Intermediated Loans:
A New Approach to Microfinance

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Recent trends in microfinance

Various criticisms of traditional microfinance approaches based on group lending:

- − Rigid repayment schedules; Restrictions on project choice
- − Joint Liability 'Tax'; Collective Defaults
- − Free Riding; Harm Social Capital
- − Costs of frequent group meetings

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Recent crisis in microfinance in India:

- − partly due to limited scope for flexibility MFIs can afford with respect to repayments

Additional limitations of traditional MF (highlighted in our WB client interviews):

- Does not finance agriculture (owing to rigid repayment rules + absence of any risk tolerance)
- Low rate of return on investments in livestock or small business
- High degree of monitoring and pressure from MFI officials, not just peers
- High costs of meeting savings requirements, limiting take up

Wish List of Traditional MF Clients

Allow individual loans

Drop savings requirements

Less rigid repayment schedules
- Allow money to be used in agriculture

Reduce/eliminate meetings with MFI officials

Is it possible to design a more flexible system of MF that:

- is based on ILs

- targets smallholder agriculture

- without requiring collateral or savings

- limit MFI monitoring, onerous group meetings

- without endangering financial sustainability?

Question:

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Main Problem:

How to address problems relating to borrower selection and repayment incentives?

Flexible MF: A Possible Approach

Utilize basic principles of MF:

- Harness local information and social capital;
- Use dynamic repayment incentives

If there are people within the local community with information and sanctioning power, mechanism design theory suggests a possible approach:

Appoint them as loan intermediaries, with a suitable incentive scheme

Large theoretical literature on hierarchical contracting networks in procurement, marketing and internal organization of firms where middlemen or managers play exactly this kind of role

- Melumad-Mookherjee-Reichelstein (1995), Laffont-Martimort (1998, 2000), Faure-Grimaud-Laffont-Martimort (2003), Mookherjee-Tsumagari (2004), Celik (2009), Motta (2010)

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Idea similar to the banking Franchise (BF) Model of RBI, and credit franchise program plan of ICICI

Agent Intermediated Loans: The Idea

MFI selects a loan agent in a village, from those with considerable experience and knowledge of individual households

Agents recommend clients eligible to receive MF loans

Agents receive commissions based on loan repayments

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Two categories of potential agents:
- Traders/informal lenders (TRAIL);
- Recommended by local government (GRAIL)

Dynamic Features

Augment borrower repayment incentives by linking future eligibility for loans on repayment of current loans

Expand loan size progressively with successful repayment

Loans designed to finance cultivation and marketing of leading cash crop in WB (potatoes, 4 month duration cycles)

Allow repayment in form of potato bonds

Build in insurance against adverse covariate shocks to crop yields or revenues

Other Features to Limit Scope for Monopoly Power of Agent

MFI lends directly to client rather than through the agent

Restrict client eligibility to landless and marginal landowners (owning less than 1.5 acres)

Interest rate pegged below average rates in the informal market

75% of interest paid goes to agent as commission, small deposit per client forfeited in event of non-repayment, plus firing rule

No savings requirements, or any mandated meetings with agents or MFI officials

Door-step banking, no need to open a formal bank account

Hazards of AIL

What are the agent's incentives to recommend good clients?

Agent may be lending to the clients at a profit, which they would forego as the clients switch to MFI loans

- − May therefore recommend their worst clients
- − Agent may try to recoup lost profits from clients by manipulating other contractual relationships with them

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Repayment incentives of clients: would they be high enough?

Possibility of collusion between agent and borrowers?

This Project

Design and implement an agent intermediated loan (AIL) system in a field experiment, with group-based lending (GBL) as a control

Compare targeting, repayment rates and impacts on borrowers

In this paper, however, focus only on targeting and repayment

Theoretically model incentive issues

Empirically test predictions of the model, and use it to interpret outcomes

The Experiment

Randomized Intervention in 72 villages in 2 districts of West Bengal (Hugli and West Medinipur), India

In association with Shree Sanchari, a Kolkata based MFI (SS)

▸ West Bengal

(Agricultural) Loans, repayment in 120 days. Starting amount Rs 2000; increases with timely repayment.

Cycle 1 started in October-November 2010, coinciding with planting of potato (major cash crop in this area)

Credit Treatments

TRAIL: Agent Intermediated Lending - agent is a trader (ILs)

GRAIL: Agent Intermediated Lending - agent is recommended/selected by Gram Panchayat or Village Council (ILs)

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GBL: Group Based Lending (JLs, groups, savings requirements, 4-month group repayments on same terms as ILs)

Expected Differences between TRAIL and GRAIL

Targeting: less precise with respect to risk type, whereas with respect to landholding it is difficult to say owing to ambiguity of their preferences

Takeup: similar to TRAIL

Repayment: lower compared with TRAIL

GRAIL outcomes somewhere inbetween those of TRAIL and GBL.

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This paper: focus on the extremes:

− TRAIL versus GBL comparison with respect to targeting, takeup and repayment

Agent Selection and Functions

Agent is randomly selected from a list of traders/lenders with established business in the village (clientele size, duration requirements)

Agent recommends names of 30 potential borrowers/households owning less than 1.5 acres in the entire village.

10 out of these 30 recommended randomly chosen and offered individual liability, 4 month, 18% annual interest rate loan from SS.

75% of actual repayments paid to the agent; agent posts a deposit per client which is forfeited if the loan is not repaid

Agent dismissed if average repayment rates fall below 50%

Agent Incentives

Monetary

Commission

Deposit and Bonus

Increase/decrease volume of trade with clients

Other

Enhance reputation within village

Family Holiday

Loan Details

Loan cycles match crop cycles

Cycle 1: November 2010 - February 2011 (and so on)

Client eligible for 133% of repaid amount in the next cycle

Can repay in form of potato bonds at market value

GBL

Group formation (groups of size 5) as per usual SS protocol (group meetings, savings requirements)

Two groups randomly selected (via public lottery) out of the groups that have formed and survived

Joint liability loans of 4- month duration

Similar rules for loan size, duration, insurance etc.

