The returns to microenterprise support among the ultra-poor: A field experiment in post-war Uganda

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Online Appendix

A Training programs: Aims and curricula

1 Business skills training

The stated objectives of the business skills training were to increase basic knowledge and skills of business management, to develop confidence in enterprise initiation and management, to help participants assess their own capabilities and motivation in entrepreneurial careers, and to strengthen and develop business skills. The training was adapted from the CARE-Uganda Ecodev projects training manual which is based on CARE Bangladesh's Small Economic Activity Development Sector and Rural Maintenance Program. The program manual is available at `http://chrisblattman.com/documents/policy/WINGS.Business.Skills.Training.Manual.pdf`.

Training and subsequent follow-up visits were led by AVSI resident field officers (RFOs), full time professional staff of the NGO. RFOs typically had tertiary education in social work, the slight majority were men, and most had at least a few years of experience on similar interventions. AVSI trained them in providing business support as well as psychological and social support. They were based in field offices at the sub-county level. Prior to administering the training, each RFO had participated in a two-week course led by an external facilitator. RFOs were trained using the Participatory Rural Approach Manual and the Community Resilience and Dialogue (CRD) Manual, aimed for literate and non-literate persons, respectively. Training time was divided equally between each training manual.

During this business skills training, participants were asked to address five key questions: a) Can I operate this IGA? b) Will people buy my products? c) Is the IGA profitable? d) How much money do I need to start and operate the IGA? e) Will the income from the IGA when added to other family income, be enough to pay household incomes? These key questions were practically presented to participants through lectures, small group discussion, group games, storytelling, dramatizations and role-playing by participants, large group sharing of experiences, and drawings. Participants were also constantly asked to recite the five key

questions that they have to ask themselves as they think about starting their businesses. After the training, participants were given two weeks to develop a business plan, at which point AVSI staff would return to review plans individually.

The curriculum outline was as follows:

1. Business identification strategy and start-up process
    (a) Business identification games
    (b) Characteristics of an entrepreneur or good business person
    (c) Steps to become a businessperson
    (d) Business experience sharing
2. Business management
    (a) Constraints on business growth and performance
    (b) Advantages and disadvantages of being in business
    (c) Importance of monitoring activities and progress, avoiding delays and taking timely corrective actions
    (d) Sales and sales promotion
    (e) Choosing location and prices
3. Whether to sell on cash or credit
    (a) What are credit sales?
    (b) Advantages and disadvantages of credit
4. Financial management
    (a) Separation of home and business finances
    (b) Simple record keeping
    (c) Simple income and expenditure tracking
    (d) Costing of products and services
    (e) Simple budgeting
5. Developing a business plan

(a) Definition and purpose of a business plan

(b) How to prepare a simple business plan

6. Basic management of a group savings and credit fund

   (a) Reasons for saving

   (b) Structure of a group savings system

   (c) Reasons for a credit system

   (d) Structure of a group credit system

A copy of the training manual is available from AVSI USA on request (`http://www.avsi-usa.org/`).

2 Group dynamics training

AVSI did not typically encourage women to form support groups. Prior to the study, however, our qualitative work suggested that receiving training and grants could strengthen bonds among the beneficiaries in a village and induce them to cooperate, share ideas, and informally save together or insure one another.

The group dynamics training took place over three days, several weeks or months after grant disbursement. The program manual is available at `http://chrisblattman.com/documents/policy/WINGS.Group.Dynamic.Training.Manual.pdf`.

AVSI intended for group members to exchange business ideas (including in agriculture), to organize savings and credit, and to collaborate or cooperate in economic activities such as marketing their produce or buying their inputs. The stated importance of groups, for instance, emphasized on the first day of training, included the following:

- Farmers learn from each other
- Farmers can market their produce and buy inputs together
- Groups ease organizing demonstrations
- Groups help to organize saving and credit for farmers
- Groups simplify interpersonal communication among members
- Groups are powerful in changing behaviors, attitude and values
- Groups can be used for decision making, negotiation and bargaining

- Groups are a door for new innovation

The stated goals of the training present AVSI's mechanism to do so:

- To enable members acquire basic skills in leadership and management of a group
- To instill the spirit of good communication habit essential for building cooperation, unity and trust in a group
- To enable members value and respect decision made collectively
- To enable members to understand the importance of record keeping and identify types of record to keep in a group.

The curriculum had several key components and messages:

1. Introduction to the Advantages and importance of groups. As outlined above.
2. Leadership styles. Different types of leadership were illustrated to the members in order to make them understand the importance of an inclusive approach to group decision-making. For example, participants were asked to role play the parts of a dictator, passive and democratic.
3. Communication and listening. AVSI field workers stressed the importance of clear, open, and inclusive communication with regard to group activities. For example, participants were asked to take parts in dramatizations that illustrate bad and good communication skills and present their observations. They also practice listening skills.
4. Decision making process. The objective of this topic was to help the member to choose how decisions relevant for the group would be taken to then be reflected in a group Constitution. Again, the training underlined the importance of group inclusion. Here participants were asked to identify any topic of interest, discuss as a group and arrive at a conclusion and present results. They also learn mechanisms to resolve interpersonal conflicts.
5. Roles and Responsibilities. Group members participated in activities designed to demonstrate the different roles that group members can take on, their responsibilities and unhelpful behavior in groups. For example, this was done through animal codes where facilitators presented pictures of 19 different animals such as elephant, monkeys, owl, tortoise etc. Each of these animals were attached to a given behavioral pattern

and participants were expected to discuss the reality of such behavior in a group. The training stressed the importance of saving and suggested that groups collectively maintain a group savings account to make investments.

6. RECORD KEEPING. Basic record keeping techniques were illustrated to the participants as well as the importance of maintaining some level of record keeping. For example the facilitators illustrated the use of a ledger book for keeping records of monthly income and expenditure. Facilitators also presented different types of books that can be used in business such as a cash book, bank book and a purchase book, sales day book, the suppliers account record book, the customer account record book, a receipt book and an expense account book.

7. CONSTITUTION. Field workers also facilitated the creation of a group constitution in which participants agreed to a set their expectations for group activities and adopted rules governing how members interacted and supported one another. The purpose of the constitution was to reinforce the group goals and expectations agreed upon on the initial three-day training course. After the course, a copy of the constitution remained in the village with the group members.

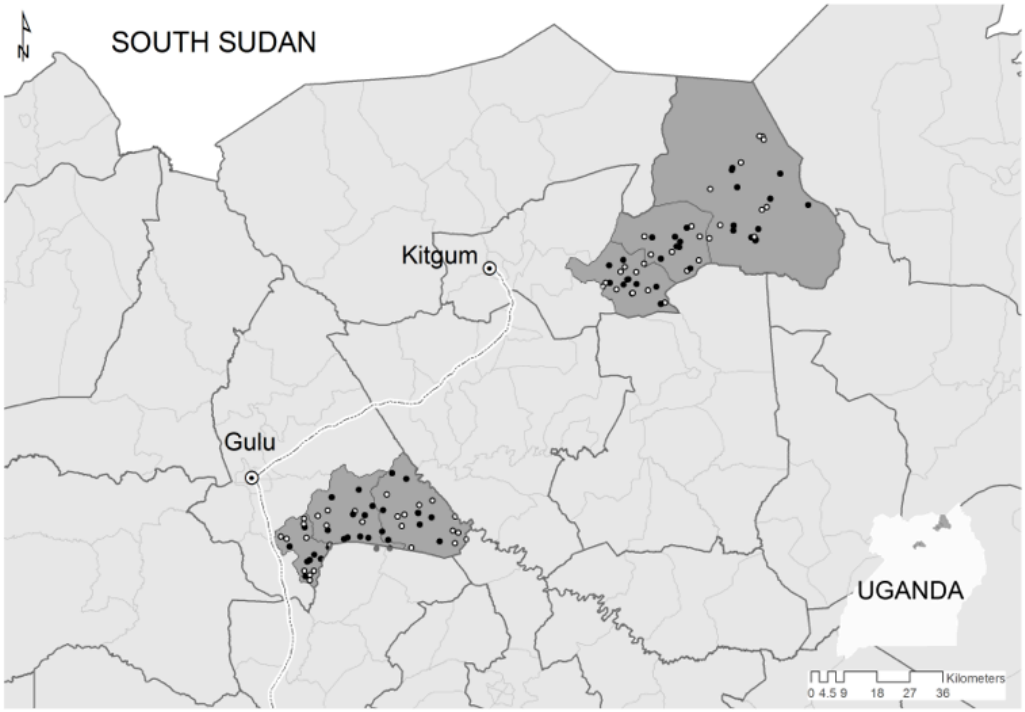
AVSI also provided stationery packages to the group members for purposes of record keeping. After the course, AVSI staff members administered follow-up meetings every two months to monitor group formation and progress. The purpose of these follow-ups was for AVSI staff to track group formation progress as well as for the staff to interact with the groups and offer advice and guidance.

B Survey summary statistics, attrition, and randomization balance

1 Villages

Figure B.1 displays the location of treatment and control villages. Only villages eligible for the study and intervention are displayed (roughly 40% of all villages in the six highlighted sub-counties). Thick and thin lines indicate district and sub-county boundaries. Villages assigned to initial treatment (Phase 1) are represented by black circles. Villages assigned to delayed treatment (Phase 2) are hollow circles.

Figure B.1: Villages in the study sample



2 Baseline summary statistics and balance

Table B.1 reports summary statistics and balance tests for all baseline covariates.

