# Individual vs. village lending: Evidence from Montenegro

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**Abstract**

This paper analyzes differences in loan performance across two Montenegrin microfinance institutions with different lending techniques using a sample of individuals borrowing from both institutions. We make use of administrative data from both institutions over the period 2004 to 2013. While one institution relies on village associations for screening and monitoring of borrowers, the other institution uses the individual liability approach. We find that the likelihood to go into arrears is higher for the institution with a strictly individual lending technique, while the likelihood of going into arrears over 30 days is higher for the institution working with village associations. These results are robust to a variety of additional tests, including different definitions of arrears and subsamples. Our findings suggest that the institution using an individual lending technique provides certain flexibility to its clients, while the village-based microfinance institution might face more strategic default behavior. We provide evidence that once a borrower is in arrears, (s)he is more likely to stay in arrears for more than 30 days in branches with a higher share of borrowers in arrears and in the village-based lender. Our findings provide evidence that a village- or group-based lending technique is not necessarily superior to individual lending technique in terms of loan performance.

**JEL Classification:** G21
**Keywords:** Lending technology, group lending, individual lending, village associations, loan repayment, microcredit.

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# 1 Introduction

One of the striking characteristics of microcredit are high repayment rates across many institutions and countries. On the other hand, there have been spectacular failures of microfinance institutions (MFIs), as quoted by Armendariz de Aghion and Morduch (2010). Chen et al. (2010) report non-performing loan ratios in 2009 reaching 7% in Bosnia-Herzegovina, 10% in Morocco, 12% in Nicaragua and 13% in Pakistan. Most prominently, following a rapid expansion of the microcredit industry India's Andhra Pradesh saw a major crisis in the sector in 2010. While the, on average, high repayment rates in microcredit have often been explained with the group lending technique whose main element is joint liability, more and more MFIs have shifted away from group lending and joint liability towards individual lending techniques over the past years. One of the important open questions in micro lending is therefore whether repayment problems are less pronounced when a lending technology based on groups or village associations is applied compared to an individual lending approach. Theory provides contradictory predictions and in empirical research, so far this issue has not been settled. In this paper, we use data for a sample of micro borrowers from two large MFIs in Montenegro that use different lending techniques to address this question. By considering repayment behavior across a group of borrowers that take out loans from both institutions we are able to control for borrower selection.

Theory provides opposing predictions on the effect of alternative lending techniques on repayment behavior. On the one hand, group lending, whose main element is joint liability, can both have an insurance function – in case of idiosyncratic shocks to individual group members – and provide a more efficient screening and monitoring mechanism, thus impacting repayment incentives, ultimately serving to reduce risks for the lender. Given the very high information asymmetries between lenders and micro borrowers and the resulting agency costs, peer screening (Ghatak, 1999; Ghatak, 2000; Van Tassel, 1999) and peer monitoring

(Banerjee et al., 1994) can reduce information asymmetries and therewith agency problems. Group lending is also related to the idea of social capital, with evidence that social capital and connections among group members can matter for default probability (Ahlin and Townsend, 2007; Karlan, 2007; Feigenberg et al., 2010). On the other hand, there are increasing doubts whether group lending is always better under any circumstance. While group lending can encourage risk sharing, it can also increase the likelihood of strategic default if a large number of borrowers in the groups default (Besley and Coate, 1995).[1] Thus, theory does not provide a clear prediction to the question whether group lending is always preferable under any circumstance than individual lending.

The empirical exploration of loan performance differences associated with group lending versus individual lending techniques has so far focused on MFIs that have changed from one to the other lending technique or use both at the same time. Gine and Karlan (2014) use the gradual and partial switch of an MFI in the Philippines from group to individual lending to gauge the relative effectiveness of both lending techniques and find that default rates are the same for groups of individual borrowers and joint liability borrowers. Similarly, Attanasio et al. (2015) find no difference in default rates between groups of individual and joint liability borrowers in rural Mongolia. Carpena et al. (2013) study a similar conversion of an Indian MFI from individual to joint liability loans and find not only a higher repayment rate under group liability, but also a selection effect with more reliable borrowers joining the same group. Bryan et al. (2015) show the importance of peer influence under individual liability contracts in a field experiment in South Africa. Gine et al. (2010) and Fischer (2011) use laboratory experiments with actual and potential microcredit customers and find significant differences according to the degree to which group members can observe behavior

[1] Bond and Rai (2008) provide arguments that the risk of strategic default can be reduced if the microcredit contract is designed appropriately.

of other members and individual or joint decision taking. Finally, Gine et al. (2011) provide evidence for strategic default, using repayment data on Muslims and Hindu microcredit clients in India. Specifically, in 2009, the Anjuman Committee of Kolar issued a statement banning all Muslims from repaying their MFI loans as interest is forbidden under Sharia. The authors show that this increased strategic default by Hindu borrowers occurred in groups dominated by Muslim borrowers.

Contrary to most of the existing literature that uses field or laboratory experiments, our empirical approach relies on analyzing administrative data provided by two large MFIs operating in Montenegro, a southeastern European successor country of former Yugoslavia. When comparing repayment behavior of borrowers that take out loans under a village association scheme with borrowers that take out loans under individual liability, it is crucial to rule out that borrower selection drives any detected performance differences. Borrower selection can lead to comparing individuals of different unobserved quality, which may explain any differences in the repayment behavior rather than the lending approach used by the MFI. We circumvent this problem by focusing on clients that took out loans from both MFIs in our sample period that spans the years 2004 to 2013. Specifically, we focus on the same borrower getting a loan from an MFI that uses a village-based lending approach and compare her repayment behavior to a situation when she takes out a loan from the other MFI that uses an individual liability lending approach. Furthermore, as we are able to identify all clients at both MFIs, we can include client fixed effects in our regressions that should control for any unobserved, time-invariant borrower characteristics (such as borrower gender) that may drive repayment behavior. By including loan purpose fixed effects (investment in fixed asset, investment in working capital, investment in real estate, consumption loan and loan usage for other purposes) we are also able to control for the possibility that borrowers use loans from the different institutions for different purposes. We confirm our findings by

focusing on a sample of borrowers taking out a loan from both institutions in the same year and confirm them across two sub-samples where borrowers take out a loan either first from the individual-based or first from the village-based institution. While these additional tests cannot completely exclude selection biases, they likely mitigate these concerns substantially.

We find that borrowers face repayment problems more often when they are subject to individual liability. In particular, they are more often late on their payments under the individual liability contract. However, this effect is reversed when we use repayment delays of more than 30 days (and longer time periods) as outcome variable. In this case, we find that borrowers under the village lending scheme display a worse performance. The 30-day threshold is a crucial risk measure for MFIs and as such we interpret our findings as evidence in favor of a better impact of the individual liability contract on micro borrowers' repayment behavior. We also provide suggestive evidence that the higher arrear probability for village-based loans might be due to strategic default behavior by focusing on borrowers that stay in arrears for more than 30 days once they have fallen into arrears. This likelihood is not only greater for loans in village association but increases in the share of borrowers in arrears for more than 30 days in the same branch and month.