MFI receives 75% of repayments, to cover administrative costs of group meetings

Table: Sample Sizes in Each Village

TRAIL	24 villages	
	Number of Recommended Households	30
TREATMENT	Households Recommended and Receiving Credit	10
CONTROL1	Households Recommended and Not Receiving Credit	10
CONTROL2	Households Not Recommended	30

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GBL:		
TREATMENT	Group survived until lottery and eligible for credit	10
	(Sample at group level: 2 groups)	
CONTROL1	Group survived until lottery but not selected through lottery	10
	(Sample at group level: 2 groups)	
CONTROL2	Random sample of households who did not form group	30

Extensive household level survey (50 households in each village) in 7 successive waves following credit cycles

Survey on: household demographics, assets, landholding, cultivation, land use, input use, allocation of output, sales and storage, credit, incomes, relationships within village

Table: Randomization: Village Level Differences

	TRAIL		GBL		Difference
	Mean	SD	Mean	SD	TRAIL - GBL
Number of Households	276.04	41.15	346.42	76.53	-70.38
Number of Potato Cultivators	164.63	26.60	208.29	48.57	-43.67
Total Landless	15.96	3.88	12.83	3.47	3.13
Total $0-1.25$	113.88	21.07	149.96	43.63	-36.08
Total $1.25-2.50$	25.58	3.32	31.54	4.47	-5.96
Total $2.50-5.00$	10.88	1.51	11.58	1.77	-0.71
Total $5.00-12.50$	1.38	0.37	2.38	0.67	-1.00
Total Above 12.50	0.00	0.00	0.00	0.00	0.00

Table: Randomization: Household Level Differences

| | TRAIL | | GBL | | Difference |
	Mean	SD	Mean	SD	TRAIL - GBL
Male Head	0.95	0.01	0.94	0.01	0.01
Non Hindu	0.21	0.02	0.16	0.02	0.06**
SC	0.23	0.02	0.25	0.02	-0.02
ST	0.05	0.01	0.04	0.01	0.01
OBC	0.06	0.01	0.06	0.01	-0.01
Household Size	5.13	0.12	5.32	0.11	-0.19**
Age of Household Head	49.94	0.58	51.56	0.53	-1.61
Married Household Head	0.91	0.01	0.90	0.01	0.01
Head: Completed Primary School	0.50	0.02	0.49	0.02	0.00
Head Occupation: Cultivator	0.56	0.02	0.55	0.02	0.01
Head Occupation: Labour	0.22	0.02	0.22	0.02	-0.01
Head: Resident	0.99	0.01	0.99	0.01	0.00
Landholding	1.00	0.05	1.05	0.06	-0.05
Landless	0.07	0.01	0.08	0.01	-0.01
Received GP Benefit	0.54	0.02	0.62	0.02	-0.08***
Purchased on Credit	0.38	0.02	0.43	0.02	-0.05*
Joint Signficance of Household Variables[‡]					21.71
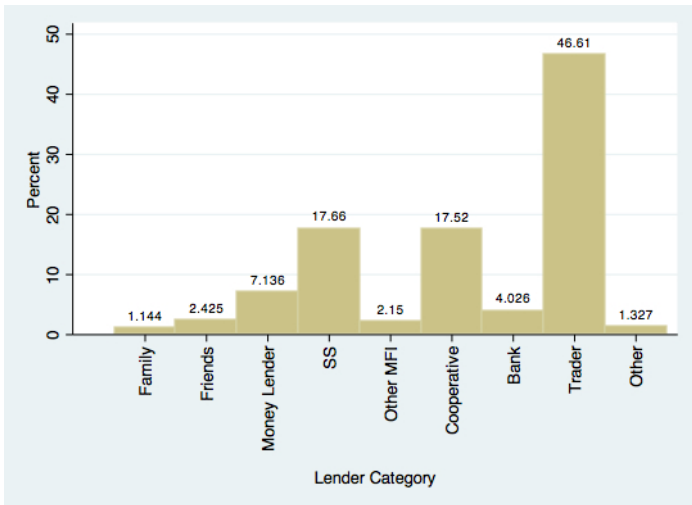
Figure: Loans by Lender Category

Figure: Returns to Scale in Crop Profit (Potato)
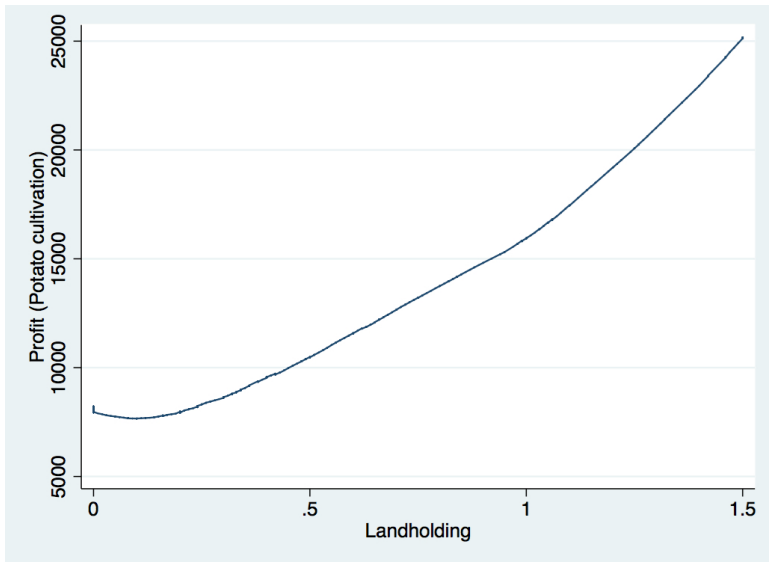
A Theoretical Model

Extend Ghatak (2000) to:

