Loan Contract Structure and Adverse Selection: Survey Evidence from Uganda[*]

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January 2020

Abstract

While adverse selection is an important theoretical explanation for credit rationing it is difficult to quantify empirically. Many studies measure the elasticity of credit demand of existing or previous borrowers as opposed to the population at large; other studies use cross-sectional approaches that may confound borrower risk with other factors. We circumvent both issues by surveying a representative sample of microenterprises in urban Uganda and by measuring their responses to multiple hypothetical contract offers, varying in interest rates and collateral requirements. The two seminal theories on selection provide contradicting predictions following a change in the contractual terms. Under adverse selection, a lower interest rate or a lower collateral obligation should increase take up among less risky borrowers. By contrast, advantageous selection implies that take up should increase among the riskier borrowers. We test these two predictions by examining if firm owners respond to changes in the interest rate or the collateral requirement and whether higher take up varies by firms' risk type. We find support for the presence of adverse selection as contracts with lower interest rates or lower collateral obligations increase hypothetical demand – especially for less risky firms. Our results imply that changes to the standard loan product available to microenterprises may have substantial effects on credit demand.

JEL classification: D22, G21, O12
Keywords: Adverse selection, Interest rates, Collateral, SMEs.

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1   Introduction

Access to credit is widely recognized as an important engine of firm growth. So is the fact that small and medium enterprises (SMEs) are credit constrained, especially in developing countries (De Mel et al, 2008; Banerjee and Duflo 2014). One of the most commonly cited explanations for the existence of credit rationing is adverse selection (Stiglitz and Weiss, 1981). It implies that changes to the contract terms affect the composition of borrowers. Specifically, a fall in the interest rate or in the collateral requirement should induce less risky borrowers to enter the market (Stiglitz and Weiss, 1981; Wette, 1983). These theoretical predictions have important policy implications. In particular, they imply that lower interest rates or relaxed collateral requirements not only increase demand for credit, they could also change the type of borrowers choosing to borrow. To test for such effects, one needs variation in the contract terms as well as a representative sample of potential borrowers to quantify which individuals switch into (or out of) borrowing as a result of changed contract terms. Most empirical work on credit markets studies borrowers who have accepted the prevailing contract terms, and therefore cannot assess selection effects for the average person; the few existing studies of selection in credit markets focus on consumer or agricultural loans among households. We are left with little evidence on selection effects for business loans among firms.

In this paper, we present evidence on how changes in key dimensions of credit contracts may affect the types of firms who choose to take a loan. Using original survey data on a representative sample of microenterprises, we study how adjustments in the interest rate and the collateral requirement of loan contracts affect their reported willingness to borrow. Theoretically, a fall in the interest rate may attract less (Stiglitz and Weiss, 1981) or more risky borrowers (De Meza and Webb, 1987), depending on the assumptions made about the project returns.[1] Meanwhile, a lower collateral requirement may attract less risky borrowers (Wette, 1983). In our empirical analysis, we test these predictions. In particular, we examine if microentrepreneurs' risk characteristics and attitudes are associated with a change in their expressed interest for loans when the interest rate is lowered or when the collateral requirement is made less stringent, to see which of the two sets of models best describe selection into borrowing in our setting.

Our data was collected in selected neighborhoods of the greater Kampala area in Uganda. Prior to the survey, we conducted a census of microenterprises operating in light manufacturing

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[1]In Stiglitz and Weiss (1981), all projects are assumed to have the same expected return but differ in their dispersion, while projects have different expected returns in De Meza and Webb (1987).

and retail.[2] We used the census listing to draw a representative sample of 925 microenterprises to participate in the more detailed survey. The survey included information about business activities along with measures of business owners' risk aversion and the riskiness of the firms' business environment. Moreover, respondents were presented a number of loan contracts that varied the interest rate and the collateral level. We use responses to these questions to elicit microentrepreneurs' willingness to borrow under different contractual terms. Specifically, we test whether the business-owners' intention to borrow under the different contracts varies with the riskiness of the business (measured either by the entrepreneur's risk aversion or the riskiness of the business environment).

These tests can be carried out with a standard cross-sectional approach in which loan take up is predicted with risk. But given that firms respond to multiple contract offers, we are also able to use an approach that identifies selection effects from within-firm variation. That is, we include firm fixed effects to absorb level effects of firm characteristics and study design on loan take up, and focus on how *changes* in firm take up – in response to improved contract offers – are related to firm risk. We also restrict the sample by dropping firms that show no interest in borrowing under any offered terms; these may have no demand for external credit and thus not fit within the models' assumptions.[3] This sample restriction is also needed because the models deliver no clear risk ordering between firms that change take up in response to improved contracts and firms that do not. This is because firms that do not change take up come from both ends of the risk spectrum: those that accept all contracts and those that accept none. When firms that accept no contracts are eliminated, the ordering becomes clear in both models.

The baseline contract that our respondents were asked about entailed a 25% annual interest rate, full collateral (equal to the loan value), individual liability, and a one-year repayment period with equal monthly installments. These terms closely resemble the business loans available to small enterprises in Uganda at the time of our study.[4] We find that 14 percent of the firms

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[2]In particular, the manufacturing businesses in the census were operating in welding, carpentry or motor-repair while the retail businesses consisted of grocery shops, hardware shops, and food/beverage wholesalers. According to the 2010/2011 Business Registry, welding and carpentry are 2 of the 3 single largest groups in Uganda's manufacturing sector, together accounting for 30% of the sector. Similarly, motor repair and the retail sectors we focus on are also among the most prevalent in the country, with wholesale of food and beverages being the single largest retail sector (Uganda Bureau of Statistics, 2011).

[3]We explain and motivate this sample restriction in a more detailed way in Section 2.

[4]In our sample, the median interest rate on loans taken by enterprises was 25% and 80% of these loans required collateral. According to the World Bank Enterprise Survey 2013, the average interest rate on loans taken by a representative sample of Ugandan enterprises was 22%, 87% of the loans required some collateral and the average value of the collateral needed for a loan was 162% of the loan value. Available from:

in our sample express an interest to take up a loan at these terms. This figure is similar to the actual borrowing experience of our respondents.[5]

In line with the theory, we find that the hypothetical loan take up is sensitive to changes in the contract. If the interest rate is lowered by 5 percentage points to 20%, one fourth of the firm owners say they would like to borrow. Also, if the collateral requirement is reduced by half (relative to the baseline contract), 28 percent of the firm owners express an interest in borrowing. More importantly, the *propensity* to switch to borrowing depends on the individual risk aversion of the firm owner and the volatility in demand ("riskiness") of her business environment. Firms that face a less risky business environment or firm-owners with a high risk aversion are more likely to start borrowing following a change in the interest rate. Similarly, reducing the collateral requirement from 100% to 50% of the loan value induces less risky firm owners to want to borrow. These results are robust to controlling for the firm owners' wealth level (an important correlate of risk aversion). Our findings are consistent with and lend support to Stiglitz and Weiss' (1981) model, in which asymmetric information leads to inefficient underprovision of credit, and counter to the predictions of De Meza and Webb (1987).

The paper contributes to several strands in the literature. First, it validates central results in contract theory that explain the prevalence of credit rationing (Stiglitz and Weiss, 1981; Wette, 1983). Empirically testing these models is complicated since contract terms are endogenous, and the rigorous evidence available thus far is mainly focused on consumer or agricultural loans among households. Moreover, we typically only observe demand for credit for those who already selected to borrow, making it hard to study selection issues. Closest to our work are Ahlin and Townsend (2007) and Karlan and Zinman (2009). Ahlin and Townsend (2007) use cross-sectional survey data on borrowing patterns of a random sample of households in non-urban Thailand. They show that the likelihood of joint-liability borrowing increases the lower is the probability of project success, consistent with Stiglitz-Weiss adverse selection. Our estimation using within-firm variation arguably improves the identification of adverse selection in several ways, as discussed in Section 2. In their seminal paper, Karlan and Zinman (2009) study the effects of experimentally lowering the offered interest rate on the repayment rate of consumption loans among a sample of former borrowers of a micro-lender in South Africa. They randomly vary contractual interest rates in a second stage, allowing them to separate

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http://www.enterprisesurveys.org/data/exploreeconomies/2013/uganda#finance

[5]In our sample, 11% of respondents had taken a loan in the last 2 years. According to the World Bank Enterprise Survey 2013, 10% of enterprises in Uganda had taken a loan in the last year.

selection from incentive effects. While they find little evidence for adverse selection, their sample consists of known, repeat customers taking short-term consumption loans, so it is not clear how applicable their findings are to a random sample of firms. Our use of hypothetical contracts provides us a different way to distinguish selection effects from incentive effects, and our results suggest that adverse selection is a more significant issue among firms in Uganda. Overall, our findings add solid evidence of adverse selection of the Stiglitz-Weiss variety, among a random sample of microenterprises (rather than households).[6,7]

Work by Karlan and Zinman (2008) and Dehejia et al. (2012) is also related. They estimate demand elasticities for consumption loans with respect to interest rates in South Africa and Bangladesh, respectively. The former find small elasticities for interest rate reductions, while both find substantial elasticities for interest rate hikes. Karlan and Zinman (2008) show that default increases in the interest rates, which tempers but does not eliminate positive effects on profits; but they do not attempt to distinguish between adverse selection, moral hazard, or the repayment burden as the cause of the rising default. Our work is similar in examining the effects of lowering interest rates (and collateral requirements) on demand for credit, and it bolsters the finding that revenue losses from lower interest rates can be offset by higher loan quality, at least partially. Since we offer hypothetical contracts, we are not able to go as far as this work in quantifying effects on profits, but we do push further in isolating selection effects.

We also add to a growing literature on firms' access to credit in developing countries. Recent studies provide the first randomized evaluation of the microfinance initiative, finding little evidence of the transformative effects often heralded by the proponents of microfinance (Attanasio et al., 2015; Angelucci et al., 2015; Augsburg et al., 2015; Banerjee et al. 2015; Crépon et al., 2015; Tarozzi et al., 2015). Unlike the present paper, these evaluations do not study selection effects but instead focus on the impact of a given (standard) contract, finding rather low take-up rates. One way to improve take up may be to reduce interest rates (Karlan and Zinman, 2008).

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[6]In a different context (ROSCAs) but also related is work by Klonner and Rai (2009). They exploit a policy experiment that imposed an interest rate ceiling (and later removed it) for ROSCAs in India and show that the resulting change in default patterns is consistent with adverse selection.

[7]Other studies have analyzed the selection effects of different features of micro loans. Demont (2016) highlights the selection effects of the entry of MFI(s) and how this may affect the interest rate in the informal credit market (i.e. moneylenders' rate) in equilibrium, while we consider the partial equilibrium effects of a change in the interest rate offered by a particular (formal) lender. Maitra et al. (2017) compare two alternative ways of targeting micro loans to farmers: agent-intermediated targeting vs group-based lending. Their results suggest that the traditional microfinance model with joint liability may be ineffective in selecting productive borrowers. Jack et al. (2016) study the effect of introducing asset-collateralized loans, as an alternative to loans that required cash deposits and/or guarantors.

Also, even though standard microcredit loans do not require collateral, many microfinance institutions offer SME loans that are larger in size and involve collateral.[8] However, evidence on how changes to the microcredit contract(s) may affect the pool of borrowers is limited. Our findings contribute to the literature by showing that reasonable improvements in loan contract terms offered to microenterprises are likely to increase both the quantity and quality (in terms of risk) of firms that choose to borrow. Furthermore, we find that the effects are strong for businesses in both the manufacturing and the retail sector, while the recent studies of credit use and returns to capital in microenterprises (such as Banerjee and Duflo 2014; De Mel et al, 2008; De Mel et al, 2009; Field et al., 2013) has mainly studied the retail sector.

Taken together, the results inform empirical work examining barriers to credit faced by the poor (Banerjee and Duflo, 2005). While our findings are consistent with theory, we view them as suggestive, given their reliance on hypothetical take up. However, this also creates advantages to our approach: we have firm responses to multiple contract offers, which allows us to estimate effects using within-firm variation and restrict attention to firms that have some stated interest in borrowing; and, we are able to rule out incentive effects since the contracts are never implemented. Given the limited empirical literature on selection into borrowing, we feel our work contributes usefully toward characterizing the selection effects of reduced interest rates and collateral requirements within a general population of microenterprises.

The next section outlines the theoretical hypotheses that we will test in the empirical analysis and explains how we use our survey to disentangle the different predictions. Section 3 describes the survey methodology and the data we collected. Section 4 presents the empirical specifications and the results. Section 5 concludes.

2 Conceptual Framework

We envision a lender offering standardized contracts to all applicants, and analyze selection issues: who chooses to borrow, and under what conditions? As the typical loan product offered by most microlenders is quite rigid (Dehejia et al., 2012), we focus on borrower selection into

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[8]For example, as part of its "Small Enterprise Lending Program" BRAC offers such a contract to microenterprises in Uganda and elsewhere (Battaglia et al., 2019), and other lenders offer loans with similar conditions. Similarly, at the time of our study, one of the biggest microfinance institutions in Uganda, PRIDE Microfinance, offered loans with 26% annual interest rate and full collateral (Fiala, 2014). According to a recent report by the Government of Uganda, large MFIs report that around 10-15% of their loans are backed by traditional collateral (Bank of Uganda, 2017).

stand-alone contracts varying in the interest rate and the collateral requirement, rather than selection from a menu of contracts meant to screen borrowers[9] or selection from a set of contracts tailored to a borrower's observables.[10] Moreover, we only relate to theoretical work analyzing ex-ante asymmetric information as our data bars us from assessing other types of frictions.[11]

In their seminal contributions, Stiglitz and Weiss (1981, "SW") and De Meza and Webb (1987, "DW") show how credit rationing and credit market inefficiency can result as equilibrium phenomena based on selection driven by the asymmetry of information between borrowers and lenders. In SW, agents have projects with the same expected return but different dispersion, and selection can lead to under-provision of credit. In DW, agents have projects with different expected returns, and selection may induce over-provision of credit. The effects of expanding credit through improved lending conditions are thus quite different in the two models. In SW, a credit expansion attracts safer firms with efficient projects (that perfect credit markets would fund), while in DW, it attracts riskier firms with potentially inefficient projects (that perfect credit markets would leave unfunded). Understanding which model, if either, fits a given credit market is a helpful step toward understanding potential effects of credit expansion.

