# Please, stay put: Lender behaviour in a competitive environment

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### Abstract

We study the effects of competition between new "arms-length" lenders and incumbent "relationship" lenders focusing on the intensive margin. We show that loans disbursed by new entrants to borrowers who switch from incumbents turn out to be riskier driven primarily by adverse selection. Subsequently, we demonstrate that the incumbents offer riskier loans with better terms to retain their erstwhile borrowers. We further depict that loan multiplicity due to the new lenders is associated with negative real outcomes such as higher levels of over-indebtedness. Our results are relevant in today's context given recent advances in peer-to-peer and "fintech" based lending. Moreover, they are also expected to inform policymakers in exercising caution when legitimizing free entry in credit markets to promote financial deepening. The after-effects of such a policy could be particularly debilitating, especially in developing countries.

## 1 Introduction

Competition among firms tends to have a positive payoff for consumers as it lowers output price and increases choice. However, with respect to the banking sector, the extant literature has established that a degree of market power is actually beneficial for both borrowers and lenders. Keeley (1990) predicts that intense competition between lenders increases the likelihood of bank failures and financial instability. Delis, Kokas, and Ongena (2017) find that lenders with more market power are more likely to engage poorly-performing and resource-constrained firms, and are able to positively impact their performance. Boot and Thakor (2000) and Petersen and Rajan (1995) show using theoretical models that market power is necessary for the fruitful crystallization of lender-borrower relationships, because it allows lenders to internalize benefits of assisting firms.

Given recent trends in financial deepening in emerging and developing economies, including the advent of "fintech" and peer-to-peer lending, an important current debate has evolved around whether outcomes from competition *across lender types* differ from competition *within lender type*. On one hand, a number of studies have posited or demonstrated that competition *across lender types* can have positive complementary effects by forcing lenders to seek out differentiated market segments, leading to increased financial access and improving consumer choice (Boot and Thakor (2000), Cull, Demirgüç-Kunt, and Morduch (2014)). Most recently, Buchak et al. (2018) highlights that fintech or peer-to-peer (P2P) lenders can play this co-operative and complementary role in expanding the ambit of the financial system to credit rationed borrowers. On the other hand, other studies have shown that substitution effects occur, where riskier borrowers tend to migrate or engage in multiplicity (De Roure, Pelizzon, and Tasca (2018), Tang (2018)).

While instructive, insights gained from the prior studies in this debate have certain limitations in that they are predominantly focused on how competition results in changes on the extensive margin (e.g - financial access, migration between lenders, or multiplicity). There is limited focus on how it impacts borrowers directly i.e., effects their longer-term loan performance and real outcomes. More generally, there are few empirical studies on credit market competition that have directly analyzed "second-order effects"[1]. In particular, we study how the incumbent lenders' responses may further amplify borrower risk outcomes. Finally, until more recently, studies in this area have tended to have a disproportionate focus on firms rather than households. Paradoxically, households are less insulated from firms in dealing with adverse real outcomes from loan performance issues. A recent literature strand (Mian, Sufi, and Verner (2017)) has begun to emphasize the primary role household lending and indebtedness play in driving credit boom and bust cycles.

Consequently, this paper seeks to help fill this gap by exploring how increasing competition between incumbent relationship lenders and new arms-length lenders alters the structure of household credit markets by affecting borrower loan-performance, incumbent lending incentives, subsequent lender-borrower relationships, and real outcomes for borrowers. To do so, we draw on the Bolivian *Central de Información de Riesgo Crediticio* (CIRC), a credit registry that includes all regulated lenders in the country and covers an important period of intensifying competition in the country's household credit market. We study a context where the household credit market was initially served by incumbent microfinance institutions (MFIs), who had established an or-

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[1] where we use this term to denote the responses of incumbent lenders to borrowers they observe engaging in multiplicity

ganic credit culture through relationship lending and adapted lending technologies. Competition then arose both from other MFIs and new consumer lenders – a specific type of lender using arms-length methods and specializing in unsecured personal loans. The CIRC contains detailed monthly borrower and loan-level data, which allow us to segment borrowers, trace borrower credit histories over time, and determine changing loan and risk traits before and after the entry of consumer lenders into the market. Use of this rich dataset allows us to better identify the effects of competition *across lender types* on household borrowers and their incumbent lenders, particularly on the intensive margin.

The paper's identification strategy involves three steps. First, we mitigate risk that differences in outcomes may be driven by different borrower pools going to MFIs or consumer lenders by focusing our comparison between the intensive margin borrowers who first took a loan from an MFI but subsequently "switched" to another MFI versus a consumer lender for their next loan. Second, to further mitigate risk that MFI borrowers who specifically choose consumer lenders for their "switch" are additionally risky, we run a first-stage regression of ex-post risk on a set of ex-ante observable risk measures and time, region and lender dummies. We then use the borrower-level residuals generated from this regression as a proxy for strategic default in our subsequent analyses. Finally, in line with Ioannidou and Ongena (2010), we further ensure that borrower and loan characteristics in our treatment and control groups closely mimic one other by matching (using coarsened exact matching) on a wide array of borrower and loan-level characteristics. Matching allows us to further reduce unobserved borrower heterogeneity.

Our main results show that "switching" loans where borrowers switch from MFIs to consumer lenders are ex-post riskier than similar switches within MFIs and within consumer lenders. Again, this is after one takes into consideration the fact that MFI borrowers and loans are considered less risky ex-ante due to a variety of adapted lending practices intended to reduce information-asymmetries and selection issues. This suggests that the switching loan was probably "on the margin" in terms of riskiness from the consumer lender's perspective. In other words, it is possible that it was beyond the repayment capacity of the borrowers. However, it was disbursed nonetheless to ensure that consumer lenders expand their borrower base. We also show that the main factor driving the increased riskiness of the "switching" loans is adverse selection, i.e the inability of consumer lenders to clearly assess the risks of their borrowers[2].

Second, we show that borrowers switch as they are offered better lending terms by consumer lenders. Our results supplement those Ioannidou and Ongena (2010) where clients switch lenders

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[2]primarily through soft information channels

owing to better interest rates offered to them[3] on switching loans by "outside" lenders. We also find that loans given by MFIs to the same borrowers subsequent to their switch also turn out to be much riskier than their pre-switch loans. This could either due to the fact that risky loans disbursed by the consumer lenders end up having a knock-on effect on the MFI loans or that the MFIs themselves indulge in risk taking behaviour to ensure that their customers do not migrate to consumer lenders. Moreover, it is also possible that both effects operate in conjunction with one another. We find evidence of MFIs offering better terms to borrowers post-switch[4] to "lock them in".

We show that there is a possibility that the consumer loans were re-financed by MFI loans. This re-financing also acts (possibly) as a pass through for risk from the consumer loans. Furthermore, we show that the borrowers engaging in multiplicity with the consumer lender entrants consequently suffered from worse real outcomes in that they tended to be saddled with notably larger repayment amounts at the time of loan defaults.

Our primary contribution is to literature surrounding the debate on effects from competition across lender types, where there are several relevant studies on lower-income credit markets. Most recently, Agarwal et al. (2018) study a setting with competition between SACCOs[5] and commercial banks and find evidence of complementary effects, where better borrowers of the SACCOs were "cream-skimmed" (or graduated) to more mainstream commercial banks. This was accompanied by negligible or lower defaults in comparison to those who switched within credit unions or commercial banks. In comparison, our results are more demonstrative of substitution effects as we show that households borrow *simultaneously* from lenders with different lending technologies. Moreover, we take the analysis a step further in demonstrating that there are second-order effects of lenders that can exacerbate negative consequences for borrowers in the longer-term.

Our results focus on households instead of firms. This is an addition to the growing literature focusing on households as a channel of economic crises in lieu of firms. The seminal work of Mian and Sufi (2009) tried to establish a causal link between household credit expansion and the subsequent recession. However, Mian and Sufi (2009) show that the channel operates via households onto the broader macro-economy which then impacts firms. In their follow up work, Mian, Sufi, and Verner (2017) show an empirical relation between household debt and business cycles across 30 developed economies from 1960 to 2012. This substantiates that the Great

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[3]Ioannidou and Ongena (2010) primarily focus on interest rates as the marginal variable based on which borrowers decide to switch across lenders.

[4]compared to pre-switch

[5]Community-focused credit cooperatives.

Recession was not a one-off household debt induced occurrence. In fact, the build-up of household debt can also be the trigger for the proliferation of business cycles *in general*. However, a caveat is in order here: Mian and Sufi (2009) study the U.S economy and advanced economies where the distinction between household and firm debt is largely unambiguous. However, for emerging and developing economies this is not necessarily the case as the lines between household and firm credit are sometimes blurred[6]. Thus, in our scenario while the loans were disbursed to households, there is a realistic chance that these loans were deployed for business purposes. Hence, our study assumes greater relevance when we analyze it in the context of developing countries.

In terms of policy implications, our results are relevant for recent trends in "fintech" and peer-to-peer (P2P) lending. Much positive attention has been given to the rapid growth of "fintech" lending, particularly with respect to its potential for providing credit opportunities to under-served firms or households (Hau et al. (2018)). These loans[7] are largely made by standalone companies and hence are considered to be ring-fenced from the traditional financial system. However, a significant risk component revolves around whether existing relationship based lenders compete or co-operate with the "fintech" lending companies. Competition for these borrowers could result in perverse incentives for the incumbent lenders thus increasing the possibility of systemic risk episodes within lenders and the broader financial system. While our results are from a different time than the current one and "fintech" lending methods may arguably use more sophisticated methods for lending decisions, they are expected to serve a wider template for depicting the negative externalities that could accompany widespread credit market competition, conditional on the absence of sound regulation.

The remainder of the paper is organized as follows. Section 2 reviews literature and establishes the key hypotheses to be investigated. Section 3 explains key features of the dataset and construction of variables. Section 4 describes the methods and main results on hypotheses concerning borrower risk. Section 5 presents analyses explaining possible mechanisms driving increased risk. Section 6 describes and presents results on our analyses on real outcomes. Finally, Section 7 concludes.

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[6]Due to a smaller industrial base, there is a significant contribution of micro, small, and medium enterprises (MSMEs) in developing and emerging economies. Given the small size and nature of operations of these MSMEs, household and firm credit are in many ways fungible.

[7]Peer to peer lending and fintech based lending are considered to be win-win for both lenders and borrowers as it allows individuals who are not under the ambit of traditional finance to access lending markets. Moreover, it limits the risk to the financial system as it is mostly carried out by startups and e-commerce companies otherwise not directly engaged in banking.

# 2 Literature Review & Hypotheses

This paper speaks to three different streams of literature. First, we contribute to the large literature on competition amongst lenders in the financial industry but focus primarily on the intensive margin instead of the prevailing extensive margin focus. Second, we contribute to the recently burgeoning literature on fintech and peer-to-peer lending. Finally, the results also relate to the literature on financial access that deals with credit product design and real outcomes.

Most studies on competition in banking have primarily focused on the extensive margin. For example, Degryse and Ongena (2007) demonstrate that inter-bank competition affects bank branch orientation. Cetorelli and Strahan (2006) depict how bank competition affects entry of new firms in non-financial sectors. Beck, De Jonghe, and Schepens (2013) carry out a cross-country study to estimate the impact of bank competition on bank stability. Beck, Demirgüç-Kunt, and Maksimovic (2004) also carry out a study across 74 countries and show that bank competition increases obstacles to financing but conditional on countries' level of economic development and quality of institutions. Cull, Demirgüç-Kunt, and Morduch (2014) show that there is an important interaction effect between banks and MFIs, where greater commercial bank branch penetration is associated with MFIs moving down-market to find new clientele. In that respect, a paper which also seeks to study the effects of competition in banking on the intensive margin is Delis, Kokas, and Ongena (2017) which tracks how bank market power affects firm performance *after* loan origination. However, they are unable to trace borrowers over time. Our study is an important addition to this literature because we are able to track borrowers till they are present in the credit register.

There are also some seminal theory papers which explore the effects of competition particularly with respect to market concentration and relationship lending. Boyd and Nicolo (2005) propose a theory which counters the common assumption that competition increases riskiness. Instead, they state that concentration in lending markets leads to perverse outcomes as banks charge higher loan rates which expedites moral hazard and bankruptcy risk. Boot and Thakor (2000) state that interbank competition pushes banks from transactional to relationship based lending. The relationship insulates banks from pure price competition and hence they postulate that transactional lending is a vestige of non-competitive environments. However, in our case the interbank competition is not pure play in nature, but is instead fuelled by an increase in product portfolio (consumer loans vis-à-vis traditional group lending) by the competitor.

One of the key debates around competition in lending markets centres around whether new entrants act as substitutes or complements to incumbents. This debate has gained further

relevance with the proliferation of fintech or peer-to-peer (P2P) lenders. The extant literature has sought to drill down the scope of these P2P lenders where one group seeks to highlight their co-operative and complementary role in expanding the ambit of the financial system to otherwise credit rationed borrowers (Buchak et al. (2018)). On the flip side, there is a stream which emphasizes that banks and P2P lenders are substitutes and do compete for the same borrowers. However, when banks are faced with regulatory restrictions, they withdraw from the lowest quality borrowers who then migrate to P2P lenders. While Tang (2018) shows that this lowers average P2P borrower quality and thus finds support in favour of the substitution hypothesis, De Roure, Pelizzon, and Tasca (2018) show that the P2P loans are riskier than traditional bank loans. Our setting (though not contemporary) finds favour with the substitution hypothesis as we show that consumers may borrow *simultaneously* from lenders with different lending technologies. However, we go a step further and demonstrate the possible fallout (in terms of negative externalities) of such a substitution in the medium and long run. With the benefit of hindsight in our favour, our results may be viewed as a possible direction the P2P lending market might take conditional on the absence of sound regulation.

The literature on financial access includes a number of studies exploring how lending technologies adapted to lower-income borrowers can help mitigate moral hazard. Carpena et al. (2012), Goldberg, Gine, and Yang (2010) and Field et al. (2013) conduct controlled experiments varying individual aspects of the classical microfinance model. They find significant improvements to loan repayment from use of joint liability lending, dynamic incentives, and increased frequency of repayment schedules, respectively. Armendáriz and Morduch (2010) also anecdotally describe other archetypical microfinance practices expected to mitigate risk including a relative emphasis on lending for productive rather than consumer purposes and lending in currencies unexposed to FX-risk, albeit these have received less formal attention in empirical work. Given increased market saturation in a growing number of important microfinance markets, there are also several papers that study effects of multiple lending and multiplicity among MFIs. In line with mainstream literature on banking competition, these studies generally find that multiple access to similar institutions weakens borrower incentives to repay and tend to lead to default (McIntosh and Wydick (2005); Guha and Chowdhury (2013)), albeit highly dependent on levels of information sharing among lenders and/or actual credit constraints and loan purpose of borrowers (McIntosh, Alain Janvry, and Sadoulet (2005); Shapiro (2015)).

However, past studies in this area have mostly overlooked how access to lenders of different institutional types and using different lending technologies may further exacerbate "knock-on effects" on incumbent MFIs by shifting them away from practices that are well adapted to

lower-income borrowers. While such competition understandably increases consumer choice in the short-run, we test whether this has adverse real effects on borrowers in the longer-term. The closest paper is by McIntosh, Alain Janvry, and Sadoulet (2005), who study how the entrance of new microfinance lenders impacted borrower multiplicity and loan performance issues among clients of an incumbent lender. However, they look at a context with limited formal information sharing, focus on competition between different MFIs, and hence do not explore mechanisms specifically related to lending technologies. Moreover, these previous studies have typically measured borrower outcomes within 2-3 year windows and generally lack complete information on borrowers' full credit history. A study close to ours also exploring spillover in lending markets is that of Tantri (2018), who empirically demonstrates how political intervention in the micro-finance market affects standard debt contracts. On the contrary, we investigate second-order effects of competition in standard debt contracts on the micro-finance market using variation across lenders in the credit register. Apart from Agarwal et al. (2018), ours is also the only paper among related studies on financial access, to our knowledge that uses extensive microdata from a credit register to overcome power issues common and address issues of multiplicity and longer-term outcomes related to duration of financial access and debt spirals over multiple loan cycles.

Using the information present in the extant literature, we develop the following testable hypotheses:

$\mathbb{H}_1$ : *Switching loans offered by consumer lenders to MFI clients are riskier than similar switching loans provided to clients who switch within MFIs.*

$\mathbb{H}_2$ : *MFIs lend to riskier borrowers after the entry of consumer lenders. Moreover, they offer more favourable loan terms to the switching borrowers.*

$\mathbb{H}_3$ : *Consumer loans are risky due to adverse selection issues. The lending methods of consumer lenders make them unable to access borrowers' soft information like their MFI counterparts.*

$\mathbb{H}_4$ : *Borrowers of the incumbent MFIs who engaged in multiplicity with consumer lenders had worse real outcomes in terms of longer-term access to credit and levels of indebtedness.*

## 3   Data

Our data is from the *Central de Información de Riesgo Crediticio (CIRC)*, which is the public credit registry of Bolivia and managed by its Superintendent of Banks and Financial Entities

(SBEF). All supervised lenders in the country are mandated to collect key client information, provide monthly updates on all credit transactions, and use the shared information to evaluate creditworthiness of borrowers for loan decisions. Our sample covers the period between January 1995 and June 2004, as well as data on unresolved defaulted and written off loans going back several decades[8].

