## Online Appendix

## A1 Multidimensional Screening with Credit Rationing

Below we sketch the alternative model where agents screen farmers of multidimensional types, in the presence of credit rationing. We use the predictions of this model to empirically examine whether this mechanism can provide an alternative explanation of our result of larger average treatment effects in the TRAIL scheme.

Farmers (indexed by $i$ ) can vary in three different dimensions of type: wealth, ability and cost. All farmers face binding credit constraints in the informal credit market, so their scale of cultivation is determined by their credit access, which is an increasing function of their wealth type. Output is increasing in the scale of cultivation, with a constant elasticity $\mu$ which may exceed or be smaller than one, so we impose no restrictions on returns to scale. Output also depends on productivity, which depends on the farmer's ability type. Finally, unit costs of cultivation vary for a given farmer with the scale of cultivation with a constant elasticity $\zeta$. Cultivation costs vary across farmers according to the third dimension of heterogeneity, their cost type. We impose no constraints on the joint distribution of wealth, ability and cost.

Since credit constraints bind, the scale of cultivation is not chosen by farmers and depends on their wealth type, which is exogenously assigned. The farmer's financing constraint determines the upper bound on what the farmer can spend on cultivation cost. Since financing constraints bind by assumption, the actual cultivation cost equals the financing constraint. The farmers financial access (from self-financing as well as access to credit) therefore determines the actual cultivation cost:

$$
\begin{equation*}
\log C_{i v t}=\log w_{i}+\log \gamma_{v t}+\epsilon_{4 i v t} \tag{A1}
\end{equation*}
$$

where $C_{i v t}$ denotes the total cultivation cost of a control farmer $i$ in village-year $v, t, w_{i}$ is a measure of credit access or wealth, and $\gamma_{v t}$ represents village and year dummies for shocks to the supply of credit. Hence farmer fixed effects in the panel regression (A1) provide a measure of wealth.

Let $u_{i v t}$ denote the unit cultivation cost of farmer $i$ in village-year $v, t$. This in turn depends on the farmer's cost type $c_{i}$ and the area cultivated $l_{i v t}$ (owing to pecuniary scale economies or diseconomies), according to

$$
\begin{equation*}
\log u_{i v t}=\log c_{i}+\log q_{v t}+\zeta \log l_{i v t}+\epsilon_{3 i v t} \tag{A2}
\end{equation*}
$$

where $\log q_{v t}$ denotes input price shocks in $(v, t)$. On the other hand, the relationship between total and unit cultivation costs is given by

$$
\begin{equation*}
C_{i v t} \equiv u_{i v t} l_{i v t} q_{v t} \tag{A3}
\end{equation*}
$$

Given $C_{i v t}$ the financial access of the farmer, (A2) and (A3) represent two equations in two unknowns (unit cost, and scale of cultivation). Solving these, the scale of cultivation
is determined by

$$
\begin{equation*}
\log l_{i v t}=\frac{1}{1+\zeta}\left[\log c_{i v t}-\log c_{i}-\log q_{v t}\right]=\frac{1}{1+\zeta}\left[\log w_{i}-\log c_{i}-\log q_{v t}+\log \gamma_{v t}\right]+\epsilon_{4 i v t} \tag{A4}
\end{equation*}
$$

i.e., by the wealth and cost type of the farmer, in conjunction with village and year shocks in the supply of credit and input prices.

Finally, we can estimate farmer ability $a_{i}$ as a fixed effect in a panel production function regression:

$$
\begin{equation*}
\log y_{i v t}=\log a_{i}+\mu \log l_{i v t}+\delta_{2 v t}+\epsilon_{2 i v t} \tag{A5}
\end{equation*}
$$

where $y_{i v t}$ denotes revenue of farmer $i$ in village $v$ in year $t, \mu$ represents returns to scale, and $\delta_{2 v t}$ denotes village and year dummies representing village level productivity shocks.

## Selection Patterns

The three type variables are estimated as farmer fixed effects in panel regressions (A1, A2, A5) respectively. We can then directly check selection in either TRAIL and GRAIL on any of the three dimensions by comparing the corresponding distribution of each dimension between control 1 and 2 subjects.

## Predicted Treatment Effects

Under the assumption of no treatment effects per se on farmer wealth, ability or cost, we can estimate the treatment effect of either program (TRAIL or GRAIL) and the difference between these treatment effects implied by selection differences on the three dimensions: wealth, ability and cost.