A fundamental difference between the two models is that SW predicts the borrowing pool will consist of disproportionately risky agents, while DW predicts that it will contain disproportionately safe agents. Specifically, given a contract on offer, in SW there is a cutoff risk-type such that only firms *riskier* than the cutoff choose to borrow; that is, borrowing firms are relatively risky. See Figure 1, left panel, which features two cutoffs, $\hat{r}$ and $\hat{r}'$, corresponding to two rank-ordered contracts. By contrast, only firms *safer* than the cutoff risk-type choose to borrow in DW; that is, borrowing firms are relatively safe. See Figure 1, right panel. This suggests a simple test to distinguish the models: is risk a positive or negative predictor of borrowing? Ahlin and Townsend (2007, "AT07") follow this strategy in a cross-section of Thai households

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[9]More generally, if microfinance institutions are allowed to offer a menu of interest rates and collateral simultaneously, Bester (1985) shows that an equilibrium in which no credit rationing prevails is possible (see also Chan and Kanatas, 1985; Besanko and Thakor, 1987; Bester, 1987). In addition to the fact that these types of contract menus are unrealistic in our setting, credit rationing is a stylized fact in the markets under study.

[10]The theory we focus on (see below) focuses on asymmetric information, but does allow that some borrower characteristics may be observable and thus priced for in the contract (as in Karlan and Zinman, 2009). Our empirical setup, however, does not make use of any observable information in setting the offers made to borrowers; and lenders in our context typically offer standardized rates to all comers.

[11]That is, we do not consider work that relates e.g. the variability of collateral to risk-shifting, reduced effort, and ex-post moral hazard concerns (e.g. Holmstrom and Tirole, 1997), to limited contract enforceability (e.g. Banerjee and Newman, 1993), or to monitoring problems as in the costly state verification framework (e.g. Townsend, 1979). We are, however, confident that our results are not driven by ex ante or ex post moral hazard, as discussed below.

and find support for SW: higher risk predicts greater likelihood of borrowing.

However, this straightforward approach ignores the following complication in taking these models to data. The models assume a population of agents, all of which have a project requiring capital that must be financed externally. This assumption is likely violated in typical datasets of households or firms. Some firms (or households) may currently have no projects needing funding; others may have projects that they can finance internally, and would prefer to do so even absent asymmetric information. This set of agents, the "uninterested", can be approximated as having no demand for external credit. The uninterested thus lie outside both the SW and DW models, which apply only to the complementary set of "potential borrowers". Thus, the simple approach that compares borrowers with non-borrowers in a sample, as in AT07, may produce misleading results, because the set of non-borrowers includes *both* potential borrowers who opt out *and* the uninterested. The uninterested group may have any risk characteristics – the models make no prediction – and thus they may bias the risk comparison in any direction.

As an example, imagine the uninterested are largely in high-risk sectors with low capital requirements. Further, assume that the SW model accurately describes the potential borrowers: safer ones opt out, riskier ones opt in. If the uninterested are a sufficiently large and risky group, borrowers may be safer than non-borrowers, in line with DW but contrary to SW, as the high risk of the uninterested outweighs the low risk of the potential borrowers who opt out. But it would be wrong to conclude the SW model does not apply – it does apply to the pool of potential borrowers, which is what it aims to model and what is relevant for policy questions related to expanding the market by reasonably improving contract terms. A similar example could be presented for the DW model.

In econometric terms, a result based on comparing borrowers and non-borrowers can be biased due to an unobservable that is correlated with risk and predictive of borrowing: being "uninterested". The dataset of this paper enables us to tackle this issue in a unique way. In particular, we observe firm demand for credit under *multiple* contracts varying in contract terms: firms respond to three hypothetical contract offers, one with prevailing terms and two with terms that are improved in one of two dimensions.[12] This allows us to drop those from the sample who never opt to borrow under any contract and keep only those who borrow under at least some terms, thus purging the sample of the uninterested and eliminating any bias from this unobservable. While this sample restriction does reduce sample size, it enables us to ensure

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[12]More detail on the contracts is provided in Section 3.

7

that the sample only includes agents that fall within the purview of the SW and DW models.

What do SW and DW predict about those who opt in for at least one contract? See Figure 1, which graphs two risk cutoffs for each model, corresponding to a standard contract and an improved contract, $\hat{r}$ and $\hat{r}'$, respectively. In SW, when contract terms are improved, the risk cutoff drops: $\hat{r}' < \hat{r}$. See Figure 1, left panel. Thus, the agents who borrow only under the improved contract ("switchers") are safer – risk in $[\hat{r}', \hat{r})$ – than those who opt in for either contract – risk in $[\hat{r}, \bar{r}]$. In DW, the reverse is true: $\hat{r} < \hat{r}'$, so switchers are riskier – risk in $[\hat{r}, \hat{r}']$ – than those who opt in for either contract – risk in $[\underline{r}, \hat{r})$. See Figure 1, right panel. In short, the marginal borrowers, or switchers, are the safest of those who borrow under at least one contract in SW, and the riskiest in DW.

The above results hold whenever the borrowing pool is expanded through improved terms, whether through lower interest rates as in Stiglitz and Weiss (1981) and De Meza and Webb (1987), or through relaxed collateral requirements as in Wette (1983), who extends the results of Stiglitz and Weiss.[13] Thus, we have two opposite predictions that can be used to distinguish the two models, stated here along with a null hypothesis for completeness:

H_0: (Null) Among firm owners that choose to borrow under at least one contract, those that are less risky are *neither more nor less* likely to choose to borrow only under the more attractive contract (lower interest rate or lower collateral requirement).

H_1: (SW) Among firm owners that choose to borrow under at least one contract, those that are less risky are *more* likely to choose to borrow only under the more attractive contract.

H_2: (DW) Among firm owners that choose to borrow under at least one contract, those that are less risky are *less* likely to choose to borrow only under the more attractive contract.

Empirically, we can test these by dropping respondents that opt out of both contracts and using the risk of the firm to predict whether a firm borrows only under the better contract. The identifying assumption in this approach is that there are no unobservables correlated with risk and predictive of switching, i.e. borrowing only under the improved contract, among the

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[13]In Appendix 3, we summarize the uniting and distinguishing features of Stiglitz and Weiss (1981) and Wette (1983) that deliver the analogous results in terms of the interest rate and the collateral obligation.

population that borrow under at least one contract. We view this assumption as significantly more plausible than the assumption needed under the simple cross-sectional approach, that there are no unobservables correlated with risk and predictive of borrowing per se, in the overall population.

Critical to our approach is that firms respond to multiple hypothetical contracts. If only one contract were on offer, dropping never-borrowers would eliminate all variation in the borrowing choice. In addition, the offer of hypothetical contracts allows us to solve the identification issue related to moral hazard. The possibility of moral hazard leads to the concern of reverse causality: in short, is risk influencing the borrowing choice (selection), or is borrowing influencing risk-taking (moral hazard)? This is a concern tackled to some degree by AT07, and convincingly so by Karlan and Zinman (2009), who pioneered the use of multi-stage randomization to separate the interest rate relevant for selection from the interest rates relevant for risk-taking and repayment. Our use of hypothetical contracts solves this issue straightforwardly. Since the contracts are hypothetical, they are never enacted and thus do not affect risk-taking behavior or repayment. That is, the measured risk of the firm is unaffected by the terms of the contract, unlike in other non-experimental contexts, eliminating concerns that results reflect reverse causation.

3   Survey Methodology and Data

The census and survey data was collected in the first half of 2013 in the metropolitan area of Kampala, Uganda. Fieldwork was carried out in collaboration with the Research and Evaluation Unit of the NGO BRAC Uganda. The businesses surveyed are a random sample drawn from a larger pool of businesses whose contact details were collected in the census preceding the survey. In what follows, we provide details about the sampling strategy and the data collected.

3.1   Census and Sample Selection

The census was conducted in January and February 2013. Firms were chosen on the basis of their sector and geographic location. Sectors were selected to represent the main sectors in urban and semi-urban Uganda and can broadly be grouped into retail and manufacturing, with the former category including supermarkets, smaller food retail shops, food and bever-

age wholesale, and hardware shops. Manufacturing businesses consisted of carpentry, welding/metal works, and motor repair workshops (for cars and motorcycles). The enumerators were instructed to approach all firms in the selected sectors, with some restrictions on the size and type of business structure. The lower bound set on firm size depended on the sector. To be included in the census, manufacturing firms (including motor repair) were required to have at least 1 employee (formal or informal) in addition to the owner, while firms in retail were required to have a permanent business location and a well-stocked shop. The upper bound was set at 15 employees (formal or informal) regardless of the business sector. According to the Ugandan Business registry 2010-11, 98% of all businesses in the country had less than 10 employees and were thus classified as micro-, small-, or medium-sized businesses, and 87% of the workers in the private sector were working in a business with less than 50 employees (Uganda Bureau of Statistics, 2011).[14] As such, we study loan attitudes among owners of micro and small businesses in sectors that make up the bulk of the urban private sector in Uganda.[15]

1,353 businesses were listed in the firm census. Importantly, most of them had no previous loan experience. The enumerators approached the businesses with a script saying that they were part of a research project conducted by researchers based in universities in Europe, about business growth in "enterprises like yours" and "learning about the difficulties and opportunities for growth of firms in your sector", and that the data would be treated with anonymity. Since BRAC is well known as a microfinance institution, the name of "BRAC" was not mentioned to respondents in order not to prompt them to think about loans. This was important as most firm-owners are likely to be used to the standard loan contracts that prevail in the Ugandan

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[14] The official definition of micro, small, medium, and large businesses in Uganda is the following: micro businesses are those with an annual turnover of less than 5 million shillings irrespective of the number of employees, while small businesses are those with an annual turnover of between 5 and 10 million shillings, irrespective of the number of employees. Medium businesses, on the other hand, are those with an annual turnover of more than 10 million shillings, but employing less than 50 persons, while large businesses are those with an annual turnover of more than 10 million shillings and employing at least 50 persons (Uganda Bureau of Statistics, 2011). Using the 2013 World Bank PPP-adjusted exchange rate for Uganda (1,014 UGX/USD), 5,000,000 corresponds to 4,930 USD. Using the nominal exchange rate of April 1, 2013 (2,585 UGX/USD), 5,000,000 UGX corresponds to 1,934 USD. While definitions differ substantially across countries, an international standard definition has been created by the International Labor Organization. This definition states that a micro business is an enterprise with up to ten employees, while small enterprises are those that have 10-100 employees, and medium-sized enterprises have 100 to 250 employees (International Labor Organization, 2015). Most studies in the literature have adopted the 10 employee threshold in classifying firms as "microenterprises" (e.g. Hsieh and Olken, 2014), while others refer to those with 5 or fewer employees as such (e.g. Ayyagari et al., 2011).

[15] According to the 2010-11 Business Registry published by the Uganda Bureau of statistics, welding and carpentry are among the 3 single largest groups within manufacturing and together account for 30% of the manufacturing sector in the country. According to the same report, motor repair and the retail sectors we focus on are also among the most prevalent, with wholesale of food and beverages being the single largest retail sector (Uganda Bureau of Statistics, 2011).

context. As our objective is to study which firms would switch into borrowing under different contractual variations, it was important for us that to be able to interview firm owners who may be unwilling to borrow under the prevalent loan contracts terms. To do so, we wanted to ensure the enumerators are not perceived as loan officers or marketing professionals associated with a lender.

Using the census listing, a random sample of 1036 businesses was selected to participate in the main survey. The sample was stratified by business sector and female-owned businesses were over-sampled. The response rate was 89%, resulting in a final sample of 925 businesses on which the following analysis is conducted. The interviews were conducted with the firm owner, except in a handful cases where the owner was unavailable for the interview, the person making financial decision (i.e. the manager) was interviewed.

3.2   Data

The survey provides detailed information on firms' inputs, their owners' background characteristics, and demand for credit under different hypothetical loan contracts. A few sections of the survey require additional explanation, as they are central to our analysis. These are described in more detail below.

3.2.1   Measures of loan demand

To learn about selection into borrowing, and to investigate which firm characteristics are particularly relevant for loan demand, the survey included a module eliciting respondents' demand for different hypothetical loan contracts described to them. This section began by describing a generic contract with terms and amounts similar to the standard credit contracts offered by most lenders targeting small businesses in urban Uganda. After eliciting respondents' interest in this contract, the module presented them with different contracts that amended the contractual aspects. The benefit of this approach is significant. Firms respond to multiple contracts, and this enables us to exploit within-subject variation in the decision to borrow, for example by controlling for a firm-specific (and thus interaction-specific) fixed effect. Among other issues, this helps to address the concern that respondents may systematically over- or understate hypothetical demand compared to their true willingness to accept a given credit contract (see, for example, Neill et al., 1994). An alternative approach would have been to allow only firms who

11

selected into borrowing under the baseline contract to vary their loan demand as the contract terms changed. This would have restricted our scope to the study of intensive margin demand among self-selected borrowers. To enable us to study the extensive margin of take up, all 925 firms were offered both the standard and the perturbed contracts.

The contract descriptions were phrased to ensure that the loan contracts would be adequately explained to respondents with varying degrees of loan experience and financial literacy.[16] The benchmark, "standard" contract was described as follows:

"Imagine you were offered the opportunity to take a loan. If you decide to take this loan, you can borrow up to 8 million Shillings. You would need to repay this amount plus a 25% interest within one year. The repayments have to be done in equal monthly repayment installments over the year. [Here, the enumerator was urged to show an example to the respondent]. The lender requests security (collateral) in the form of land. That is, in order to borrow a certain amount, for example, 3 million,[17] you need to have formal property rights to land valued at 3 million and in case you fail to repay, the lender will claim the 3 million in terms of your land."

The contract terms described above resemble the typical loan contract available to microenterprises in Uganda. We show this using data on actual loan contracts from the 2013 Ugandan World Bank Enterprise Survey as well as information on previous loan use for firms in our dataset. Table 1 presents descriptive statistics on real-life loan contracts in Uganda, using the 2013 World Bank Enterprise Survey data. This is a nationally representative dataset of enterprises.[18] On average, 10% of the enterprises report having taken out a loan within the last 1 year.[19] The contractual details were recorded for the most recent loan taken by these enterprises. The average duration of these loans is 15 months, the interest rate is 22% per year and 87% of them require some collateral. While these figures give an idea about the situation for the average firm in Uganda, it is possible that for smaller enterprises the situation is different. To assess this, columns 2 and 3 of Table 1 present descriptive statistics by firm size. As a proxy for firm size, we use the number of employees of the firm and compare firms with number of

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[16]The phrasing of the contract description was based on extensive piloting to ensure that the wording was appropriate for the level of education and financial literacy in our sample. We are also grateful to loan officers working in BRAC's 'Small Enterprise Lending Program' (SEP) for assisting us with the descriptions of the loan contracts.