## 3.1 Lender and loan classifications

We begin by classifying lenders and switching loans to organize the data for our subsequent analysis and to subset the sample to relevant observations.

At the provider level, we draw on lender descriptions outlined by Rhyne (2002) and A. de Janvry et al. (2003)[9] to subset to two main lender types that predominantly served households and micro-enterprises: MFIs—including both microfinance banks and microfinance *Fondos Financieros Privados* (FFPs)—and consumer credit lenders—which include commercial banks with consumer credit divisions and consumer credit FFPs[10]. Table 1 provides a list of the (6) MFIs and (13) consumer credit lenders that were active in Bolivia during the sample period. As shown in the table, two incumbent MFIs—Bancosol and Caja Los Andes—were market leaders in Bolivia's household and microcredit lending market during the study period in terms of numbers of borrowers and loan initiations, but had competition from other MFI FFPs and particularly from a 2 consumer lender FFPs—FFP Accesso and FFP Fassil and the consumer lending divisions of Banco Santa Cruz and Banco Union.

Rhyne (2002) details the differences in lending philosophy and portfolio between the microcredit and consumer credit lenders, noting that while they offered similar loan amounts and interest rates, they differed fundamentally otherwise in their screening and monitoring methods. For example, the microcredit lenders were relationship lenders that focused on assessing enterprise and household cash flow as the key basis for loan approval, emphasized loan officer-client relationships and collateral substitutes such as joint liability lending to mitigate risk, and had low tolerance for delinquency. By contrast, the consumer lenders used transaction-based or arms-length lending that largely based loan approval on clients' salary and/or prior credit score, were more likely to require personal guarantees but had weaker overall monitoring systems in

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[8]All previous work using the registry thus far has only analyzed loans to firms originated by commercial banks.

[9]Their full classification includes: commercial banks, commercial banks with consumer credit divisions, microfinance banks, microfinance private financial funds (*Fondos Financieros Privados*) (FFPs), consumer credit FFPs, credit cooperatives, and several other minor institutional types

[10]It is worth noting that Bolivia's credit cooperatives also served households, however they represent a notably smaller share of lending—roughly <8 percent of total unique loan initiations to household borrowers— so we focus our analysis on the comparison between MFIs and consumer lenders to simplify exposition.

place, and a high tolerance for delinquency built into their model of operations. It is worth noting that while in theory, the consumer lenders sought salaried borrowers, in practice, they ended up overlapping considerably with the microenterprise borrowers of the MFIs. In other words, the lines between productive and consumer lending were quite blurred.

At the borrower-loan level, we define an *Outside loan* as one which was the first loan given by a lender to a borrower who was present in the credit register or one which was given more than 12 months after the previous loan granted by the same institution to the same borrower. On the other hand, an *Inside loan* loan is one which was given within 12 months of the previous loan by the same institution to the same borrower.

Additionally, and key to our analysis, we define a *Switching loan* for a borrower as one where their previous lending institution was different from their current one. Our interest primarily lies in those loans where a borrower switched from an MFI to a consumer lender, for whom we compare outcomes primarily against borrowers who switch from an MFI to another MFI. The motivation for this comparison is to mitigate self-selection issues that may threaten the internal validity of our analysis—i.e., where different borrower pools may be attracted to different lender types or begin accessing additional loans from outside lenders. Focusing the comparison on this subset of borrowers is our first step at identifying a suitable comparison group with similar borrower-level characteristics and propensity to seek loans from additional lenders. In other words, we focus on causally identifying the outcomes of multiplicity, conditional on borrowers receiving loans under the loan terms and lending technologies of the consumer lenders. Our *a priori* expectation is that their arms-length lending methodologies were less well-adapted at mitigating ex-ante and ex-post risk. Combined, the MFI-to-MFI and MFI-to-consumer lender switchers make up roughly 60% of the total number of switching loans[11]. The transition matrix for switches is depicted in Table 2.

## 3.2  Ex-post and ex-ante borrower risk

Our primary dependent variables include four indicators of ex-post and four indicators of ex-ante borrower risk. Along the lines of Berger, Frame, and Ioannidou (2011), we draw on features of the CIRC that were present at the time of our study period to construct the variables.

To briefly elaborate, the SBEF requires that some loan information is shared among regulated institutions to help alleviate the otherwise pervasive information asymmetries in the Bolivian credit markets. After obtaining a written authorization from a prospective customer, lenders

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[11]The remaining switchers are mostly consumer lender-to-consumer lender (24%) and then switchers between MFIs and consumer lenders and cooperatives, which are less relevant for our analysis.

may access the registry and obtain a credit report, which contains information on all outstanding loans of the customer for the previous two months. The information which is accessible to a proposed contracting lender includes the originating lender, loan amount, type of loan, value of collateral, value of overdue payments, and the borrower's credit rating from the originating lender.

Overdue loans remain in the registry until they are paid off completely, even if they are past maturity. Loans that are never paid back can remain indefinitely, meaning that our CIRC sample contains unresolved NPLs and defaulted loans going back several decades. When a borrower approaches a lender, any write-offs, defaults or delinquencies from the past two months are observable to them through the registry. On the other hand, delinquincies that were paid off more than two months ago are not observable to other lenders through the registry (Campion (2001))[12]. When lenders originate new loans they rate each borrower's repayment capacity on a scale from one to five. A rating of one indicates that borrowers are expected to repay their debt in full, while ratings greater than one indicate possible repayment difficulties. These ratings may be downgraded over the course of the loan.

We draw on the two-month threshold to set up our four ex-ante measures of risk: *Default Observable Registry*, a dummy variable that equals one if the loan is given to a borrower that defaulted with any lender in the previous 12 months and *Npl Observable Registry*, a dummy variable that equals one if the borrower had a loan with any lender that had been 30 days past due in the last two months. *Npl Observable Relation*, a dummy variable that equals one if a loan is given to a borrower (who had an outstanding loan with the same lender) that had been 30 days past due from three to 12 months prior to the present day. To measure unobserved risk, we create a dummy variable *Npl Unobservable*, that equals one if the borrower had been 30 days past delinquent at other lenders three to 12 months prior to the loan origination.

We then construct four measures of ex-post risk: *Writeoff*, a dummy variable that equals one if a loan is not repaid by the borrower after its due date and the lenders recognize it as bad debt. *Default* is a dummy variable that equals one if the payment for a loan is over 120 days past due. *NPL* is a dummy variable that equals one if the payment for a loan is over 30

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[12]An underlying assumption that we maintain in the paper is that at least some of the information about past delinquencies does not become observable through other sources. We think that this was a reasonable assumption for several reasons.First, during the sample period, no other credit registry is operational in Bolivia (A. de Janvry et al. (2003)). Second, Bolivian credit markets are opaque. The vast majority of households MSMEs do not have audited financial statements. Third, evidence presented in Ioannidou and Ongena (2010) is consistent with the assumption that at least some of this information remains unobserved as borrowers appear to use the two-month disclosure window strategically. The authors find that banks are unwilling to extend credit to new customers with observable repayment problems and that borrowers trying to switch to new banks clear past due payments on their outstanding loans for those two months, manage to switch, but tend to return to non performance soon thereafter.

days past due. *Rating Downgrade*, a dummy variable which equals one if a loan has its rating downgraded at any time before it is repaid in full. Due to the nature of our construction there is a certain degree of correlation between *NPL* and *Rating Downgrade*. This is because a loan which is declared as an *NPL* could also have its rating downgraded over the course of the loan. It is to be noted that an *NPL* can be written off if not repaid over time or become performing again once the outstanding amount is repaid in full.

## 3.3   Other Variables—Lending Technologies and Lender-Borrower Relationships

To investigate the role of lending technologies, we draw on existing borrower and loan information contained in the CIRC to flag relevant characteristics or construct additional variables capturing aspects of classical MFI lending technologies. First, we use the number of borrowers associated with a given loan to classify whether it is a *Joint liability loan* or individual liability loan. Second, we use an existing 9-category variable on the borrower's economic activity to create a dummy indicator for whether the loan is for *Productive* or non-productive purposes. Third, we use information on the currency of the loan to flag it as *FX-risk exposed* versus unexposed if it is denominated in local currency (Bolivianos). Fourth, we use information on the repayment structure to flag whether a loan is a *Standard installment* loan or a fixed one-time payment loan. Finally, we create an alternative variable to collateral value, and instead flag whether a given loan requires *Any collateral*.

We also construct a set of variables which tries to capture the strength of lender-borrower relationships. *Relationship length* measures the length of the lender-borrower relationship in months. *Number of relationships* equals the number of relationships a borrower had with other lenders during the entire sample period. *% of Amount lent* is the % of total amount borrowed by an individual which can be attributed to a given lender.

A full list of all the variables used in the paper's analysis and further details on their construction is provided in Appendix Tables A1 and A2.

## 3.4   Descriptive statistics

Summary statistics for key loan initiation-level variables used in the paper are reported in Table 3. We provide the tables combined and separately for the MFI-to-MFI and MFI-to-consumer lender switchers. The average loan amount for this subset of household borrowers is approximately USD 1800 with an average interest rate of 34 % (APR), and maturity of

18 months. While the consumer lenders and MFIs appear fairly similar in terms of contract amount and interest rate, they typically provide slightly longer maturity loans and have lower collateral value both in absolute terms or relative terms to the contract amount. Moreover, the consumer lenders are much less likely to use group (joint liability) lending, to lend for productive purposes, and much more likely to be exposed to FX-risk. Meanwhile, they also are more likely to have some collateral requirement, which coupled with the low collateral value, suggests greater use of (non-valued) personal guarantees. Figures 1 and 2 help illustrate that the microcredit and consumer lenders exhibited some similarities in their basic loan terms, but differed more substantially in terms of lending technologies and orientation. In terms of loan performance, we observe that new loan initiations to borrowers who "switch" to consumer lenders are to borrowers who exhibit higher unobservable risk, which points to issues of adverse selection. They are also more likely to exhibit ex-post rating downgrades, NPLs, defaults, and write offs. With respect to relationship variables, switchers to consumer lenders have shorter relationships with the new lender than switchers to other MFIs and appear notably less likely to use them as a primary lender.

Figures 3 and 4 show the evolution of the lending market in Bolivia over time. Figure 3 shows that the percentage of the Bolivian population with access to formal credit peaked close to 1998 and then decreased once consumer lenders exited the market. Figure 4 shows the extent of multiplicity in lending i.e a borrower having more than one lending relationship. We observe again that multiplicity peaked in 1999 and once again gradually declined over time once the consumer lenders pulled out.

# 4 Analysis and results: Borrower risk

Our main research question attempts to quantify effects from increased competition from consumer lenders on both borrowers and incumbent MFIs. However, the entry dates for the consumer lenders into the lending market are not clustered around a single date or a period. As a result, market entry can be considered endogenous and not dictated by an exogenous shock that would allow us to test the pre-event and post-event effects with ease. This hampers the usage of standard empirical techniques. Moreover, we also acknowledge that a potential threat to the internal validity of this analysis understandably concerns issues of non-randomization, where different borrower pools may match themselves to different lender types. A particular issue is that our results might be driven by *self-selection* and that the borrowers who choose to switch institutions are riskier ex-ante. Any post-switching risk that we capture could be entirely

attributed to this strategic switching behaviour.

Hence, our identification strategy exploits the richness of our dataset and focuses on analyzing intensive margin borrowers, since we can use their borrowing histories to better identify and match borrowers of similar types and risk categories. We thus use a three-step process to establish proper counterfactual groups and to account for effects from self-selection.

First, we subset our sample to only intensive margin borrowers who started off with an incumbent MFI and exhibited the same propensity to switch to an additional lender. That is, we compare outcomes between those borrowers who were initially MFI borrowers and then had subsequent "switching" loans with an new MFI versus those who had subsequent "switching" loans with a new consumer lender. We focus primarily on comparing these groups because our objective is to understand how the spread of formal finance impacts incumbent institutions, particularly when competition is across lenders using relationship versus arms-length lending technologies. Understanding this dynamic is important, as MFI institutions help build a credit culture organically in a bottom-up manner. Thus, our study shares the objectives of Agarwal et al. (2018) especially with respect to the formalization of finance and credit amongst households in developing countries.

Second, we take an additional step to mitigate further concerns of unobservable borrower riskiness. In particular, there may be additional concerns that borrowers of MFIs who specifically chose to switch to consumer lenders may have been inherently riskier than their counterparts that switch to MFIs. Thus, we also run a first-stage regression on ex-ante riskiness using the borrowers loan history prior to their switching loan. This enables us to control for unobservable borrower riskiness as a matching variable for our main results. The first-stage regression is as follows:

$$ExPostRisk_{bijt} = \beta_0 + \beta_1 ExAnteRisk_{bijt} + R_{bi} + \delta t + R_{bi} \times \delta_t + \gamma_j + \eta_{bi} + \epsilon_{it} \qquad (1)$$

where $R$ and $\delta$ denote region and time fixed effects. $\gamma$ denotes lender fixed effects and $\eta$ denotes fixed effects for the type of economic activity the borrower is involved in. Subscripts $b$, $i$, $j$, and $t$ index borrower, loans, lender, and time, respectively, here and throughout the remainder of the paper. We collect the residuals, $\epsilon$ generated from this regression (at the borrower-loan level) and use them as a proxy for strategic default. We use these borrower level residuals (*ex-ante unobservable risk*) as a matching variable to control for propensity to "self-select" into switching across institutions.

Finally, we apply the coarsened exact matching (CEM) method (Iacus, King, and Porro (2012)) to match observations and obtain a control group which closely mimics the treatment group. Specifically, before calculating OLS regression estimates, we match the observations (for the control group) on a wide array of loan and borrower level characteristics including the year-month of loan initiation, currency of loans, region, initial borrower rating, economic activity of borrower and loan provider (for some analyses). For continuous measures such as loan amount, interest rate, maturity and % of loan collateralized, we bucket them into quartiles. This ensures that the maximum possible difference between two matched loans (for these continuous variables) will lie in the range of -25% to +25%.

However, we do not match on a loan term variable when it is also an outcome variable. For example, when the outcome variable is loan amount, we match on all other variables except loan amount. The exact matching process returns weights for each observation in the control group based on their distance from the treatment group. Usually, the number of matched observations are less than the original number of observations in the control group. We then estimate weighted OLS regression to obtain our main results[13]. Being a non-parametric process, CEM does not incorporate information from outside the region overlapping across the treatment and control groups in its estimates. Using this combined strategy, we test our first group of hypotheses on intensive margin borrowers.

## 4.1 Ex-post risk on "switching" loans

Our first hypothesis tests for differences in outcomes for MFI-to-consumer lender "switchers" compared to MFI-to-MFI "switchers" in terms of riskiness and loan characteristics. We first restrict the sample of switching loans to *Outside loans*. As stated in Section 3, these loans are given by a new lending entity to borrowers who are already present in the credit register or 12 months after the previous loan by a given lender. The key assumption and motivation for this is that inside information gets stale after 12 months and hence these lenders can be treated as if they were initiating a new relationship with their erstwhile borrowers. We then test hypothesis 1 using the following specification.

$$Outcome_{bijt} = \beta_0 + \beta_1 Treated_{bijt} + \beta_z Z_{bijt} + \delta_t + \epsilon_{bijt} \tag{2}$$

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[13]These weights are generated by the matching process based on the "distance" of the matched control group strata from the treatment group.

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where *Outcome* denotes ex-post risk for a given loan. *Treated* in this case is a dummy variable which equals 1 for MFI-to-consumer lender switching loans whereas it is 0 for MFI-to-MFI switching loans. $Z$ denotes a vector of controls (appropriated by matching on these variables) and $\delta$ denotes time (quarter) fixed effects[14], if any. The observations are weighted based on the differential strata sizes created by the matching process.

Table 4 presents results and shows that switches from MFI-to-consumer lenders were riskier than switches within MFIs. Columns 1-3 depict the regression results where the control group comprises of switching loans where the switch was within MFIs. We observe that the NPLs are higher for the MFI to consumer lender group by 2.1% where as the proportion of rating downgrades are higher by 3.8%. This denotes that the switching loans from MFI to consumer lender were more risky in comparison to switches within the MFI institutions. Ex-ante, MFI loans are expected to be less risky than consumer loans owing to group lending (which acts as an insurance), higher collateral guarantees, dynamic incentives, and better monitoring by loan officers. As previously described, in these models, we control for the possibility of self-selection driving results by matching on unobservable ex-ante risk.

An alternative view of these main results is provided in Figure 6, which shows the difference between MFI-to-CL and MFI-to-MFI "switching loans" initiations by month that became non-performing at any later point. This is done for the Santa Cruz region, which was one of the most competitive local markets in the country during our study period. The figure highlights two key points. First, comparing the descriptive evidence in the figure and the regression results from our matching analysis, we can intuit that a large proportion of the performance issues are likely being driven by adverse selection issues, basic loan terms, or time-specific trends. This is because the figure depicts and compares the non-performing loan rates for the universe of MFI-to-CL and MFI-to-MFI loans, whereas our matching analysis results more narrowly isolates the difference in performance issues that is not being driven by those factors. Second, we observe that while the MFI-to-CL switching loans start off notably riskier, the MFI-to-MFI switching loans become riskier over time as well, hinting at spillover effects and risk propagation across borrower pools. We explore both these points in more detail in Section 5 when decomposing borrower risk.