Let $\Delta>0$ denote the percent change in financial access resulting from the treatment, so that $\log C_{i v t}$ rises by $\Delta$. Dropping the regression error terms, the resulting expressions for post-treatment log acreage and log unit cost are:

$$
\begin{gather*}
\log l_{i v t}=\frac{1}{1+\zeta}\left[\Delta+\log w_{i}+\log \gamma_{v t}-\log q_{v t}-\log c_{i}\right]  \tag{A6}\\
\log u_{i v t}=\frac{\zeta}{1+\zeta}\left[\Delta+\log w_{i}+\log \gamma_{v t}\right]+\frac{1}{1+\zeta}\left[\log c_{i}+\log q_{v t}\right] \tag{A7}
\end{gather*}
$$

Denoting (total) cost by $C_{i v t}$, the reduced form for log cost is therefore

$$
\begin{equation*}
\log C_{i v t} \equiv \log l_{i v t}+\log u_{i v t}=\Delta+\log w_{i}+\log \gamma_{v t} \tag{A8}
\end{equation*}
$$

Hence the treatment effects on these three variables are:

$$
\begin{equation*}
d \log l_{i v t}=\frac{1}{1+\zeta} \Delta, d \log u_{i v t}=\frac{\zeta}{1+\zeta} \Delta, d \log C_{i v t}=\Delta \tag{A9}
\end{equation*}
$$

The resulting treatment effect on log revenues is

$$
\begin{equation*}
d \log R_{i v t}=\mu d \log l_{i v t}=\frac{\mu}{1+\zeta} \Delta \tag{A10}
\end{equation*}
$$

and on farm profit is

$$
\begin{equation*}
d \Pi_{i v t} \equiv d R_{i v t}-d C_{i v t}=\left[\frac{\mu}{1+\zeta} R_{i v t}-C_{i v t}\right] \Delta \tag{A11}
\end{equation*}
$$

The difference in predicted treatment effect between TRAIL and GRAIL is thus equal to the difference between average quasi-profit $\left[\frac{\mu}{1+\zeta} R_{i v t}-C_{i v t}\right]$ of the respective Control 1 subjects. To relate quasi-profit to underlying types of the farmers, observe that the model implies

$$
\begin{equation*}
\frac{\mu}{1+\zeta} R_{i v t}-C_{i v t}=a_{i}\left[\frac{w_{i} \gamma_{v t}}{c_{i} q_{v t}}\right]^{\frac{\mu}{1+\zeta}}-\frac{w_{i} \gamma_{v t}}{\left(c_{i} q_{v t}\right)^{\frac{1}{1+\zeta}}} \tag{A12}
\end{equation*}
$$

so if we normalize the village year shocks to their unit mean, this reduces to

$$
\begin{equation*}
a_{i}\left[\frac{w_{i}}{c_{i}}\right]^{\frac{\mu}{1+\zeta}}-\frac{w_{i}}{\left(c_{i}\right)^{\frac{1}{1+\zeta}}} \tag{A13}
\end{equation*}
$$

which we can calculate for each control 1 farmer from the estimated types on the three dimensions ability $\left(a_{i}\right)$, wealth $\left(w_{i}\right)$ and $\operatorname{cost}\left(c_{i}\right)$.

## A2 Model Of Agent-Farmer Interactions: Details

## Control Farmers

A contract between farmer $F$ of ability $\theta$ and trader $T$ is represented by a scale of cultivation $l$, help $h$, monitoring $m$, an interest rate $r$ and a side-payment $s$. The first three determine the size of the loan $c(h, m) l$. The farmer repays the loan if his crop succeeds. Hence the farmer's expected payoff (excluding fixed cost $F$ ) is

$$
\begin{equation*}
p(\theta, m)[a(\theta, m) f(l)-(1+r) c(h, m) l]+s \tag{A14}
\end{equation*}
$$

while the trader's payoff is

$$
\begin{equation*}
\tau p(\theta, m) a(\theta, m) f(l)+[(1+r) p(\theta, m)-(1+\rho)] c(h, m) l-\gamma_{T}(m+h)-s \tag{A15}
\end{equation*}
$$

where $\tau$ represents an exogenous middleman margin earned by the trader per unit output. An efficient contract maximizes the joint payoff given by

$$
\begin{equation*}
(1+\tau) A(\theta, m) f(l)-(1+\rho) c(h, m) l-\gamma_{T}[m+h] \tag{A16}
\end{equation*}
$$

It is optimal for the trader to not monitor the farmer at all $\left(m^{c}(\theta)=0\right)$, since monitoring is costly, lowers expected productivity $A$ and increases the production cost. Next, observe that given a certain level of help $h$, the optimal scale of cultivation $l^{c}(\theta, h)$ which maximizes

$$
\begin{equation*}
(1+\tau) A(\theta, 0) f(l)-(1+\rho) c(h, 0) l \tag{A17}
\end{equation*}
$$

is increasing in $\theta$ and $h$. Let the maximized value of the expression in equation (A17) be denoted by $\Pi(h, \theta)$. Then help $h^{c}(\theta)$ is chosen to maximize

$$
\begin{equation*}
\Pi(h, \theta)-\gamma_{T} h \tag{A18}
\end{equation*}
$$

By the Envelope Theorem, $\Pi$ is a supermodular function: the marginal return to help increases with the farmer's ability. ${ }^{50}$ Hence $h^{c}(\theta)$ is increasing: higher ability farmers receive more help, and end up with higher scale of cultivation, productivity, and lower unit cost. This rationalizes our use of scale of cultivation as a proxy for ability and for productivity among control farmers.

