

# Knowing what's good for you: Can a repayment flexibility option in microfinance contracts improve repayment rates and business outcomes?\*

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## Abstract

Flexible microfinance contracts can help borrowers mitigate the negative effects of income fluctuations. But the additional liquidity repayment flexibility entails can increase default. Can this risk be mitigated by using contract price as a screening mechanism? We implement a randomized experiment where, in treated branches, borrowers select between the standard, rigid contract and a more expensive flexible contract. In control branches, customers are only offered the standard contract. Treated clients have similar repayment rates but better business outcomes. Selection is important: in treated branches, time-consistent and financially sophisticated borrowers are significantly more likely to opt for the flexible repayment schedule.

**Keywords:** Microfinance, Repayment Flexibility, Borrowers' Selection, Contract Design

**JEL Codes:** O12, O16, C93, D91

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\*Funding from IGC (1-VRF-VINC-VXXXX-89219); from the British Academy/Leverhulme Small Research Grants (SRG1819-190902); from the Griswold Center for Economic Policy Studies and Warwick Business School (Barboni) is gratefully acknowledged. RCT ID: AEARCTR-0002259. IRB Approval obtained at IFMR-LEAD and Trinity College Dublin. Ethical Committee Approval from HSSREC also obtained at Warwick University. We thank Prachi Agarwal, Khushboo Gupta, Sitaram Mukherjee, Alreena Pinto, Rupika Singh, Mallika Sridhar, Hongdi Zhao and especially Arjun Malhotra and Anisha Singh for outstanding research assistance. We are grateful to Pierre Bachas, Lasse Brune, Kristina Czura, Will Dobbie, Thomas Fujiwara, Selim Gulesci, Johannes Haushofer, Asim Khwaja, Adrien Matray, Atif Mian, Jonathan Murdoch, Natalia Rigol, Ben Roth, Giudy Rusconi, Ketki Sheth, Jack Willis, Motohiro Yogo, and many other seminar participants for comments, discussions and suggestions. We also thank those at Princeton University, Zurich University, Munich University, Imperial Business School, University of Bonn, University of Venice, Warwick University, Oxford CSAE, 2017 IPA Financial Inclusion Researcher Gathering, 2017 Advances in Field Experiment Conference, NBER Productivity, Development and Entrepreneurship, NBER Household Finance, SITE Development Economics. We are particularly indebted to Rohini Pande. All errors are our own.

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# 1 Introduction

Repayment flexibility allows borrowers to make larger investments and to insure themselves against negative cash-flow shocks. Flexible repayment schedules can be especially useful to microentrepreneurs living in developing countries, who are likely to experience irregular income streams but are constrained by a limited set of financial instruments to cope with volatile cash flows.

Yet flexible debt contracts might not suit *every* borrower. Borrowers differ in their business characteristics and behavioral traits; those who are time-inconsistent or highly risk-loving may be more likely to default under repayment flexibility. It follows that in contexts where it is costly for lenders to ascertain borrowers' characteristics – as is often the case in developing countries –, offering flexible contracts to all customers can translate into high default rates (Field et al., 2013, Czura, 2015). Since lenders cannot identify ex-ante which customers may be more or less suitable for a flexible repayment schedule, they find it risky to offer repayment flexibility. This explains why most microfinance institutions (MFIs) rarely offer flexible contracts and, instead, provide standardized “rigid” contracts. Such contracts require frequent repayments to help borrowers keep repayment discipline, thus ensuring high repayment rates.

The poor performance of flexible repayment schedules in microfinance presents a challenge as to how such contracts can be designed and offered in order to be sustainable for MFIs. In this paper, we argue that allowing borrowers to choose between a flexible and a rigid contract, when the former is made more expensive than the latter, mitigates the adverse selection problem lenders face that prevents them from realizing the full potential of flexible contracts. Offering repayment flexibility as a more expensive contract option triggers a (positive) selection mechanism wherein borrowers choose the repayment schedule that best suits their characteristics.

If a flexible contract were provided at the same price as the rigid contract, it would be implicitly more advantageous, since it would include the repayment flexibility without additional costs. Borrowers who instead choose the rigid contract over the flexible contract, despite the latter being cheaper, likely are doing so for behavioral motives – that is, because they are sophisticated enough to understand they need a “commitment device” to discipline themselves to comply with the rigid repayment schedule. These borrowers are willing to sacrifice the economic benefits of a flexible schedule to avoid defaulting and to continue their relationship with the lender.

Conversely, a contract where the repayment schedules are offered simultaneously at different prices would trigger a selection mechanism based not only on borrowers' behavioral traits but also on their expected returns to capital. Indeed, borrowers are likely to choose the flexible contract as long as their returns to capital are equal to or higher than the price of the flexible contract. By contrast, borrowers whose returns to capital are lower than the contract price are screened out (De Mel et al., 2008; McKenzie and Woodruff, 2008; Barboni, 2017). The more expensive flexible option should be chosen not only by borrowers who are already financially disciplined and therefore do not need a commitment device, but also by those who are more likely to invest in high-risk and high-return projects and thus have higher expected returns to capital. Such contracts should perform better, both in terms of business income and repayment rates, than a contract where microfinance borrowers are exogenously assigned the flexible schedule or where they are offered only the standard microfinance contract that does not allow a repayment holiday.

We test these predictions through a Randomized Controlled Trial set up in Uttar Pradesh, India and carried out in partnership with a local Microfinance Institution, Sonata Microfinance Ltd. (Sonata hereafter).<sup>1</sup> The experiment is used to study the impact of offering a choice between a flexible, more expensive contract and a standard, rigid, and cheaper contract, on both repayment rates and business outcomes. We designed the flexible contract in collaboration with Sonata to allow borrowers to waive repayments during the loan cycle and to exercise this option whenever they needed it the most. The flexible contract thus provides borrowers with additional liquidity that can be used to “reshuffle” their cash flows throughout the year and to smooth out business irregularities.

About 800 customers from Sonata were involved in the experiment across twenty-eight branches, half of which were randomly assigned to the treatment group. These borrowers had just graduated from group loans and had approached Sonata for the first time for individual loans, which are larger in size than typical group loans and targeted for business purposes. In treated branches, the lender offered both the flexible and the standard rigid contract, the former being more expensive than the latter. In control branches, only the standard rigid contract was offered.

We report results from three data collection rounds: The baseline, which was conducted at the time of loan disbursement; The midline was carried out approximately 8 months after loan disbursement; The endline was conducted after all loan cycles had been concluded. Almost one-third of the treated borrowers chose the more expensive flexible contract versus the rigid one, showing that flexible contracts are desirable for microfinance borrowers, even when they are more expensive than the standard rigid contract. When comparing treatment with control group, we find that offering a pricey flexible option has a positive impact on borrowers, both in the short- and long-term: business sales and profits are higher in the treatment than in the control group. At the end of the study, using administrative data from Sonata, we find similar default rates across treatment and control group, suggesting that the selection mechanism triggered by the contract works effectively, and that offering repayment flexibility as a more expensive contract option is also optimal for lenders. We also find that treated borrowers are more likely to repay their loans at Sonata before the due date, while they are also less likely to request additional, top up, credit during their loan cycle. Taken together, these results confirm that the flexible contract provides additional liquidity to borrowers.

All in all, our findings show that including a flexible repayment option at a higher price improves borrowers’ returns without undermining repayment rates. Most importantly, such contracts appear sustainable for microfinance lenders. One *caveat* to our analysis is that due to technical problems in their Management Information System (MIS), Sonata was not able to offer a repayment holiday during the second year of the contract to *any* customer who had chosen the flexible contract at the beginning of the study. Evidence that treated borrowers saved less than control ones at endline might be interpreted as treated customers’ strategy to cope with this unexpected income shock. Nevertheless, the magnitude of the treatment effects we observe at endline in terms of business outcomes is similar to midline results, suggesting that even providing only one three-month repayment holiday can have long-lasting effects.

In contrast to existing studies on repayment flexibility (Field et al., 2013; Czura, 2015), our novel experimental design allows us to relate borrowers’ choice of the flexible versus the rigid contract with

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<sup>1</sup><http://www.sonataindia.com>

their business characteristics and behavioral traits. We find that time-consistent borrowers, those who have an appetite for risk, those who report being more worried about future events, but also those who report giving financial advice to others are more likely to opt for the flexible contract. This result suggests that offering both repayment schedules simultaneously, and including a pricey flexibility option, selects “high-quality” entrepreneurs into the flexible contract.

One must notice that our treatment consists in offering a combination of contract features (price and flexibility option). Including a treatment where both contracts had the same price might have allowed us to distinguish the respective impact of each dimension, but it was not feasible because of administrative and bureaucratic constraints.<sup>2</sup> In order to address this issue, at least partly, we performed a set of qualitative interviews with treated borrowers and asked how they perceived the price of the flexible schedule versus the rigid one and what made them opt for one or the other. Results suggest that borrowers consider the higher price of the flexible contract “fair” – they seem to recognize that the advantages of benefiting from a repayment flexibility option should come at a premium for the lender.

Our paper is the first to study borrowers’ selection in the context of flexible repayment contracts and to establish a causal link between borrowers’ selection, repayment rates, and business growth. More generally, our paper is intended to contribute to the growing debate on customers’ selection in credit contracts in developing countries by showing that a screening mechanism that builds on contract choice through different prices could be implemented effectively to identify more entrepreneurial and financially sophisticated borrowers, when lenders lack information on their quality.

We see the contribution of our paper to the microfinance literature as threefold: first, we test the impact of flexible schedules on repayment rates and business growth in a viable context for MFIs. One objective of this study has been to provide guidance to Sonata – and, in general, to MFIs – on how to introduce flexible repayment schedules in a sustainable way. Our paper aims to contribute to the research on the role of innovations in microfinance contracts in developing countries to promote entrepreneurship among micro- and small enterprises without negatively affecting repayment rates (Feigenberg et al., 2013; Field et al., 2013; Battaglia et al., 2018; Czura, 2015). Our study not only corroborates previous findings that rigid microfinance schedules impede microentrepreneurs’ business activities from growing beyond subsistence level (Field et al., 2013; Fischer, 2013), but we also show that the rigid contract can be less profitable for lenders compared with a menu of contracts where both schedules are offered simultaneously with different prices (Barboni, 2017).

Second, we address the issue of selection in microfinance contracts by studying a novel way for lenders to screen borrowers: leveraging their sensitivity to contract price. We show that when a pricey flexible option is available, borrowers select the contract that is optimal both for themselves and for the lender. Our findings therefore suggest that by offering appropriate financial contracts, lenders are able to identify more entrepreneurial and financially disciplined borrowers, even in the absence of traditional screening instruments like credit bureaus or balance sheet data. In this sense, our study is closely related to Rigol et al. (2017)’s paper, which analyzes the role of local information in predicting

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<sup>2</sup>Battaglia et al. (2018) study the introduction of repayment flexibility when the flexible contract is priced at the same interest as for the rigid contract. Though their flexible contract have different characteristics, they find similar results to our paper.

microentrepreneurs' quality and find that peers can predict "high types" of entrepreneurs in their network.

Last, our paper speaks to the literature that analyzes how financial products can reduce the negative effects of behavioral biases (Bauer et al., 2012; John, 2015; Ashraf et al., 2006; Brune et al., 2016; Sprenger and Stavins, 2010). Our results show that behavioral traits that can lead to poor repayment (and business) performance, and which often deter lenders from introducing more sophisticated financial products, can be largely mitigated by allowing borrowers to choose their preferred repayment schedule. Our paper aligns with Bauer et al., 2012, who finds that time-inconsistent borrowers are more likely to prefer a rigid contract to a flexible one, precisely because it works as a commitment device. Although less-frequent repayment schedules have been shown to lead present-biased borrowers to over-borrow, at least theoretically (Fischer and Ghatak, 2010), our findings suggest that even time-inconsistent borrowers can discipline themselves by choosing the most appropriate contract for themselves.