- Include informal credit market where local lenders have some information about borrower risk types

- Two dimensional borrower characteristics: landholding (observable), risk type (unobservable)

- Use the model to compare TRAIL with Group Based Lending (GBL) with respect to targeting, take-up and repayment rates

Segmented Information Structure

Introduce segmented informational monopolies of local lenders as follows

- The village is partitioned into segments with identical composition θ of risky-safe borrowers

- In each segment there is one lender who knows the risk types of borrowers in that segment (from past dealings), but is uninformed about the risk types of borrowers in any other segment

Motivation for Segmented Information Structure

- In the absence of any informational asymmetry, local lenders do not have any information advantage *vis-a-vis* external lenders such as formal financial institutions (FFI)

- Any FFI with lower cost of lending than local lenders should be able to drive the latter out of business, but this is often not the case

- This motivates our assumption of segmented informational monopolies in the informal market:
  - Informal lenders have informational advantage wrt FFIs, while FFIs have access to funds at lower cost

Properties of Segmented Informal Credit Market

Equilibrium interest rate for risky borrowers higher than that of safe borrowers

Interest rate for risky borrowers does not depend on landholding; not so for safe borrowers

Interest rate for safe borrowers depends on the shape of the returns function $R_i(a)$

If $R_i(a)$ is convex in a then this relationship is likely to be u-shaped

    − True from earlier figure

Test of TRAIL Effectiveness

Say that *TRAIL is effective* if there is no collusion between agent and borrowers, and $K \geq \underline{K}$

We can test whether TRAIL is effective, by checking whether:

- The agent tends to recommend his own clients
- Recommended clients are safe types (judged by rates paid on the informal market)

Suppose that the test for TRAIL effectiveness is satisfied. Then:

Informal Interest Rates:

Average risk level in GBL is higher than in TRAIL

- TRAIL *Control 1* households pay lower informal interest rate than GBL *Control 1* households

Predictions Continued

Targeting:

TRAIL selection should be biased in favor of those landholdings paying the lowest interest rates in the informal market, while GBL should exhibit a bias in favor of those paying the highest interest rates

- − TRAIL to target households with an intermediate level of landholding
- − GBL to end up selecting poorest (landless) households

Predictions Continued

Takeup:

Controlling for landholding, take-up rates should be higher under TRAIL (since TRAIL clients avoid the joint liability tax, cost of attending meetings and reaching savings targets, plus collective action problems)

− Welfare should be higher under TRAIL

On the other hand GBL provides insurance

− Welfare should be higher under GBL

Welfare comparisons become harder when we incorporate expost moral hazard: there can be cases where welfare is higher under GBL

Predictions Continued

Repayment:

If TRAIL borrowers are safer (on average) than GBL borrowers, TRAIL should achieve higher or same repayment rates than GBL

On the other hand, the joint liability feature of GBL implies that loans are repaid as long as one member of the group has a successful outcome, i.e., controlling for risk types GBL would attain a higher repayment rate.

Possibility of contagion lower in TRAIL

Hence the comparison of repayment rates is ambiguous.

Table: Informal Interest Rates (OLS Regressions)

	TRAIL	GBL	Pooled
Control 1	0.170	6.582***	6.700***
TRAIL			1.506
TRAIL × *Control 1*			-6.575**
Constant	20.213***	19.737***	19.276***

Average riskiness of TRAIL *Control 1* households lower than that of GBL *Control 1* households.

This will have implications on repayment rates (as we see below).

Table: Informal Interest Rates: VFE Regressions

	TRAIL	GBL
Control 1	7.038*	-1.535
Landholding (0 − 0.25]	-3.339*	-0.102
Landholding (0.25 − 0.50]	-2.299	-0.753
Landholding (0.50 − 0.75]	-3.483*	0.008
Landholding (0.75 − 1.00]	-1.432	-2.420
Landholding (1.00 − 1.25]	-3.887*	1.030
Landholding (1.25 − 1.50]	-4.345*	0.748
Landholding (0 − 0.25] × Control 1	-7.897*	5.497
Landholding (0.25 − 0.50] × Control 1	-6.159	2.091
Landholding (0.50 − 0.75] × Control 1	-9.019**	-3.943
Landholding (0.75 − 1.00] × Control 1	-9.003*	1.134
Landholding (1.00 − 1.25] × Control 1	-2.886	-3.014
Landholding (1.25 − 1.50] × Control 1	-6.906	-8.463*
Constant	26.190***	25.161***

Interest Rate Differentials: *Control 1* vs *Control 2*

Within village comparisons

TRAIL *Control 1* households pay lower interest rates than *Control 2* households for landed households (not always statistically significant - often are)

GBL *Control 1* households almost never pay lower interest rates compared to *Control 2* households.

TRAIL agents more effective at selecting safer households (at least within certain ranges of landholding)

Table: Recommendation Bias in TRAIL

	(1)	(2)
Prior interaction with agent	0.148***	0.145*
No informal borrowing	-0.053	-0.061
Average interest low	0.000	-0.001
Landholding	0.262**	0.408***
Landholding squared	-0.259***	-0.330***
SC		0.472
SC × Agent high caste		-0.555*
ST		-0.308*
ST × Agent high caste		0.262
OBC		0.020
Non hindu		0.001
Non hindu × Agent hindu		-0.180
Constant	0.245***	0.199**
Non Hindu Household, Hindu Agent		5.35**
SC Household, High Caste Agent		3.18*
ST Household, High Caste Agent		0.27
Head Cultivator, Agent Business		0.40
Head Labour, Agent Business		10.76***

Test Result of TRAIL Effectiveness

TRAIL agents more biased towards households with whom they have prior interaction

Less likely to recommend households from outside their caste and religion network

More likely to recommend laborer households

Incorporating moral hazard: TRAIL agents are more likely to recommend households on whom that can impose sanctions more easily?

