

Zahid Husain Memorial Lecture Series, No. 20

**Trader Agent Intermediated Lending (TRAIL):
A New Approach to Financing Smallholder
Agriculture in LDCs**



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Ideas For Growth
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The Key Problem

- ❖ Institutional finance does not reach poor in many LDCs
- ❖ E.g., more than 40% of Indian population do not have bank accounts; those without access to bank loans are even larger
- ❖ Consequence: poor are forced to rely on credit from informal lenders at high cost
- ❖ Prevents them from engaging in productive activities which would enhance growth and enable them to escape poverty

Underlying Reasons for Financial Exclusion of Poor

- ❖ **Poverty:** Poor borrowers lack collateral
- ❖ **Weak State Capacity:** Bank officials have poor information and enforcement capacity
- ❖ **Geography:** Banks incur high transaction costs of providing access to poor, many of whom are located in rural, remote regions

What about “Traditional” microcredit?

- ❖ Microcredit has expanded credit access for the poor...
 - generated high repayment rates
 - allow borrowers to smooth consumption, manage liquidity, purchase consumer durables
- ❖ ...but has not been successful in enabling borrowers to raise their incomes by financing productive activities
- ❖ January 2015 symposium issue of *American Economic Journal: Applied*: uniform result of RCTs conducted in Bosnia, Ethiopia, India, Mexico, Mongolia, Morocco

The Challenge

- ❖ We therefore need to consider new approaches to expanding access to loans for the poor
- ❖ The problem is hardest with regard to rural poor
- ❖ Main productive activity in rural areas: agriculture
- ❖ Need to devise innovative approach to financing agricultural needs of poor farmers

TRAIL Experiment in West Bengal, India

- ❖ Shall talk about an RCT conducted in West Bengal to address this problem
- ❖ We devise a new microfinance product called TRAIL (Trader Agent Intermediated Loans)
- ❖ Similar to TRAIL experiment being carried out currently by State Bank of Pakistan

Main Idea Underlying TRAIL

- ❖ Individual liability rather than group liability loans, intermediated by local lender/trader
- ❖ Eliminate role of group members and bank/MFI officials in selection, monitoring and enforcement
- ❖ Rely instead on the trader-intermediary agent
- ❖ Incentivize the TRAIL agent suitably to ensure responsible behavior
- ❖ Besides restructuring loans to allow borrowers to finance high-risk agriculture

Main Objective of West Bengal Experiment

- ❖ Devise a loan product which:
 - targets poor farmers
 - enables them to expand cultivation of cash crops
 - raise borrower incomes
 - achieves high take-up and repayment rates
- ❖ Evaluate it relative to a 'traditional' microfinance product relying on groups and active monitoring by loan officials

Our Diagnosis: Why Has Microcredit Not Succeeded So Far?

Traditional microcredit

- ❖ motivated by need to ensure high repayment rates
- ❖ high frequency (weekly/bi-weekly/monthly) repayment
- ❖ intensive peer monitoring and MFI monitoring to restrict project choices and risk-taking

Our Diagnosis, contd.

These features rule out scope for financing cash crop cultivation, since:

- ❖ crop cycle durations exceed loan duration
- ❖ cash crops entail high-risk
- ❖ interest rates similar to informal credit rates, owing to high costs of administering group meetings

Our Approach: Loan Features

- ❖ Our loans are structured to address these problems:
 - 4-month durations (to match crop cycles)
 - ‘low’ (18% p.a.) interest rate relative to local informal rates (26%)
 - built-in crop insurance against local covariate (price, yield) risks

- ❖ besides dynamic repayment incentives:
 - repayment-based expansion in future credit access (33% across 4-month rounds, starting with Rs. 2000)
 - termination following more than 50% default

Mechanism 1: TRAIL

Trader Agent Intermediated Lending (TRAIL) scheme:

- ❖ Individual liability loans
- ❖ No MFI or group role in selection or monitoring, no savings requirements or group meetings
- ❖ Borrower selection: a local trader/lender intermediary agent recommends borrowers, on the basis of personalized knowledge of their reliability resulting from prior experience
- ❖ Agent is incentivized via commissions based on loan repayment