From a policy perspective, our experiment leads to two main sets of recommendations: First, offering flexible schedules as a contract option represents an optimal strategy not only for lenders but also for borrowers. Despite the common belief that the rigid repayment schedule is necessary to discipline borrowers,<sup>3</sup> it may be beneficial for MFIs to move from the standard rigid contract toward more sophisticated contracts that allow borrowers to select their preferred repayment schedule. Second, behavioral characteristics matter for contract choice. Therefore, for microfinance borrowers' business activities to grow beyond the subsistence level and for them to continue to have access to microcredit, MFIs should offer more tailored financial products whose design takes into account borrowers' behavioral traits.

The remainder of the paper is organized as follows. Details on the flexible contract are discussed in Section 2. Section 3 describes the experiment and its target population; results, both in terms of business performance and repayment rates, are discussed in Section 4. That section also explores whether an effective selection has been implemented by offering both repayment schedules simultaneously. Section 5 concludes.

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<sup>3</sup>In his prominent book "Banker to the Poor," while describing the creation of the Grameen Bank, the first Microfinance Institution, Yunus (2003) stressed the importance of having "equal weekly installments [and] repayments start[ing] one week after the loan" (p. 110). He also emphasized that frequent repayments were more manageable and easier to be repaid, as "[...] large amounts are difficult to part with" (ibid., p. 31). In Yunus' opinion, rigid repayment schedules allow borrowers to maintain financial discipline.

## 2 The flexible contract

From January 2016, we partnered with an Indian Microfinance Institution, Sonata Financial Services Ltd. (Sonata), to design a flexible contract to offer its customers. Sonata is based in Lucknow (Uttar Pradesh, northern India) and operates throughout India with a network of 478 branches (data from 2019). Like most Indian MFIs, Sonata offers both group and individual loans. Individual loans are usually more expensive than group loans, are for larger amounts, and are targeted for business purposes. Customers who want to take an individual loan from Sonata must first have taken a few group loans (usually between three and four group loans). Conditional on their successful repayment behavior in the group lending schemes, these borrowers are then eligible for individual loans.

At the time we started discussions with Sonata, they did not have flexible contracts, but were interested in these innovative products and therefore we developed them together. The aim was to offer a flexible contract that would help borrowers cope with business fluctuations, whether from high-risk investments or other negative income shocks. Concerns for higher levels of borrower default under more flexible schedules had prevented the implementation of such a contract.<sup>4</sup>

With this in mind, we helped the product team at Sonata design a contract that would give borrowers the possibility to waive repayments at some point during the loan cycle and to exercise this option when they needed it the most. This, in turn, would allow individual-lending customers to better manage their business cash flows.

The flexible contract which resulted feasible gave borrowers the opportunity to exercise a three-month repayment holiday, which must have been continuous. Since all individual loans offered by Sonata have a maturity of twenty-four months,<sup>5</sup> this repayment holiday was initially designed to be used twice over the entire loan maturity, once every twelve months. However, as we already mentioned, Sonata was not able to offer the repayment holiday in the second year of maturity because of technical reasons. To be eligible to exercise the first repayment holiday, borrowers had to successfully repay at least three monthly loan installments after loan disbursement. Once this condition was satisfied, they could exercise the repayment holiday any time they wanted, provided they gave Sonata a one-month notice.

Figure 1 shows a representation of the flexible contract Sonata ultimately offered, and highlights how it differs from the rigid contract usually offered by the MFI. It plots the outstanding amount of the loan over the number of installments to be repaid by Sonata's customers. The standard, rigid contract can be thought of as a "straight bond": Borrowers have to repay equal installments (which include capital plus interest) on a monthly basis over the entire loan cycle. The flexible contract, in contrast, allows borrowers to suspend payments for some time during the loan cycle. At the end of this repayment holiday, repayments resume and the residual outstanding amount to be repaid is spread over the remaining installments. As a result, the size of the installments after the repayment holiday is larger than before the repayment holiday. The flexible contract can be thought of as a "line of credit" available to borrowers (Sannikov, 2007): By skipping repayments, borrowers are implicitly provided with more liquidity, which can be used as a buffer against shocks or to make business investments.

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<sup>4</sup>This means that when we started the intervention, Sonata had never before offered a flexible contract.

<sup>5</sup>Borrowers still have the possibility of repaying the loan in advance if they want to.

Since the flexible contract carries a higher risk, it would be a more expensive option than the standard, rigid contract. To calculate the right interest rate that would entice borrowers who would be successful, we built on the results from a set of lab-in-the-field games where we elicited borrowers' (hypothetical) willingness-to-pay for a flexible, as opposed to a rigid, microfinance contract (Barboni, 2017). We arrived at the price of the flexible contract at 26%, versus the rigid contract, which was offered at 24%.<sup>6</sup>

A more detailed description of how the flexible contract worked "in practice" is shown in figure 2.<sup>7</sup> In the figure, the repayment pattern of the standard, rigid monthly repayment loan is compared with that of the flexible contract. In this example, both loans have the same size (38,000 Rs, approximately 500 USD, the average loan size for Sonata), but borrowers end up paying different installments each month. As already discussed, both borrowers would have started repaying with a monthly schedule, the customer choosing the flexible option having a slightly larger installment, as the 26% interest rate instead of the 24% interest rate applied from the first repayment. After the first three months, the repayment holiday could be exercised at any time. During the repayment holiday, flexible borrowers had to pay a small "flexibility fee". Once the repayment holiday was over, monthly repayments resumed, and the residual loan balance was spread across the remaining months. At the time of the contract offer, borrowers were also told that if they decided to exercise the repayment holiday again during the second year of their maturity, they must have done so before the 21st month. This was to avoid installments that would have become too large for the borrowers in the very last months of the loan cycle.

The way it was conceived and designed, the flexible-contract structure ensures that the Net Present Value of the flexible contract is always higher than the rigid contract for the lender – from the moment of the contract choice, the flexible contract is more expensive than the rigid one.

## 2.1 Selection into repayment flexibility

By offering both contracts simultaneously, one being more expensive than the other, borrowers should select the repayment schedule that suits best their characteristics. In terms of business performance, customers should select the flexible schedule if their expected returns to capital are higher than its price, and the opposite for the rigid schedule. At the same time, sophisticated borrowers – that is, those who are aware of their personality traits and of any bias that might affect their behavior – should choose the contract that helps them maximize their repayment rates, if they value continuing their relationship with the lender.<sup>8</sup>

The type of behavioral biases we consider here range from borrowers' time-inconsistency (especially in the form of lack of self-control), to excessive risk-taking behavior, to a lack of financial

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<sup>6</sup>Sonata charges 24% on its "regular" rigid individual loans.

<sup>7</sup>A very similar image was shown to treated borrowers to help them understand the characteristics of the flexible contract.

<sup>8</sup>The costs associated to the interruption of the lending relationship with Sonata, or, more in general, with an MFI for these borrowers is quite high in this context. In fact, these customers have spent several months being screened by their current lender to be able to borrow individual loans. In case they have to switch to a different lender, it is likely that they have to start this screening process again – our impression, by talking to Sonata and other MFIs, is that lenders only partly rely on credit registry information to lend to new customers.

discipline or adequate financial literacy. While borrowers may not necessarily display all of these traits simultaneously, what these have in common, in the context of micro and small enterprises, is that they may compromise borrowers' ability to correctly predict and evaluate cash flows, potentially leading to poor repayment performance.

From a theoretical perspective, selection in microfinance contracts through flexible repayment schedules has received very little attention. The only exception we are aware of is [Barboni \(2017\)](#), who looks at borrowers' selection into rigid and flexible contracts based on their time-inconsistency, in the form of present-bias, which is modeled as  $\beta$ - $\delta$  discounting.

Barboni's model shows that by offering both contracts simultaneously, the flexible contract being more expensive than the rigid one ("mixed contract"), the microfinance lender can reach a separating equilibrium where present-biased borrowers will choose the rigid contract, while time-consistent ones will opt for the flexible contract. Importantly, this contract performs better than the standard rigid contract when enough borrowers in the pool are time-inconsistent.

These theoretical predictions were then tested through a set of lab-in-the-field games, in the form of a Multiple Price List (MPL), with microfinance borrowers in India. The games consisted of a hypothetical willingness-to-pay lottery, which is used to estimate the demand for repayment flexibility, as well as to elicit borrower "types" along many dimensions, including behavioral traits. Consistent with the model, the study finds that preferences for the rigid versus the flexible repayment schedule highly correlate with borrowers' behavioral characteristics. In particular, different attitudes toward risk and business performance significantly drive borrowers' choice for rigid versus flexible contracts.

In this paper, we design a field experiment that allows us to assess how relevant borrowers' behavioral traits are for contract choice. We conjecture that, if the screening mechanism works effectively, we should observe borrowers with time-inconsistent preferences, as well as high risk-aversion levels and low financial literacy rates choosing the rigid contract to a larger extent than the flexible contract. This is because such borrowers might be more exposed to the perils embedded in a flexible repayment schedule. Conversely, time-consistent and more risk-loving, or financially sophisticated borrowers should opt for the flexible repayment schedule. They would benefit from the possibility to "reshuffle" their cash flows and repayments over time and at the same time have the ability to correctly manage the larger installments following a repayment holiday.

Against this background, we therefore make the following predictions:

### **Prediction 1**

*The pricing structure of the contract menu acts as a screening mechanism and enhances borrowers self-selecting a repayment schedule based on their characteristics.*

### **Prediction 2**

*If Prediction 1 is satisfied, offering the flexible and the rigid contract simultaneously has better outcomes than the standard, rigid contract in terms of repayment rates, business outcomes, and, as a consequence, the lender's profits.*

Capturing every borrower's trait that can be predictive of the take-up of either the rigid or the



flexible schedule is a relatively unexplored task. At baseline, we collected extensive data that aimed at gathering a full set of subjects' characteristics, including, among others, time preferences, risk preferences, financial literacy, personality traits, and expectations on future life outcomes.

In the next sections, we provide a detailed discussion of how we use these characteristics to assess whether providing the flexible and the rigid contract simultaneously works as an effective screening mechanism.

### 3 The Experiment

To test the above predictions, we designed and set up a field experiment in India in collaboration with IFMR-LEAD (now LEAD at Krea University), which organized and carried out all the field operations. It began in January 2016; midline data were collected between May and July 2017; endline data collection was completed in August 2019.

Twenty-eight branches of Sonata were selected in Uttar Pradesh for the experiment<sup>9</sup>, either in urban or peri-urban areas, and randomly assigned to either the treatment or the control group using a pair-matching algorithm, as shown in Figure 3.<sup>10</sup>

Figure 4 shows the experimental design. Both in the control and treatment groups, subjects approached the branch to get a twenty-four month individual loan with a rigid repayment schedule, which is offered by Sonata at a standard interest rate of 24%.<sup>11</sup> Branches catchment area spans several kilometers, and borrowers typically approach the closest bank branch to their place of residency or business location.

Once Sonata's loan officers ascertained eligibility for an individual loan, customers in treated branches were offered the opportunity to choose between the product they asked for (i.e., the rigid contract) and a flexible contract offered at an interest rate of 26%. Customers in control branches were only offered the rigid contract at 24%. The study sample consists of first-time individual lending borrowers. All subjects were micro-entrepreneurs who took up the loan to make an investment for their business activity. Sonata indeed collects detailed data on the loan purposes and verifies them.

Loan disbursement began in May 2016 and continued until December 2016 accompanied by a simultaneous comprehensive baseline survey. All loan cycles were concluded by early 2019. An extensive follow-up survey was carried out from May 2017 to July 2017, on average eight months after the baseline, when the average borrower had repaid approximately one-third of his loan. Endline data collection was conducted between June 2019 and August 2019. We complement information from primary data with administrative data from Sonata to measure repayment rates and new loan applications.<sup>12</sup>

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<sup>9</sup> Around 9% of Sonata's total branches at the beginning of the study

<sup>10</sup> Our unit of randomization is the bank branch and, because of that, we always cluster standard errors at the branch level in the analysis of treatment effects. In the coming sections, we also discuss randomization inference.

<sup>11</sup> The same interest rate applies, irrespective of loan size.

