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Expanding Access to Finance Through Micro-Equity*

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Abstract

Conventional microcredit has expanded access to finance for many borrowers; however, a growing literature suggests that the rigid structure of standard debt contracts may limit both their impact and access. We run a field experiment to test the effects of a promising alternative to conventional microcredit. Specifically, we partner with a microfinance institution to design equity contracts in which clients are provided with a productive asset (a set of livestock) and split the proceeds of the sale of the asset at a fixed rate with the MFI. We market this product to livestock farmers alongside a flexible debt contract. Relative to the debt-financing status quo, expanding equity finance to small-scale entrepreneurs could affect both the type of client that participates in the formal financial market (*selection* effects), as well as their outcomes conditional on participation (*contract* effects). Our first set of results will characterize relative demand for the two contracts, as well as key characteristics on which the borrowers may differ (e.g., debt aversion, risk aversion, and religion). Our randomized experiment with 1,875 farmers will then characterize the effects on borrower outcomes (total income, total livestock revenue, product-specific livestock revenue, and repayment).

Keywords: equity, finance, small firms, agriculture

JEL codes: O12, O14, M31, L26

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I. Introduction

Despite improvements in financial inclusion, many small firms in developing countries remain capital-constrained, and conventional microcredit has had limited success in improving firm profitability and growth (Banerjee et al., 2015, 2019). Financing has typically been extended in the form of loans with rigid repayment plans and stark consequences for default. Recent research has tested relaxing loan structure through additional flexibility in the timing of repayment.¹ While these variations have in some cases improved firm profitability, it's possible that individuals with high returns to financing would only participate under more substantial changes to contract structure (e.g., expanding beyond standard debt financing). For example, an aversion to holding interest-based loans (debt aversion) has been shown to affect educational decisions in the US (Field, 2009), and such behavior might extend to small-scale entrepreneurs or would-be entrepreneurs as well. Many also eschew debt contracts for religious reasons. Muslim-majority countries, which constitute over 1.8 billion people (Center, 2017), have lower financial inclusion rates than peer countries (Demirguc-Kunt et al., 2015) and surveys find that up to 40% of Muslims with access to microloans reject them on religious grounds (Karim et al., 2008; El-Zoghbi et al., 2009).

In this project, we aim to test the effects of a promising alternative to debt contracts: Equity Financing. We work with a microfinance institution (MFI) to design equity contracts in which clients are provided with a productive asset (a set of goats and/or sheep) and split the proceeds of the sale of the asset (i.e. the difference between the sale price of the fattened livestock and their purchase price) at a fixed rate with the MFI. We market this product to livestock farmers alongside a flexible debt contract whose payment structure matches the asset's production timeline (i.e. due on the sale date of the livestock). To date, access to equity financing has typically been restricted to large, audited firms, and research outside of these contexts is scarce outside of a small-scale pilot (de Mel et al. (2019), though see Cordaro et al. (2022) for a notable recent exception).^{2,3} Relative to the debt-financing status quo, expanding equity finance to small-scale entrepreneurs could affect both the type of client that participates in the formal financial market (*selection effects*), as well as their outcomes conditional on participation (*contract effects*). Our experiment aims to test both the financial inclusion effects of a substantive departure in contract structure, as well as the potential effects on client and bank outcomes of the contract relative to a best-practice

¹This has included allowing a one-month repayment grace period (Field et al., 2013), a three-month grace period (Barboni and Agarwal, n.d.), providing vouchers to skip payments in the loan cycle (Battaglia et al., 2021), and matching repayment periods to the specific financed asset's production cycle (Czura, 2015).

alternative (flexible credit) as well as a pure control group.

Our experiment has four key features that allow us to understand the potential of equity financing for microentrepreneurs. First, we estimate preferences over the two contract types, allowing clients to state whether they would be willing to take out the debt contract (“debt-only”), the equity contract (“equity-only”), or both (“indifferent”). Those who state a willingness to take both are told they will have a higher probability of receiving a contract, so as not to limit the sample in this group just to knife-edge cases of true indifference. We collect a host of demographic, financial, and behavioral characteristics (e.g., risk & time preferences) of these potential clients. This allows us to estimate whether the equity contract would expand financial inclusion, and whether the type of client in the “equity-only” group is significantly different on observables from others. Second, we consider how financing affects firm outcomes. We randomize the extension of contract offers within each group.⁴ By randomizing within each of the stated preference groups, we can separate selection from the effect of the contract structure on client outcomes. For example, we isolate selection effects of the equity contract by comparing those who get the equity contract in the “equity-only” group to those who get the same equity contract in the “indifferent” group. Third, because equity clients are insured against downside risk, a natural concern is moral hazard, which motivates a cross-randomized monitoring treatment. Specifically, we randomize half of the

²Cordaro et al. (2022) run the first field experiment on performance-contingent microfinance contracts. Specifically, their equity-like contract has clients pay half of the fixed monthly payment of a debt contract, in addition to a 10% share of monthly profits from clients’ micro-distributor business. Individuals are randomized to be offered either this contract, a standard debt contract, a hybrid, or an insurance contract (in which the 10% share is taken from an index of other micro-distributors). Our study complements theirs in at least four ways. First, our design allows us greater scope to measure ex-ante moral hazard through the choice of investment share in goats. Second, our design provides more power to estimate the extent of adverse selection and moral hazard (each cell in their study has approximately 32 people, with around 20 actually taking the financing – we expect to have more than 10 times this number in each cell). Third, Cordaro et al. (2022) examines a supply chain finance context in which the creditor also supplies a profitable product sold by the clients. Thus, clients have a strong incentive to repay and the creditor naturally has detailed administrative data to condition the contract on. By contrast, we expand to the context of livestock farming, where a third party provides the financing and incentives to repay are not tied to ability to secure business inputs. Fourth, we study these contracts in a Muslim-majority country (the context of Cordaro et al. (2022) is Kenya, which is 11% Muslim), where debt aversion (and thus, the financial inclusion effects of introducing equity) may be more pronounced due to religious prohibitions on interest.

³As noted by Battaglia et al. (2021), there is a large literature in corporate finance highlighting the importance of financial flexibility (contracts that provide both access to capital and insurance against entrepreneurial risk), though this has been largely limited to high-income country contexts (Graham and Harvey, 2001; Gamba and Triantis, 2008). Equity contracts do not need to be limited to high-income countries or in supporting only high-growth firms. This project will test the potential benefits of equity for a common type of firm in low-income countries.

⁴Those in the “indifferent” group are randomized to an equity contract, a debt contract, or pure control.

clients to receive a regular visit by a veterinarian to check on the health of the livestock — clients are told that failure to properly care for the livestock may result in forfeiture of the asset to the bank.^{5,6} By comparing clients across these conditions, we jointly test the presence of moral hazard and the ability of light-touch monitoring to mitigate its scope.⁷ Fourth, by limiting our study to livestock, we are able to create granular measures of productivity by measuring the weight of the livestock as well as the final sale prices observed in the market. Since livestock are randomized across clients and conditions, we can attribute any differences in the livestock outcomes to the client selection and contract structure. This design allows us to sidestep some of the challenges of implementing equity contracts within microenterprises (e.g., profit-sharing contracts would require observing accurate book keeping, an unsurmountable challenge in other pilots; [de Mel et al. \(2019\)](#)) and carefully measure outcomes for the firms and the MFI. While this may partially limit the generalizability to other contexts, agriculture remains the main source of income for a majority of the rural poor in developing countries.