Observe also that the choice of scale of cultivation can be delegated to the farmer, if the interest rate is set at

$$
\begin{equation*}
1+r^{c}(\theta)=\frac{1+\rho}{(1+\tau) p(\theta, 0)} \tag{A19}
\end{equation*}
$$

This interest rate adjusts the cost of capital up for default risk, and then subsidized by the trader in order to induce the farmer to internalize the effect of cultivation scale on T's profits. Hence we obtain predictions (i) and (ii).

[^0]
## TRAIL Treatment Effects

In TRAIL, a trader is appointed the agent, and recommends borrowers for TRAIL loans. These loans are offered at interest rate $r_{T}$, which is lower than the informal cost of capital for traders $\rho$. Agents earn a commission of $\psi \in(0,1)$ per rupee interest paid by the borrowers they recommended. We assume that any farmer whom the agent selects is already committed to cultivating $l^{c}$, financed by informal loans taken before the TRAIL loan was offered to him/her. ${ }^{51}$ As a result the TRAIL loan finances an increase in the cultivation scale. ${ }^{52}$ This applies to farmers in productivity Bins 2 and 3; for those in Bin 1 there are no pre-existing plans for cultivating potatoes. In what follows, we present calculations for farmers in Bins 2 and 3; for those in Bin 1 we set the pre-existing cultivation scale $L^{c}(\theta)$ to zero.

The efficient contract between $T$ and $F$ will now involve a supplementary cultivation scale of $l^{t}$, resulting in total scale of $l^{T} \equiv l^{c}+l^{t}$. The levels of monitoring and help will be adjusted to $m^{T}, h^{T}$. Then the joint payoff of $T$ and $F$ is

$$
\begin{equation*}
(1+\tau) A(\theta, m) f\left(L^{c}(\theta)+l^{t}\right)-\left[(1+\rho) L^{c}(\theta)+\left\{1+r_{T}(1-\psi)\right\} p(\theta, m) l^{t}\right] c(h, m)-\gamma_{T}[h+m] \tag{A20}
\end{equation*}
$$

where $L^{c}(\theta) \equiv l^{c}\left(\theta, h^{c}(\theta)\right)$.
The TRAIL agent continues to find it optimal not to monitor the farmer: $m^{T}(\theta)=0$. Given help $h$, the treatment effect on cultivation scale $l^{t}(\theta, h)$ maximizes

$$
\begin{equation*}
(1+\tau) A(\theta, 0) f\left(L^{c}(\theta)+l^{t}\right)-\left[(1+\rho) L^{c}(\theta)+p(\theta, 0)\left\{1+r_{T}(1-\psi)\right\} l^{t}\right] c(h, m) \tag{A21}
\end{equation*}
$$

and therefore it also maximizes

$$
\begin{equation*}
(1+\tau) a(\theta, 0) f\left(L^{c}(\theta)+l^{t}\right)-\left[\left\{1+r_{T}(1-\psi)\right\} l^{t}\right] c(h, m) \tag{A22}
\end{equation*}
$$

Using the same argument as used in Lemma 2 in Maitra et al. (2017), the cultivation treatment effect $l^{t}(., h)$ is increasing in $\theta$. The Envelope Theorem implies that the help provided by the agent to the treated farmer $h^{T}(\theta)$ must satisfy the first order condition

$$
\begin{equation*}
\left[(1+\rho) L^{c}(\theta)+\left\{1+r_{T}(1-\psi)\right\} p(\theta, 0) l^{t}\left(\theta, h^{T}(\theta)\right)\right] c_{h}\left(h^{T}(\theta), 0\right)+\gamma_{T}=0 \tag{A23}
\end{equation*}
$$

The corresponding second order condition implies that $h^{T}(\theta)$ is increasing. Among treated farmers the more able will receive more help, and thereby attain lower unit costs, cultivate a larger scale, and produce higher output: hence the Order Preserving Assumption holds in TRAIL.

We can also compare agent interactions between treated and control farmers with the same ability $\theta$. Help $h^{c}(\theta)$ provided to a control farmer with the same ability satisfies the first order condition

$$
\begin{equation*}
\left[(1+\rho) L^{c}(\theta)\right] c_{h}\left(h^{c}(\theta), 0\right)+\gamma_{T}=0 . \tag{A24}
\end{equation*}
$$

[^1]Comparing (A23) and (A24), it is evident that $h^{T}(\theta) \geq h^{c}(\theta)$, so treated farmers obtain more help. The reason is that they cultivate a larger area compared to control farmers with the same ability, so the gains from unit cost reductions generate a larger reduction in total cost, which motivates the agent to provide more help. In turn this implies treated farmers cultivate a larger area, produce more output and earn more profits compared with control farmers of the same ability. This is prediction (iv).