<sup>12</sup> Since customers were offered the flexible repayment schedule as a more expensive option than the rigid contract – that is, the intervention comes as a bundle (option *and* price) – our experimental design does not distinguish the selection deriving from the provision of repayment flexibility as a contract choice from the selection triggered by borrowers' demand for flexibility at different prices. The ideal design for such an experiment would have involved randomizing the price of the flexible contract across different branches, but was not feasible be-

Before the intervention, we ran a set of hypothetical willingness-to-pay lotteries in the form of a Multiple Price List and used those to estimate microfinance borrowers' demand for repayment flexibility. Results from these experiments are extensively discussed in [Barboni \(2017\)](#).<sup>13</sup> They show a substantial drop in borrowers' demand for a flexible contract when the difference in price between the flexible and the rigid contract is equal to or higher than two percentage points. One potential interpretation is that until the prices of the two contracts are equal or just slightly different, borrowers perceive the flexible contract as a cheaper contract, because they value the repayment holiday as an additional benefit of the contract. As the difference in price across the two contracts begins to increase, costs outweigh the benefits of repayment flexibility, and indeed [Barboni \(2017\)](#) observes that the take-up rate for the flexible contracts at higher prices is associated with borrowers displaying higher revenues. Informed by these findings, the price of the flexible contract was set exactly two percentage points higher than the rigid one.

In addition, at midline, we performed a set of qualitative interviews with Sonata's customers. In particular, customers assigned to the treatment group were asked how they perceived the price of the flexible schedule versus the rigid one, what made them opt for either one or the other, and how much they would have been willing to pay for the flexible contract. Borrowers who, in the treatment group, opted for the flexible contract, believe that the higher price of the flexible contract is "fair". This suggests that not only they have understood the difference in price between the two contracts, but they also acknowledge that they should pay more for benefiting from a repayment flexibility option.

### 3.1 Sample and Outcomes Measurement

A total of 799 borrowers were involved in the study: 410 in the control and 389 in the treatment branches. All were clients of Sonata who had successfully repaid the required loans as group-lending borrowers and approached Sonata to get an individual loan. However, these borrowers had not yet taken an individual loan from Sonata. This sample of borrowers was particularly suitable for the experiment, for two main reasons: First, subjects were entrepreneurs with business growth potential and, as such, had borrowing needs for productive purposes. Second, these individuals had never taken individual loans before, nor benefited from repayment flexibility. Therefore, their preferences for repayment flexibility were driven solely by their circumstances and characteristics, and not by any learning from previous experiences with flexible loans. This condition is further ensured by the fact that, to the best of our knowledge, no MFI in India was offering a flexible contract at the time we started the intervention.

In terms of data collection, the baseline survey instrument contained questions aiming to detect subjects' socio-demographic profile, business characteristics, and borrowing and saving behavior, as well as to measure borrowers' aspirations, use of time, personality traits, and financial literacy. Two sets of games were also played to elicit both time and risk preferences.

Borrowers' attitude toward risk was measured with a standard Multiple Price List (MPL), similar

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cause of technical and administrative reasons.

<sup>13</sup>We must stress that the lab-in-the-field games were not administered specifically to Sonata's customers, but to a sample of group-lending borrowers who had just become eligible for individual loans in Kolkata and who had never been exposed to flexible repayment schedules.

to [Holt and Laury \(2002\)](#). The MPL protocol in our case consists of presenting the subjects with two different hypothetical lotteries, Lottery A and Lottery B, entailing six decisions. Payouts are constant in both lotteries, but the probabilities of success change from one decision to the next, with Lottery B being riskier than lottery A. Until round three, lottery A gives a higher expected value than lottery B. Starting from round four, Lottery B yields a higher expected value. Therefore, subjects who stay with Lottery A longer than three rounds display increasing levels of risk aversion. Conversely, subjects switching to Lottery B in the earlier rounds display increasing levels of risk-tolerating behavior.

In addition, we assessed subjects' intertemporal preferences using standard list choices, similar to [Harrison et al. \(2002\)](#). This protocol consisted of two hypothetical lotteries. In the first, the respondent had to choose between 200 Indian Rupees (Rs. 200) to be received the day after the interview and an equal or larger sum (Rs. 200, 240, 260, 280, 300) to be received one month later. The second lottery "shifted" the time horizon of the first lottery by three months. Combining the two lotteries allows one to estimate the subjects' discount rate and detect any time inconsistency. If a subject preferred Rs. 260 one month later to Rs. 200 paid tomorrow, she should have also preferred Rs. 260 paid four months in the future to Rs. 200 paid three months in the future. This behavior is defined as "time consistent." Still, preference "reversals" may emerge. For example, when a subject prefers Rs. 260 one month later to Rs. 200 paid tomorrow, but the choice is reverted for the later rewards, the subject is said to display hyperbolic discounting, as shown by [Mahajan and Tarozzi \(2011\)](#). Conversely, when a subject prefers Rs. 260 one month later to Rs. 200 paid tomorrow, but this choice is reverted for the earlier rewards, the subject displays anti-hyperbolic discounting.<sup>14</sup>

The midline and endline we carried out after about eight and twenty-four months from baseline, respectively, contained questions on loan usage, business performance, borrowing, savings, and expenditures, among others. These data were complemented by repayment information from Sonata, together with data on whether and when borrowers who had opted for the flexible repayment schedule used the repayment holiday.

Of the 799 individuals we interviewed at baseline, we were able to re-interview 789 at midline, and 761 at endline, with an implied attrition of 1.2% and 4.8%, respectively.<sup>15</sup>

Our experimental subjects are not the typical microfinance borrowers described by [Yunus \(2003\)](#); they are mostly male, micro and small entrepreneurs, and they are not borrowing through a group. Our results might therefore not apply to the female group borrowers that represent the most widely known microfinance model in developing countries. Our sample population is much more similar to the customers of banks and larger Non-Banking Financial Companies (NBFCs) in less-developed countries; it must also be mentioned that the characteristics and business models of our borrowers are not largely different from those in more advanced economies. In terms of external validity, our results can apply to a larger set of subjects and, most importantly, to both developing and developed countries.

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<sup>14</sup>Although less documented in the behavioral economics literature, anti-hyperbolic discounting has been reported in a number of contexts (see [Read et al., 2013](#)).

<sup>15</sup>Attrition is balanced across treatment and control for both midline and endline data collection. Migration, lack of interest in participating in the survey, as well as a subject's death were among the reasons we were not able to re-interview those borrowers. A few months after loan disbursement, Sonata's loan officers found that 12 borrowers (1.5% of the original sample) had actually taken a loan for somebody else. In order to avoid any potential endogeneity, we kept these subjects in the sample.

### 3.2 Randomization and Balancing Checks

We set up a Clustered Randomized Controlled Trial where the unit of randomization is Sonata’s bank branch. Before randomizing branches into treatment and control, we paired them using the Edmond algorithm for minimum distance, and then assigned each branch of each pair to either treatment or control. This allowed us to maximize the power of the experiment, given the relatively small number of clusters in the study. 389 subjects were recruited in treatment branches, while 410 subjects were recruited in control branches. These figures represent the universe of individual lending customers in the branches during the months we carried out the baseline.

Table 1 reports balancing checks across the treatment and control groups for the main demographic variables, as well as for wealth, income, and borrowing behavior. The businessperson in the household was targeted to be interviewed and, when this was not available, we resorted to the person in the household who had the most extensive knowledge of the business activity. The households in our sample consist on average of six members, they were predominantly Hindu, and with the heads of household being 41 years old, on average. Ninety-seven percent of the household heads are male, and about 40% have completed at least middle school. Slightly less than half of households report owning land, at baseline. Average household income in the last twelve months was about 220,000 INR ( $\approx$  3,000 USD). Taking into account average household size, this means that households in our sample on average live (slightly) above the poverty line. Average total business sales reported for the last month were 15,000 INR ( $\approx$  200 USD), suggesting that business income represents a very large part of households’ total income. At baseline, less than one in five households had an outstanding loan, revealing that our subjects lack borrowing opportunities outside of Sonata.<sup>16</sup> The average size of the loans borrowed from Sonata was 39,000 INR ( $\approx$  600 USD). This is significantly higher than standard group-lending loan size, which usually ranges between 10,000 INR and 20,000 INR ( $\approx$  150 USD-300 USD). In terms of business activities, all borrowers were micro-entrepreneurs engaged in small-business activities that predominantly entailed producing and/or selling goods and services.

Treatment and control groups were balanced along the subjects’ main socio-economic dimensions, suggesting that the randomization has worked well. We detect a small imbalance in terms of education of the household head: The share of individuals who completed middle school is slightly lower in the treatment versus the control group (4 p.p. less in treatment, significant at 5%), while the reverse holds true for the share of individuals who completed a higher degree (6 p.p. more in treatment, again significant at 5%).<sup>17</sup> Treatment and control groups were also balanced in terms of land ownership, income, and business performance (reported at baseline), as well as borrowing and savings behavior. We find a slight imbalance in the type of business activities held in the treatment versus the control group. Treated subjects are more likely to be small manufacturers/artisans/tailors, while control subjects are more likely to own a grocery store – though the difference is quite small (six percentage

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<sup>16</sup>There might be other reasons for explaining the low borrowing rates: First, most of the subjects had already repaid their group-lending loans and were about to borrow as individual-lending customers for the first time. Second, Indian regulations regarding microfinance institutions does not allow microfinance borrowers to hold more than two or three outstanding loans from MFIs. Last, borrowers might under-report informal borrowing.

<sup>17</sup>Throughout the analysis, we will therefore control for education level to take into account for this imbalance.

points).<sup>18</sup>

## 4 Results

Our experimental design allows us to look at three main sets of results. First, comparing the treatment and control groups and using both administrative data from Sonata and primary data collected on the field, we study the impact of providing a menu of contracts versus the rigid contract on borrowers' repayment rates and business income.<sup>19</sup> Better business outcomes in the treatment as compared with the control branches without worsening of repayment rates would suggest that this menu of contracts represents an effective screening mechanism for Sonata.

Second, using baseline data from the treated branches, we study which borrowers' characteristics are predictive of the choice for the flexible versus the rigid contract.

Finally, by using administrative data gathered from Sonata, we carry out a Cost-Benefit Analysis (CBA) of each contract, in order to understand whether offering the flexible schedule as a more expensive option is a sustainable financial product for Sonata.

In the following paragraphs we first perform the Intention-To-Treat (ITT) estimates and compare the treatment and control branches to study the treatment effects in terms of loan usage, repayment rates, business outcomes, and borrowing and saving behavior. We then turn to our first stage to look at which variables predict the take up of the flexible schedule. Last, based on the findings from the Cost-Benefit Analysis we performed using administrative data from Sonata, we discuss to what extent providing a flexible contract can be sustainable for Microfinance Institutions.

### 4.1 Treatment Effects

The following regression equation allows us to estimate the ITT:

$$y_{ibp} = \alpha + \beta T_{bp} + pair_p + \epsilon_{ibp} \quad (1)$$

where  $y_{ibp}$  is the outcome of interest (loan usage; repayment performance; business outcomes; borrowing, savings and expenditures) for individual  $i$  in branch  $b$ , belonging to pair  $p$ .  $T_{bp}$  is a binary variable for the treatment assigned to the branch  $b$  - whether borrowers were only offered the standard rigid contract ( $T_{bp} = 0$ ) or, instead, both contracts at different prices ( $T_{bp} = 1$ ).

Our coefficient of interest is  $\beta$ , which measures the average causal effect of being offered the menu of contracts versus the standard rigid contract. Standard errors are clustered at the unit of randomization, that is at the branch level (Abadie et al., 2017). We include branch-pair fixed effects to control for stratified sampling.<sup>20</sup>

Given that treatment and control group were balanced at baseline, we estimate equation (1) with

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<sup>18</sup>We take into account these imbalances in the main analysis by including controls for the type of business activity carried out by borrowers.

<sup>19</sup>We also present here results for formal and informal borrowing, formal savings and consumption.

<sup>20</sup>Given concerns for the relatively small number of clusters in our experiment, we account for randomization inference and also estimate our results using the *ritest* Stata command. We thank Thomas Fujiwara for pointing this out.

midline and endline data only. Our analysis will present results using data from both survey rounds for two main reasons: (i) At midline, loan repayment was not completed and this might have influenced some of the other outcomes; (ii) Since Sonata did not provide the repayment holiday in the second period, it is important to show whether, and to what extent, some of the borrowers' outcomes might have changed across time. We also include an additional specification (Panel B) that introduces a vector of controls at the individual level,  $X_{ibp}$ , selected using Double LASSO regression (Belloni et al., 2014).<sup>21</sup>

#### 4.1.1 Loan Usage

The first outcome we look at in estimating equation (1) is loan usage. This is to ascertain whether any difference can be detected across the treatment and control groups in the way borrowers have employed the loan from Sonata.