Prior research suggests a variety of reasons why equity contracts may produce different outcomes either through *selection* effects or *contract* effects. On the former, standard information economics would suggest equity contracts bring in clients who demand insurance against downside risk – these could be either more risk-averse individuals or those who have greater uncertainty about their expected productivity (e.g., due to more limited experience or higher background risk). Behavioral economics and psychology suggest further reasons these clients could differ. For example, a growing literature has attempted to explain *underborrowing* or suboptimal repayment patterns in debt. In the context of consumer finance, [Prelec and Lowenstein \(1998\)](#) rationalize aversion to debt via a model of mental accounting that generates a “pain of paying”. Several papers find evidence consistent with this,

⁵In the baseline survey, we note that the lender will have the ability to check up on the animal. Individuals in the monitoring arm are told during their visit with the bank that a veterinarian will be visiting regularly to check on the condition of the animal. The translated contract notes “the second party acknowledges that it observed these animals and that they are in good health and disease-free (that negates any ignorance) and pledges to maintain them during their cycle and to look after them as a careful person looking after their own money” and later that “In case the second party violates any condition that is decided by this contract, the whole financing fee and its supplements will be repayable immediately.” In practice, we instructed the bank not to forfeit any animals except in especially egregious cases.

⁶All clients (across both the debt and equity contracts) are required to purchase health insurance for the livestock. Thus, they will be insured against any outbreaks of disease that periodically decimate livestock in Egypt.

⁷We will also cross-randomize these monitoring visits in the debt arm, albeit these will be pure reminder visits in that group (since there will be no threat of forfeiture). Since simply having a veterinarian visit might provide a reminder of care, by comparing across these conditions in the debt condition, we can test whether this reminder effect is contributing to the monitoring treatment effect in the equity condition.

including the results that people are willing to pay a penalty to pay off debt early (Azmat et al., 2020), will sub-optimally close out smaller debt accounts early at the cost of higher interest payments (Amar et al., 2011; Ponce et al., 2017; Gathergood et al., 2019), and are reluctant to take on debt-framed contracts (Caetano et al., 2019). Moreover, debt may take on a moral dimensions for some clients. Karlan et al. (2021) run a marketing experiment in a Muslim-majority country and find that individuals are willing to pay a 10% premium on average for a religiously-compliant debt contract.

There is also a large literature that helps us understand why equity contracts may produce different outcomes via their contract effects. An extensive corporate finance literature has highlighted the role of financial flexibility on the ability of firms to hedge against risk and take on more uncertain investments (Gamba and Triantis, 2008), and RCTs have shown that allowing grace periods or vouchers to skip payments does in fact increase risk-taking by microenterprises (Field et al., 2013; Battaglia et al., 2021).⁸ In our experiment, we identify scope for contract effects through 3 primary mechanisms – asset choice (i.e. mix of goats and sheep), input investments (e.g., type, quantity and quality of feed), and farmer effort (e.g., maintenance through walking and grazing livestock). We explore asset choice by looking at the number of goats vs. sheep chosen by the borrowers. Moreover during the baseline survey we will elicit hypothetical reports of ideal project scope (i.e. how much financing the client would be willing to take and how it would be split between sheep and goats under the two different contract types) to provide some additional evidence on how contract type may affect investment decisions. We explore choice of inputs and farmer effort through careful data collection during the study period and through impacts on weight and sales price of the livestock at the market. We also designed the experiment to shut down potential differences in liquidity across the contracts by providing a flexible in-kind debt contract instead of comparing to a standard loan that requires monthly repayment. This ensures that farmers in both groups have similar liquidity available to respond to shocks in the interim.⁹

While the standard economics literature provides somewhat limited scope for *contract* effect differences across the two financial structures, the behavioral economics and psychology literatures provide some reasons to expect differences. Within psychology, lab experiments have shown that simply mentally labeling student loans as “debt” causes a significant decline

⁸There is also a literature on consumer mortgages in which repayment flexibility helps borrowers smooth their consumption (Cocco, 2013).

⁹Although liquidity during the contract period is similar, the equity and debt contract groups face different potential upside and downside risk. Thus, anticipated liquidity (which may affect current decisions) may still differ between the two groups.

in self-reported life satisfaction (Greenberg and Mogilner, 2021). Within economics, a few studies have shown that debt can go beyond the immediate hedonic consequences. Martinez-Marquina and Shi (2021) run an online lab experiment and find that randomly assigning debt to subjects causes them to exhibit behavioral biases that affect their financial payoffs. This work ultimately isolates the debt channel, while other work in the field has shown that financial strain (i.e. poverty and scarcity) can make individuals less productive (Kaur et al., 2021) and make poorer decisions (Shah et al., 2012; Mani et al., 2013). It’s possible that individuals in the equity condition have less stress and anxiety and are thus able to perform better. To assess this channel, we measure stress, anxiety, and worry among clients.¹⁰

This research will contribute to the aforementioned literatures on microfinance, financial contracts, debt aversion, and agricultural productivity. The early promise of studies of flexible lending suggests that equity contracting may go even further, and the scope for overcoming debt aversion holds the promise of increasing financial inclusion in places where excess capacity has not yet been fully utilized.

II. Research Design

A. Local Context

We are focused on livestock farmers in Egypt. This setting is well suited to answer these questions for several reasons. First, outcomes related to the livestock are relatively easy to observe. Unlike many other businesses (e.g., the small retail shops that are a mainstay of microenterprises around the world), the financing is constrained to a handful of assets that can be marked and observed.¹¹ One of the main outcome variables will be the weight of the livestock at the time of the sale and the final sale price.¹²

Second, this context is one in which credit constraints are often reported as being binding. Based on our conversations with local farmers and NGOs we believe there is often excess capacity amongst farmers. Many could take on additional livestock with little marginal

¹⁰We include these measures in the midline and endline surveys after clients have completed their initial contracts. Thus, we will not be able to measure stress during the contract period, but may still find residual differences in this immediate aftermath.

¹¹Borrowers will be allowed to invest in both goat and sheep.

¹²Sales prices may also reveal aspects of livestock quality not captured in weight alone. However, weight will be one of the primary outcomes of interest since sales price may also reflect differences in sales skill/effort. Farmers in the equity contract group will be required to receive sale approval by an agent appointed by the bank in order to ensure there is no side-dealing (e.g., the farmer agreeing to a lower-than-market sales price with a buyer, so as to get a transfer later that doesn’t have to be shared with the bank). Since those in the debt contract condition will not be required to use a sales agent (though they will be afforded the option to do so), the sales price may reflect differences in ability to secure/negotiate a high sales prices.

cost (sharing the mainly fixed costs of the livestock they already have), but do not do so primarily because of the financing constraints they face. While microfinance institutions exist, often there are only one or two working in an area, and they do not provide products that line up with the agricultural return cycle (e.g., repayment is monthly starting right after disbursement, while it normally takes at least 6 months for a farmer to be able to sell the livestock at a profit.) This provides an opportunity to test these contracts in a market where we expect the returns to be high, and hence expect higher take-up, improving our statistical power.

Third, we expect debt aversion to be an important consideration in this context. The majority of Egypt is Muslim, and Islam prohibits the payment of *riba*'a (which some interpret as a blanket prohibition on interest, while others interpret it as a prohibition on “usurious” interest rates). While the central religious authority in the country (Al Azhar) has ruled that interest from banks is not the prohibited form of interest, many seek to avoid any interest-bearing instruments and this has contributed to a social norm of debt avoidance. We will also be including Christians in our sample which will allow us to assess the degree of debt aversion amongst those without the explicit religious prohibition of interest.

Finally, the setting is one in which we expect some baseline interest in equity contracts, as similar contracts already exist informally. We have heard of several examples of farmers with relatives in urban areas who have a family member provide cash to the farmer to buy more animals with the intent that they split the profits.

B. Experimental Design & Product Details

We will have two samples: (1) a representative demand sample, and (2) an impact sample. The representative demand sample will answer hypothesis 1 (i.e. how does demand for the products differ), while the impact sample will answer all other hypotheses.

For the representative demand sample, we will implement a set of village censuses in which we knock on every door and ask if the individual has any experience raising livestock. If yes, then we ask if they are interested in an opportunity to expand the size of their flock (see Section F. for more detail on the recruitment process).¹³ Next, we will explain the

¹³We are careful not to use the term “finance” to avoid prompting debt-averse individuals from dropping out of the survey (and thus out of the take-up analysis). Since some individuals could misinterpret the opportunity as being limited to debt, we ask all respondents who decline participation to give a reason – if they mention religion, then the enumerator is prompted to explain that the bank is offering a Sharia-compliant equity product. We will record how many individuals initially decline and then revise their answer once prompted with this explanation – for all other respondents, the explanation of the equity product won’t come until later in the survey.

products to them (using a cartoon video we have produced) and ask about their preferences regarding the products and their interest in applying.