Table B.1: Summary statistics and balance tests

Covariate	Sample mean, baseline	Phase 1 –Phase 2 difference	Balance test, p-values: Assigned to Phase 1	Assigned to Phase 1, post-attrition	Assigned to group formation	Assigned to any follow-up
	(1)	(2)	(3)	(4)	(4)	(5)
			(n=1800)	(n=1,734)	(n=896)	(n=904)
Age	27.33	-0.62	0.17	0.13	0.39	0.31
Female	0.86	-0.01	0.72	0.67	0.24	0.73
Household size	6.90	-0.26	0.06	0.04	0.62	0.71
Married or living with partner	0.48	-0.05	0.26	0.24	0.07	0.10
Single headed household	0.49	0.04	0.17	0.22	0.47	0.01
Biological children alive	3.34	-0.24	0.08	0.07	0.53	0.10
Non-Acholi ethnic group	0.15	0.02	0.63	0.65	0.35	0.20
Currently in school	0.07	-0.01	0.49	0.53	0.20	0.40
Highest grade reached at school	2.79	0.07	0.70	0.69	0.69	0.02
Able to read and write minimally	0.26	-0.05	0.04	0.02	0.53	0.47
Able to speak some English	0.09	-0.01	0.37	0.30	0.37	0.09
Months of non-formal training	0.44	-0.25	0.06	0.17	0.69	0.39
Digit recall test score	0.00	-0.02	0.89	0.89	0.76	0.07
Any nonfarm self-employment	0.03	-0.01	0.17	0.20	0.59	0.47
Average work hours per week	15.38	-1.62	0.12	0.12	0.50	0.17
Agricultural	12.32	-2.09	0.02	0.02	0.17	0.09
Own farm and animals	8.36	-1.33	0.08	0.08	0.23	0.08
Agricultural wage labor	3.96	-0.75	0.08	0.09	0.47	0.75
Casual non-agricultural labor	1.62	0.04	0.86	0.93	0.53	0.92
Nonagricultural	3.06	0.46	0.25	0.28	0.31	0.64
Brewing alcohol/beer	0.52	0.05	0.58	0.52	0.97	0.17
Petty trading	0.40	0.07	0.70	0.69	0.52	0.55
Other work	0.53	0.30	0.11	0.13	0.44	0.33
Average hours of chores per week	34.56	0.63	0.68	0.82	0.80	0.01
Zero employment hours in past month	0.20	0.05	0.07	0.08	0.15	0.31
Consumption durables (z-score)	-0.63	-0.07	0.05	0.04	0.59	0.42
Production durables (z-score)	-0.51	-0.02	0.48	0.40	0.20	0.32
Monthly cash earnings (000s UGX)	8.93	-0.78	0.26	0.22	0.50	0.66
Monthly cash earnings of other household earner	850.59	-127.93	0.20	0.14	0.74	0.00
Member of a savings group	0.09	-0.03	0.07	0.06	0.42	0.52
Total savings, 000s UGX	4.86	-1.23	0.20	0.17	0.54	0.82
Total debts, 000s UGX	4.16	0.15	0.82	0.77	0.99	0.98
Can obtain 15,000 UGX ($7.50) loan	0.24	-0.01	0.53	0.39	0.76	0.59
Can obtain 100,000 UGX ($50) loan	0.04	0.01	0.34	0.28	0.86	0.25
Quality of family relationships, z-score	-0.00	-0.19	0.00	0.00	0.63	0.90

Covariate	Sample mean, baseline (1)	Phase 1 –Phase 2 difference (2)	Balance test, p-values: Assigned to Phase 1 (n=1800) (3)	Assigned to Phase 1, post-attrition (n=1,734) (4)	Assigned to group formation (n=896) (4)	Assigned to any follow-up (n=904) (5)
Community participation, z-score	0.00	-0.11	0.05	0.04	0.40	0.15
Neighbor relations, z-score	0.00	-0.03	0.62	0.55	0.27	0.94
# of community groups	0.53	-0.10	0.04	0.04	0.02	0.23
Community maltreatment, past year	0.18	0.03	0.11	0.09	0.06	0.48
Physical and emotional abuse, z-score	0.07	-0.04	0.54	0.69	0.25	0.60
Economic autonomy, z-score	0.00	0.07	0.20	0.20	0.62	0.67
Attitudes to women's rights, z-score	-0.00	0.04	0.51	0.51	0.46	0.54
Related to a traditional chief or LC1	0.28	-0.06	0.02	0.03	0.64	0.86
Physical health index, z-score	-0.05	-0.02	0.75	0.89	0.83	0.60
Reports having HIV or AIDS	0.06	-0.01	0.59	0.48	0.26	0.20
Symptoms of distress, z-score	-0.00	0.18	0.02	0.01	0.65	0.82
War violence experienced, z-score	-0.01	-0.08	0.19	0.28	0.64	0.65
Forcibly recruited into rebel group	0.23	-0.05	0.03	0.02	0.39	0.43
Carried gun within rebel group	0.03	-0.01	0.45	0.66	0.85	0.58
Forcibly married within rebel group	0.03	-0.00	0.63	0.73	0.83	0.96
Bore a child in forced marriage	0.01	-0.00	0.70	0.70	0.99	0.75
Self-reported risk aversion, z-score	0.00	0.03	0.55	0.60	0.39	0.63
Self-reported patience, z-score	0.00	-0.03	0.57	0.64	0.42	0.07
Village-level covariates (N=120)						
Village population	699.11	100.58	0.34	0.34	0.09	0.24
Average education of village	4.38	-0.25	0.16	0.14	0.48	0.16
Weighted distance to all villages	0.55	-0.07	0.34	0.35	0.61	0.16
Weighted distance to treatment villages	0.52	0.09	0.43	0.43	0.68	0.10
Distance to capital (km)	45.46	1.48	0.58	0.57	0.62	0.04
Sample members in the village	15.16	-0.18	0.50	0.48	0.95	0.13
Remoteness index, z-score	-0.01	0.12	0.49	0.46	0.31	0.01
Accessible by bus	0.95	0.08	0.05	0.05	0.31	0.06
Minutes walk to primary school	54.48	6.66	0.49	0.45	0.77	0.44
No mobile coverage	0.04	0.02	0.61	0.60	0.58	0.16
Minutes walk to pay phone	99.19	9.38	0.49	0.49	0.85	0.76
Minutes walk to health center	274.81	-10.49	0.73	0.76	0.16	0.10
Village has a market	0.26	-0.16	0.05	0.05	0.83	0.07
Minutes walk to market	110.73	12.11	0.36	0.35	0.51	0.44
Price index, z-score	0.01	-0.32	0.05	0.05	0.14	0.64
Cost of renting one unit land (UGX)	104.12	0.33	0.97	0.98	0.18	0.98
Village was a camp	0.06	-0.05	0.25	0.26	0.96	0.35
Number of NGOs active in village	7.27	-0.29	0.68	0.66	0.21	0.40

Covariate	Sample mean, baseline (1)	Phase 1 –Phase 2 difference (2)	Balance test, p-values: Assigned to Phase 1 (n=1800) (3)	Assigned to Phase 1, post-attrition (n=1,734) (4)	Assigned to group formation (n=896) (4)	Assigned to any follow-up (n=904) (5)
Number of vendors in village	3.20	-1.56	0.17	0.16	0.21	0.79
Number of kiosks in village	1.62	0.45	0.40	0.39	0.95	0.80
Number of shops in village	1.49	-0.52	0.30	0.30	0.97	0.24
Number of tailors in village	1.47	0.36	0.66	0.63	0.50	0.35
Number of restaurants in village	0.42	0.18	0.42	0.40	0.96	0.28
People buy goods from here	0.27	0.04	0.59	0.64	0.52	0.44
Observations			1,800	1,734	896	890
p-value (join significance)			0.00	0.00	0.00	0.00

Notes: All variables denominated in UGX and hours were top-censored at the 99th percentile to contain outliers. The p-values (and associated treatment group differences, not shown) in Columns 3–5 come from an OLS regression of each baseline characteristics on an indicator for treatment assignment plus a strata (district) fixed effect, with robust standard errors clustered at the village level.

3 Response rates and attrition

Table B.2: Survey response rates

Survey round	Median date (1)	Observations: Sought (2)	Observations: Surveyed (3)	Response rates: All (4)	Control (5)	Treatment (6)	Difference (7)	p-value (8)
Phase 1:								
Baseline	5/09	1,800	1,800	100.0%	100.0%	100.0%	0.0%	
Endline	12/10	1,800	1,734	96.3%	96.6%	96.1%	-0.5%	0.62
Phase 2:								
Baseline	12/10	904	882	97.6%	97.8%	97.4%	-0.4%	0.72
Endline (1 mo.)	9/11	904	858	94.9%	93.1%	95.9%	2.8%	0.13
Endline (1 yr.)	7/12	904	868	96.0%	95.0%	96.6%	1.6%	0.29

Notes: Columns 7 and 8 report the treatment-control difference in response rates, calculated via OLS regression controlling for baseline district, using robust standard errors clustered by village. There were 1800 study subjects in Phase 1. Baseline data in Phase 2 includes the 847 original sample members from 2009, plus 2011 data on the 57 new respondents who replaced those who died or left the village.

Table B.2 reports response rates by survey and round. Missing data and attrition are low. For instance:

- All 1800 participants completed the baseline survey. A very small number of respondents did not answer some questions. For the purpose of treatment effects analysis, we impute missing baseline data with the sample median in order to avoid losing the observation.

- Attrition at the Phase 1 endline was low (3.7%) and uncorrelated with assignment to treatment.

- The Phase 2 baseline represents a baseline of the 57 replacements (for the Phase 2 subjects who died or migrated away since the Phase 1 baseline) and the data collected at Phase 1 endline for all those assigned to Phase 2 who were interviewed and not replaced. We are missing 2.4% of this Phase 2 baseline data because 7 of the 57 replacements could not be surveyed, and because a small number of people were not found at the Phase 2 endline but were still eligible for the program. We impute missing Phase 2 baseline data with the Phase 1 baseline value if available and the sample median if not.

- Attrition at the Phase 2 1-month endline is 5.1% and at the 1-year endline is 4%. There is no significant correlation with treatment (assignment to any follow-ups).

Table B.3 reports the correlates of attrition in Phases 1 and 2, regressing an indicator for being found on selected baseline covariates. We pool Phases 1 and 2, clustering standard errors at the individual level, because: (a) the determinants of attrition are likely to be similar in each round, and (b) there are so few attritors (less than 40 per round) that there are almost as many plausible independent variables as unfound members of the sample. From Columns 1 and 2 illustrate that there is no significant correlation with treatment assignment. There is some correlation with covariates, namely age, schooling, and current enrollment. All covariates are jointly significant in explaining attrition, but all covariates explains just 3 percent of the variation.

