# 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))
- Corroborated in our interviews of MFI clients in West Bengal:
  - they wanted to (but could not) invest in cash crops with high mean returns
  - one reason: minimum lag of 3 months between planting and harvest
  - other reason: cash crops are risky, discouraged by peers and MFI

# 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)
- Contrary to Ghatak-Tassel theory, JL loans attract both high productivity and low productivity borrowers, resulting in low average impact
- The problem is compounded by joint liability tax and loan inflexibility
- Experiment with TRAIL (Trader Agent Intermediated Individual Liability Loans), an alternative approach to utilizing local 'social capital' in improving selection of good borrowers

# TRAIL: An Alternative Approach (Maitra et al 2017), contd.

- The paper reports on results of an RCT comparing TRAIL and traditional JL based micro-credit (GBL) in 48 villages of West Bengal, India
- Both TRAIL and GBL give loans of 4 month duration, and crop-risk insurance, to facilitate cash crop financing
- Main hypothesis is that TRAIL achieves better selection of borrowers, and this is an important reason for superior performance of TRAIL in raising borrower incomes (while maintaining low default rates)
- RCT is designed to separate selection from treatment effects, and identify the quantitative role of selection in explaining differences in ATEs

# TRAIL: Idea and Design

- Borrowers selection delegated to an **agent**: local lender/trader with extensive experience in (informal) 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
- We set $x = 75\%$, to be on the 'safe' side

# TRAIL Loans

- 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 (same as TRAIL agent)
- *All other loan terms same as TRAIL*, including duration, interest rate, timing, crop insurance, dynamic repayment incentives
- In particular, GBL loans have 4 month duration, as against 2 month grace period in Field et al (2013), and carry crop insurance, so they are just as flexible and suited for high risk cash crop cultivation as TRAIL

# 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
- From those recommended, *10 chosen randomly to receive TRAIL loan offers* — Treated group
- Two control groups within TRAIL: Control 1 (recommended, not offered the loan), Control 2 (not recommended)
- Enables separation of **selection** (difference between control 1 and 2) and **treatment** effects (difference between treated and control 1)

# Experiment Setting and Details, continued

- Similarly, in GBL villages, 5-person borrower groups self-form, group meetings and savings targets for 6 months, then apply for JL loan
- Of those applying, two groups are randomly chosen to receive GBL loan offer — GBL Treated
- Those applying but not offered loans constitute GBL Control 1 borrowers; those that never applied are GBL Control 2 subjects
- Estimate selection (Control 1 - Control 2) and treatment (Treated - Control 1) effects in GBL; then compare these with corresponding TRAIL selection and treatment effects
- Household surveys in each village: random sample of 50 households per village (10 treated, 10 Control 1, 30 Control 2), 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 are fully informed about borrower type, engage in Bertrand competition (but have high lending costs $\rho$)
- MFI has lower cost of capital than $\rho$, offers loans at rate $r_T < \rho$ which supplement informal loans
- Comparative advantage of local lenders: information; of MFI: access to capital at lower rates

# Model Predictions: Selection and Incentive Differences

- Superior selection in TRAIL (returns to cultivation higher)
- Because TRAIL agent commissions motivate the agent to select H type farmers (high productivity, lower risk)
- On the other hand, GBL may not achieve selection of H types for following reasons:
  - GBL is a single loan product, not a menu designed to induce self-selection of H and L types
  - Single GBL loan product at below market interest rate, attracts both H and L types
  - With variable scale of cultivation, assortative matching need not happen

