

# THE ROLE OF BORROWER-COSIGNER KINSHIP RELATIONS ON LOAN DEFAULT

EVIDENCE FROM AN ITALIAN MFI<sup>1</sup>

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In the last few years, microfinance has gradually departed from the traditional model of group lending in favor of several forms of individual credit, which rely on mechanisms other than joint liability in order to enforce repayment. However, the relatively poor environment in which microfinance institutions (MFIs) operate still calls for substitutes of physical collateral in order to warrant borrowers' good behavior. Therefore, evaluating the impact that non-physical guarantees exert on repayment performance remains a primary objective for lenders, in especially in the microfinance sector. This paper investigates to what extent the practice of requiring loans cosigned by individuals linked to the borrower by a different degree of social "intensity" can affect default rates. Using a database of 2,350 loan agreements from a leading Italian microfinance provider in the period from September 1, 2009 to October 31, 2012 we address causality issues using an instrumental variable built on the exogenous rule imposed by the lender that requires personal guarantees for loans exceeding € 5,000. Conditional on the presence of a continuous measure of the amount borrowed, this allows identifying the effect of having different types of cosigners on default rates. Our estimates provide evidence that loans supported by closely related cosigners perform better than other types of loans. In particular, borrowers having siblings, spouses and next-of-kin cosigners exhibit lower default rates than borrowers linked to cosigners by weaker ties. Inspecting the frequency of direct cosigners' intervention in the repayment process, we find that non-relatives are unlikely to provide financial support to the borrower, whereas family relatives – and especially close relatives – seem to actually step in and contribute to repayment when difficulties arise. We explain this result by the fact that close relatives may be likely to promote "social enforcement" more effectively. We find that this is the result of a possible combined effect of both stronger solidarity and more effective psychological pressure exerted by relatives compared to other categories of cosigners.

Keywords: microfinance institutions, cosigner, repayment behavior, loan default.

## 1. Introduction

In the last few years, microfinance has gradually departed from the traditional model of group lending in favor of several forms of individual credit, which rely on mechanisms other than joint liability in order to enforce repayment. However, the relatively poor environment in which microfinance institutions (MFIs) operate still calls for substitutes of physical collateral in order to warrant borrowers' good behavior. Therefore, evaluating the impact that non-physical guarantees exert on repayment performance remains a primary objective for lenders, in particular in the microfinance sector.

This paper concentrates on the practice of requiring cosigned individual loans. Such types of loans are frequent in many developing countries and have received positive appraisal also in the microfinance literature. It has been observed, in particular, that under some circumstances cosigning mechanisms have advantages compared to more consolidated forms of guarantees traditionally adopted by group-based micro-lending. Bond and Rai (2006), for example, find that cosigned loans are preferred to group lending when the power of imposing sanctions is unequal among individuals. Klonner and Rai (2008) also provide evidence of a negative causal effect of cosigners on default rates in organized rotating savings and credit associations in Southern India.

We focus on the "intensity" of social relationships between borrowers and cosigners. To the best of our knowledge, the economic literature does not provide specific evidence regarding the role that the strength of kinship relations in this context may exert on loan repayment performance. The most relevant contributions regarding social and kinship relationships are, in fact, related to access to lending (Karlan et al., 2009a; Karlan et al., 2009b; Churchill 1999; La Ferrara 2003; Besanko and Thakor 1987; Armendáriz and Morduch, 2010; Jaunaux 2007, Gangopadhyay and Lensink 2005, among others).

Regarding loan performance, it is worth considering that a fundamental role in shaping borrowers' attitude towards loan repayment may be played by the strength of the relationships subsisting between borrowers and cosigner. These could efficiently be exploited by MFIs in order to minimize losses when loans are not assisted by real guarantees. On the one hand, it is common belief that pressure from family and close neighbors would keep borrowers honest and make them more easily repay their loans since they may exert more credible influence and control than other individuals. Indeed, recourse to guarantors who know the borrower's whereabouts is typically equivalent to threaten their reputation by making their lack of reliability public in case of misbehavior. On the other hand, however, lenders' confidence in cosigners' ability to exert effective pressure could be potentially undermined by excess-solidarity, so that the threat exerted by the guarantor may be eventually deceptive. Therefore, the sign and the dimension of the effects of stronger relationships on loan repayment deserves careful investigation.