We will also have an “impact sample” that will be comprised of individuals who were recruited through the demand sample, as well as individuals who were recruited directly by the loan officers through their normal marketing efforts. Loan officer recruitment is much more efficient than a door-to-door census, so we expect that the great majority of our impact sample will come from direct loan officer recruitment (which usually happens through asking previous clients for leads and through word-of-mouth marketing efforts). When loan officers identify individuals that they think will be a good fit for the study we will send an enumerator to implement the baseline survey with them.

Following a script (see Appendix Table 1), enumerators will explain the two potential contracts: (i) a micro-equity (net revenue sharing) contract that provides 10k EGP in funding to cover the cost of buying young livestock & (ii) a flexible micro-loan that provides 10k in funding to cover the cost of buying young livestock.¹⁴ The two products are as follows:

Micro-Equity (Revenue Sharing) [Musharaka in Arabic]:

The equity product provides financing in the form of an in-kind transfer of young goats and/or sheep (equivalent to up to 10,000 EGP, or roughly \sim \$530 as of July 2022, providing roughly 3 sheep depending on market prices).¹⁵ The borrower is expected to take care of these livestock (including by feeding them and walking them) over the course of 6 months. At the end of the 6 months, they are expected to sell the livestock on the market for a profit. The profit comes from an increase in the weight of the livestock which is sold for its meat. When sold, the market price received is allocated by first returning the original amount of the financing (i.e. 10,000 EGP) and then splitting the remaining funds, with one-third going to the financial institution and two-thirds going to the borrower.¹⁶ For example, if the fattened livestock sell for

¹⁴Note that Egypt experienced multiple currency devaluations during recruitment. To keep numbers in somewhat similar real terms, we updated the survey to note amounts of 15,000 EGP after the first set of currency devaluations. In practice, the actual amount varies to allow a relatively similar number of young livestock to be financed throughout the study period (typically 3 sheep).

¹⁵Since the price of goats and sheep will fluctuate over the period of recruitment, we have chosen to keep the maximum amount of financing available fixed per cohort as an approximate ceiling in local currency (e.g., 10,000 EGP). For example, if the market price for young sheep is 2000 EGP in one cycle this could fund 5 sheep for all clients who choose to only fund sheep in that period. If in the next period (e.g., the following month), the prices of sheep increase to 2400 EGP, then all clients who want only sheep in that period will be provided with 4 of them (9,600 EGP). In neither case are the borrowers provided with any cash. Because the number of livestock provided in this initial investment may vary over time, we will include cohort fixed effects in our specifications.

¹⁶There are two issues worth clarifying for the equity contract. First, the borrower will be allowed to sell

16,000 EGP, the borrower will keep 4,000 EGP and the bank will receive 12,000 EGP.

Flexible Micro-loan [Qard in Arabic]:

The micro-loan will provide similar financing the form of an in-kind transfer of young livestock (again, equivalent to up to 10,000 EGP, or roughly \sim \$530 as of July 2022, providing 3 sheep depending on market prices). Borrowers will then be expected to repay these funds as well as an additional 13.5% in interest fees 6 months after disbursement (i.e. the bank will received 11,350 EGP at the end of the loan cycle).¹⁷ These loans differ from existing credit contracts because they don't require repayment until 6 months after disbursement. Standard loans in this market require repayment starting on a monthly basis even though this is not in line with the cashflow timing of agricultural products like livestock.

After explaining the two products, enumerators will implement a **preference elicitation procedure**. Specifically, clients will be asked to indicate whether they would be willing to accept one, both, or neither of the contracts. Individuals will be informed that there is a chance that they will be allocated to the control group or one of the financing groups. In particular, they are told that they will have *approximately* a 1 in 3 chance of being randomly assigned to **eligibility** for each of the three groups (debt, equity or control), but will only receive the funding if they indicated “yes” for that product (i.e. an individual who says yes to “equity” and yes to “debt” has approximately a 2 in 3 chance of receiving financing, whereas one who only says yes to “equity” only has a 1 in 3 chance). See Appendix Table 1 for the exact (translated) wording of these prompts and questions. Note that neither of these products are available to the general public.

Finally, half of those assigned to financing will be randomly assigned to a **monitoring** intervention to help estimate the scale of (and scope for reducing) moral hazard across the two contracts. We will inform those in the monitoring groups that they will be visited by a veterinarian on a regular basis who will be assessing how well they are taking care of the animals. The vet will be instructed to only collect data on the health of the livestock and not

to any buyer in the market but will need to have a member of the financing organization join them for the sale to monitor the price that was received for the animals. The lender will also have a trusted buyer that will provide an assessment of how much they would buy the animals for, and if the borrower is unable to beat that price in the market, they will need to sell it to the trusted buyer. Second, if the borrower wants to exit the contract early, they will need to pay the greater of (i) what the borrowers in the debt arm would have had to pay by that point in the contract and (ii) the principle plus one third of the excess from the value they can get on the market/trusted buyer for their animals.

¹⁷This is approximately the existing market interest rate for these types of financial institutions.

to communicate any of that information to the borrower to make sure that the monitoring intervention is in fact only providing monitoring and not providing information that could be changing outcomes through any other channels other than a reminder channel.¹⁸ Since those in the debt arm will not have any threat of forfeiture for bad care, the treatment effect of the monitoring arm in the debt group will allow us to estimate the extent to which the visits induce differential outcomes through a pure reminder channel (or non-compliance by the veterinarian with our instructions to not share information with the client).

C. Randomization Procedure

The randomization will be done at the individual level in batches. Each batch will be comprised of the individuals who were contacted over a 1-4 week period and were deemed eligible by the lender. Eligibility is primarily based on the individual's credit score, and the loan officer's assessment of the borrower (historically nearly everyone who applies is deemed eligible). We will then split those individuals into strata based on their indicated interest in the different products and gender.

The first stratum will be individuals who have indicated interest in both debt and equity. We will randomize them into one of the three groups (equity/debt/control). A second stratum will be those who have indicated interest in equity only. They will be randomized into either equity or control. We will further cross-randomize the monitoring treatment within contract & preference groups. Individuals who indicate an interest in only debt or that they are not interested in equity nor debt will not be part of our impact sample. We outline the different groups in Figure 1 below.

¹⁸The lender will also have a veterinarian available for anyone in the debt or equity arms to call in the case that they need assistance.

Figure 1: Design Cells

Willingness to Accept:						
Debt & Equity (Indifferent)	<table border="1"> <tr> <td>Equity-Indifferent (1)</td> <td>Debt-Indifferent (3)</td> <td rowspan="2">Control (Indifferent) (5)</td> </tr> <tr> <td>Equity-Indifferent & Monitoring (2)</td> <td>Debt-Indifferent & Monitoring (4)</td> </tr> </table>	Equity-Indifferent (1)	Debt-Indifferent (3)	Control (Indifferent) (5)	Equity-Indifferent & Monitoring (2)	Debt-Indifferent & Monitoring (4)
Equity-Indifferent (1)	Debt-Indifferent (3)	Control (Indifferent) (5)				
Equity-Indifferent & Monitoring (2)	Debt-Indifferent & Monitoring (4)					
Equity Only	<table border="1"> <tr> <td>Equity-Only (6)</td> <td>Equity-Only & Monitoring (7)</td> <td>Control (Equity-Only) (8)</td> </tr> </table>	Equity-Only (6)	Equity-Only & Monitoring (7)	Control (Equity-Only) (8)		
Equity-Only (6)	Equity-Only & Monitoring (7)	Control (Equity-Only) (8)				
Debt Only	Not Part of Analysis					
Neither Equity nor Debt	Not Randomized					

This produces 8 distinct groups for analysis. We will use the following cell comparisons to test the different hypotheses we outlined below:

Equity vs Debt (vs. Control) for Firm Outcomes: [(1) & (2)] vs [(3) & (4)] vs [(5)]

Adverse Selection in Equity: [(1) & (2)] vs [(6) & (7)]

Moral Hazard in Equity: [(1) - (2)] vs [(3) - (4)]

Impact of finance on debt averse individuals: [(6) & (7)] vs [(8)]

Note that if individuals who select “equity-only” respond similarly to monitoring as individuals who stated a willingness to take either product (the “debt & equity” group), then we can further increase power by combining groups. Specifically, we could estimate the impact of monitoring in that case by combining (1) & (6) and comparing against the combined group of (2) & (7). Similarly, if we assume the impact of contract is the same across the two preference groups (e.g., there is no adverse or advantageous selection), we can estimate the impact of equity products on firm outcomes (relative to no financing) by combining (1), (2), (6) & (7) and comparing against the combined group of (5) & (8).