Table B.3: Correlates of attrition, all phases pooled

	Dependent variable: Not found	
Covariate	Coeff.	Std. Err.
Assigned to treatment at P1	0.0119	[.012]
Assigned to group dynamics	-0.0172	[.013]
Assigned to 2 follow-ups	-0.0217	[.016]
Assigned to 5 follow-ups	0.0105	[.015]
Phase 2 dummy	0.0177	[.013]
Gulu district	-0.0264	[.008]***
Age	-0.0028	[.001]***
Female	-0.0185	[.013]
Married or living with partner	-0.0135	[.008]*
Highest grade reached at school	-0.0032	[.001]***
Currently in school	0.0532	[.021]**
Average farm work hours per week	-0.0001	[0000]
Average nonfarm work hours per week	-0.0003	[0000]
Durable assets, z-score	0.0065	[.009]
Monthly cash earnings, 000s UGX	-0.0002	[0000]
Activities of daily life, z-score	-0.0061	[.005]
Symptoms of distress, z-score	0.0003	[.007]
Village population	0.0000	[0000]
Village remoteness, z-score	-0.0025	[.004]
Observations	2704	
R-squared	0.0283	
P(baseline covariates are jointly insignificant)	<0.001	
P(treatment assignments are jointly insignificant)	0.4508	

C Ramsey model of occupational choice and investment with heterogeneous agents

Our central questions are under what conditions, and why, do we expect the poorest to start new, profitable enterprises as a result of business training and a grant, with or without supervision and advice?

To interpret the interventions and understand potential mechanisms, we consider a model where people choose how many (if any) hours to work in each of two occupational sectors: traditional labor-intensive work (e.g. subsistence agriculture and casual labor) and capital-intensive small enterprise (both farm and non-farm).[1]

[1]The model is rooted in models of investment and occupation choice by Udry (2010); Fafchamps et al. (2014); Blattman et al. (2014), and has parallels to models by Kaboski and Townsend (2011). We thank Xing Xia for research assistance in developing this model.

The model is rooted in the basic idea that, to expect investment and high returns, programs such as WINGS must help overcome some constraint. We see four main candidates: lack of credit, imperfect insurance, low business knowledge (skill) levels, and time-inconsistency (present bias). In order to make predictions, we match these possible constraints with the various components of the WINGS program.

The cash windfall in WINGS was mainly designed to alleviate credit constraints, which according to the model could have a first-order effect on outcomes in the sense of producing sustained high returns. Cash could also alleviate an insurance constraint, though we discussed in the main paper why this is unlikely in this context.

Both the business skills training and the extended supervision could relax knowledge constraints. Given our cross-cutting design, we cannot disentangle the effect of cash on credit constraints from the effect of business skills training on knowledge, or the disciplining effects of supervision.

The initial accountability element of the follow-ups (i.e. belief that one would be monitored) could help to address time-inconsistency (along with other potential rivers of poor decision-making, such as attention). However, as the model below shows, using a commitment device to address present bias alone cannot produce high returns. There must also be another constraint such as imperfect credit markets. If we see an effect of the initial supervisory visits on business size and profitability, then this implies that time-consistency likely exists in this population and that it affects consumption and saving levels, but not that it affects occupational choice and investment returns.

Finally, the group formation intervention was designed to impact social capital more generally. In the model this potentially corresponds to both credit constraints (via semi-formal savings & loan groups) and knowledge constraints (via diffusion of ideas).

1 Setup

Consider an individual who can spend time working in one of two sectors: enterprise or traditional labor. Production functions for enterprise and traditional labor are $f^E(k, l^E, \theta)$ and $f^T(l^T, \omega)$, where k is accumulated physical and human capital used in enterprise, l^E is hours spent on enterprise, l^T is hours on traditional labor, and θ is individual specific talent in enterprise, and ω is individual specific talent in traditional labor. Working in enterprise requires a minimum capital stock $\underline{k} \geq 0$, while traditional labor has no capital requirement. We assume positive but diminishing marginal returns to inputs, $f^E_k > 0 > f^E_{kk}$, $f^E_l > 0 > f^E_{ll}$; inputs are complements, $f^E_{kl} > 0$; and the returns to inputs are increasing in ability, $f^E_{k\theta} > 0$,

$f^E_{l\theta} > 0$ and $f^T_{l\omega} > 0$.[2] Also, note that $l_t = l^E_t + l^T_t \in [0,1]$.

The individual thus faces the problem:

$$\begin{aligned} \max_{c_t>0, l_t\geq 0, k_{t+1}\geq 0, a_{t+1}} \quad & \sum_{t=0} \delta^t u(c_t, l_t) \\ s.t. \;\; c_t + a_{t+1} + k_{t+1} &= (1+r_t)a_t + k_t + f^E(k_t, l^E_t, \theta) + f^T(l^T_t, \omega) \\ l_t &= l^E_t + l^T_t \leq 1 \\ k_0 &= 0 \\ a_0 & \quad given \end{aligned}$$

where a_t is any financial assets other than capital invested in enterprise and r_t is the returns to these alternative financial assets at time t. Without loss of generality, we assume $k_0 = 0$ and all initial wealth is in the financial asset, a_0. To make analysis simple, we fix $r_t = r > 0$. Finally, to fully characterize the equilibrium we add a transversality condition: $\lim_{t\to\infty} \delta^t u'_c(c_t, l_t) a_t = 0$.

This benchmark case considers perfect financial markets and consistent time preferences. In this case, individuals will allocate assets between the enterprise and savings until the returns of capital are equal, and will allocate their time across sectors until the marginal disutility is equal. The solution to the problem is characterized as time-paths of quantities $\{c_t, l^E_t, l^T_t, k_{t+1}, a_{t+1}\}_{t=0}^{\infty}$ that satisfy the following set of conditions given $k_0 = 0$ and $a_0 > 0$:

$$(1) \quad \frac{u'_c(c_t, l_t)}{u'_c(c_{t+1}, l_{t+1})} = \delta(1+r)$$

$$(2) \quad -\frac{u'_l(c_t, l_t)}{u'_c(c_t, l_t)} = f^{E'}_l(k_t, l^E_t, \theta) \quad if \; l^E_t > 0$$

$$(3) \quad -\frac{u'_l(c_t, l_t)}{u'_c(c_t, l_t)} = f^{T'}_l(l^T_t, \omega) \quad if \; l^T_t > 0$$

$$(4) \quad \frac{u'_c(c_t, l_t)}{u'_c(c_{t+1}, l_{t+1})} = \delta(1 + f^{E'}_k(k_{t+1}, l^E_{t+1}, \theta)) \quad if \; k_{t+1} > 0$$

$$(5) \quad c_t + a_{t+1} + k_{t+1} = (1+r)a_t + k_t + f^E(k_t, l^E_t, \theta) + f^T(l^T_t, \omega)$$

$$(6) \quad \lim_{t\to\infty} \delta^t u'_c(c_t, l_t) a_t = 0$$

[2] We also assume the minimum capital requirement means that $f^E(k, l^E, \theta) \equiv 0$ as long as $k < \underline{k}$, and that for any ability level, at very low levels of k, marginal product of the first unit of labor is always higher in traditional labor than in enterprise, while at higher levels of k it is the opposite, $\lim_{k\downarrow 0} \frac{f^E_l(k,0,\theta)}{f^T_l(0,\omega)} = 0$ and $\lim_{k\uparrow+\infty} \frac{f^E_l(k,0,\theta)}{f^T_l(0,\omega)} = +\infty$. For simplicity, we assume $f^E(k, l^E, \theta)$ is homogeneous of degree 1 in (k, l^E).

Conditions 1 and 4 imply that whenever investment in enterprise is positive the individual always produces at efficient scale, i.e. $f_k^{E'}(k_{t+1}, l_{t+1}^E, \theta) = r$. For simplicity, we focus on interior solutions only throughout.

Who runs an enterprise? For $\underline{k} > 0$, there will be low θ types who cannot reach efficient scale because their returns to capital are lower than r. We can define a minimum ability before enterprise is feasible, $\underline{\theta} = \underline{\theta}(r, \underline{k})$ for $f_k^{E'}(\underline{k}, 1, \underline{\theta}) = r$.[3] Note that $\underline{\theta}$ does not depend on a_0.

As θ rises above $\underline{\theta}$, the returns to capital and labor increase in enterprise, and enterprise becomes a better alternative than saving all assets in a_t. This does not guarantee that the individual will invest, since time could be allocated instead to traditional labor. Not surprisingly, those with high values of ω and low values of θ will only engage in traditional labor. Specifically, there will be a second threshold, $\tilde{\theta}$, above which individuals will invest in enterprise if $\theta > \underline{\theta}$ is also satisfied. $\tilde{\theta}$ is a function of the relative marginal products of labor. The marginal product of labor in enterprise, $MPL^E(r, \theta)$, is decreasing in r and increasing in θ.[4] In the traditional sector, $MPL^T(\omega, a_0, r)$ is determined by the equilibrium level of l^T, and is increasing in ω, a_o and r.[5] For high enough ω, $MPL^T(\omega, a_0, r) \geq MPL^E(r, \theta)$, and these individuals will engage only in traditional labor and save all their assets in a_t. $MPL^T(\omega, a_0, r) = MPL^E(r, \theta)$ defines a threshold level of $\tilde{\theta} = \tilde{\theta}(\omega, r, a_o)$ where $\theta > \tilde{\theta}$ if and only if $MPL^T(\omega, a_0, r) < MPL^E(r, \theta)$. $\tilde{\theta}(\omega, r, a_0)$ is increasing in all three arguments r, ω and a_o. However, the effect of a_o on $\tilde{\theta}$ will be negligible and so we simplify to $\tilde{\theta}(\omega, r)$.

Finally, in the steady state[6], occupational choice is determined by the threshold $\theta^* =$

[3]Since hours working in the enterprise are upward bounded by 1 while capital invested in skilled trade must be higher than $\underline{k}$, for any individual that invests in the enterprise, $\frac{k}{l^E}$ must be higher than $\underline{k}$. Then for any $\theta < \underline{\theta}$, $k \geq \underline{k}$, and $l^s < 1$, $f_k^{E'}(k, l^E, \theta) < f_k^{E'}(\underline{k}, 1, \underline{\theta}) = r$. The inequality arises because $f_k^{E'}$ is decreasing in k but increasing in l^E and θ. Therefore, for individuals with $\theta < \underline{\theta}$, their returns to capital in enterprise is below r regardless of the level of l^E and k. Note that $\underline{\theta}$ is an increasing function of $\underline{k}$, r and other parameters in the production function f^E.