## GRAIL Treatment Effects

In the GRAIL scheme, the political incumbent appoints an agent who is not a trader. This agent does not lend, or trade in inputs or crop output, and so does not have the same business-related incentives as a TRAIL agent. Instead, his objectives are political or ideological, represented by welfare weight $v(\theta)$, and seeks to maximize $v(\theta) p(\theta, m)-\gamma_{G} m$. The welfare weight also includes the commission earned by the agent. While this may bias the agent in favor of selecting more able borrowers because they select larger loans and are less likely to default, we assume this is outweighed by political considerations which bias them in favor of less able farmers, so $v$ is a decreasing function. The optimal level of monitoring (positive if $\gamma_{G}$ is small enough) satisfies

$$
\begin{equation*}
v(\theta) p_{m}\left(\theta, m^{G}(\theta)\right)=\gamma_{G} \tag{A25}
\end{equation*}
$$

Since monitoring is more effective when farmers are less able, and the welfare weights are decreasing in ability, $m^{G}(\theta)$ is decreasing in ability, and is greater that $m^{T}(\theta)=0$. This implies prediction (vi): the GRAIL agent interacts less with high ability farmers. And default rates on GRAIL loans are lower than on TRAIL loans: $p\left(\theta, m^{G}(\theta)\right) \geq p(\theta, 0)$.

Monitoring by the GRAIL agent affects the payoffs of treated farmers and the trader they contract with. Their joint payoff is given by

$$
\begin{align*}
& \left.(1+\tau) A\left(\theta, m^{G}(\theta)+m\right)\right) f\left(L^{c}(\theta)+l^{g}\right)-\left[(1+\rho) L^{c}(\theta)\right. \\
+ & \left.\left\{1+r_{T}\right\} p\left(\theta, m^{G}(\theta)+m\right) l^{g}\right] c\left(h, m^{G}(\theta)+m\right)-\gamma_{T}[h+m] \tag{A26}
\end{align*}
$$

where $l^{g}$ denotes the additional area that the GRAIL treated farmer cultivates, and $(h, m)$ continues to denote help and monitoring activities of the trader. The commission does not enter this expression since it accrues to the GRAIL agent rather than the trader. The trader has no incentive to monitor. Hence the contract involves a treatment effect $l^{g}$ on area cultivated and help $h$ which maximize

$$
\begin{equation*}
\left.(1+\tau) A\left(\theta, m^{G}(\theta)\right)\right) f\left(L^{c}(\theta)+l^{g}\right)-\left[(1+\rho) L^{c}(\theta)+\left\{1+r_{T}\right\} p\left(\theta, m^{G}(\theta)\right) l^{g}\right] c\left(h, m^{G}(\theta)\right)-\gamma_{T} h \tag{A27}
\end{equation*}
$$

$l^{g}(\theta, h)$ must then maximize

$$
\begin{equation*}
\left.(1+\tau) a\left(\theta, m^{G}(\theta)\right)\right) f\left(L^{c}(\theta)+l^{g}\right)-\left[\left\{1+r_{T}\right\} l^{g}\right] c\left(h, m^{G}(\theta)\right) \tag{A28}
\end{equation*}
$$

while help $h^{G}(\theta)$ minimizes

$$
\begin{equation*}
\left[(1+\rho) L^{c}(\theta)+\left\{1+r_{T}\right\} p\left(\theta, m^{G}(\theta)\right) l^{g}\left(\theta, h^{G}(\theta)\right)\right] c\left(h, m^{G}(\theta)\right)+\gamma_{T} h \tag{A29}
\end{equation*}
$$

Arguments similar to those used for TRAIL treated subjects imply that higher ability farmers receive more help. To see this, note that if $l^{g}(\theta ; h)$ denotes the area treatment effect in GRAIL for any given help $h$, the same argument (combined with $m^{G}($.$) decreas-$ ing) implies $l^{g}(,, h)$ is increasing in $\theta$. Hence $h^{G}(\theta)$ satisfies the first order condition

$$
\begin{equation*}
\left[(1+\rho) L^{c}(\theta)+\left\{1+r_{T}\right\} p\left(\theta, m^{G}(\theta)\right) l^{g}\left(\theta, h^{G}(\theta)\right)\right] c_{h}\left(h^{G}(\theta), m^{G}(\theta)\right)+\gamma_{T}=0 \tag{A30}
\end{equation*}
$$

$c_{h m}=0$ then implies that $c_{h}\left(h^{G}(\theta), m^{G}(\theta)\right)=c_{h}\left(h^{G}(\theta), 0\right)$ and the second order condition for minimization of (A30) implies $h^{G}($.$) is increasing. Hence the Order Preserving$ Assumption is also satisfied in GRAIL: treated farmers of higher ability have lower unit cost, cultivate larger area and produce more output. This is the second part of prediction (v). The first part follows from the greater monitoring in the GRAIL scheme.