Mechanism 2: GBL

Group-based lending (GBL) scheme:

- ❖ has the same loan features to allow agricultural financing
- ❖ and also “traditional” group-lending features
 - self-forming and self-monitoring 5-member groups
 - joint liability loans
 - monthly group meetings, savings requirements

TRAIL versus GBL: The Key Difference

- ❖ Individual versus Joint Liability Loans:
 - High-powered versus Low-powered incentives
 - Group Monitoring/Constraints
- ❖ Selection Mechanism:
 - TRAIL agent acts as gate-keeper, selects productive, reliable borrowers
 - GBL based on self-forming groups: no way to exclude unreliable borrower groups

Can Agents be Trusted?

- ❖ Concerns expressed both by academics and policy-makers
- ❖ Don't local trader/lenders have a quasi-monopsonistic grip over poor farmers/borrowers, which they would be reluctant to give up?
- ❖ *Our hypothesis:* We can design schemes which are incentive compatible for trader/lenders, in which **both** they and borrowers benefit
- ❖ Develop this hypothesis theoretically, and test experimentally

Possible Abuses of Power by Agents?

Agents could:

- ❖ charge high interest rates (if permitted or through kickbacks)
- ❖ select cronies, unprofitable, or unsuitable (i.e, non-poor) clients in exchange for bribes
- ❖ collude with borrowers e.g., divide up loan funds, recommend non-repayment
- ❖ extract borrower benefits by manipulating other contractual relationships with them
- ❖ exert excessive coercion on borrowers to repay

TRAIL Features to Limit Abuse of Power

1. Limit scope for discretionary behavior of agent:

- ❖ MFI lends directly to client rather than through the agent
- ❖ Only landless and marginal landowners (that own ≤ 1.5 acres) can be recommended
- ❖ Interest rate is pegged below the average informal market rate
- ❖ Not every household recommended by agent receives the loan (limits scope for collusion)

TRAIL Features to Limit Abuse of Power, contd.

2. Incentive Design for Agent

- ❖ *Positive Incentives:* Agent's commission is based on interest repaid by recommended clients
- ❖ *Negative Incentives:* Agent forfeits deposit posted upfront if any client does not repay; termination clauses
- ❖ Arms-length role of agent implies near-zero direct cost incurred, so direct income gains result if recommended clients repay their loans
- ❖ Agent has a positive stake in loan repayment: motivated to recommend reliable and productive borrowers, monitor/help them

Additional Reasons why Agents Could Behave Responsibly

- ❖ Trader agents earn markups on resale of crop purchases from farmers: motivated to select productive farmers who will generate more such business
- ❖ Traders compete with one another for clients within village:
TRAIL agent uses power to recommend borrowers as a marketing tool, and advance own-reputation
- ❖ Traders tend to recommend borrowers from within their own caste/geographic network, and internalise the latter's benefits to some extent

Empirical Questions Addressed by Experiment

- ❖ Nevertheless, ultimately an empirical matter whether these features would suffice to overcome possible motives for dysfunctional behavior by the agent
- ❖ We shall evaluate (compare across TRAIL and GBL) :
 - impacts on cultivation of leading cash-crops
 - impacts on borrower incomes
 - estimate productivity of selected borrowers
 - loan repayment rates
 - loan take-up and admin costs
 - effects on other transactions with agent

Location of the Experiment



The Field Experiment

- ❖ We collaborated with Sree Sanchari, a Kolkata-based MFI
- ❖ Conducted in two potato-growing districts in West Bengal in eastern India, to introduce
 - TRAIL scheme in 24 randomly chosen villages
 - GBL scheme in 24 randomly chosen villages
- ❖ Third arm: GRAIL, where agent is appointed by local government (will not discuss today)

Agent Selection: TRAIL

- ❖ MFI employs a trader as agent from the local community, from among those who have at least 50 clients in the village the village, and have been operating in the village for at least 3 years
- ❖ SS (in conjunction with village elders) creates a list and randomly selects from this list
- ❖ Selected trader/lender is approached and given the offer of becoming a commission agent
- ❖ Agent recommends 30 borrowers within the village
- ❖ 10 of them are chosen via lottery to receive TRAIL loans