[17]Using the 2013 World Bank PPP-adjusted exchange rate for Uganda (1,014 UGX/USD), 3,000,000 corresponds to 2,960 USD. Using the nominal exchange rate of April 1, 2013 (2,585 UGX/USD), 3,000,000 UGX corresponds to 1,161 USD.

[18]We use sampling weights included in the dataset to achieve cross-sectional representativeness.

[19]98% of these loans were taken from formal sources (banks or other financial institutions). We exclude the handful of cases of informal loans in the data.

workers below the sample median (10) with those above. 97% of the small firms report that they had to show some collateral for the loan while the corresponding rate is 72% for larger firms.[20] For smaller firms, 85% of the time the value of collateral required was equal to or greater than the value of the loan and 75% of them were in terms of land. Moreover, the average interest rate on small firms' loans is significantly higher than the one for larger firms (23% vs.19% per year). Appendix Table A.1 shows that the pattern is similar for the microenterprises in our dataset.[21] To summarize, both sources of data suggest that the standard hypothetical contract we presented to the enterprises in our survey resembles the typical loan contract available to *small* firms in Uganda. Our findings are less likely to be relevant for larger firms who are more likely to have access to loans with lower collateral and lower interest rate requirements.

After the description of the benchmark contract, the respondents were asked to report whether they would like to borrow under such conditions and if so, how much they would borrow and what would be the main use. Thereafter, two other contracts with the following variations relative to the standard one above were described to the respondent:[22]

- Low interest-rate contract: the annual interest rate was lowered from 25% to 20%.

- Low collateral contract: the collateral requirement was lowered from 100% of the loan-size value to 50% of the value. The collateral was always required to be in the form of land.

The difference between the standard contract and each amended contract was made salient by using an example to show how the repayment structure and the size of each installment (size of the collateral) changed with the low interest rate contract (low collateral contract). After that, the respondent was asked if they would take a loan under the changed contract terms.

Our choice of using hypothetical questions to gauge firm owners' intention to borrow under different contracts was motivated by several factors. First, to understand selection effects in relation to changing credit contract terms, interviewing a representative sample of businesses - both borrowers and non-borrowers - was deemed necessary. Moreover, while extending credit

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[20]The difference is statistically significant and the normalized difference is greater than .25, the benchmark level according to Imbens and Woolridge (2009)

[21]In particular, 80% of the firms who borrowed in the last 2 years reported they had to show some collateral and 88% stated that the value of the collateral was equal to or greater than the value of their loan. The pattern is very similar if we restrict the loans to those from formal sources such as banks, MFIs, and cooperatives (only a handful of the loans in our data are taken from informal sources).

[22]The exact wording of the contract variations and the example used to describe them to the respondents are provided in Appendix 2.

13

to these businesses is a goal of many lenders (and, in particular, most microcredit organizations), doing so requires learning more about their loan demand. Using hypothetical questions is a first step in building this knowledge. Finally, observing firm borrowing behavior under multiple scenarios allows identification from within-firm variation.

Hypothetical questions are, however, associated with concerns about misreporting and bias (e.g. Neill et al., 1994). For example, some respondents may overestimate demand for certain goods while others provide estimates that are lower than their actual demand. Responses could also be affected by the timing and circumstances of the interview or by the interaction between the respondent and the interviewer. Most of these concerns regard individual- and interview occasion-specific unobservables that complicate the interpretation of the valuations. However, they are less problematic if the analysis focuses on within-subject variation, since the level of misreporting is correlated across responses from the same individual (List and Shogren, 2002).

3.2.2 Measures of riskiness

As described in Section 2, to test the predictions from theory, we would ideally like to have direct measures of the firm owners' projects' riskiness or their expected returns. Since we do not observe these outcomes, we use the volatility of the business environment and the firm owners' self-reported risk aversion as proxies.

Risk index: As we are interested in capturing the type of risk that may lead to default, we need a measure of the riskiness of the firm's business environment and activities. To capture this, we construct an index based on the responses to a list of statements about possible reasons why repaying loans may be challenging. During the survey, prior to the hypothetical loan-demand module, the respondents indicated to what extent they agree with different statements about why repaying loans may be difficult. The measures we obtain are thus directly related to the business practices and the environment of the enterprise. In particular, the respondents were asked if they agree (on a 4-point scale between strongly agree and strongly disagree) with the following statements: (1) "It is difficult to make loan repayments on time due to sale fluctuations"; and (2) "It is difficult to make loan repayments on time because it is hard to predict when sales will be good or bad." We define a dummy for "low risk environment" as an indicator variable equal to 1 if the risk index value of the firm is below the sample median of the responses to these two questions and 0 otherwise. Assuming that firm owners in less risky

14

environments have safer projects that they want to fund, this is our second proxy measure for their projects' riskiness.[23]

Risk aversion: In addition to the riskiness of the firm's business environment, we also want to capture the firm owner's risk aversion. As our measure of risk aversion, we use a survey question where the respondent was asked to make a judgement of their own willingness to take risks. More specifically, we ask them to place themselves on a $0 - 10$ scale between "Not at all willing to take risks" and "Very willing to take risks". The measure has been experimentally validated by Falk et al. (2016) and shown to be predictive of financial risk in work by Dohmen et al. (2011). Unlike other commonly used methods of eliciting risk preferences, it involves no computations and should therefore be appropriate for our sample of less-educated respondents. In the empirical analysis, we rescale the measure to make it increasing in the respondent's risk aversion. Specifically, we define "risk averse" as a dummy variable taking the value 1 if the respondent is at or above the sample median on this self-reported risk taking scale and 0 otherwise. We use this as our first proxy for the firm owners' projects' riskiness, with the underlying assumption being that more risk averse firm owners are less likely to invest in risky projects.[24]

As the purpose is to understand hypothetical loan take up and, specifically, test theories about selection into borrowing, without observing actual loan behavior, we were especially interested in capturing the type of risk that may lead to default. Risk aversion, as measured by e.g. Holt and Laury (2002) or the self-reported willingness to take risk is likely correlated both with desirable, entrepreneurial risk and with undesirable default risk. The risk index, however, focuses on features of the business environment that are likely to increase default risk.

A potential concern with the risk index is that it captures not only risk-related reasons but a general unwillingness to borrow or that it is correlated with the confidence of the respondent [some owners may be more (less) inclined to say that they agree (disagree) with both statements because they find all aspects of repayment equally challenging]. To address this issue, we also construct a *risk placebo index* based on responses to three other statements about difficulties with repaying loans; constraints that are not associated with sale fluctuations or uncertainty. As

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[23]The risk index measure focuses on uncertain income streams, which would directly impact the repayment probability. But there could be other dimensions of risk that this measure is not able to capture, such as variation in costs. Reassuringly, our results for the risk index measure go in the same direction as the results for our risk aversion measure.

[24]The distribution of this variable can be seen in Appendix Figure A 1.

before, we look at differences across the sample median.[25] If the effects we identify using the risk index are absent when it is replaced by the placebo, this suggests that the risk index truly captures something related to the riskiness of the firm's business environment rather than other repayment-related difficulties.

3.3 Summary Statistics and data validation

Table 2 presents descriptive statistics on a number of important variables for the firms in our sample.[26] The first row of the table shows that 31% of the firms are in the manufacturing sector while the remaining ones are in retail. The average firm was established 7 years ago and employs 2.8 workers, including the owner, and the average reported asset value corresponds to about 2.2 Million UGX. This is in line with our sampling strategy that specifically targeted microenterprises. Among business owners, the average level of education is 11.5 years, which in Uganda would correspond to having finished secondary school (O-level). Around 20% of firm owners report having ever taken a loan, and only 11% have taken a loan in the past 2 years.

Compared to microenterprises that are typically studied in the literature on microfinance, a few differences in our sample of firms are noteworthy. While the average firm in our sample is small enough to be classified as a *microenterprise*,[27] the businesses in our sample are larger on average than the typical household business studied in the microfinance literature. In addition, the business owners in our sample are less used to borrowing than those observed in such studies. This reflects our sampling strategy that aimed to collect information on a representative sample of firms operating in our context, whereas most studies in the literature sample firms conditional on being a microfinance client (Karlan and Valdivia, 2011; Field et al., 2013; Valdivia, 2013; Berge et al., 2014), or expressing interest in a loan and/or business training program (Fiala, 2014).[28] Also, in line with the sampling strategy (which was designed to sample

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[25]Specifically, the placebo statements we use are: (1) "It is difficult to get a loan because it is hard to know where to get the best terms"; (2) "It is difficult to get large enough loans to make good business investments"; and (3) "It is difficult to make loan repayments on time because it takes a while to know how to generate profits from an investment".

[26]Table A.2 in the appendix presents descriptive statistics for the two subsamples we focus on for the analysis, namely for firms who are interested in borrowing under the standard contract and the low interest/collateral contract.

[27]See footnote 14 for a discussion of the official definition of microenterprises and the typical threshold(s) used in the literature.

[28]Although the differences in borrowing experience between the respondents in these studies and those participating in our survey could be explained by differences across geographical regions, the share with loan experience in our sample is considerably lower even compared to other work carried out in East Africa (Fiala, 2014; Berge et al., 2014).

both retail and manufacturing businesses), there is a relatively higher share of manufacturing businesses in our sample.

Columns (4) and (5) of Table 2 partition the sample by sector. The comparison across the sectors reveals important differences between manufacturing and retail firms. Manufacturing businesses were established, on average, 1.4 years before the retail businesses and have more employees: the average number of workers is 4.12 in manufacturing firms, compared to 2.14 in retail firms. Meanwhile, both the reported profits and stock value are significantly lower in the manufacturing firms compared to the retail firms. Business owners in the manufacturing sector are less likely to be female and have on average 1 year less schooling compared to owners in retail.[29] Manufacturing firms are also more likely to report that they want to expand their business by investing in labor or capital. In particular, 76% (41%) of manufacturing (retail) firms' owners reported that they would like to invest more in capital, while 30% (14%) of business owners in manufacturing (retail) said they would like to hire more workers. On the other hand, manufacturing firm owners report having more limited access to funds in case of an emergency. In particular, when asked whether they could raise 500,000 UGX (or 2 million UGX) at 0 interest in case of an emergency, only 69% (41%) of firm owners in manufacturing responded positively, while the corresponding rate is 80% (56%) among retailers. Taken together, these differences suggest that manufacturing firms in our context may be more financially constrained – they want to expand their business (by investing in capital or hiring more workers) but they face difficulty in raising funds.[30]

The final variables of Table 2 provide an overview of the share of respondents expressing a willingness to borrow under the standard loan contract described to them, as well as under the two other contract variations. The contracts are presented in the order in which they were asked to respondents in the survey instrument. 14.14% of the respondents reported that they would take a loan if offered the standard contract. The take-up rate of each of the amended contracts is significantly higher, with 24.67% saying they would like to borrow under the low interest contract and 27.84% saying yes to the low collateral contract.[31] Also of note are the sectoral

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[29]The fact that most of our firm owners are male is due to our sector choice. Sub-sectors within manufacturing that have a higher share of female workers include tailoring and some types of food processing.

[30]This is not to say that financial constraints are the only possible explanation behind this pattern. Another reason could be that owners of manufacturing firms have more limited access to (formal or informal) insurance which makes it harder for them to raise emergency funds and also more difficult to invest in labor or capital, both of which may entail significant risks in a volatile business environment.

[31]Twenty-six respondents state that they would borrow under the standard contract but say "No" to either the low interest or the low collateral contract. Since both our amended contracts are strictly better than the standard

differences in firm owners' intention to borrow under the various loan contracts. While we do not see a significant difference across manufacturing and retail in the expressed interest in the standard contract or the low collateral one, manufacturing firms are significantly more likely to want to borrow under the low interest rate offer, and less likely to *not* want to borrow under any of the three contracts. This implies that in the Ugandan context, lower interest rates are likely to attract more firms from the manufacturing sector in particular.

A possible concern related to the use of hypothetical questions has to do with the extent to which they predict actual behavior. To verify that the answers to our hypothetical elicitations are informative about respondents' preferences, we cross-check the consistency by looking at the answers to different survey question about loans. Specifically, we exploit questions about firm owners' loan experience, asked before the hypothetical loan-demand section. We restrict the sample to respondents who say "No" to the question: "Are you planning to take a loan in the next 2 years to use (mainly) in your business?".[32] In Table 3, we focus on the stated reasons for not planning to borrow that are most closely related to the mechanisms that our contract variations target. Specifically, we examine the correlation between, on one hand, stated reasons such as: (a) high cost (interest rate) of the loan; (b) lack of collateral; (c) fear of losing the collateral; and (d) the repayment structure, with the expressed interest in the hypothetical contracts that address these specific types of borrowing constraints. We expect those who indicate that they do not plan to borrow because of high interest rates to be more convinced by the low interest contract, and those who state that they have no collateral, or who fear losing their collateral, to be more affected by the low collateral contract. Table 3 shows that this is precisely the pattern we observe in the data. Here, we study the correlation between the stated reasons for not wanting a loan and an indicator variable for saying "No" to the standard loan, but saying "Yes" to contract i where $i \in \{Low\ interest\text{-}rate\ contract,\ Low\ collateral\ contract\}$. We find that respondents who say that they do not plan to borrow because the interest rate is too high are significantly more likely to express a willingness to borrow when offered the low interest contract. Also, those who have no collateral are not affected by a lower interest rate, but are more likely to switch to borrowing if the collateral obligation is lowered. Those who fear losing their collateral are,

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contract (by lowering the cost of borrowing), this indicates that they may have misunderstood the hypothetical nature of the questions. Throughout the analysis, we exclude these 26 respondents. The results are qualitatively identical if they are included.

[32]An overview of the most common stated reasons for why respondents do not plan to borrow is presented in Table A.11.

however, not convinced by any of the two contract amendments. Reassuringly, those reporting to be constrained mainly by high interest rates are not systematically more likely to take up the contracts when the collateral requirement is reduced, nor are those constrained by collateral likely to opt in when the interest rate is diminished.[33]

We conclude that respondents' stated reasons for not planning to take a loan are consistent with how they replied to the hypothetical contracts described to them later during the same interview. In addition, the results for the subgroup of respondents who have some borrowing experience (indicating that they may be better informed about their loan preferences) go in the same direction as the overall sample, suggesting that most respondents understand the hypothetical nature of the questions.