Our paper adds to the literature that investigates how borrower liability affects repayment behavior. Specifically, we add to the above mentioned empirical studies comparing repayment behavior of clients under different liability regimes (see Banerjee, 2013, for an overview); in most cases these studies are conducted as randomized field experiments with clients of the same institutions being randomly assigned to one of the two liability schemes, where the institution either expands or changes its lending technique. Our study works with observational data across two MFIs but with a consistent sample of individuals borrowing from both. While we document an array of differences across the two institutions, loan conditions are fairly similar as we will discuss below so that we are not able

to point to only one specific contract difference between the two institutions that can explain performance differences. Rather, the differences seem to be driven by different lending techniques across the two institutions. Our findings have broader implications for the debate on the provision of sustainable microcredit services, as we document a significant cultural difference between both institutions. Our results also underline that focusing on only one loan performance metric might give a distorted picture.

The remainder of the paper is organized as follows. Section 2 provides background information, describes the two MFIs, the dataset and methodology and presents descriptive statistics. Section 3 discusses the main empirical results, provides several robustness tests and explores heterogeneity in borrower and loan characteristics. Section 4 concludes.

# 2 Data and background information

This section describes our data, provides information about the two lenders, sample composition and summary statistics.

## 2.1 Background information

Our information on the loan products and lending techniques is based on credit manuals and personal conversations with management in both Montenegrin MFIs. For reasons of data confidentiality, we will in the following refer to bank A (village lender) and bank B (individual liability lender). While there are other micro lenders in the market, these two institutions together make up around 80% of the microfinance market in Montenegro during our sample period.

Clients of Bank A have to be a member of village associations to be able to apply for a loan. Initially, Bank A only issued loans targeted to improve the quality of life in the village, and was therefore restricting loans to local businesses. In 2008 Bank A, however, started

issuing loans for consumption purposes as well. Loan amounts range from 250 to 1,500 Euro for the first loan and this increases to a maximum of 3,500 Euro in case of repeat borrowers. Loan maturities for first loans range from 3 to 18 months and up to 30 months for repeat loans. In the sample period, Bank A used a fixed rate of 18 percent per annum for all loans issued. Bank B's target group consists of entrepreneurs, who have their own private business. However, clients of Bank B are also allowed to apply for microloans to improve living conditions if the client has her own business. Bank B has two loan products; loans for business purposes whose amounts can range from 500 to 5,000 Euro and this increases with repeat loans to 10,000 Euro, while for loans issued for improvement of living conditions the loan amount ranges from 500 to 3,000 Euro with no increase for repeat loans. Bank B offered loans with maturities of 6 to 36 months with no increase on the maturity for repeated loans and calculates the interest rates based of the nature of the loan, starting at 15.9 percent per annum for large business loans to 24.9 percent per annum for urgent loans.

Bank A's lending technique relies on the group lending model, even though there is strictly speaking no joint liability. Bank A focuses on small villages with 120 to 150 households to set up village associations. To qualify for a loan, the client has to be a resident of a village with a village association and a member of the association. Bank A is using this method to create a solidarity link between the clients and to make sure that all members of the association have social influence over each other. Consequently, the members can screen potential new members of the village association and monitor the use of loan and repayment behavior of the other members. Village councils perform the initial screening, undertake collection of repayments and support the monitoring process of Bank A. The village council is elected by the people in the specific village association and has 3 to 5 members, preferably people with respect and therefore influence throughout the village. Compensation of village councils depends both on total credit outstanding of the village association and repayment

performance. While there is no direct joint liability, increased default has consequences for the whole association. In case of arrears, the village association will be affected by not receiving any new loans after 10 days of delay of an individual borrower. In addition, 50 percent of the salary of the village council will be withheld. Bank A will also punish the association with not issuing new loans for three months, to encourage peer monitoring and repayment enforcement. Finally, the individual that does not make the loan payments may suffer from a loss of social capital because of the strong connections among the villagers. All these aspects should give the borrowers strong repayment incentives and resembles the main ideas of the group lending model.

Bank B, on the other hand, focuses on individual lending, with a credit assistant undertaking initial screening of the client, before the information is passed on to the loan officer. The latter is ultimately responsible for screening and monitoring. There is no reliance on local residents or neighbors for screening or monitoring purposes in the case of Bank B.

In summary, while loan conditions seem fairly similar across the two micro lenders, the main difference is in the lending technique applied, allowing us to gauge the importance of individual versus village lending for a group of borrowers that take out loans from both institutions.

### 2.2. Data and descriptive analysis

We have loan-level data for clients of the two MFIs for the period of January 2004 to April 2013. The data include information about the borrowers, their loan values and repayment history. To gauge the effect of lending technique on loan performance we use three different dependent variables: *times in arrears* is a dummy variable indicating whether a loan went into arrears for at least one day during its life; *times in arrears over 30 days* is a dummy variable indicating whether a loan went in arrears for more than 30 days at least once; finally,

*maximum days in arrears* is the total number of days that the loan was in arrears during the longest spell until the date of maturity.[2]

While the original database comprising all loans by the two institutions over the ten-year period included 150,723 observations for 78,769 unique clients, we limit our sample to 8,041 individuals who borrowed from both MFIs over the sample period, with a total of 31,420 loans, representing almost four loans on average per borrower. The merging of the administrative data of the two MFIs was done using a unique identifier that mimics the social security number of the individuals and that is contained in both MFIs administrative datasets.

Table 1 presents descriptive statistics. The sample is finely balanced, with 51.6 percent of all loans (16,211 observations) in our sample provided by the institution with an individual lending technique, Bank B, and 48.4 percent of all loans (15,209 observations) provided by Bank A, the village association lender. 72 percent of all loans were in arrears at some point of the loan, although only 36 percent for more than 30 days. On average, the maximum number of days in arrears for the loans that actually went into arrears was 52 days. Compared to the global experience in microfinance, the repayment performance of both banks is rather bad. While the incidence of arrears was relatively constant between 2004 and 2011 and then dramatically decreased[3], the incidence of arrears over 30 days shows a hump-shaped pattern over the sample period, with a peak in 2008. This latter pattern is consistent with the credit boom that Montenegro experienced in the first decade of the 21st century and which turned into a bust in 2009; this boom-bust cycle has also been associated with easy access to credit by households and subsequent high levels of over-indebtedness.

[2] Our data do not allow us to distinguish whether a loan went into arrears more than once during its lifetime.
[3] The decrease towards the end of the sample period is also driven mechanically because we cannot observe the exact point in time when a loan went into arrears and loans which were given out towards the end of the observation period are subject to the problem of right censoring of the data.

On average, borrowers are 40 years old, 56 percent of the borrowers are female and only 5.8 percent of loans are taken out for consumption purposes, although this should be seen as the lower bound because the real loan usage is not observable and loans that were officially taken out as business loans may actually have been used for consumption purposes. 17.5 percent of loans are taken out for purposes of investment in fixed asset, 17.5 percent for working capital, and 5.2 percent for investment in real estate. The remaining 54% are taken out for other or undefined purposes. The average approved amount was somewhat below 2,000 Euros with an approved maturity of 21 months and the average value of the monthly installment was 131 Euros. The loan characteristics are thus typical for microloans in developing countries.