Agent's Incentives

- ❖ Agent receives a commission = fraction of interest received from the borrowers he recommended (= 75% in experiment)
- ❖ Bonus: payable at end of two years conditional on satisfactory repayment record of recommended clients
- ❖ Small deposit (Rs 50/client) posted, forfeited if client achieves repayment rate of less than 50%
- ❖ Agent is terminated if average repayment rate across all recommended clients falls below 50%

GBL Details

- ❖ Six months prior to start of scheme in GBL villages, MFI announces the scheme and invites 5-member groups to form
- ❖ During these six months, groups have to meet once a month with MFI officials and meet monthly savings requirements
- ❖ At the end of six months, two groups from those formed and survived, are randomly selected to receive joint liability loans

Credit Market Characteristics

| Source | Proportion of Loans | Interest Rate (APR) | Duration (Days) | Proportion Collateralized |
|--------------------|---------------------|---------------------|-----------------|---------------------------|
| Informal Lenders | 0.65 | 26.57 | 123.63 | 0.01 |
| Family and Friends | 0.05 | 20.53 | 168.92 | 0.07 |
| Cooperatives | 0.23 | 15.41 | 323.53 | 0.77 |
| Government Banks | 0.05 | 11.91 | 299.67 | 0.83 |

Data

- ❖ 8 rounds of household survey (2010-2012)
 - Information on household demographics, landownership and cultivation, agricultural inputs, outputs, networks
- ❖ Loan administrative data

Sample

- ❖ **Treatment Households:** Recommended/formed groups and received loans (10 in each village)
- ❖ **Control 1 Households:** Recommended/formed groups and did not receive loans (10 in each village)
- ❖ **Control 2 Households:** Not recommended/did not form groups (30 in each village)
- ❖ Allows us to separate out the treatment (Treatment - Control 1) from the selection (Control 1 - Control 2) effects

Estimating Treatment (ITT) and Selection Effects

$$\begin{aligned} y_i = & \beta_0 + \beta_1 \text{TRAIL} \\ & + \beta_2 (\text{TRAIL} \times \text{Recommended, no loan}) \\ & + \beta_3 (\text{TRAIL} \times \text{Offered loan}) \\ & + \beta_4 (\text{GBL} \times \text{Formed group, no loan}) \\ & + \beta_5 (\text{GBL} \times \text{Offered loan}) \\ & + \gamma X_i + \varepsilon_i \end{aligned}$$

- ❖ Controls include land owned, year dummy
- ❖ Standard errors clustered at the village level

Impacts on Borrowing

| | Unit | Treatment | | Selection | | Mean |
|--------------------|---------|-----------|----------|-----------|---------|-----------|
| | | TRAIL | GBL | TRAIL | GBL | Control 1 |
| All Loans: | | | | | | |
| Loan Size | Rs | 7126*** | 6464*** | -417 | -919 | 7279 |
| Cost of Borrowing | Percent | -0.03** | -0.07*** | -0.01 | 0.04** | 0.24 |
| Non Program Loans: | | | | | | |
| Loan Size | Rs | -495 | 254 | -372 | -930 | 7279 |
| Cost of Borrowing | Percent | 0.01 | -0.01 | -0.01 | 0.04*** | 0.24 |

Impacts on Potato Production


| | Unit | Treatment | | Selection | | Mean |
|---------------------|-------|-----------|--------|-----------|---------|-----------|
| | | TRAIL | GBL | TRAIL | GBL | Control 1 |
| Cultivate | | 0.0545 | 0.0492 | 0.0949*** | 0.0614 | 0.677 |
| Acreage | Acres | 0.0896*** | 0.0402 | 0.0010 | -0.0421 | 0.432 |
| Leased-in acres | Acres | 0.0467** | 0.0222 | -0.00265 | 0.00447 | 0.111 |
| Output | Kg | 888.0*** | 278 | 145.4 | -417.9 | 4760 |
| Cost of production | Rs | 1774** | 1308 | 372.8 | -1111 | 9538 |
| Family labour hours | Hours | 6.03 | 4.91 | -0.2 | 4.951 | 57.86 |
| Revenue | Rs | 3429*** | 1637 | 942 | -2534 | 19137 |
| Value added | Rs | 1687** | 271.8 | 555.6 | -1371 | 9498 |