Our field team collected data on loan usage at midline. We were concerned that asking borrowers what they were planning to use the loan for immediately at baseline was too sensitive a question – subjects might have worried that we would report this information to Sonata and as a result, potentially provide biased answers. To avoid any confounding factor, we decided to ask this information only during the second round of data collection, when loan disbursement had already happened.<sup>22</sup> As required by the MFI's enrollment protocol, customers have to state their borrowing purpose to Sonata's loan officers when they apply for the loan. Not surprisingly – both because of the very nature of individual loans and because this information was collected by Sonata directly – all borrowers at the start of the loan cycle reported they would use the loan for business investments.

Results for loan usage are shown in Table 2. Loan-usage main categories included: buy agriculture inputs, buy other inputs, make improvement works, start new businesses, purchase more stock during festivals, repay old debt. We also included nonbusiness-related loan usage categories such as consumption and other expenditures (health, education, weddings, funerals). Borrowers could report multiple usages for their loans.

Interestingly, despite the large majority of borrowers report using the loan to make investments to improve their business (71% of borrowers in the control group, not significantly different from the treatment group), we find that borrowers in the treated branches are more than twice (117%) as likely to use the loan to buy more stock during the festivals. At the same time, borrowers in treatment branches are 33% significantly less likely to use the loan for agriculture inputs. Finally, borrowers are more likely to use the loan for consumption – though point estimates are very small.

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<sup>21</sup>The full list of controls includes: household size; age and education of the head of the household; religion; caste; land ownership; sector of business activity; household income; monthly and weekly sales, total formal and informal borrowed amount; total savings; difference in profits between best and worst month of the year. All these outcomes were measured at baseline except for the level of education of the head of the household and religion and caste that were measured at midline (education) and endline (religion and caste). While we do not see any reason for our intervention to have changed religion and caste – which, particularly in the Indian context, can be reasonably assumed to be time-invariant, we also believe that the level of education of the household head (who on average is more than 40 years old), which was measured after just eight months on average from baseline, should have not been affected by our study.

<sup>22</sup>For baseline information, we rely on Sonata's administrative data on borrowers' self-reported intended loan usage.

All in all, results from Table 2 suggest that the subjects in the treated group are more likely to invest in seasonal business activities. At the same time, they are less likely to borrow for agriculture activities, potentially suggesting a shift from agriculture towards non-agriculture occupations. Moreover, they are also more likely to divert part of their loans toward consumption. This is consistent with the idea that being offered the possibility to choose between a rigid and a flexible contract allows borrowers to better manage their cash flows, thus increasing investment during the business peak season, as well as to use this extra liquidity for consumption purposes.

#### 4.1.2 Default Rates, Loan Prepayments, and New Loan Applications

Repayment rates are crucial to determine whether the flexible contract is a sustainable product from the lender's perspective. So far, studies on repayment flexibility have shown that flexible repayment schedules lead to an increase in delinquencies and defaults when these are exogenously assigned to borrowers (Field et al., 2013; Czura, 2015).

Repayment rates for the standard, rigid contract in the microfinance industry are very high: Sonata's yearly loan default rate at the beginning of the study was, for instance, less than 3%. This explains MFIs' concerns about introducing products that could potentially undermine their ability to retrieve credit owed.

Our analysis of repayment rates relies on default rates measured in terms of the probability borrowers have completed the repayment of their loan to Sonata. Sonata also allows borrowers to complete their repayment earlier than the loan closing date. We obtained administrative data from Sonata on borrowers' loans closing dates, as well as on new loan applications after having closed the loan under study, in order to gather a comprehensive picture of their repayment performance and borrowing behavior from Sonata.<sup>23</sup> We estimate equation (1) using loan-completion probability, early repayment completion, and new loan applications to Sonata as dependent variables.<sup>24</sup> Results are displayed in Table 3, without and with controls, in Panel 1 and 2, respectively.

Column (1) shows that about 90% of borrowers in control group have completed the repayment of their loan on time, with borrowers in treatment group displaying a similar repayment pattern. This result is very relevant in this context, as it indicates, in contrast with most of the literature studying the impact of introducing repayment flexibility in microfinance contracts, that offering a menu of contracts that vary in price and flexibility does not harm repayment rates. Column (2) reports results for early loan closures (loan early closures): we find that borrowers in treatment group are 31% significantly more likely than borrowers in control group to have repaid their loan earlier than the due date. Finally, Column (3) of Table 3 shows that borrowers in treatment group are twice as likely to request a new loan at Sonata than the control group, after having repaid their current loan.<sup>25</sup>

All in all, results from Table 3 show, on the one hand, that offering both schedules simultaneously performs at least as well as the standard, rigid microfinance contract. This confirms **Prediction 2**: If the screening mechanisms enhanced by the more expensive flexibility option works effectively, offer-

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<sup>23</sup>Sonata does not allow borrowers to take two loan products simultaneously.

<sup>24</sup>For obvious reasons, this is the only regression equation we estimate using final outcomes only.

<sup>25</sup>We report results for new-loan requests instead of new loans granted to avoid confounding effects of endogeneity and discretion from Sonata in giving out new loans.

ing the flexible and the rigid contract simultaneously performs better than the standard rigid contract in terms of repayment rates. Our findings appear in stark contrast to the existing literature: Indeed, both [Field et al. \(2013\)](#) and [Czura \(2015\)](#) find that offering a flexible contract undermines repayment rates. On the other hand, results from Column 2 of Table 3 suggest, again in line with our hypotheses, that the repayment holiday provides borrowers with additional liquidity: this, in turn, allows treated borrowers to manage their cash flows to a better extent and even pre-pay their loans to a higher extent than control borrowers. Finally, one last insight we can gather from Table 3, Column (3), is that borrowers in the treatment group appreciated the financial product they received, and are willing to continue their borrowing relationship with Sonata to a greater extent than borrowers in control group. In some sense, this is also reassuring in light of Sonata’s inability to offer a second repayment holiday: the fact that Sonata did not fully execute the flexible financial contract seems not to have jeopardised their relationship with the customers.

### 4.1.3 Business Outcomes

The third set of outcomes we look at relate to the differences in business performance between the treatment and the control group. As we discussed in section 2, borrowers should choose the flexible contract as long as their returns to capital are greater than or at least equal to the interest rate of this contract. Therefore, in theory, the screening mechanism triggered by the pricey flexible option ensures that borrowers who choose the flexible contract are the high-revenue ones – and are also time-consistent, as shown by [Barboni \(2017\)](#). The extra liquidity provided by the flexible schedule allows these borrowers to “reshuffle” their cash flows over the loan cycle. More flexibility in managing business income should thus allow these clients to either cover their losses or to further reinvest profits, or both. This should translate into increased business sales in the treatment group as compared with the control group, both as a result of greater investment or losses mitigation. To see whether this hypothesis is confirmed, we study business performance by first looking at the timing of usage of the repayment holiday and then estimating equation (1) with business sales and profits, measured both at midline and endline.

When designing the flexible contract with Sonata, the reason for setting the repayment holiday as a continuous three months-period was twofold: first, the festival season in India typically lasts three months (September to November or October to December, depending on the year). Festival months are likely to be an ideal period for borrowers to exercise the repayment holiday – as results from Table 2 also suggest. Flexibility in repayment would in fact give them enough time to reinvest returns generated from their business activity, which are notably higher during the festival months. Second, three months are sufficiently long enough to allow borrowers to recover from any potential shock, or from the business “lean” season, or simply to be able to collect returns generating from a more illiquid investment.

Figure 5 shows in which months flexible borrowers exercised the repayment flexibility. This is used to study whether any pattern can be identified in terms of *when* this option was taken. Among borrowers who selected the flexible schedule in the treated branches (120 out of 389, 31%), 56% ultimately exercised the repayment holiday during the first year. The figure plots the share of eligible borrowers exercising the repayment holiday in each month – that is, those who had already com-



pleted the three compulsory monthly repayments and therefore could use the repayment holiday any time by giving Sonata one month's notice.<sup>26</sup>

If borrowers intended to use the repayment flexibility only during the festival season, we should see a very high share of eligible borrowers starting to exercise the repayment holiday from September 2016<sup>27</sup> or over the following months. Figure 5 shows that only 1.7% and 3.4% of eligible borrowers used the flexibility option in September and October 2016. On the contrary, many more borrowers opted for waiving repayments in December 2016 (almost 20%) and February 2017 (18%). All in all, Figure 5 shows that borrowers exercised the repayment holiday mainly in two occasions: during the festival months, but also during the lean season starting with the new year. This suggests that borrowers did not use the repayment holiday just to increase revenues during the high season. On the contrary, they also appear to demand flexibility to get additional liquidity during periods of business downturns. Both behaviors are compatible with using the repayment holiday to better manage cash flows, thus shifting liquidity when it is most needed and allowing for planning expenditures in advance.<sup>28</sup>

Keeping this in mind, we turn to the analysis of business performance by looking at business sales. We mainly focus on the level of total business sales in the last month and last week, as reported by borrowers. These measure the total business sales from the business activities borrowers took up a loan for from Sonata at baseline, and are meant to be representative of a typical month and a typical week of borrowers' business activities. In the Appendix, table A.1 shows results for *new* business activities – those that borrowers started some time during the study time span. We do not study these outcomes in the main analysis as the loan from Sonata was not tied to these business activities. We also analyse business profits, measured as business revenues minus costs. We report profits only at endline, as costs were imprecisely measured at midline. Results are shown in Table 4. Panel 1 shows results without LASSO-selected controls, which are added in Panel 2. We find that borrowers in the treated branches report higher weekly and monthly sales than those in the control group, the difference between treatment and control being statistically significant both at midline and at endline – except for weekly sales at endline, which are still positive. Monthly and weekly sales reported at midline by borrowers in the treatment group are approximately 17% and 35% higher than those in the control group, respectively (Column 1 and 2). Column (3) and (4) of Table 4 report monthly and weekly sales at endline. Monthly sales at endline are still 25% significantly higher in treatment than in control, confirming the magnitude of treatment effects. We then study profits at endline: monthly profits are computed as monthly revenues minus monthly costs.<sup>29</sup> Treatment effects for endline profits are displayed in Column 5: while the business activities of borrowers in control group operate

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<sup>26</sup>We subtract from the pool of eligible borrowers in each month those who exercised the repayment holiday in the previous month.

<sup>27</sup>The first month that eligible borrowers in our sample could have started using the repayment holiday.

<sup>28</sup>Consistent with this view, we can make the claim that the one-month notice borrowers must give to Sonata before exerting the repayment holiday does not limit or constrain the use of the flexibility option. Indeed, if the repayment holiday allows borrowers to shift liquidity across months, such strategy requires some planning on the borrowers' side which a one month notice is not likely to affect.

<sup>29</sup>We include the following cost categories: input costs; rent of land and cost of storage; utilities; wages/salaries; travels to meet suppliers; marketing; renovation of business premises; cleaning and maintenance costs; rent on machinery and equipment; minor repairs.

on average in loss (the mean of the dependent variable for control group is about minus 13,500 Rs), borrowers in treated branches do actually break-even, on average, and are able to realise positive and significant profits.

All in all, results from Table 4 show that the flexible contract allows borrowers to carry out higher-revenues and more profitable business activities. This is consistent with the view that the repayment holiday is used to reshuffle borrowers' cash flows throughout the year, as well as to better cope with shocks. In the next section, we complement results from Table 4 by looking at microentrepreneurs' investment behavior. This is used to understand whether the flexible contract, beside smoothing cash flows irregularities, also led to changes in business stock and size (measured in terms of number of employees).