Observe next that the HTE on area cultivated is higher in TRAIL, for any $\theta$. This follows from comparing maximization problems (A22) and (A28), and using $a\left(\theta, m^{G}(\theta)\right) \leq$ $a(\theta, 0),\left\{1+r_{T}\right\}>\left\{1+r_{T}(1-\psi)\right\}$ and $c\left(h, m^{G}(\theta)\right) \geq c(h, 0)$.

To obtain prediction (vi), compare the first order conditions (A23) and (A30) for help provided by the trader to treated farmers in TRAIL and GRAIL. If

$$
\begin{equation*}
p(\theta, 0)\left\{1+r_{T}(1-\psi)\right\} l^{t}\left(\theta, h^{T}(\theta)\right)>p\left(\theta, m^{G}(\theta)\right)\left\{1+r_{T}\right\} l^{g}\left(\theta, h^{G}(\theta)\right) \tag{A31}
\end{equation*}
$$

more help will be provided to TRAIL treated farmers, who will then end up with lower unit costs, higher output and profits than GRAIL treated farmers of the same ability (because the latter are less productive and incur higher unit costs).

Finally we show (A31) holds if the production function has constant elasticity $f(l)=$ $l^{\alpha}$ where $\alpha \in(0,1)$. Since $A(\theta, m)$ is falling in $m$ and $c(\theta, m)$ is rising in $m$, it follows that

$$
\begin{equation*}
\frac{A\left(\theta, m^{G}(\theta)\right)}{c\left(\theta, m^{G}(\theta)\right)} \leq \frac{A(\theta, 0)}{c(\theta, 0)} \tag{A32}
\end{equation*}
$$

This implies

$$
\begin{equation*}
\frac{p\left(\theta, m^{G}(\theta)\right)}{p(\theta, 0)} \leq\left[\frac{a(\theta, 0) c\left(h, m^{G}(\theta)\right)}{a\left(\theta, m^{G}(\theta)\right) c(h, 0)}\right] \tag{A33}
\end{equation*}
$$

Since the right-hand-side of (A33) is larger than one:

$$
\begin{equation*}
\frac{p\left(\theta, m^{G}(\theta)\right)}{p(\theta, 0)} \leq\left[\frac{a(\theta, 0) c\left(h, m^{G}(\theta)\right)}{a\left(\theta, m^{G}(\theta)\right) c(h, 0)}\right]^{\frac{1}{1-\alpha}} \tag{A34}
\end{equation*}
$$

From the respective first-order conditions for maximization of (A22) and (A28), and using $f(l)=l^{\alpha}$, we have

$$
\begin{equation*}
\frac{a(\theta, 0) c\left(h, m^{G}(\theta)\right)}{a\left(\theta, m^{G}(\theta)\right) c(h, 0)}=\left[\frac{L^{c}(\theta)+l^{t}(\theta, 0)}{L^{c}(\theta)+l^{g}\left(\theta, m^{G}(\theta)\right)}\right]^{1-\alpha} \frac{1+r_{T}(1-\psi)}{1+r_{T}} \tag{A35}
\end{equation*}
$$

The right-hand-side of this is smaller than

$$
\begin{equation*}
\left[\frac{L^{c}(\theta)+l^{t}(\theta, 0)}{L^{c}(\theta)+l^{g}\left(\theta, m^{G}(\theta)\right)} \frac{1+r_{T}(1-\psi)}{1+r_{T}}\right]^{1-\alpha} \tag{A36}
\end{equation*}
$$

Therefore

$$
\begin{equation*}
\left[\frac{a(\theta, 0) c\left(h, m^{G}(\theta)\right)}{a\left(\theta, m^{G}(\theta)\right) c(h, 0)}\right]^{\frac{1}{1-\alpha}}<\frac{L^{c}(\theta)+l^{t}(\theta, 0)}{L^{c}(\theta)+l^{g}\left(\theta, m^{G}(\theta)\right)} \frac{1+r_{T}(1-\psi)}{1+r_{T}} \tag{A37}
\end{equation*}
$$

Combining this with (A34) we obtain

$$
\begin{equation*}
1<\frac{p(\theta, 0)\left\{1+r_{T}(1-\psi)\right\}\left(L^{C}(\theta)+l^{t}(\theta, 0)\right)}{p\left(\theta, m^{G}(\theta)\right)\left\{1+r_{T}\right\}\left(L^{C}(\theta)+l^{g}\left(\theta, m^{G}(\theta)\right)\right)} \tag{A38}
\end{equation*}
$$

Since $l^{g}\left(\theta, m^{G}(\theta)\right) \leq l^{t}(\theta, 0)$ we have $\frac{L^{c}(\theta)+l^{t}(\theta, 0)}{\left.L^{C}(\theta)+l^{g}\left(\theta, m^{G}(\theta)\right)\right)} \leq \frac{l^{t}(\theta, 0)}{\left.l^{g}\left(\theta, m^{G}(\theta)\right)\right)}$. So (A31) holds.