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[14]While our empirical specification includes time fixed effects, the displayed results preclude them. This is because we use month of loan origination as a matching variable. Moreover, including quarter fixed-effects does not materially alter our results. However, we do not display them in the interest of brevity.

## 4.2 Ex-post risk for post-switch loans from incumbent MFIs

Our second hypothesis tests whether loans given by MFIs before and after their borrowers switch to a consumer lender vary in riskiness or loan terms offered by these institutions–i.e., we test for second-order effects. Our a priori expectation is that borrower loan performance may further suffer on subsequent loans since the incumbent MFIs (the initial lenders) may respond with different loan terms or technologies that are less effective for risk mitigation.

To analyze the former part of this hypothesis, we use a generalized difference-in-differences specification where the event date varies for each borrower (switching date). As before, switchers from MFI-to-consumer lenders serve as our treatment group and switchers within MFIs as our control group. However, we now focus on comparing the differences in loan performance from the initial MFI for the loans before and after borrowers switch. Since borrowers may potentially switch between lenders multiple times, we restrict the sample to those borrowers who switch only once during the sample period for this analysis to simplify exposition. We use lender fixed effects to absorb any lender level heterogeneity that might influence our results. However, there might be some time specific factors which could bias our results. To account for this, we use quarter fixed effects in our OLS estimates. We also use an interaction of time and region fixed effects to capture any regional effects that might influence outcomes that vary across time. The creation of the treatment and control groups follows a matching process similar to the one in the previous tables. It is worth noting that we do not include the switching loan for the borrower in our estimates.

$$Outcome_{bijt} = \beta_0 + \beta_1 Treated_{bij} \times Post_t + \beta_z Z_{bijt} + \gamma_j + R_{bi} + \delta_t + R_{bi} \times \delta_t + \epsilon_{bijt} \qquad (3)$$

where $Outcome$ denotes either ex-post risk or loan terms. Each of these variables is a dummy coded as either 0 or 1. $Treated$ is a dummy variable which equals 1 for all borrowers who were MFI-to-consumer lender switchers" whereas it is 0 for all MFI-to-MFI switchers. $Post$ denotes a loan from a borrower's initial MFI following a switch. $Z$ denotes a vector of controls (appropriated by matching on these variables). $\gamma$ denotes lender fixed effects. $R$ and $\delta$ denote region and time (quarter) fixed effects, respectively. The observations for each borrower are then weighted based on the differential strata sizes created by the matching process for the switching loans.

We present our results for estimates of ex-post risk in Table 5. We observe that the borrowers

who switched to consumer lenders were granted loans by MFIs after this switch which turn out to be riskier ex-post shown by the higher probability of NPLs encountered ($\sim 8\%$). To show that our results are not driven by lender specific effects, we remove lender fixed effects in columns 2, 4 and 6 but still obtain very similar results. Table 6 uses the same methodology as Table 5 but changes the outcome variables to ex-ante risk.

## 5    Analysis of "switching" loans

The previous section demonstrated that loans given to borrowers who switched from MFIs to consumer lenders were ex-post riskier than similar loans given to borrowers who switched between MFIs. In this section, we try to delve deeper into: 1) Why borrowers switch across lender types 2) What factors drive increased riskiness for the former switching borrowers.

### 5.1    Why do borrowers change lender type?

Borrowers may switch across lender types if they are ex-ante, offered better terms. Table 7 denotes the difference in loan terms in comparison to switches within MFIs and is similar in construction to Table 4. However, we alter the outcome variables to loan terms like contract amount, interest rate, loan duration and % of loan collateralized. We observe that the MFI-to-consumer lender switching loans have contract amounts which are lower by 20.9%, interest rates that are higher by 5.66% and loan duration which is longer by 7.2 months. Collateral requirements are also higher by 11.6%. While an interest rate increase of $\sim 6\%$ may seem very substantial, one has to understand that the median interest rate in our dataset for household loans in  36% and thus a 6% increase in interest rates is not an order of magnitude greater. To attract the marginal MFI client, consumer lenders offered lower loan amounts to marginal MFI customers with a higher interest rate but balance this by decreasing collateral requirements and increasing loan duration. In some ways, consumer lenders do not rescind the surplus that can be obtained from charging higher interest rates as the borrowers are used to a higher interest rate regimes coming from a micro-lending environment.

To further test the circumstances which were associated with MFI-to-consumer lender switching borrowers, we compare loan terms offered by MFIs to their borrowers who switched to consumer lenders at some point. The results are demonstrated in Table 8. We observe that the MFI loans had larger loan amounts ($\sim 23\%$), higher interest rates ($\sim 2.5\%$) and shorter duration ($\sim 7$ months). Thus, we observe that consumer lenders balanced lower amounts with better loan terms like longer duration and lower interest rates. Since, the consumer lenders did not

offer radically better terms (loan amounts were in fact lower), it is probable that the borrowers' decision to switch was not determined by the *type* of product offered but instead by the *manner* in which it was offered. This brings to light the nature of the lending technologies adopted by both sets of lenders.

We test for differences in the lending technologies used by the MFIs and new consumer lenders[15]. We test these using the difference-in-difference model specification in equation (3) and the switching model specification in equation (2) respectively. We change the *Outcome* variables to denote several dummy indicators capturing whether the switching loan or post-switching loan used: 1) joint liability as opposed to individual liability, 2) were for productive vs. non-productive loan purposes, 3) were denominated in USD (and thus exposed to FX-risk) versus denominated in the local currency, 4) used a standard installment repayment structure vs. fixed one-time payment, and 5) required any collateral / guarantee or not. As previously described (in Section 2), these relate to aspects of traditional MFI lending technologies that have been shown in past studies to mitigate or drive risk. As before, *Treated* is a dummy variable which equals 1 for MFI-to-consumer lender switching loans whereas it is 0 for MFI-to-MFI switching loans. All other variables are as previously described.

We first compare differences in the lending technologies obtained by the MFI-to-consumer lender switchers vis-à-vis MFI-to-MFI switchers. We examine this both in instances when borrowers have been left mostly unmatched and in instances when they have been fully matched on borrower characteristics and basic loan terms. The former cases are used to demonstrate general differences in the overall lending technologies applied between the consumer lenders and MFIs. We observe in Table 9 that the MFI-to-consumer lender switching loans were on average 40% less likely to use joint liability lending (col. 1), 59% less likely to be for productive economic activity (col. 3), 38% more likely to be denominated in a currency exposed to FX-risk (US dollars) (col. 5), 2 percent less likely to be an installment loan (col. 7), and 8 percent more likely to require some form of collateral (col. 9). Next, we look at the instances when the switching borrowers are fully matched to analyze in more granular detail how the consumer lenders may have attracted MFI borrowers who were otherwise looking for similar loan terms—i.e. with respect to same loan amounts, interest rates, maturity, and collateral value.

Table 9 shows that compared to otherwise matched MFI-to-MFI switching loans, the MFI-to-consumer lender switching loans were still on average 8 percent less likely to use joint liability lending (col. 2), 16 percent less likely to be for productive economic activity (col. 4), 16 percent more likely to be denominated in a currency exposed to FX-risk (US dollars) (col. 6), 2 percent

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[15]to whom borrowers switched

less likely to be an installment loan (col. 8), and 2 percent more likely to require some form of collateral (col. 10). It is worth briefly elaborating that the higher requirement for collateral for the consumer lender switching loans makes sense given that the MFIs largely used joint liability as a collateral substitute. However, one can observe that the reduction in joint liability lending for the consumer lender switching loans appears much higher than the increase in collateral requirement, leaving a large proportion of unsecured and hence riskier loans.

Next, and more importantly, we analyze how the incumbent MFIs subsequently adapted their lending technologies for their borrowers who switched to consumer lenders vis-`-vis other MFIs. Again, we examine this both for mostly unmatched observations and fully matched observations. Results are summarized in Table 10. With respect to the unmatched sample, perhaps the most notable finding is that the incumbent MFIs were 12% more likely to lend in US dollars for borrowers who had switched to a consumer lender compared to an MFI (col. 5), comparing their loans before and after the switch. Moreover, with respect to the fully matched sample, we observe that comparing loans granted to the same borrower before and after they switched, incumbent MFIs were 3% less likely to use joint liability (col. 2) and 2 percent less likely to require any collateral (col. 10) for borrowers who had switched to a consumer lender compared to an MFI. Meanwhile, we do not observe much evidence that there was any differential in terms of moving away from lending for productive purposes. Taken together, we find some evidence that incumbent MFIs appeared more likely to adapt riskier lending practices to retain their borrowers that had switched to consumer lenders, particularly with respect to reduced requirements for joint liability and collateral.

## 5.2 Exploring the riskiness of "switchers"

Tables 4 and 5 show that the switching borrowers are ex-post riskier than their counterparts. In this section, we investigate various plausible mechanisms driving the increased loan performance issues of the MFI-to-consumer lender switchers.

There might be some concerns that the borrowers we assess in Table 4 were observably riskier ex-ante and this might be driving the ex-post riskiness as well. Hence, we also repeat an analysis similar to Table 4 but change our outcome variables to ex-ante riskiness. Table 11 depicts that there isn't any difference in ex-ante riskiness between the two types of switching loans. In fact, as shown in Column 3, there is a statistically significant probability (4.4%) that the switching consumer loans were less risky than similar switching MFI loans being originated by lenders with whom past defaulting borrowers have had a relationship. Column 4 corroborates

our decision to use *ex-ante unobservable risk* as a matching variable. We observe that switching loans from MFI-to-consumer lenders are unobservably more risky[16] than similar switching loans from MFI-to-MFI.

The variable capturing ex-ante unobservable riskiness allows us to control for self-selection induced moral hazard, i.e we are able to control for the possibility of risky borrowers switching across lender types especially to new entrants like consumer lenders. To further demonstrate that this variable captures the tendency to self-select into a relationship, we run a specification similar to Table 4 but do not use ex-ante unobservable risk as a matching variable. The results are presented in Table 12. Columns 1-3 show that ex-post risk is higher (as compared to Table 4) when we allow for the possibility of self selection. Specifically, NPLs are higher by 2.9% as compared to when we preclude the possibility of moral hazard and limit ourselves to adverse selection. It may be tempting to state that this 2.9% is the effect of moral hazard on NPLs. However, it must be noted that when moral hazard and adverse selection operate together the net effect is a sum of moral hazard, adverse selection and the joint determination of adverse selection and moral hazard. Hence it is difficult for us to disentangle whether this 2.9% points is due to moral hazard itself or adverse selection induced moral hazard. Also, delving into this detail is beyond the scope of our paper. Nonetheless, we are able to state that the incremental defaults on MFI-Consumer lender switching loans are driven primarily by adverse selection i.e the inability of consumer lenders to properly monitor or obtain soft information about the relevant borrower pool. This inability or unwillingness to gather borrower information was primarily responsible for their ex-post poor performance. This result also brings to light the lending practices of consumer lenders who did not operate via loan officers and relied more on automated loan processing. They also encouraged late repayments as this allowed them to build additional fees into the repayments. Given their practices, it is not surprising that they are unable to assess with great precision the unobservables which influence borrower riskiness.

## 5.3  Risk propagation across borrower pool and time

One of our primary assertions revolves around the hypothesis that the entry of consumer lenders[17] can result in spillover risks. Table 5 shows that the loans given by MFIs post-switch are riskier than the ones given before. We investigate the reasons behind the increase in riskiness

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[16]To remind, Npl observable relation captures if a repeat loan was offered to a borrower by the same lender with which the borrower defaulted in the last 12 months. Since, consumer lender loans are new loans for traditional MFI borrowers, it is logical that the switching loan was originated by a consumer lender is less risky with respect to this parameter.

[17]with a new product, lending technology and better terms

in MFI loans offered to borrowers who switch to consumer lenders. This could be possible due to either supply or demand side effects (explained below) operating by themselves or in concurrence with each other:

1. _Lock-in effect_: This tries to capture the supply side effect originating from the MFIs. We hypothesize that MFIs courted borrowers with more lucrative loan terms to lock them in and prevent them from completely moving to consumer lenders. This would imply that ex-post riskiness was a result of the lenders' lax disbursement philosophy which offered borrowers much better terms than their pre-switch loan. As a result, lenders ended up encouraging borrowers to demand more credit than they were capable of repaying. As this MFI loan was probably on the margin in terms of repayment capacity, the borrowers ended up defaulting on the loan.

2. _Contagion effect_: The demand side effect is borrower initiated and plays out a little differently. It is plausible that instead of the subsequent MFI loan, it was the switching loan which was (granted by consumer lenders) on the margin. Owing to their prior relationship with the MFI, borrowers tried to repay their consumer loan through another borrowing from their old (or another) MFI. Hence, in such a scenario the increased risk on the post switching loan emanates due to the contagion spread from riskier switching loans.

### 5.3.1 Lock-in effect

We first test whether MFIs try to retain their erstwhile borrowers. We do this by comparing whether loans given by MFIs before and after their borrower switch to a consumer lender vary in loan terms offered. We use a difference-in-differences specification similar to Table 5. As before, switchers from MFI-to-consumer lenders serve as our treatment group where as switchers within MFIs is our control group. However, we now focus on comparing the differences in loan terms only. Table 13 displays the results where we try to capture the extent of the lock-in effect. We observe that the loan amount increases significantly ($\sim 50\%$ for post-switch loans thus establishing that MFIs did compete on loan amount. Loan rates seem to increase as well but this difference is not economically siginificant. Loan duration increases by $\sim 2$ months (statistically significant). A notable change is the lowering of collateral to loan value ratios by around 11%. However, this effect disappears when we include lender fixed effects. These results confirm our assertion that the MFIs altered loan terms in favour of borrowers to retain them and hence corroborates our _lock-in effect_ hypothesis.

### 5.3.2 Contagion effect

Table 7 demonstrated the results where we try to test the veracity of the contagion hypothesis. We postulate that any spillover risks in the financial system were transmitted by the riskier switching consumer loans. As mentioned above, this was probably owing to the fact that MFIs were used to refinance the consumer loans[18]. We first filter these loans based on difference (in days) between the maturity date of the switching consumer loan and contract date of the subsequent MFI loan. We focus on those loans which were disbursed close to the maturity date of the switching loan. For example, 0-30 days implies that the MFI loan was contracted 0 to 30 days prior to the expiry of the switching consumer loan. We then explore the difference in riskiness (captured by whether the loan was an NPL) between the consumer loans and the subsequent MFI loan. We observe that for loans within the one month range, the MFI loans are 4.5% (Column 2) more likely to result in NPLs as compared to the consumer loan. The results remain statistically and economically significant when we alter this buffer period to ranging between 30 to 60 days and 60 to 90 days (Columns 3 and 4). It is noteworthy that when we include the entire sample of MFI loans taken after consumer loans[19], our results demonstrate that the MFI loans are less risky by almost 19% (Column 1). This depicts that possibly refinanced MFI loans were also instrumental in risk transmission for borrowers along the time dimension.

## 6  Real outcomes

Finally, we test for differences in two real outcomes to demonstrate further economic implications of competition from the consumer lenders. Specifically, we analyze differences between MFI-to-consumer lender switchers and MFI-to-MFI switchers in terms of their longer-term access to credit and in terms of repayment outcomes at the time of loan defaults. We use the same basic switching model specification as in equation (2), depicted again below.

$$Outcome_{bijt} = \beta_0 + \beta_1 Treated_{bij} + \beta_z Z_{bijt} + \epsilon_{bijt} \qquad (2)$$

where *Outcome* instead denotes variables capturing either a borrower's: 1) *Future Access* to loans after their switch or 2) *Exposure Amount* at the time of loan defaults. More specifically, *Future Access* variables include a borrower's *post-switch* number of loans and length of borrowing

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[18]which were close to maturity

[19]Including MFI loans taken before and after the expiry date of the consumer loan

relationships, where we measure the latter in terms of months between their first and last loan initiations, inclusive of the switching loan. We calculate these variables separately at the borrower-lender level with respect to their "switching" lender and at the borrower-level for all their other lenders combined. The *Exposure Amount* variables flag the outstanding exposure for switching borrowers with their "switching lender" and all lenders if they default on their "switching" loan. We also flag their maximum exposure amounts with their "switching lender" and all lenders at the time of any post-switch loan defaults, as a rough way of illustrating likelihood of having fallen into a debt spiral. As before, *Treated* is a dummy variable which equals 1 for MFI-to-consumer lender switching loans whereas it is 0 for MFI-to-MFI switching loans. All other variables are as previously described.

As previously demonstrated, MFI-to-CL "switching" loans exhibited notably higher rates of loan performance issues in comparison with MFI-to-MFI "switching" loans. To the extent that ability to build long-term borrower-lender relationships should be considered an important component of financial inclusion, another relevant question is whether the MFI-to-consumer lender switchers were disproportionately shut out of future borrowing in the formal credit market compared to comparable and risky MFI-to-MFI switchers[20]. Table 15 thus presents results for analyses comparing the difference in post-switch borrowing for MFI-to-CL versus MFI-to-MFI switching borrowers, who are otherwise fully matched on the full range of borrower and loan characteristics.