**2.3. Methodology**

We work with a sample of individuals that borrow from both MFIs, although not necessarily in the same year (we restrict our sample accordingly in robustness tests). This allows us to include borrower fixed effects in our regressions, thus controlling for selection bias arising from certain individuals preferring one institution over the other. Specifically, we estimate the following regression model

(1) $$y_{ibjkt} = \beta Individual_j + \gamma Borrower_{i,t} + \delta Loan_{i,j,t} + \tau_t + \mu_i + n_k + \varphi_b + \varepsilon_{ibjt},$$

where subscripts *i*,*b*,*j*,*k*, *t* denote borrower, branch, bank, loan purpose, and month, respectively. The dependent variable $y_{ibjkt}$ is *times in arrears, times in arrears over 30 days* or *maximum days in arrears*, depending on the respective regression specification. The coefficient of interest is β, which captures the difference in the arrear likelihood of borrowers borrowing from MFI B vis-à-vis the same borrowers borrowing from MFI A, after controlling

for calendar month and year (τ), branch (μ), loan purpose ($n$) and borrower (φ) fixed effects as well as loan contract terms such as the approved amount in Euro, the approved maturity in months and the value of the monthly instalments in Euro.[4] In addition we control for borrower age.[5] In the regression analyses below, we add the fixed effects and covariates gradually to check whether our results depend on the inclusion of any of these controls.

Although two of our dependent variables are binary variables, we use OLS instead of a non-linear Probit or Logit model as we would otherwise lose a large number of borrower clusters with no variation in arrear incidence.[6] The standard errors in all regressions are clustered on the borrower level.

# 3 Empirical results

In this section, we first present our main results and the results of various robustness tests, then we proceed to present some heterogeneous results with regard to borrower and contract characteristics.

## 3.1. Main results

Our main results are shown in Table 2. The table suggests that there is a higher incidence of a loan going into arrears for borrowers borrowing from Bank B, i.e. the bank with individual liability rather than village lending technique. We present six different specifications, adding different fixed effects and control variables as we move from column (1) to column (6). Specifically, column (1) presents a simple correlation without any control variables, column

[4] We can include branch and borrower fixed effects at the same time because borrowers borrow from different branches.

[5] We do not include the borrower gender as a control variable as borrower gender is time-invariant and therefore saturated by the inclusion of borrower fixed effects. Furthermore, when we include loan purpose fixed effects, we do not additionally include the consumer loan dummy.

[6] Angrist and Pischke (2008) provide an in-depth discussion of why OLS is not necessarily inferior to probit or logit models even when the dependent variable is binary.

(2) adds calendar month and year fixed effects indicating the month and year in which the loan was approved, column (3) branch-fixed effects, column (4) borrower fixed effects, borrower age and whether the loan was taken out for consumption purposes, column (5) adds loan characteristics. Finally, column (6) replaces the consumer loan dummy with four more detailed dummies for the loan purpose, including loan usage for investment in fixed assets, working capital, real estate investment and consumption, with other purposes being the omitted category. The stepwise addition of fixed effects and covariates serves to show that our results do not depend on the inclusion of any specific controls and remain robust irrespective of the estimated model.

Across all six specifications, the dummy variable indicating loans from Bank B, the bank with individual liability, enters positively and significantly. The effect is not only statistically but also economically highly significant, with borrowers being between 29 and 35 percentage points more likely to fall into arrears with the individual liability lender than with the village lender. Given the average arrears incidence of 72 percent, this is a large economic effect, as it explains almost half of the average. As specifications (4), (5) and (6) also control for borrower fixed effects, this suggests stronger repayment pressure and thus performance for a given borrower if (s)he borrows from the village rather than from the individual liability lender. As specification (6) includes loan purpose dummies, our findings suggest that this stronger repayment pressure even holds for loans used for similar purposes. The results also show that older borrowers are more likely to fall into arrears, while consumer loans are less likely to do so. The unreported coefficient estimates on the loan purpose dummies in column (6) suggest that fixed asset, real estate and working capital loans are more likely to go into arrears. Finally, larger loans and loans with longer maturity are more likely to go into arrears while loans with higher monthly instalment payments are less likely to do so.

The results in Table 3 suggest a stronger incidence of arrears over 30 days for loans taken out from the village lender instead of from the individual liability lender. We present the same specifications as in Table 2 and gradually add the fixed effects and borrower covariates and loan contract characteristics. Interestingly, the results are now reversed. Using the interpretation of specifications (4), (5) and (6), a borrower is more likely to fall into arrears for more than 30 days under the village lending scheme than when the same borrower is under the individual liability scheme, even when controlling for the loan purpose. The results are, however, economically less strong than in Table 2. Specifically, given an unconditional likelihood to go into arrears for more than 30 days of 35 percent for the entire sample, the coefficient of 4.32 percent in column (5) indicates a difference in the likelihood of going into arrears of 12.3 percent. On the other hand, the results are significantly stronger, with 15.8 percent, once we control for the loan purpose in column (6). This is still a substantial economic magnitude, albeit smaller than the one documented in Table 2. Also, lending techniques explain a lower share of the overall variation in the probability of arrears of more than 30 days than in the case of any arrears, as can be seen by the lower adjusted R squares of the Table 3 regressions compared to the Table 2 regressions. The control variables enter with the same sign as in Table 2, with older borrowers and borrowers borrowing larger amounts, at longer maturities and smaller monthly instalment payments being more likely to fall into arrears for more than 30 days, while consumer loans are less likely to do so.

### 3.2. Robustness tests

Table 4 shows the results when we use variations of the dependent variable. Specifically, we use arrear definitions of 60 days, 90 days, 180 days and a variable indicating the longest time stretch in the lifetime of the loan that the borrower was in arrears computed as the number of accumulated days. We only show results for the specification that includes all fixed effects

and covariates of column (6) in Tables 2 and 3. The results in Table 4 confirm the findings so far, using these different definitions of arrears as well as the maximum number of days of arrears. In columns (1), (2) and (3) that use the 60, 90 and 180 days in arrears definitions, the dummy variable for individual liability lending enters negatively and significantly. It is important to note that the economic effect is larger than in Table 3, suggesting that the higher incidence of arrears for the village as opposed to the individual lending institution becomes stronger the longer the loan is in arrears. Finally, in column (4), we use the maximum number of days a loan was in arrears as dependent variable. On average, loans given by the village lender are 40 days longer in arrays than loans given under individual liability, even if for the same borrower and the same loan purpose. Signs and significance of the coefficients on the other control variables are very similar to the ones in the previous tables.

In another robustness test, in Table 5 we limit our sample to loans that were terminated by April 2013, the time our sample period ends. We run this specification to address the potential problem of right-censoring, i.e., the fact that loans whose maturity goes beyond our sample period end are by construction less likely to fall into default. In this regression, our sample size is about 15 percent smaller than before. We confirm our finding of a higher arrears probability for any arrear for loans under individual liability and a lower probability of arrears above 30 days for such loans. Similarly, the maximum days of arrears for such loans is, on average, 46 days lower. Furthermore, the coefficient sizes are very comparable to the cases where we use the full sample. These results suggest that our findings are not driven by data censoring.

We next explore whether there is a time variation in the performance differences of borrowers borrowing from both microfinance institutions. We first present the difference in (i) incidence of any arrears and (ii) incidence of arrears of more than 30 days between both institutions in form of a graphical analysis. The prior is depicted in Figure 1a and the latter in

Figure 1b. While Figure 1a shows that loans of the MFI with the individual lending technique always had a higher incidence of arrears in our sample period, the higher incidence of arrears above 30 days for the village-based MFI only holds for loans approved up to the first quarter of 2007. From the second quarter of 2007 onwards there is a small, though not significantly, higher incidence of arrears of more than 30 days of the MFI using the individual liability lending technique.