#### **4.1.4 Treatment Effects on Investment and Employment**

For the microbusinesses included in our study, inventory represents the main margin of investment. Table 5 looks at treatment effects in terms of amount of stock held by borrowers at midline (column 1) and endline (column 2). Borrowers in treatment report larger stock in their business at the time of the interview. However the difference with the control group is not statistically significant. We also look at differences in labor across treatment and control group: we do find that borrowers in treated branches are employing a significantly lower number of workers in the business than in control – however, the magnitude of the effect is economically very small (1.6 workers on average in control group vis-a-vis 1.5 workers in treatment group). All in all, results from Table 5 show that borrowers do not seem to have used the repayment holiday to increase the extent of their business – neither in terms of capital nor of labour. This supports the idea that treated borrowers have mainly used the repayment holiday to reshuffle cash flows throughout the year, in order to recover more easily from periods of bad income realization or to take greater advantage from high-income periods.

#### **4.1.5 Treatment Effects on Borrowing, Savings and Expenditures**

Results so far have shown that borrowers in the treated branches perform better in terms of business revenues than borrowers in the control group, without any negative effects on repayment rates. By looking at both the timing of repayment holidays and the differences in business outcomes across treatment and control, our findings confirm the hypothesis that repayment flexibility, at least in the form of the contract Sonata offered, helps borrowers smooth irregular cash flows by providing extra liquidity. This, in turn, allows borrowers to increase their business income while also limiting their losses.

In this section, we study treatment effects on two sets of ancillary outcomes: borrowing, as well as savings and expenditures. We first look at changes in clients' borrowing behavior as a result of our intervention. The aim is to determine whether the additional liquidity derived from the flexible option is itself sufficient to cover borrowers' financial needs. We then look at differences between the treatment and control groups in terms of both expenditures and savings, to see how the flexible contract led to changes on consumption and savings choices.

We study two main sets of borrowing outcomes: the extensive and intensive margin of credit, and

the probability that borrowers asked for a top-up to their current loans including, but not limited to, the loan from Sonata. Loan top-ups are a common product at MFIs, and typically consist of a one-shot extra credit, at the same interest rate of the current loan (24% at Sonata). The size of the loan top-up is quite arbitrary: It depends on the borrower's request, the size of the loan previously borrowed, and also on the borrower's repayment performance. Results from this analysis are shown in Table 6. We do not detect any significant differences in borrowing from informal sources, neither at midline (Column 2) or endline (Column 4), when we add selected control variables. At the same time, while subjects in our experiment reported to borrow significantly more from formal sources at midline (potentially to further mitigate cash-flow irregularities – this is shown in column 1 of Table 6), we do not detect any significant difference in formal borrowing across treatment and control at endline. The last outcome variable we analyse in terms of borrowing is the probability borrowers requested a loan top up. Results are shown in column (5) of Table 6. Borrowers in the treated branches are 75% less likely to request a loan top up from a formal financial institution, including Sonata, the coefficient being statistically significant and of the same magnitude after including baseline controls. In line with our hypotheses, this result suggests that the borrowers in the treated group are in less need of credit than those in the control group: The repayment holiday appears to provide the additional liquidity that borrowers otherwise might seek from a loan top up.<sup>30</sup> At the same time, this finding also shows that borrowers in the treatment group value the advantages of repayment flexibility more than advantages deriving from a loan top up. This suggests that borrowers not only appreciate the provision of the extra liquidity derived from the repayment holiday but also that the flexible contract allows them to manage their cash flows better.

We then look at treatment effects on savings and expenditures. To this end, we asked borrowers to report expenditures on a number of items, including meat and vegetables, temptation goods<sup>31</sup>, education and health. Results are shown in table 7. We do not observe any statistically significant difference in expenditures between treatment and control across survey rounds. We do, however, observe a significant reduction in savings at endline, as shown in column 3 of table 7. This result may suggest that treated borrowers had to cut down savings in order to cope with the unexpected negative shock coming from the lack of the second repayment holiday.

## 4.2 Disentangling the Screening Mechanism

The analysis so far has shown that borrowers in the treatment group display similar repayment rates than those in the control group; they also report higher sales and higher profits. Finally, they are less likely to request a loan top-up. Offering both the rigid and the flexible repayment schedules versus only the rigid contract appears to enable borrowers to benefit from additional liquidity. This, in turn, allows them to manage their cash flows to a better extent. On the contrary, lack of evidence on the acquisition of business capital suggests that repayment flexibility is not used to make large-scale investments, but rather to manage day-to-day business in a better way.

All in all, our findings show that the more expensive flexible option works as an effective screening

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<sup>30</sup>The dependent variable here represent any loan top up from any formal financial institution. Estimation results remain significant and with the expected sign also after restricting top up loans only from Sonata.

<sup>31</sup>Alcohol, cigarettes. Also mobile phone expenses are grouped in this category.

mechanism – borrowers who chose the flexible schedule have better business outcomes, while being also able to repay.

In this section, we look in greater detail at this selection effect. To this end, we focus on the treatment branches and use the extensive data collected at baseline to understand which characteristics predict whether a borrower will choose the flexible contract. Overall, 120 out of 389 individuals chose the flexible schedule, a take-up rate of 31%. Recalling our predictions in section 2, we expected borrowers whose returns to capital are equal to or higher than the contract price to have chosen the flexible contract. At the same time, if borrowers value continuing their relationship with the lender, we should expect those who anticipate having more difficulties making payments under the flexible contract (time-inconsistent and financial illiterate customers, for instance) to be less likely to choose the flexible schedule over the rigid one (Barboni, 2017).

#### 4.2.1 Borrowers’ Selection into the Rigid Versus the Flexible Repayment Schedule

To study selection, we focus on the treatment branches and look at who chose the flexible versus the rigid repayment schedule. To this end, we recall **Prediction 1** from section 2: By offering the flexible contract as a more expensive option, borrowers should sort themselves into the most suitable repayment schedule, given their characteristics.

We therefore study which borrowers’ baseline characteristics are predictive of the choice for the flexible versus the rigid contract, by estimating the following regression equation:

$$probflex_{ib} = \beta X_{ib} + \epsilon_{ib} \quad (2)$$

where  $probflex_{ib}$  is the probability that borrower  $i$  in a treated branch  $b$  chooses the flexible contract when he is offered both schedules, and  $X_{ib}$  is a vector of borrowers’ variables including behavioral (time preferences, risk aversion, financial literacy) and business characteristics (income, wealth, sales).

Table 8 focuses on behavioral characteristics. In particular, we analyze the predictive power of time preferences, risk aversion, financial literacy, and other behavioral traits, on contract choice. We estimate equation (2) always including the type of business activity borrowers were carrying out at baseline. This is because the seasonality of cash flows associated with a certain business may affect borrowers’ attitude toward time and risk, among others. Column 1 of Table 8 shows that time-consistent borrowers are significantly more likely to choose the flexible contract compared with time-inconsistent ones. We then further distinguish time-inconsistent borrowers between present-biased and future-biased borrowers (columns 2), and find that both categories are less likely to opt for the flexible repayment schedule, compared with time-consistent borrowers.<sup>32</sup>

We also find evidence that risk-loving borrowers are significantly more likely to choose the flexible contract (column 3). We then look at borrowers’ business literacy (columns 4), and find that

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<sup>32</sup>One possible explanation for why we find that both present- and future-biased borrowers are less likely to take up the flexible contract is that the flexible contract seems to be appealing mainly to forward-looking, time-consistent borrowers. As such, all time-inconsistent borrowers, either present- or future-biased, are less attracted by such contracts.

borrowers who report drafting a budget for their business activity on a frequent basis (daily, weekly, or fortnightly) positively, but not significantly predict the take up of flexible contract.<sup>33</sup> Column 5 shows that borrowers who report being more worried about future events are more likely to choose the flexible contract – a potential explanation for this is that these borrowers may feel better insured by a flexible contract. Finally, Column 6 also shows that borrowers who report giving other people financial advice are more likely to take up the flexible contract. We interpret this variable as an indicator of the borrower’s financial sophistication, that also translates into the choice of more innovative financial contracts.

All in all, results from Table 8 suggests that time-consistent and financially sophisticated borrowers, as well as those who are more inclined to take risk, are more likely to choose the flexible contract. This confirms our hypothesis that the more flexible schedule represents an effective screening mechanism for the lender.

We then turn to baseline business characteristics and wealth, including land ownership, income, and business sales. Results are shown in Table 9. Interestingly, the only “hard-information” characteristics that predict borrowers’ probability of choosing the flexible contract are the (log) variability of monthly sales and the (log) difference of profits borrowers report in the best and the worst months of their business activity across the previous twelve months, as shown in column (4) and (5) respectively of Table 9. We interpret these results as evidence that borrowers that experience larger business fluctuations across the year are more likely to opt for the flexible repayment schedule. In line with [Fafchamps \(2013\)](#), this suggests that business irregularity is a big concern for the microentrepreneurs in our sample. As such, those who suffer more from unstable income are, in turn, more likely to opt for the flexible schedule. At the same time, our results confirm [Karlan and Mullainathan \(2007\)](#)’s view that rigid contracts may discourage more lucrative customers from borrowing, partly because these borrowers are very concerned about defaulting. Offering a pricey option thus seems to encourage those clients to borrow and to make additional investments in their business activity.

#### 4.2.2 Predicting Take-Up of the Flexible Contract: Observables Versus Unobservables

In light of our results, one might wonder what lessons we can learn from the screening mechanism triggered by the pricey flexibility option – in particular, what is the predictive power of behavioral vis-a-vis hard-information characteristics in the choice for flexible contract?

To answer these questions, we run a regression including all the predictors examined in Table 8 and Table 9. Results are shown in table A.2 in the Appendix. We observe that behavioral traits like time consistency and risk aversion still significantly predict the take up of the flexible schedule after including “hard-information” characteristics. We also use the Shorrocks-Shapley decomposition of the R squared ([Shorrocks, 2013](#)) and we find that behavioral traits contribute to explain more than 60% of the R squared. This once again confirms the predominant role of behavioral traits over hard-information indicators in the contract choice.

Results from Table 8 and 9, as well as Table A.2, also raise additional questions on the type of screening mechanisms lenders should implement when offering new financial products. If it is possible to

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<sup>33</sup>The  $\beta_5$  coefficient is significant when we do not include business fixed effects, suggesting that it is the nature of the business itself that may require borrowers to draft budgets at a different frequency.

identify a set of characteristics that are predictive of the choice of the flexible schedule, does this imply that lenders can simply use a few screening tests before loan disbursement to measure borrowers' traits and subsequently assign each borrower a repayment schedule? If this were the case, it would suggest that the screening mechanism relies fully on borrowers' *observable* characteristics and that giving borrowers a choice is not so important, after all. In reality, however, we find that borrowers' *unobservable* characteristics play a major role in driving their decisions. By testing all predictors together in table A.2, we find that these variables contribute to explain only a small portion of borrowers' probability to choose the flexible contract – the  $R^2$  of such regressions is 11%, suggesting that there is a large set of “unmeasurable” characteristics that play a big role for selection – which are also hard to capture by lenders when screening applicants.

All in all, our results show that any screening technique lenders can adopt – IQ tests, psychometric measurements, or risk assessments – can be helpful in guiding them toward the identification of borrowers who might be suitable for the flexible repayment schedule. However, none of these measures would probably be fully predictive of the profile of the ideal customer to be offered the flexible contract. This leads us to conclude that it is only by giving borrowers a choice between the two contracts that the screening mechanism is fully implemented, resulting in better repayment rates and better business outcomes.

### 4.3 Cost-Benefit Analysis

As a final step in this paper, we look at the sustainability of the flexible contract for Sonata. To this end, we gather administrative data from our partner MFI to carry out a Cost-Benefit analysis of introducing the flexible repayment contract. Results are shown in Table 10. The analysis of branch-level monthly data from August 2018 to May 2019 reveals that treated branches performed not significantly differently than control ones, along several dimensions including Portfolio at Risk indicators (number of loans that are either 30-days or 90-days due); Branch Productivity (number of loans per loan officers); Number of active loans per branch per month. While we plan to gather additional branch-level indicators – and for a longer time horizon – in order to strengthen the profitability analysis of Sonata, these findings already show that the flexible repayment contract Sonata offered is a sustainable financial product. This is especially important since, unlike state banks or large non-profit organizations, Sonata is a private financial company with minimal government support. Hence, results highlighting the sustainability of this flexible loan should hopefully encourage more Microfinance Institutions to adopt such innovative financial contracts, at least in the space of individual business loans.

