribution in favor of highest ranked entrepreneurs)
- Self-reported business profits after 6 months calculated, compared between winners and losers

Main Results regarding Community Information (Hussam et al 2017)

- High heterogeneity (and mean) monthly rate of return: mean of 8%, for top third varying between 17 and 27% **(hence targeting to latter would triple income impact)**
- Peer reports successfully predict returns, more than can be predicted by machine learning based algorithms based on observable household characteristics
- Peer reports are biased strategically to favor family and close friends chances of winning the grant (peer reports are less accurate in the high stakes treatment)
- Incentivizing truthful reporting via mechanism design techniques based on cross-reporting reduces such strategic behavior and increases accuracy of peer reports
- *Hence the results suggest that eliciting community information would help improve targeting of grants to more productive entrepreneurs*

Alternative Direction: Collateralized Sales (Jack et al (2016))

- Jack, Kremer, de Laat and Suri (2016) pursue a different new direction: individual liability loans that finance asset purchases, using the asset itself as collateral
- Common in developed countries: home, car, appliance purchases are bundled with financing plans
- Asset itself serves as collateral for the loan: default results in lender repossessing the asset
- Less common in LDCs (why? maybe asset repossession is more difficult, less profitable for lender...)
- This paper conducts an RCT in rural Kenya, where a savings cooperative allowed members to purchase plastic water tanks to harvest rainwater with varying collateral terms

Setting and Experiment Design

- Smallholder farmers belonging to a dairy cooperative, and an associated savings and credit cooperative SACCO
- SACCO can provide loans to farmers to purchase 5000 litre plastic water tanks to be installed outside their home (store water for drinking, to feed livestock, and irrigate fields)
- Status quo arrangement for financing: one third of loan to be secured by farmers own saving deposits, remaining secured by cash or third-party guarantees (i.e., joint liability)
- New financing options offered:
  - 25% deposit paid by borrower, remaining 75% collateralized by the tank itself
  - 4% deposit, 21% third-party guarantees, 75% asset-collateral
  - 4% deposit, 96% asset collateral

Predicted Effects

- Authors develop a theory to predict impact of these new treatments on loan take-up, defaults, lender and borrower profits
- Assumes unobserved heterogeneity among borrowers w.r.t. personal valuation of the water tank, and ex post income (available to repay the loan)
- Asset repossession (i.e., default) is costly to both lender and borrower
- Predicted effects of lowering deposit requirements: increases default rates, raises loan take-up, borrower welfare, effects on lender is ambiguous
- Profit-maximizing strategy for lender involves excessive deposit requirements (lender does not internalize costs imposed on intra-marginal borrowers)

Experimental Results

- Loan take-up rates rise from 2.4% in the status quo, to 24% in the two treatments with the intermediate (25%) deposit requirement, and to 41% in the one with low (4%) deposit requirement
- Take up rate difference between intermediate deposit-cum-JL and low deposit treatments (both involve own deposit of 4%) is not statistically significant: hence no evidence that JL expands credit access
- No defaults in the low or intermediate deposit treatments, rising to only 0.7% in the low deposit treatment

Experimental Results, contd.

- SACCA decided (based on the results of the experiment) to select the intermediate deposit policy, rather than the low deposit policy
- Impact of low deposit treatment (compared with status quo) on borrowers:
  - increased access to fresh water
  - lower sickness among cows
  - time spent by children fetching water
  - higher school enrollment of girls
  - negligible effects on milk production, some increase in milk sales

Concluding Observations

- Disappointing results concerning poverty impact of traditional microcredit
- Currently dominant approach to poverty reduction rely on grants — e.g., de Mel-McKenzie-Woodruff (2007), BRAC style ultra-poor programs (Bandiera et al (QJE 2017), Banerjee et al (Science, 2015))) relying on bundled offers of productive assets, training and savings access
- New directions in microcredit are promising, involving enhanced loan flexibility, individual liability loans combined with harnessing of community information and collateralized asset loans
- Concerns with external validity, scale up issues — needs more work!