Impacts on Value Added of Other Crops, and on Total Farm Income

| | Unit | Treatment | | Selection | | Mean |
|-------------------|------|-----------|--------|-----------|----------|-----------|
| | | TRAIL | GBL | TRAIL | GBL | Control 1 |
| Sesame | Rs | 180 | -158.3 | -115.7 | 73.41 | 2126 |
| Paddy | Rs | 271.6 | 573.6 | -469.9 | -759.6* | 2506 |
| Vegetables | Rs | 1255 | -1955 | 1329 | -957.5 | 8325 |
| <hr/> | | | | | | |
| Total Farm Income | Rs | 2621*** | 53.24 | 11466*** | 10066*** | 10328 |

1: TRAIL borrowers were more productive on average

| | Potatoes | Total Farm income |
|--|-------------------|----------------------|
| Bootstrapped Estimates | | |
| TRAIL | 1.05*** (0.06) | 1.15*** (0.02) |
| GBL | 0.09 (0.37) | -0.10 (0.29) |
| IV Estimates of Cobb-Douglas Production Function | | |
| TRAIL | 0.72** (0.33) | 1.03*** (0.35) |
| GBL | 0.37 (0.97) | 0.38 (1.23) |



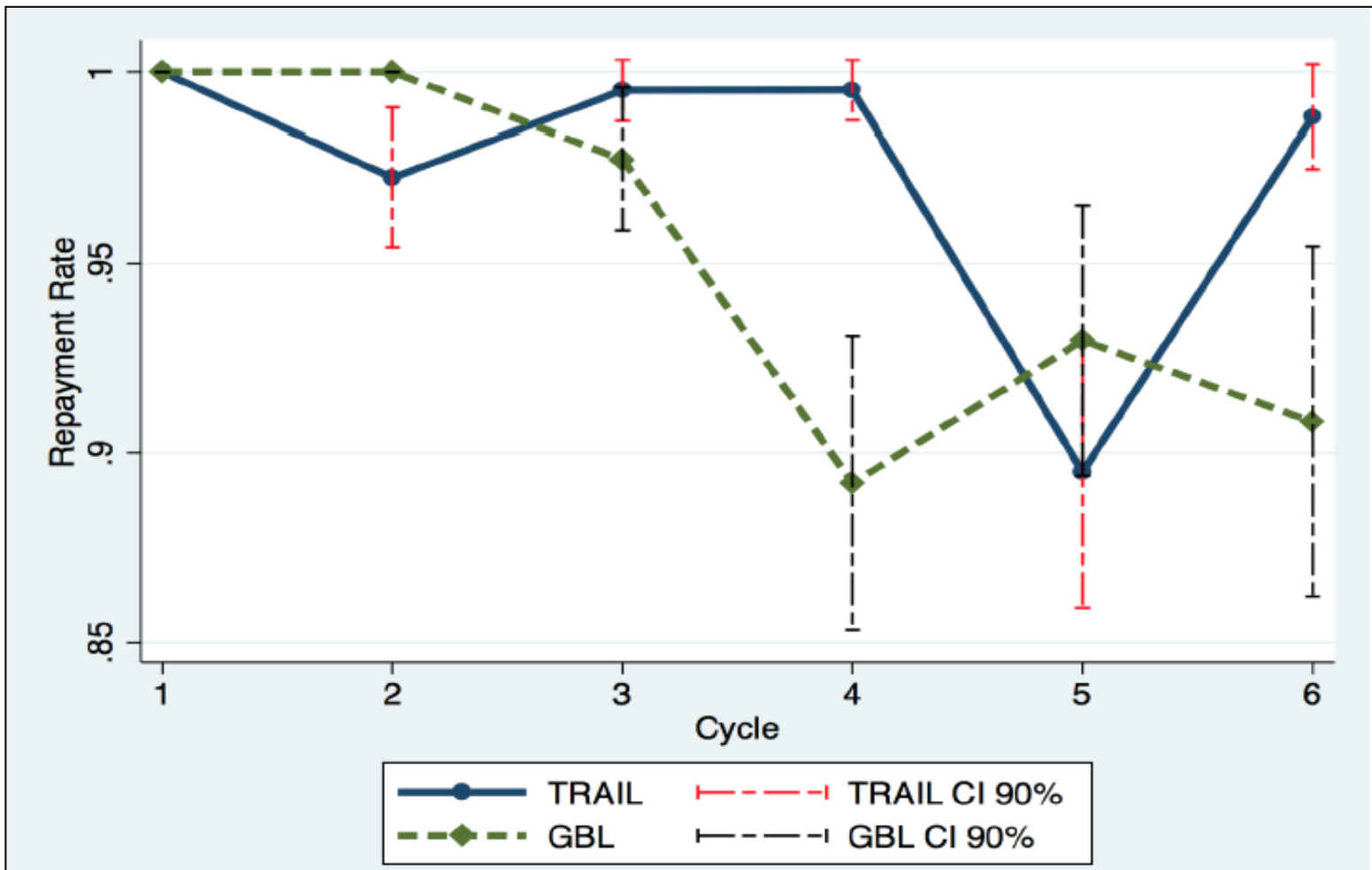
2. TRAIL Borrower Selection Likelihood

| | (1) | (2) |
|-------------------------|---------------------|----------------------|
| Bought from agent | 0.023 (0.044) | 0.016 (0.047) |
| Borrow from agent | 0.139*** (0.037) | 0.142*** (0.035) |
| Work for agent | 0.003 (0.049) | -0.005 (0.055) |
| Non Hindu | | 0.030 (0.143) |
| Non Hindu × Agent Hindu | | -0.098 (0.132) |
| SC | | 0.544*** (0.031) |
| SC × Agent High Caste | | -0.610*** (0.036) |
| ST | | -0.198* (0.108) |
| ST × Agent High Caste | | 0.218 (0.166) |
| Sample Size | 1031 | 1031 |

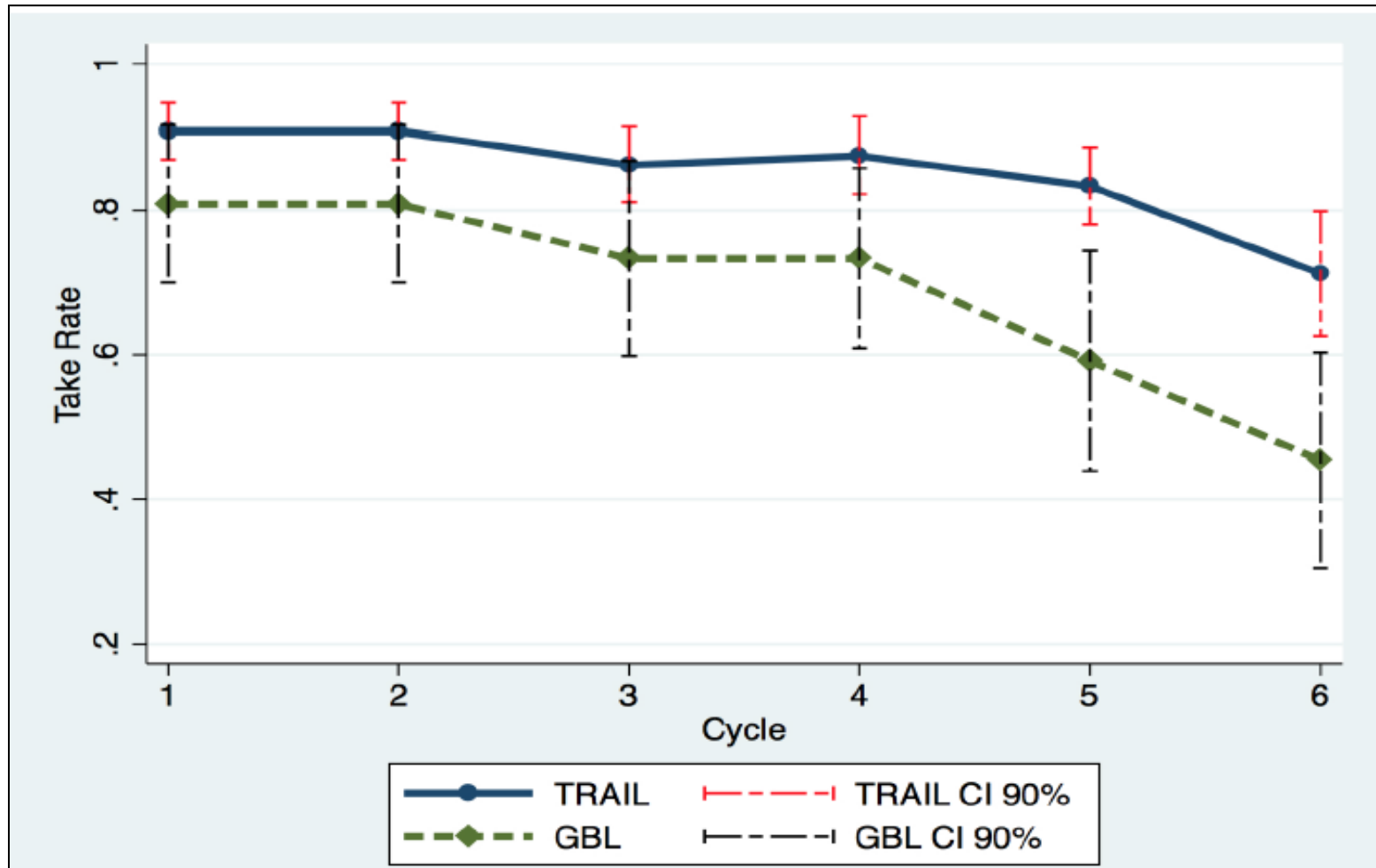
3. Risk Selection: Informal Interest Rate Regressions