### 4.4 Discussion of results

Our analysis has shown that when borrowers were offered repayment flexibility as a more expensive contract option, 31% of them chose the flexible contract and this allowed them to increase their business sales without negatively affecting their ability to repay.

The main channel through which the pricey flexible option has worked is by triggering a selection mechanism across borrowers, whereby the more financially disciplined and forward-looking individuals are more likely to choose the flexible contract. The flexible contract allows these borrowers to

“reshuffle” their cash flows throughout the year. The flexibility can be thought of as a line of credit, or more simply as an injection of additional liquidity that helps borrowers manage their business activity on a daily basis, thus limiting the extent of negative shocks. Evidence that treated borrowers increase their sales and manage to make profits suggests that the repayment holiday is used to cleverly reshuffle cash flows, as well as a buffer against negative income realizations.

As already pointed out, one of the potential limitations of the flexible contract tested in this study is that it is a bundled product: It is more expensive than the standard rigid contract, but it is also offered as an option. This implies that we cannot really distinguish the effect of contract price from that of the contract option on borrowers’ demand for flexibility.

In order to partly address this issue, we conducted a set of qualitative interviews with borrowers who chose the flexible option, both a few months after loan disbursement and contract choice, as well as the end of the loan cycles. These interviews were meant to understand what made these borrowers opt for the flexible contracts, whether they felt it was adequately priced, and their overall degree of satisfaction for this loan product. Results from these interviews suggest, first of all, that borrowers were very satisfied with the product, and they precisely used the repayment holiday to smooth business irregularities. They also mentioned they would have liked to use the repayment holiday over the second year of loan maturity, if this was available. Finally, they acknowledged that the flexible contract is adequately priced: A difference of two percentage points in the interest rate between the flexible contract and the rigid contract appears to them as a *“a fair price to pay to benefit from repayment flexibility”*.<sup>34</sup>

This confirms our intuition that flexible contracts should be offered as a more expensive financial contract in order to be appealing to those borrowers who precisely recognize their value and intrinsic advantages. Results from the Cost-Benefit Analysis add to our findings by providing Sonata with a clear business rationale for offering flexible repayment schedules as a more expensive contract option – and indeed, now that the new MIS is in place, Sonata is planning to expand this line of financial products into new geographical areas.

## 5 Conclusions

Although repayment flexibility allows borrowers to manage their cash flows better and to further reinvest their profits, flexible repayment schedules are rarely offered in the context of microfinance. This is because flexible microfinance contracts have been shown to increase borrowers’ default rates.

Motivated by the poor performance of flexible schedules in microfinance, we sought to study the impact of introducing repayment flexibility in microfinance contracts as a more expensive option. Our interest lies in understanding whether this could be a sustainable approach for microfinance lenders, and how such a contract would perform compared with the standard rigid microfinance contract.

Through a Randomized Controlled Trial (RCT) we tested the impact, both in terms of repayment rates and business outcomes, of providing repayment flexibility to microfinance borrowers in the form of a contract option, versus offering them only the standard rigid contract. In the treated branches, the lender offered a menu of contracts including both the flexible and the standard rigid

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<sup>34</sup>Words pronounced by a subject during an interview conducted on a subject in October 2017.

contract, the former being more expensive than the latter. In the control branches, only the standard rigid contract was offered. The flexible contract was designed to allow borrowers to “waive” repayments during the loan cycle and to exercise such an option whenever they needed it the most.

Almost one third of borrowers in the treated group chose the more expensive flexible contract versus the rigid one. When comparing the treatment with the control group, we find monthly sales to be about 20% higher in the treatment group than in the control. This does not come at the cost of loan repayments: default rates, at the end of the loan cycle, are not significantly different between treatment and control. We also detect a lower need for extra liquidity among treated borrowers, in the form of loan top-ups.

By looking at the selection mechanism triggered by the contract option, we find that time-consistent, risk-taking and more financially sophisticated borrowers are more likely to opt for the flexible contract, suggesting that giving borrowers the opportunity to choose the contract they prefer successfully attracts borrowers who value the benefits of repayment flexibility the most. The flexible contract, in turn, gives borrowers the possibility of benefitting from extra liquidity that can then be used to reinvest in their business activity.

Our paper is the first study on borrowers’ selection in the context of flexible repayment contracts. Indeed, our focus not only lies in estimating the impact of repayment flexibility on business outcomes and repayment rates but also in understanding which borrowers’ characteristics drive the choice for rigid versus flexible contracts. Our experimental design allows us to observe microfinance borrowers’ choice for flexible versus rigid schedules and to relate this choice to their characteristics and behavioral traits. On a broader level, our paper is intended to contribute to the growing debate on customers’ selection in credit contracts in developing countries by showing that a screening mechanism that builds on contract choice through different prices could be implemented effectively to identify more entrepreneurial and financially sophisticated borrowers, when lenders lack information on their quality.

Finally, from a policy perspective, our experiment leads to two main sets of recommendations: First, offering flexible schedules as a contract option represents an optimal strategy not only for lenders but also for borrowers. Thus, it would seem to be beneficial for MFIs to move from standard rigid contract towards sophisticated contracts that allow borrowers to select their preferred repayment schedule. Second, behavioral characteristics matter for contract choice. Therefore, in order for microfinance borrowers’ business activities to grow beyond the subsistence level and for them to continue to have access to microcredit, MFIs should offer more tailored financial products whose design takes into account borrowers’ behavioral characteristics.

Taken together, our findings highlight the need for conducting further research that explores different ways of modifying contract characteristics and introducing repayment flexibility in microfinance contracts. The main objective of this research agenda is to guide lenders in developing countries to adopt a more personalized approach toward their customers, catering to borrowers with heterogeneous business opportunities and financial needs, as well as different behavioural characteristics.



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## 6 Figures and Tables

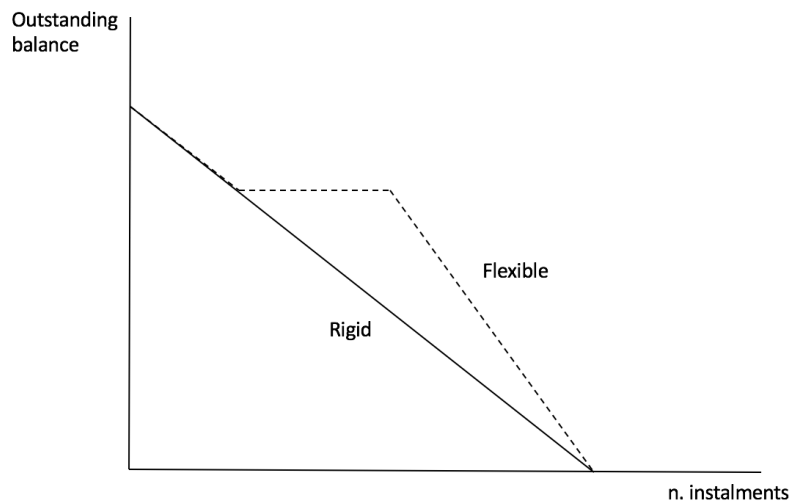


Figure 1: Flexible contract versus rigid contract

Month #	Rigid Cash Flows	Flexible Cash Flows
0	38000	38000
1	-2009	-2047
2	-2009	-2047
3	-2009	-2047
4	-2009	-2047
5	-2009	-2047
6	-2009	-304
7	-2009	-304
8	-2009	-304
9	-2009	-2509
10	-2009	-2509
11	-2009	-2509
12	-2009	-2509
13	-2009	-2509
14	-2009	-2509
15	-2009	-304
16	-2009	-304
17	-2009	-304
18	-2009	-3695
19	-2009	-3695
20	-2009	-3695
21	-2009	-3695
22	-2009	-3695
23	-2009	-3695
24	-2009	-3695