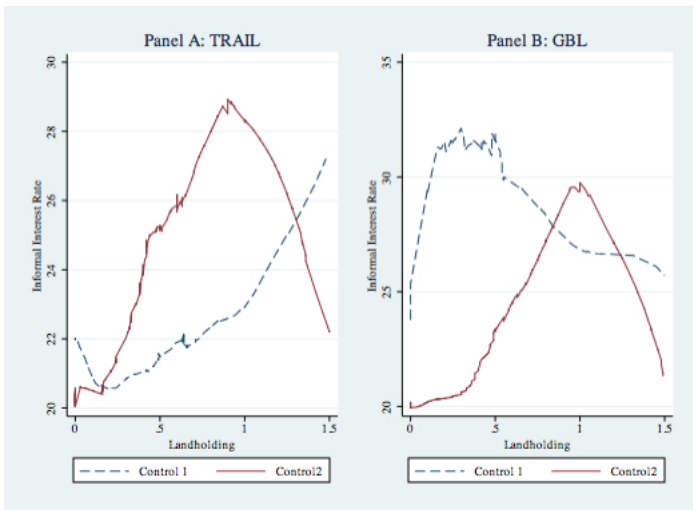# Figure: Targeting by Landholding. Selection/Recommendation
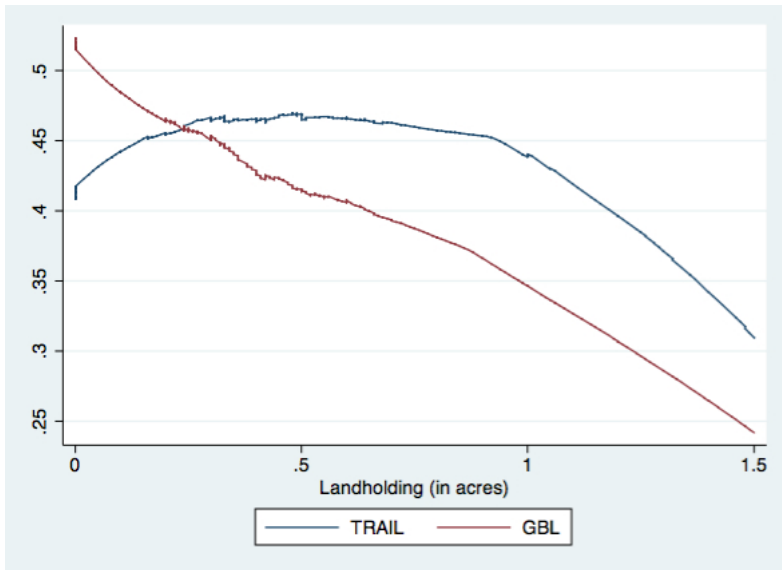
Figure: Targeting by Landholding. Selection/Recommendation

TRAIL

Inverse u-shaped relationship between landholding and the likelihood of being recommended

- − likelihood of being recommended maximized at an intermediate level of landholding

Pattern consistent with agent recommending own segment safe types

- − Peak of recommendation close to where interest rate is minimized for *Control 1* households

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GBL

Within GBL villages, landless more likely to form group

  − Likelihood of group formation decreases monotonically with respect to landholding

Table: Selection (Targeting) Regressions

	TRAIL	GBL
Landholding	0.231*	-0.182
Landholding Squared	-0.241**	0.034
Non Hindu	-0.022	-0.190***
Non Hindu × Agent Hindu	-0.184	
SC	0.275	0.017
SC × Agent High Caste	-0.362*	
ST	-0.355**	0.038
ST × Agent High Caste	0.307*	
OBC	-0.006	0.142**
Purchased on Credit	0.069*	0.042
Received GP Benefits	0.030	-0.003
Buy from Agent/Group Leader	0.070*	0.042
Borrow from Agent/Group Leader	0.193***	0.320***
Work for Agent/Group Leader	0.028	0.052
Constant	0.251**	0.854***
Non Hindu Household, Hindu Agent	8.56***	
SC Household, High Caste Agent	3.62**	
ST Household, High Caste Agent	0.32	
Head Cultivator, Agent Business	0.62	
Head Labour, Agent Business	4.71**	

Table: Recommendation/Group Formation. Including Landless dummy

	TRAIL	GBL
Landholding	0.231*	-0.182
Landholding Squared	-0.241***	0.034
Alternative Specification		
Landless	-0.03	0.09**

Is GBL More Pro-Poor?

Within GBL villages, landless are more likely to form groups

Within TRAIL villages, agents are more likely to recommend households with intermediate level of landholding

If TRAIL and GBL were to be offered in the same village, would GBL target poorer households?

No

But GBL better able to target other disadvantaged groups like OBC

Table: Is GBL more Pro-poor? Likelihood of Participating in TRAIL

	(1)	(2)	(3)
Landless	-0.030		
Landholding			0.174
Landholding Squared			-0.094
Landholding $(0-0.25]$		-0.006	
Landholding $(0.25-0.50]$		0.056	
Landholding $(0.50-0.75]$		0.046	
Landholding $(0.75-1.00]$		0.096	
Landholding $(1.00-1.25]$		0.006	
Landholding $(1.25-1.50]$		0.060	
SC	-0.035	-0.031	-0.027
ST	0.104	0.101	0.102
OBC	-0.132**	-0.131**	-0.130**
Non Hindu	0.055	0.057	0.059
Purchased on credit	-0.031	-0.033	-0.034
Received benefit from GP	-0.038	-0.035	-0.036
Buy from Agent/Group leader	0.479***	0.480***	0.481***
Borrow from Agent/Group leader	0.053	0.056	0.051
Work for Agent/Group leader	0.061	0.057	0.059
Constant	-0.070	-0.107	-0.107