The microcredit market in Montenegro experienced a very large boom period starting in 2007 that eventually ended in a bust when the global financial crisis hit Montenegro, starting from 2009 onwards. The large expansion of microloans may explain the time variation in the results documented in Figure 1b because MFIs may have expanded their loan volume while paying less attention to the associated risk of the borrowers. This may explain why we see a sharp increase in the arrears of more than 30 days starting in 2006. In Table 6, we report the results for the three dependent variables arrears of more than one day, arrears of more than 30 days and maximum number of days in arrears considering only loans given out between January 1, 2004 and December 31, 2006, i.e., the period before the start of the rapid expansion of the microcredit market in Montenegro.

In line with the graphical analysis in Figure 1b, we find that the effects are much stronger for the arrears of more than 30 days and the maximum number of days in arrears variables. Specifically, the size of the effect is 22.2% in the case of the arrears of more than 30 days. This is 50% higher than the size of the effect of the baseline case that includes all observations in the time period 2004 to 2013. This suggests that the overall effect we document for this variable is partly driven by the early years in the sample.[7] The size of the effect is also stronger for the maximum number of days in arrears variable, more than 50%

[7] When we run a regression including all fixed effects and covariates as in column (5) of Tables 2 and 3, but restrict the sample period to January 2007 to April 2013 with the arrear occurrence of more than 30 days as dependent variable, we get statistically and economically insignificant results.

the size of the baseline effect. On the other hand, the effect for the more than 1 day in arrears variable is not different from the baseline effect, again in line with the graphical evidence presented in Figure 1a. The results for the other controls are broadly in line with the earlier findings.

As final robustness test, we limit our sample even further to individuals taking out loans from both institutions in the same year. This allows us to control for time-variant unobservable borrower effects, by replacing borrower and year fixed effects with the product of the two and controlling additionally for calendar months. Restricting the data in this way yields a sample of 3,511 borrowers and 7,603 loans. We then estimate the full model of column (6) in Tables 2 and 3 for the three main dependent variables. The results of this estimation are presented in Table 7. We find that even in this more restricted sample, the incidence of arrears is higher in the case of the MFI with individual lending technique, while arrears more than 30 days and the maximum number of days in arrears are significantly higher in the case of the village-based MFI. Not only the statistical, but also the economic effects are of similar if not somewhat larger size than before. Specifically, loans to the same borrower and controlling for loan purpose are 35% more likely to go into arrears in the case of individual-based lending, but 19% more likely to go into arrears for more than 30 days in the case of the village-based institution where the maximum days in arrears is 51 days higher. In unreported robustness tests, we also split this sample into borrower-year clusters where the borrower took out the individual-based loan first (4,032 observations) and borrower-year clusters where the borrower took out the village-based loan first (3,571 observations). While we control for loan purpose dummies, borrowers might take out a loan for a given purpose from one institution and then complement for the same purpose with borrowing from the other institution in case funding is not sufficient. This ordering might be correlated with the likelihood of going into arrears. However, our results show that all our findings are

confirmed, both in statistical and economic significance, independent of whether a borrower first took out an individual-based or a village-based loan in a given year. This further reassures us that our findings are not driven by selection bias on how borrowers use the loan proceeds from the two institutions.

In summary, our results are fairly consistent across different specifications and sample restrictions – loans given under individual liability are more likely to fall into arrears for short time periods, while loans given under the village association program are more likely to fall into arrears for more than 30 days, an effect that is exacerbated as we consider longer time periods. While we cannot exclude completely that these differences might be due to borrowers taking out the loans for different purposes and projects with different risk profiles, the robustness tests presented above mitigate such concerns. These results are consistent with a certain degree of flexibility on the side of Bank B using individual lending technique as well inefficient monitoring techniques on the side of Bank A using village associations, with the possibility that there might be strategic default behaviour. We will provide some evidence about this effect below.

### 3.3. Heterogeneous results

In Tables 8 and 9 we test for heterogeneous effects of different lending techniques across borrowers with different characteristics (Table 8) and across loans with different contract terms (Table 9). Specifically, we introduce interaction variables interacting the individual lending technique dummy with a dummy variable that indicates borrowers above the median age of 40 years (column 1 and 3) and a dummy for female borrowers (columns 2 and 4).[8] None of the four interaction terms enters significantly at the 10 percent level,

[8] In these regressions, we do not additionally control for the continuous age variable. The results do not change when we include it in the regressions.

suggesting that the difference in arrear probability between the individual and village-based lending institutions do not vary with age or gender.

In Table 9, we introduce interaction terms between the individual lending technique dummy and dummies for loans above the median amount of 1,500 Euros (columns 1 and 4), for loans above the median maturity of 18 months (columns 2 and 5) and for loans with above median monthly instalment payments of 106.50 Euros (columns 3 and 6).[9] The results suggest important variation across loans with different characteristics. First, larger loans are not only more likely to suffer from arrears of more than 30 days, but this effect is stronger under the individual lending technique; specifically, the higher likelihood of arrears for more than 30 days under the village-based lending technique is less strong for above-median-sized loans (column 4).[10] If there is strategic default behaviour in the village associations, it seems more prevalent among smaller loans. We do not find any differential effect of loan size on the relationship between lending technique and the probability of any arrear (column 1).

Second, while a longer maturity somewhat dampens the positive relationship between individual lending technique and arrear probability (column 2), it enters with the opposite sign in the regression of arrear probability of more than 30 days. The coefficient size of the interaction term implies that the higher arrear probability under the village lending technique is only half as large for loans above the median maturity of 18 months (column 5). Finally, we find that the negative relationship between individual lending technique and the probability of arrears above 30 days is less pronounced for loans with above-median monthly instalment payments (column 6).

[9] In these regressions, we do not additionally control for the continuous variables for approved loan amount, approved loan maturity and approved monthly value of instalment payment. Results are invariant to the omission of these variables.

[10] The linear combination of the individual liability dummy and its interaction with the large loan dummy is not significant.

### 3.4. Strategic default

In Table 10, we offer some tentative results for tests of strategic default. Specifically, we create on the branch-year-month level the share of borrowers that were (i) in arrears for at least one day or (ii) in arrears for more than 30 days.[11] This variable thus gauges the sensitivity of individual borrower's arrear likelihood to the extent of contemporaneous arrears within the same branch. We include both of these two variables by themselves and in interaction with the individual bank dummy to test whether there is a difference in the sensitivity of individual borrower's arrear probability to the average arrear probability in the same branch across the two institutions. In addition, we include the same fixed effects and loan and borrower characteristics as in column (6) of Tables 2 and 3.