Figure A1: Comparing selection in TRAIL and GRAIL villages. Descriptive Statistics on Productivity.


Notes: Sample restricted to Control 1 households TRAIL and GRAIL villages with at most 1.5 acres of land.

Figure A2: Percentage of households in each Productivity Bin. TRAIL and GRAIL


Notes: The height of the bars denote the fraction of households in each productivity Bin. Productivity is computed using the logarithm of acreage under potato cultivation. Sample restricted to Control 1 households in TRAIL and GRAIL villages with at most 1.5 acres of land.

Figure A3: Variation in Farm Value Added for Treatment and Control 1 groups by Productivity


Notes: Lowess plot of farm value added from potato cultivation on productivity presented. Separate lowess plots presented for Treatment and Control1 households in TRAIL and GRAIL villages.
Figure A4: CDFs of the household fixed effects on Unit Cost of Production, Acreage and Wealth


Notes: Sample Restricted to Control 1 households in TRAIL and GRAIL villages with at most 1.5 acres of landholding.

## Figure A6: Interest Rate on Informal Loans and Productivity. Control Households Only

## Panel A: <br> Average Informal Interest Rates



Panel B:
Variation in Informal Interest Rates


Notes: The vertical axis measures the average interest rate paid on informal loans by households. The horizontal axis shows the productivity estimate. In the left panel, we compute the average interest rate for households in each productivity bin. The average interest rate paid on informal loans by households in productivity Bin 1 is significantly higher than that paid by households in productivity Bin 2 ( $p-v a l u e=$ 0.03 ) and productivity $\operatorname{Bin} 3(p-v a l u e=0.04)$. In the right panel we present the locally weighted regressions in of interest paid on informal loans on productivity. The average interest rate paid by households in productivity Bin 1 is shown as a single point. The sample is restricted to Control 1 and Control 2 households in TRAIL and GRAIL villages with at most 1.5 acres of land. Productivity is computed using the logarithm of the acreage under potato cultivation.

Table A1: Baseline Credit Market characteristics


Annualized Interest Rate by Source (percent)

| Traders/Money Lenders | 24.93 | $(20.36)$ | 25.19 | $(21.47)$ |
| :--- | :---: | :---: | :---: | :---: |
| Family and Friends | 21.28 | $(14.12)$ | 22.66 | $(16.50)$ |
| Cooperatives | 15.51 | $(3.83)$ | 15.70 | $(2.97)$ |
| Government Banks | 11.33 | $(4.63)$ | 11.87 | $(4.57)$ |
| MFI and Other Sources | 37.26 | $(21.64)$ | 34.38 | $(25.79)$ |


| Duration by Source (days) |  |  |  |  |
| :--- | :---: | :---: | :---: | :---: |
| Traders/Money Lenders | 125.08 | $(34.05)$ | 122.80 | $(22.43)$ |
| Family and Friends | 164.08 | $(97.40)$ | 183.70 | $(104.25)$ |
| Cooperatives | 323.34 | $(90.97)$ | 327.25 | $(87.74)$ |
| Government Banks | 271.86 | $(121.04)$ | 324.67 | $(91.49)$ |
| MFI and Other Sources | 238.03 | $(144.12)$ | 272.80 | $(128.48)$ |

Proportion of Loans Collateralized by Source
Traders/Money Lenders 0.020 .01
Family and Friends $0.04 \quad 0.07$
$\begin{array}{lll}\text { Cooperatives } & 0.79 & 0.78\end{array}$
Government Banks $0.81 \quad 0.83$
MFI and Other Sources $0.01 \quad 0.01$

Notes: Statistics are reported for all sample households in TRAIL and GRAIL villages with at most 1.5 acres of land. All characteristics are for loans taken by the households in Cycle 1. Program loans are not included. For the interest rate summary statistics loans where the principal amount is reported equal to the repayment amount are not included. To arrive at representative estimates for the study area, Treatment and Control 1 households are assigned a weight of $\frac{30}{N}$ and Control 2 households are assigned a weight of $\frac{N-30}{N}$, were $N$ is the total number of households in their village. ${ }^{\dagger}$ : Total borrowing $=0$ for households that do not borrow. $\ddagger$ : Proportion of loans in terms of value of loans at the household level. All proportions are computed only over households that borrowed. Standard deviations are in parentheses.