Our empirical analysis aims at investigating whether different grades of kinship between borrowers and cosigners can affect borrowers' loan default rates. We observe 2,350 loans in the period 2009-2012. Data

were provided by PerMicro, a leading MFI that has been operating in Italy since 2007. PerMicro supplies individual loans for productive purposes, especially to start-up activities, and consumer credit to people of several different ethnic groups. Borrowers are frequently supported either by a cosigner or a network, often a religious community.

We have detailed information on the kind of relationship linking borrowers and cosigners, as well as several personal characteristics of borrowers, and granted loans. Information is available both on borrowers having extinguished their position with PerMicro (either because they have finished repaying their loan or because of debt restructuring and/or default), and on those having outstanding loans.

We handle endogeneity problems arising from the presence of unobservable elements affecting both the presence of a cosigner and the probability of default, by using an instrument based on an exogenous rule established by the lender. The rule consists in the requirement of a personal guarantee in case of loans exceeding € 5,000. Conditional on the presence of a continuous measure of the amount borrowed, this allows identifying the effect of having different types of cosigners on default rates.

Our estimates provide evidence that loans supported by closely related cosigners perform better than other types of loans. In particular, borrowers having siblings, spouses and next-of-kin cosigners exhibit lower default rates than borrowers linked to cosigners by weaker ties. Inspecting the frequency of direct cosigners' intervention in the repayment process, we find that non-relatives are unlikely to provide financial support to the borrower, whereas family relatives – and especially close relatives – seem to actually step in and contribute to repayment when difficulties arise. We explain this result by the fact that close relatives may be likely to promote “social enforcement” more effectively.

The paper is organized as follows. In the next section we describe the dataset, Section 3 presents the empirical methodology adopted, and Section 4 illustrates the results. Section 5 concludes.

## **2. Data**

Data have been drawn from a database of 2,350 loans accorded by PerMicro in the period from September 1, 2009 to October 31, 2012 (observation date). The data include all borrowers who have either extinguished their relationship with the lender or have an outstanding loan in correspondence of the observation date. Repeated loans to the same borrowers are not frequent (1.5 per cent).<sup>2</sup> We also extend our analysis

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<sup>2</sup> This is due to the combination of both the relatively recent establishment of PerMicro and the average length of loans (more than 30 months, see below). Note also that restructured loans are not accounted for twice.

confining to 1,789 loans outstanding from at least six months. This choice is driven by the fact that defaults rarely take place without a sufficient number of installments being overdue.<sup>3</sup>

The lending activity of PerMicro is carried out by twelve branches located in the Northern/Central area of the country. All agencies operate through individual lending. Loans are repaid in a variable number of monthly installments (*install\_number*) with a minimum of 12 and a maximum of 60.

More in detail, 626 credit positions have been regularly extinguished (26.6 per cent of the cases). There are 110 defaults (4.7 per cent), 43 of which have been passed to recovery by means of a specific legal procedure, while the remaining are recorded as losses.<sup>4</sup> The remaining ones (68.7 per cent) consist of outstanding loans for which the borrower keeps repaying regularly.<sup>5</sup> Details are reported in Table 1, including statistics on the sub-samples of loans with and without cosigner. Apparently there are no substantial differences in the share of loans belonging to each category – Extinguished, Outstanding, Default – when considering the full sample and the sub-samples of cosigned and non-cosigned agreements. In particular, the percentage of defaults looks alike in the three samples.

As reported in Table 2, the loan average principal (*principal*) is € 5,345, with a minimum of € 876 and a maximum of € 28,000. The average amount of installments (*install\_amount*) is € 198. Interest rate ranges from 0 to 16 per cent, yet most of the loans are accorded a fixed interest of 11.9 per cent. Physical collateral is never required.

Guarantors may be of two types: cosigners (56.2 per cent of the loans) and informal networks (29.1 per cent). The most substantial difference between the two is that the former are jointly liable with the borrower in case of default. Cosigners are also required to pay late charges, fines, and penalties, in case the original borrower fails to do so. Networks, instead, only provide informal moral guarantees on the borrower's social background to testify that she belongs to community held in sufficient esteem.