In terms of total number of loans, we observe that MFI-to-consumer lender switchers received fewer additional loans from the consumer lender they switched to, but appear to have been able to compensate by obtaining more loans from other lenders, with respect to MFI-to-MFI switchers. We observe similar results in terms of the length of their formal borrowing relationships. The MFI-to-consumer lender switchers exhibit shorter relationships with their switching lenders— roughly half a year less; however, they appear to then have slightly longer relationships with their other lenders. In other words, while the MFI-to-CL switchers exhibited signs of poorer relationships with their switching lenders in comparison to MFI-to-MFI switchers, it didn't appear to restrict them from continued access in the formal credit market. It is worth noting that the differences in the length of the borrower-lender relationships are unlikely to be driven due to differences in maturity of loans since the sample observations have been match on loan duration, and, furthermore, the variable is measured as the number of days between consecutive loan initiations (and not between 1st loan initiation and last maturity date).

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[20]We for the moment leave aside the subjective question of whether these borrowers should or shouldn't have continued access, as we argue that their higher levels of loan performance issues was at least in part driven by poor lending practices.

Meanwhile, the evidence concerning adverse real outcomes is considerably stronger with respect to repayment and overindebtedness issues. In Table 16, we observe that MFI-to-CL switching borrowers who *defaulted on a switching loan* had somewhat comparable exposure amounts with their switching lender or other lenders compared to MFI-to-MFI switchers at the time of default. The respective figures hover at around 150 USD less, but are largely statistically insignificant. However, MFI-to-CL switching borrowers who *defaulted on any post-switch loans* ended up with much larger maximum exposure amounts with either their "switching" lender or other lenders at the time of default. These latter figures are highly statistically and economically significant, at around 700 and 2,100 USD, respectively (which are considerable amounts given the average loan size of 1,800 USD).

We interpret these combined results as suggesting that the MFI-to-CL switchers were more likely to have been using the consumer loans for refinancing compared with MFI-to-MFI switchers, increasing their propensity to take on additional loans with other lenders and fall into greater debt spirals. It is worth noting that these are borrowers who have been matched on loan terms (including loan amount and interest rates) and "unobservable ex-ante risk". Consequently, the increased intensity of debt spirals captured here is more likely being driven by the consumer lenders' weaker monitoring of borrowers after loan disbursement, with respect to MFIs.

# 7 Conclusion

We analyze household loans using a comprehensive credit registry from a developing country. We try to discern effects of credit market competition across different lender types on intensive margin borrowers. The credit registry allows us to trace borrower credit histories over time and determine changing loan and risk traits before and after the entry of consumer lenders.

We focus on comparisons between MFIs and consumer lenders since they constitute the vast majority of household lending in our data and because the entrance of the latter shifted the centre of gravity from classical MFI lending technologies—i.e. loans meant for productive purposes typically using joint liability, higher frequency repayment, and other adapted means for lower-income borrowers—towards individual unsecured lending aimed at consumption. For our analyses, we draw on coarsened exact matching in order to ensure that our treatment and comparison groups are similar on key borrower, loan, and provider-level characteristics.

In the absence of an overarching regulation which legitimized the entry of consumer lenders, we focus on comparing changes in loan performance, loan terms, and lending technologies caused by borrowers switching from MFIs to consumer lenders. Specifically, we find that the switching

loans *across* MFI to consumer lenders were riskier and more susceptible to default than similar switching loans *within* MFIs. Thereafter, we find that MFI loans granted to switching borrowers also ended up being riskier than similar loans before the switch.

We explore several reasons explaining this increased risk. First, we find evidence of adverse self-selection, where borrowers who were "unobservably riskier" on prior loans were more likely to switch from MFI to consumer lenders than to other MFIs. After controlling for these selection issues, we further demonstrate that loan terms and lending technologies used by both the "switching" consumer lenders and, subsequently, by the incumbent MFIs shifted to practices linked with higher inherent risk. In other words, we find evidence that incumbent MFIs appeared to be apprehensive that their borrowers would switch entirely to consumer lenders and hence were more aggressive in disbursing credit to them. We also find that part of the increased risk was likely driven by higher likelihood of using consumer loans for refinancing given weaker monitoring of the consumer lenders. This made it easier for borrowers' to borrower beyond their repayment capacity. We find evidence borrowers used MFI loans to repay their consumer loans. As a result, when the borrowers were unable to repay their dues, it was the loans from MFIs that they ended up defaulting on.

Finally, we show important economic outcomes. While borrowers who engaged in multiplicity with the consumer lenders were not necessarily shut out of future formal borrowing at a higher rate than those of MFIs, they exhibit defaults following their "switching loans" with notably higher amounts owed—suggestive of having fallen into greater debt spirals.

Our results are expected to inform policymakers about being prudent before they allow free entry of institutions into certain lending markets. Given the existence of incumbent lenders who are already well-adapted to their markets, maintaining certain barriers to entry maybe recommended allowing them to preserve some degree of market power. This may understandably lead to some reduction in borrower choice, however, it can be beneficial in preventing them from being extensively leveraged and, furthermore, to promote longer-term financial inclusion and stability. With regard to the latter, our context and results arguably have certain parallels with and lessons that relate to recent developments in fintech and digital finance, where new and much-lauded forms of digitally delivered and big-data-based credit are expected to substantially increase access. Our results may be relevant for the growing chorus from stakeholders heeding caution and noting that such developments could fundamentally alter competitive forces, market dynamics, financial inclusion, and consumer rights in ways that could also weaken overall stability. Further work on how competition among lenders pushes borrowers towards informal

finance[21] could be a suitable direction for future research.

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Figure 1: Kernel density plots for loan terms by lender category
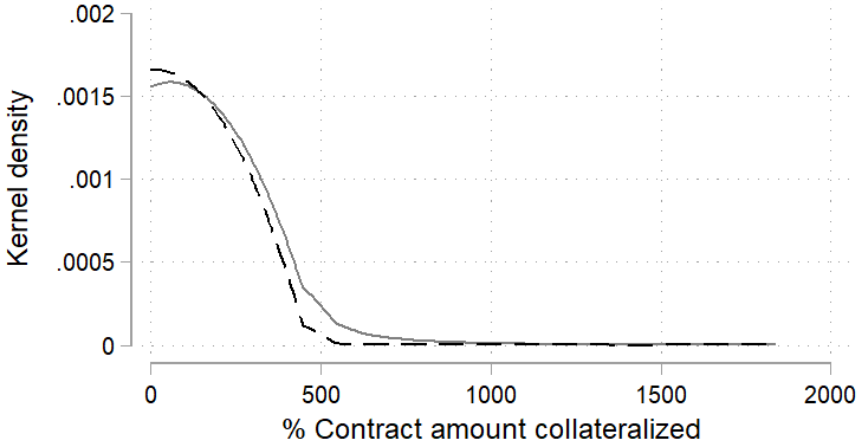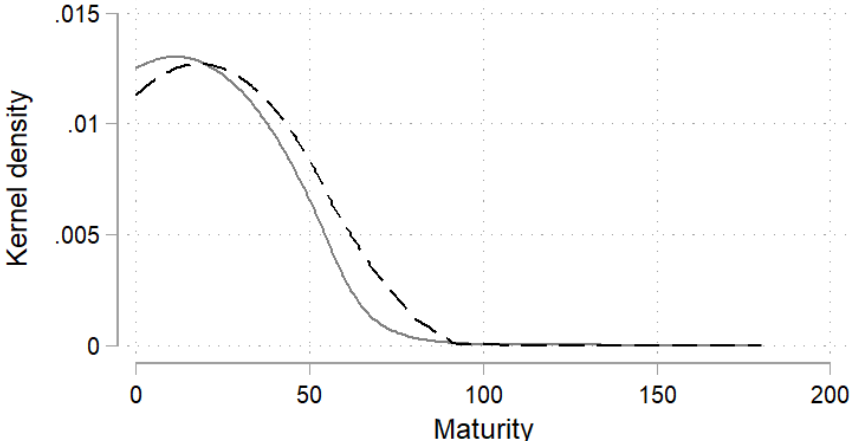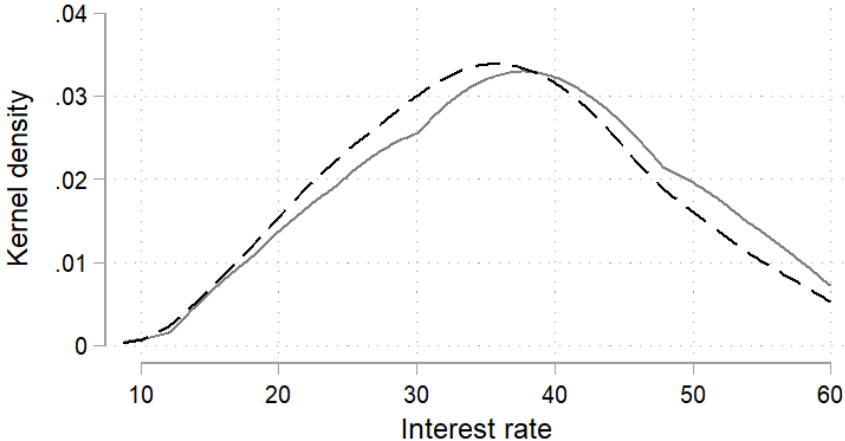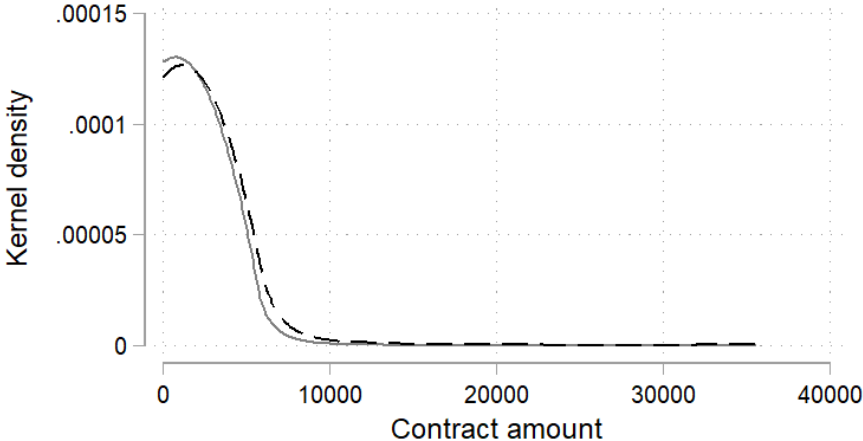
Figure 2: Kernel density plots for lending technologies by lender category
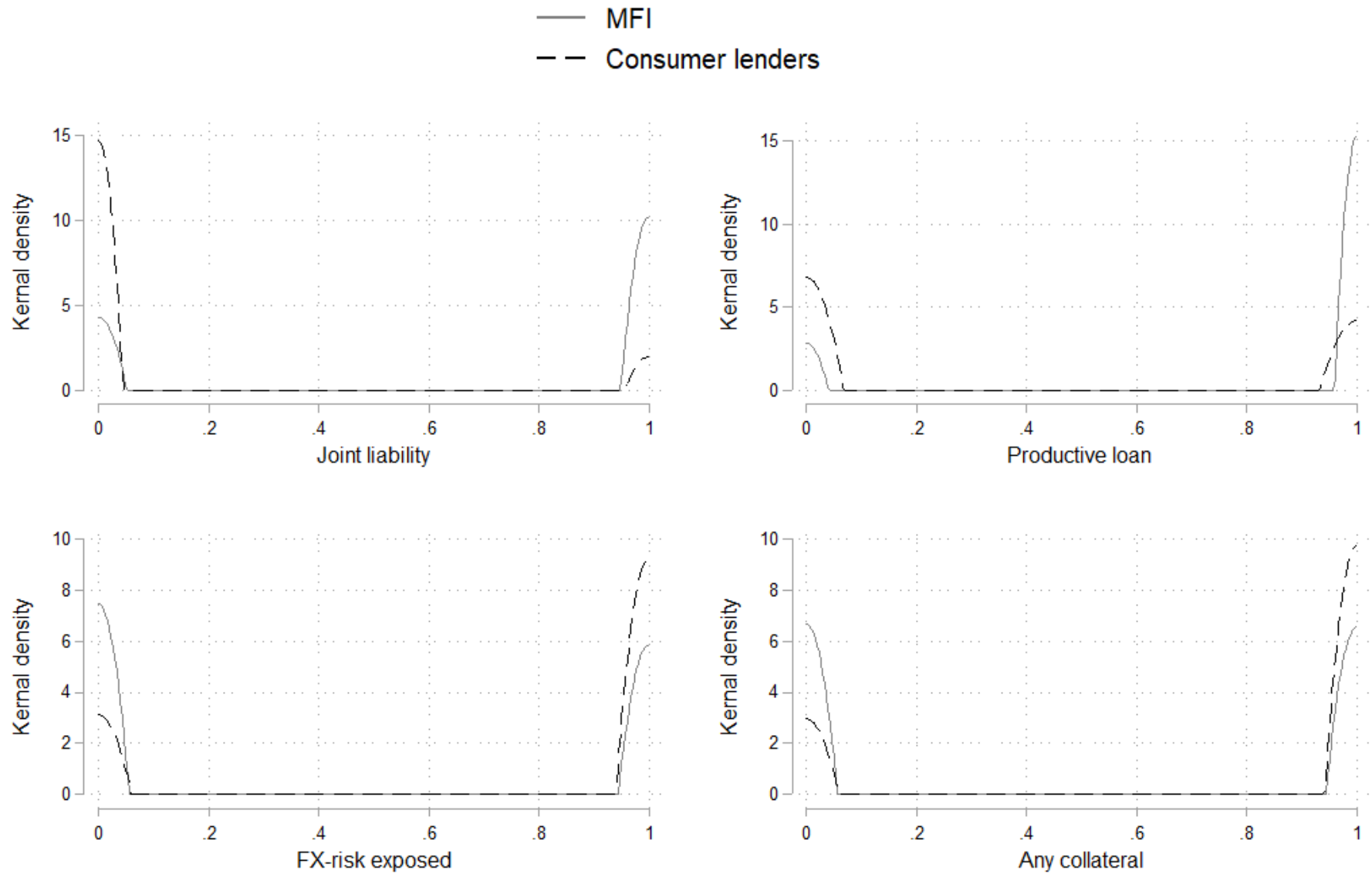
Figure 3: Percentage of Bolivian population with formal credit, by region and year
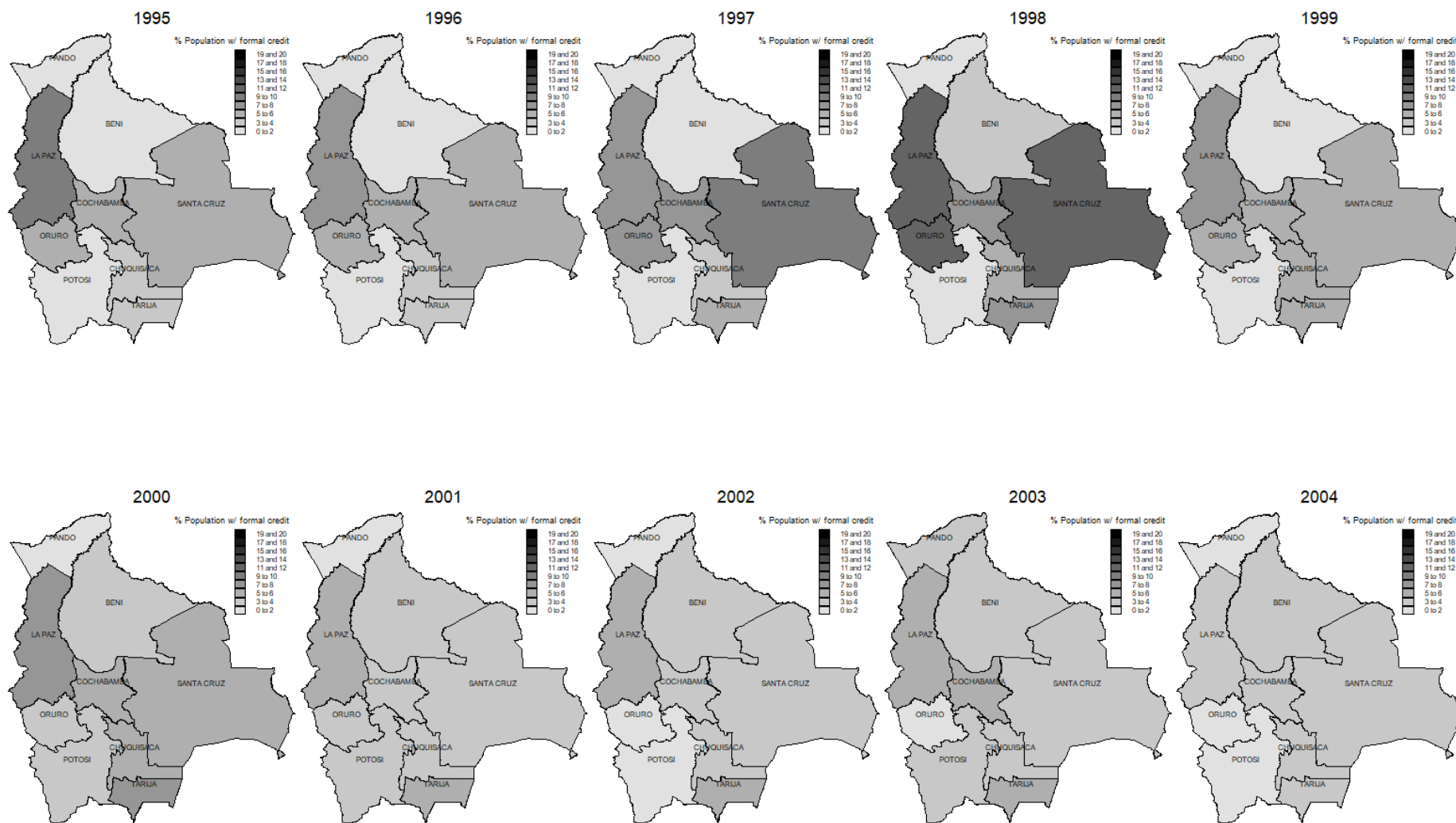
Figure 4: Percentage of Bolivian population with formal credit who have more than one simultaneous borrowing relationship, by region and year
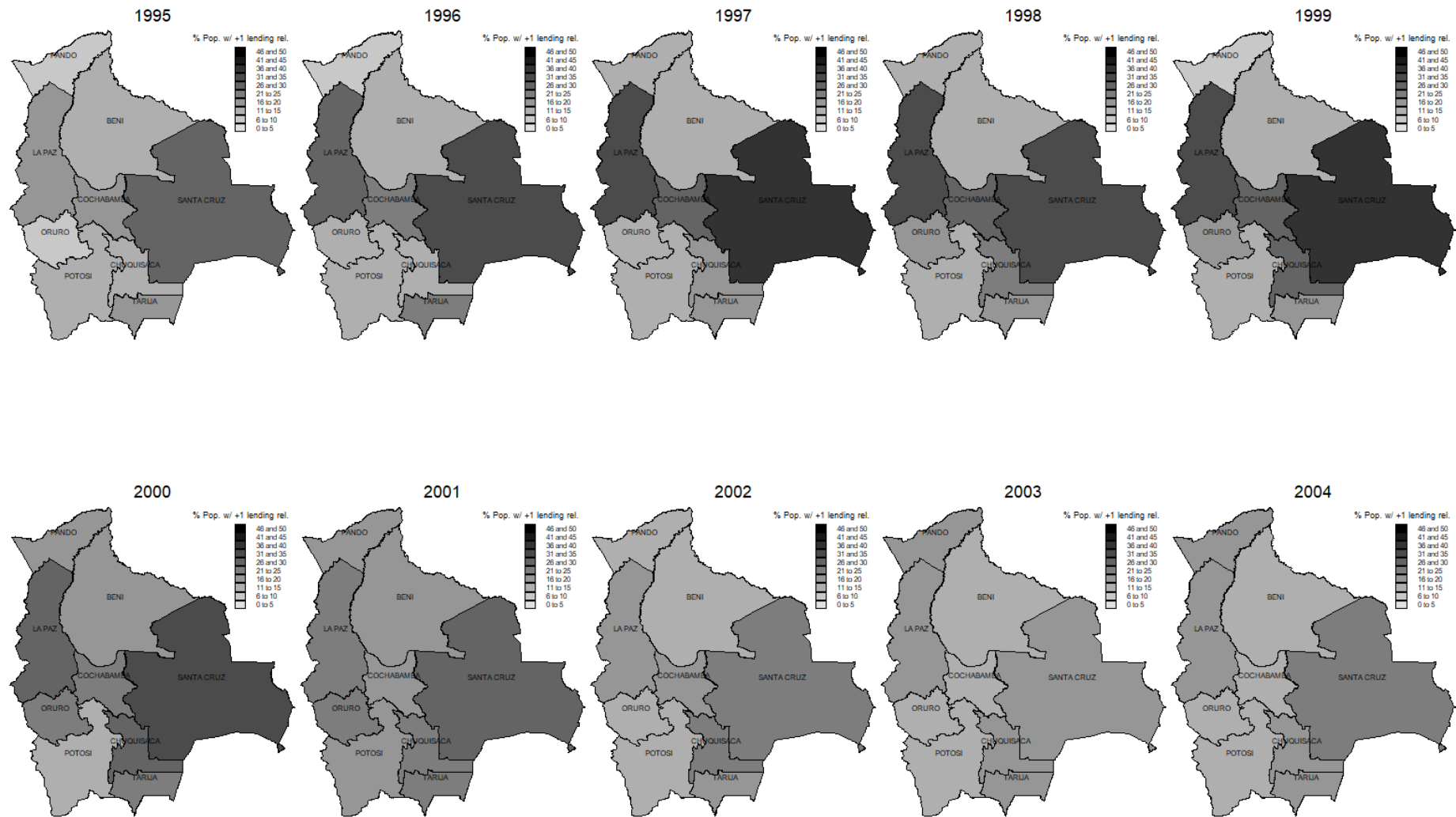
Figure 5: Percentage of loan initiations to household borrowers with more than one simultaneous lender relationship and ex=post NPLs by month—Santa Cruz