[4]If there is positive investment in enterprise, condition $f_k^{E'}(k, l^E, \theta) = r$ pins down the level of $\frac{k}{l^E}$ (this is because we assumed f^E is homogenous of degree one in (k, l^E)). $\frac{k}{l^E}$ then pins down the marginal product of labor on the right hand side of condition 3: $-\frac{u_l'(c_t, l_t)}{u_c'(c_t, l_t)} = f_l^{E'}(k_t, l_t, \theta)$.

[5]If an individual does not invest in enterprise and only engages in traditional labor, conditions 1,3,5 and 6 will pin down a level of l^T.

[6]Note that we cannot have growth on the steady state because total hours available to the individual is 1, and we assume there is no exogenous growth in productivity or individual ability. Therefore, we characterize a steady state where c_t, k_t, l_t and a_t are all constant. From optimal condition 1, we can see that, without any restraints on savings or borrowing, the existence of a steady state requires $\delta(1 + r) = 1$, otherwise we cannot keep consumption constant. Notice that this is because we assumed there is free lending and free borrowing, both at the same rate r. Patient individuals whose $\delta > \frac{1}{1+r}$ would over save and accumulate infinite wealth when $t \to \infty$; impatient individuals whose $\delta < \frac{1}{1+r}$ would borrow too much today and their

$\theta^*(r, \underline{k}, \omega) = max\{\underline{\theta}(r, \underline{k}), \tilde{\theta}(\omega, r)\}$. Low ability individuals whose $\theta < \theta^*(r, \underline{k}, \omega)$ will set $k = 0$ and $l^E = 0$. c and l^T will be determined by a_o, r and w. High ability individuals whose $\theta \geq \theta^*$ will invest in enterprise and set $k^* > 0$ and $l^{E*} > 0$ such that $f_k^{E'}(k^*, l^{E*}, \theta) = r$ and $-\frac{u_l'(c^*, l^*)}{u_c'(c^*, l^*)} = f_l^{E'}(k^*, l^{E*}, \theta) = f_l^{T'}(l^{T*}, \omega)$. Their returns to capital will be r regardless of their level of wealth. The ratio $\frac{k^*}{l^{E*}}$ will be determined by θ and r, while hours in traditional labor l^{T*} will be determined by w and r. Initial wealth a_o will have a small effect on the level of k^*, l^{E*}, c and a. Without any constraints, all individuals will immediately jump to these efficient steady state levels of production and consumption at time $t = 1$.

In our comparative statics below we focus mainly on the cash component of our cross-cutting research design. But the model is also informative about the other components (training, group formation, and supervision). The simplest way to think of basic business skills training is in increasing θ, perhaps most of all among low types. This will raise the number of people above the minimum ability threshold, and potentially raise the returns to capital for people already above that threshold. Thus if people received training alone, we would expect to see increased entry into enterprise and greater enterprise earnings. This is the case with or without a windfall. Group formation may increase productivity (θ) either through shared ideas or possibly through some forms of cooperation (e.g. economies of scale in sourcing wholesale goods or selling in the same place), bring down the costs of borrowing r (e.g. by forming loans&savings groups, which usually provide cheaper finance than conventional money lenders), or reduce credit constraints (a) and uncertainty (e.g. about own ability,δ_θ, introduced in section C.2 below) as the group pools resources and idiosyncratic risk. The accountability portion of the supervision component (designed to provide commitment to invest) is supposed to affect discount factor δ, whereas the additional supervisory visits (provision of substantive advice) enhance productivity (θ).

Impact of a windfall. With perfect financial markets, an unrestricted windfall will have no effect on entry into enterprise and little effect on earnings because it does not change θ, ω or r. The individual will immediately jump to a new steady state with higher level of savings a and consumption c, and will slightly reduce investment k and hours in enterprise l^E because of greater wealth.

Suppose instead the windfall is granted in the form of in-kind transfers or restricted funding and there is some minimal "flypaper effect" such that capital stocks are "sticky" and cannot be divested immediately. This "restricted windfall" will force individuals to produce

assets would approach negative infinity as $t \to \infty$. In both of these cases, the transversality condition would be violated. While this condition $\delta(1 + r) = 1$ seems restrictive, we could argue that in reality, there will bounds for borrowing and savings. As long as there is lending and borrowing within some bounds at the rate r, our results would hold. We do not need $\delta(1 + r) = 1$ for our comparative analysis.

above their efficient scale, $f_k^{E'}(k,l,\theta) < r$. c will increase as output increases in the enterprise. l^T will decrease and l^E could go either direction, depending on parameter values. Over time, if it is possible to shift capital to a, individuals will divest until the returns in enterprise drops back to r.

2 Cash windfalls in imperfect financial markets

Credit constraint $a_t \geq 0$

For simplicity, we consider an extreme credit constraint, $a_t \geq 0$. The intuition and comparative statics are similar for other less restrictive credit constraints. The credit constraint affects optimality conditions 1, which becomes:

$$\frac{u_c'(c_t, l_t)}{u_c'(c_{t+1}, l_{t+1})} \geq \delta(1+r) \quad \textit{with equality} \quad \textit{if} \quad a_{t+1} > 0 \tag{7}$$

Initially wealthy entrepreneurs tend to operate at efficient scale, with marginal returns equal to r. The less wealthy, more impatient and higher ability do not have savings, will satisfy 7 with equality, and will invest below efficient scale with marginal returns are higher than r.

Credit constraints also change the steady state level of investments, returns to investments, and threshold θ^*. Define $\rho = \frac{1-\delta}{\delta}$, where a high level of ρ indicates impatience. Define k^{**} and l^{E**} such that $f_k^{s'}(k^{**}, l^{E**}, \theta) = \rho$. For impatient individuals whose $\rho > r$, the steady state level of capital and hours in the enterprise would be $k^{**} < k^*$ and l^{E**}, and their returns to capital will be ρ. These individuals are investing below the efficient scale. For those whose $\rho < r$, the steady state level of returns will still be r and investments will still be k^* as before. To sum up, the steady state returns to capital will be $max\{r, \rho\}$. For simplicity we will still refer to the threshold as θ^*, while here $\theta^* = \theta^*(r, \underline{k}, \omega, \rho)$ and θ^* is increasing in ρ whenever $\rho > r$. This means that with a credit constraint, more impatient individuals will find enterprise undesirable than in the benchmark case.

Not surprisingly, with a credit constraint, not all whose $\theta > \theta^*$ will immediately engage in enterprise. Specifically, if there is a credit constraint, $a_t \geq 0$, then compared to the benchmark case with no constraints at all then occupational choice and investment will vary by type and initial wealth in the following manner:

1. Low ability individuals, $\theta < \theta^*$. A credit constraint will not change occupational choice, consumption or labor supply as they would not invest in the enterprise even if they are allowed to borrow.

2. HIGH ABILITY AND HIGH WEALTH, $\theta \geq \theta^*$ AND $a_0 \geq k^{**}$. A credit constraint will not change occupational choice. However, investment levels and returns will depend on time preferences:

   (a) Patient types ($\rho < r$) will invest k^*, with marginal returns r.

   (b) Impatient types ($\rho > r$) will invest $k^{**} < k^*$, with marginal returns ρ.

3. HIGH ABILITY AND BELOW STEADY STATE WEALTH ($\theta \geq \theta^*$ AND $\underline{k} \leq a_0 \leq k^{**}$). A credit constraint will reduce initial investment in enterprise only. They will start with an enterprise below efficient scale and over time will accumulate enough capital to reach the steady state level of investment.

4. HIGH ABILITY AND BELOW MINIMUM SCALE WEALTH ($\theta \geq \theta^*$ AND $a_0 \leq \underline{k}$). A credit constraint will change initial occupational choice, but whether this effect is long-term or not depends on a_0, δ and abilities in each sector:

   (a) if a_0 is close to $\underline{k}$ or ω is very high, and δ is close to one, the individual would be able to save in the initial periods and eventually accumulate enough wealth to invest in enterprise. In this case, the credit constraint only temporarily alters the individual's occupational choice. Individuals will not invest in enterprise until a_{t+1} is above $\underline{k}$, after which they start investing in enterprise and reach the steady state level of investment over time.

   (b) if a_0 is far below $\underline{k}$ or ω is very low, and δ is close to zero, the individual would remain in traditional labor forever. In this case, the credit constraint has a permanent effect on the individual's occupational choice.

Impact of a windfall. We first consider an unrestricted cash windfall. In cases 1 and 2(a), individuals are in their optimal steady state, and the windfall will increase consumption and savings and slightly reduce labor supplied, but will not affect entry into enterprise or earnings. In case 2(b), individuals will increase investments in enterprise temporarily above k^{**} and increase total earnings but reduce marginal returns to capital to a level below ρ, but not lower than r; over time they will reduce capital in the enterprise until capital returns in the enterprise rise up to ρ again. Consumption will rise in the long run, but savings will be zero in the long run. In case 3, the windfall will immediately increase their investments in enterprise and earnings, and they will continue to increase capital and earnings over time until they reach k^*. Likewise, in case 4, individuals will start and sustain an enterprise if the windfall is enough to cover the capital requirement $\underline{k}$. For those with extremely low level

of initial wealth $a_0 < \underline{k} - M$, the windfall will not immediately affect their involvement in enterprises, but it does increase the chances of their engaging in enterprise in the long run. Whether they will eventually engage in the enterprise will again depend on their patience and productivity in traditional labor.

Next we consider a restricted windfall with some flypaper effect. In cases 1 and 2, individuals are in their optimal steady state and the results are the same as in the case of perfect financial markets: they will be forced to invest above efficient scale in the short run, earnings will increase, but returns will be low. In the long-run, they will divest and go back to the their steady state level of production, merely saving and consuming divested funds. In cases 3 and 4, individuals are below steady state and the impact will be similar to the case of the unrestricted windfall.