Figure 2: Flexible contract versus rigid contract

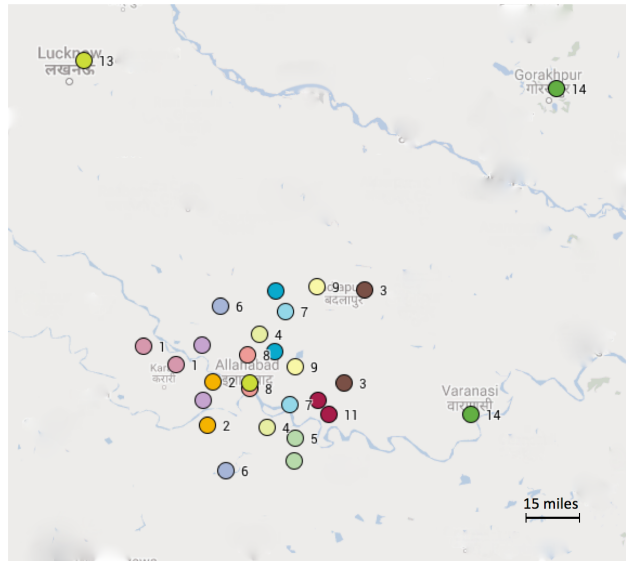


Figure 3: Randomization map

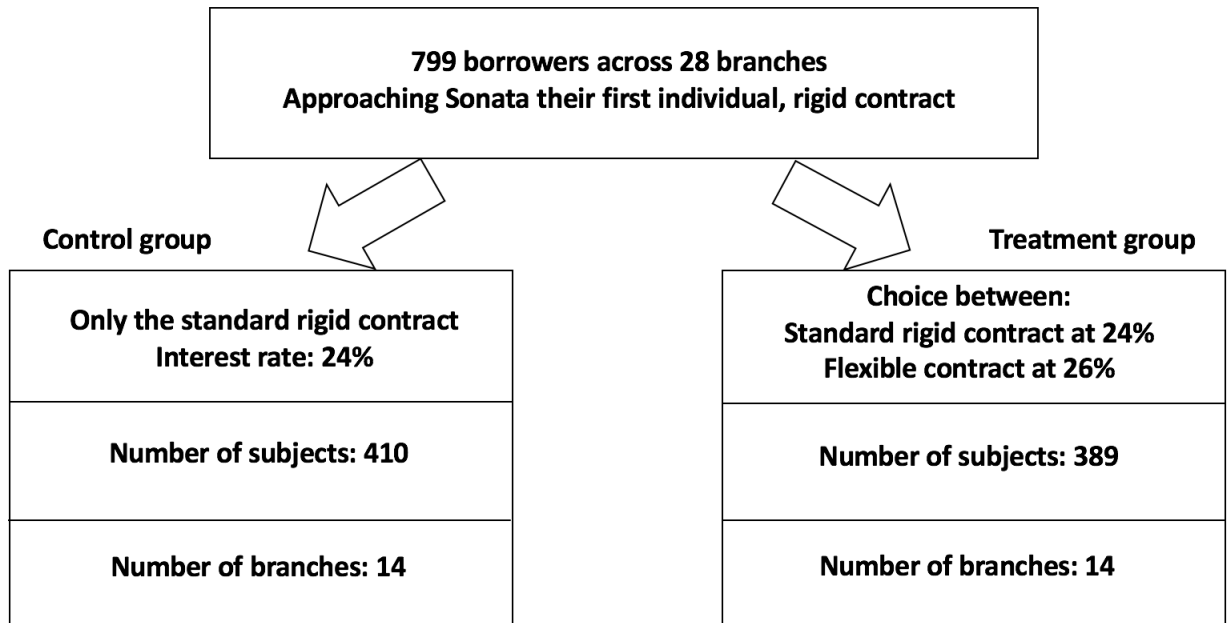


Figure 4: Experiment design

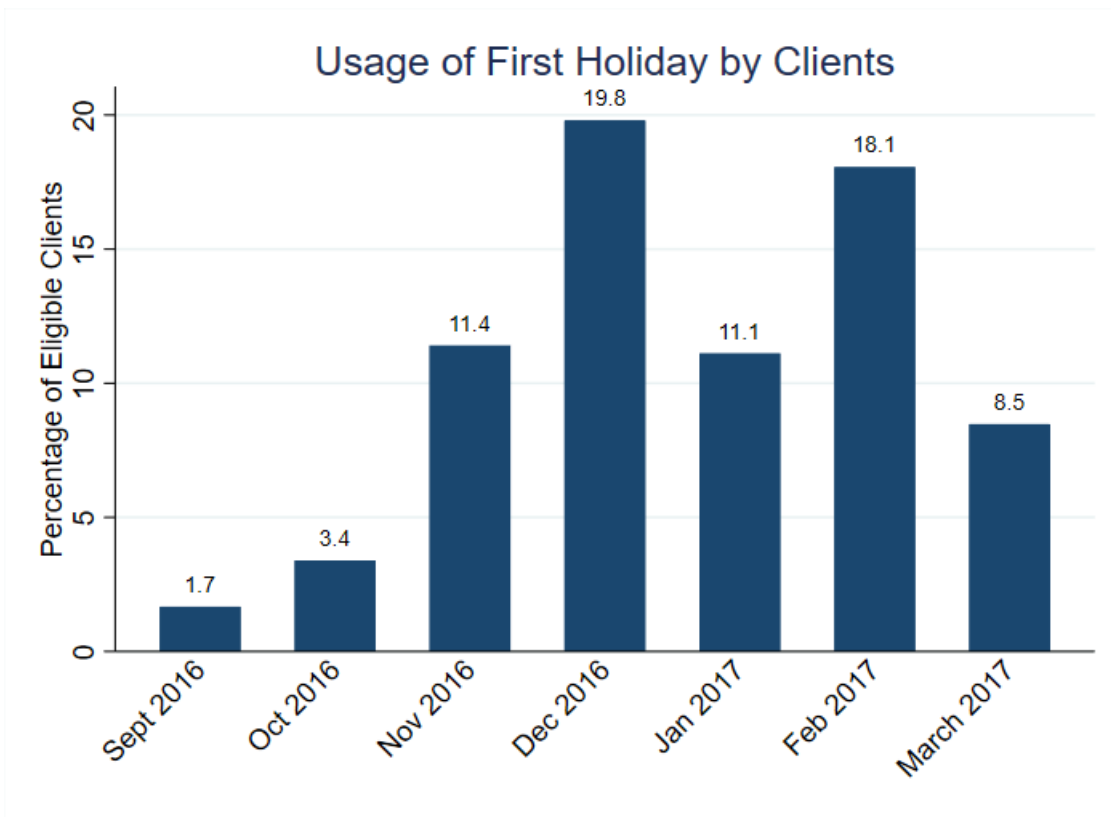


Figure 5: Share of eligible customers using the (first) repayment holiday, by month

Table 1: Balancing Checks Across Treatment and Control Group

	Control Mean [SD]	Coefficient difference (SE)	N
	[1]	[2]	[3]
<b>Panel A: Demographics</b>			
Household size	6.007 [ 2.388 ]	-0.021 ( 0.126 )	799
Age of household head	41.445 [ 10.646 ]	-0.005 ( 0.597 )	799
Non-Hindu	0.087 [ 0.283 ]	0.023 ( 0.023 )	761
Has completed primary school	0.165 [ 0.372 ]	-0.021 ( 0.024 )	789
Has completed middle school	0.210 [ 0.408 ]	-0.043 ( 0.017 )	789
Has completed high school	0.440 [ 0.497 ]	-0.011 ( 0.031 )	789
Has completed higher education	0.128 [ 0.335 ]	0.063 ( 0.023 )	789
Has no formal schooling	0.054 [ 0.227 ]	0.012 ( 0.012 )	789
<b>Panel B: Wealth</b>			
Owns land	0.402 [ 0.491 ]	0.065 ( 0.051 )	799
<b>Panel C: Income and Business Performance</b>			
Income last 12 months	222006.1 [ 144530.3 ]	-13501.64 ( 9316.35 )	799
Business sales last 30 days	14852.51 [ 16674.72 ]	-2292.877 ( 1456.498 )	788
Profit (best / worst month)	10726.17 [ 14044.35 ]	-465.844 ( 753.398 )	794
<b>Panel D: Borrowing and Savings</b>			
Has formal loans (other than Sonata's loan)	0.132 [ 0.339 ]	0.062 ( 0.042 )	799
Has informal loans	0.007 [ 0.085 ]	0.007 ( 0.008 )	799
Tot formal borrowed amt (last 12m, excl. Sonata loan)	9974.878 [ 78456.549 ]	465.426 ( 1848.053 )	799
Loan amount received from Sonata	38846.463 [ 6702.252 ]	-1007.232 ( 612.709 )	799
Loan amount requested to Sonata	38950.280 [ 7027.755 ]	-856.476 ( 646.590 )	784
Total informal borrowed amount	365.854 [ 4266.525 ]	256.386 ( 297.444 )	799
Total saved amount	14445.08 [ 25542.038 ]	1095.101 ( 1099.253 )	786

	<b>Control</b> Mean [SD]	<b>Coefficient</b> difference (SE)	<b>N</b>
	[1]	[2]	[3]
<b>Panel E: Business Activities</b>			
Manufacturer/Artisan/Tailor	0.124 [ 0.330 ]	0.063 ( 0.025 )	799
Seller/Trader/Contractor	0.137 [ 0.344 ]	0.057 ( 0.055 )	799
Dairy/Meat/Poultry	0.188 [ 0.391 ]	-0.050 ( 0.032 )	799
Grocery/Fruits & Vegetables	0.229 [ 0.321 ]	-0.058 ( 0.024 )	799
Business/Shop/Hotel	0.180 [ 0.385 ]	-0.017 ( 0.038 )	799
Transport	0.071 [ 0.257 ]	-0.008 ( 0.012 )	799
Services	0.051 [ 0.221 ]	0.017 ( 0.010 )	799
Labor	0.017 [ 0.130 ]	-0.008 ( 0.007 )	799
Others	0.002 [ 0.049 ]	0.004 ( 0.003 )	799

**Note :** Branch-pair fixed effects are included in all specifications. Robust standard errors in parentheses (clustered at the branch level). Household income, business sales, as well as loan amount received by Sonata have been topcoded.

Table 2: Sonata's Loan Usage

	Buy agri- culture inputs	Buy business inputs	Improve- ment works	Start new business	Buy more stock during festivals	Repay old debt	Consump- tion	Other ex- penditures
<i>Panel A: Without Controls</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	-0.059 (0.028)	-0.014 (0.021)	0.048 (0.057)	-0.022 (0.031)	0.118 (0.053)	-0.001 (0.006)	0.011 (0.006)	0.013 (0.016)
N	788	788	788	788	788	788	788	788
<i>Panel B: With Controls - Lasso</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	-0.043 (0.021)	-0.018 (0.020)	0.040 (0.057)	-0.025 (0.030)	0.129 (0.052)	-0.003 (0.005)	0.011 (0.006)	0.013 (0.015)
Control Dep Var Mean	0.130	0.070	0.710	0.100	0.110	0.010	0.000	0.030
N	788	788	788	788	788	788	788	788

**Note:** Branch-pair fixed effects are included in all specifications. Standard errors in parentheses (clustered at the branch level). All the dependent variables are dummies that indicate whether or not the loan was used for a specific purpose. The dependent variables were constructed by aggregating borrowers' answer to the survey question: What did you use Sonata's loan for? The dependent variable in Column (1) includes: purchase of agriculture-related machinery or other inputs; purchase of land; purchase of livestock; Column (2): purchase of inputs for grocery shops, garment suppliers, tailoring and embroidery; dairy farmers; Column (3): financing improvement works to the business during normal times; Column (4): start a new business; Column (5): purchase of more stock during major festivals or other festivals; Column (6): Repay old debt; Column (7): household consumption; Column (8): health expenditures, weddings; home improvements; purchase of jewelry. Borrowers could give more than one answer. Controls included in Panel 2 are Lasso-selected (measured at baseline) covariates among: household size; age of the head of the household; land ownership; sector of business activity; household income; monthly and weekly sales; total formal and informal borrowed amount; total savings; difference in profits between the best and the worst month of the year. The level of the education of the head of the household was captured during midline (on average after 8 months from baseline), while religion and caste were asked at endline to avoid that asking non-business related, sensitive questions at baseline might have compromised borrowers' willingness to complete the survey.



Table 3: Repayment Rates, Early Loan Repayments, New Loan Requests

	Has closed loan	Has closed loan earlier	Has applied for a new loan at Sonata
<b>Panel A: Without Controls</b>			
	(1)	(2)	(3)
treatment	-0.000 (0.031)	0.094 (0.019)	0.302 (0.045)
N	792	789	792
<b>Panel B: With Controls - Lasso</b>			
	(1)	(2)	(3)
treatment	-0.000 (0.030)	0.094 (0.018)	0.302 (0.044)
Control Dep Var Mean	0.890	0.300	0.310
N	792	789	792

**Note:** Branch-pair fixed effects are included in all specifications. Standard errors in parentheses (clustered at the branch level). The dependent variable in column (1) is the probability borrowers have finished repaying their loan. The dependent variable in column (2) is a dummy that equals one if borrowers have repaid their loan before the due date. The dependent variable in column (3) is a dummy that equals one if borrowers have requested a new loan at Sonata after completing the one under study. Controls included in Panel 2 are Lasso-selected (measured at baseline) covariates among: household size; age of the head of the household; land ownership; sector of business activity; household income; monthly and weekly sales; total formal and informal borrowed amount; total savings; difference in profits between the best and the worst month of the year. The level of the education of the head of the household was captured during midline (on average after 8 months from baseline), while religion and caste were asked at endline to avoid that asking non-business related, sensitive questions at baseline might have compromised borrowers' willingness to complete the survey.

Table 4: Business Outcomes

	Midline		Endline		
	Monthly Sales	Weekly Sales	Monthly Sales	Weekly Sales	Profits
<b>Panel A: Without Controls</b>					
	(1)	(2)	(3)	(4)	(5)
Treatment	2302.612 (2034.157)	1363.719 (546.043)	4975.144 (1890.115)	627.170 (577.429)	20645.517 (11402.218)
N	781	778	761	761	761
<b>Panel B: With Controls - Lasso</b>					
	(1)	(2)	(3)	(4)	(5)
Treatment	4066.497 (2150.624)	1882.415 (568.817)	5778.628 (2234.869)	693.091 (722.315)	23352.992 (11797.280)
Control Dep Var Mean	24423.94	5941.36	22744.82	5472.50	-13527.720
N	781	778	761	761	761

**Note:** Branch-pair fixed effects are included in all specifications. Standard errors in parantheses (clustered at the branch level). All the dependent variables used are top-coded (3 sd). Weekly (monthly) sales are computed from the question: *What were the sales in the past seven (thirty) days?* We then verified (and corrected, accordingly) whether the past week/month was a typical one for the business activities of our subjects. Controls included in Panel 2 are Lasso-selected (measured at baseline) covariates among: household size; age of the head of the household; land ownership; sector of business activity; household income; monthly and weekly sales; total formal and informal borrowed amount; total savings; difference in profits between the best and the worst month of the year. The level of the education of the head of the household was captured during midline (on average after 8 months from baseline), while religion and caste were asked at endline to avoid that asking non-business related, sensitive questions at baseline might have compromised borrowers' willingness to complete the survey.

Table 5: Capital and Labor: Inventory and Employees

	Midline		Endline	
	Inventory	Total Em- ployees	Inventory	Total Em- ployees
<i>Panel A: Without Controls</i>				
	(1)	(2)	(3)	(4)
Treatment	1643.258 (7518.492)	0.082 (0.095)	699.333 (7088.463)	-0.158 (0.082)
N	771	776	761	761
<i>Panel B: With Controls - Lasso</i>				
	(1)	(2)	(3)	(4)
Treatment	7647.554 (7405.648)	0.075 (0.093)	2164.463 (7550.134)	-0.161 (0.084)
Control Dep Var Mean	53314.380	1.680	70547.380	1.590
N	771	776	761	761

**Note:** Branch-pair fixed effects are included in all specifications. Standard errors in parentheses. All the dependent variables used are topcoded (3 s.d.). The dependent variable in column (1) and (3) is derived from the question: "What is the amount of stock you currently have in your business?". Controls included in Panel 2 are Lasso-selected (measured at baseline) covariates among: household size; age of the head of the household; land ownership; sector of business activity; household income; monthly and weekly sales; total formal and informal borrowed amount; total savings; difference in profits between the best and the worst month of the year. The level of the education of the head of the household was captured during midline (on average after 8 months from baseline), while religion and caste were asked at endline to avoid that asking non-business related, sensitive questions at baseline might have compromised borrowers' willingness to complete the survey.