Table A2: Cultivators and Non-cultivators. Differences in Demographic Characteristics

|  |  |  |
| :--- | :---: | :---: |
|  | Non Cultivators <br> $(1)$ | Cultivators <br> $(2)$ |
|  |  |  |
| Landholding | 0.267 | 0.561 |
| Non Hindu | 0.239 | 0.139 |
| Low Caste | 0.419 | 0.261 |
| Household Size | 4.440 | 4.806 |
| Female Headed Household | 0.101 | 0.031 |
| Age of Oldest Male | 45.280 | 49.007 |
| Oldest Male: Completed Primary School | 0.348 | 0.457 |

Notes: Households that cultivate potato at least 2 of the 3 survey years are categorized as cultivators.
Table A3: Robustness. Average Treatment Effects in Potato Cultivation.

|  | Cultivate (1) | Acreage <br> (Acres) <br> (2) | Production $(\mathrm{Kg})$ <br> (3) | Cost of Production (Rs.) <br> (4) |  | Revenue <br> (Rs.) <br> (6) | Value <br> Added <br> (Rs.) <br> (7) | Imputed profit (Rs.) <br> (8) | Input Cost <br> (Rs.) <br> (9) | Input Cost per acre (Rs./acre) (10) | Index Variables <br> (11) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Panel A: Regressions with no Additional Controls |  |  |  |  |  |  |  |  |  |  |  |
| TRAIL Treatment <br> Mean TRAIL C1 \% Effect TRAIL | $\begin{gathered} 0.04 \\ (0.03) \\ 0.72 \\ 6.25 \end{gathered}$ | $\begin{gathered} 0.09 \\ (0.04) \\ 0.34 \\ 27.21 \end{gathered}$ | $\begin{gathered} 934.37 \\ (376.71) \\ 3646.12 \\ 25.63 \end{gathered}$ | $\begin{aligned} & 1842.19 .19 \\ & (865.79) \\ & 8481.75 \\ & 21.72 \end{aligned}$ | $\begin{aligned} & -0.03 \\ & (0.10) \\ & 4.63 \\ & -0.68 \end{aligned}$ | $\begin{gathered} 3839.97 \\ (149.020) \\ 14285.47 \\ 26.88 \end{gathered}$ | $\begin{gathered} 2005.47 \\ (752.46) \\ 5732.36 \\ 34.99 \end{gathered}$ | $\begin{gathered} 1852.20 \\ (716.06) \\ 4733.77 \\ 39.13 \end{gathered}$ | $\begin{gathered} 3027.82 \\ (1660.52) \\ 16288.50 \\ 18.59 \end{gathered}$ | $\begin{aligned} & -2904.30 \\ & (1072.87) \\ & 49076.88 \end{aligned}$ $-5.92$ | $\begin{gathered} 0.18 \\ (0.07) \\ 0.05 \\ 362.36 \end{gathered}$ |
| GRAIL Treatment <br> Mean GRAIL C1 <br> \% Effect GRAIL | $\begin{gathered} 0.15 \\ \left(\begin{array}{c} 0.03) \\ 0.64 \\ 23.79 \end{array}\right. \end{gathered}$ | $\begin{gathered} 0.10 \\ \left(\begin{array}{c} 0.03) \\ 0.30 \\ 34.29 \end{array}\right. \end{gathered}$ | $\begin{gathered} 1127.11 \\ (378.38) \\ 3236.73 \\ 34.82 \end{gathered}$ | $\begin{gathered} 2755.10 \\ (824.74) \\ 7070.65 \\ 38.97 \end{gathered}$ | $\begin{gathered} -0.18 \\ \left(\begin{array}{c} 120) \\ 4.80 \\ -3.83 \end{array}\right. \end{gathered}$ | $\begin{gathered} 4033.85 \\ (1554.91) \\ 12964.78 \\ 31.11 \end{gathered}$ | $\begin{aligned} & 1267.60 \\ & (857.83) \\ & 5827.66 \\ & 21.75 \end{aligned}$ | $\begin{gathered} 913.02 \\ (826.72) \\ 4941.51 \\ 18.48 \end{gathered}$ | $\begin{gathered} 5459.37 \\ (1522.90) \\ 13454.99 \\ 40.58 \end{gathered}$ | $\begin{gathered} 700.20 \\ (1048.81) \\ 47510.73 \\ 1.47 \end{gathered}$ | $\begin{gathered} 0.21 \\ (0.07) \\ -0.02 \\ -869.23 \end{gathered}$ |
| TRAIL v. GRAIL Treatment | $\begin{aligned} & -0.11 \\ & (0.05) \end{aligned}$ | $\begin{aligned} & -0.01 \\ & (0.05) \end{aligned}$ | $\begin{aligned} & -192.74 \\ & (533.63) \end{aligned}$ | $\begin{gathered} -912.91 \\ (1195.00) \end{gathered}$ | $\begin{gathered} 0.15 \\ (0.15) \end{gathered}$ | $\begin{gathered} -193.88 \\ (2155.41) \end{gathered}$ | $\begin{gathered} 737.87 \\ (1140.18) \end{gathered}$ | $\begin{gathered} 939.18 \\ (1092.87) \end{gathered}$ | $\begin{aligned} & -2431.54 \\ & (2251.67) \end{aligned}$ | $\begin{aligned} & -3604.50 \\ & (1500.80) \end{aligned}$ | $\begin{aligned} & -0.03 \\ & (0.10) \end{aligned}$ |