The results in columns (1) and (2) of Table 10 show a strong positive relationship between individual arrear probability and average probability of arrears in the same branch. The share of loans in arrears for at least one day enters positively and significantly in both specifications, though with a smaller coefficient sign in the regression of arrears over 30 days. In terms of variation across the two institutions, we find that the previous finding of higher arrears in the case of individual liability lending holds only in branches where there is a higher average share of arrears (with a threshold value of 28% average arrears). This can be interpreted either as higher flexibility by branch managers applying to all borrowers in a given branch or (alternatively) as branch managers allowing borrowers to continuously pay late, with such a behaviour becoming "contagious". The interaction term between the individual liability lending dummy and the branch-level average arrear probability enters negatively and

[11] As we do not exactly know the timing of arrears we match the branch-level arrears share to the month of credit approval.

significantly in the regressions of *arrears over 30 days* (column 2), suggesting that not only are borrowers less likely to fall into arrears for more than 30 days under the individual-based lending system, but even more so the higher the share of borrowers falling into arrears in these branches. This is not consistent with strategic default in the case of individual liability lending. Putting it differently, borrowers are not only more likely to fall into arrears for more than 30 days when taking out a loan from the village association-based MFI, but even more so the higher the share of other borrowers in the respective branch in the same year and month. This might be a first sign of strategic default under the village-based lending system because large numbers of borrowers seem to default together, suggesting collusion among them.

To get closer to a test of strategic default, we limit our sample to borrowers that have fallen into an arrear of at least one day (22,649 borrowers) and estimate the likelihood they will stay in arrears for more than 30 days. The results in column (3) confirm the previous finding of a higher arrear probability above 30 days when borrowing from the village-based lenders for the subsample of borrowers that fall into any arrear. The coefficient, however, is now much higher, with a 44 percentage point higher likelihood under the village-based system that a borrower once in arrears will be in arrears for more than 30 days. This compares to an average likelihood of 49 percent of a borrower falling into arrears once she has gone into arrears for at least one day. The results in column (4) show that this likelihood increases in the share of arrears above 30 days in the same branch, but less so in the case of the individual-based lender. Specifically, while the likelihood of falling into arrears for over 30 years increases by 8.3 percent for every 10 percent increase in the average arrears ratio in the same village-based branch in the same year and month, this likelihood increases by only 6.2 percent for every 10 percent increase in the average arrears ratio in the same individual-based branch in the same year and month. As in column (3), borrowers in arrears are less likely to stay in arrears for more than 30 days for loans from the individual-based institution

and this difference increases in the share of borrowers in the same branch that have fallen into arrears for more than 30 days. While these findings do not exclude other explanations for branch-wide defaults, they provide tentative evidence for strategic default behaviour in the case of the village-based, but not the individual-based lender.

# 4 Conclusion

We use a sample of micro borrowers that borrowed at least once from both of the two leading MFIs in Montenegro over the period January 2004 to April 2013 to assess the relationship between the different lending techniques used by the two MFIs and loan performance. We find that borrowers borrowing from the institution relying on village associations and certain elements of the group lending approach have a lower incidence of going into arrears but a higher likelihood of being in arrears for more than 30 days, a difference that increases as the arrear definitions become longer. These results are highly statistically and economically significant. Several robustness tests confirm that these findings are independent of how we specify our econometric model and that they cannot be explained by data censoring.

Our findings imply different interpretations. On the one hand, one could interpret the higher arrears probability of the institution using individual lending technique as flexibility and a close interaction between loan officer and borrower (although we are not able to observe and measure this interaction in our data). On the other hand, one can interpret the higher incidence of arrears of more than 30 days, and especially the increase as time passes, for the village-based MFI as indication of strategic default. We document some evidence for such strategic default, as borrowers that have already fallen into arrears are more likely to stay in arrears for more than 30 days in branches with higher average arrear probability and in the

village-based MFI. Our findings are consistent with the theoretical predictions by Besley and Coate (1995) and the evidence provided by Gine et al. (2011). We can, however, not fully rule out that other differences between the two MFIs are the underlying cause of the results we document in this study.

Our results add to the growing, yet inconclusive empirical literature comparing individual liability contracts with contracts that contain group lending elements. Given the structure of our data, we are not able to explore whether the performance differences are driven by differences in borrower screening, monitoring, repayment enforcement or a combination of the three. We view this to be a fruitful avenue for further research.

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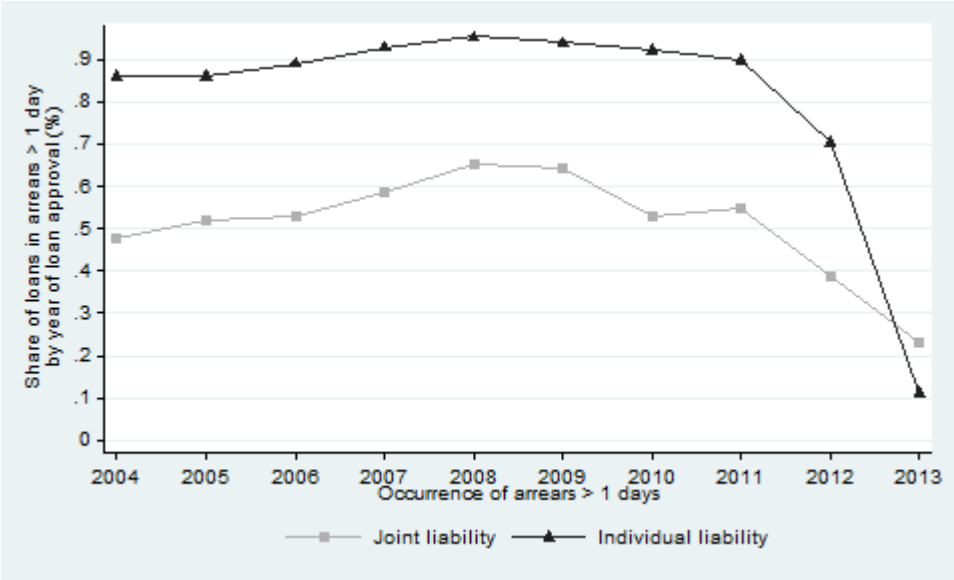
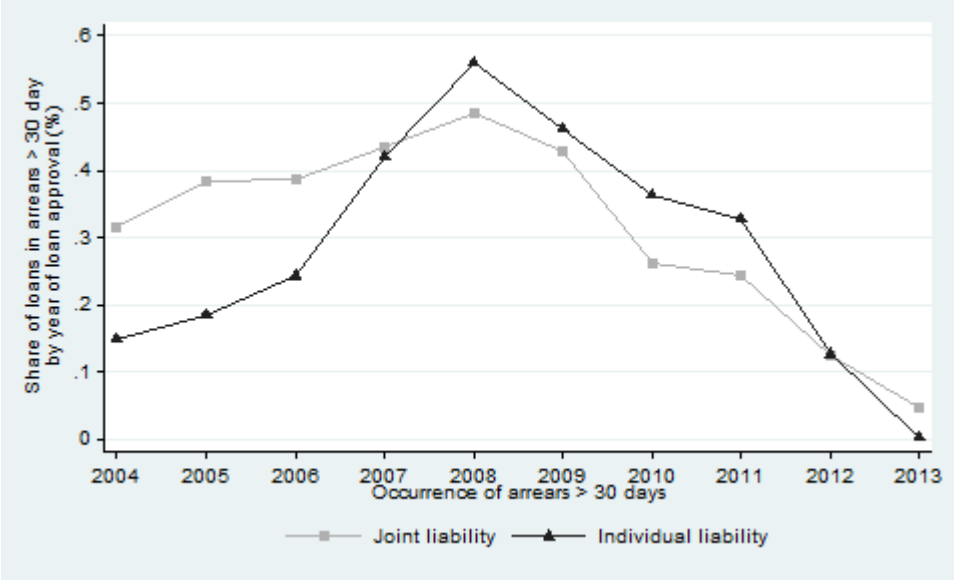
## Figure 1a: Graphical analysis of occurrence of arrears > 1 day

This figure shows a comparative analysis of the occurrence of arrears for more than one day at least once during the lifetime of the loan for the bank that uses a joint liability lending approach versus the bank that uses an individual lending approach. The analysis is done using the year of loan approval as the time unit. Only client are considered that took out loans from both banks at any point in time during the sample period 2004 to 2013.