[Table 1]

A crucial feature for our purposes is that PerMicro requires the presence of a cosigner when the loan principal exceeds € 5,000, although borrowers may propose a cosigner for lower amounts. There are few cases in which borrowers are waived from presenting a cosigner on loans above € 5,000. In our dataset, for example, we have observed that, for loans below € 5,000, borrowers with cosigners are in the number of 471 (41 per cent), while those without cosigners are 680. Conversely, in loans larger than € 5,000, 850 are

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<sup>3</sup> The risk committee of PerMicro, for instance, discusses the possibility of assigning the practice to a lawyer after four overdue installments (i.e. at the fifth month). Moreover, we noticed that defaults more frequently occur at the early stage of the loan, while for loans approaching extinguishment this is rarely observed.

<sup>4</sup> The classification of defaulting loans is made by the lender (see below).

<sup>5</sup> There are some cases in which repayment delays occur but the latter are not considered enough severe by the lender so as to either start a legal recovery procedure or record them as losses. Restructured loans are also included in this category.

cosigned (71 per cent). In spite of the fact that the rule is not perfectly enforced, there is substantial difference between loans above and below the threshold of € 5,000.

We have information regarding both the share of cosigned loans and the kinship relation between each individual borrower and her cosigner.<sup>6</sup> Based on this information, we built a dummy variable taking value 1 when a cosigner is present (*co\_yes*), and 0 otherwise. Two additional dummy variables aimed at capturing the strength of the borrower-cosigner relationship were also constructed. The first (*co\_weak*) takes value 1 when cosigners are siblings, spouses, next-of-kin, and other types of relatives (21.7 per cent of the loans), hence excluding friends and neighbors. The second dummy further excludes the other types of relatives (12.7 per cent of the loans), thus measuring the impact of stronger kinship relations (*co\_close*). A binary variable indicating the involvement of informal network guarantees (*net*) has also been considered.<sup>7</sup>

The effect of cosigning relationships on repayment diligence is investigated through the analysis of loan defaults. The latter are measured by a dummy variable (*default*) taking value 1 if the borrower did not fully repay her loan, and 0 otherwise. More precisely, in the event of a default, the lender can decide to either pursue legal procedures for recovery or to record a loss.

We combined the information on the presence of cosigners and on borrowers' repayment performance. As we already noticed, there does not seem to be any strong correlation between the two measures, since the two sub-samples of cosigned and non-cosigned loans show no difference in the average number of defaults (see Table 2). However, lack of correlation could be due to some form of endogeneity (see Section 3.1 for details). Furthermore, pairwise correlation does not account for measurable features like income, age, education, business conduction, which may well explain the propensity towards default while being contemporaneously correlated with the likelihood of having a cosigner.

As for other characteristics, summary statistics in Table 2 show that 80.6 per cent of the borrowers have a stable working position (*job\_stable*). In addition, we consider fixed-effects related to the type of business conducted by the borrowers. A detailed breakdown of the borrowers' job sector shows that most of them (1,096) either operate in personal care services (mainly as housemaids and caring for the elderly) or are workmen (627), while 260 declare they carry out an independent activity as self-employed. In smaller percentages, farmers, drivers, shopkeepers, craftsmen, doctors and nurses, accountants, waiters, teachers, and students are also included. From this perspective, the main difference between borrowers with and without cosigner is that the former category includes a slightly higher share of self-employed workers.

From information regarding the declared purpose of the loan, it emerges that, to a large extent, it goes to support home/consumption expenditure (873), although indications regarding the final destination of the

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<sup>6</sup> Information on rejected applicants is not available.

<sup>7</sup> Having multiple cosigners (see for example Klöpper and Rai, 2008) is not allowed.

remaining share of loans are rather ambiguous. Most importantly, there seems to be evidence pointing to the presence of a cosigner for credit having productive purposes (1084), possibly because productive loans are of a larger size. Anyway, all specifications include a dummy variable (*l\_type*) taking value 1 in case PerMicro classifies the loan as “consumer credit”, and 0 otherwise (see Table 2).

Besides job sector and purpose of the loan, there are other elements affecting repayment performance. We consider a continuous variable (*income*) representing the sum of wage and other earnings, which amount to 80 per cent and 20 per cent of total earnings, respectively. The borrowers’ *savings* and whether they send money to relatives in their countries of origin (*money\_home*) are also taken into account.