Testing Takeup Predictions

Figure: Total Number of Loans Disbursed as a Proportion of Maximum Eligible
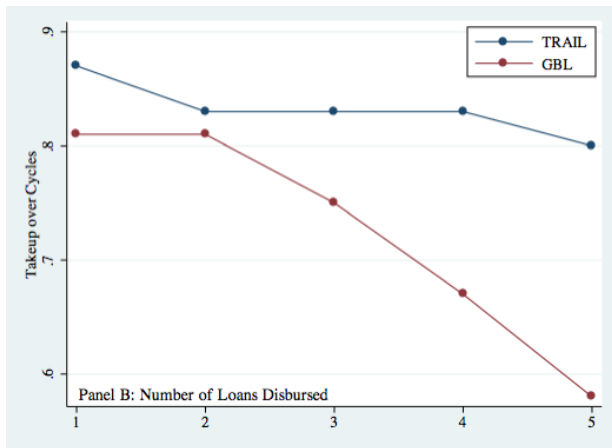

Maximum number eligible in each village is 10

Table: Total Number of Loans Disbursed as a Proportion of Maximum Eligible

	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
TRAIL	0.070	0.034	0.079	0.170*	0.219**
Hugli	-0.171**	-0.208***	-0.200**	-0.191**	-0.052
Constant	0.887***	0.904***	0.846***	0.758***	0.603***
Takeup rate in GBL	0.808	0.808	0.754	0.671	0.579
Number of Villages	48	48	48	48	48

Figure: Continuation: Cycles 1 - 5. Household Level

Panel A: Continuation
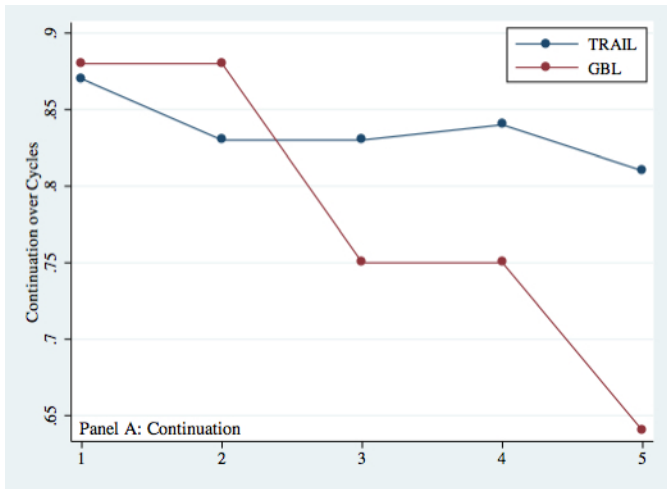
Takeup/Continuation conditional on eligibility

Table: Continuation: Cycles 1 - 5. Household Level

	Cycle 1	Cycle 2	Cycle 3	Cycle 4	Cycle 5
TRAIL	-0.009	-0.048	0.016	0.026	0.076
Hugli	-0.136**	-0.173***	-0.194***	-0.146**	-0.172**
Constant	0.644***	0.612***	0.635***	0.420**	0.468*
Continuation Rate in GBL	0.882	0.882	0.754	0.745	0.649
Number of Households	460	460	459	433	404

Comparing Repayment Rates

Figure: Repayment over Cycles
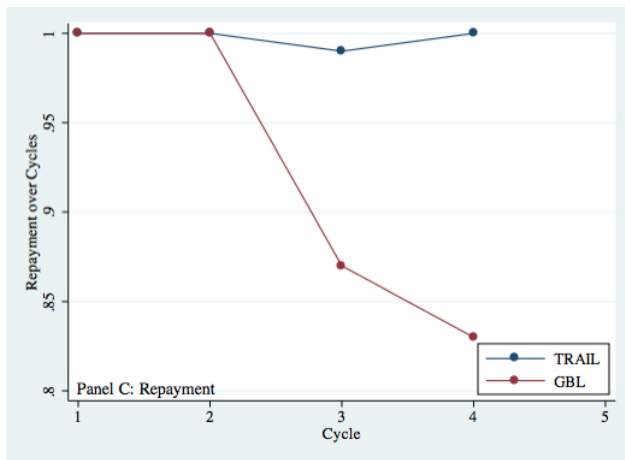
Repayment conditional on continuation

Table: Repayment over Cycles

	Cycle 3	Cycle 4
TRAIL	0.095**	0.166***
Hugli	-0.089	0.070*
Constant	0.681***	0.797***
Average Repayment in GBL	0.867	0.826
Number of Households	379	361

Summary

Results suggest TRAIL is effective in the sense of agent's incentives to recommend own-safe clients

- TRAIL Agents better at selecting safe types
- TRAIL *Control 1* households less risky compared to GBL *Control 1* households

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Confirms predictions that:

- TRAIL agents select households with intermediate landholdings, while GBL selection is biased in favour of low landholdings
- Financial inclusion is higher in TRAIL

Conditional on landholding

  — No significant treatment difference in takeup rate
  — Repayment rate is higher in TRAIL
    — Risk selection
    — Contagion

Intuitively the scope for contagious default in GBL is greater when individual projects are riskier.

This helps explain the insistence of most MFIs that their group loan clients pursue extremely safe projects.

Controlling for risk type, the repayment rate in GBL could be above or below the TRAIL repayment rate depending on how severe the repayment incentive constraint is.

For example, consider the case of $n = 2$. If $S = 1$ (S is the minimum number of group members that need to repay for the group not to default), GBL attains a higher repayment rate than TRAIL, but it attains a lower repayment rate if $S = 2$.

In the former case, the GBL loan is repaid if at least one member has a successful project. In the latter, there is contagion in default: both members have to be successful for the loan to be repaid.

If $n > 2$, the same is true when we consider the polar extremes of $S = 1$ and $S = n$.

For intermediate values of S, the comparison depends on the riskiness of the project.

Implications; Next Steps

TRAIL is 'working' well in the sense of conventional MFI metrics of takeup and repayment rates

− In these respects it is doing better than GBL

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What about broader welfare implications?

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Next step of the project: will compare impacts on household cultivation, profits, incomes etc.