## Figure 1b: Graphical analysis of occurrence of arrears > 30 days

This figure shows a comparative analysis of the occurrence of arrears for more than 30 day at least once during the lifetime of the loan for the bank that uses a joint liability lending approach versus the bank that uses an individual lending approach. The analysis is done using the year of loan approval as the time unit. We only consider clients that took out loans from both banks at any point in time during the sample period 2004 to 2013.



## Table 1: Descriptive statistics

This table shows descriptive statistics for the sample of 31,420 loans taken out by 8,041 borrowers from both MFIs in the time period January 2004 to April 2013. Dummy times in arrears is a dummy variable that takes on the value of one if the borrower was in arrears at least once during the lifetime of the loan. Dummy times in arrears > 30 days is a dummy variable that takes on the value of one if the borrower was in arrears for more than 30 days at least once during the lifetime of the loan. Maximum number of days in arrears indicates the longest arrear period per borrower measured in days. If a borrower was in arrears more than once during the lifetime of the loan, then maximum number of days in arrears would be the longest number of days in arrears of all arrear occurrences. Individual liability is a dummy variable that takes on the value of one if the loan was given by the MFI that uses the individual liability lending technology, and zero otherwise. Borrower age is the age of the borrower measured in years. Female borrower is a dummy variable that takes on the value of one if the borrower is female. Consumer loan is a dummy variable that takes on the value of one if the loan purpose is consumption. Value of installment is the value of the monthly installment in Euros.

| | Mean | Std. Dev. | p1 | p50 | p99 |
|---|---|---|---|---|---|
| Dummy times in arrears | 0.7208 | 0.4486 | 0 | 1 | 1 |
| Dummy times in arrears > 30 days | 0.3554 | 0.4786 | 0 | 0 | 1 |
| Maximum number of days in arrears | 51.928 | 76.852 | 0 | 16 | 271 |
| Individual liability | 0.5159 | 0.4998 | 0 | 1 | 1 |
| | | | | | |
| Borrower age | 40.525 | 10.851 | 21 | 40 | 66 |
| Female borrower | 0.5594 | 0.4965 | 0 | 1 | 1 |
| Consumer loan | 0.0575 | 0.2328 | 0 | 0 | 1 |
| Working capital loans | 0.1750 | 0.3800 | 0 | 0 | 1 |
| Fixed asset loans | 0.1754 | 0.3803 | 0 | 0 | 1 |
| Real estate loans | 0.0519 | 0.2219 | 0 | 0 | 1 |
| | | | | | |
| Approved amount (EUR) | 1,995 | 1,605 | 400 | 1,500 | 8,000 |
| Approved maturity (months) | 21.323 | 11.530 | 6 | 18 | 60 |
| Value of installment (EUR) | 130.73 | 144.87 | 34.2 | 106.5 | 609 |
| | | | | | |
| Number of observations | 31,420 | | | | |
| Number of borrowers | 8,041 | | | | |

## Table 2: Arrear occurrence

This table shows OLS regression results with the arrear occurrence as dependent variable. Arrear occurrence is a dummy variable that takes on the value of one if the borrower was in arrears for more than one day at least once at any point during the lifetime of the loan. Time and branch fixed effects are dummy variables for the month and year of the loan approval and the city in which the branch is located, respectively. Borrower fixed effects are dummy variables for each borrower. Loan purpose fixed effects are dummy variables for the usage of the loan. All control variables are explained in Table 1. Approved amount is scaled by dividing the original value by 1000; approved maturity and value of installment are scaled by dividing the original value by 100. ***, **, * indicate significance at the 1, 5, and 10 percent level, respectively.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Individual liability | 0.2870*** | 0.3250*** | 0.3321*** | 0.3370*** | 0.3488*** | 0.3125*** |
| | [0.0067] | [0.0067] | [0.0082] | [0.0110] | [0.0110] | [0.0145] |
| Borrower age | | | | 0.0199*** | 0.0211*** | 0.0186*** |
| | | | | [0.0037] | [0.0037] | [0.0037] |
| Consumer loan | | | | -0.0609*** | -0.0477*** | |
| | | | | [0.0165] | [0.0166] | |
| Approved amount | | | | | 0.0079** | 0.0078** |
| | | | | | [0.0032] | [0.0032] |
| Approved maturity | | | | | 0.1571*** | 0.1676*** |
| | | | | | [0.0413] | [0.0415] |
| Value of installment | | | | | -0.0051* | -0.0054** |
| | | | | | [0.0026] | [0.0026] |
| Sample mean of dependent variable | 0.7208 | 0.7208 | 0.7208 | 0.7208 | 0.7208 | 0.7208 |
| Observations | 31,420 | 31,420 | 31,420 | 31,420 | 31,420 | 31,420 |
| Adjusted *R*2 | 0.102 | 0.174 | 0.187 | 0.499 | 0.502 | 0.502 |
| Time fixed effects | No | Yes | Yes | Yes | Yes | Yes |
| Branch fixed effects | No | No | Yes | Yes | Yes | Yes |
| Borrower fixed effects | No | No | No | Yes | Yes | Yes |
| Loan purpose fixed effects | No | No | No | No | No | Yes |

## Table 3: Arrear occurrence of more than 30 days

This table shows OLS regression results with the arrear occurrence of more than 30 days as dependent variable. Arrear occurrence of more than 30 days is a dummy variable that takes on the value of one if the borrower was in arrears for more than 30 days at least once at any point during the lifetime of the loan. Controls and fixed effects are included as indicated in the table. All control variables are explained in Table 1 and Table 2. ***, **, * indicate significance at the 1, 5, and 10 percent level, respectively.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Individual liability | -0.0683*** | -0.0183*** | -0.0496*** | -0.0623*** | -0.0432*** | -0.1578*** |
| | [0.0067] | [0.0068] | [0.0090] | [0.0119] | [0.0119] | [0.0152] |
| Borrower age | | | | 0.0437*** | 0.0454*** | 0.0358*** |
| | | | | [0.0044] | [0.0044] | [0.0044] |
| Consumer loan | | | | -0.0600*** | -0.0401*** | |
| | | | | [0.0144] | [0.0144] | |
| Approved amount | | | | | 0.0079** | 0.0078** |
| | | | | | [0.0037] | [0.0037] |
| Approved maturity | | | | | 0.2835*** | 0.2950*** |
| | | | | | [0.0482] | [0.0478] |
| Value of installment | | | | | -0.0059** | -0.0069*** |
| | | | | | [0.0026] | [0.0026] |
| Sample mean of dependent variable | 0.3553 | 0.3553 | 0.3553 | 0.3553 | 0.3553 | 0.3553 |
| Observations | 31,420 | 31,420 | 31,420 | 31,420 | 31,420 | 31,420 |
| Adjusted *R*2 | 0.005 | 0.070 | 0.119 | 0.445 | 0.450 | 0.456 |
| Time fixed effects | No | Yes | Yes | Yes | Yes | Yes |
| Branch fixed effects | No | No | Yes | Yes | Yes | Yes |
| Borrower fixed effects | No | No | No | Yes | Yes | Yes |
| Loan purpose fixed effects | No | No | No | No | No | Yes |