N==644,426

% of loan initiations to borrowers with >1 lender relationship | % of loan initiations with any ex-post NPL | New lender entry
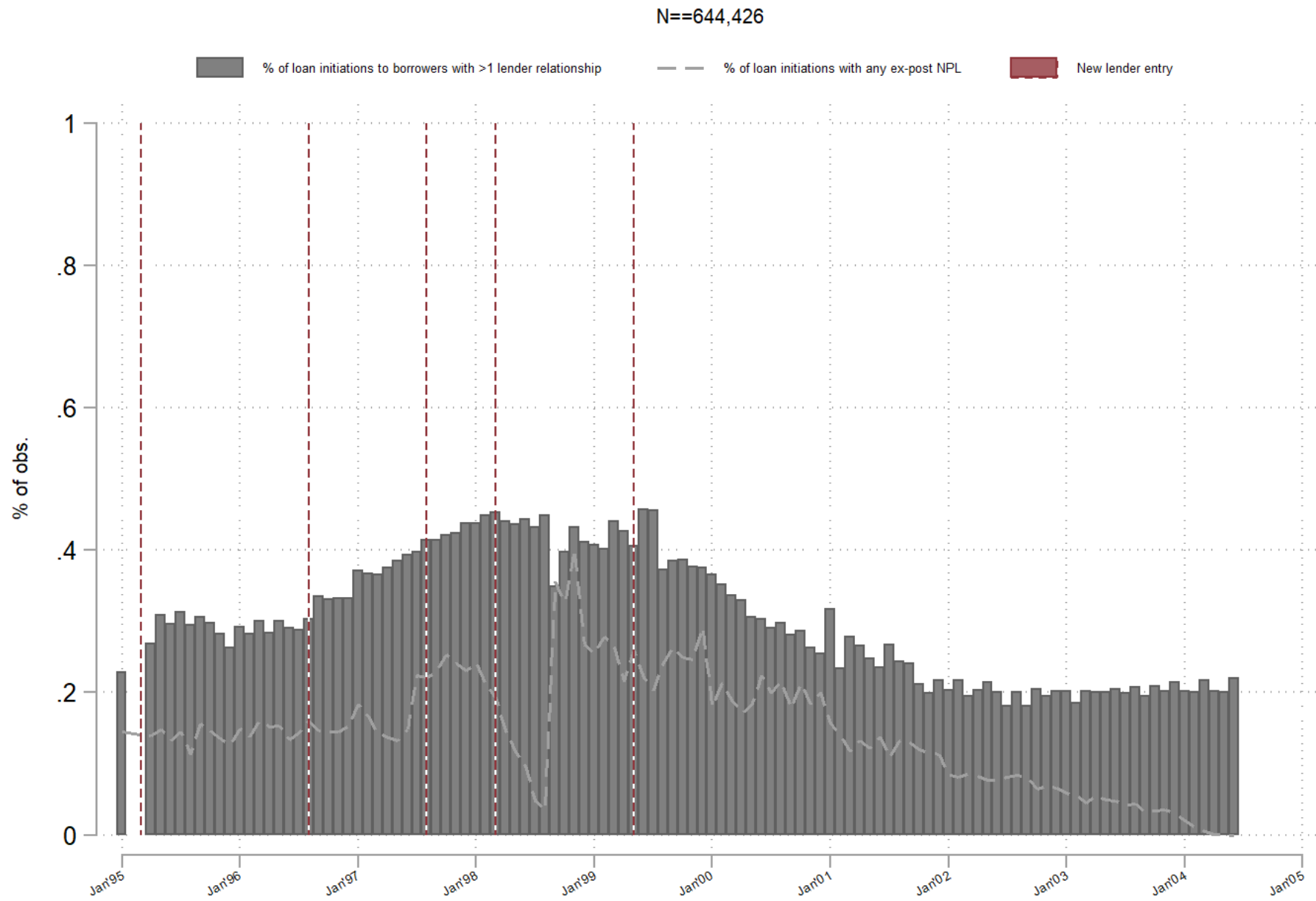
Figure 6: Percentage of loan initiations by month and "switching" category with ex-post loan performance issues—Santa Cruz



— % of loan initiations to MFI-to-CL switchers with performance issue   — — % of loan initiations to MFI-to-MFI switchers with performance issue   ▣ New lender entry

Rating Downgrade

NPL

Default

Write-Off
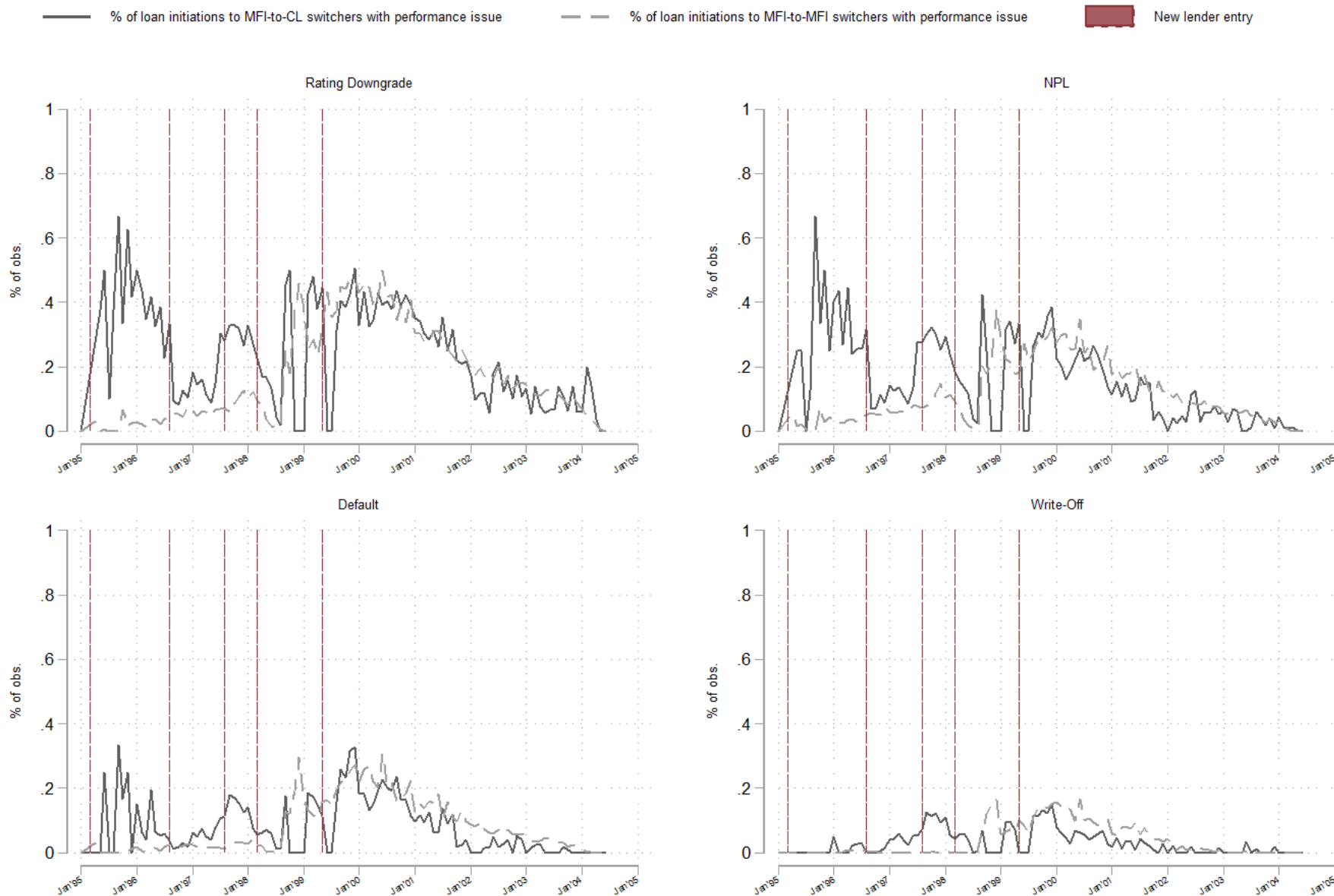
Table 1: **Summary Statistics for MFIs and Consumer Lenders Operating in Bolivia.**
This table lists the regulated MFIs and consumer lenders that were active in Bolivia between January 1995 and June 2004 and provides the number of unique borrowers and borrower-loan observations for each lender during our study sample. The former includes commercial banks and Fondos Financieros Privados (FFPs) principally doing microcredit lending. The latter includes consumer lending divisions of commercial banks, as well as FFPs that principally did consumer lending.

| MFIs | | | Consumer lenders | | |
|---|---|---|---|---|---|
| Lender Name | # Borrowers | # Loans obs. | Lender Name | # Borrowers | # Loan obs. |
| Banco Solidario SA | 342,871 | 761,968 | FFP Financiera Acceso SA | 127,942 | 181,754 |
| FFP Caja Los Andes | 254,821 | 619,080 | FFP Fondo Financiero Fassil | 69,337 | 142,805 |
| FFP FIE | 121,557 | 219,118 | Banco Santa Cruz SA | 68,649 | 91,111 |
| FFP Eco Futuro | 27,397 | 38,948 | Banco Union SA | 65,247 | 85,113 |
| FFP Prodem | 82,995 | 130,153 | Banco De Credito De Bolivia SA | 26,314 | 32,783 |
| FFP Fortaleza | 482 | 520 | Banco Boliviano Americano SA | 20,985 | 22,635 |
| | | | Banco Mercantil SA | 11,368 | 13,505 |
| | | | Banco Economico SA | 10,992 | 13,431 |
| | | | Banco Industrial SA | 9,647 | 19,915 |
| | | | Banco Nacional De Bolivia SA | 7,281 | 9,471 |
| | | | Banco Ganadero SA | 2,693 | 3,414 |
| | | | Banco De La Paz SA | 2,423 | 5,012 |
| | | | FFP Fondo F. De La Comunidad | 872 | 1,342 |
| Total | 724,409 | 1,769,787 | | 342,498 | 622,291 |

Table 2: **Summary Statistics on "Switching" Borrowers**

This table presents the frequency and percentage of of observations that are outside loan "switches" within and across lender types. A "*" denotes categories of switchers used for intensive margin analysis. Figures are calculated for household borrowers using nationwide data from the Bolivian CIRC covering the period from January 1995 to June 2004.

| Initial Lender Type | Second Lender Type | "Switch" Type | # of Obs. | % |
|---|---|---|---|---|
| Credit Cooperative | Credit Cooperative | 1 to 1 | 15,742 | 2.92 |
| Consumer lender | Credit Cooperative | 2 to 1 | 14,411 | 2.67 |
| Microfinance | Credit Cooperative | 3 to 1 | 15,822 | 2.93 |
| Credit Cooperative | Consumer lender | 1 to 2 | 8,697 | 1.61 |
| Consumer lender | Consumer lender | 2 to 2 | 127,461 | 23.62 |
| Microfinance | Consumer lender | 3 to 2* | 42,140 | 7.81 |
| Credit Cooperative | Microfinance | 1 to 3 | 15,391 | 2.85 |
| Consumer lender | Microfinance | 2 to 3 | 36,920 | 6.84 |
| Microfinance | Microfinance | 3 to 3* | 263,129 | 48.75 |
| Total Switches | | | 539,713 | 100.0% |

## Table 3: **Summary statistics**

Notes: This table presents summary statistics for selected loan, borrower, relationship and loan performance characteristics. Our data covers the period from January 1995 to June 2004 and includes all regulated lenders nationwide in Bolivia. We subset to MFI-to-consumer lender and MFI-to-MFI switchers. Figures are calculated at the loan initiation level. All loan, collateral, and exposure amounts are expressed in USD.