| | TRAIL | | GBL | | TRAIL v GBL | |
|---------------------------------------|---------------------|---------------------|-------------------|-------------------|-------------------|---------------------|
| | OLS (1) | Heckman (2) | OLS (3) | Heckman (4) | OLS (5) | Heckman (6) |
| Recommend | 0.022 (0.016) | 0.022 (0.017) | 0.053* (0.027) | 0.052* (0.029) | | |
| Own-clientele | 0.050 (0.033) | 0.049* (0.027) | | | | |
| Own-clientele × Recommend TRAIL | -0.071** (0.026) | -0.071** (0.035) | | | -0.064 (0.046) | -0.064** (0.027) |
| Constant | 0.238*** | 0.240*** | 0.196*** | 0.151 | 0.271*** | 0.235** |
| Sample Size | 438 | 1,032 | 417 | 1,038 | 412 | 911 |

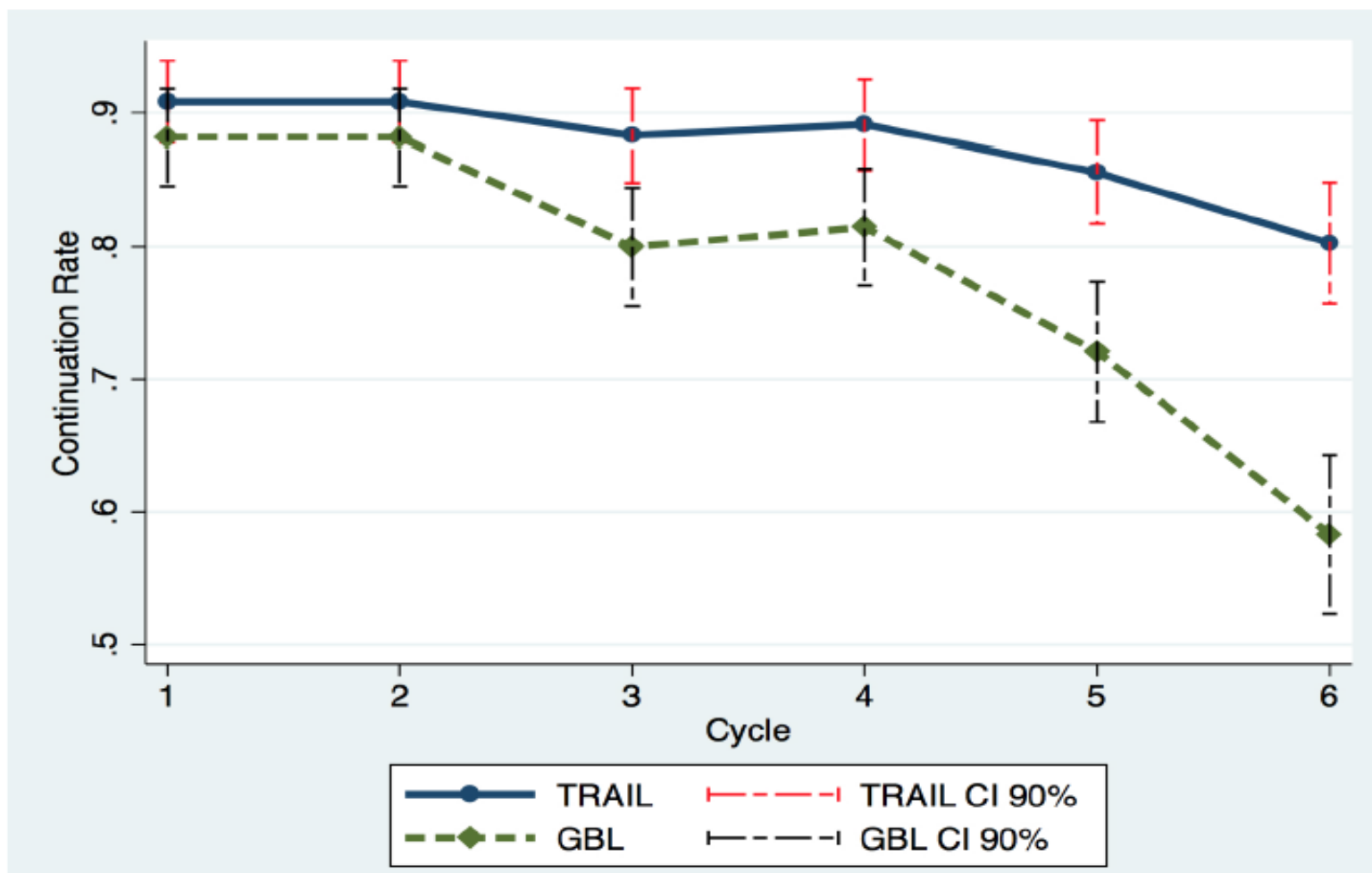
Loan Repayment Rates



Loan Take-Up Rates



Loan Continuation Rates, conditional on eligibility



Treatment Effect on Non-Farm Income

| | Treatment | | Selection | | Mean |
|---------------------------------------|-----------|--------|-----------|--------|-----------|
| | TRAIL | GBL | TRAIL | GBL | Control 1 |
| Rental Income (Rupees) | 153.6 | 784.4 | -182.1 | -427.9 | 1508 |
| Income from Animal Products (Rupees) | 166.8 | 49.18 | 62.66 | -279.1 | 771 |