[Table 2]

The dataset also includes personal information on the borrower, such as the year of birth (*birth\_year*), which is on average 1971, *gender* (41 per cent male), and dummies capturing the educational level attained (*edu\_primary*, *edu\_secondary*, *edu\_prof*, *edu\_high*, *edu\_bachelor*). The borrowers’ marital status (*married*), number of children (*children*), house ownership (*house\_own*), time of arrival in Italy (*Italy\_since*), and knowledge of the language (*Italian\_lang*), are also used as control variables. In addition, we have data on cosigners’ income (*co\_income*). All details are summarized in Table 2.

We have tackled the problem of missing data by replacing unavailable observations with mean values. In particular, few borrowers did not provide details on one of their characteristics, although exhaustively submitting all the other data including those regarding the basic features of the loan. Under such conditions, dropping observations regarding such borrowers seemed inconsistent with the main purpose of the paper. We avoided doing so, since this would also have given rise to a sample-selection bias depending on the choice of the set of covariates.

Finally, Table reports statistics on the covariates comparing the sub-samples of loans with and without cosigner. Figures do not exhibit any substantial discrepancy between average values of the variables. Some interesting differences concern the presence of informal network guarantees (lower for cosigned customers, thus highlighting some degree of substitutability between the two types of guarantees), savings (slightly higher for cosigned customers), features related to borrowers’ activity and working position, such as a higher percentage of productive loans and a lower share of stable employment contracts associated to cosigned loans. In particular, it is worth noting that, according to the rule established by PerMicro requiring a personal guarantee on loans exceeding € 5,000 (see above), a considerably higher principal goes hand in hand with cosigned agreements (the difference is on average € 1,000).

### 3. Empirical methodology

We estimate the following equations:<sup>8</sup>

$$co_{ij} = \alpha_0 + X_{ij}\beta_0 + z_{ij}\delta + \mu_j^c + \vartheta_{ij} \quad (1)$$

$$default_{ij} = \alpha_1 + X_{ij}\beta_1 + \widehat{co}_{ij}\gamma + \mu_j^d + \varepsilon_{ij} \quad (2)$$

where  $i$  identifies the individual borrower, and  $j$  refers to several types of fixed effects (see below for details). In particular,  $co_{ij}$  are variables reflecting the role of the borrower-cosigner relationship on default rates ( $co\_yes$ ,  $co\_weak$ ,  $co\_close$ ) alternatively entering equation (1). Hat variables in (2) are the associated fitted values.

The parameter  $\gamma$ , which is our main focus of attention, can be interpreted as the change in the likelihood of default due to the presence of a cosigner (or a given category of cosigners), compared to the situation when lending is not assisted by such guarantee.

$X_{ij}$  is a vector of general characteristics of the borrower, such as age, gender, education and other personal traits. Variables seizing on both the relationship network and the extent of social and cultural integration are also included, along with all the other covariates described in Table 2.  $z_{ij}$  is an instrumental variable explaining  $co_{ij}$  but not correlated to  $\varepsilon_{ij}$  (see next sub-section).

Fixed-effects are summarized in  $\mu_j$ , where  $j$  may alternatively refer to different specificities. As previously mentioned, job sector and declared loan purpose are considered as fixed-effects. Then, we include branch dummies, since agencies may differ in terms of quality of the employees, ability of the staff in selecting borrowers and soliciting for repayment, and geographical features affecting the probability of repaying on a regular basis (such as unemployment).<sup>9</sup>

Finally,  $\vartheta_{ij}$  and  $\varepsilon_{ij}$  are idiosyncratic errors, such as  $E(\vartheta_{ij}|X_{ij}, z_{ij}, \mu_j^c) = 0$  and  $E(\varepsilon_{ij}|X_{ij}, co_{ij}, \mu_j^d) = 0$ . Standard errors are clustered at country (borrowers' nationality) level.

#### 4.1 Selection process and endogeneity

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<sup>8</sup> Guttman (2007) previously used a similar reduced-sample approach in the study of the repayment behavior in microfinance programs, although not contemplating borrowers with cosigned loans.

<sup>9</sup> Since  $default$  takes value 0 when either the loan is outstanding or extinguished, controlling for the state of the loan makes no sense (i.e., the corresponding estimated marginal effects would be equal to either 1 or -1).