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Next step of the project: will compare impacts on household cultivation, profits, incomes etc.

Thank you

Impact of microfinance

- – Recent experimental evaluations of MF based on RCTs in urban settings (Banerjee et al (2010), Karlan and Zinman (2009)) fail to find large impacts

Evaluations of Alternative Lending Approaches:

- – Gine and Karlan (2010): Moving from JL to IL contracts (or offering IL contracts from scratch) had no effects on repayment, while reducing takeup (ILs based on selection/monitoring by MFI official, plus group meetings)
- – Attanasio et. al. (2011): JL contract stronger effects on food consumption and entrepreneurship, compared with ILs (mainly based on collateral)
- – Field and Pande (2008): making the repayment schedule less rigid has no effect on client delinquency or default in JL loans.
- – Field and Pande (2012): Increasing the grace period associated with IL loans increased short-run business investments and long term profits but also increased default rates.

Many changes are happening in MF: trend back to individual lending (Grameen II, Asa, BancoSol)
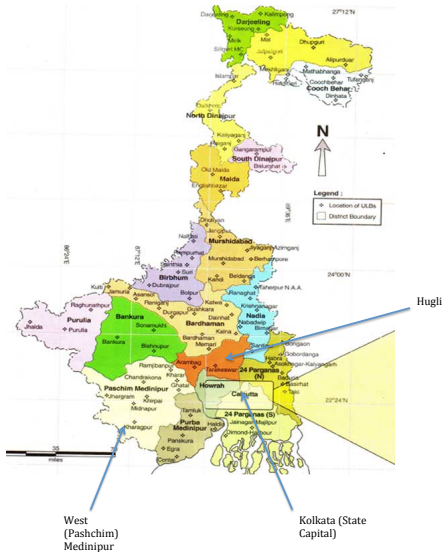
Repayment amount (in each Cycle) $= 1.06\times$ Outstanding loan

If full repayment at the end of any cycle: loan offer in next cycle 133% of previous cycle.

Borrowers who repay less than 50% of the repayment obligation in any cycle will be terminated and will not be allowed to borrow again.

If there is less than full repayment but more than 50% of repayment, then the borrower is eligible for only 133% of the amount repaid.

Agent Selection: TRAIL

- SS will employ a trader as agent from the local community.
  - Priority 1: Traders who have at least 50 clients in the village the village, and or have been operating in the village for at least 3 years;
  - Priority 2: Traders who have fewer than 50 clients or have been working in the village for fewer than 3 years;
  - Priority 3: Others who come forward to participate as agents;
- SS (in conjuction with village elders) creates a list and randomly selects from this list.

- SS will ask a member of the Gram Panchayat (village council) to make an informal recommendation.
  - Lived in the village for at least 3 years;
  - Have some personal familiarity with small farmers in the village; and
  - Should be reputed to be a responsible person.

Figure: Loans by Lender Category: by Landholding
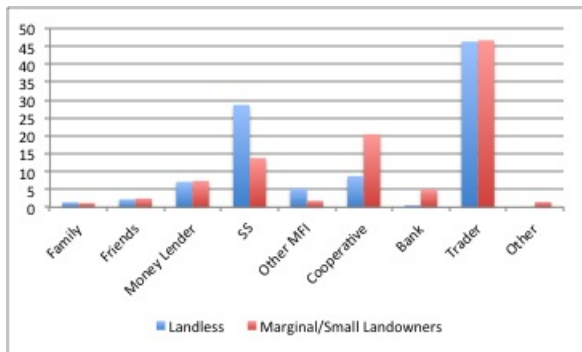
Marginal/Small landowners: Landholding $\in (0, 1.5]$

Figure: Interest Rate and Loansize by Lender Category ▸ Back
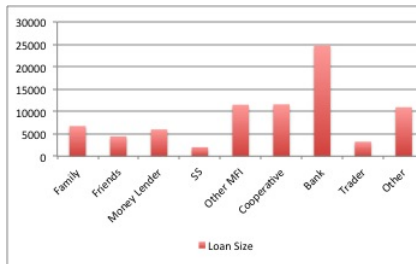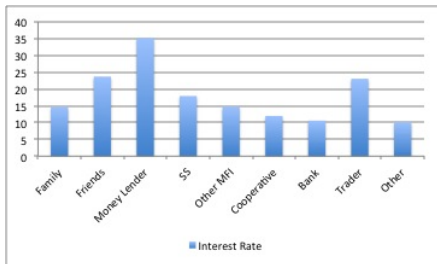
Table: Profits from Potato Cultivation

	(1)	(2)
Landholding	4,327.039*	3,738.737
Landholding Squared	4,950.229**	5,269.364**
Jyoti		684.059
Pokhraj		-5,446.259***
Chandramukhi		1,648.039
Constant	6,888.438***	7,088.972***