We have also randomized some of the debt-only applicants into being provided the debt product, but we do not intend to include them in our impact analysis. Nonetheless, providing some of them with the debt product ensures that they still truly have a chance of getting the debt product if they report only wanting debt.

D. Hypotheses

Hypothesis 1: Application behavior will differ across the two contracts.

Our first hypothesis is that there will be differential demand for debt and equity contracts. We expect this difference to manifest both in the overall application rates as well as in the characteristics of who applies across the two contracts. In line with our discussion above, we expect that there will be a subset of individuals who would only be willing to take equity, and that those who do apply for the equity contract may be different on measures of risk aversion, debt stigma, and other observable characteristics.

Hypothesis 2: Outcomes will differ across the two contracts and the control group.

We expect that the two contracts will lead to differences in outcomes for the borrowers. We will consider four primary final outcomes: (1) *total income*, (2) *total livestock revenue*, (3), *product-specific livestock revenue (and its components: price and weight)*¹⁹, and (4) *repayment (days delinquent)*. Moreover, to study mechanisms, we will consider four intermediate outcomes: (1) effort through hours spent grazing, (2) total spent on feed, (3) high-quality feed type, and (4) asset mix (fraction of livestock that are goats).

Differences in these outcomes could manifest through a few different channels. First, effort levels may differ. The debt contract makes the borrower the residual claimant on any profits. This allows the borrower to choose the amount of effort that maximizes profits by considering the costs and benefits of effort and investment together. The equity contract, on the other hand, shares the potential profits and losses between parties, thereby lowering the incentive for the borrower to provide the level of effort that would maximize profits (because those profits would be shared with the lender) and also lowering the incentive for them to engage in loss-mitigating activities (as those losses will also be shared with the lender). On the other hand, there is also a behavioral argument for why the insurance provided by equity may increase effort (or output more broadly). [Kaur et al. \(2021\)](#) show that workers who are worried about their finances are less productive at work – in their experiment, workers who are paid earlier increase their output and make fewer costly mistakes, and they argue this is explained at least partly through psychological channels. Similarly, in our experiment, those provided with equity contracts will be insulated against more downside risk, and this alone

¹⁹The product-specific livestock are the specific livestock given to the client by the MFI.

could improve their cognition and focus, and thus output.²⁰ Our measure of outcomes for this set of hypotheses are the livestock weights, which could reflect either effort levels (e.g., properly grazing the livestock) or the attention and skill with which the livestock have been taken care of (e.g., not making any mistakes in responding to temporary illnesses of the livestock).

Another way in which there could be different outcomes is through the differences in selection of those who apply for the equity contract and those who apply for the debt contract. Theoretically, it is unclear if this would be adverse or advantageous selection. It is possible that the people who are only willing to take equity are those who expect that they have low returns to the activity, or are more likely to engage in low effort activities or fraud. If that were the case, then outcomes for that group would be expected to be lower. On the other hand, willingness to only take equity may reflect prudence (either due to risk preferences or moral/religious concerns) that could manifest in taking extra effort to limit bad outcomes or in limiting the scope for strategic default or late payment (i.e. sale timing in the case of equity). We will be able to directly assess the degree of adverse (or advantageous) selection by comparing outcomes for treated individuals in the equity-only arm (i.e. those who applied for only the equity product) and those in the equity-indifferent arm (i.e. and those who applied for both the equity and debt product and were randomized into the equity offer).

Hypothesis 3: Outcomes will differ across the monitoring groups.

The equity contract may lend itself to additional moral hazard since the lender shares in the profit & loss. To assess the potential importance of moral hazard concerns in equity we will randomize those in the equity group into a monitoring & non-monitoring group. If moral hazard is an important determinant of behavior, we would expect that the monitoring group would fare better than the group without monitoring with respect to their outcomes including repayment (i.e. on-time selling for the equity group) and profits. We will consider differences across monitoring groups on the same four primary outcomes mentioned in hypothesis 2: (1) *total income*, (2) *total livestock revenue*, (3), *product-specific livestock revenue (and its components: price and weight)*, and (4) *repayment (days delinquent)*.

The monitoring intervention will send a veterinarian to check on the health of the live-

²⁰While the task of raising livestock may require less direct attention and cognition than some of those studied in this literature (e.g., stitching together irregularly shaped leaves as in Kaur et al. (2021)), it still has several components that could be impacted by such psychological factors (e.g., remembering to check the animals for various potential health issues and following through on regularly walking and feeding them).

stock at an unannounced time and frequency. The veterinarian will collect data on the health of the livestock and could answer questions asked of them by the borrower. The borrowers will be told that if the vet identifies instances of clear negligence on the part of the borrower then the lender could repossess the livestock and charge an administrative fee. We will also include a monitoring arm in the debt group, without the forfeiture clause of the equity contract. This will allow us to control for the impact of the salience provided by the visits, with comparisons between the two groups serving as a check on the impact of the potential penalty to overt negligence.²¹

E. Statistical Power

Formal micro-equity products are extremely rare. Many of the entities we have spoken to have told us that they do not offer these types of products because they are worried about the potential for adverse selection and moral hazard that could come from the product (although not in this exact language). Our prior is that while adverse selection and moral hazard may be higher in equity contracts relative to debt contracts, they are likely not much higher. We describe above how we think equity financing can provide a way to bring in people who would otherwise not be utilizing finance. To that end, finding a relatively precise null effect on repayment and borrower outcomes would be informative. This would showcase that equity products do not severely underperform debt products, allowing lenders to cater to those who would otherwise be unbanked, without significant deterioration of the performance of their portfolios.

Hypothesis 1: To assess how application behavior differs by contract we will utilize an incentive compatible survey instrument to have people directly apply for the different products. We will measure what proportion of the sample are only willing to apply to the equity product. This will allow us to document what proportion of the population in this context is currently underfinanced but willing to take out equity financing. If this number is significantly greater than 0 this will show the extent of this untapped financial demand.

Hypothesis 2: While hypothesis 1 can be assessed without randomization, hypotheses 2 & 3 require a randomized experiment to properly assess the impacts. We expect to have 150 individuals allocated to each financing group [i.e. 750 individuals split across the eq-

²¹Across both the debt and equity monitoring arms, we will instruct the veterinarians not to provide any information to the client. Thus the monitoring arm in the debt group should only increase the salience of care; however, insofar as veterinarians deviate from the protocol similarly across the two arms, this should also account for the information provided.

uity groups (1), (2), (6), & (7) and 375 individuals split across groups (3) & (4)], and 375 individuals allocated to each control group [(5) & (8)].