Endogeneity may stem from some borrowers' unmeasurable characteristics which simultaneously affect the probability of default and the presence of a cosigner. Our most likely explanation for this phenomenon is that, *ceteris paribus*, soft information may induce the lender to invite riskier customers to present a cosigner regardless of the loan amount they are accorded. If additional risk is positively correlated with default, something that looks rather plausible, a positive relation between cosigning and default would be observed.<sup>10</sup> Furthermore, it seems likely that potential cosigners expressing stronger solidarity would be more inclined to provide riskier borrowers with guarantees. Relatives – especially closer ones – seem good candidates in this case, so that the misleadingly positive relation described above would be the outcome of closer relatives cosigning worse borrowers.

In addition, it is possible that better borrowers have higher reputational concerns, a fact that could lead them to count exclusively on their own resources for loan repayment. Conversely, bad borrowers may attempt to exploit the possibility of cosigners' intervention in the repayment process, so as to reduce the risk of their own assets being seized in case of a default. Again, we would end up with a positive sign of the parameter  $\gamma$  in equation (1), which would still be the mere result of hidden features, eventually leading to identification problems.

Therefore, besides using a comprehensive set of covariates with the aim of reducing the correlation between the presence of a cosigner and unmeasurable components of repayment performance, instrumental variables techniques are employed. The instrument adopted is based on the requirement, established by PerMicro, of a cosigner if the principal is above € 5,000. This information is converted into a binary variable (*threshold*) taking value 1 when such larger loans are accorded.

Summary statistics concerning the instrument used are reported in Table 3, both for the full sample of borrowers and the sub-samples of cosigned and non-cosigned loans. In particular, the choice of our instrument relies on two elements: *i*) sufficiently high predictive power in terms of the variables measuring the likelihood of having a cosigner; *ii*) absence of correlation with unmeasurable features explaining the probability of default.

As for *i*) summary statistics between *threshold* and variables related to both the existence of a cosigner and the intensity of her kinship relation with the borrower are reported in Table 4. As a general indication, it is worth noticing that the share of loans with principals above € 5,000 is considerably higher among the category of cosigned agreements. In fact, comparing cosigned and non-cosigned loans (regardless of the existence of any kinship relation between the parties involved) in excess of € 5,000, it is possible to observe that the latter are 34 per cent of loans granted above that threshold, while 65 per cent are co-signed. Hence,

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<sup>10</sup> Klonner and Rai (2008), for example, show that the number of cosigners is positively correlated with defaults, arguing that this may occur because borrowers who have high default risk are asked for more cosigners. However, when looking for a causality relation, the authors find that the number of cosigners has a negative causal effect on defaults.

even if this highlights the fact that the lender does not strictly enforce the rule of the € 5,000 limit, one can be confident that the predictive power of the dummy *threshold* in terms of cosigning variables is sufficiently large. Correlations reported in Table 4 confirm the above.

As for *ii*) in Table 4 we also report the correlation between the instrument and our measure of default, which is approximately zero. Like in previous contributions made to the literature on microcredit, the exclusion restrictions for instruments consisting of exogenous rules set up by lenders hold conditional on the inclusion of a continuous measure of the variable on which the rule is designed (see, among others, Pitt and Khandker (1998), and Dalla Pellegrina (2011)). In our case the required measure is the amount lent. In this way, the instrument should affect the probability of having a cosigner while not being simultaneously correlated with unmeasurable features explaining repayment rates conditional on all other covariates.<sup>11</sup>

[Table 3]

[Table 4]

### 3.2 Testing solidarity versus cosigners' intervention hypotheses

In our context it would be interesting trying to further investigate whether having the loan cosigned by a close relative actually strengthens the borrower's commitment towards repayment. Another – not necessarily alternative – hypothesis is that, due to higher solidarity, closer relatives are more likely than other individuals to step in to repay the loan on behalf of the borrower.

We attempt to shed light on this important issue by introducing a variable indicating the *expectation of cosigners' intervention* in the loan repayment process.<sup>12</sup> It consists of a measure of the extent to which co-signers' income exceeds extra savings remaining to the borrower after repayment of the monthly installment:<sup>13</sup>

$$\frac{\text{cosigner's income} - (\text{borrower's savings} - \text{installment amount})}{\text{cosigner's income}}$$

$$\text{cosigner's income}$$

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<sup>11</sup> As remarked by Pitt and Khandker, a necessary condition for the validity of their instrument (ownership of less than 0.5 acres of land) is that credit cannot be used to buy additional land. In their 1998 paper the authors exclude this possibility arguing that in Bangladesh the land market is rather static and land is merely inherited. Likewise, we make a similar assumption in that obtaining a loan of a given amount does not necessarily increase the opportunity of being accorded larger loans in the future. In other words, loans are not progressive in the amount. As a matter of fact, we do not frequently observe a borrower more than once in our dataset, unless her debt is re-negotiated.