4 Results

4.1 Specification and Main Results

As argued in Section 2, the SW model predicts that, among firms that choose to borrow under at least one contract, it is the less risky firms that will be more likely to change their borrowing in response to improved contract terms (hypothesis H_1). The DW model makes the opposite prediction (hypothesis H_2). In order to test these predictions, we analyze whether firms' risk level (proxied either by the firm's risk index or the owner's risk aversion) is correlated with changes in its borrowing intentions in response to improvements in the loan contract.

We estimate two specifications, where in each case the unit of observation is the contract $\times$ individual respondent (firm). One specification is

$$(1) \qquad Demand_{ic} = \alpha + \gamma Improved_c + \beta X_i + \sigma [Improved_c \times X_i] + \phi Z_i + \varepsilon_{ic},$$

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[33]One key question in the study of loan contract terms is: would it pay off for the lender to reduce the interest rate and attract these new clients? While we cannot fully address this question in our hypothetical setup, we can speak to and discuss a related point: are these potential borrowers (with lower risk measures) less likely to default on a loan? Specifically, we explore the survey question "Did you have to delay any loan repayments?" asked to the respondents who had taken a loan in the past 2 years. We find that the two risk measures used in our analysis, namely risk aversion and the indicator for being exposed to a low-risk business environment, are negatively correlated with having delayed loan repayments. The negative correlation is statistically significant at the 10% level for the risk index, while the p-value of the correlation coefficient is 0.19 for the risk aversion indicator. This exercise suggests that, conditional on having borrowed in the past, safer individuals (as defined in our data) are less inclined to delay their loan repayments, implying that they are more likely to be good future clients for a potential lender. However, it should be stressed that the analysis is restricted to the subsample of previous borrowers, and results may look different for first time borrowers attracted by the lower cost of borrowing.

where $Demand_{ic}$ is an indicator variable that takes the value 1 if individual i states that she would like to borrow under contract c; $Improved_c$ is an indicator variable that takes the value 1 if the offered contract has improved terms relative to the standard contract (lowered interest rate or lowered collateral);[34] X_i is an indicator for whether the respondent is a "safe" type, equal to 1 if the respondent's risk index is below the sample median (alternatively, if the respondent's risk aversion is greater than or equal to the sample median); and Z_i is a vector of controls.[35] We also estimate the following fixed-effect model:

$$(2) \qquad Demand_{ic} = \gamma Improved_c + \sigma \left[Improved_c \times X_i \right] + \eta_i + \varepsilon_{ic},$$

where η_i is an individual fixed effect which absorbs the level terms X_i and Z_i. In both cases, standard errors are clustered at the firm (i.e. individual) level.[36]

The focal parameter for testing hypotheses H_1 and H_2 is σ in both specifications. A positive σ would imply that low-risk borrowers are more likely to change their borrowing decision in response to improved contract terms, as in H_1; a negative σ would imply the opposite, as in H_2.

As Section 2 makes clear, these hypotheses hold when comparing among those firms who have some interest in borrowing, and thus firms that do not respond affirmatively to any contract offered are dropped in the regressions. A complication in bringing theory to data is that firms in the data are offered not one, but two improved contracts. While each improved contract dominates the baseline contract, there is no clear ranking between the two improved contracts; one lowers the interest rate while the other reduces the collateral requirement, and firms value these improvements differently. The theory, summarized in Figure 1, applies to two rank-ordered contracts, however. We follow the simplest approach, which is to consider only one improved contract at a time while ignoring the other. So, we first include only borrowers that opt into at least one of the standard and the reduced-interest contracts, and run the above regressions including these two contract types only; and we next include only borrowers that opt into at least one of the standard and reduced-collateral contracts, and run the above regressions including these two contract choices only. An alternative would be to consider both improved contracts

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[34]For the low interest contract, we also test for effects on the intensive margin of loan demand. In this case, the outcome variable is the log of the loan amount (plus 1) that the respondent reports that they would like to borrow under the given loan conditions. Intensive margin demand data was not collected for the low collateral contract in order to avoid respondent fatigue.

[35]In our baseline specification, we control for enumerator and survey day fixed effects.

[36]By clustering at the firm level, we account for the possibility that the error term is correlated across contract choices of the same respondent.

in the same regression; however, this seems less preferable because theory does not dictate how the two improved contracts rank relative to each other and how selection might differ across the two.

Table 4 presents results on the selection effects of lowering the interest rate. The dependent variable is a dummy equal to 1 if owner of firm i reported that she would like to borrow under contract c. The estimation results from specification (1) are reported in odd-numbered columns; while the results from specification (2) are reported in even-numbered columns.[37] In columns (1) and (2), the coefficient on the indicator for the "Low interest-rate contract" (top row) shows that, among firms who borrow under either contract, individuals with a high-risk business environment (the omitted category) are 45 percentage points more likely to say yes to the low interest contract compared to the standard one. Note that the mean demand for the standard contract in this subsample is 55% (displayed at the bottom of the table).[38] By examining the interaction term in the third row, we see that the corresponding difference in take up for individuals in a low-risk environment (with a low score on the risk index) is significantly higher: they are 27 percentage points *more* likely to switch into borrowing under the low interest-rate contract compared to firms with high-risk business environments. This supports H_1 and the SW model. The estimate for σ is precisely estimated at conventional levels in both columns (1) and (2). One also sees from adding the estimates of β and σ in column (1) that low-risk borrowers are roughly no more nor less likely to accept the improved contract, while from β alone they are less likely to accept the standard contract. This is expected from the SW model where among those who accept at least one contract, all types accept the improved contract while only riskier borrowers accept the standard contract (see Figure 1, left panel).

In columns (3)-(4) of Table 4, we use the respondent's risk aversion as the proxy for riskiness. The first row of columns (3)-(4) indicate that less risk-averse borrowers are 43 percentage points more likely to switch into borrowing under the low interest contract compared to the standard one. The interaction terms in columns (3)-(4) show that firm owners with above-median risk aversion score are an additional 14 percentage points more likely to start borrowing when offered the low interest contract. The effect is precisely estimated at the 90% confidence level

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[37]The interaction term estimates of σ are the same in both specifications due to the equivalence of the pooled OLS specification 2 with the fixed effect specification 2 in this context, which both exploit within-subject variation in choices when estimating the coefficient of interest.

[38]More specifically, because of the sample restriction, 55% of the sample population take up the standard *and* the low interest-rate contract. The remaining 45% express an interest in borrowing only when the low interest contract is offered. Together, the two groups make up the full sample.

in column (3) while it is imprecisely estimated in column (4) with a p-value of 0.179. These results are also in line with the SW model.[39]

A key omitted variable that could bias our estimates is wealth. In particular, one concern is that the risk measures are correlated with the respondent's wealth which could drive the differential demand for the low interest-rate contract. To account for this, we flexibly control for the owner's household wealth in columns (7)-(10). The point estimates for the wealth controls added in these columns are small and statistically insignificant. Importantly, the coefficient on the interaction between take up and low risk changes very little. This suggests that our risk measures capture something independent of wealth (or its correlates).[40]

Next, we turn to estimating the selection effects of lowering the collateral requirements. Table 5 presents the findings, which show that firms with a less risky business environment (i.e. a score below the median risk index) are more likely to switch into borrowing when the collateral requirement is reduced. The top row shows that firm owners with an above-median risk index are 53 percentage points more likely to desire the low collateral contract compared to the standard one [columns (1)-(2)]. Firm owners with a score below the median increase demand by an additional 27 percentage points under the low collateral contract [column (2)].

When we use the respondent's risk aversion instead of the risk index of his/her business, we do not find a significant effect. In columns (3)-(4), the interaction term "Low collateral×Risk averse" has a positive, but imprecisely estimated, coefficient of 0.04. Importantly, the coefficients on the risk aversion and the low-risk index are robust to controlling for wealth. Columns (7)-(10) of Table 5 show that controlling for the wealth quartiles of the respondent does not change the estimates significantly. For the risk index, the point estimate on the interaction term increases marginally and remains significant at the 99 percent confidence level [columns (7)-(8)]. For risk aversion, the point estimates remain positive but insignificant [columns (9)-(10)]. The coefficients of the wealth estimates are positive in general, but imprecisely estimated. In sum, the findings in Table 5 lend additional support to hypothesis H_1.

Overall, the empirical findings show that lowering the interest rate or the collateral requirement is likely to attract a safer mix of firms. In terms of the theoretical hypotheses laid out in

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[39]Table A.3 in the Appendix presents results on the intensive margin of demand for the low interest-rate contract relative to the baseline offer. The results are similar to those on the extensive margin, with take up being significantly higher among business owners in a lower-risk environment and among those who are more risk averse (the latter effect is imprecisely estimated at conventional levels).

[40]Our results are also robust to adding controls for sales volume, firm age and firm owner education.

Section 2, the findings are in line with H_1 but not with H_2 (or H_0). That is, the evidence favors the adverse selection model of Stiglitz and Weiss (1981) and Wette (1983) over the advantageous selection story of De Meza and Webb (1987).[41]

4.2   Robustness

A possible drawback with our main findings for the risk index could be that the index not only captures the way uncertainty in the business environment poses a challenge to borrowing, but a respondent's general unwillingness to borrow. To address this issue, we replace the risk index with the placebo index. Appendix Table A.4 shows that, unlike the risk measure, the placebo index is not correlated with the respondent's propensity to borrow neither under the low interest-rate contract nor under the low collateral one, relative to baseline. These null results on the placebo index support our interpretation that the estimates obtained using the risk index in Tables 4 and 5 are capturing elasticities associated with risk rather than other repayment-related difficulties.

Another important concern connected to the use of hypothetical questions has to do with the extent to which they predict actual behavior. This was tackled to some extent in Section 3, where we showed that a respondent's hypothetical take-up patterns for each of the amended contracts are consistent with their stated reasons for not planning to borrow in the near future (as expressed in an earlier section of the questionnaire). To further address such concerns about our use of hypothetical questions we re-run the main analysis with two alternative sample restrictions, based on the question "Are you planning to take a loan in the next 2 years to use (mainly) in your business?". The results from this exercise are shown in Appendix Tables A.5 - A.8. In Tables A.5 and A.6, we restrict the sample to respondents who say "No" to the question: "Are you planning to take a loan in the next 2 years to use (mainly) in your business?". In Ta-

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[41]To shed further light on the results, we examine the heterogeneity of the effects across firms' sector of operation and with respect to borrowing experience. The first exercise is motivated by the observation that manufacturing firms in our sample express a greater need to expand their business, both in terms of labor and capital. Specifically, 76% (30%) of the manufacturing firms in the sample reported a desire to employ more capital (labor) while the corresponding rates were significantly lower among firms in retail (41% for capital and 14% for labor). In addition, they are more responsive to changes in the loan contract compared to retail firms. For instance, when offered the low interest contract, the fraction of firm owners who report wanting to borrow goes up from 15% to 29% in manufacturing and from 14% to 23% among retail, with the difference in the change being statistically significant. Yet, we have limited evidence on selection effects among the manufacturing sector, as much of the previous work from developing countries has focused on households or enterprises in the retail sector. When we test for the selection effects by sector, we find similar evidence of adverse selection among both sectors. In particular, a lower interest rate or a less stringent collateral requirement is likely to attract less risky firms both within the manufacturing and the retail sectors. Results are shown in Appendix Table A.9

bles A.7 and A.8, we instead restrict the sample according to the *reported reason* for answering "No" to the question: "Are you planning to take a loan in the next 2 years to use (mainly) in your business?". In particular, in these two tables we only exclude respondents who state that they do not plan to take such a loan because they "Do not need capital". Compared to the main analysis, these sample restrictions provide alternative ways to ensure that "uninterested" firms, who would never borrow under any contract, and who are not included in the theoretical models we set out to test, are excluded from the analysis sample. The results are qualitatively the same as our main results presented in tables 4 and 5, and the difference between the take-up rates of the standard contract and those of the amended contracts are similar in these sub-samples.

Finally, to address potential problems related to multiple hypothesis testing and to capture the broader average effect of a firm owner's risk profile on loan demand, we create a composite and standardized measure of firm-owner risk that combines the risk index and the risk aversion measure. This variable is constructed by first standardizing each risk measure (in the relevant subsample), and then averaging over the two risk measures (in that sample) and standardizing the resulting mean. Appendix Table A.10 displays the outcome from re-running our main specification using the composite risk measure, for the "Low interest contract" and the "Low collateral contract", respectively, and shows a similar pattern: the take up of the amended contracts is much higher among individuals with low values on the composite risk measure.[42]

5   Conclusion

A body of evidence has demonstrated that small enterprises in developing countries are credit constrained. Lower interest rates or less stringent collateral requirements offer two possible ways of improving access to finance for these firms. Economic theory predicts that changing the standard loan product provided in the credit market could induce important selection effects by attracting firms with different risk profiles. In order to test for the possibility of such effects, we collect information on a representative sample of business owners in urban Uganda and examine whether their intention to borrow under different contractual variations change in line with theory, as a function of their riskiness.

We find that hypothetical demand for loans is affected by contractual changes in a way that is

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[42]Relatedly, the main results for the risk index, and the corresponding results using the placebo index are also robust to constructing these indices using principal component analysis rather than taking an unweighted average over the index components, as is done for our main analysis. Results are available upon request.

consistent with adverse selection a la Stiglitz and Weiss (1981) and Wette (1983). In particular, lowering the annual interest rate from 25% to 20% increases the intention to borrow for firm owners who are more risk averse and who operate in a business environment with lower risk (that is, less seasonality and uncertainty). Similarly, loans with lower collateral requirements seem more desirable for firms with lower risk (controlling for the owner's wealth). The effects are present both among retail and manufacturing firms, where the latter also report a greater need for capital and labor in their businesses and a stronger desire to borrow if interest rates are lowered. This suggests that lowering the price of borrowing may attract not only more manufacturing firms, but also relatively less risky firms within both sectors.

Our findings indicate that adverse selection is likely to be one of the reasons for why SMEs in less developed economies are credit constrained. Nevertheless, our data does not allow us to test explicitly for whether the firms in our sample are credit constrained and to quantify the extent to which this may be driven by adverse selection. Also, the findings do not shed light on whether the contractual variations we study would attract borrowers with higher marginal returns to capital (that is, those with more business potential). Future research on these issues is an essential ingredient for the design of credit market interventions that aim to further firm growth. Moreover, while our results show that lower interest rates and less stringent collateral requirements are likely to attract safer borrowers on the margin, their effects on lenders' profits are not clear. A proper assessment of the full impact of these contractual variations in terms of borrower and lender profits would require evaluating actual contract changes, randomized at the market level. This would also enable the validation of our findings which, due to the hypothetical nature of our loan demand questions, are merely suggestive. Nevertheless, the results stress that an approach that ignores selection effects is likely to provide a partial picture of the full impact of altering contract terms of loans available to microenterprises in developing countries.