# Model Predictions: Selection and Incentive Differences, contd.

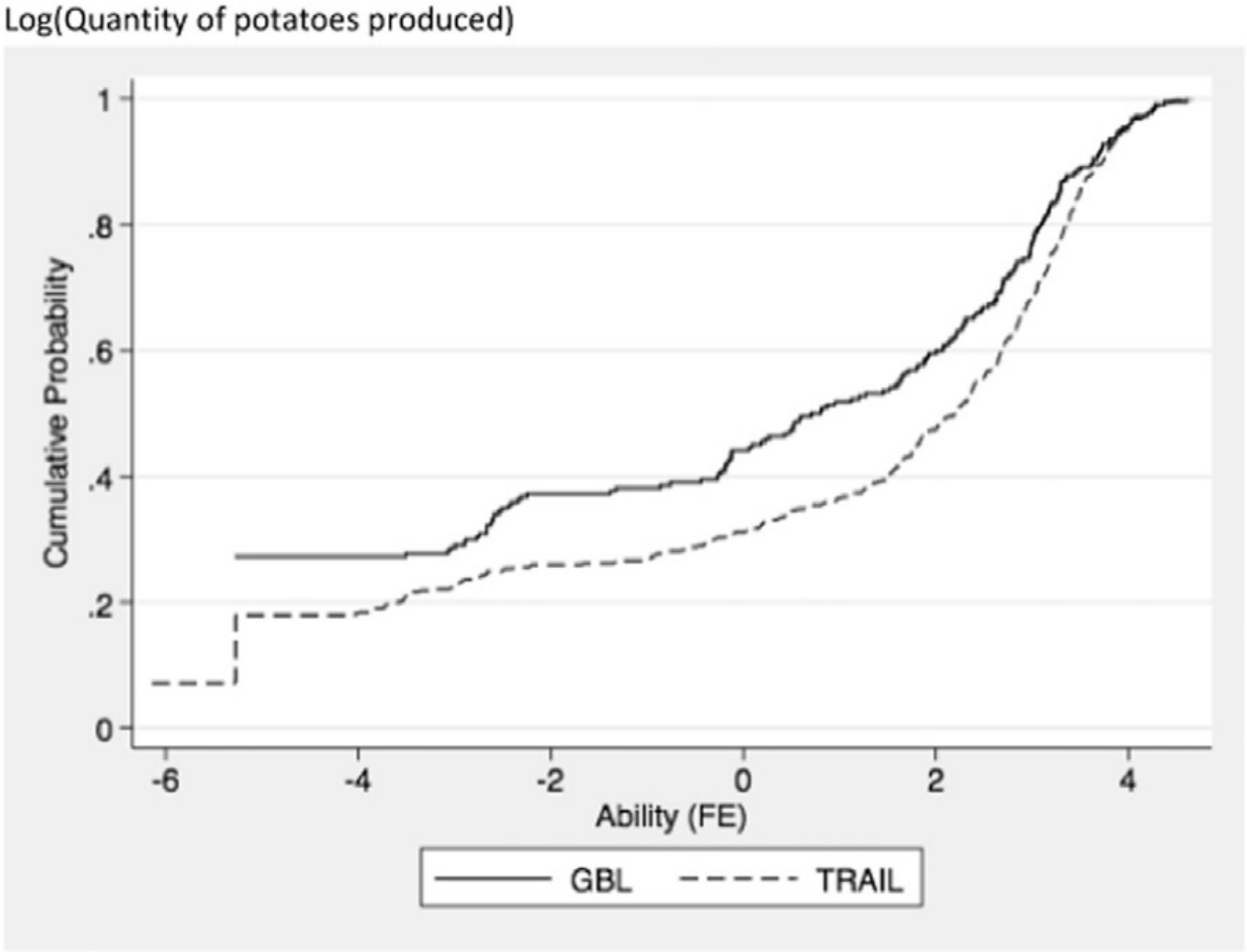
- Superior selection in TRAIL: TRAIL selection biased in favor of high productivity borrowers; GBL attracts borrowers of both types
- Superior incentive effect in TRAIL: higher treatment effect on scale of cultivation, because it avoids joint liability tax (interest obligation on TRAIL loan is $r_T$, 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)
- **Estimated Selection Difference:** 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%

# Testing Prediction on Selection Differences

*P. Maitra et al.*



# Decomposition of ATE Difference: Role of Selection

*P. Maitra et al.*

**Table 12**
Decomposition of average effect on farm value added by ability.

| | TRAIL | GBL | Difference (TRAIL - GBL) | Treatment Effect | Difference× Treatment Effect |
|---|---|---|---|---|---|
| | (1) | (2) | (3=1-2) | (4) | (5=3×4) |
| **Ability estimates from: Log(Quantity of potatoes produced)** | | | | | |
| $\widehat{Q}_1$ | 0.18 | 0.27 | −0.09 | 629.4 | −58.58 |
| $\widehat{Q}_2$ | 0.24 | 0.28 | −0.04 | −2706 | 112.46 |
| $\widehat{Q}_3$ | 0.30 | 0.25 | 0.05 | 3521 | 163.86 |
| $\widehat{Q}_4$ | 0.28 | 0.20 | 0.09 | 7734 | 681.33 |
| **% of Average Treatment Effect Difference due to Selection Difference** | | | | | 40.76 |

# 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!