Figure: Initial Impacts. Likelihood of Cultivating Potato
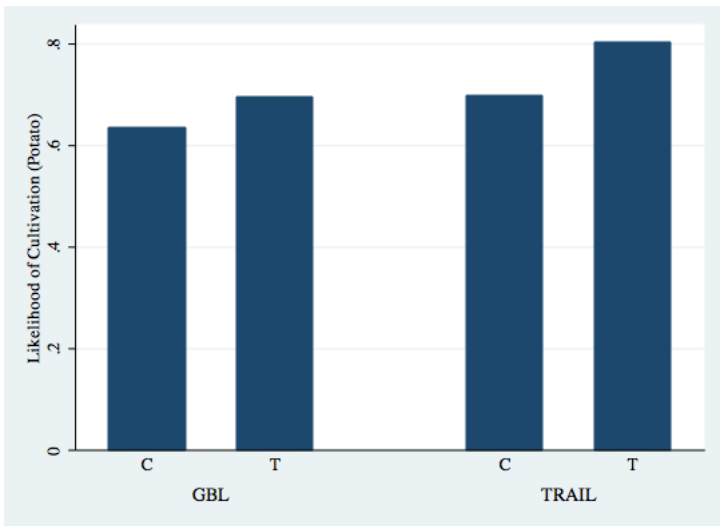
Figure: Initial Impacts. Area Cultivated (Potato)
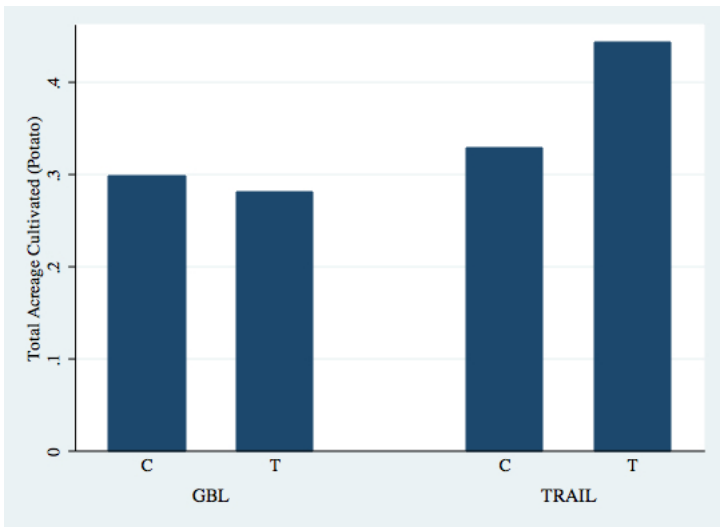
Figure: Initial Impacts. Share of Cultivated Land Leased in (Potato)
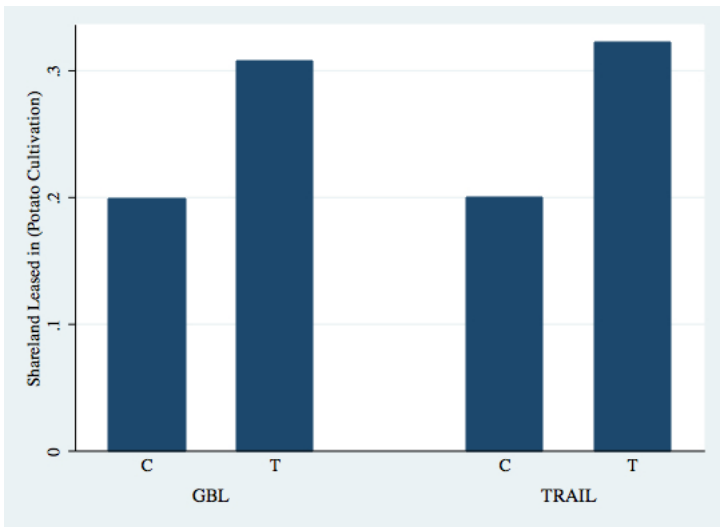
Setting

Borrowers are characterized by

$i = r, s$ unobservable riskiness of their projects

$a \geq 0$ observable landholding (=outside option (normalize

$R_i(a)$ Return of the project if successful

0 Return of the project if unsuccessful

$1 > p_s > p_r > 0$ probability of success, independent of a (for simplic

θ proportion of risky borrowers in the population

Projects: fixed-size, unit-capital, limited liability

Credit Details

- Scale of loan needed by each borrower: 1, independent of a (simplifying assumption)
- Loan terms summarized by interest rate r
- Limited Liability: borrower repays nothing in event of failure
- Assume that they repay r in success state as long as $r < R_i(a)$, owing to concern for future loan access
- Borrower (i, a) willing to accept interest rate r and operate the project if $R_i(a) - r \geq \frac{a}{p_i}$

Informal Credit: Competition and Information

- ρ_l constant unit cost of lending for lenders; no capacity constraints
- Many lenders in the village engaging in price competition
- Information: a is observable to all lenders, risk type known only by own-segment lender
    - Contrast to Ghatak, who assumed symmetry among lenders: no lender has any information about borrower risk types

Adverse Selection Assumptions

Similar to Ghatak, we assume the following for all a:

$$R_r(a) - \frac{a}{p_r} \geq R_s(a) - \frac{a}{p_s} \qquad (A1)$$

$$\frac{\rho_I}{\bar{p}} \geq R_s(a) - \frac{a}{p_s} \qquad (A2)$$

$$R_s(a) - \frac{a}{p_s} > \frac{\rho_I}{p_s} \qquad (A3)$$

Implications of (A1)-(A3) with Symmetric Competition among Lenders

- All borrowers have access to lowest interest rate offered in the market
- (A1) ensures risky type is willing to accept this interest rate if the safe type finds it acceptable
- (A2) rules out pooling
- Lemons market: safe type driven out, risky type gets loans at interest rate $\frac{\rho_I}{p_r}$
- (A3) says absence of loan access for safe type is inefficient

Example of Informal Interest Rate Pattern For Safe Type
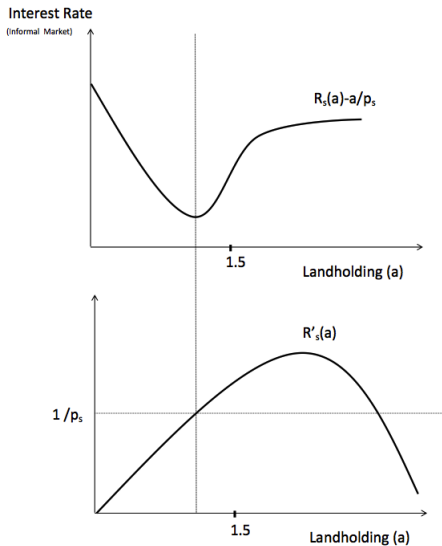
Intuition

Think of interest rate as the surplus extracted by the lender

Initially lender can extract a lot, because the outside option of the borrower (a) is low

As a increases: value of project goes up, increasing the extractable surplus

But that also increases the outside option of the borrower

If $R_i(a)$ is convex (as it is), the second effect could dominate for lower values of a and the first value could dominate for higher values of a