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Figure 1: Selection in the SW and DW models
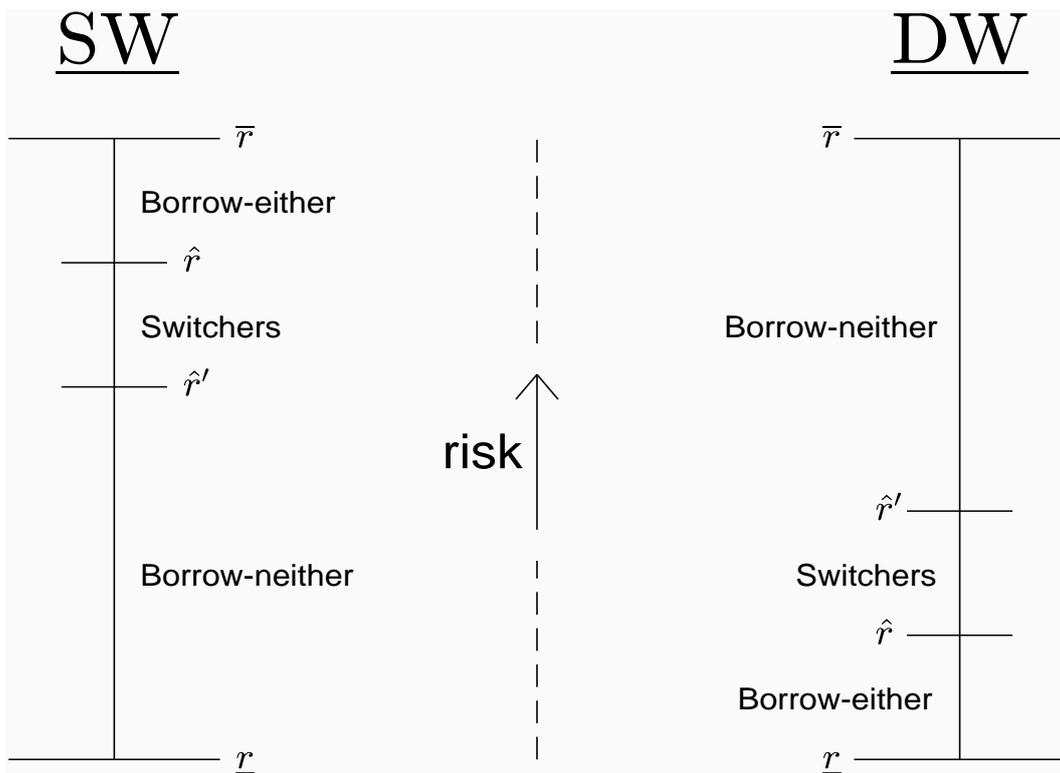
Note: Potential borrowers vary in risk, from $\underline{r}$ to $\overline{r}$. In the SW model (left), the riskiest borrowers ($r \in (\hat{r}, \overline{r})$) choose to borrow under either of two contracts, the next riskiest group ("switchers", $r \in (\hat{r}', \hat{r})$) choose to borrow only under the more attractive contract, and the rest ($r \in (\underline{r}, \hat{r}')$) choose not to borrow under either contract. In the DW model (right), the selection is reversed.

Table 1: Loan Terms in Uganda, by Firm Size

	(1)		(2)		(3)		(4)
	All firms		Small firms		Large firms		Difference
	Mean		Mean		Mean		between
	(SD)	N	(SD)	N	(SD)	N	2 vs. 3
Firm has an outstanding loan (Yes=1)	0.097	684	0.086	360	0.119	305	-0.057
	(0.406)		(0.376)		(0.441)		[0.388]
Total duration of the loan (months)	14.833	106	16.890	56	11.587	49	0.231
	(16.355)		(13.577)		(18.460)		[0.229]
Interest rate (per annum)	21.607	74	22.579	39	18.780	34	0.294
	(9.463)		(9.588)		(8.679)		[0.046]
Any collateral required (Yes=1)	0.871	126	0.966	59	0.721	66	0.447
	(0.394)		(0.326)		(0.441)		[0.028]
Collateral land (Yes=1)	0.793	101	0.747	52	0.889	48	-0.242
	(0.421)		(0.466)		(0.357)		[0.209]
Collateral size $\geq$ Loan size (Yes=1)	0.772	37	0.854	22	0.605	15	0.383
	(0.450)		(0.429)		(0.488)		[0.161]
Collateral size $\leq$ 50% of Loan size	0.162	37	0.097	22	0.294	15	-0.363
	(0.374)		(0.351)		(0.414)		[0.241]

Notes: The data comes from the Uganda 2013 Enterprise Surveys Data Set, collected between January 2013 and August 2013 as part of the Africa Enterprise Survey 2013, a World Bank initiative. Observations are weighted using the inverse of the sampling weights. The sample consists of all surveyed businesses in column 1; businesses with 10 or fewer employees in column 2; businesses with more than 10 employees in column 3. Column 4 reports the normalized difference between columns 2 v.s. 3., computed as the difference in means in treatment and control observations divided by the square root of the sum of the variances (Imbens and Wooldridge 2009). Column 4 also reports (in square brackets) the *p*-values for comparison of means across columns 2 v.s. 3.

Table 2: Summary Statistics

	Full sample mean	St. dev.	N	Retail mean (N=636)	Manufacture mean (N=289)	Difference	p-value difference
Firm and Owner characteristics						-	-
Sector: Manufacturing	0.312	0.464	925	-	-	-	-
Firm age	6.671	5.277	891	6.24	7.61	-1.37***	0.000
Number of workers	2.762	1.771	925	2.14	4.12	-1.98***	0.000
Share of firms with any worker (other than the owner)	0.734	0.442	925	0.64	0.93	-0.29***	0.000
Typical monthly profit last year (1000 UGX)	997.154	1325.759	882	1055.506	868.356	187.149*	0.052
Aggregate asset value (1000 UGX)	2238.367	5217.137	925	2293.303	2117.471	175.832	0.635
Value of current stock/inventories (1000 UGX)	12883.215	16439.932	815	13789.455	10787.073	3002.382**	0.017
Owner is female	0.282	0.45	925	0.38	0.06	0.32***	0.000
Owner's years of schooling	11.458	3.011	889	11.75	10.80	0.95***	0.000
Ever borrowed from formal/semi-formal lender	0.206	0.405	922	0.20	0.21	-0.01	0.668
Borrowed in last 2 years	0.097	0.296	921	0.10	0.10	0.00	0.986
Risk aversion	4.437	2.704	910	4.40	4.51	-0.11	0.574
Risk index	2.226	0.644	919	2.20	2.28	-0.09*	0.063
Placebo index	1.831	0.65	921	1.85	1.80	0.05	0.314
Household wealth (1000 UGX)	26856.173	82707.639	925	29511.583	21012.433	8499.149	0.148
Wants more labor	0.186	0.389	925	0.14	0.30	-0.16***	0.000
Wants more capital	0.518	0.5	925	0.41	0.76	-0.35***	0.000
Can obtain 500K UGX	0.766	0.424	913	0.80	0.69	0.11***	0.000
Can obtain 2M UGX	0.51	0.5	888	0.56	0.41	0.15***	0.000
Expressed loan demand							
Yes to standard contract	0.141	0.349	898	0.137	0.151	-0.015	0.560
Yes to low interest contract	0.247	0.431	908	0.23	0.29	-0.07**	0.029**
Yes to low collateral contract	0.278	0.448	862	0.27	0.30	-0.03	0.327
No to all three contracts	0.629	0.483	833	0.651	0.585	0.065*	0.068*

Notes: *Number of workers* is the total number of workers in a firm, including the owner and both paid and unpaid employees. Monetary variables are reported in 1000's Ugandan Shillings (UGX). According to the 2013 World Bank PPP-adjusted exchange rate UGX1,014 =USD1. Using the nominal exchange rate of April 1, 2013 UGX2,585=USD1. *Risk index* is the average of responses to 2 questions where respondents were asked if they agree (on a 4-point scale between strongly agree=3 and strongly disagree=0) with the following statements: (1) "It is difficult to make loan repayments on time due to sales fluctuations"; and (2) "It is difficult to make loan repayments on time because it is hard to predict when sales will be good or bad." *Placebo index* is the average response (on a similar 4 point scale) to the following statements: (1) "It is difficult to get a loan because it is hard to know where to get the best terms"; (2) "It is difficult to get large enough loans to make good business investments"; and (3) "It is difficult to make loan repayments on time because it takes a while to know how to generate profits from an investment". *Risk aversion* is the self-reported score when the respondent is asked to rank herself on a 0-10 scale according to how much she is willing to take risks where 0="Not at all willing to take risks" and 10="Very willing to take risks", then rescaled so that the index reported is increasing in risk aversion of the respondent. *No to all the contracts*: Dummy=1 if respondent said no to all 3 contract variations. In case of missing response to one or more of the contracts and the respondent said no to the remaining contracts, the variable is coded as missing. * p<0.1, ** p<0.05, *** p<0.01

Table 3: Correlation Between Hypothetical Demand and Reasons for Not Planning to Borrow

Crowds in to (contract):	Low interest	Low collateral	N
Do not need capital	-0.049	-0.027	628
Interest rate too high	0.127***	0.018	628
Do not have access to collateral	-0.017	0.138***	628
Fear to lose the collateral	-0.041	-0.073*	628
Installments too often	-0.019	0.011	628

Notes: The table reports simple pairwise correlations. The sample is restricted to respondents who stated that they do not plan to borrow in the next 2 years. * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table 4: Demand for Low Interest Rate Contract

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Low interest	0.449***	0.449***	0.432***	0.432***	0.500***	0.500***	0.446***	0.446***	0.435***	0.435***
	[0.044]	[0.056]	[0.058]	[0.075]	[0.088]	[0.113]	[0.091]	[0.117]	[0.095]	[0.122]
Risk index low	-0.228***						-0.205**			
	[0.079]						[0.081]			
Low interest*risk index low	0.272***	0.272**					0.270***	0.270**		
	[0.087]	[0.112]					[0.088]	[0.114]		
Risk averse			-0.125*						-0.123*	
			[0.067]						[0.067]	
Low interest*risk averse			0.136*	0.136					0.136*	0.136
			[0.078]	[0.101]					[0.079]	[0.102]
Bottom wealth q					0.086		0.082		0.098	
					[0.094]		[0.094]		[0.093]	
2nd wealth q					-0.066		-0.055		-0.049	
					[0.093]		[0.096]		[0.092]	
3rd wealth q					-0.023		-0.009		-0.020	
					[0.090]		[0.090]		[0.092]	
Low interest*Bottom wealth q					-0.029	-0.029	-0.028	-0.028	-0.045	-0.045
					[0.117]	[0.151]	[0.116]	[0.150]	[0.116]	[0.150]
Low interest*2nd wealth q					0.047	0.047	0.040	0.040	0.032	0.032
					[0.116]	[0.149]	[0.118]	[0.152]	[0.114]	[0.147]
Low interest*3rd wealth q					0.009	0.009	0.001	0.001	-0.003	-0.003
					[0.114]	[0.147]	[0.114]	[0.147]	[0.116]	[0.149]
Mean demand standard contract	0.551	0.551	0.568	0.568	0.500	0.500	0.500	0.500	0.571	0.571
Firm fixed effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	402	402	398	398	402	402	402	402	398	398
Adjusted R^2	0.430	0.368	0.415	0.347	0.407	0.330	0.426	0.360	0.413	0.339

Notes: The sample is restricted to firm owners who choose to borrow under either the standard contract or the low interest contract. *Low interest* is a dummy=1 if the contract offered is the low interest-rate contract. *Risk index low* is a dummy variable=1 if the risk index is lower than the median. The risk index was compiled from questions measuring whether the respondent faces a business environment with fluctuations or unpredictability. *Risk averse* is a dummy variable =1 if the respondent's risk aversion is greater than or equal to the sample median. Please see notes to Table 2 for further details on the risk index and the risk aversion measure. *Mean demand standard contract* displayed below the table indicates the mean hypothetical take up of the standard contract in the base category. i.e. respondents with risk index low=0 in columns 1, 2, 7, and 8, with risk aversion=0 in columns 3, 4, 9, and 10, and, additionally, in wealth quartile=4 in columns 5-10. Standard errors in brackets are clustered at the firm level, * p<0.1, ** p<0.05, *** p<0.01.

35

Table 5: Demand for Low Collateral Contract

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Low collateral	0.530***	0.530***	0.568***	0.568***	0.525***	0.525***	0.483***	0.483***	0.508***	0.508***
	[0.040]	[0.052]	[0.051]	[0.067]	[0.086]	[0.113]	[0.086]	[0.114]	[0.092]	[0.121]
Risk index low	-0.154**						-0.151**			
	[0.063]						[0.069]			
Low collateral*Risk index low	0.270***	0.270***					0.278***	0.278***		
	[0.073]	[0.096]					[0.078]	[0.103]		
Risk averse			-0.088						-0.087	
			[0.060]						[0.061]	
Low collateral*Risk averse			0.041	0.041					0.035	0.035
			[0.070]	[0.092]					[0.070]	[0.092]
Bottom wealth q					-0.069		-0.077		-0.071	
					[0.089]		[0.090]		[0.088]	
2nd wealth q					-0.052		-0.040		-0.059	
					[0.093]		[0.093]		[0.092]	
3rd wealth q					-0.091		-0.065		-0.096	
					[0.084]		[0.085]		[0.084]	
Low collateral*Bottom wealth q					0.096	0.096	0.108	0.108	0.094	0.094
					[0.107]	[0.141]	[0.108]	[0.142]	[0.108]	[0.142]
Low collateral*2nd wealth q					0.013	0.013	-0.009	-0.009	0.013	0.013
					[0.114]	[0.150]	[0.114]	[0.150]	[0.114]	[0.150]
Low collateral*3rd wealth q					0.102	0.102	0.051	0.051	0.103	0.103
					[0.105]	[0.138]	[0.105]	[0.138]	[0.106]	[0.139]
Mean demand standard contract	0.470	0.470	0.432	0.432	0.475	0.475	0.5	0.5	0.524	0.524
Firm fixed effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	466	466	462	462	466	466	466	466	462	462
Adjusted R^2	0.508	0.442	0.497	0.414	0.489	0.412	0.504	0.440	0.494	0.412

Notes: The sample is restricted to firm owners who choose to borrow under either the standard contract or the low collateral contract. *Low collateral* is a dummy=1 if the contract offered is the low collateral contract. *Risk index low* is a dummy variable=1 if the risk index is lower than the median. The risk index was compiled from questions measuring whether the respondent faces a business environment with fluctuations or unpredictability. *Risk averse* is a dummy variable =1 if the respondent's risk aversion is greater than or equal to the sample median. Please see notes to Table 2 for further details on the risk index and the risk aversion measure. *Mean demand standard contract* displayed below the table indicates the mean hypothetical take up of the standard contract in the base category, i.e. respondents with risk index low=0 in columns 1, 2, 7, and 8, with risk aversion=0 in columns 3, 4, 9, and 10, and, additionally, in wealth quartile=4 in columns 5-10. Standard errors in brackets are clustered at the firm level, * p<0.1, ** p<0.05, *** p<0.01.