| Labour income (year; Rupees) | 393 | -5642 | -12729** | -4941 | 37465 |
| Wage employment (last 2 weeks; Hours) | 0.615 | -4.496 | -6.855* | 1.749 | 40.24 |
| Self-employment (last 2 weeks; Hours) | 6.884 | 4.294 | 0.215 | 5.914* | 121.8 |
| Reported profits (Rupees) | 2343 | 2918 | 100.9 | -1917 | 5802 |
| Current value business (Rupees) | 4917 | 6692 | 952.1 | 353.8 | 10465 |
| Total Non-Farm Income (Rupees) | 3056 | -1890 | -12748 | -7565 | 45546 |

Sensitivity of Treatment Effects to Price Fluctuations

Dependent Variable: Value added (Actual/Imputed)

| | | Treatment | | Selection | | Sample | Mean |
|---|------------------|-----------|--------|-----------|---------|--------|-----------|
| | | TRAIL | GBL | TRAIL | GBL | Size | Control 1 |
| 1 | Actual | 1687** | 271.8 | 555.6 | -1371 | 2718 | 9498 |
| 2 | 2011 prices | 1654*** | 55.11 | 318 | -872.7 | 2718 | 8258 |
| 3 | 2012 prices | 3187*** | 500 | 254.8 | -1907 | 2718 | 14311 |
| 4 | 2007 prices | -194.7 | -328.5 | -45.25 | -2744 | 2718 | 4423 |
| 5 | 2008 prices | -1913** | 1653 | 1079 | -2886** | 2718 | -4434 |
| 6 | 2011 market wage | 1672** | 217.3 | 463.5 | -1483 | 2718 | 8219 |
| 7 | 2012 market wage | 1665** | 182.6 | 460.4 | -1416 | 2718 | 8134 |