## Table 4: Different arrear occurrence definitions

This table shows OLS regression results using different arrears definitions as dependent variables. In column 1, the arrear definition used is if the borrower was in arrears for more than 60 days at least once during the lifetime of the loan. In column 2 (3), an arrears definition of 90 (180) days is used instead. In column 4, the dependent variable is the maximum number a borrower was in arrears during the lifetime of the loan. Controls and fixed effects are included as indicated in the table. All control variables are explained in Table 1 and Table 2. ***, **, * indicate significance at the 1, 5, and 10 percent level, respectively.

| | Arrears > 60 days | Arrears > 90 days | Arrears > 180 days | Maximum days in arrears |
|---|---|---|---|---|
| Individual liability | -0.2389*** | -0.2365*** | -0.1732*** | -39.6841*** |
| | [0.0134] | [0.0126] | [0.0109] | [2.2988] |
| Borrower age | 0.0294*** | 0.0272*** | 0.0153*** | 4.4075*** |
| | [0.0038] | [0.0035] | [0.0030] | [0.6180] |
| Approved amount | 0.0056* | 0.0076** | 0.0095*** | 1.8554*** |
| | [0.0032] | [0.0030] | [0.0027] | [0.5487] |
| Approved maturity | 0.2016*** | 0.1370*** | 0.0872** | 35.9731*** |
| | [0.0416] | [0.0392] | [0.0343] | [7.0402] |
| Value of installment | -0.0061*** | -0.0049** | -0.0029* | -1.2342*** |
| | [0.0022] | [0.0020] | [0.0016] | [0.3496] |
| Sample mean of dependent variable | 0.2424 | 0.1992 | 0.1293 | 51.928 |
| Observations | 31,420 | 31,420 | 31,420 | 31,420 |
| Adjusted *R*2 | 0.522 | 0.535 | 0.531 | 0.589 |
| Time fixed effects | Yes | Yes | Yes | Yes |
| Branch fixed effects | Yes | Yes | Yes | Yes |
| Borrower fixed effects | Yes | Yes | Yes | Yes |
| Loan purpose fixed effects | Yes | Yes | Yes | Yes |

## Table 5: Terminated loans only

This table shows OLS regression results using different arrears definitions as dependent variables. In column 1, the arrear definition used is if the borrower was in arrears for more than 1 day at least once during the lifetime of the loan. In column 2, an arrears definition of 30 days is used instead, and in column 3 we use the maximum number of days in arrears as dependent variable. The regressions only consider loans that have a maturity date before or on April 23, 2013, the end of our sample period. Controls and fixed effects are included as indicated in the table. All control variables are explained in Table 1 and Table 2. ***, **, * indicate significance at the 1, 5, and 10 percent level, respectively.

| | Arrears > 1 day | Arrears > 30 days | Maximum days in arrears |
|---|---|---|---|
| Individual liability | 0.3397*** | -0.1802*** | -46.3164*** |
| | [0.0165] | [0.0186] | [2.8905] |
| Borrower age | 0.0143*** | 0.0299*** | 3.7058*** |
| | [0.0040] | [0.0050] | [0.7069] |
| Approved amount | 0.0082** | 0.0072 | 2.2566*** |
| | [0.0037] | [0.0045] | [0.7081] |
| Approved maturity | 0.2223*** | 0.4714*** | 60.9509*** |
| | [0.0496] | [0.0601] | [9.3115] |
| Value of installment | -0.0052** | -0.0066** | -1.2453*** |
| | [0.0026] | [0.0029] | [0.3856] |
| Sample mean of dependent variable | 0.7431 | 0.3833 | 56.880 |
| Observations | 26,783 | 26,783 | 26,783 |
| Adjusted *R*2 | 0.526 | 0.461 | 0.582 |
| Time fixed effects | Yes | Yes | Yes |
| Branch fixed effects | Yes | Yes | Yes |
| Borrower fixed effects | Yes | Yes | Yes |
| Loan purpose fixed effects | Yes | Yes | Yes |

## Table 6: Analysis of the 2004-2006 sub-period

This table shows OLS regression results using different arrears definitions as dependent variables. In column 1, the arrear definition used is if the borrower was in arrears for more than 1 day at least once during the lifetime of the loan. In column 2, an arrears definition of 30 days is used instead, and in column 3 we use the maximum number of days in arrears as dependent variable. The regressions only consider loans that were approved in the time period January 1, 2004 to December 31, 2006. Controls and fixed effects are included as indicated in the table. All control variables are explained in Table 1 and Table 2. ***, **, * indicate significance at the 1, 5, and 10 percent level, respectively.

| | Arrears > 1 day | Arrears > 30 days | Maximum days in arrears |
|---|---|---|---|
| Individual liability | 0.3342*** | -0.2223*** | -66.0836*** |
| | [0.0440] | [0.0521] | [8.1920] |
| Borrower age | -0.1413 | -0.2163 | -11.6646 |
| | [0.1586] | [0.2206] | [21.4012] |
| Approved amount | 0.0023 | -0.0139 | -0.6182 |
| | [0.0144] | [0.0142] | [1.7661] |
| Approved maturity | 0.4496** | 0.5743*** | 69.4935*** |
| | [0.1778] | [0.1899] | [25.1685] |
| Value of installment | -0.0111 | 0.0077 | -0.3680 |
| | [0.0159] | [0.0123] | [0.9660] |
| Sample mean of dependent variable | 0.6995 | 0.2840 | 39.9584 |
| Observations | 8,557 | 8,557 | 8,557 |
| Adjusted *R*2 | 0.597 | 0.476 | 0.600 |
| Time fixed effects | Yes | Yes | Yes |
| Branch fixed effects | Yes | Yes | Yes |
| Borrower fixed effects | Yes | Yes | Yes |
| Loan purpose fixed effects | Yes | Yes | Yes |

## Table 7: Loans by both institutions in the same year

This table shows OLS regression results using different arrears definitions as dependent variables. In column 1, the arrear definition used is if the borrower was in arrears for more than 1 day at least once during the lifetime of the loan. In column 2, an arrears definition of 30 days is used instead, and in column 3 we use the maximum number of days in arrears as dependent variable. Controls and fixed effects are included as indicated in the table. All control variables are explained in Table 1 and Table 2. ***, **, * indicate significance at the 1, 5, and 10 percent level, respectively.

| | Arrears > 1 day | Arrears > 30 days | Maximum days in arrears |
|---|---|---|---|
| Individual liability | 0.3454*** | -0.1866*** | -50.6249*** |
| | [0.0403] | [0.0456] | [7.1535] |
| Borrower age | 0.0162* | 0.0251** | 2.7501* |
| | [0.0090] | [0.0100] | [1.5082] |
| Approved amount | -0.0124 | -0.0050 | 0.6702 |
| | [0.0092] | [0.0111] | [1.8804] |
| Approved maturity | 0.5226*** | 0.5769*** | 91.6164*** |
| | [0.1222] | [0.1477] | [23.9166] |
| Value of installment | -0.0041 | -0.0128** | -2.3699*** |
| | [0.0049] | [0.0064] | [0.8966] |
| Observations | 7,603 | 7,603 | 7,603 |
| Adjusted $R^2$ | 0.309 | 0.356 | 0.498 |
| Borrower-time fixed effects | Yes | Yes | Yes |
| Branch fixed effects | Yes | Yes | Yes |
| Month fixed effects | Yes | Yes | Yes |
| Loan purpose fixed effects | Yes | Yes | Yes |