Appendix 1

Figure A 1: Distribution of Risk Aversion Measure
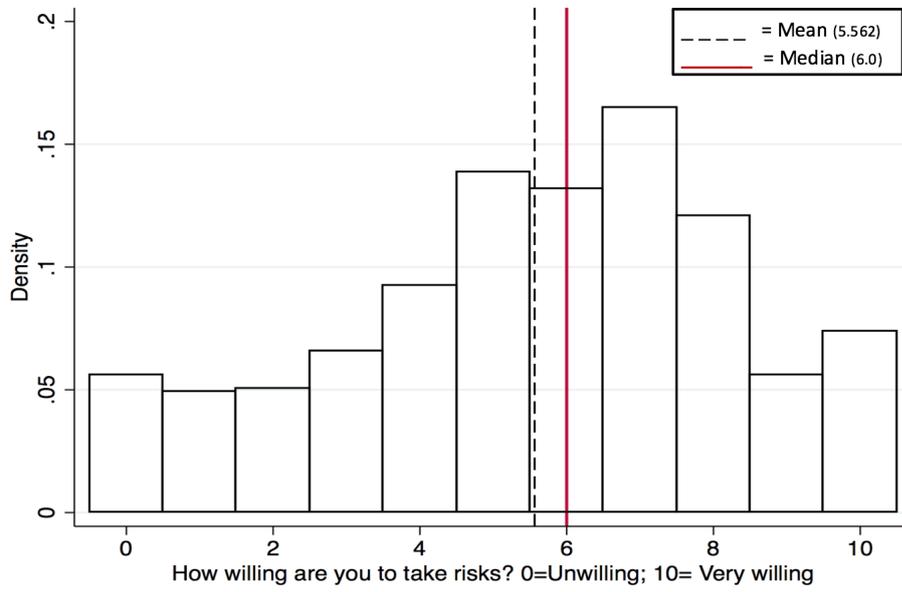
Notes: The histogram shows the distribution of answers to the question that we use as the basis of our risk aversion measure. The respondents were asked "How willing are you to take risks" and to indicate their answer on a $0-10$ scale between "Not at all willing to take risks" and "Very willing to take risks".

Table A.1: Loan terms in Our Data

	Mean	SD	Median	N
Firm had a loan in last 2 years (Yes=1)	0.110	(0.313)	-	921
Panel A:	**All Loans**			
Total duration of the loan (months)	13.978	(15.955)	12	92
Interest rate (per annum)	56.204	(123.288)	25	72
Any collateral required (Yes=1)	0.796	(0.405)	-	98
Collateral land (Yes=1)	0.667	(0.475)	-	75
Collateral size $\geq$ Loan size (Yes=1)	0.875	(0.333)	-	72
Collateral size $\leq$ 50% of Loan size (Yes=1)	0.097	(0.298)	-	72
Panel B:	**Formal Loans**			
Total duration of the loan (months)	11.915	(12.005)	11	86
Interest rate (per annum)	53.725	(126.437)	25	64
Any collateral required (Yes=1)	0.884	(0.323)	-	86
Collateral land (Yes=1)	0.685	(0.468)	-	73
Collateral size $\geq$ Loan size (Yes=1)	0.871	(0.337)	-	70
Collateral size $\leq$ 50% of Loan size (Yes=1)	0.100	(0.302)	-	70

Table A.2: Summary Statistics, by Subsample

	Sample mean	St. dev.	N	Retail mean (N=636)	Manufacture mean (N=289)	Difference	p-value difference
PANEL A: Firm-owners who would borrow under the standard or low interest contracts							
Sector: Manufacturing	0.388	0.489	201	-	-	-	
Firm age	6.968	5.095	190	6.59	7.58	-0.99	0.195
Number of workers	2.985	1.999	201	2.09	4.4	-2.31***	0.000***
Share firms with any worker (other than the owner)	0.741	0.439	201	0.63	0.91	-0.28***	0.000***
Typical monthly profit last year (1000 UGX)	832.330	1259.334	191	728.889	995.878	-266.989	0.154
Aggregate asset value (1000 UGX)	1751.918	3238.721	201	1667.988	1884.269	-216.281	0.646
Value of current stock/inventories	12088.439	16031.426	173	12993.271	10621.515	2371.756	0.346
Owner is female	0.269	0.444	201	0.4	0.06	0.33***	0.000***
Owner's years of schooling	11.199	2.879	191	11.45	10.8	0.66	0.125
Ever borrowed from formal/semi-formal lender	0.318	0.467	201	0.32	0.32	0	0.960
Borrowed in last 2 years	0.174	0.38	201	0.18	0.17	0.01	0.825
Risk aversion	4.824	2.595	199	4.78	4.9	-0.12	0.757
Risk index	2.244	0.692	199	2.23	2.26	-0.03	0.796
Placebo index	1.814	0.618	200	1.8	1.83	-0.03	0.756
Household wealth (1000 UGX)	23614.654	88438.345	201	20990.76	27752.33	-6761.57	0.599
wants more labor	0.284	0.452	201	0.16	0.47	-0.31***	0.000***
wants more capital	0.572	0.496	201	0.4	0.85	-0.45***	0.000***
Can obtain 500K without interest	0.766	0.424	197	0.81	0.71	0.1	0.100
Can obtain 2M without interest	0.492	0.501	193	0.52	0.45	0.06	0.392
PANEL B: Firm-owners who would borrow under standard or low collateral contracts							
Sector: Manufacturing	0.352	0.479	233				
Firm age	7.009	5.373	221	6.62	7.72	-1.1	0.148
Number of workers	2.768	1.763	233	2.09	4.02	-1.94***	0.000***
Share firms with any worker (other than the owner)	0.734	0.443	233	0.66	0.88	-0.22***	0.000***
Typical monthly profit last year (1000 UGX)	789.054	1104.475	224	797.055	774.077	22.978	0.882
Aggregate assets (1000 UGX)	1965.294	3875.425	233	2052.354	1804.976	247.379	0.643
Value of current stock/inventories (1000 UGX)	10684.729	14200.802	203	11338.657	9414.783	1923.874	0.362
Owner is female	0.27	0.445	233	0.38	0.07	0.30***	0.000***
Owner's years of schooling	11.168	3.048	220	11.31	10.91	0.4	0.353
Ever borrowed from formal/semi-formal lender	0.343	0.476	233	0.33	0.37	-0.03	0.596
Borrowed in last 2 years	0.142	0.349	233	0.17	0.1	0.07	0.156
Risk aversion	4.636	2.71	231	4.46	4.96	-0.5	0.184
Risk index	2.227	0.665	231	2.23	2.23	0	0.985
Placebo index	1.825	0.641	232	1.84	1.81	0.03	0.746
Household wealth (1000 UGX)	23585.859	92598.67	233	20326.02	29588.73	-9262.71	0.467
wants more labor	0.262	0.441	233	0.17	0.44	-0.27***	0.000***
wants more capital	0.571	0.496	233	0.45	0.79	-0.34***	0.000***
Can obtain 500K without interest	0.784	0.413	231	0.8	0.76	0.04	0.454
Can obtain 2M without interest	0.416	0.494	221	0.45	0.35	0.11	0.119

Notes: *Number of workers* is the total number of workers in a firm, including the owner and both paid and unpaid employees. Monetary variables are reported in 1000's Ugandan Shillings (UGX). According to the 2013 World Bank PPP-adjusted exchange rate UGX1,014 =USD1. Using the nominal exchange rate of April 1, 2013 UGX2,585=USD1. *Risk index* is the average of responses to 2 questions where respondents were asked if they agree (on a 4-point scale between strongly agree=3 and strongly disagree=0) with the following statements: (1) "It is difficult to make loan repayments on time due to sales fluctuations"; and (2) "It is difficult to make loan repayments on time because it is hard to predict when sales will be good or bad." *Placebo index* is the average response (on a similar 4 point scale) to the following statements: (1) "It is difficult to get a loan because it is hard to know where to get the best terms"; (2) "It is difficult to get large enough loans to make good business investments"; and (3) "It is difficult to make loan repayments on time because it takes a while to know how to generate profits from an investment". *Risk aversion* is the self-reported score when the respondent is asked to rank herself on a 0-10 scale according to how much she is willing to take risks where 0="Not at all willing to take risks" and 10="Very willing to take risks", then rescaled so that the index reported is increasing in risk aversion of the respondent. *No to all the contracts*: Dummy=1 if respondent said no to all 3 contract variations. In case of missing response to one or more of the contracts and the respondent said no to the remaining contracts, the variable is coded as missing.* p<0.1, ** p<0.05, *** p<0.01

Table A.3: Demand for Low Interest Rate Contract, Intensive Margin

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Low interest	6.917***	6.935***	6.908***	6.984***	7.634***	7.475***	6.755***	6.634***	6.856***	6.772***
	[0.660]	[0.869]	[0.907]	[1.193]	[1.349]	[1.774]	[1.392]	[1.826]	[1.457]	[1.916]
Risk index low	-3.645***						-3.446***			
	[1.199]						[1.237]			
Low interest*risk index low	4.234***	4.012**					4.212***	3.997**		
	[1.307]	[1.721]					[1.320]	[1.731]		
Risk averse			-1.625						-1.566	
			[1.043]						[1.053]	
Low interest*risk averse			1.607	1.416					1.605	1.407
			[1.197]	[1.567]					[1.213]	[1.586]
Bottom wealth q					0.757		0.653	0.000	0.904	
					[1.405]		[1.406]	[.]	[1.394]	
2nd wealth q					-1.312		-1.163	0.000	-1.059	
					[1.419]		[1.454]	[.]	[1.414]	
3rd wealth q					-0.459		-0.200	0.000	-0.469	
					[1.363]		[1.379]	[.]	[1.391]	
Low interest*Bottom wealth q					-0.514	-0.215	-0.481	-0.189	-0.712	-0.373
					[1.769]	[2.319]	[1.770]	[2.316]	[1.765]	[2.313]
Low interest*2nd wealth q					0.862	1.048	0.816	1.010	0.662	0.907
					[1.780]	[2.342]	[1.795]	[2.356]	[1.764]	[2.319]
Low interest*3rd wealth q					0.329	0.343	0.266	0.312	0.219	0.267
					[1.747]	[2.294]	[1.735]	[2.274]	[1.767]	[2.316]
Mean demand standard contract	8.114	8.114	8.199	8.199	7.527	7.527	7.436	7.436	8.577	8.577
Observations	393	393	389	389	393	393	393	393	389	389
Adjusted R^2	0.449	0.403	0.431	0.377	0.423	0.368	0.443	0.395	0.426	0.370

Notes: The sample is restricted to firm owners who choose to borrow under either the standard contract or the low interest-rate contract. The dependent variable is the logarithm of the amount the respondent would like to borrow (in Ugandan Shillings) plus 1. *Low interest* is a dummy=1 if the contract offered is the low interest contract. *Risk index low* is a dummy variable=1 if the risk index is lower than the median. The risk index was compiled from questions measuring whether the respondent faces a business environment with fluctuations or unpredictability. *Risk averse* is a dummy variable=1 if the respondent's risk aversion is greater than or equal to the sample median. Please see notes to Table 2 for further details on the risk index and the risk aversion measure. *Mean demand standard contract* displayed below the table indicates the mean hypothetical take up of the standard contract in the base category, i.e. respondents with risk index low=0 in columns 1, 2, 7, and 8, with risk aversion=0 in columns 3, 4, 9, and 10, and, additionally, in wealth quartile=4 in columns 5–10. Standard errors in brackets are clustered at the firm level, * p<0.1, ** p<0.05, *** p<0.01.

40

Table A.4: Demand for Low Interest Rate and Low Collateral Contracts, Placebo Index

Panel A: Low Interest Rate contract, Placebo Index						
	(1)	(2)	(3)	(4)	(5)	(6)
Low interest	0.504***	0.500***	0.501***	7.833***	7.475***	7.634***
	[0.061]	[0.113]	[0.124]	[0.955]	[1.774]	[1.946]
Low interest*placebo index low	0.004		-0.003	-0.245		-0.335
	[0.107]		[0.111]	[1.631]		[1.671]
Low interest*Bottom wealth q		-0.029	-0.030		-0.215	-0.298
		[0.151]	[0.154]		[2.319]	[2.353]
Low interest*2nd wealth q		0.047	0.038		1.048	0.885
		[0.149]	[0.151]		[2.342]	[2.358]
Low interest*3rd wealth q		0.009	0.008		0.343	0.275
		[0.147]	[0.149]		[2.294]	[2.323]
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	400	402	400	391	393	391
Adjusted R^2	0.333	0.330	0.324	0.370	0.368	0.362
Panel B: Demand for Low collateral contract, placebo index						
	(1)	(2)	(3)			
Low collateral	0.582***	0.525***	0.519***			
	[0.056]	[0.113]	[0.117]			
Low collateral*placebo index low	0.012		0.018			
	[0.098]		[0.098]			
Low collateral*Bottom wealth q		0.096	0.098			
		[0.141]	[0.142]			
Low collateral*2nd wealth q		0.013	0.004			
		[0.150]	[0.151]			
Low collateral*3rd wealth q		0.102	0.101			
		[0.138]	[0.139]			
Firm fixed effects	Yes	Yes	Yes			
Observations	464	466	464			
Adjusted R^2	0.411	0.412	0.409			

Notes: The sample is restricted to firm owners who choose to borrow under either the standard contract or the low interest-rate contract in Panel A; to those who choose to borrow under either the standard contract or the low collateral contract in Panel B. *Low interest (Low collateral)* is a dummy=1 if the contract offered is the low interest (low collateral) contract. The *Placebo index low* is a dummy variable=1 if the respondent's 'placebo index' is below the sample median. The placebo index is compiled from answers to questions about the difficulty of repaying loans that are unrelated to fluctuations or unpredictability in sales and demand. Please see notes to Table 2 for further details on the placebo index. The first three columns in each panel show extensive margin demand while the last three columns of Panel A show intensive (total) margin demand, including zeroes. *Mean demand standard contract* displayed below the table indicates the mean hypothetical take up of the standard contract in the relevant base category for each column. Standard errors in brackets are clustered at the firm level, * p<0.1, ** p<0.05, *** p<0.01.