<sup>12</sup> This measure has been suggested by experts at PerMicro.

<sup>13</sup> The variable has been censored so as to set it in the [0,1] interval.

From the descriptive statistics computed on the sub-sample of cosigned loans it emerges that the average expected rate of co-signers' intervention is rather high (0.52, with standard deviation of 0.37).

Besides being interested in estimating the size of potential financial support, our main purpose is to see if, and to what extent, the parameters associated to the presence of (certain types of) cosigners are affected by the inclusion of a measure of cosigners' intervention.

#### 4. Results

Two-Stage Least Squares (2SLS) estimates of equations (1)-(2) are presented in Table 5 for the full sample of 2,350 loans.

More in detail, estimates of equation (1) (first-stage 2SLS) are shown in columns (a), (e) and (i). The dependent variables are respectively: *co\_yes*, expressing whether the loan is cosigned or not; *co\_weak*, indicating whether the cosigner and the borrower are relatives; and *co\_close*, capturing only strong kinship relations between borrowers and cosigners. The other columns refer to equation (2) (2SLS second-stage regressions).

The first important result emerging from the regression analysis is that the presence of a cosigner, irrespective of her relationship with the borrower, improves repayment performance. However, this effect is either not significant or rather weak. Conversely, when exploring the specific investigation of borrower-cosigner relations we find that kinship has a significant role in reducing defaults. Moreover, it can be easily noticed that shifting from columns weak to strongly related cosigners, parameters are ranked according to the strength of the borrower-cosigner relationship. Hence, the closer the borrower-cosigner kinship relation, the better repayment diligence is.

Moreover, as the magnitude of the parameters suggest, estimated effects are considerable in size. For example, referring to the Job sector Fixed-Effects model, we observe that simply having a cosigned loan leads on average to a (non-significant) 20.9 per cent decrease of the probability of default, while having a relative as cosigner reduces this probability to 35.8 per cent. A close relative as cosigner further decreases the likelihood of default by an additional 22.3 per cent.

First-Stage regressions also provide important indications in terms of the selection process taking place when deciding the presence of a cosigner in a given loan. In fact, the dummy *threshold* is positively correlated with both the presence of a generic cosigner and of a relative cosigner. Weak identification tests (see bottom of each table) suggest that the instrument has sufficiently high predictive power to explain both the presence of a cosigner and the varying extent of the borrower-cosigner relationship. In particular, the Kleibergen-

Paap F statistic attains noticeably high values in regressions having *co-yes* as a dependent variable. The test provides satisfactory results in the other cases as well.

There are also noteworthy insights to be derived from the estimates concerning other covariates.<sup>14</sup> In terms of loan characteristics, we find that in general cosigners are more frequent on larger loans, as confirmed by the positive sign corresponding to *principal* in first-stage regressions. However, it is interesting to note that close relatives tend to avoid cosigning larger loans, whereas lengthier loans (measured by *install\_number*) are more likely to be supported by kinship-related cosigners, although exhibiting higher default rates.

Furthermore, a negative sign associated to *loan\_start* indicates that more recent credit agreements require less frequently the presence of a cosigner, while exhibiting lower default rates. A possible interpretation of this evidence is that recent agreements could benefit from the lender's increased experience in managing credit, although it is also possible that non-defaulting loans have a longer duration since they normally reach maturity. As for the other terms of contract, a higher *interest\_rate* is positively correlated with the presence of a cosigner, evidence that may be related to the riskiness of the projects involved. The fact that higher interest rates correspond to a lower probability of default can be explained by the fact that more favorable conditions are accorded to customers who have renegotiated loans because of difficulties in repaying installments. However, the riskiness embedded in such loans may have persisted, eventually leading to actual defaults.

Most interesting is a negative sign associated to the presence of informal network guarantees (*net*) both in the first and in second-stage regressions. In first-stage regressions this confirms that there is a relevant degree of substitutability between cosigning and informal guarantees in order to achieve better credit conditions. In second-stage regressions, the negative sign of the variable *net* suggests that also the presence of informal networks tends to improve repayment rates, even though this effect is much lower in magnitude compared to the presence of a cosigner.