Table 6: Formal and Informal Borrowing

	Midline			Endline			
	Log formal borrowed amount	Log informal borrowed amount	Prob. informal credit	Log formal borrowed amount	Log informal borrowed amount	Prob. informal credit	Loan Top-up
<i>Panel A: Without Controls</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treatment	0.581 (0.342)	0.027 (0.029)	0.003 (0.003)	-0.383 (0.306)	-0.031 (0.190)	-0.004 (0.018)	-0.056 (0.010)
N	783	783	783	759	759	759	761
<i>Panel B: With Controls - Lasso</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treatment	0.557 (0.328)	0.029 (0.029)	0.003 (0.003)	-0.353 (0.305)	-0.050 (0.190)	-0.006 (0.018)	-0.062 (0.010)
Control Dep Var Mean	0.940	0.030	0.000	1.780	0.680	0.060	0.080
N	783	783	783	759	759	759	761

**Note:** Branch-pair fixed effects are included in all specifications. Standard errors in parentheses (clustered at the branch level). Loan top-up is a dummy that takes value of one if the subject reports having received an extra-loan amount from Sonata or any formal financial institution. Formal loans are loans from banks and MFIs, excluding Sonata. Informal loans are loans from moneylenders, employers, friends/relatives/neighbors and landlords. Controls included in Panel 2 are Lasso-selected (measured at baseline) covariates among: household size; age of the head of the household; land ownership; sector of business activity; household income; monthly and weekly sales; total formal and informal borrowed amount; total savings; difference in profits between the best and the worst month of the year. The level of the education of the head of the household was captured during midline (so on average after 9 months from baseline), while religion and caste were asked at endline to avoid that asking non-business related, sensitive questions at baseline might have compromised borrowers' willingness to complete the survey.

Table 7: Expenditures and Savings

	Midline		Endline	
	Log total savings amount	Log monthly expenditure	Log total savings amount	Log monthly expenditure
<b><i>Panel A: Without Controls</i></b>				
	(1)	(2)	(3)	(4)
Treatment	-0.161 (0.118)	0.027 (0.066)	-0.265 (0.144)	-0.021 (0.064)
<i>N</i>	749	788	708	761
<b><i>Panel B: With Controls - Lasso</i></b>				
	(1)	(2)	(3)	(4)
Treatment	-0.173 (0.120)	0.024 (0.063)	-0.301 (0.145)	-0.023 (0.062)
Control Dep Var Mean	8.970	7.820	8.790	8.790
<i>N</i>	749	788	708	761

**Note:** Monthly expenditures include: meat and vegetables, temptation goods, education and health. Expenses on both meat and vegetables and temptation good were captured for the last seven days, therefore are re-calculated on a monthly basis. Expenditures in education and health were reported for the last thirty days. Logarithms are taken on topcoded variables (3sd). Controls included in Panel 2 are Lasso-selected (measured at baseline) covariates among: household size; age of the head of the household; land ownership; sector of business activity; household income; monthly and weekly sales; total formal and informal borrowed amount; total savings; difference in profits between the best and the worst month of the year. The level of the education of the head of the household was captured during midline (on average after 8 months from baseline), while religion and caste were asked at endline to avoid that asking non-business related, sensitive questions at baseline might have compromised borrowers' willingness to complete the survey.

Table 8: Behavioral variables that predict borrowers' selection in the flexible contract

	Prob. flex	Prob. flex	Prob. flex	Prob. flex	Prob. flex	Prob. flex	Prob. flex
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\beta_1$ : time consistent	0.193 (0.050)						0.168 (0.053)
$\beta_2$ : present biased		-0.162 (0.071)					
$\beta_3$ : future biased		-0.197 (0.054)					
$\beta_4$ : risk loving			0.213 (0.118)				0.235 (0.119)
$\beta_5$ : frequent budget				0.061 (0.050)			0.011 (0.053)
$\beta_6$ : worried about expenses					0.166 (0.050)		0.141 (0.058)
$\beta_7$ : give financial advice						0.101 (0.053)	0.047 (0.057)
<i>N</i>	389	389	389	389	389	389	389
Dep. Var. Mean	0.31	0.31	0.31	0.31	0.31	0.31	0.31
Pseudo R-Squared	0.061	0.061	0.044	0.040	0.056	0.045	0.086
$\beta_2 = \beta_3$ (P-value)		0.723					
Joint significance: All Coeffs = 0 (P-value)							0.129

**Note:** Standard errors in parentheses. The time-consistent variable is a measure derived from the time lotteries administered to subjects at baseline. It is a dummy that takes the value of one if the subject consistently prefers the same later payoff to the early payoff in both lotteries, and zero otherwise. The subject is defined as present-biased if he prefers an earlier payoff to a later payoff in the lottery but switches to the later payoff in earlier decisions when the lottery is shifted ahead in the future. An opposite behavior is classified as future-biased. The risk loving variable is a measure derived from the risk lottery administered to subjects at baseline. It is a dummy that takes the value of one if the subject prefers the risky to the safe lottery in decision one or two, thus showing greater risk-tolerance. Frequent budget is a dummy that takes the value of one if the subject reports drafting the budget for his business activity on a daily, weekly, or fortnightly basis, and zero otherwise. Worried about expenses is a dummy that takes the value of one if the subject reports being extremely worried or very worried about expenses for the household, and zero otherwise. Give financial advice is a dummy that takes the value of one if the subjects reports giving financial advice to others.

Table 9: Income variables that predict borrowers' selection in the flexible contract

	Prob. flex	Prob. flex	Prob. flex	Prob. flex	Prob. flex	Prob. flex
	(1)	(2)	(3)	(4)	(5)	(6)
$\beta_1$ : owns land	0.081 (0.050)					0.073 (0.051)
$\beta_2$ : log(household income)		0.016 (0.041)				0.008 (0.042)
$\beta_3$ : log(monthly sales)			-0.004 (0.009)			-0.019 (0.013)
$\beta_4$ : log(variability monthly sales)				0.021 (0.010)		0.023 (0.011)
$\beta_5$ : log(difference profit best/month)					0.016 (0.011)	0.033 (0.014)
<i>N</i>	389	389	389	389	387	387
Dep. Var. Mean	0.31	0.31	0.31	0.31	0.31	0.31
Pseudo R-Squared	0.042	0.037	0.037	0.046	0.043	0.065
Joint significance: All Coeffs = 0 (P-Value)						0.064

**Note:** Standard errors in parentheses. All variables are measured at the baseline. Household income is the overall income of the household. Monthly sales are the sales reported by borrowers in the last thirty days. The variability of sales is measured as the (scaled) squared difference between total sales in the last month and the mean value of total sales in the last month. Best and worst profit are the profits of, respectively, the best and the worst month in the past twelve days, as reported by respondents.

Table 10: Cost-Benefit Analysis

Average over 10-month period (August 2018-May 2019)	Mean (Control)	Mean (Treatment)	Diff (Control-Treatment)	Standard Error	P-Value
<b>Portfolio at Risk (&gt; 30 days)</b>	0.013	0.009	0.004	0.004	0.231
<b>Portfolio at Risk (&gt; 90 days)</b>	6.153	4.514	1.639	1.391	0.250
<b>Productivity: Loans per loan officer</b>	57.231	53.339	3.891	10.987	0.726
<b>Monthly active loans per branch</b>	405.115	348.345	56.770	55.266	0.314
Sample (nb. branches)	13	14			

**Note:** Indicators used for the mean tests refer to the period August 2018-May 2019. Portfolio at Risk refers to the number of loans that are due by more than 30 (90) days. Data for one branch in the control group are currently missing.



## 7 Appendix

Table A.1: Business Outcomes for New Business Activities

	Has new business	Monthly Sales	Weekly Sales	Total Em- ployees	Inventory
<i>Panel A: Without Controls</i>					
	(1)	(2)	(3)	(4)	(5)
Treatment	0.026 (0.022)	151.592 (195.141)	1002.669 (736.014)	1238.911 (3052.572)	0.012 (0.018)
N	761	760	760	760	761
<i>Panel B: With Controls - Lasso</i>					
	(1)	(2)	(3)	(4)	(5)
Treatment	0.030 (0.021)	181.430 (188.190)	1127.603 (715.553)	1098.872 (2957.452)	0.013 (0.018)
Control Dep Var Mean	0.200	1293.810	5184.060	-2635.720	0.060
N	761	760	760	760	761

**Note:** Branch-pair fixed effects are included in all specifications. Standard errors in parantheses (clustered at the branch level). The dependent variables used in column (2), (3) and (4) are top-coded (3 sd). Weekly (monthly) sales are computed from the question: *What were the sales in the past seven (thirty) days?* We then verified (and corrected, accordingly) whether the past week/month was a typical one for the business activities of our subjects. Controls included in Panel 2 are Lasso-selected (measured at baseline) covariates among: household size; age of the head of the household; land ownership; sector of business activity; household income; monthly and weekly sales; total formal and informal borrowed amount; total savings; difference in profits between the best and the worst month of the year. The level of the education of the head of the household was captured during midline (on average after 8 months from baseline), while religion and caste were asked at endline to avoid that asking non-business related, sensitive questions at baseline might have compromised borrowers' willingness to complete the survey.

Table A.2: Behavioral versus “hard-information” variables that predict borrowers’ selection in the flexible contract

	Prob. flex	Prob. flex	Prob. flex
	(1)	(2)	(3)
$\beta_1$ : time consistent	0.168 (0.053)		0.159 (0.055)
$\beta_2$ : risk loving	0.235 (0.119)		0.270 (0.124)
$\beta_3$ : frequent budget	0.011 (0.053)		0.034 (0.056)
$\beta_4$ : worried about expenses	0.141 (0.058)		0.150 (0.060)
$\beta_5$ : give financial advice	0.047 (0.057)		0.040 (0.057)
$\beta_6$ : owns land		0.073 (0.051)	0.071 (0.051)
$\beta_7$ : log(household income)		0.008 (0.042)	0.024 (0.042)
$\beta_8$ : log(monthly sales)		-0.019 (0.013)	-0.021 (0.013)
$\beta_9$ : log(variability monthly sales)		0.023 (0.011)	0.027 (0.011)
$\beta_{10}$ : log(difference profit best/month)		0.033 (0.014)	0.027 (0.015)
$N$	389	387	387
Dep. Var. Mean	0.31	0.31	0.31
Pseudo R-Squared	0.086	0.065	0.113

**Note:** Standard errors in parentheses. Marginal effects are displayed. The time-consistent variable is a measure derived from the time lotteries administered to subjects at baseline. It is a dummy that takes the value of one if the subject consistently prefers the same later payoff to the early payoff in both lotteries, and zero otherwise. The subject is defined as present-biased if he prefers an earlier payoff to a later payoff in the lottery but switches to the later payoff in earlier decisions when the lottery is shifted ahead in the future. An opposite behavior is classified as future-biased. The risk loving variable is a measure derived from the risk lottery administered to subjects at baseline. It is a dummy that takes the value of one if the subject prefers the risky to the safe lottery in decision one or two, thus showing greater risk-tolerance. Frequent budget is a dummy that takes the value of one if the subject reports drafting the budget for his business activity on a daily, weekly, or fortnightly basis, and zero otherwise. Worried about expenses is a dummy that takes the value of one if the subject reports being extremely worried or very worried about expenses for the household, and zero otherwise. Give financial advice is a dummy that takes the value of one if the subjects reports giving financial advice to others. Household income is the overall income of the household. Monthly sales are the sales reported by borrowers in the last thirty days. The variability of sales is measured as the (scaled) squared difference between total sales in the last month and the mean value of total sales in the last month. Best and worst profit are the profits of, respectively, the best and the worst month in the past twelve days, as reported by respondents. Business-activity dummies are included to account for business-specific heterogeneity.