| | (1) All | | (2) MFI-to-MFI Switchers | | (3) MFI-to-CL Switchers | | (4) Diff. (2-3) | |
|---|---|---|---|---|---|---|---|---|
| | mean | sd | mean | sd | mean | sd | b | p |
| *Panel A. Loan Terms and Lending Technologies* | | | | | | | | |
| Loan amount (USD) | 1794.94 | 2661.68 | 1813.65 | 2785.69 | 1678.08 | 1687.92 | 135.57*** | (0.00) |
| Loan amount (USD), rescaled by # of borrowers | 1034.34 | 1576.12 | 986.39 | 1611.16 | 1333.88 | 1297.13 | -347.49*** | (0.00) |
| Interest rate | 34.19 | 6.86 | 33.64 | 6.57 | 37.68 | 7.56 | -4.05*** | (0.00) |
| Maturity (Mths.) | 17.32 | 11.04 | 16.69 | 10.66 | 21.27 | 12.45 | -4.58*** | (0.00) |
| Collateral value (USD) | 549.88 | 3586.89 | 619.19 | 3712.23 | 116.98 | 2633.24 | 502.20*** | (0.00) |
| Perc. loan amount collateralized | 27.20 | 7206.20 | 31.26 | 7760.78 | 1.83 | 283.40 | 29.43 | (0.44) |
| Joint liability | 0.62 | 0.48 | 0.69 | 0.46 | 0.22 | 0.41 | 0.47*** | (0.00) |
| Productive loan | 0.81 | 0.40 | 0.88 | 0.32 | 0.34 | 0.47 | 0.54*** | (0.00) |
| Currency exposed to FX-risk | 0.63 | 0.48 | 0.59 | 0.49 | 0.90 | 0.30 | -0.31*** | (0.00) |
| Standard installment repayment | 0.97 | 0.18 | 0.97 | 0.17 | 0.95 | 0.23 | 0.03*** | (0.00) |
| Any collateral | 0.40 | 0.49 | 0.33 | 0.47 | 0.83 | 0.37 | -0.50*** | (0.00) |
| *Panel B. Ex-Ante Loan Performance* | | | | | | | | |
| Ex-ante, observable default in registry=1 | 0.00 | 0.06 | 0.00 | 0.06 | 0.00 | 0.05 | 0.00*** | (0.00) |
| Ex-ante, observable NPL in registry=1 | 0.02 | 0.15 | 0.02 | 0.13 | 0.05 | 0.23 | -0.04*** | (0.00) |
| Ex-ante, observable NPL through relation=1 | 0.02 | 0.13 | 0.02 | 0.13 | 0.01 | 0.10 | 0.01*** | (0.00) |
| Ex-ante, unobservable NPL=1 | 0.05 | 0.21 | 0.04 | 0.19 | 0.11 | 0.31 | -0.07*** | (0.00) |
| *Panel C. Ex-Post Loan Performance* | | | | | | | | |
| Ex-post, rating downgraded=1 | 0.19 | 0.39 | 0.17 | 0.37 | 0.35 | 0.48 | -0.19*** | (0.00) |
| Ex-post, any NPL=1 | 0.12 | 0.33 | 0.09 | 0.29 | 0.29 | 0.46 | -0.20*** | (0.00) |
| Ex-post, overdue loan=1 | 0.12 | 0.32 | 0.09 | 0.28 | 0.29 | 0.45 | -0.20*** | (0.00) |
| Ex-post, default rating=1 | 0.08 | 0.27 | 0.07 | 0.25 | 0.15 | 0.36 | -0.09*** | (0.00) |
| Ex-post, written-off loan=1 | 0.04 | 0.18 | 0.02 | 0.16 | 0.10 | 0.30 | -0.08*** | (0.00) |
| *Panel D. Relationships* | | | | | | | | |
| Relationship length (mths.) | 37.76 | 24.09 | 38.98 | 23.32 | 30.16 | 27.26 | 8.82*** | (0.00) |
| # of simultaneous relationships | 1.53 | 0.72 | 1.44 | 0.63 | 2.08 | 0.91 | -0.65*** | (0.00) |
| Multiple relationships | 0.43 | 0.49 | 0.37 | 0.48 | 0.76 | 0.42 | -0.39*** | (0.00) |
| % of total exposure w given lender | 76.62 | 32.83 | 80.07 | 31.24 | 55.02 | 34.27 | 25.05*** | (0.00) |
| Primary bank | 0.75 | 0.43 | 0.79 | 0.41 | 0.51 | 0.50 | 0.28*** | (0.00) |
| *Panel E. Real outcomes* | | | | | | | | |
| Total # post-switch loans from lender | 4.03 | 4.35 | 3.81 | 4.11 | 5.36 | 5.43 | -1.54*** | (0.00) |
| Post-switch relationship length (mths.) | 20.88 | 21.31 | 21.61 | 21.29 | 18.15 | 21.19 | 3.45*** | (0.00) |
| Amt. owed (USD) at default | 640.55 | 3713.90 | 519.93 | 2869.08 | 1393.99 | 6919.15 | -874.06*** | (0.00) |
| Amt. owed (USD) at default—all lenders | 1423.85 | 23829.68 | 1045.75 | 18059.26 | 3785.61 | 45511.51 | -2739.86*** | (0.00) |
| Observations | 305322 | | 263188 | | 42134 | | 305322 | |

Table 4: **Difference in Ex-Post Risk Outcomes for Switching (MFI to Consumer Lender) Loans**
The table below presents the coefficient estimates for switching loans from a regression of ex-post outcomes on an indicator for switching borrowers. The treatment group consists of all outside loans where the switch was from a micro-finance institution (MFI) to consumer lenders whereas the control group also consists of outside loans but for those borrowers who switch within MFIs. Outside loans are defined as those loans which were either initiated more than 12 months after the previous loan for a bank-borrower combination or was the first loan disbursed by a given lending institution to a borrower already present in the credit register. The treatment and control groups are matched on a set of loan and borrower level characteristics using coarsened exact matching. This allows us to compare only those loans which are similar to each other. Loan amount, interest rate, loan maturity and % of loan amount collateralized are bucketed into quartiles thus ensuring that the range of comparison lies within a band of -25% to +25% for these variables. Standard errors clustered at the provider-level in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

| | Control: Switchers within MFIs | | |
| --- | --- | --- | --- |
| | (1) Writeoff | (2) NPL | (3) Rating Downgrade |
| Treatment Loan–Control Loan | 0.006** | 0.021** | 0.038*** |
| | (0.043) | (0.031) | (0.001) |
| *Observables matched on:* | | | |
| Year:Month of loan initiation | Y | Y | Y |
| Currency | Y | Y | Y |
| Region | Y | Y | Y |
| Borrower rating (initial) | Y | Y | Y |
| Loan amount | Y | Y | Y |
| Interest rate | Y | Y | Y |
| Loan maturity | Y | Y | Y |
| Percent collateralized | Y | Y | Y |
| *Unobservables matched on:* | | | |
| Unobservable ex-ante risk | Y | Y | Y |
| No. Treatment Observations | 7938 | 7938 | 7938 |
| No. Control Observations | 22249 | 22249 | 22249 |
| Observations | 30187 | 30187 | 30187 |

Table 5: **Difference in Ex-post Risk for Loans Disbursed Post Switching Loan**

The table below presents the DiD estimates for a regression of ex-post risk on an indicator which captures information on post-switch loans. Treatment loans are defined as outside loans where borrowers switched from an MFI to a consumer lender. The control group consists of loans given by an MFI immediately after a switching MFI loan. The treatment group consists of all loans given by MFIs just after the switching consumer loan. We do not include the switching loans itself for our analyses. *Treatment×Post* is an interacted dummy which equals 1 for loans given after the switching loan for the treatment group. The treatment and control groups are matched on a set of loan and borrower level characteristics using coarsened exact matching. This allows us to compare only those loans which are similar to each other. Loan amount, interest rate, loan maturity, % of loan amount collateralized and unobservable ex-ante risk are bucketed into quartiles thus ensuring that the range of comparison lies within a band of -25% to +25% for these variables. Standard errors are corrected for heteroskedascity using White's methodology. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

| | Writeoff | | NPL | | Rating Downgrade | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Treatment x Post | 0.002 | 0.006 | 0.085*** | 0.086*** | 0.069*** | 0.070*** |
| | (0.791) | (0.305) | (0.000) | (0.000) | (0.000) | (0.000) |
| Treatment | 0.001 | 0.002 | −0.065*** | −0.065*** | −0.048*** | −0.047*** |
| | (0.794) | (0.509) | (0.000) | (0.000) | (0.000) | (0.000) |
| Post | 0.022*** | 0.018*** | −0.002 | −0.004 | 0.003 | −0.000 |
| | (0.001) | (0.010) | (0.894) | (0.840) | (0.884) | (0.989) |
| Quarter fixed-effects | Y | Y | Y | Y | Y | Y |
| Region fixed-effects | Y | Y | Y | Y | Y | Y |
| Quarter x Region fixed-effects | Y | Y | Y | Y | Y | Y |
| Lender fixed-effects | Y | N | Y | N | Y | N |
| *Observables matched on:* | | | | | | |
| Year:Month of loan initiation | Y | Y | Y | Y | Y | Y |
| Currency | Y | Y | Y | Y | Y | Y |
| Region | Y | Y | Y | Y | Y | Y |
| Borrower rating (initial) | Y | Y | Y | Y | Y | Y |
| Loan amount | Y | Y | Y | Y | Y | Y |
| Interest rate | Y | Y | Y | Y | Y | Y |
| Loan maturity | Y | Y | Y | Y | Y | Y |
| Percent collateralized | Y | Y | Y | Y | Y | Y |
| *Unobservables matched on:* | | | | | | |
| Unobservable ex-ante risk | Y | Y | Y | Y | Y | Y |
| Observations | 37570 | 37570 | 37570 | 37570 | 37570 | 37570 |

Table 6: **Difference in Ex-ante Risk for Loans Disbursed Post Switching Loan**

The table below presents the DiD estimates for a regression of ex-ante risk on an indicator which captures information on post-switch loans. Treatment loans are defined as outside loans where borrowers switched from an MFI to a consumer lender. The control group consists of loans given by an MFI immediately after a switching MFI loan. The treatment group consists of all loans given by MFIs just after the switching consumer loan. We do not include the switching loans itself for our analyses. *Treatment×Post* is an interacted dummy which equals 1 for loans given after the switching loan for the treatment group. The treatment and control groups are matched on a set of loan and borrower level characteristics using coarsened exact matching. This allows us to compare only those loans which are similar to each other. Loan amount, interest rate, loan maturity, % of loan amount collateralized and unobservable ex-ante risk are bucketed into quartiles thus ensuring that the range of comparison lies within a band of -25% to +25% for these variables. Standard errors are corrected for heteroskedascity using White's methodology. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

| | Obs. Default | | Obs. NPL (Registry) | | Obs. NPL (Relation) | | Unobs. NPL | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Treatment x Post | −0.002 | −0.002 | 0.021 | 0.019 | −0.051** | −0.050** | −0.035** | −0.032** |
| | (0.169) | (0.226) | (0.113) | (0.140) | (0.010) | (0.011) | (0.023) | (0.031) |
| Treatment | −0.000 | −0.000 | −0.016* | −0.017* | −0.017** | −0.017** | −0.007 | −0.007 |
| | (0.877) | (0.976) | (0.070) | (0.065) | (0.020) | (0.020) | (0.165) | (0.162) |
| Post | 0.002 | 0.001 | 0.009 | 0.011 | 0.073*** | 0.073*** | 0.050*** | 0.047*** |
| | (0.177) | (0.273) | (0.440) | (0.360) | (0.000) | (0.000) | (0.000) | (0.000) |
| Quarter fixed-effects | Y | Y | Y | Y | Y | Y | Y | Y |
| Region fixed-effects | Y | Y | Y | Y | Y | Y | Y | Y |
| Quarter x Region fixed-effects | Y | Y | Y | Y | Y | Y | Y | Y |
| Lender fixed-effects | Y | N | Y | N | Y | N | Y | N |
| *Observables matched on:* | | | | | | | | |
| Year:Month of loan initiation | Y | Y | Y | Y | Y | Y | Y | Y |
| Currency | Y | Y | Y | Y | Y | Y | Y | Y |
| Region | Y | Y | Y | Y | Y | Y | Y | Y |
| Borrower rating (initial) | Y | Y | Y | Y | Y | Y | Y | Y |
| Loan amount | Y | Y | Y | Y | Y | Y | Y | Y |
| Interest rate | Y | Y | Y | Y | Y | Y | Y | Y |
| Loan maturity | Y | Y | Y | Y | Y | Y | Y | Y |
| Percent collateralized | Y | Y | Y | Y | Y | Y | Y | Y |
| *Unobservables matched on:* | | | | | | | | |
| Unobservable ex-ante risk | Y | Y | Y | Y | Y | Y | Y | Y |
| Observations | 37570 | 37570 | 37570 | 37570 | 37570 | 37570 | 37570 | 37570 |

Table 7: **Difference in Loan Conditions for Switching (MFI to Consumer Lender) Loans**

The table below presents the coefficient estimates for switching loans from a regression of loan conditions on an indicator for switching borrowers. The treatment group consists of all outside loans where the switch was from a micro-finance institution (MFI) to consumer lenders whereas the control group also consists of outside loans but for those borrowers who switch within MFIs. Outside loans are defined as those loans which were either initiated more than 12 months after the previous loan for a bank-borrower combination or was the first loan disbursed by a given lending institution to a borrower already present in the credit register. The treatment and control groups are matched on a set of loan and borrower level characteristics using coarsened exact matching. When a particular loan term is used as an outcome variable, we exclude it from the matching process. This allows us to compare only those loans which are similar to each other. Loan amount, interest rate, loan maturity and % of loan amount collateralized are bucketed into quartiles thus ensuring that the range of comparison lies within a band of -25% to +25% for these variables. Standard errors clustered at the provider-level in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

| | Control: Switchers within MFIs | | | |
| | (1) | (2) | (3) | (4) |
| | Log(Contract amount) | Interest rate | Loan duration | Log(% Collateralized) |
|---|---|---|---|---|
| Treatment Loan–Control Loan | $-0.209^{***}$ | $5.663^{***}$ | $7.222^{***}$ | $0.116^{***}$ |
| | (0.000) | (0.000) | (0.000) | (0.002) |
| *Coarsened exact matching on:* | | | | |
| Year:Month of loan initiation | Y | Y | Y | Y |
| Currency | Y | Y | Y | Y |
| Region | Y | Y | Y | Y |
| Borrower rating (initial) | Y | Y | Y | Y |
| Provider | Y | Y | Y | Y |
| Loan amount | N | Y | Y | Y |
| Interest rate | Y | N | Y | Y |
| Loan maturity | Y | Y | N | Y |
| Percent collateralized | Y | Y | Y | N |
| *Unobservables matched on:* | | | | |
| Unobservable ex-ante risk | Y | Y | Y | Y |
| No. Treatment Observations | 4855 | 13462 | 5935 | 4629 |
| No. Control Observations | 14657 | 21419 | 16423 | 12543 |
| Observations | 19512 | 34881 | 22358 | 17172 |

Table 8: **Change in Loan Terms over Time for Borrowers who Switched from MFIs to Consumer Lenders**

The table below depicts the coefficient estimates for a regression of loan terms for those loans which were disbursed by MFIs prior to the switching loan. We trace these prior loans for a borrower before the borrower's decision to switch. The switching consumer lender loans and the pre-switch MFI loans are matched on a set of loan and borrower level characteristics using coarsened exact matching. This allows us to compare only those loans which are similar to each other. Loan amount, interest rate, loan maturity and % of loan amount collateralized are bucketed into quartiles thus ensuring that the range of comparison lies within a band of -25% to +25% for these variables. Standard errors are corrected for heteroskedascity using White's methodology. *** p<0.01, ** p<0.05, * p<0.1.

| | Log(Contract amount) | Interest rate | Loan duration | Log(% Collateralized) |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Up to 3 Months prior to Switching Loan | 0.195*** | 2.513*** | −7.019*** | −0.057 |
| | (0.000) | (0.000) | (0.000) | (0.636) |
| 3 to 6 Months prior to Switching Loan | 0.206*** | 2.396*** | −6.721*** | −0.062 |
| | (0.000) | (0.000) | (0.000) | (0.616) |
| 6 to 9 Months prior to Switching Loan | 0.196*** | 2.554*** | −6.816*** | −0.061 |
| | (0.000) | (0.000) | (0.000) | (0.624) |
| 9 to 12 Months prior to Switching Loan | 0.134*** | 2.813*** | −6.948*** | −0.059 |
| | (0.002) | (0.000) | (0.000) | (0.637) |
| 12 to 15 Months prior to Switching Loan | 0.153*** | 2.974*** | −7.015*** | −0.080 |
| | (0.001) | (0.000) | (0.000) | (0.529) |
| 15 to 18 Months prior to Switching Loan | 0.154*** | 2.845*** | −6.993*** | −0.040 |
| | (0.001) | (0.000) | (0.000) | (0.750) |
| More than 18 Months prior to Switching Loan | 0.186*** | 2.644*** | −6.993*** | −0.043 |
| | (0.000) | (0.000) | (0.000) | (0.732) |
| | | | | |
| *Observables matched on:* | | | | |
| Year:Month of loan initiation | N | N | N | N |
| Currency | Y | Y | Y | Y |
| Region | Y | Y | Y | Y |
| Borrower rating (initial) | Y | Y | Y | Y |
| Multiple relationships | Y | Y | Y | Y |
| Primary bank | Y | Y | Y | Y |
| Loan amount | N | Y | Y | Y |
| Interest rate | Y | N | Y | Y |
| Loan duration | Y | Y | N | Y |
| Percent collateralized | Y | Y | Y | N |
| Relationship length | Y | Y | Y | Y |
| Quarter fixed-effects | Y | Y | Y | Y |
| Region fixed-effects | Y | Y | Y | Y |
| No. Treatment Observations | 39100 | 54236 | 45114 | 39324 |
| No. Control Observations | 23853 | 37974 | 23708 | 21552 |
| Observations | 62953 | 92210 | 68822 | 60876 |