Not surprisingly, consumer lending (*cons\_lending*) has a higher incidence of cosigning. Regardless of its apparent non-productive use, consumer lending exhibits better repayment rates. Apart from evidence showing that higher *income* is correlated with lower cosigner presence, parameters associated to earnings and *savings* are not particularly indicative.<sup>15</sup> On the other hand, borrowers sending money home (*money\_home*) less frequently have kinship-related cosigners, while showing better attitude towards repayment. The former finding can be explained by the fact that individuals still having a family in the home country are less likely

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<sup>14</sup> Full tables are available upon request.

<sup>15</sup> The correlation between *income* and *default* is in fact negligible (-0.076) as well as the correlation between *savings* and *default* (0.008).

to exploit relatives as cosigners in Italy, whereas there seems to be no particular economic meaning for their lower default rates.<sup>16</sup>

Parameters related to personal traits of the borrower are also sometimes quite informative. First, younger individuals (measured by *birth\_year*) more frequently have loans cosigned by third parties, and this could be justified by their comparative lack of experience in managing money, which may eventually result in higher default rates. Males (measured by *gender*) generally show worse repayment behavior, a fact that has been already observed in poorer contexts, and which is often connected to non-productive uses of money. The variable *married* is positively associated with the likelihood of having a cosigner, possibly because spouses are often used as guarantors. There is also evidence that professional education (*edu\_prof*) corresponds to better repayment rates, perhaps due to higher chances of being employed. Stable working positions (*stable\_work*) are associated to a lower probability of a lender being required to have a cosigner, since they reduce the risk of default. Other parameters related to personal traits of the borrower are rarely significant.

The outcome of the regressions performed on the sub-sample of borrowers having at least 6-month outstanding loans is illustrated in Table 6. In general, estimates are robust to changes in the sample of loans analyzed. In particular, more efficient parameters are associated to the presence of various types of cosigners compared to parameters' estimates obtained using the full sample of borrowers. Such evidence suggests that removing the ambiguities related to more recent loans helps offering a clearer picture of the factors at play.

Next, we seek to investigate whether key parameters are changed by the introduction of a proxy of expected cosigner's intervention in the loan repayment process. Estimates corresponding to the job sector fixed-effects specification are reported in Table 7, both for the full sample and for 6-month outstanding loans.

Parameters for our proxy of cosigners' intervention exhibit the expected – negative – sign when they are associated to borrower-cosigner kinship and are significant only in the regressions pertaining to relations of close kinship. This suggests that actual cosigners' participation in repayment takes place when cosigners are either siblings, spouses, or next-of-kin.

Moreover, we observe that the parameters associated to the borrower-cosigner relationship in Table 7 are lower in magnitude compared to the corresponding values in Tables 5 and 6. Since estimated coefficients in Table 7 reflect the likelihood of cosigners reducing the default rate, net of (expected) direct financial support, such reduction turns out to be consistent with the actual participation of cosigners in the repayment process.

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<sup>16</sup> Again, this does not seem the result of high correlation between variables cannibalizing each other. Both the correlation between *money\_home* and *income* (0.024) and between *money\_home* and *savings* (-0.024) are in fact negligible.

Finally, by computing the ratio between the parameters in Table 7 and the corresponding parameters in Tables 5 for the full sample of 2,350 loans, one may infer the extent of the borrower's concurrence in loan repayment, whereas the remaining share can be interpreted as the cosigner's contribution. For example, referring to the Job activity model we calculated that borrowers contribute to 86.5 per cent of loan repayment when cosigners are related to them by weak kinship, against 78.8 per cent when strong kinship is involved.<sup>17</sup> When looking at 6-month outstanding loans, this percentage looks even more far apart, since it turns out that borrowers contribute to 92.7 per cent of loan repayment in case of weak kinship relations with the cosigner, against 78.9 per cent in the case of strong kinship.<sup>18</sup> Hence, the stronger the relationship with the borrower, the more generous is the cosigner's financial support.

[Table 5]

[Table 6]

[Table 7]

## 5. Conclusions

In this paper we have conducted an analysis on the effect that kinship relations between MFIs and cosigners have on loan repayment.