We aim to recruit 1875 total subjects in the study design, of which 1125 will be allocated to the funding arms and 750 will be in pure control groups.²² For the test of the impact of contract type on outcomes, we would compare those with the same selection (debt & equity) to each other (i.e. equity groups (1) & (2) against debt groups (3) & (4)). This would give us 375 borrowers in each group, allowing an MDE of 0.2 standard deviations using an ANCOVA specification with 1 pre-period and 1 post-period.²³

For the test of adverse selection, we would compare those with the same contract (equity) but different selection to each other (i.e. comparing groups (1) & (2) against groups (6) & (7)). We again would expect 375 borrowers in each group and again an MDE of 0.2 standard deviations.

Finally, to assess the impacts of equity over no financing we can pool the equity samples. In this case we would have 750 borrowers in equity and 750 in control. That would provide an MDE of 0.14 SDs.

Hypothesis 3: For the test of the impact of monitoring we would compare outcomes for the groups that got the monitoring in the equity group [(2) & (7)] to those that did not [(1) & (6)]. This would again provide an MDE of 0.2 SDs (375 in each group, assuming that monitoring has similar treatment effects on those who initially requested equity only and those who requested debt & equity. Without that assumption we would need to compare each cell separately providing an MDE of 0.29 SDs). We would also want to compare this to the monitoring intervention in the debt group which would have an MDE of 0.25 SDs if we group the equity groups together.

F. Data Collection

The sample for this study will be drawn from livestock farmers in the areas serviced by our implementing partner. The study will be implemented in the state of Assuit in Egypt. Assuit is about 400 kilometers south of Cairo and has a population of about 4.5 million people.

Our partner is the Assuit Businesswomen’s Association (ABWA). ABWA has been lend-

²²We recruit 1,875 to match the bank’s funding for roughly 900 contracts (as we allocate roughly 60% to an offer of treatment and forecast a take-up rate of 80%).

²³We assume a correlation between baseline and follow up of just 0.25, and so in the cases where we don’t have baseline measures to control for, our MDE will increase slightly to 0.205.

ing in the area for over a decade and have over 5,000 existing clients. They lend to both men and women. Data will be collected by trained enumerators who are introduced to the community by employees from ABWA. As mentioned above we will have two samples, a “demand sample” and an “impact sample”. For the demand sample enumerators will enter different villages and attempt to reach the universe of livestock farmers in the village. When they encounter an existing livestock farmer they will ask them if they would be interested in expanding their flock with financing, and if so then they will attempt to implement the baseline survey with them. We include several key questions from the baseline survey instrument in the appendix in the appendix, and some simple summary statistics from data collection through September 2023 in Table 1. The baseline survey includes a video that explains the different product options to the individual and elicits their interest in them. The impact sample will include individuals who expressed interest in the products from the demand sample, and were deemed eligible by the lender. The impact sample will also include individuals who were directly recruited by loan officers. Since direct recruitment is more efficient we expect the majority of the impact sample to come from loan officer efforts.

We will have administrative data, including the prices and weights of the animals at the time of purchase and sale. These data are collected by the lender, whose loan officers are trained to go to the borrowers and identify the correct animals (who are tagged with ID numbers) – these officers utilize scales that are available in markets and villages to get the correct weight. We will also have administrative data on repayment time and repayment amount from the lender, and data from the veterinarian on animal status and feed quality from the monitoring visits.

We began data collection in July 2022 and over the course of the following year have been able to enroll around 800 approved applicants into the experiment. We expect that we will be able to complete enrollment of our intended 1875 borrowers by the summer of 2024, and then will have another year to complete the 7 and 13-month follow-up surveys, bringing us to project completion by summer of 2025. While the speed of recruitment has improved over time, there is risk that we will need longer to complete recruitment.

In summary, our key data sources are as follows:

1. Implementation data on the number of farmers who were contacted regarding their interest in expanding their flock and participating in the study, and their response.
2. Data from the baseline survey, which will include: preferences across the products,

demographic information; information related to livestock and other income earning activities; risk, debt and behavioral characteristics, etc.

3. Data from two follow-up surveys, intended at 7 and 13 months after disbursement. These surveys will collect similar data to the baseline survey, focused on the income-generating activities of the borrower.
4. Administrative data on borrowing, repayment, and sales of the livestock (i.e. weight, sale price, and timing of sale, etc).
5. Data from the veterinary visits (e.g., vet's assessment of animal health and feed quality, etc.)

Table 1: Summary Statistics for Eligible Respondents

	(1)	(2)	(3)	(4)	(5)	(6)
	N	Mean	SD	Min	Median	Max
Panel A: Demographics						
Age	789	38.70	9.62	19.43	38.29	59.95
Household Size (Number of Members)	789	6.06	2.59	2.00	6.00	33.00
Female	789	0.63	0.48	0.00	1.00	1.00
Married	789	0.86	0.35	0.00	1.00	1.00
Household Head	789	0.45	0.50	0.00	0.00	1.00
High School Completed?	789	0.34	0.47	0.00	0.00	1.00
Previously Taken Business Training?	789	0.07	0.25	0.00	0.00	1.00
Muslim	789	0.96	0.21	0.00	1.00	1.00
Panel B: Contract Preferences and Beliefs						
Only Willing to Take Equity?	789	0.45	0.50	0.00	0.00	1.00
Willing to Take Either Product?	789	0.55	0.50	0.00	1.00	1.00
Prefers Equity? (Forced Choice)	789	0.87	0.33	0.00	1.00	1.00
(Beliefs) How Many Goats Does 10k Finance?	741	4.96	2.25	0.00	5.00	20.00
(Beliefs) How Many Sheep Does 10k Finance?	762	3.26	0.93	0.00	3.00	10.00
(Hyp) Ideal Contract Amount: Equity	789	22,507.10	14,476.07	5.00	20,000.00	150,000.00
(Hyp) Ideal Contract Amount: Debt	789	20,513.70	12,390.15	0.00	20,000.00	100,000.00
(Hyp) Sheep-to-Goat Frac for Equity Ideal	787	0.88	0.21	0.00	1.00	1.00
Panel C: Business and Financial Background						
Monthly Profit from Livestock	761	583.22	2,008.97	0.00	0.00	25,000.00
Share of Total Income from Livestock	696	0.18	0.33	0.00	0.00	1.00
Owens Goats or Sheep?	789	0.23	0.42	0.00	0.00	1.00
Owens Cows?	789	0.23	0.42	0.00	0.00	1.00
Owens Other Livestock (Chickens, Camels, etc.)?	789	0.19	0.39	0.00	0.00	1.00
Years of Experience Raising Goats or Sheep	768	3.40	8.08	0.00	0.00	37.00
Previously Participated in (Informal) Equity	733	0.15	0.36	0.00	0.00	1.00
Previously Applied For Any Loans?	754	0.34	0.47	0.00	0.00	1.00
Currently Paying Any Loans?	789	0.30	0.46	0.00	0.00	1.00
Number of Loans Currently Paying Back? (If 0)	789	0.22	0.57	0.00	0.00	6.00
Panel D: Behavioral Preferences						
Debt Stigma	787	4.09	4.40	0.00	2.00	10.00
Debt Aversion	787	5.69	4.33	0.00	7.00	10.00
Risk Aversion (Qualitative)	787	5.44	3.68	0.00	5.00	10.00
Risk Aversion (Quantitative)	781	6.21	9.39	1.00	1.00	32.00
Patience (Qualitative)	788	6.79	3.47	0.00	8.00	10.00
Pos. Reciprocity: Willing to return favor	787	9.44	1.66	0.00	10.00	10.00
Pos. Reciprocity: Thank You gift (binary)	789	0.99	0.11	0.00	1.00	1.00
Pos. Reciprocity: Thank You gift (EGP amt)	779	5.44	4.92	1.00	6.00	99.00
Trust	782	4.80	3.44	0.00	5.00	10.00
Digit Span Recall	789	2.53	1.47	1.00	2.00	8.00
Stress (0-100)	716	33.64	38.34	0.00	10.00	100.00
Anxiety (GAD-2)	716	1.02	0.98	0.00	1.00	3.00
Worry (GAD-2)	716	0.80	0.90	0.00	1.00	3.00
Financial Worry	716	1.09	1.07	0.00	1.00	3.00

Notes: Sample consists of all bank-eligible respondents to baseline survey collected up through September 2023. Eligible in Panel B denotes individuals who answers “Yes” for willingness to take Equity (individuals only willing to take Debt are dropped from the treatment randomization). Full text for Panel D questions may be found in Appendix Table 3.