Savings constraint $a_t \leq 0$

Now we consider the case of a savings constraint where individuals do not have any alternative means to invest other than enterprise. They are, however, still allowed to borrow at rate r. Condition 1 now becomes

$$\frac{u_c'(c_t, l_t)}{u_c'(c_{t+1}, l_{t+1})} \leq \delta(1+r) \quad with\ equality \ \ if \ \ a_{t+1} < 0. \tag{8}$$

Savings constraints can lead to investment above the efficient scale. For those with debts $a_{t+1} < 0$ (the impatient and poor ones), the first order conditions require their returns to capital to be the same as r; however, for those without debts $a_{t+1} = 0$ (the patient and savings constrained ones), these conditions mean marginal returns are lower than r.

Among those who do invest in the enterprise, for the patient individuals whose $\rho < r$, the steady state level of capital and hours are k^{**} and l^{E**}, and their returns will be ρ. Notice $k^{**}/l^{E**} > k^*/l^{E*}$. For those impatient ones whose $\rho > r$, steady state returns are still r and investments are still k^* as before. Thus the steady state returns to capital are $min\{r, \rho\}$. Because individuals are still allowed to borrow, any individual with $\theta \geq \theta^*$ would invest in enterprise, though this θ^* is lower than in the benchmark and credit constraint cases for patient individuals whose $\rho < r$.[7] Thus, under a savings constraint, more people run an

[7]Savings constraints will lower the threshold level of θ^* for those whose $\rho < r$. This is because now we would need to define θ^* based on the new level of returns to capital $min\{r, \rho\}$ instead of r. For simplicity of discussion, we will still refer to the threshold as θ^*, while here $\theta^* = \theta^*(r, \underline{k}, \omega, \rho)$ and θ^* is increasing in ρ whenever $\rho < r$. This means that with a credit constraint, more individuals will be engaging in enterprise than in the benchmark case.

enterprise at any $t > 0$, before and after everyone reaches their steady state. However, the average rate of returns among entrepreneurs will be lower than r.

Impact of a windfall. An unrestricted windfall will not change any individual's decision to engage in enterprise, since all those with $\theta \geq \theta^*$ will be already engage in enterprise at the outset. However, in the short run, since individuals cannot save, the windfall will increase consumption and capital stocks, and thus further reduce the marginal returns to capital in the enterprise below $min\{r, \rho\}$. In the long run, however, capital and consumption will drop back to the steady state level and rate of returns will rise back to $min\{r, \rho\}$.

A restricted cash transfer with a flypaper effect will immediately increase capital stocks and lower the rate of return while having no immediate impact on consumption. Over time, the individual will consume these transfers until consumption and capital stock falls back to the steady state level. The average impact on earnings will not be as high as under a credit constraint.

Savings and credit constraints $a_t = 0$

Finally we consider the effect of a savings constraint on top of a credit constraint. For those who do invest in the enterprise, their rate of return will be $f_k^{E'}(k, l^E, \theta) = \frac{1-\delta}{\delta} = \rho$. This means the less patient will be investing below the efficient scale while the more patient will be investing above the efficient scale. This also changes the threshold level θ^* for all individuals. We would need to define θ^* using $f_k^{E'}(k, l^E, \theta) = \rho$ instead of r. For impatient ones whose $\rho > r$, θ^* would be higher than in the benchmark case; while for patient ones whose $r > \rho$, θ^* would be lower than in the benchmark case. This means, compared to the benchmark case, there will be more patient individuals and less impatient ones investing in enterprise. Individuals with $\theta < \theta^*$ (case 1 above) will be engaging in traditional labor only, as are those with high ability and below minimum scale wealth (case 4(a) and (b)).

Cash windfalls, restricted or unrestricted, will be invested in all cases.[8] Those at or near their optimal steady state level of capital (including no enterprise) will have an average return below $min\{r, \rho\}$, and those below their steady state will have average returns higher than this level.

[8]The sole exception is the very poor with initial wealth $a_0 < \underline{k} - M$. They will no longer pass a point where they have incentives to save in order to accumulate $\underline{k}$. This is a moot point if $M > \underline{k}$.

3 Introducing uncertainty and imperfect insurance

Next we consider the case of risky enterprise and risky traditional labor but a riskless financial alternative. It is possible to model risk in several ways. To incorporate uncertainty, we illustrate the case where the productivity measures θ_t and ω_t are uncertain and vary over time.

Specifically, we assume that realizations of ability are normally distributed around expected productivities $\bar{\theta}$ and $\bar{\omega}$, $\theta_t \sim N(\bar{\theta}, \delta_\theta)$ and $\omega_t \sim N(\bar{\omega}, \delta_\omega)$. Hours in enterprise and traditional labor are determined after the realization of θ_t and ω_t. Investment decisions k_t and a_t, however, are made in time $t-1$, before the realization of productivity θ_t and ω_t. We can view the individual as having a stochastic income stream delivered by the stochastic wage from traditional labor. At the same time, the individual has the option of investing his asset in either the risky enterprise with expected return $\mathbb{E}_t\left(1 + f_k^{E'}(k_{t+1}, l_{t+1}^E, \theta)\right)$ or the riskless asset with return $1+r$.

The solution to the problem is characterized as time-paths of quantities $\{c_t, l_t^E, l_t^T, k_{t+1}, a_{t+1}\}_{t=0}^{\infty}$ that satisfy the following set of conditions for all time periods t and for all states of the world at time t:

$$\mathbb{E}_t\left[\frac{\delta u_c'(c_{t+1}, l_{t+1})}{u_c'(c_t, l_t)}(1+r)\right] = 1 \tag{9}$$

$$-\frac{u_l'(c_t, l_t)}{u_c'(c_t, l_t)} = f_l^{E'}(k_t, l_t^E, \theta_t) \quad if\ l_t^E > 0 \tag{10}$$

$$-\frac{u_l'(c_t, l_t)}{u_c'(c_t, l_t)} = f_l^{T'}(l_t^T, \omega_t) \quad if\ l_t^T > 0 \tag{11}$$

$$\mathbb{E}_t\left[\frac{\delta u_c'(c_{t+1}, l_{t+1})}{u_c'(c_t, l_t)}\left(1 + f_k^E(k_{t+1}, l_{t+1}^E, \theta_t)\right)\right] = 1 \quad if\ k_{t+1} > 0 \tag{12}$$

$$(1+r)a_t + k_t + f^E(k_t, l_t^E, \theta_t) + f^T(l_t^T, \omega_t) = c_t + a_{t+1} + k_{t+1} \tag{13}$$

$$\lim_{j\to\infty} \mathbb{E}_t \beta^j u_c'(c_{t+j}, l_{t+j}) a_{t+j} = 0 \tag{14}$$

given $k_0 = 0$ and $a_0 > 0$.

Following the asset pricing literature, we define $M_t = \frac{\delta u_c'(c_{t+1}, l_{t+1})}{u_c'(c_t, l_t)}$ as the stochastic discount factor. Condition 9 and 12 imply that investment in the enterprise, if positive, must satisfy the usual asset pricing equation:

$$\mathbb{E}_t f_k^{E'}(k_{t+1}, l_{t+1}^E, \theta_t) - r = -(1+r)Cov_t\left(f_k^{E'}(k_{t+1}, l_{t+1}^E, \theta_t), M_{t+1}\right)$$

Risk neutral individuals will invest until $\mathbb{E} f_k^{E'}(k, l^E, \theta) = r$. As in the case without risk, we refer to the level of investment that corresponds to $\mathbb{E} f_k^{E'}(k, l^E, \theta) = r$ as the efficient scale of

investment.

For any risk averse individual, if θ_{t+1} and ω_{t+1} are *positively* correlated or uncorrelated, then $Cov_t\left(f_k^{E'}(k_{t+1}, l_{t+1}^E, \theta_t), M_{t+1}\right) < 0$ and $\mathbb{E}_t f_k^{E'}(k_{t+1}, l_{t+1}^E, \theta_t) > r$. This is saying that if the returns to enterprise and traditional labor are *positively* correlated, then the riskless asset will deliver higher expected utility than the risky enterprise, and the individual will invest below the efficient scale in the enterprise as long as he is risk averse. In this case, the more risk averse the individual is, the less he invests in risky enterprise, and the higher the returns to the enterprise. Similarly, the higher the variability of θ or w, the less the individual invests in risky enterprise,

If instead, θ_{t+1} and ω_{t+1} are *negatively* correlated, i.e. the returns to enterprise and traditional labor are *negatively* correlated, then the enterprise and traditional labor are a good hedge against each other. The individual will invest more in the enterprise, or even invest above the efficient scale. The returns to enterprise $\mathbb{E}_t f_k^{E'}(k_{t+1}, l_{t+1}^{sE}, \theta_t)$ will be close to r, or even lower than r if the variability of ω is high.

Here the optimal level of investment is a function of interest rate r, the mean and variance of productivity $\bar{\theta}$, δ_θ, $\bar{\omega}$, δ_ω, the correlation between θ and ω, patience δ and the degree of risk aversion. The optimal choice of whether to invest in enterprise or not then depends on all these parameters, as well as the minimum scale of production $\underline{k}$.

Impact of a windfall. We ask the same question as before: Under what conditions will the cash windfall have a sustained effect on individuals' investment in enterprise and/or returns to investment in enterprise?

Even absent a credit constraint a windfall may induce some individuals to enter into enterprise, and change investment levels for those who do invest in enterprise, simply through the wealth effect. If utility displays constant absolute risk aversion (CARA) wealth would not have any effect on the optimal level of investment, and no effect on entry into enterprise. If, however, utility displays constant relative risk aversion (CRRA) then a windfall increases the level of wealth, which then increases the optimal level of investment in the risky enterprise.

Note that there will be individuals with either very low initial wealth, or very high risk aversion, who would not invest in the risky enterprise (because of $\underline{k}$) but would do so after receiving the cash windfall. Unless the amount of the windfall is very large (relative of the minimum scale $\underline{k}$) or the individual is very risk averse, we would not expect the windfall to have a large long-run average effect on investment across many individuals.

So long as both sectors are risky, for a windfall to result in high levels of investment and high returns, there must be some other form of imperfection on top of an environment with risk. Again, a credit constraint is a likely candidate in the setting described. This

conclusion rests on the assumption that there are roughly similar levels of uncertainty in the two sectors. We turn to that assumption next.