Table 9: **Difference in Lending Technologies for Switching (MFI to Consumer Lender) Loans**

The table below presents the coefficient estimates for switching loans from a regression of lending technologies on an indicator for switching borrowers. The lending technology variables are dummy indicators for if the switching loans used: 1) joint liability as opposed to individual liability, 2) were for productive vs. non-productive loan purposes, 3) were denominated in USD (and thus exposed to FX-risk) versus denominated in the local currency, 4) used a standard installment repayment structure vs. fixed one-time payment, and 5) required any collateral / guarantee or not. The treatment group consists of all outside loans where the switch was from a micro-finance institution (MFI) to consumer lenders whereas the control group also consists of outside loans but for those borrowers who switch within MFIs. Outside loans are defined as those loans which were either initiated more than 12 months after the previous loan for a bank-borrower combination or was the first loan disbursed by a given lending institution to a borrower already present in the credit register. The treatment and control groups are matched on a set of loan and borrower level characteristics using coarsened exact matching. When a particular loan term is used in construction of an outcome variable, we exclude it from the matching process. This allows us to compare only those loans which are similar to each other. Loan amount, interest rate, loan maturity, % of loan amount collateralized, and unobserved ex-ante risk are bucketed into quartiles thus ensuring that the range of comparison lies within a band of -25% to +25% for these variables. Standard errors clustered at the provider-level in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

| | Control: Switchers within MFIs | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Joint liability | | Productive sector | | FX-risk exposed | | Std. installment repayment | | Any collateral | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Treatment Loan–Control Loan | −0.398*** | −0.084*** | −0.586*** | −0.158*** | 0.376*** | 0.163*** | −0.018*** | −0.015*** | 0.075*** | −0.011 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.108) |
| *Observables matched on:* | | | | | | | | | | |
| Year:Month of loan initiation | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Currency | N | Y | N | Y | N | N | N | Y | N | Y |
| Region | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Borrower rating (initial) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Loan amount | N | Y | N | Y | N | Y | N | Y | N | Y |
| Interest rate | N | Y | N | Y | N | Y | N | Y | N | Y |
| Loan duration | N | Y | N | Y | N | Y | N | Y | N | Y |
| Percent collateralized | N | Y | N | Y | N | Y | N | Y | N | Y |
| *Unobservables matched on:* | | | | | | | | | | |
| Unobservable ex-ante risk | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Quarter fixed-effects | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| No. Treatment Observations | 41618 | 8338 | 41618 | 8338 | 41618 | 16158 | 41618 | 8338 | 41618 | 8338 |
| No. Control Observations | 202973 | 29268 | 202973 | 29268 | 202973 | 110466 | 202973 | 29268 | 202973 | 29268 |
| Observations | 244591 | 37606 | 244591 | 37606 | 244591 | 126624 | 244591 | 37606 | 244591 | 37606 |

Table 10: **Difference in Lending Technologies for Loans Disbursed Post Switching Loan**

The table below presents the DiD estimates for a regression of lending technologies on an indicator which captures information on post-switch loans. The lending technology variables are dummy indicators for if the switching loans used: 1) joint liability as opposed to individual liability, 2) were for productive vs. non-productive loan purposes, 3) were denominated in USD (and thus exposed to FX-risk) versus denominated in the local currency, 4) used a standard installment repayment structure vs. fixed one-time payment, and 5) required any collateral / guarantee or not. Treatment loans are defined as outside loans where borrowers switched from an MFI to a consumer lender. The control group consists of loans given by an MFI immediately after a switching MFI loan. The treatment group consists of all loans given by incumbent MFIs just after the switching consumer loan. We do not include the switching loans itself for our analyses. *Treatment × Post* is an interacted dummy which equals 1 for loans given after the switching loan for the treatment group. The treatment and control groups are matched on a set of loan and borrower level characteristics using coarsened exact matching. This allows us to compare only those loans which are similar to each other. Loan amount, interest rate, loan maturity, % of loan amount collateralized and unobservable ex-ante risk are bucketed into quartiles thus ensuring that the range of comparison lies within a band of -25% to +25% for these variables. Standard errors are corrected for heteroskedascity using White's methodology. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

| | Joint liability | | Productive sector | | FX-risk exposed | | Std. installment repayment | | Any collateral | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Treatment x Post | 0.005 | −0.027** | 0.006 | −0.001 | 0.120*** | −0.054** | 0.005 | 0.013* | −0.000 | −0.023*** |
| | (0.195) | (0.028) | (0.113) | (0.900) | (0.000) | (0.013) | (0.285) | (0.062) | (0.919) | (0.010) |
| Treatment | −0.010*** | 0.018*** | −0.025*** | −0.008* | −0.022*** | −0.078*** | −0.026*** | −0.020*** | 0.005*** | 0.013*** |
| | (0.000) | (0.004) | (0.000) | (0.058) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.001) |
| Post | −0.022*** | 0.023 | −0.028*** | 0.021*** | −0.037*** | 0.136*** | −0.047*** | −0.027*** | 0.039*** | 0.087*** |
| | (0.000) | (0.118) | (0.000) | (0.007) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Quarter fixed-effects | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Region fixed-effects | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Quarter x Region fixed-effects | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Bank fixed-effects | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| *Observables matched on:* | | | | | | | | | | |
| Year:Month of loan initiation | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Currency | N | Y | N | Y | N | Y | N | Y | N | Y |
| Region | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Borrower rating (initial) | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Loan amount | N | Y | N | Y | N | Y | N | Y | N | Y |
| Interest rate | N | Y | N | Y | N | Y | N | Y | N | Y |
| Loan duration | N | Y | N | Y | N | Y | N | Y | N | Y |
| Percent collateralized | N | Y | N | Y | N | Y | N | Y | N | Y |
| *Unobservables matched on:* | | | | | | | | | | |
| Unobservable ex-ante risk | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Observations | 299472 | 38026 | 299479 | 38032 | 299469 | 38035 | 120724 | 15910 | 299478 | 38028 |

Table 11: **Difference in Ex-Ante Risk Outcomes for Switching (MFI to Consumer Lender) Loans**
The table below presents the coefficient estimates for switching loans from a regression of ex-post and ex-ante risk outcomes on an indicator for switching borrowers. The treatment group consists of all outside loans where the switch was from a micro-finance institution (MFI) to consumer lenders whereas the control group also consists of outside loans but for those borrowers who switch within MFIs. Outside loans are defined as those loans which were either initiated more than 12 months after the previous loan for a bank-borrower combination or was the first loan disbursed by a given lending institution to a borrower already present in the credit register. The treatment and control groups are matched on a set of loan and borrower level characteristics using coarsened exact matching. This allows us to compare only those loans which are similar to each other. Loan amount, interest rate, loan maturity and % of loan amount collateralized are bucketed into quartiles thus ensuring that the range of comparison lies within a band of -25% to +25% for these variables. Standard errors clustered at the provider-level in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

| | Control: Switchers within MFIs | | | |
|---|---|---|---|---|
| | (1) Obs. Default | (2) Obs. NPL (Registry) | (3) Obs. NPL (Relation) | (4) Unobs. NPL |
| Treatment Loan–Control Loan | −0.007 | −0.004 | −0.044*** | 0.029*** |
| | (0.377) | (0.471) | (0.000) | (0.000) |
| *Observables matched on:* | | | | |
| Year:Month of loan initiation | Y | Y | Y | Y |
| Currency | Y | Y | Y | Y |
| Region | Y | Y | Y | Y |
| Borrower rating (initial) | Y | Y | Y | Y |
| Loan amount | Y | Y | Y | Y |
| Interest rate | Y | Y | Y | Y |
| Loan maturity | Y | Y | Y | Y |
| Percent collateralized | Y | Y | Y | Y |
| No. Treatment Observations | 9036 | 9036 | 9036 | 9036 |
| No. Control Observations | 46912 | 46912 | 46912 | 46912 |
| Observations | 55948 | 55948 | 55948 | 55948 |

Table 12: **Difference in Ex-Post Risk Outcomes for Switching (MFI to Consumer Lender) Loans not controlling for self-selection**

The table below presents the coefficient estimates for switching loans from a regression of ex-post outcomes on an indicator for switching borrowers. The treatment group consists of all outside loans where the switch was from a micro-finance institution (MFI) to consumer lenders whereas the control group also consists of outside loans but for those borrowers who switch within MFIs. Outside loans are defined as those loans which were either initiated more than 12 months after the previous loan for a bank-borrower combination or was the first loan disbursed by a given lending institution to a borrower already present in the credit register. The treatment and control groups are matched on a set of loan and borrower level characteristics using coarsened exact matching. This allows us to compare only those loans which are similar to each other. Loan amount, interest rate, loan maturity and % of loan amount collateralized are bucketed into quartiles thus ensuring that the range of comparison lies within a band of -25% to +25% for these variables. Standard errors clustered at the provider-level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

| | Control: Switchers within MFIs | | |
| --- | --- | --- | --- |
| | (1) Writeoff | (2) NPL | (3) Rating Downgrade |
| Treatment Loan–Control Loan | 0.014*** | 0.043*** | 0.064*** |
| | (0.000) | (0.000) | (0.000) |
| *Observables matched on:* | | | |
| Year:Month of loan initiation | Y | Y | Y |
| Currency | Y | Y | Y |
| Region | Y | Y | Y |
| Borrower rating (initial) | Y | Y | Y |
| Loan amount | Y | Y | Y |
| Interest rate | Y | Y | Y |
| Loan duration | Y | Y | Y |
| Percent collateralized | Y | Y | Y |
| *Unobservables matched on:* | | | |
| Unobservable ex-ante risk | N | N | N |
| No. Treatment Observations | 9036 | 9036 | 9036 |
| No. Control Observations | 46912 | 46912 | 46912 |
| Observations | 55948 | 55948 | 55948 |

Table 13: **Difference in Loan Terms for Loans Disbursed Post Switching Loan**

The table below presents the DiD estimates for a regression of ex-post risk on an indicator which captures information on post-switch loans. Treatment loans are defined as outside loans where borrowers switched from an MFI to a consumer lender. The control group consists of loans given by an MFI immediately after a switching MFI loan. The treatment group consists of all loans given by MFIs just after the switching consumer loan. We do not include the switching loans itself for our analyses. *Treatment×Post* is an interacted dummy which equals 1 for loans given after the switching loan for the treatment group. The treatment and control groups are matched on a set of loan and borrower level characteristics using coarsened exact matching. This allows us to compare only those loans which are similar to each other. Loan amount, interest rate, loan maturity, % of loan amount collateralized and unobservable ex-ante risk are bucketed into quartiles thus ensuring that the range of comparison lies within a band of -25% to +25% for these variables. Standard errors are corrected for heteroskedascity using White's methodology. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

| | Log(Contract amount) | | Interest rate | | Loan duration | | Log(% Collateralized) | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Treatment x Post | 0.414*** | 0.421*** | 0.448 | −0.002 | 2.160*** | 2.549*** | −0.005 | −0.113* |
| | (0.000) | (0.000) | (0.271) | (0.996) | (0.000) | (0.000) | (0.932) | (0.082) |
| Treatment | −0.224*** | −0.208*** | 1.757*** | 1.731*** | −1.901*** | −1.826*** | −0.064** | −0.064* |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.047) | (0.057) |
| Post | −0.089** | −0.112** | −2.006*** | −1.502*** | −0.984** | −1.376*** | −0.004 | 0.018 |
| | (0.039) | (0.014) | (0.000) | (0.001) | (0.016) | (0.001) | (0.939) | (0.740) |
| Quarter fixed-effects | Y | Y | Y | Y | Y | Y | Y | Y |
| Region fixed-effects | Y | Y | Y | Y | Y | Y | Y | Y |
| Quarter x Region fixed-effects | Y | Y | Y | Y | Y | Y | Y | Y |
| Lender fixed-effects | Y | N | Y | N | Y | N | Y | N |
| *Observables matched on:* | | | | | | | | |
| Year:Month of loan initiation | Y | Y | Y | Y | Y | Y | Y | Y |
| Currency | Y | Y | Y | Y | Y | Y | Y | Y |
| Region | Y | Y | Y | Y | Y | Y | Y | Y |
| Borrower rating (initial) | Y | Y | Y | Y | Y | Y | Y | Y |
| Loan amount | Y | Y | Y | Y | Y | Y | Y | Y |
| Interest rate | Y | Y | Y | Y | Y | Y | Y | Y |
| Loan maturity | Y | Y | Y | Y | Y | Y | Y | Y |
| Percent collateralized | Y | Y | Y | Y | Y | Y | Y | Y |
| *Unobservables matched on:* | | | | | | | | |
| Unobservable ex-ante risk | Y | Y | Y | Y | Y | Y | Y | Y |
| Observations | 37571 | 37571 | 37571 | 37571 | 37571 | 37571 | 5138 | 5138 |

Table 14: **Difference in NPLs for Borrowers for Switching Loan vs. Subsequent MFI Loans**
The table below depicts the coefficient estimates for a regression of NPLs on an indicator for whether the loan was given by an MFI right after the switching loan for a borrower. *NPL* is a dummy variable which equals 1 if a loan was flagged as non-performing by the lending institution. The control group consists of all outside switching loans disbursed by consumer lenders where as the treatment group consists of MFI loans disbursed right after the switching loan. The first column depicts results for all MFI loans which were taken out by a borrowers prior to the expiry of the consumer loan. The remaining columns signify the difference in days between the maturity date of the switching loan and the contract date of the subsequent MFI loan. A smaller value for the no. of days signifies that the borrower approached an MFI for a loan closer to the maturity date of the switching consumer loan. Switching loans are defined as outside loans where borrowers switched from an MFI to a consumer lender. Outside loans are defined as those loans which were either initiated more than 12 months after the previous loan for a bank-borrower combination or was the first loan disbursed by a given lending institution to a borrower already present in the credit register. The treatment and control groups are matched on a set of loan characteristics using coarsened exact matching. This allows us to compare only those loans which are similar to each other. Standard errors are corrected for heteroskedascity using White's methodology. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

|  | Full sample | 0-30 days | 31-60 days | 61-90 days |
|---|---|---|---|---|
|  | (1) | (2) | (3) | (4) |
| Treatment | −0.188*** | 0.045** | 0.113*** | 0.069*** |
|  | (0.000) | (0.048) | (0.000) | (0.001) |
| Quarter fixed-effects | Y | Y | Y | Y |
| Region fixed-effects | Y | Y | Y | Y |
| Quarter x Region fixed-effects | Y | Y | Y | Y |
| *Observables matched on:* |  |  |  |  |
| Currency | Y | Y | Y | Y |
| Region | Y | Y | Y | Y |
| Borrower rating (initial) | Y | Y | Y | Y |
| No. Treatment Observations | 17566 | 484 | 510 | 468 |
| No. Control Observations | 17624 | 487 | 521 | 474 |
| Observations | 35190 | 971 | 1031 | 942 |

**Table 15: Difference in Future Borrowing for Switching (MFI to Consumer Lender) Loans**

The table below presents the coefficient estimates for switching loans from a regression of future borrowing on an indicator for switching borrowers. The future borrowing variables include: 1) number of post-switch loans with the "switching" lender, 2) number of post-switch loans with any other lenders, 3) length of post-switch borrowing relationship with the "switching" lender, and 4) length of post-switch borrowing relationship with other lenders. The treatment group consists of all outside loans where the switch was from a micro-finance institution (MFI) to consumer lenders whereas the control group also consists of outside loans but for those borrowers who switch within MFIs. Outside loans are defined as those loans which were either initiated more than 12 months after the previous loan for a bank-borrower combination or was the first loan disbursed by a given lending institution to a borrower already present in the credit register. The treatment and control groups are matched on a set of loan and borrower level characteristics using coarsened exact matching. This allows us to compare only those loans which are similar to each other. Loan amount, interest rate, loan maturity, % of loan amount collateralized, and unobserved ex-ante risk are bucketed into quartiles thus ensuring that the range of comparison lies within a band of -25% to +25% for these variables. Standard errors clustered at the provider-level in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

| | Control: Switchers within MFIs loans | | | |
| | # of post-switch loans | | Months btw. "switching" loan & last loan initiation | |
| | With "switching" lender (1) | With other lenders (2) | With "switching" lender (3) | With other lenders (4) |
|---|---|---|---|---|
| Treatment Loan–Control Loan | −0.533*** | 2.252*** | −4.979*** | 3.334*** |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| *Observables matched on:* | | | | |
| Year:Month of loan initiation | Y | Y | Y | Y |
| Currency | Y | Y | Y | Y |
| Region | Y | Y | Y | Y |
| Borrower rating (initial) | Y | Y | Y | Y |
| Provider | | | | |
| Loan amount | Y | Y | Y | Y |
| Interest rate | Y | Y | Y | Y |
| Loan duration | Y | Y | Y | Y |
| Percent collateralized | Y | Y | Y | Y |
| Unobservable ex-ante risk | Y | Y | Y | Y |
| Quarter fixed-effects | Y | Y | Y | Y |
| | | | | |
| No. Treatment Observations | 8214 | 8214 | 8214 | 8214 |
| No. Control Observations | 27403 | 27403 | 27403 | 27403 |
| Observations | 35617 | 35617 | 35617 | 35617 |