G. Variations from Intended Sample Size

Our plan is to enroll 1,875 farmers into the sample, which we believe to be feasible. If we struggle to get enough farmers to agree to participate in Assuit, we will be able to expand to other areas in the country. This may increase how long it takes to enroll the full sample, but it should not otherwise affect the analysis. There are two dimensions on which the sample could deviate from this target: treatment non-compliance and attrition.

Treatment Non-compliance: It is possible that people will indicate their interest in one of the financial product but then change their mind when it is time to actually sign the final contract and take the funds. We will try to limit this behavior by confirming with individuals their interest in the different products and their willingness to take the financing between the baseline survey and randomization.

Attrition in follow ups: We will try to limit attrition by collecting additional contact information for the individuals in our study, as well as people that can help reach them if they move. We will have detailed addresses for those that don't move, and we will make repeated visits interview those who may be initially busy. In previous experiments in this context the authors have been able to reach greater than 90% of the initial sample, and so we expect to continue to have low attrition in this study.

III. Empirical Analysis

Hypothesis 1: Take-up will differ across the two contracts.

We expect that selection into the two contracts will differ. We will test this in three ways. First, we will compare the overall application rates using a stacked regression that will include enumerator and cohort fixed effects:

$$y_{i,c} = \beta_0 + \beta_1 \text{EquityContract}_{i,c} + \delta_{\text{cohort}} + \gamma_{\text{enum}} + \epsilon_{i,c}, \quad (1)$$

Where $y_{i,c}$ is a binary variable that is equal to 1 if an individual applies for a contract and equals 0 if they turn down the contract (i.e. each individual has two observations, one for each contract type). $\text{EquityContract}_{i,c}$ is a binary variable equal to 1 if the individual applies for the equity contract.²⁴ This is functionally equivalent to a t-test but allows for the inclusion

²⁴Application for a contract here denotes agreeing to a preference elicitation survey question, i.e. responding “yes” to “Would you take this offer?” (see questions 4 and 5 in Appendix Table 1). Respondents are told that this decision is binding and will be followed up with a contract. This, however, does not constitute

of enumerator (γ_{enum}) and cohort (δ_{cohort}) fixed effects; capturing variation in time of year and price/number of young livestock at the time of sale to the client. This regression will tell us if the overall demand for equity differs from the overall demand for debt.

Second, we will consider the potential for equity to bring in a different type of client. To do this we will compare people who were only interested in the equity product to those who were interested in debt or both debt & equity. This will compare the people who are “reachable” by existing financial instruments to those that were only reachable by the new equity product. We will do this with the following specification:

$$y_i^e = \beta_0 + \sum_{j=1}^N X_j' \beta_j + \delta_{cohort} + \gamma_{enum} + \epsilon_i, \quad (2)$$

Where the outcome y_i^e is now a binary variable that is equal to 1 if the individual only applies for equity and equals 0 if the individual applies for debt (those who agreed to neither will be excluded). X_j will be a set of demographic, behavioral, and firm background characteristics. In particular we believe that borrowers across the two groups are likely to differ significantly on dimensions of religion (i.e. Muslim vs. non-Muslim), risk aversion, debt aversion, and debt stigma (see Appendix Table 3 for survey questions meant to capture these dimensions).²⁵

Third, we will more generally explore how the four preferences groups differ from each other. The four groups are equity-only, debt-only, both, and neither. We will show how the baseline characteristics of the groups differ using a more traditional specification across a set of 13 baseline variables. Specifically, we will include religion, gender, age, education level, any prior loan experience, any prior (informal) equity experience, years of experience raising goat/sheep, monthly profit from livestock farming, share of total income from livestock

actual take-up because the individual could be denied a product due to not passing the MFI’s screening process, due to being assigned to the control group, or due to changing their mind upon delivery of the formal contract. As a secondary analysis, we will also replace “applies for a contract” with “takes up a contract”. This is our secondary analysis because it will require conditioning on whether an individual is approved by the bank (and whether they actually take up the contract), which conflates selection bias with differential demand (e.g., if subprime borrowers prefer debt vs. equity).

²⁵For risk preferences, we adapt the qualitative and quantitative measures from the Egypt sample of the Global Preference Survey (Falk et al. (2018)); we also include measures of positive reciprocity, trust, and time preference from the survey). For debt aversion and debt stigma, we use a similar format to the qualitative trust positive reciprocity questions in the GPS, but provide our own measures. In particular, debt aversion is degree of to which the following statement describes the respondent as a person: “If I need money, I try to avoid taking a loan, even if I know I can pay it back,” and for debt stigma it is, “It is embarrassing if someone else knows I have loans from a bank.” For religion, we use ID cards when possible, and otherwise rely on assessments by local field staff (based on name and location).

farming, risk aversion (qualitative), risk aversion (quantitative), debt aversion, debt stigma, and digit span recall (all of which are summarized for the baseline survey data collection to-date in Table 1).

$$X_i^k = \beta_0 + \beta_1 Equity_i + \beta_2 Debt_i + \beta_3 Both_i + \delta_{cohort} + \gamma_{enum} + \epsilon_i, \quad (3)$$

Where X_i^k indexes the 13 baseline characteristic (e.g., age, education, gender), and the variables on the right hand side are binaries for if the person wanted either equity only, debt only or was willing to take either contract. This specification will allow us to show how characteristics differ between groups based on their interests in the different financial products.

We will also use a more flexible strategy for characterizing the differences between the 4 groups by utilizing recent machine learning classification algorithms. In particular, we intend to utilize variable selection algorithms combined with multinomial logits to provide evidence on the predictors of group preferences that may differ in high-dimensional space (similar to [Tutz et al. \(2015\)](#)).

Hypothesis 2: Outcomes will differ across the two contracts and the control group.

We expect that borrower outcomes will differ across the two contracts and the control group. We will consider how they differ by utilizing the following specification:

$$Y_i = \beta_0 + \beta_1 Equity_i + \beta_2 Debt_i + \tau_s + \sum_{k=1}^K \alpha_k X_{i,0}^k + \epsilon_i \quad (4)$$

Where τ_s are randomization strata fixed effects (following [Bruhn and McKenzie \(2009\)](#)), $X_{i,0}^k$ are baseline controls chosen through a double post-lasso procedure ([Belloni et al., 2014](#)), and we will use Huber-White standard errors. Note that this ANCOVA specification controls for baseline values that are predictive of the outcome variable and can boost power ([McKenzie, 2012](#)) for outcomes like sales and profits which normally have high variance. Note that β_1 , and β_2 will give intention-to-treat (ITT) effects, which are the impacts of being offered our various treatments. To test for differential impacts of equity and debt on outcomes, we will report a Wald test of the null hypothesis that $\beta_1 = \beta_2$. While we collect 7 & 13-month follow-up surveys, our primary analysis will be using the 7-month outcomes. While we expect there may be longer-term impacts, they will likely be muted relative to impacts directly after the end of the 6-month borrowing period.

To estimate “contract effects” we will restrict the sample to only those who were willing to apply for both the equity and debt products. We will then use the same specification as outlined in equation 6.

To estimate “selection effects” we will restrict the sample to those who expressed interest in equity-only, and those who were allocated to the equity arm amongst the indifferent group. received the equity contract. use the following specification:

$$Y_i = \beta_0 + \beta_1 \text{EquityOnly}_i + \beta_2 \text{EquityIndif}_i + \beta_3 \text{ControlIndif}_i + \tau_c + \sum_{k=1}^K \alpha_k X_{i,0}^k + \epsilon_i \quad (5)$$

where τ_c is now a cohort fixed effect (since we are comparing across strata). This provides us the treatment effect for the equity-only group in β_1 and the treatment effect for equity-indifferent in $\beta_2 - \beta_3$. Then our primary test will be checking if $\beta_1 = (\beta_2 - \beta_3)$.