Table A.5: Demand for Low Interest Rate Contract, Extensive margin, excludes those who do not plan to borrow in next 2 years

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Low interest contract	0.156***	0.159***	0.100***	0.111***	0.200***	0.239***	0.159**	0.196**	0.120*	0.161*
	[0.032]	[0.041]	[0.033]	[0.042]	[0.071]	[0.091]	[0.073]	[0.093]	[0.071]	[0.091]
Risk index low	-0.071						-0.087			
	[0.076]						[0.079]			
Low interest*Risk index low	0.204**	0.201*					0.198**	0.197*		
	[0.081]	[0.106]					[0.082]	[0.107]		
Risk averse			-0.076						-0.076	
			[0.060]						[0.061]	
Low interest*Risk averse			0.227***	0.208**					0.225***	0.211***
			[0.062]	[0.081]					[0.062]	[0.080]
bottom wealth q					0.020		0.016		0.023	
					[0.089]		[0.090]		[0.088]	
2nd wealth q					0.034		0.038		0.047	
					[0.090]		[0.090]		[0.090]	
3rd wealth q					0.101		0.108		0.115	
					[0.094]		[0.094]		[0.096]	
Low interest*bottom wealth q					-0.050	-0.088	-0.038	-0.075	-0.058	-0.094
					[0.089]	[0.115]	[0.089]	[0.115]	[0.088]	[0.113]
Low interest*2nd wealth q					0.015	-0.039	0.006	-0.048	-0.027	-0.075
					[0.095]	[0.122]	[0.095]	[0.122]	[0.089]	[0.114]
Low interest*3rd wealth q					0.037	-0.008	0.021	-0.023	0.008	-0.034
					[0.091]	[0.118]	[0.090]	[0.116]	[0.091]	[0.117]
Mean demand standard contract	0.283	0.283	0.252	0.252	0.234	0.234	0.216	0.216	0.267	0.267
Observations	435	435	429	429	435	435	435	435	429	429
Adjusted R^2	0.370	0.655	0.370	0.664	0.362	0.638	0.367	0.652	0.368	0.662

Notes: The sample is restricted to firm owners who report planning to take a loan in the next 2 years. *Low interest* is a dummy=1 if the contract offered is the low interest contract. *Risk index low* is a dummy variable=1 if the risk index is lower than the median. The risk index was compiled from questions measuring whether the respondent faces a business environment with fluctuations or unpredictability. *Risk averse* is a dummy variable=1 if the respondent's risk aversion is greater than or equal to the sample median. Please see notes to Table 2 for further details on the risk index and the risk aversion measure. *Mean demand standard contract* displayed below the table indicates the mean hypothetical take up of the standard contract in the base category, i.e. respondents with risk index low=0 in columns 1, 2, 7, and 8, with risk aversion=0 in columns 3, 4, 9, and 10, and, additionally, in wealth quartile=4 in columns 5-10. Standard errors in brackets are clustered at the firm level, * p<0.1, ** p<0.05, *** p<0.01.

Table A.6: Demand for Low Collateral Contract, Extensive margin, excludes those who do not plan to borrow in next 2 years

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Low collateral contract	0.232*** [0.037]	0.216*** [0.048]	0.272*** [0.046]	0.259*** [0.061]	0.154** [0.060]	0.140* [0.077]	0.093 [0.059]	0.073 [0.074]	0.131** [0.064]	0.112 [0.082]
Risk index low	-0.190** [0.076]						-0.196** [0.078]			
Low collateral*Risk index low	0.290*** [0.087]	0.315*** [0.115]					0.293*** [0.087]	0.317*** [0.114]		
Risk averse			-0.037 [0.063]						-0.032 [0.064]	
Low collateral*Risk averse			0.075 [0.072]	0.081 [0.095]					0.065 [0.072]	0.074 [0.095]
bottom wealth q					0.008 [0.091]		-0.010 [0.092]		0.006 [0.092]	
2nd wealth q					0.029 [0.091]		0.034 [0.092]		0.034 [0.092]	
3rd wealth q					0.106 [0.092]		0.120 [0.091]		0.100 [0.094]	
Low collateral*bottom wealth q					0.242** [0.098]	0.243* [0.129]	0.254*** [0.097]	0.256** [0.128]	0.239** [0.098]	0.240* [0.129]
Low collateral*2nd wealth q					0.139 [0.092]	0.140 [0.121]	0.124 [0.090]	0.124 [0.118]	0.127 [0.094]	0.128 [0.123]
Low collateral*3rd wealth q					0.189** [0.090]	0.199* [0.117]	0.162* [0.085]	0.168 [0.109]	0.200** [0.092]	0.209* [0.120]
Mean demand standard contract	0.283	0.283	0.252	0.252	0.234	0.234	0.216	0.216	0.267	0.267
Observations	423	423	417	417	423	423	423	423	417	417
Adjusted R^2	0.360	0.603	0.334	0.565	0.356	0.577	0.373	0.613	0.346	0.575

Notes: The sample is restricted to firm owners who report planning to take a loan in the next 2 years. *Low collateral* is a dummy=1 if the contract offered is the low collateral contract. *Risk index low* is a dummy variable=1 if the risk index is lower than the median. The risk index was compiled from questions measuring whether the respondent faces a business environment with fluctuations or unpredictability. *Risk averse* is a dummy variable=1 if the respondent's risk aversion is greater than or equal to the sample median. Please see notes to Table 2 for further details on the risk index and the risk aversion measure. *Mean demand standard contract* displayed below the table indicates the mean hypothetical take up of the standard contract in the base category, i.e. respondents with risk index low=0 in columns 1, 2, 7, and 8, with risk aversion=0 in columns 3, 4, 9, and 10, and, additionally, in wealth quartile=4 in columns 5-10. Standard errors in brackets are clustered at the firm level, * p<0.1, ** p<0.05, *** p<0.01.

43

Table A.7: Demand for Low Interest Rate Contract, Extensive margin, excludes firms stating that they do not need capital

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Low interest contract	0.111*** [0.014]	0.110*** [0.019]	0.080*** [0.015]	0.082*** [0.021]	0.097*** [0.028]	0.112*** [0.038]	0.078*** [0.028]	0.093** [0.038]	0.054* [0.028]	0.070* [0.038]
Risk index low	-0.049 [0.036]						-0.049 [0.036]			
Low interest*Risk index low	0.124*** [0.043]	0.125** [0.059]					0.118*** [0.043]	0.120** [0.059]		
Risk averse			-0.015 [0.030]						-0.012 [0.030]	
Low interest*Risk averse			0.119*** [0.028]	0.114*** [0.039]					0.117*** [0.028]	0.113*** [0.039]
bottom wealth q					-0.063 [0.040]		-0.065 [0.040]		-0.061 [0.040]	
2nd wealth q					-0.077* [0.042]		-0.076* [0.042]		-0.076* [0.042]	
3rd wealth q					-0.053 [0.042]		-0.049 [0.042]		-0.051 [0.043]	
Low interest*bottom wealth q					0.010 [0.036]	-0.004 [0.050]	0.012 [0.036]	-0.001 [0.049]	0.000 [0.037]	-0.013 [0.050]
Low interest*2nd wealth q					0.063 [0.040]	0.038 [0.054]	0.059 [0.039]	0.034 [0.054]	0.045 [0.039]	0.021 [0.053]
Low interest*3rd wealth q					0.072* [0.041]	0.051 [0.056]	0.063 [0.041]	0.041 [0.056]	0.061 [0.041]	0.041 [0.057]
Mean demand standard contract	0.139	0.139	0.123	0.123	0.131	0.131	0.131	0.131	0.136	0.136
Observations	1345	1345	1321	1321	1345	1345	1345	1345	1321	1321
Adjusted R^2	0.149	0.637	0.152	0.640	0.147	0.631	0.149	0.637	0.152	0.640

Notes: The sample is restricted to firm owners who report planning to take a loan in the next 2 years. *Low interest* is a dummy=1 if the contract offered is the low interest contract. *Risk index low* is a dummy variable=1 if the risk index is lower than the median. The risk index was compiled from questions measuring whether the respondent faces a business environment with fluctuations or unpredictability. *Risk averse* is a dummy variable=1 if the respondent's risk aversion is greater than or equal to the sample median. Please see notes to Table 2 for further details on the risk index and the risk aversion measure. *Mean demand standard contract* displayed below the table indicates the mean hypothetical take up of the standard contract in the base category, i.e. respondents with risk index low=0 in columns 1, 2, 7, and 8, with risk aversion=0 in columns 3, 4, 9, and 10, and, additionally, in wealth quartile=4 in columns 5-10. Standard errors in brackets are clustered at the firm level, * p<0.1, ** p<0.05, *** p<0.01.

44

Table A.8: Demand for Low Collateral Contract, Extensive margin, excludes firms stating that they do not need capital

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Low collateral contract	0.157***	0.147***	0.156***	0.152***	0.103***	0.094***	0.081***	0.069*	0.082***	0.074*
	[0.016]	[0.022]	[0.021]	[0.028]	[0.028]	[0.036]	[0.028]	[0.036]	[0.031]	[0.039]
Risk index low	-0.085**						-0.083**			
	[0.040]						[0.039]			
Low collateral*Risk index low	0.141***	0.163**					0.136***	0.159**		
	[0.048]	[0.066]					[0.046]	[0.065]		
Risk averse			-0.013						-0.010	
			[0.031]						[0.031]	
Low collateral*Risk averse			0.062*	0.058					0.060*	0.056
			[0.032]	[0.045]					[0.032]	[0.045]
bottom wealth q					-0.043		-0.045		-0.041	
					[0.041]		[0.041]		[0.041]	
2nd wealth q					-0.055		-0.052		-0.050	
					[0.043]		[0.043]		[0.043]	
3rd wealth q					-0.053		-0.046		-0.055	
					[0.043]		[0.042]		[0.043]	
Low collateral*bottom wealth q					0.104**	0.117**	0.107**	0.122**	0.102**	0.116**
					[0.043]	[0.057]	[0.043]	[0.057]	[0.043]	[0.058]
Low collateral*2nd wealth q					0.053	0.055	0.049	0.049	0.043	0.045
					[0.040]	[0.054]	[0.040]	[0.053]	[0.040]	[0.054]
Low collateral*3rd wealth q					0.156***	0.149**	0.144***	0.135**	0.152***	0.146**
					[0.045]	[0.062]	[0.044]	[0.060]	[0.046]	[0.063]
Mean demand standard contract	0.139	0.139	0.123	0.123	0.131	0.131	0.131	0.131	0.136	0.136
Observations	1313	1313	1290	1290	1313	1313	1313	1313	1290	1290
Adjusted R^2	0.204	0.579	0.196	0.569	0.203	0.575	0.206	0.586	0.199	0.576

Notes: The sample is restricted to firm owners who report planning to take a loan in the next 2 years. *Low collateral* is a dummy=1 if the contract offered is the low collateral contract. *Risk index low* is a dummy variable=1 if the risk index is lower than the median. The risk index was compiled from questions measuring whether the respondent faces a business environment with fluctuations or unpredictability. *Risk averse* is a dummy variable=1 if the respondent's risk aversion is greater than or equal to the sample median. Please see notes to Table 2 for further details on the risk index and the risk aversion measure. *Mean demand standard contract* displayed below the table indicates the mean hypothetical take up of the standard contract in the base category, i.e. respondents with risk index low=0 in columns 1, 2, 7, and 8, with risk aversion=0 in columns 3, 4, 9, and 10, and additionally, in wealth quartile=4 in columns 5-10. Standard errors in brackets are clustered at the firm level, * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

45

Table A.9: Heterogenous Effects by Sector

	(1)	(2)	(3)	(4)	(5)
Panel A:	**Demand for Low Interest Rate Contract**				
Low interest contract	0.446***	0.480***	0.444***	0.407***	0.406**
	[0.071]	[0.144]	[0.152]	[0.096]	[0.159]
Low interest*Risk index low	0.236		0.226		
	[0.159]		[0.166]		
Low interest*Manufacturing	0.011	0.053	0.006	0.063	0.063
	[0.118]	[0.236]	[0.242]	[0.155]	[0.253]
Manufacturing*Low interest*Risk index low	0.069		0.088		
	[0.227]		[0.236]		
Low interest*Risk averse				0.137	0.142
				[0.129]	[0.131]
Manufacturing*Low interest*Risk averse				-0.003	0.019
				[0.207]	[0.214]
Mean demand standard contract	0.554	0.520	0.476	0.593	0.583
Wealth controls	No	Yes	Yes	No	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	402	402	402	398	398
Adjusted R^2	0.363	0.329	0.355	0.343	0.340
Panel B:	**Demand for Low Collateral Contract**				
Low collateral contract	0.549***	0.556***	0.515***	0.610***	0.565***
	[0.064]	[0.138]	[0.139]	[0.079]	[0.147]
Low collateral*Risk index low	0.278**		0.276**		
	[0.119]		[0.135]		
Low collateral*Manufacturing	-0.057	-0.094	-0.095	-0.140	-0.164
	[0.112]	[0.242]	[0.246]	[0.146]	[0.250]
Manufacturing*Low collateral*Risk index low	-0.008		-0.003		
	[0.200]		[0.209]		
Low collateral*Risk averse				-0.016	-0.021
				[0.114]	[0.115]
Manufacturing*Low collateral*Risk averse				0.176	0.134
				[0.195]	[0.191]
Mean demand standard contract	0.451	0.444	0.478	0.389	0.400
Wealth controls	No	Yes	Yes	No	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	466	466	466	462	462
Adjusted R^2	0.439	0.425	0.450	0.414	0.423

Notes: In Panel A, the sample is restricted to firm owners who choose to borrow under either the standard contract or the low interest-rate contract. In Panel B, the sample is restricted to firm owners who choose to borrow under either the standard contract or the low collateral contract. *Manufacturing* is a dummy=1 if the respondent's firm operates in the manufacturing sector (as opposed to retail). *Low interest* is a dummy=1 if the contract offered is the low interest contract. *Risk index low* is a dummy variable=1 if the risk index is lower than the median. The risk index was compiled from questions measuring whether the respondent faces a business environment with fluctuations or unpredictability. *Risk averse* is a dummy variable =1 if the respondent's risk aversion is greater than or equal to the sample median. Please see notes to Table 2 for further details on the risk index and the risk aversion measure. *Mean demand standard contract* displayed below the table indicates the mean hypothetical take up of the standard contract in the relevant base category for each column. Standard errors in brackets are clustered at the firm level, * $p<0.1$, ** $p<0.05$, *** $p<0.01$.