## Table 8: Heterogeneous effects – borrower characteristics

This table shows OLS regression results with the two dependent variables arrear occurrence of more than 1 day (columns 1 and 2) and arrear occurrence of more than 30 days (columns 3 and 4). In columns 1 and 3, we interact the dummy variable indicating the bank that uses an individual liability lending approach with a dummy variable indicating whether the borrower is older than the median age of all borrowers (Old borrower = 1 if the borrower is older than the median age); in columns 2 and 4, we interact it with the borrower gender (Female = 1 if the borrower is female). Controls and fixed effects are included as indicated in the table. All control variables are explained in Table 1 and Table 2. ***, **, * indicate significance at the 1, 5, and 10 percent level, respectively.

| | Arrears > 1 day | Arrears > 1 day | Arrears > 30 days | Arrears > 30 days |
|---|---|---|---|---|
| Individual liability | 0.3186*** | 0.3236*** | -0.1423*** | -0.1504*** |
| | [0.0157] | [0.0161] | [0.0166] | [0.0171] |
| Old borrower | 0.0111 | | 0.0095 | |
| | [0.0168] | | [0.0172] | |
| Old borrower X individual liability | 0.0063 | | 0.0053 | |
| | [0.0138] | | [0.0142] | |
| Female borrower X individual liability | | -0.0200 | | -0.0134 |
| | | [0.0142] | | [0.0144] |
| Sample mean of dependent variable | 0.7208 | 0.7208 | 0.3553 | 0.3553 |
| Observations | 31,420 | 31,420 | 31,420 | 31,420 |
| Adjusted *R*2 | 0.501 | 0.502 | 0.454 | 0.457 |
| Borrower and loan covariates | Yes | Yes | Yes | Yes |
| Time fixed effects | Yes | Yes | Yes | Yes |
| Branch fixed effects | Yes | Yes | Yes | Yes |
| Borrower fixed effects | Yes | Yes | Yes | Yes |
| Loan purpose fixed effects | Yes | Yes | Yes | Yes |

## Table 9: Heterogeneous effects – contract characteristics

This table shows OLS regression results with the two dependent variables arrear occurrence of more than 1 day (columns 1-3) and arrear occurrence of more than 30 days (columns 4-6). In columns 1 and 3, we interact the dummy variable indicating the bank that uses an individual liability lending approach with a dummy variable indicating whether the loan amount is bigger than the median loan amount of all loan amounts (Large loan = 1 if the loan amount is bigger than the median loan amount); in columns 2 and 4, we interact it with a dummy variable indicating whether the loan maturity is bigger than the median loan maturity (Large maturity = 1 if the maturity is bigger than the median maturity); in columns 3 and 6 we interact it with a dummy variable indicating whether the value of the installment is bigger than the median value of installment (Large installment = 1 if the value of installment is bigger than the median value of installment). Controls and fixed effects are included as indicated in the table. All control variables are explained in Table 1 and Table 2. ***, **, * indicate significance at the 1, 5, and 10 percent level, respectively.

| | Arrears > 1 day | Arrears > 1 day | Arrears > 1 day | Arrears > 30 days | Arrears > 30 days | Arrears > 30 days |
|---|---|---|---|---|---|---|
| Individual liability | 0.3328*** | 0.3510*** | 0.3134*** | -0.1501*** | -0.1627*** | -0.1697*** |
| | [0.0157] | [0.0167] | [0.0157] | [0.0158] | [0.0169] | [0.0160] |
| Large loan | 0.0420*** | | | 0.0339*** | | |
| | [0.0095] | | | [0.0094] | | |
| Large loan X individual liability | -0.0135 | | | 0.0313** | | |
| | [0.0125] | | | [0.0129] | | |
| Large maturity | | 0.0607*** | | | 0.0455*** | |
| | | [0.0098] | | | [0.0090] | |
| Large maturity X individual liability | | -0.0348*** | | | 0.0750*** | |
| | | [0.0130] | | | [0.0132] | |
| Large installment | | | 0.0193** | | | 0.0235** |
| | | | [0.0094] | | | [0.0096] |
| Large installment X individual liability | | | -0.0022 | | | 0.0260** |
| | | | [0.0124] | | | [0.0130] |
| Sample mean of dependent variable | 0.7208 | 0.7208 | 0.7208 | 0.3553 | 0.3553 | 0.3553 |
| Observations | 31,420 | 31,420 | 31,420 | 31,420 | 31,420 | 31,420 |
| Adjusted *R*2 | 0.502 | 0.503 | 0.502 | 0.456 | 0.461 | 0.457 |
| Borrower and loan covariates | Yes | Yes | Yes | Yes | Yes | Yes |
| Time fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Branch fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Borrower fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Loan purpose fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |

## Table 10: Heterogeneous effects across branches

This table shows OLS regression results with the two dependent variables arrear occurrence of more than 1 day (column 1) and arrear occurrence of more than 30 days (columns 2, 3 and 4). We include the share of arrears over 1 day (columns 1 and 2) and share of arrears over 30 days (columns 3 and 4) in each borrower's branch in a given year and month. The sample in columns 3 and 4 includes only borrowers that have been in arrears for at least one day. We also include interaction terms of these variables with the individual lending dummy. Controls and fixed effects are included as indicated in the table. All control variables are explained in Table 1 and Table 2. ***, **, * indicate significance at the 1, 5, and 10 percent level, respectively.

| | (1) Arrears > 1 day | (2) Arrears > 30 day | (3) Arrears > 30 day | (4) Arrears > 30 days |
|---|---|---|---|---|
| Individual liability | -0.0615** | -0.1586*** | -0.4416*** | -0.1120** |
| | [0.0277] | [0.0261] | [0.0212] | [0.0490] |
| Share arrears | 0.6246*** | 0.2786*** | | |
| | [0.0252] | [0.0267] | | |
| Share arrears X Individual liability | 0.2153*** | -0.1076*** | | |
| | [0.0333] | [0.0333] | | |
| Share arrears > 30 | | | | 0.8294*** |
| | | | | [0.0257] |
| Share arrears > 30 X Individual liability | | | | -0.2128*** |
| | | | | [0.0490z] |
| Sample mean of dependent variable | 0.7208 | 0.3553 | 0.4930 | 0.4930 |
| Observations | 31,420 | 31,420 | 22,649 | 22,649 |
| Adjusted $R^2$ | 0.543 | 0.459 | 0.476 | 0.530 |
| Borrower and loan covariates | Yes | Yes | Yes | Yes |
| Time fixed effects | Yes | Yes | Yes | Yes |
| Branch fixed effects | Yes | Yes | Yes | Yes |
| Borrower fixed effects | Yes | Yes | Yes | Yes |
| Loan purpose fixed effects | Yes | Yes | Yes | Yes |