We expect the bank to be able to provide the product to 100% of those assigned to a treatment, and we will implement an additional level of screening before randomization to ensure people are serious about borrowing, so we expect high compliance and that the ITT should be similar to the TOT for these treatments. To formally estimate the TOT in the presence of some noncompliance, we will instrument for take-up of the product with the randomized offer of the product. The exclusion restriction here will be that the offer of product by itself does not change client outcomes, which appears plausible in this setting.

We are also interested in how the different contracts may lead to borrowers taking on more risk, which could manifest itself in the data as an increase in the variance of outcomes in the different treatment arms. We will explore these differences using a test of equality of variance across the arms, as well as through distributional analysis including quantile regressions.

Hypothesis 3: Outcomes will differ across the monitoring groups.

Our main interest is in estimating the differential impact of monitoring on equity relative to debt. To do that we will utilize the following specification:

$$Y_i = \beta_0 + \beta_1 \text{Equity}_i + \beta_2 \text{Debt}_i + \beta_3 \text{Equity}_i * \text{Monitoring}_i + \beta_4 \text{Debt}_i * \text{Monitoring}_i + \tau_j + \sum_{k=1}^K \alpha_k X_{i,0}^k + \epsilon_i \quad (6)$$

Where Y_i is the outcome of interest, and “Equity” is a binary for if they were allocated to the equity group, “Debt” is a binary for if they were allocated to the debt group, “Monitoring” is a binary for if they were allocated to a monitoring group, and then the following two variables are interactions of Equity & Monitoring, and Debt & Monitoring. We will again use the double post-lasso procedure to choose controls and improve power. We will be especially interested in testing whether $\beta_3 = \beta_4$, i.e. if the impact of monitoring is the same across debt and equity.

A. *Procedures for dealing with attrition, missing values, and outliers*

We expect limited non-response in the baseline data, and any missing baseline data will be dummied out when being used for controls in later analysis. That is, we will create dummy variables for having missing baseline data, and then replace the missing value with 0, including both variables in the control variable set.

We deal with attrition in follow up surveys in a few ways. First, as mentioned above we will collect detailed data on how to contact people and on others who can help us find them if we can’t reach them. Second, we will test for non-random attrition using data from baseline, by comparing the characteristics of those that we were able to find and those we were not able to find differentially by treatment and control. We will also generate Lee bounds to show the potential impacts of attrition on our results.

For outliers, we will winsorize our outcome variables at the 99th percentile.

B. *Multiple Outcomes and Multiple Hypothesis Testing*

To limit the downsides associated with multiple hypothesis testing, we will utilize two main approaches. The first is to identify a limited set of primary hypotheses, as we do above, limiting our primary outcomes to (1) *Total Income*, (2) *Total Livestock Revenue*, (3) *Product-Specific Livestock Revenue* as well as (4) *Days Delinquent*. We will also report the components of the product-specific livestock revenue (price and weight) and a set of primary mechanism measures: (a) livestock grazing hours, (b) total spending on feed, (c) high-quality feed type, (d) fraction of animals that are goats. Second, we will generate sharpened q-values (Anderson, 2008) to adjust the p-values associated with the families of secondary outcomes we are testing which will be useful for examining treatment heterogeneity that we outline below.

Families of secondary outcomes:

1. Veterinarian Observed Measures - 3 measures: (a) animal health, (b) borrower neglect, (c) feed quality.
2. Hypothetical Project Scope - 3 measures: (a) intended proportion of goats vs. sheep; (b) maximum financing requested; (c) proportion of goats vs. sheep conditional on receiving maximum financing requested.
3. Product Revealed Preference - 7 measures that discuss how they were satisfied by the product they received, which product they preferred, if they would take each product if they had the opportunity to do so now, and if so how much they would want in financing.
4. Subjective Well-Being - 4 measures: reported values of stress, anxiety, financial worry, and general worry.
5. Outside Financing - 4 measures: total value of outside financing from MFIs, banks, friends & family, and informal sources.

C. Heterogeneous Treatment Effects

We collect a variety of demographic, behavioral, and farmer background information in the baseline survey, which we intend to utilize to examine treatment effect heterogeneity. While we have informed predictions on which groups may show higher demand for equity over debt (e.g., Muslim, risk averse, and debt averse clients), we have limited guidance on which characteristics will predict borrower's outcomes. Therefore we will use the generic machine learning strategy for predicting heterogeneous treatment effects developed by [Chernozhukov et al. \(2020\)](#) using the full set of baseline survey questions.

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Appendix Table 1: Recruitment Prompt & Preference Elicitation Questions

#	Topic	Survey Question Text
1	Initial Survey Recruitment Consent	<p>Good morning. My name is [Enumerator Name] and we are conducting a research study in collaboration with Assiut Business Women Association. First, we would like to check if this is relevant for you, so we will ask you three questions:</p> <ol style="list-style-type: none"> 1. Do you have any livestock or experience raising livestock? [Yes/No] 2. Would you be interested in hearing about an opportunity that would allow you to expand your flock? [Yes/No] 3. Are you the financial decisionmaker in the household? [Yes/No] <p><i>If NO to (1) or (2) → “Based on your answers, this survey is not relevant for you. We thank you for your time.”</i></p> <p><i>If NO to (3) → “Who is the financial decision maker? [Options]. “When will they return?” “May we return at that time to survey them?”</i></p> <p><i>If YES → End survey with, “Thank you, we will return later to survey the financial decision maker.”</i></p> <p><i>If NO → End survey with, “Based on your answers, this survey is not relevant for you. We thank you for your time.”</i></p> <p>We would like to tell you about two new financial products: equity and an agricultural loan that you may find valuable. If you agree to participate in the research we will fill a survey with you and you will be eligible for financing provided by the Assiut Business Women Association. During the survey, I will talk with you more on the details and types of this financing.</p> <p>Through this research we will:</p> <ul style="list-style-type: none"> • Ask you some questions about yourself and your preferences for different choices of financing to raise the number of goats and sheep you have • Ask you some questions about your work and family. <p>Duration of the survey: The survey that will be conducted now will take about 30 minutes from your time.</p> <p>It is important to know that:</p> <ul style="list-style-type: none"> • Your participation in this study is voluntary and if you feel uncomfortable at any point we could stop the interview at any time. You have the right to reply or refuse to reply to any question, but it is important for you to know that your answers will not have any effect on your chances of obtaining funding or on your relationship with the Association. • Your consent to participate in the study will not guarantee that you will receive one of the types of funding • All the information you will tell us will be strictly confidential and will not be shared with anyone and will only be used for research purposes <p>We will also want to reach out to you again twice: once after 7 months and another time after 13 months. Do you agree to participate in the study? [Yes/No] <i>If NO →, “Why don’t you agree to participate?” [Open Text Response]</i></p> <p><i>[Enumerator Note] If answer includes any mention of religion then → “We will explain the products in more detail later in the survey if you continue, but you should know that in addition to standard loans, the Bank is also offering Sharia-compliant equity contracts in which the borrower shares in the profits and losses with the Bank instead of paying a fixed interest rate. With this new information, I want to check again, do you agree to participate in the study?” [Yes/No]</i></p>

Appendix Table 1: Recruitment Prompt & Preference Elicitation Questions (Cont'd)