Relative uncertainty. Intuitively, the relative volatility of traditional trade and enterprise matter for investments in enterprise. More importantly, the impact of their relative volatility depends on initial wealth, the degree of risk aversion, as well as the correlation between enterprise and traditional labor.

In general terms, if either enterprise or traditional labor is relatively safe (i.e. either σ_θ or σ_ω is low), then investment in enterprise k falls as $\sigma_\theta/\sigma_\omega$ increases; and the more risk averse the individual is, the steeper the slope of the fall is. If σ_θ is low while σ_ω is high, the individual will very likely engage in the enterprise, as long as she is not bounded by a credit constraint. If σ_θ is high while σ_ω is low, the individual will likely not engage in the enterprise. In both cases, a windfall will have little impact on investments and earnings.

If, however, productivity in traditional labor and enterprise are both very volatile (σ_θ and σ_ω both high), then the relationship between k and $\sigma_\theta/\sigma_\omega$ would also depend on initial wealth a_0, the degree of risk aversion, as well as the correlation between θ and ω. First, consider the case where traditional labor and enterprise are uncorrelated or positively correlated. Holding everything else constant, if an individual has very low (or negative) initial wealth, then given a highly volatile income stream from traditional labor, the safety asset would be much more appealing to her than the enterprise even if the enterprise is less volatile than traditional labor. In this case, the individual may not enter into enterprise even if she faces no credit constraint – she might fear that she would never be able to repay the debt with her earnings. The same happens if the individual is very risk averse – she would not enter the enterprise and instead use the safety asset to smooth consumption over time. In both of these cases, a large windfall might pull the individual out of these situations and allow her to invest in the enterprise. However, if the returns from traditional labor and enterprise are negatively correlated, then again k increases as $\sigma_\theta/\sigma_\omega$ falls, and the individual will likely invest in the enterprise as long as she is not bounded by a credit constraint. In this case, a windfall will have a long term effect on those with high levels of risk aversion and low levels of initial wealth . Again, this is because a windfall increases wealth and lead the risk averse to invest more in risky assets – the enterprise.

4 Introducing time-inconsistency

We introduce quasi-hyperbolic (β, δ) preferences to see what predictions they hold for investment and earnings. The problem becomes:

$$\begin{aligned} \max_{c_t>0, l_t \geq 0, k_{t+1} \geq 0, a_{t+1}} \quad & u(c_t, l_t) + \beta \sum_{s=t+1}^{\infty} \delta^s u(c_s, l_s) \\ s.t. \quad c_t + a_{t+1} + k_{t+1} &= W_t \\ l_t &= l_t^E + l_t^T \leq 1 \\ W_t &\equiv (1+r_t)a_t + k_t + f^E(k_t, l_t^E, \theta) + f^T(l_t^T, \omega) \end{aligned}$$

We consider the case of a "naive" type, or "naif", who makes investment decisions under the false belief that future selves will act in the interest of the current self, and a "sophisticate" who knows exactly what her future selves' preferences will be.

Perfect financial markets

Optimal conditions 1 and 4 will now change into the general Euler equation for hyperbolic preferences:

$$\frac{u_c'(c_t, l_t)}{u_c'(c_{t+1}^P, l_{t+1})} = [\frac{\partial c_{t+1}}{\partial W_{t+1}} \beta\delta + (1 - \frac{\partial c_{t+1}}{\partial W_{t+1}})\delta] \cdot (1+r) \tag{15}$$

and

$$\frac{u_c'(c_t, l_t)}{u_c'(c_{t+1}^P, l_{t+1})} = [\frac{\partial c_{t+1}}{\partial W_{t+1}} \beta\delta + (1 - \frac{\partial c_{t+1}}{\partial W_{t+1}})\delta] \cdot (1 + f_k^{E'}(k_{t+1}, l_{t+1}^E, \theta)) \quad if\ k_{t+1} > 0 \tag{16}$$

These resemble the Euler equations 1 and 4 under exponential discounting, except that the discount factor δ is replaced by the effective discount factor $\frac{\partial c_{t+1}}{\partial W_{t+1}}\beta\delta + (1 - \frac{\partial c_{t+1}}{\partial W_{t+1}})\delta$, a weighted average of the short-run and long-run discount factors $\beta\delta$ and δ where the weights are the next period marginal propensity to consume out of total wealth. Here W_t denotes total wealth at time t. c_{t+1}^P denotes the individual's predicted future decision about c_{t+1} at time t.

The differences between the naif and the sophisticate lie in the predicted consumption c_{t+1}^P and the marginal propensity to consume $\frac{\partial c_{t+1}}{\partial W_{t+1}}$. Sophisticates are aware of the time-inconsistency problem and will correctly anticipate future consumption. For them, $c_{t+1}^P = c_{t+1}$. Naifs, however, mistakenly believe that future selves will act as if their discount factor remains unchanged at all future dates. For them $c_{t+1}^P < c_{t+1}$. Time-inconsistency will affect both consumption and savings.

Time-inconsistency should not affect the optimal use of a cash windfall. For those with $\theta \geq \theta^*$, they will still invest until the returns to capital are equal between the enterprise and alternative financial options, or $f_k^{E'}(k, l^E, \theta) = r$. Note that consumption, hours and savings will all be different under time-inconsistency compared to our benchmark case without time-inconsistency. Thus threshold value of θ^* is different than in the benchmark case. However, the effect of a windfall will be similar to that in the benchmark case without time-inconsistency. This is because absent of any credit market imperfections, everyone will already be at their efficient scale.

Time-inconsistency with credit constraints

For a windfall to be invested and produce high average returns, some other constraint must be present. Similar to the case without time-inconsistency, credit constraints will suffice. To see this, we turn to the Euler equations again. Those who are credit constrained will put every additional dollar they get into consumption (not savings), because they are present-biased. Therefore $\frac{\partial c_{t+1}}{\partial W_{t+1}} = 1$ and the Euler equations become

$$\frac{u_c'(c_t, l_t)}{u_c'(c_{t+1}^P, l_{t+1})} = \beta\delta(1 + f_k^{E'}(k_{t+1}, l_{t+1}^E, \theta)) \quad if\ k_{t+1} > 0$$

for those who are bounded by the credit constraint, i.e. $a_{t+1} = 0$.

With time inconsistency, all credit constrained individuals will invest less than if they were time-consistent. To see this, define τ such that $\frac{1}{1+\tau} = \beta\delta$, i.e. $\tau = \frac{1}{\beta\delta} - 1$. Since the sophisticates can correctly anticipate their future consumptions, in their steady state $c_{t+1}^P = c_{t+1} = c_t$, and the marginal rate of return will be $f_k^{E'}(k_{sophisticate}, l^E, \theta) = \tau$. Naifs will naively expect themselves to have more self-control tomorrow, and expect $c_{t+1}^P < c_t$. For them $\frac{u_c'(c_t, l_t)}{u_c'(c_{t+1}^P, l_{t+1})} < 1$ and $\rho < f_k^{E'}(k_{naive}, l^E, \theta) < \tau$. Therefore, for those who are credit constrained ($a_{t+1} = 0$), their steady state level of investment satisfies $\rho < f_k^{E'}(k_{naive}, l^E, \theta) < \tau = f_k^{E'}(k_{sophisticate}, l^E, \theta)$. They also work less and consume a larger portion of their income.

Somewhat counter-intuitively, given the levels of β and δ, the sophisticates invest even less than the naifs. This is because the naifs believe (incorrectly) that they will consume less tomorrow and eventually grow to $k = k^{**}$ just like a time-consistent type. Thus they think their average future marginal utility of consumption is low (i.e. high consumption) and therefore are willing to consume less than the sophisticates. In practice, however, we might expect β and δ to be positively correlated, or sophisticates to have both higher β and δ than naifs. In this case, sophisticates would invest more than naifs.

Impact of a windfall. The impact of a cash windfall is similar to the case with time-consistent preferences. Credit constraints (but not savings constraints) are needed in this simple model to expect investment and high returns. High investment and returns, moreover, will only be seen where people start below their steady state. The steady state levels of capital to which the time-inconsistent will move, however, are lower than the case without time inconsistency. Thus the average returns will be lower than the benchmark case, but still greater than r.

Recall, however, that in the time consistent case the average impact was expected to increase in patience (at least amongst those below their optimal steady state capital). With time inconsistency, holding patience constant, we expect the impacts to be larger among the more time-inconsistent. In practice, however, this comparative static will be difficult to identify, partly because β and δ may be correlated and partly because they may be difficult to measure separately.

More importantly, restricted windfalls with a flypaper effect have the potential to increase investment levels to k^*, at least temporarily. Eventually as long as they can divert, both types will return to their steady state level of investment. However, if there is a commitment device, for example an in-kind transfer that cannot be diverted over time, then the sophisticates will more likely be the ones who apply for and use this in-kind transfer. Such a transfer will not only help some constrained individuals to enter into enterprise or get closer to their steady state level of investment, it will also change the steady state level of investment for the sophisticates from $k_{sophisticate}$ to k^{**}. A naive type, on the other hand, would not want to tie their hands to such a transfer; they would prefer a transfer that can be diverted over time. Intuitively, time inconsistency makes the sophisticates act like a person with very low discount rate $\beta\delta$ every period, when in fact their real discount rate for the far future is δ. So a windfall that also act as a commitment device could push them into a new equilibrium that it wouldn't do for someone who was time-consistent but merely impatient.

D Additional treatment effects analysis

1 Accounting for spillovers

Here we provide more detail on the distance measures used to estimate the ITT via the OLS regression in equation (1). For each town, we calculate the exposure to spillovers from all treatment towns within k kilometers of the town, via the following equation:

$$D_j^T = \sum_{j:\delta_{j,j^*} \leq k, j \neq j^*, T_j = 1} 1 - \beta \frac{\delta_{j,j^*}}{k}$$

where δ_{j,j^*} is the road distance between town j and town j^*, and T_j is an indicator equal to 1 if town j is assigned to treatment. β can take values in $[0,1]$. When $\beta = 0$, D_j^T is simply a count of treatment villages within a k kilometer radius. This is the approach taken by Miguel and Kremer (2004). When $\beta = 1$, D_j^T is a sum of one minus the distance to each village, normalized by k, so that $1 - \frac{\delta_{j,j^*}}{k}$ is close to 0 for far away villages and close to 1 for nearby villages. We choose $\beta = 0.5$ and $k = 4$, but our results are generally the same for any β and $2 < k < 8$.