Table 16: **Difference in Exposure Amounts for Switching (MFI to Consumer Lender) Loans at Default**

The table below presents the coefficient estimates for switching loans from a regression of outstanding exposure amount at the time of loan default on an indicator for switching borrowers. The exposure amount variables include borrower's: 1) exposure amount with the "switching" lender at the time of any default on the switching loan, 2) maximum exposure amount with the "switching" lender at the time of any post-switch default with any lender, 3) total exposure amount with all lenders if they defaulted on the switching loan, and 4) maximum exposure amount with all other lenders at the time of any post-switch default with any lender. All values are expressed in USD. The treatment group consists of all outside loans where the switch was from a micro-finance institution (MFI) to consumer lenders whereas the control group also consists of outside loans but for those borrowers who switch within MFIs. Outside loans are defined as those loans which were either initiated more than 12 months after the previous loan for a bank-borrower combination or was the first loan disbursed by a given lending institution to a borrower already present in the credit register. The treatment and control groups are matched on a set of loan and borrower level characteristics using coarsened exact matching. This allows us to compare only those loans which are similar to each other. Loan amount, interest rate, loan maturity, % of loan amount collateralized, and unobserved ex-ante risk are bucketed into quartiles thus ensuring that the range of comparison lies within a band of -25% to +25% for these variables. Standard errors clustered at the provider-level in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

| | Control: Switchers within MFIs | | | |
| --- | --- | --- | --- | --- |
| | Exposure amount with "switching" lender (in USD) | | Total exposure amount with all lenders (in USD) | |
| | At time of default on "switching" loan (1) | Max. exposure at any subsequent default (2) | At time of default on "switching" loan (3) | Max. exposure at any subsequent default (4) |
| Treatment Loan–Control Loan | −148.878 | 680.889*** | −143.570 | 2109.251*** |
| | (0.400) | (0.004) | (0.863) | (0.008) |
| *Observables matched on:* | | | | |
| Year:Month of loan initiation | Y | Y | Y | Y |
| Currency | Y | Y | Y | Y |
| Region | Y | Y | Y | Y |
| Borrower rating (initial) | Y | Y | Y | Y |
| Provider | | | | |
| Loan amount | Y | Y | Y | Y |
| Interest rate | Y | Y | Y | Y |
| Loan duration | Y | Y | Y | Y |
| Percent collateralized | Y | Y | Y | Y |
| Unobservable ex-ante risk | Y | Y | Y | Y |
| Quarter fixed-effects | Y | Y | Y | Y |
| | | | | |
| No. Treatment Observations | 8214 | 8214 | 8214 | 8214 |
| No. Control Observations | 27403 | 27403 | 27403 | 27403 |
| Observations | 35617 | 35617 | 35617 | 35617 |

# Online Appendix

## A  Variables

Table A1: **Variable list and definitions**
This table lists the variables used in the paper's analysis and provides the number of possible values (#) and brief descriptions.

| Variables | # | Description or Possible values |
|---|---|---|
| **Borrower and loan-level identifiers** | | |
| *Inside loan* | 2 | = 1 if a loan was given within 12 months of a previous loan by the same institution to the same borrower; = 0 otherwise. |
| *Outside loan* | 2 | = 1 if the first loan given by a lender to a borrower who was present in the credit register or one which was given more than 12 months after the previous loan granted by the same institution to the same borrower; = 0 otherwise. |
| *Switching loan* | 2 | = 1 if a loan for a given borrower is from a different lender than the borrower's previous loan; = 0 otherwise. |
| **Indicators of borrower ex-ante risk** | | |
| *Default Observable Registry* | 2 | = 1 if the borrower had defaulted on a loan any time in the previous 12 months with any lender; = 0 otherwise |
| *Npl Observable Registry* | 2 | = 1 if the borrower had overdue payments of at least 30 days with any lender any time within the last two months; = 0 otherwise. |
| *Npl Observable Relation* | 2 | = 1 if the borrower had overdue payments of at least 30 days with the current lender any time within the last three to 12 months; = 0 otherwise. |
| *Npl Unobservable* | 2 | = 1 if the borrower had overdue payments of at least 30 days with another lender from the last three to 12 months (but that was paid off); = 0 otherwise. |
| **Indicators of borrower ex-post risk** | | |
| *Writeoff (WO)* | 2 | = 1 if a loan is not repaid by the borrower after its due date and the lenders recognize it as bad debt; = 0 otherwise. |
| *Default (DEF)* | 2 | = 1 if the payment for a loan is over 120 days past due; = 0 otherwise. |
| *Non-performing loan (NPL)* | 2 | = 1 if the payment for a loan is over 30 days past due; = 0 otherwise. |
| *Rating Downgrade (RD)* | 2 | = 1 if a loan has its rating downgraded at any time before it is repaid in full; = 0 otherwise. |

Table A2: **Variable list and definitions (continued)**

This table lists the variables used in the paper's analysis and provides the number of possible values (#) and brief descriptions.

| Variables | # | Description or Possible values |
|---|---|---|
| **Loan and borrower characteristics** | | |
| *Year:Month of Loan Initiation* | 114 | Year and month of loan initiation from 1995:01 to 2004:06. |
| *Currency* | 2 | = 1 if US Dollars; = 0 if Bolivian Pesos. For our analyses on lending technology, we classify 1 as *FX-risk Exposed.* |
| *Region* | 9 | Chuquisaca (= 1), La Paz, Cochabamba, Oruro, Potosi, Tarija, Santa Cruz, Beni, Pando (= 9) |
| *Borrower Rating (initial)* | 5 | Credit rating assigned to borrower by lender at the time of loan initiation; No Problems (= 1), Potential Problems, Unsatisfactory, Doubtful, Write off (= 5). |
| *Loan Amount* | | contract amount on the loan initiation |
| *Interest Rate* | | interest rate on the loan initiation |
| *Loan Maturity* | | loan maturity (in months) on the loan initiation |
| *Percent Collateralized* | | collateral value as a percentage of contract amount |
| *Joint liability* | 2 | = 1 if joint liability loan, = 0 if individual liability loan |
| *Economic Activity* | 9 | Agriculture, Animal Husbandry, Fishing (=1); Mining And Quarrying (=2); Manufacturing Industries (=3); Electricity Gas And Water (=4); Construction (=5); Retail Trade Major Restaurant. Hotel (=6); Transportation, Storage And Communication (=7); Est.Financ. Property Insurance Serv. (=8); Social Community Service, Personal (= 9). We classify 1-7 as *Productive Loans* and 8-9 as non-productive loans. |
| *Standard repayment structure* | 2 | = 1 if Installment Loan, = 0 if Single Payment Loan. |
| *Any collateral* | 2 | = 1 if any collateral or guarantees; =0 otherwise |
| **Lender-borrower relationships** | | |
| *Relationship length (months)* | | Length of bank-borrower relationship in months |
| *Number of lender relationships* | 2 | = 1 if a borrower has outstanding loans with more than one lender; = 0 otherwise. |
| *% of Amount Lent* | | Percentage of borrower's aggregate loan value that can be attributed to a given lender |
| *Primary Lender* | 2 | = 1 if the value of loans from a bank is at least 50% of the borrower's total loans; = 0 otherwise. |

## B  Relationships and refinancing

We show whether the strength of borrower relationships (on the intensive margin) with their initial MFI moderates the intensity of second-order effects. Specifically, we try to understand if the loan terms and defaults are dependent on our constructed relationship variables. To achieve this, we interact our set of relationship variables with the $Switch \times Post$ dummy to create a triple interaction term.

$$Outcome_{bijt} = \beta_0 + \beta_1 Treated_{bij} \times Post_t \times Relationship_{bijt} + \beta_z Z_{bijt} + \gamma_j + R_{bi} + \delta_t + R_{bi} \times \delta_t + \epsilon_{bijt}$$

$$(3)$$

where $Outcome$ denotes either risk or loan terms as before. $Relationship$ denotes the set of three variables used to capture the strength of the lender-borrower relationship. The coefficient $\beta_1$ for the triple interaction is our primary interest. All other independent and control variables are as previously described.

We present the results after adding the relationship variables in Table A3 which allows us to pin point which of these variables can explain the change in outcomes. We observe that *% of Amount Lent* is able to explain some of the ex-post risk we observe. Specifically, as this variable increases the probability of Ex-post NPL and Rating downgrades over the course of the loan decreases. This is because the soft information which a lender is able to capture for borrowers increases as they increase their exposure to them. *% of Amount Lent* is also instrumental in securing better loan terms for borrowers. The primary lender is able to offer better loan terms as it can mitigate any information asymmetries by establishing a stronger relationship with the borrower. However, *Relationship length* seems to work in the other direction. As relationship length increases borrowers are subject to greater writeoff probabilities (though economically insignificant). They also obtain lower amounts and higher interest rates. The reasons for this seem to be unclear. It is possible that lenders extract surplus from borrowers knowing that they will not switch to another lender given that they have maintained a sufficiently long relationship with them.

Table A4 tries to deconstruct the effect of loans given post-switch based on time dummies (dummy variables based on time elapsed since the switching loan). We consider only those loans which were given by MFIs immediately after the switch. This allows us to delve deeper into how loan terms varied for post-switch loans depending on which time bucket they fell in. Table 8 tries to peel a layer and delve deeper into how MFIs altered loan conditions (as

compared to the switching loan) to suit borrowers. We observe that while loan conditions were no better in the first 6 months after switch, they became more favourable if the loan was disbursed 6 months (and roughly within 24 months) after the switching loan. The reason for this could be that when borrowers return to MFIs within 6 months, the lenders presume that these borrowers still want to continue the relationship. Thus, they continue to extract rents from the borrowers. However, when a loan is given after the 6 month duration, to a lender it implies that the borrower might have established a relationship with the switching institution. Hence, once this comes to pass lenders more aggressive in ascertaining the loan terms for the borrowers. As a result borrowers end up obtaining higher loan amounts, longer duration and interest rate discounts. We do not match on year-month of loan initiation across the treatment and control groups as our primary variables of interest are the time dummies which capture the time difference (in months) between the switching and subsequent loan.

Table A3: **Effect of Relationship on Ex-post Risk and Loan Terms for Loans Disbursed to Borrowers Post Switch**

The table below presents the DiD estimates for a regression of ex-post risk on an indicator which captures information on post-switch loans. Treatment loans are defined as outside loans where borrowers switched from an MFI to a consumer lender. The control group consists of loans given by an MFI immediately after a switching MFI loan. The treatment group consists of all loans given by MFIs just after the switching consumer loan. We do not include the switching loans itself for our analyses. *Treatment×Post* is an interacted dummy which equals 1 for loans given after the switching loan for the treatment group. We interact relationship variables with the interacted dummy to create a triple interaction term. The treatment and control groups are matched on a set of loan and borrower level characteristics using coarsened exact matching. This allows us to compare only those loans which are similar to each other. Loan amount, interest rate, loan duration, % of loan amount collateralized and unobservable ex-ante risk are bucketed into quartiles thus ensuring that the range of comparison lies within a band of -25% to +25% for these variables. Standard errors are corrected for heteroskedascity using White's methodology. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

| | Ex-post Risk | | | Loan terms | | | |
|---|---|---|---|---|---|---|---|
| | (1)<br>Writeoff | (2)<br>NPL | (3)<br>Rating Downgrade | (4)<br>Log(Contract amount) | (5)<br>Interest rate | (6)<br>Loan duration | (7)<br>Log(% Collateralized) |
| Treatment x Post | 0.041 | 0.221** | 0.171* | 0.255 | 2.758* | 0.113 | 0.017 |
| | (0.199) | (0.015) | (0.059) | (0.150) | (0.052) | (0.944) | (0.919) |
| Treatment | 0.007*** | −0.059*** | −0.040*** | −0.107*** | 1.006*** | −1.270*** | −0.041 |
| | (0.009) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.194) |
| Post | 0.010 | −0.003 | 0.027 | −0.098** | −1.815*** | −1.038*** | 0.030 |
| | (0.101) | (0.871) | (0.210) | (0.048) | (0.000) | (0.006) | (0.596) |
| Post x Treatment x Relationship length (months) | 0.001*** | 0.001 | 0.000 | −0.006*** | 0.025** | −0.006 | −0.003* |
| | (0.004) | (0.332) | (0.406) | (0.000) | (0.012) | (0.528) | (0.052) |
| Post x Treatment x Number of lender relationships | −0.020* | −0.057* | −0.048 | −0.058 | 0.075 | −0.403 | 0.049 |
| | (0.051) | (0.064) | (0.114) | (0.304) | (0.865) | (0.439) | (0.318) |
| Post x Treatment x % of Amount lent | −0.000** | −0.001* | −0.001* | 0.005*** | −0.038*** | 0.036*** | −0.001 |
| | (0.048) | (0.098) | (0.092) | (0.000) | (0.000) | (0.000) | (0.456) |
| Quarter fixed-effects | Y | Y | Y | Y | Y | Y | Y |
| Region fixed-effects | Y | Y | Y | Y | Y | Y | Y |
| Quarter x Region fixed-effects | Y | Y | Y | Y | Y | Y | Y |
| Bank fixed-effects | Y | Y | Y | Y | Y | Y | Y |
| *Observables matched on:* | | | | | | | |
| Year:Month of loan initiation | Y | Y | Y | Y | Y | Y | Y |
| Currency | Y | Y | Y | Y | Y | Y | Y |
| Region | Y | Y | Y | Y | Y | Y | Y |
| Borrower rating (initial) | Y | Y | Y | Y | Y | Y | Y |
| Loan amount | Y | Y | Y | Y | Y | Y | Y |
| Interest rate | Y | Y | Y | Y | Y | Y | Y |
| Loan maturity | Y | Y | Y | Y | Y | Y | Y |
| Percent collateralized | Y | Y | Y | Y | Y | Y | Y |
| *Unobservables matched on:* | | | | | | | |
| Unobservable ex-ante risk | Y | Y | Y | Y | Y | Y | Y |
| Observations | 37568 | 37568 | 37568 | 37568 | 37568 | 37568 | 5137 |

Table A4: **Change in Loan Terms over Time for Borrowers who Switched from MFIs to Consumer Lenders**

The table below depicts the coefficient estimates for a regression of loan terms for additional loans disbursed by MFIs on an indicator for time elapsed since the switching loan. We trace these subsequent loans for an MFI-borrower pair following the borrowers' decision to switch. Treatment loans are defined as outside loans where borrowers switched from an MFI to a consumer lender. Outside loans are defined as those loans which were either initiated more than 12 months after the previous loan for a bank-borrower combination or was the first loan disbursed by a given lending institution to a borrower already present in the credit register. The treatment and control groups are matched on a set of loan and borrower level characteristics using coarsened exact matching. This allows us to compare only those loans which are similar to each other. Loan amount, interest rate, loan duration and % of loan amount collateralized are bucketed into quartiles thus ensuring that the range of comparison lies within a band of -25% to +25% for these variables. Standard errors are corrected for heteroskedascity using White's methodology. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

| | Log(Contract amount) | Interest rate | Loan duration | Log(% Collateralized) |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Up to 6 Months since Switching Loan | −0.411*** | 2.649*** | −2.167*** | −0.015 |
| | (0.000) | (0.000) | (0.000) | (0.629) |
| 7 to 12 Months since Switching Loan | −0.318*** | 0.929*** | −1.022*** | −0.063* |
| | (0.000) | (0.000) | (0.000) | (0.091) |
| 13 to 18 Months since Switching Loan | −0.351*** | 0.751*** | −0.882*** | −0.108 |
| | (0.000) | (0.003) | (0.005) | (0.106) |
| 19 to 24 Months since Switching Loan | −0.328*** | 0.266 | 0.310 | −0.038 |
| | (0.000) | (0.393) | (0.477) | (0.614) |
| 25 to 30 Months since Switching Loan | −0.391*** | −0.078 | 1.791*** | 0.000 |
| | (0.000) | (0.838) | (0.003) | (0.997) |
| 31 to 36 Months since Switching Loan | −0.459*** | −0.604 | 2.438*** | 0.116 |
| | (0.000) | (0.142) | (0.000) | (0.210) |
| More than 36 Months since Switching Loan | −0.947*** | −3.312*** | 6.120*** | −0.080 |
| | (0.000) | (0.000) | (0.000) | (0.393) |
| *Observables matched on:* | | | | |
| Year:Month of loan initiation | N | N | N | N |
| Currency | Y | Y | Y | Y |
| Region | Y | Y | Y | Y |
| Borrower rating (initial) | Y | Y | Y | Y |
| Multiple relationships | Y | Y | Y | Y |
| Primary bank | Y | Y | Y | Y |
| Loan amount | N | Y | Y | Y |
| Interest rate | Y | N | Y | Y |
| Loan maturity | Y | Y | N | Y |
| Percent collateralized | Y | Y | Y | N |
| Relationship length | Y | Y | Y | Y |
| Quarter fixed-effects | Y | Y | Y | Y |
| No. Treatment Observations | 26679 | 28462 | 28425 | 22046 |
| No. Control Observations | 9282 | 18405 | 11549 | 8062 |
| Observations | 35961 | 46867 | 39974 | 2604 |