#	Topic	Survey Question Text
2	Recruitment Prompt	<p>The Association is offering two possible products to customers who would like to expand their goat or sheep farming business. Both products provide financing up to 10,000 EGP, to be used to buy young sheep or goats to be raised by the client and sold through a supervised sale or to a trusted partner of the Association.</p> <p><i>(NOTE: A video summarizes the following information:)</i></p> <ul style="list-style-type: none"> • One product is qard (loan). Through this product, Assiut Business Women Association gives you financing up to 10,000 EGP to be used to buy sheep/goats for fattening. You will be responsible for their upkeep, their feeding, and their vaccinations. You will keep the entirety of the profits, but will repay the principal plus a 13.5 interest rate to the Association. • One product is musharaka (equity). Through this product, Assiut Business Women Association gives you financing up to 10,000 EGP to be used to buy sheep/goats for fattening. You will be responsible for their upkeep, their feeding, and their vaccinations. After 6 months of fattening the goats, you will sell them all. This selling price will be used to repay the principal to the Association. The profit will be split into thirds. You will keep two-thirds, and the remaining third will go to the Assiut Business women Association. <p>These two products are offered by Assiut Business Women Association as part of a scientific study conducted by researchers to learn about the impact of these products on clients. If you would like to receive any of these products, then you will have to accept to participate in this study.</p>
3	Study (Second) Consent Prompt	<p>How will we do this?</p> <p>After agreeing to participate in the study, we will begin by asking you which product you want. You can either say you only want the qard, you only want musharaka, or you can say you want both if you are indifferent (Mesh Fareq Ma3aya).</p> <p>If you say you only want qard, you have approximately a 1/3 chance of receiving qard.</p> <p>If you say you only want musharaka, you have approximately a 1/3 chance of receiving the musharaka.</p> <p>If you say you are indifferent, you'll have approximately a 2/3 chance of receiving a product (equal chance of musharaka or qard) and approximately a 1/3 chance of not receiving a product, however, you won't be able to change which product you are assigned.</p> <p>When you agree to join us in this study, you will give us your choice out of the three options, and there will be a contract between you and the Association with all the agreed-upon details. You will commit to the product that you will be assigned. This means that if you say you want the two products and you get the musharaka, then you can't say "no, I only wanted the qard product," or vice-versa. You will also be committed to meet us again in 7 months to conduct another survey and another time in 18 months even if you didn't receive any product. This is because the study requires that some participants receive the first type and some receive the second type and others won't receive anything.</p>

Appendix Table 1: Recruitment Prompt & Preference Elicitation Questions (Cont'd)

#	Topic	Survey Question Text
4	Loan Preference Elicitation	The Association is offering 10k EGP worth of sheep or goats to purchase. You would need to repay principal plus 13.5 interest rate in 6 months. Would you take this offer?
5	Equity Preference Elicitation	The Association is offering 10k EGP worth of sheep or goat to purchase. You will repay the principal using the sale price and the profit will be divided into 3, two thirds for you and one third for the Association payable in 6 months. Would you take this offer?

Appendix Table 2: Survey Questions: Secondary Questions

#	Topic	Survey Question Text
1	Beliefs about (Input) Market Prices	<ol style="list-style-type: none"> 1. How many goats do you think the market price will get you with 10,000 EGP? 2. How many sheep do you think the market price will get you with 10,000 EGP
2	Livestock Split Choice (by product); non-binding and will be compared to actual choices in contract	<ol style="list-style-type: none"> 1. If you got the funds using musharaka, what amount would you spend on goats? 2. If you got the funds using musharaka, what amount would you spend on sheep? 3. If you got the funds using qard, what amount would you spend on goats? 4. If you got the funds using qard, what amount would you spend on sheep? <p>[Similar questions also asked for hypothetical project scope amounts below]</p>
3	Prior History with Loans & Equity	<ol style="list-style-type: none"> 1. Have you ever applied for a loan? 2. Have you shared in raising livestock with anyone before, in which someone provided financing and you shared in the reaped profits or losses? <p><i>If "Yes" to 2 then → The last time you participated in musharaka, who provided the financing?</i></p>
4	(Hypothetical) Preference between the two products	<p><i>if the individual says "yes" or "no" to both products, then →</i></p> <p>Which financing opportunity do you prefer?</p> <p><i>if the individual selects "indifferent", then →</i></p> <p>Imagine that you need to choose one of them, which one would you choose?</p>

Appendix Table 2: Survey Questions: Secondary Questions (Cont'd)

#	Topic	Survey Question Text
7	(Hypothetical) Project Scope (Equity)	<p>Imagine you were offered musharaka only and instead of the agreed-upon 10k EGP, you could request a higher amount in the form of goats or sheep. You would repay the principal plus 1/3 of the profit. How much money would you request?</p> <p>[... followed by Livestock Split Choice questions for this hypothetical amount]</p>
8	(Hypothetical) Project Scope (Debt)	<p>Imagine you were offered musharaka only and instead of the agreed-upon 10k EGP, you could request a higher amount in the form of goats or sheep. You would repay the principal plus + 13.5% interest. How much money would you request?</p> <p>[... followed by Livestock Split Choice questions for this hypothetical amount]</p>

Appendix Table 3: Survey Questions: Behavioral Preferences

#	Topic	Survey Question Text
1	GPS Qualitative Questions Prompt	Now I will ask you about your willingness to act in a specific way.
2	Qualitative Risk Preference (GPS WP13417)	Please tell me, in general, how willing or unwilling you are to take risks, using a scale from 0 to 10, where 0 means you are “completely unwilling to take risks” and 10 means you are “very willing to take risks.” You can also use any number between 0 and 10 to indicate where you fall on the scale, using 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10.
3	Qualitative Time Preference (GPS WP13418R)	How willing are you to give up something that is beneficial for you today in order to benefit more from that in the future?
4	Quantitative Risk Preference (GPS WP13427R to WP1358R)	<p>Please imagine the following situation: You can choose between a sure payment of a particular amount of money, OR a draw, where you would have an equal chance of getting 150 EGP or getting nothing. We will present to you five different situations.</p> <p>[...]</p> <p>What would you prefer: A draw with a 50-percent chance of receiving 150 EGP and the same 50-percent chance of receiving nothing, OR the amount of (80 EGP) as a sure payment?</p> <p>[...]</p> <p>Would you prefer the 50/50 chance or the amount of (40 EGP) as a sure payment?</p> <p>[...]</p> <p><i>[Full staircase has 32 possible values, see GPS Appendix]</i></p>
5	Positive Reciprocity (GPS WP13458R)	<p>Please think about what you would do in the following situation. You are in an area you are not familiar with, and you realize that you lost your way. You ask a stranger for directions. The stranger offers to take you to your destination.</p> <p>Helping you costs the stranger about 4 EGP in total. However, the stranger says he or she does not want any money from you. You have six presents with you. The cheapest present costs 1 EGP, the most expensive one costs 6 EGP. Do you give one of the presents to the stranger as a “thank you” gift?</p> <p><i>[If “yes”, then →]</i></p> <p>Which present do you give to the stranger? [1 EGP to 6 EGP options]</p>

Appendix Table 3: Survey Questions: Behavioral Preferences (Cont'd)

#	Topic	Survey Question Text
6	Behavioral Questions Prompt (read by enumerator)	How well does each of the following statements describe you as a person? Please indicate your answer on a scale from 0 to 10. A 0 means “does not describe me at all,” and a 10 means “describes me perfectly.” You can use any number between 0 and 10 to indicate where you fall on the scale, using 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10.
7	Debt Stigma	It is embarrassing if someone else knows I have loans from a bank.
8	Debt Aversion	If I need money, I try to avoid taking a loan, even if I know I can pay it back.
9	Positive Reciprocity (GPS WP13422R)	When someone does me a favor, I am willing to return it.
10	Trust (GPS WP13424R)	I assume that people only have the best intentions
11	Stress	Please indicate the degree to which you feel this emotion right now, where 0 means “not at all” and 100 means “very much”: In the present moment, I feel stressed
12	Financial Worry	How worried are you about your finances? (Options are 0: Not Worried, 1: Little Worried, 2: Quite Worried, 3: Very Worried)
13	GAD-2 (Anxiety) Prompt (read by enumerator)	Over the last 6 months, how often have you been bothered by the following problems (Options are 0: Not at all, 1: Several days, 2: More than half the days, 3: Nearly every day)
14	Anxiety 1	Feeling anxious, nervous, or on edge
15	Anxiety 2	Not being able to stop or control worrying

IV. Administrative Information

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