Equation **??** also controls for a weighted distance to all evaluation villages. We use a simulated rather than actual measure. Specifically, we simulate 100 random assignments of treatment to villages, and construct a $D_j^{\hat{T}}$ for each random assignment, l. We take an average over all 100 random assignments to obtain an estimate of the expected exposure to treatment spillovers for town j. More specifically,

$$D_j^A = \frac{1}{100}\sum_{l=1}^{100}\left(D_i^{\hat{T}^l} = \sum_{j:\delta_{j,j^*}\leq k, j\neq j^*, \hat{T}_j^l=1} 1 - \beta\frac{\delta_{j,j^*}}{k}\right)$$

where $\hat{T}_j^l$ is equal to 1 if town j is assigned to treatment in simulated assignment l. Using an actual distance measure provides broadly similar results, since it and D_j^A are nearly collinear.

Note that the majority of tertiary roads in Uganda have not been mapped. Therefore, we used high-resolution satellite imagery in the OpenStreetMap platform to trace all tertiary roads and footpaths connecting villages. We then exported this road network to ArcGIS 10.0 and used the Origin-Destination Matrix tool in the Network Analyst extension to calculate road network distances.

2 Robustness and sensitivity analysis

Two concerns are potential bias arising from baseline imbalance and systematic attrition from unfound migrants. Table 7 tests the sensitivity of our Phase 1 impacts. Column 1 reports the ITT from Table 3 for major outcomes. Results are robust to exclusions of the distance measures that account for spillovers (Column 2), for removing baseline covariates (Column 3), and (where we have comparable baseline data) to a differences-in-differences ITT estimate controlling for other baseline covariates (Column 4). In general, the impacts are similar.

We also bound treatment effects for attrition bias. We consider an extreme bound, one that imputes the 10th percentile of treatment group outcomes for unfound treatment members and the 90th percentile for unfound controls (Column 6). Results are robust to

Table D.1: Program impacts under alternative models

Outcome	Alternative ITT estimates					Attrition bounds:
	Main specification from Table 3	Without spillover controls	Without baseline covariates	Difference-in-differences estimate	No top coding	Replace missing with 90/10 percentiles
	(1)	(2)	(3)	(4)	(5)	(6)
Any hours in petty business	0.316	0.326	0.329	0.341		0.268
	[.026]***	[.027]***	[.028]***	[.027]***		[.026]***
Average work hours per week	9.632	9.223	8.814	10.174	9.965	7.754
	[1.371]***	[1.393]***	[1.430]***	[1.679]***	[1.377]***	[1.366]***
Monthly cash earnings, 000s UGX	16.835	17.584	15.627		17.357	14.968
	[3.139]***	[3.162]***	[3.165]***		[3.239]***	[2.970]***
Durable assets (consumption), z-score	0.355	0.356	0.249	0.323		0.267
	[.057]***	[.057]***	[.073]***	[.055]***		[.058]***
Monthly non-durable consumption, 000s UGX	32.227	32.830	26.669		33.955	26.557
	[4.137]***	[4.147]***	[4.449]***		[4.332]***	[4.086]***

Notes: Column 1 reports the coefficients and standard errors on an indicator for assignment to treatment from ordinary least squares regressions of each outcome on treatment, a Gulu district (strata) fixed effect, and the vector of baseline covariates reported in the online appendix. Column 2 replicates Column 1, removing the two distance measures (to treatment and to all villages). Column 3 replicates Column 1, removing the baseline covariates. Column 4 reports the difference in differences estimate for outcomes that were collected at the baseline survey. Column 5 replicates column 1, but uses uncapped outcomes, rather than outcomes capped at the 99th percentile. Column 6 replicates Column 1, but imputes missing values at the 90th percentile in the distribution for control individuals and at the 10th percentile in the distribution of treatment individuals. *** p<0.01, ** p<0.05, * p<0.1

this bounding scenario.

3 Other economic impacts of WINGS program

Table D.2 reports treatment effects for additional economic outcomes.

Table D.2: Economic impacts of WINGS program and group formation

Outcome	Control mean	ITT estimates, 16 mo. after grants (n=1,734)		
		No group training	Group training	Difference
	(1)	(2)	(3)	(4)
Non-durable consumption, 000s of UGX	32.63	10.62 [1.681]***	10.57 [1.637]***	-0.04 [1.934]
Business practices:				
# of businesses tried to start since baseline	0.64	1.193 [.067]***	1.300 [.066]***	0.106 [.077]
# of these businesses still operating	0.36	0.578 [.054]***	0.622 [.054]***	0.044 [.064]
Maintains business records	0.105	0.395 [.035]***	0.449 [.034]***	0.054 [.043]
Access to credit:				
Could get a loan of 15,000 UGX in next month	0.63	0.093 [.043]**	0.102 [.046]**	0.009 [.053]
# villagers can get 50,000 UGX loan from	1.08	0.293 [.165]*	0.364 [.126]***	0.071 [.170]
# of people outside village for 50,000 UGX loan	0.64	0.157 [.084]*	0.270 [.105]**	0.113 [.117]
Livestock:				
Number of cattle and oxen	0.167	0.275 [.068]***	0.241 [.059]***	-0.034 [.079]
Number of fowl	6.007	1.988 [.515]***	3.370 [.626]***	1.382 [.677]**
Number of donkeys, goats, sheep and pigs	1.239	1.792 [.182]***	1.398 [.216]***	-0.394 [.245]
Income risk:				
Highest–lowest projected income next year, 000s UGX	132.286	85.547 [17.612]***	99.912 [17.308]***	14.365 [22.563]
Highest projected income	243.634	172.992 [24.157]***	183.140 [27.672]***	10.148 [33.473]
Lowest projected income	111.349	87.445 [11.775]***	83.228 [14.446]***	-4.217 [16.606]
Leisure:				
Daily sleep time	9.602	-0.067 [.074]	-0.023 [.071]	0.044 [.086]
Has less leisure time than last year	0.394	0.019 [.036]	0.019 [.038]	0.000 [.041]

Notes: All variables denominated in UGX and hours were top-censored at the 99th percentile to contain outliers. Columns 2 and 3 report the coefficients and standard errors on indicator for assignment to Phase 1 without and with the group dynamics component in an OLS regression of each outcome on treatment indicators, a Gulu district (strata) fixed effect, and baseline covariates. Column 4 reports the difference between the two treatment groups. Standard errors are robust and clustered at the village level. *** p<0.01, ** p<0.05, * p<0.1

4 Expanded non-economic treatment effects

Table D.3 reports the individual components of the outcome indexes listed in Table 5.

Table D.3: Expanded non-economic outcome indexes

		ITT estimates, 16 months after grants		
Covariate	No group training	Group training	Difference	Assigned to any follow-up (n=904)
	(1)	(2)	(3)	(4)
Health index, z-score	0.002	0.020	-0.013	-0.033
		[.070]	[.069]	[.085]
Difficulty doing daily activities (0-9)	0.867	-0.056	0.122	0.178
		[.091]	[.117]	[.127]
Self-rating of health (1-10)	5.494	0.259	0.294	0.035
		[.175]	[.141]**	[.180]
# sick days last month	3.169	0.578	0.445	-0.133
		[.362]	[.386]	[.456]
Quality of family relationships, z-score	0.018	0.034	0.011	-0.023
		[.057]	[.052]	[.067]
Talk with HH about thoughts and troubles? (0-3)	2.195	0.078	-0.006	-0.084
		[.058]	[.050]	[.067]
Receive practical help from HH? (0-3)	2.384	0.091	0.045	-0.046
		[.048]*	[.050]	[.057]
Have quarrels with HH members? (0-3)	2.591	-0.101	-0.020	0.081
		[.049]**	[.047]	[.053]
Social support received, z-score	-0.084	0.195	0.159	-0.037
		[.069]***	[.063]**	[.081]
Someone who listened to your thoughts and feelings? (0-3)	1.062	0.112	0.051	-0.062
		[.062]*	[.055]	[.068]
Someone who sat with you when you were sad or lonely? (0-3)	0.903	0.176	0.129	-0.047
		[.063]***	[.065]**	[.074]
Someone who helped you get your mind off of things? (0-3)	0.403	0.109	0.083	-0.025
		[.057]*	[.051]	[.063]
Someone who assisted you in making plans for the future? (0-3)	0.735	0.225	0.176	-0.049
		[.051]***	[.061]***	[.068]
You turn to friends or neighbors for advice? (0-3)	1.903	0.015	-0.033	-0.048
		[.049]	[.051]	[.052]
Receive practical help from friends and neighbors? (0-3)	1.546	0.091	0.128	0.037
		[.070]	[.059]**	[.069]
Receive material help from your friends or neighbors? (0-3)	0.701	0.057	0.108	0.051
		[.063]	[.062]*	[.074]

Covariate	No group training	ITT estimates, 16 months after grants: Group training	Difference	Assigned to any follow-up (n=904)
	(1)	(2)	(3)	(4)
Community participation, z-score	-0.086	0.159	0.345	0.187
		[.055]***	[.062]***	[.070]***
Community mobilizer	0.163	0.019	0.086	0.067
		[.023]	[.027]***	[.030]**
Participated in local election	0.542	0.060	0.050	-0.010
		[.039]	[.029]*	[.038]
Given opinion at community meeting	0.279	0.079	0.185	0.106
		[.026]***	[.023]***	[.029]***
Is a community leader	0.157	0.003	0.092	0.089
		[.023]	[.027]***	[.030]***
Would become leader if nominated	0.351	0.069	0.049	-0.020
		[.029]**	[.028]*	[.033]
Community hostility index, z-score	-0.070	0.164	-0.018	-0.182
		[.073]**	[.050]	[.076]**
Conflict with neighbors	2.837	-0.112	-0.000	0.112
		[.043]**	[.034]	[.045]**
Community member say hurtful things	2.794	-0.103	0.001	0.104
		[.042]**	[.029]	[.043]**
Community is physically aggressive	2.849	-0.032	-0.002	0.029
		[.035]	[.027]	[.037]
Community insults your children	2.819	-0.063	0.033	0.096
		[.039]	[.030]	[.043]**
Autonomy/influence in purchases, z-score	-0.026	0.082	0.089	0.007
		[.059]	[.062]	[.075]
Can decide how to spend own pocket money (0-3)	2.028	0.069	0.066	-0.003
		[.080]	[.078]	[.096]
Can use earnings to buy clothes without permission (0-3)	1.346	0.007	-0.091	-0.099
		[.071]	[.090]	[.095]
Have a say in purchase of large assets in household (0-3)	2.459	0.091	0.163	0.072
		[.050]*	[.047]***	[.052]
Women with partners at endline (n=961):				
Physical and emotional abuse, z-score	-0.030	0.066	-0.046	-0.113
		[.079]	[.078]	[.088]
Threatened Harm (0-3)	0.217	0.085	-0.009	-0.095
		[.046]*	[.050]	[.055]*
Humiliated in front of others (0-3)	0.096	-0.049	-0.039	0.010