Extraction by TRAIL Agent through Input Transactions

| | Sample Size | Mean Control 1 | Treatment Effect |
|-----------------------------|-------------|----------------|------------------|
| Bought any input from agent | 12,448 | 0.0875 | -0.00338 |
| Agent Share | 10,196 | 0.0760 | -0.00359 |

| | Input Price (Rs/unit) | | |
|----------------------|-----------------------|-------|-----------|
| Inorganic fertilizer | 1,672 | 13.78 | -0.322 |
| Organic fertilizer | 370 | 16.12 | 29.39 |
| Outside seeds | 1,654 | 22.36 | 2.174 |
| Pesticide | 2,691 | 533.5 | -31.08 |
| Powertiller | 1,403 | 195.2 | -32.33*** |
| Water/irrigation | 1,230 | 72.30 | 148.3 |

Extraction by TRAIL Agent through Output Transactions

| | Sample Size | Mean Control 1 | Treatment Effect |
|--------------------------|-------------|----------------|------------------|
| Sold any output to agent | 2,990 | 0.209 | 0.00559 |
| Agent Share | 2,765 | 0.151 | 0.0152 |

| | | Output Price (Rs/kg) | |
|--------|-------|----------------------|---------|
| Potato | 1,386 | 4.507 | -0.0516 |
| Paddy | 498 | 9.282 | -0.0215 |
| Sesame | 881 | 28.42 | -1.003 |

Extraction by TRAIL Agent through Credit Transactions

| | Sample Size | Mean Control 1 | Treatment Effect |
|--------------------------|-------------|----------------|------------------|
| Borrowed from agent | 1690 | 0.17 | -0.072* |
| Share of loan from agent | 1690 | 0.05 | -0.034** |
| Interest Rate (APR) | 5278 | 0.14 | -0.003 |

Financial Sustainability

- ❖ Administrative costs in TRAIL scheme were *substantially* lower:
 - 5% of the costs in GBL scheme per month per village
 - no monthly group meetings among TRAIL borrowers → lower loan officers' salaries and transport expenses
- ❖ However, lender retained entire interest earned on GBL loans, but paid 75% of interest on TRAIL loans as agent commissions
- ❖ Lender can break even on TRAIL scheme if has a low cost of loanable funds (\approx 4% per annum)
 - As in Bangladesh's scheme for financing microlenders

Summary

- ❖ We designed and experimentally evaluated microcredit designed to finance smallholder agriculture of high-value cash crops
 - borrowers recommended by local intermediaries
 - who were incentivised through commissions dependent on repayment rates
 - individual liability
- ❖ Evidence shows TRAIL agents successfully selected productive, low-risk farmers
- ❖ TRAIL borrowers expanded cultivation of potatoes, and their own incomes (RoR in excess of 70% at 2011-12 prices)

Summary, contd.

- ❖ GBL scheme induced eligible farmers to expand cultivation of potatoes and incur higher cost of production
- ❖ but GBL borrowers had insignificant increases in output or farm income
- ❖ TRAIL scheme had (weakly) superior repayment rates, higher take-up rates, and significantly lower administrative costs
- ❖ No evidence of extraction of TRAIL borrower benefits by agent
- ❖ Borrower benefits came from expansion of agricultural production, and therefore were sensitive to agricultural price fluctuations

Some Policy Implications

- ❖ Our results indicate the value of providing individual rather than group liability loans to meet growth and inflation control objectives.
- ❖ Social and poverty reduction objectives of ensuring access of landless and low caste groups could be better served by group based loans (SHG loans)
- ❖ Both kinds of loans could co-exist
- ❖ Our main recommendation: supplement traditional group-based microfinance to include a component providing individual liability loans, similar to TRAIL