Example of Informal Credit Participation Pattern for Risky Type
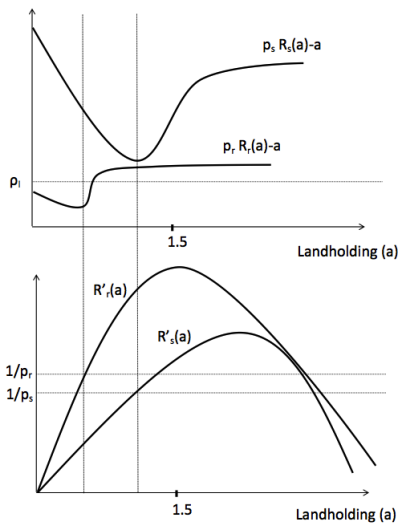
Effect of GBL Intervention

— MFI offers opportunity for groups to form, qualify for JL loan upon attending weekly meetings and achieving savings requirements for 6 months

— For simplicity assume two person groups that receive loan at interest rate r_T

— Cost of attending meetings and achieving savings targets c_i for risk type i

— Expected benefit to (i, a) from such a JL loan:

$$p_i R_i(a) - p_i(2 - p_j)r_T - c_i$$

if the other group member has risk type j, and provided limited liability constraint $2r_T \leq R_i(a)$ is met.

Expected Benefit from GBL Loan: Safe Type

– Same argument as Ghatak (2000) applies for assortative matching with respect to risk types: $i = j$

– Gain from GBL for (s, a):

$$p_s[r_s(a) - (2 - p_s)r_T - c_s]$$

is rising in the informal interest rate (because in informal market they get a)

– Hence we expect that among safe types, *participation rates will be higher for lower landholdings as they face higher informal interest rates*

Expected Benefit from GBL Loan: Risky Type

– Gain from GBL for type (r, a) if this type participates in the informal market:

$$\rho_I - p_r(2 - p_r)r_T - c_r$$

which is independent of a

– Gain from GBL for (r, a) if this type is excluded from informal market:

$$p_r R_r(a) - a - p_r(2 - p_r)r_T - c_r$$

whose variation with respect to a cannot be signed

– Relative benefits from GBL of safe and risky types (given a) also ambiguous, as expected repayment of GBL loan is lower for risky types, but their payoff in the informal market is higher

Equilibrium of Segmented Credit Market

- Borrowers can borrow from any lender in the village
- Each lender's strategy: $\{r_s, r_r, r_o\}$ where r_s is interest rate offer to own-segment-safe type, r_r is offer to own-segment-risky type, r_o to borrowers in other segments

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Lemma
In equilibrium, safe borrower do not borrow from other-segment lenders

Own-segment lender can extract full surplus $(= R_s(a) - \frac{a}{p_s})$ from safe types without having them raided by lenders from other segments; all lenders compete for lending to risky type

Proposition

There is a unique equilibrium outcome in the informal market, in which safe types owning land a borrow from their own-segment lender at interest rate $R_s(a) - \frac{a}{p_s}$, while risky types borrow (from any lender) at interest rate $\frac{\rho_l}{p_r}$ which does not depend on their landholding.

Differences in Targeting between GBL and TRAIL without collusion

Within safe types, GBL tends to target those paying the highest interest rates in the informal market (landless), while TRAIL targets those paying the lowest interest rates (borrowers with intermediate landholdings if interest rates are u-shaped)

A consequence of relying on the agent, who wants to recommend his least lucrative clients

Differences in Targeting between GBL and TRAIL without collusion

If commission rate K is large enough, TRAIL tends to select safe types only, while GBL could involve a mixture of safe and risky types

So we could see different patterns of targeting with respect to different dimensions of borrower characteristics (poor vs safe) or MFI objectives (reaching ultra-poor versus repayment rates)

Proposition

If Agent-Intermediated Lending is subject to collusion, it is never optimal for a lender to recommend own-segment safe borrowers. On the other hand, it is always optimal to recommend a borrower from other segments. In some circumstances it can also be optimal to recommend risky borrowers in one's own segment with any level of landholding.

Selection in TRAIL Loans, without collusion

- Suppose agent and borrowers behave noncooperatively
- Who will the agent (=own-segment lender) select for TRAIL loans?
- If select:
  - own-safe type: $Kp_s r_T - [r_s(a) - \rho_I]$
  - own-risky type: $Kp_r r_T$
  - other-segment borrower: $K\bar{p} r_T$
- Recommending own-risky is dominated by recommending other-segment borrower
- Recommending own-(s, a^*) is optimal if safe type interest rate $r_s(a)$ is minimized at a^*, and

$$K \geq \underline{K} \equiv \frac{r_s(a^*) - \rho_I}{(p_s - \bar{p}) r_T}$$

Proposition

Suppose Agent-Intermediated Lending is not subject to collusion.

- *[a)] If $K \geq \overline{K}$, lenders recommend own-segment safe borrowers with a level of landholding corresponding to the lowest informal sector interest rate such that $r_s(a) \geq r_T$.*

- *[b)] If $K < \overline{K}$ or $r_T > r_s^*(a)$ for all a, lenders recommend other-segment borrowers with any level of landholding.*

Implications of Collusion in TRAIL

- What if agent and borrowers collude (side-payments: bribes or adjustments in other side-contracts)?
- Agent's objective is then to maximize payoff of joint agent-borrower coalition
- Joint payoff from coalition with:
  - own-(s, a) is $\rho_I - p_s r_T + K p_s r_T = \rho_I - (1 - K) p_s r_T$
  - own-(r, a) is $\rho_I - (1 - K) p_r r_T$, which dominates
- other-a can be shown to be always at least as high as payoff from own-(r, a)
- Hence *in the presence of collusion, TRAIL never selects own-safe borrowers, and it is always optimal to recommend borrowers from other segments*