Table A.10: Demand for Low Interest Rate and Low Collateral Contracts, using combined and standardized risk measure

Panel A: Demand Low interest contract, extensive margin				
	(1)	(2)	(3)	(4)
Low interest contract	0.508***	0.508***	0.517***	0.517***
	[0.038]	[0.049]	[0.088]	[0.113]
Combined risk low	-0.108***		-0.102***	
	[0.032]		[0.033]	
Low interest*Combined risk low	0.118***	0.118***	0.118***	0.118***
	[0.035]	[0.045]	[0.035]	[0.045]
bottom wealth q			0.096	
			[0.092]	
2nd wealth q			-0.035	
			[0.094]	
3rd wealth q			-0.006	
			[0.092]	
Low interest*bottom wealth q			-0.047	-0.047
			[0.115]	[0.148]
Low interest*2nd wealth q			0.024	0.024
			[0.114]	[0.147]
Low interest*3rd wealth q			-0.009	-0.009
			[0.115]	[0.148]
Observations	398	398	398	398
Adjusted R^2	0.435	0.373	0.431	0.365

Panel B: Demand Low collateral contract, extensive margin				
	(1)	(2)	(3)	(4)
Low collateral contract	0.589***	0.589***	0.542***	0.542***
	[0.034]	[0.045]	[0.085]	[0.111]
Combined risk low	-0.084***		-0.083***	
	[0.029]		[0.031]	
Low collateral*Combined risk low	0.095***	0.095**	0.094***	0.094**
	[0.033]	[0.043]	[0.034]	[0.045]
bottom wealth q			-0.079	
			[0.088]	
2nd wealth q			-0.046	
			[0.092]	
3rd wealth q			-0.070	
			[0.085]	
Low collateral*bottom wealth q			0.094	0.094
			[0.107]	[0.140]
Low collateral*2nd wealth q			-0.001	-0.001
			[0.113]	[0.148]
Low collateral*3rd wealth q			0.064	0.064
			[0.105]	[0.138]
Observations	462	462	462	462
Adjusted R^2	0.509	0.435	0.504	0.432

Notes: The sample is restricted to firm owners who choose to borrow under either the standard contract or the low interest-rate contract in Panel A; to those who choose to borrow under either the standard contract or the low collateral contract in Panel B. *Low interest (Low collateral)* is a dummy=1 if the contract offered is the low interest (low collateral) contract. *Combined risk low* is a dummy for being below the median value on standardized average of the two risk measures used in the main analysis. Standard errors in brackets are clustered at the firm level, * p<0.1, ** p<0.05, *** p<0.01.

Table A.11: Overview of Stated Reasons for Not Planning to Borrow

	N	%
Do not need capital	168	26.75
Interest rate too high	168	26.75
Fear to lose the collateral	159	25.32
Do not have access to collateral	65	10.35
Installments too often	24	3.82
Don't know how to apply	12	1.91
Has no guarantor	4	0.64
Other reasons	28	4.46
Total	628	100

Notes: The sample is restricted to respondents who stated that they do not plan to borrow in the next 2 years. * p<0.1, ** p<0.05, *** p<0.01.

Appendix 2

Loan contract variations

1. **Standard contract**. "Imagine you were offered the opportunity to take a loan. If you decide to take this loan, you can borrow up to 3 million Shillings. You would need to repay this amount plus a 25% interest within one year. The repayments have to be done in equal monthly repayment installments over the year. [SHOW EXAMPLE.] The lender requests security (collateral) in the form of land. That is, in order to borrow a certain amount, for example, 3 million, you need to have formal property rights to land valued at 3 million and in case you fail to repay, the lender will claim the 3 million in terms of your land. If you were offered such a loan, would you choose to borrow? If yes, how much would you like to borrow?"

2. **Low interest rate contract**. "Now think about the loan contract we had above (remind the respondent about the terms equal monthly repayments starting one month after the loan is taken, and collateral in the form of land). Suppose all the terms stay the same except the interest rate on the loan is 20% instead of 25%. [SHOW EXAMPLE.] Do you think this is a better offer compared to the previous loan contract you were offered? If you were offered such a loan, would you choose to borrow? If yes, how much would you like to borrow under this contract?"

3. **Low collateral contract**. "Now think again about the first loan contract we had above (remind the respondent about the terms equal monthly repayments starting one month after the loan is taken, and collateral in the form of land). Suppose all the terms stay the same except the collateral/security was land for 50% (=half) of the value of the loan. Do you think this is a better offer compared to the previous loan contract you were offered? If you were offered such a loan, would you choose to borrow?"

LOAN 1

Loan Size: 3 000 000
Yearly Interest Rate: 25%
Total Interest Rate: 3 000 000 * 25% = 750 000 Ush
Total to Repay: 3 000 000 + 750 000 = 3 750 000 Ush
Monthly Repayments: 3 750 000 / 12 = 312 500 USh

May 2013: 312 500 + Jun 2013: 312 500 + Jul 2013: 312 500 + Aug 2013: 312 500 + Sep 2013: 312 500 + Oct 2013: 312 500 + Nov 2013: 312 500 + Dec 2013: 312 500 + Jan 2014: 312 500 + Feb 2014: 312 500 + Mar 2014: 312 500 + April 2014: 312 500 = TOTAL: 3 750 000

Loan Size: 6 000 000 Ush
Yearly Interest Rate: 25%
Total Interest Rate: 6 000 000 * 25% = 1 500 000 Ush
Total to Repay: 6 000 000 + 1 500 000 = 7 500 000 Ush

Monthly Repayments: 7 500 000 / 12 = 625 000 USh

May 2013: 625 000 + Jun 2013: 625 000 + Jul 2013: 625 000 + Aug 2013: 625 000 + Sep 2013: 625 000 + Oct 2013: 625 000 + Nov 2013: 625 000 + Dec 2013: 625 000 + Jan 2014: 625 000 + Feb 2014: 625 000 + Mar 2014: 625 000 + April 2014: 625 000 = TOTAL: 7 500 000

Figure A 3: Examples, Low Interest Rate Contract

LOAN 2

- Example: Loan Size: 3 000 000
- Yearly Interest Rate: 20%
- Total Interest: 3 000 000 * 20% = 6 00 000 Ush
- Total to Repay: 3000 000+ 600 000 = 3 600 000
- Monthly Repayments: 3 600 000/ 12 = 300 000 Ush

May 2013: 300 000 + Jun 2013: 300 000 + Jul 2013: 300 000 + Aug 2013: 300 000 + Sep 2013: 300 000 + Oct 2013: 300 000 + Nov 2013: 300 000 + Dec 2013: 300 000 + Jan 2014: 300 000 + Feb 2014: 300 000 + Mar 2014: 300 000 + Apr 2014: 300 000 = TOTAL: 3 600 000

LOAN 2

- Example: Loan Size: 6 000 000
- Yearly Interest: 20%
- Total Interest Rate: 6000 000 * 20% = 1200 000 Ush
- Total to Repay: 6000 000+1200 000= 7 200 000
- Monthly Repayments: 7 200 000 / 12 = 600 000 Ush

May 2013: 600 000 + Jun 2013: 600 000 + Jul 2013: 600 000 + Aug 2013: 600 000 + Sep 2013: 600 000 + Oct 2013: 600 000 + Nov 2013: 600 000 + Dec 2013: 600 000 + Jan 2014: 600 000 + Feb 2014: 600 000 + Mar 2014: 600 000 + Apr 2014: 600 000 = TOTAL: 7 200 000
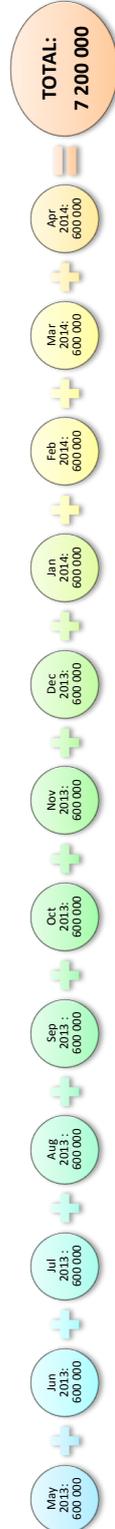
Appendix 3

In the following section we outline the uniting and distinguishing features of Stiglitz and Weiss (1981) and Wette (1983) to help explain the two parts of hypothesis H_1.

The basic assumption of Stiglitz and Weiss (1981) and Wette (1983) is that borrowers differ by a (privately observed) project risk parameter θ, for which there exist a probability distribution of gross returns R. Borrowers are risk neutral and a higher θ corresponds to greater risk in the sense of mean-preserving spreads. The net return of a borrower is given by $\pi(\cdot) = max(R - (1+r)B; -C)$, where R is the interest rate, B the loan amount, and C the collateral requirement. The borrower defaults on the loan if the return R together with the collateral C is insufficient to cover the repayment $(1+r)B$.

A crucial property in both papers is that the expected profit of the borrower, $E[\pi(\cdot)|\theta]$, is an increasing function of project riskiness θ. This follows from limited liability, which implies that profits of a given project are a convex function of the gross return R (see Figure A1 below). An increase in risk thus increases the expected profit of the borrower.

Figure A 1: Firm profits are a convex function of the return on the project
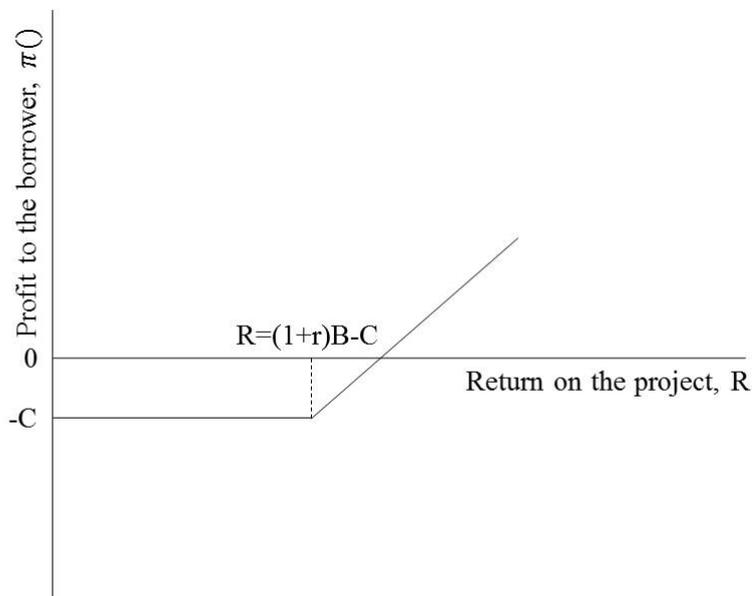
Moreover, for a given interest rate r and collateral C it follows from the convexity of the profit function that there is a critical value $\hat{\theta}$ such that an individual borrows if and only if $\theta \geq \hat{\theta}$. This is because expected profits increase with risk and so there has to exist a risk level θ

that yields zero expected profit. Subsequently, all projects with $\theta \geq \hat{\theta}$ will be undertaken while projects with risk levels below $\hat{\theta}$ will not.

Based on these shared assumptions and results, Stiglitz and Weiss (1981) goes on to analyze the implications of raising the interest rates while Wette (1983) investigates a rise in the collateral requirement. However, the underlying logic across the two papers is the same. Both an increase in the interest rate (holding collateral constant) or an increase in collateral (holding the interest rate constant) decreases $E\left[\pi\left(\cdot\right)|\theta\right]$ for every θ, meaning they increase $\hat{\theta}$, so the population of firms that demand a loan becomes more risky. The intuition for the adverse selection following the higher interest rate is that because of limited liability, the riskier projects are the most profitable from the borrowers' point of view. As the interest rate rises, the less risky projects become unprofitable so borrowers do not undertake them.

In the case of collateral, for a given project (given θ), an increase in the collateral requirement unambiguously increases the cost–and decreases the profit–to the borrower for some realizations of R. Consequently, expected profit for that project declines (see Figure A2). This decrease in expected profit on each project means that some projects that were profitable at the initial level of C become unprofitable at the new, higher level of C. These have to be the low-risk projects (as expected profit increases in risk). Together, these two results underlie our first hypothesis, H_1.

Figure A 2: Firm profits and different collateral requirements for a given project
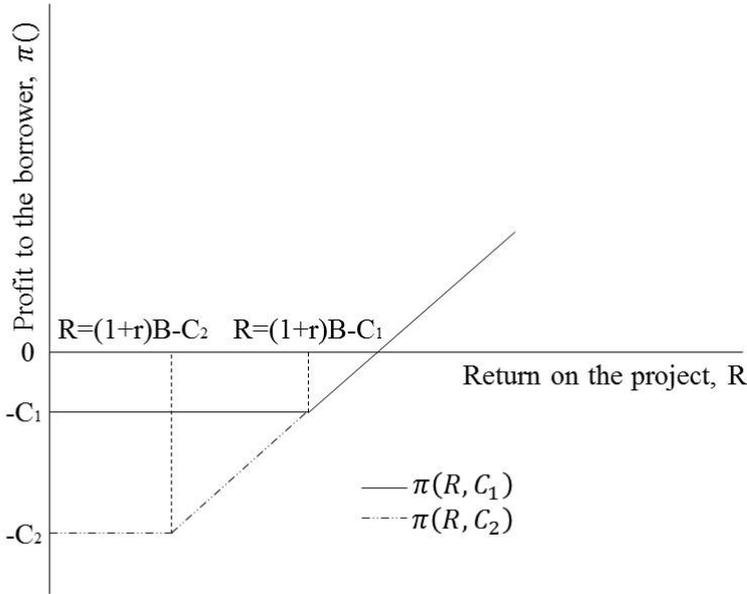
To summarize, when changes in either the interest rate r or the collateral requirement C are analyzed separately (that is, holding C fixed when looking at changes in r and vice versa) the two policy instruments yield similar results in terms of borrower selection. This follows from the assumption of limited liability which makes the riskier projects more viable. Intuitively, the difference between the two instruments is that a higher interest rate affects the cost of the project when it "succeeds" while a higher collateral requirement affects the cost of the project when it "fails".