| Sample Size | 6,237 | 6,237 | 6,237 | 6,237 | 3,843 | 6,237 | 6,237 | 6,237 | 6,237 | 4,061 | 6,237 |
| Panel B: Regressions with SEs clustered at the village level |  |  |  |  |  |  |  |  |  |  |  |
| TRAIL Treatment <br> Mean TRAIL C1 \% Effect TRAIL | $\begin{gathered} 0.04 \\ \left(\begin{array}{c} 0.03) \\ 0.72 \\ 5.63 \end{array}\right. \end{gathered}$ | $\begin{gathered} 0.09 \\ (0.020 \\ 0.34 \\ 27.58 \end{gathered}$ | $\begin{gathered} 946.10 \\ (266.12) \\ 3646.12 \\ 25.95 \end{gathered}$ | $\begin{aligned} & 1845.43 \\ & (648.20) \\ & 8481.75 \\ & 21.76 \end{aligned}$ | $\begin{aligned} & -0.03 \\ & (0.09) \\ & 4.63 \\ & -0.65 \end{aligned}$ | $\begin{gathered} 3897.28 \\ (1098.41) \\ 1425.47 \\ 27.28 \end{gathered}$ | $\begin{gathered} 2058.71 \\ (559.84) \\ 5732.36 \\ 35.91 \end{gathered}$ | $\begin{aligned} & 1906.18 \\ & (544.32) \\ & 4733.77 \\ & 40.27 \end{aligned}$ | 3047.95 $(1189.33)$ 1628.50 16288.50 18.71 | $\begin{gathered} -2910.32 \\ (900.72) \\ 49076.88 \\ -5.93 \end{gathered}$ | $\begin{gathered} 0.18 \\ (0.05) \\ 0.05 \\ 365.12 \end{gathered}$ |
| GRAIL Treatment <br> Mean GRAIL C1 <br> \% Effect GRAIL | $\begin{gathered} 0.13 \\ \left(\begin{array}{c} 0.03) \\ 0.64 \\ 20.33 \end{array}\right. \end{gathered}$ | $\begin{gathered} 0.07 \\ (0.02) \\ 0.30 \\ 23.25 \end{gathered}$ | $\begin{gathered} 770.95 \\ (273.22) \\ 3236.73 \\ 23.82 \end{gathered}$ | $\begin{gathered} 2007.20 \\ (624.02) \\ 7070.65 \\ 28.39 \end{gathered}$ | $\begin{gathered} -0.18 \\ \left(\begin{array}{c} 141) \\ 4.80 \\ -3.66 \end{array}\right. \end{gathered}$ | $\begin{gathered} 2501.15 \\ (1059.90) \\ 12964.78 \\ 19.29 \end{gathered}$ | $\begin{gathered} 492.47 \\ (676.98) \\ 5827.66 \\ 8.45 \end{gathered}$ | $\begin{gathered} 190.36 \\ (655.96) \\ 4941.51 \\ 3.85 \end{gathered}$ | $\begin{gathered} 3886.99 \\ (1174.36) \\ 13454.99 \\ 28.99 \end{gathered}$ | $\begin{gathered} 550.94 \\ (1091.80) \\ 47510.73 \\ 1.16 \end{gathered}$ | $\begin{gathered} 0.14 \\ (0.05) \\ -0.02 \\ -581.15 \end{gathered}$ |
| TRAIL v. GRAIL Treatment | $\begin{aligned} & -0.09 \\ & (0.04) \end{aligned}$ | $\begin{gathered} 0.02 \\ (0.04) \end{gathered}$ | $\begin{gathered} 175.14 \\ (383.88) \end{gathered}$ | $\begin{aligned} & -161.77 \\ & (913.29) \end{aligned}$ | $\begin{gathered} 0.15 \\ (0.16) \end{gathered}$ | $\begin{gathered} 1396.12 \\ (1561.45) \end{gathered}$ | $\begin{aligned} & 1566.24 \\ & (890.85) \end{aligned}$ | $\begin{aligned} & 1715.82 \\ & (861.55) \end{aligned}$ | $\begin{gathered} -839.04 \\ (1695.62) \end{gathered}$ | $\begin{gathered} -3461.26 \\ (1420.65) \end{gathered}$ | $\begin{gathered} 0.04 \\ (0.07) \end{gathered}$ |
| Sample Size | 6,153 | 6,153 | 6,153 | 6,153 | 3,821 | 6,153 | 6,153 | 6,153 | 6,153 | 4,041 | 6,153 |

Robustness. Average Treatment Effects in Potato Cultivation



[^0]:    ${ }^{50}$ This is because $\Pi_{h}$ equals $-\rho c_{h}(h, 0) l^{c}(\theta, h)$ which is rising in $\theta$.

[^1]:    ${ }^{51}$ This is in order to explain the lack of treatment effects on informal borrowing.
    ${ }^{52}$ Recall that in Table 4 we did not see any evidence that the TRAIL loans crowded out informal loans.