Covariate	No group training	ITT estimates, 16 months after grants: Group training	Difference	Assigned to any follow-up (n=904)
	(1)	(2)	(3)	(4)
		[.028]*	[.025]	[.029]
Beaten (0-3)	0.112	0.046	-0.027	-0.073
		[.034]	[.037]	[.037]**
Kicked or hit (0-3)	0.151	0.063	-0.005	-0.068
		[.041]	[.043]	[.048]
Cannot refuse sex (0-3)	1.545	-0.011	0.024	0.035
		[.088]	[.099]	[.092]
Degree of partner control, z-score	-0.110	0.170	0.129	-0.041
		[.082]**	[.079]	[.086]
Tries to limit your contact outside the home (0-3)	0.246	0.125	0.062	-0.063
		[.063]*	[.055]	[.068]
Requires permission to transact in market (0-3)	2.328	0.042	0.081	0.038
		[.091]	[.085]	[.103]
Refused you money for household needs (0-3)	0.591	-0.087	-0.036	0.051
		[.076]	[.078]	[.094]
Must give you earnings to partner (0-3)	0.606	0.312	0.215	-0.097
		[.096]***	[.094]**	[.108]
Partner takes your money against will (0-3)	0.121	0.040	0.075	0.035
		[.038]	[.046]	[.053]
Partner accuses you of being unfaithful (0-3)	0.083	-0.009	-0.057	-0.048
		[.038]	[.031]*	[.037]
Relationship quality, z-score	-0.086	0.180	0.201	0.021
		[.085]**	[.111]*	[.119]
Self-rating of relationship health, z-score	0.063	0.139	0.114	-0.025
		[.077]*	[.088]	[.094]
Feels partner treats you well, z-score	-0.082	0.070	0.162	0.092
		[.074]	[.096]*	[.102]
You feel free to express your opinion, z-score	-0.153	0.157	0.137	-0.019
		[.094]*	[.106]	[.116]

5 Spillovers

Within-village spillovers

We analyze within-village spillovers to non-participants in Phase 1 treatment villages. To do so we estimate equation 1 for (a) community-level variables (such as prices), and (ii) outcomes

for non-participant households in both treatment and control villages. The coefficient on the treatment indicator estimates within-village spillovers, which are reported in Table D.4. We examine impacts on households that were and were not traders at baseline.

Table D.4: Within-village spillovers of WINGS program

	Traders (n=885)		Non-traders (n=1,933)	
Outcome	Mean, control villages (1)	Treatment village (2)	Mean, control villages (3)	Treatment village (4)
Occupational choice:				
Positive hours in petty trading	0.280	-.078	0.065	-.001
		[.031]**		[.01]
Average work hours per week	31.836	-2.305	23.171	.054
		[1.55]		[.723]
Agricultural	21.376	-1.911	17.517	.727
		[1.205]		[.564]
Non-agricultural	10.461	-.394	5.655	-.673
		[1.041]		[.424]
Income:				
Index of income measures, z-score	0.560	-.148	-0.020	-.02
		[.087]*		[.037]
Monthly cash earnings, 000s UGX	21.984	-4.435	10.483	.481
		[2.601]*		[.86]
Durable assets (consumption), z-score	0.599	-.166	0.076	-.031
		[.089]*		[.041]
Non-durable consumption, 000s UGX	177.071	-3.358	138.526	-2.094
		[8.442]		[4.124]
Prices (village-level, n=120):				
Imported goods	0.036	-.089		
		[.149]		
Exported (produced) goods	0.048	-.065		
		[.167]		

Notes: See notes to Table **??**. *** p<0.01, ** p<0.05, * p<0.1

In general, spillovers to non-participants were modest. We find no evidence of large or statistically significant spillovers to non-trading households. The effect on incomes is roughly zero on average. Prices of imported and produced/exported goods both fell a slight amount (.09 and .07 standard deviations, not statistically significant), potentially because increased trade decreased the market power of existing traders and brought prices closer to the competitive equilibrium. Thus the effect on real incomes was somewhat ambiguous (we do not have individual production data).

We do, however, see an occupational shift among pre-existing traders in the treatment villages. They were 8 percentage points less likely to be engaged in petty trading but only had one fewer work hour per week than before. Their non-agricultural hours of work were almost unchanged, as they switch to casual labor and other work. Yet preexisting traders saw no significant decrease in incomes as a result.

Cross-village spillovers

Columns (2) and (7) in Table D.5 capture spillover across villages. Overall, we find no evidence of large cross-village spillovers (for traders, there is a statistically significant increase in hours worked and income, but the left bound of the 95% confidence interval is always very close to zero).

6 Heterogeneity in impacts of supervision

Our theory and the program design suggests that follow-up should have the greatest impact on the most present-biased or least autonomous individuals. To test this, we generate a measure of pre-program future orientation using both incentivized games and self-reported survey questions and interact it with treatment in Table D.6.[9] We also use a composite measure of three self-reported financial autonomy questions at baseline (described further below) and interact this with treatment as well.

The future orientation measure generally has the expected sign (i.e. more investment and earnings) though the autonomy measure does not. These are difficult traits to measure and so the size and significance may reflect measurement error, but nonetheless we do not see strong evidence of present bias impeding investment. Likewise, the interactions with treatment are in the expected direction, but they are not statistically significant. The coefficients on treatment–which represents the effect of treatment on the present-biased and less autonomous–are now larger and more statistically significant than before, in accordance with the prediction. Without significant interactions, however, this is no more than weak evidence for a heterogeneous effect.

[9] Our measure of future orientation is a weighted average of eight baseline survey questions on self-reported patience and impulsiveness and indicators for play within incentivized games, where respondents were offered choices between payment of small sums now versus in two weeks, and in two versus four weeks. The indicators include ones for choosing future versus present rewards, an indicator for future bias (less likely to choose the future in the two versus four weeks choice) and for present bias (more likely to choose the future in the two versus four weeks choice). To generate weights, we regress the endline income index on all time preference measures for the control group alone, and use the estimated coefficients to generate a predicted patience level for the full sample. We omit observations where we do not have a time preference measure.

Table D.5: Spillovers of WINGS program to non-participants

	Traders (n=885)				Non-traders (n=1,933)			
Outcome	Mean, control villages (1)	Treatment village indicator (2)	D_j^T (3)	D_j^A (4)	Mean, control villages (5)	Treatment village indicator (6)	D_j^T (7)	D_j^A (8)
Positive hours in petty trading	0.280	-.078	.008	-.109	0.065	-.001	.01	-.015
		[.031]**	[.03]	[.04]***		[.01]	[.009]	[.014]
Average work hours per week	31.836	-2.305	2.911	-3.203	23.171	.054	.941	-1.621
		[1.55]	[1.529]*	[2.227]		[.723]	[.677]	[1.223]
Index of income measures, z-score	0.560	-.148	.194	-.229	-0.020	-.02	.051	-.016
		[.087]*	[.092]**	[.135]*		[.037]	[.037]	[.061]
Monthly cash earnings, 000s UGX	21.984	-4.435	3.306	-7.17	10.483	.481	.796	-2.09
		[2.601]*	[2.78]	[3.873]*		[.86]	[.841]	[1.586]
Durable assets (consumption), z-score	0.599	-.166	.097	-.059	0.076	-.031	.052	.099
		[.089]*	[.095]	[.124]		[.041]	[.041]	[.062]
Non-durable consumption, 000s UGX	177.071	-3.358	21.237	-22.831	138.526	-2.094	3.357	-7.358
		[8.442]	[9.503]**	[13.604]*		[4.124]	[4.054]	[6.477]
Prices (village-level, n=120):								
Imported goods	0.036	-.089	.074	.08				
		[.149]	[.146]	[.177]				
Exported (produced) goods	0.048	-.065	-.048	.155				
		[.167]	[.154]	[.258]				

Notes: See notes to Table **??**. *** p<0.01, ** p<0.05, * p<0.1

Table D.6: Impact heterogeneity from supervision by time preferences and autonomy

Covariate	Dependent variable			
	6-week endline (n=842)		16-month endline (n=852)	
	Total investment expenditures (000s UGX)	Proportion of grant invested	Currently has a business	Monthly cash earnings (000s UGX)
	(1)	(2)	(3)	(4)
Assigned to any supervision	-0.06	0.049	0.133	3.034
	[1.460]	[0.022]**	[0.037]***	[1.904]
Future orientation, z-score	1.871	-0.016	0.000	0.898
	[1.868]	[0.017]	[0.039]	[1.659]
Supervision × Future orientation	-2.799	0.03	0.009	-2.037
	[2.034]	[0.021]	[0.049]	[1.910]
Purchasing autonomy, z-score	3.334	0.007	0.023	-0.584
	[2.264]	[0.021]	[0.036]	[1.860]
Supervision × Autonomy	-2.543	-0.002	0.006	-1.882
	[1.869]	[0.020]	[0.034]	[2.277]

Notes: Coefficients and standard errors come from an OLS regression of each dependent variable on an indicator assignment to any follow-up treatment, an index measure of future orientation taken from baseline, and an interaction between these two indicators. Other baseline covariates and strata fixed effects were included in each regression and are omitted from this table. *** p<0.01, ** p<0.05, * p<0.1

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