From univariate descriptive statistics comparing borrowers with and without cosigners, we have observed that the two categories perform almost the same in terms of repayment rates. However, it is quite likely that such evidence is due to some form of endogeneity, such as the possibility of the lender asking riskier customers to have a cosigner. Another possible explanation is that better borrowers have higher reputational concerns, which may lead them to exclusively rely on their own financial resources for loan reimbursement. Conversely, bad borrowers may be tempted to exploit cosigners' financial support in repayment, so as to reduce the risk of their own assets being seized in case of default.

We have used instrumental variable techniques (Two-Stage Least Squares and Probit) to address such possible biases. Our instrument consists of an exogenous rule set up by the lender according to which loans above € 5,000 should have a cosigner. This rule, conditional on the inclusion of a continuous measure of the amount lent, allowed for identification of the role played by various levels of kinship proximity in explaining the borrowers' default rate. In particular, we have measured the effect of: a) having a cosigner versus having none; b) having a cosigner who is a relative versus either having none or having a cosigner who is not a relative; c)

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<sup>17</sup> Percentages have been computed as the ratio of parameters in columns (f) and (l) in Table 7 with the corresponding parameters in Table 5. In detail the figures are 0.310/0.358 and 0.458/0.581.

<sup>18</sup> Percentages have been computed as the ratio of parameters in columns (f) and (l) in Table 7 with the corresponding parameters in Table 6. In detail the figures are 0.460/0.496 and 0.513/0.650.

having a cosigner who is a close relative (next-of-kin, sibling, spouse) versus either having no cosigner or one who is not a close relative.

Estimates have shown that cosigned loans tend to default less frequently, although the effect is rather weak. More noticeably, we have obtained strong and significant evidence backing the fact that borrowers related to cosigners by stronger kinship ties are more likely to exhibit better repayment performance. In particular, the closer the borrower-cosigner kinship relation, the lower the probability of default is.

In terms of the borrower-cosigner relationship, the considerations stemming from our estimates are twofold. On the one hand, as aforementioned, relatives and individuals who are very close to the borrower appear more likely to exert effective pressure on her compared to other individuals, since they are in a better position to screen and monitor her actions. On the other hand, relatives are often motivated by solidarity concerns, and this can lead to their direct intervention in the repayment process. We have tried to disentangle such features by introducing a measure of expected cosigner's financial support in the estimated equation. We have found that actual contribution to loan repayment occurs when the cosigner is a close relative, although this effect does not overcome the positive and significant effect on reducing default rates that the presence of a closely related cosigner brings.

In conclusion, a comprehensive evaluation of our empirical findings seems to provide support for both the principle of "excess solidarity" and the idea that borrowers are better monitored by individuals that are linked to them by closer social ties. As a policy indication, this paper suggests that cosigner-based microfinance programs should pay considerable attention to the impact that different levels of social ties linking guarantors and borrowers have on repayment behavior. Cosigners related to borrowers by closer kinship should generally be privileged.

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Table 1 - Loan state: extinguished, outstanding, default

	Full sample 2,350 obs.		Cosigned loans 1,321 obs.		Non-cosigned loans 1,029 obs.	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
1. Extinguished	626	26.6	355	26.9	271	26.3
2. Outstanding	1,614	68.7	905	68.5	709	68.9
3. Default	110	4.7	61	4.6	49	4.8

Source: PerMicro database

Table 2 – Summary statistics

Variable: description	Variable: label	Cosigned loans <sup>(a)</sup>		Non-cosigned loans <sup>(b)</sup>		t- test for mean comparison <sup>(c)</sup>
		Mean	Std. Dev.	Mean	Std. Dev.	
Year of birth	<i>birth_year</i>	1971	10.786	1970	10.353	-3.0148*
Date of arrival in Italy (normalized)	<i>Italy_since</i>	0.392	0.048	0.389	0.050	-1.3523
Gender (male=1)	<i>gender</i>	0.430	0.495	0.384	0.487	-2.2564*
Education: primary (yes=1)	<i>edu_primary</i>	0.014	0.119	0.017	0.128	0.4185
Education: secondary (yes=1)	<i>edu_secondary</i>	0.207	0.406	0.249	0.433	2.3824*
Education: professional (yes=1)	<i>edu_prof</i>	0.077	0.267	0.297	0.457	1.3111
Education: upper-secondary (yes=1)	<i>edu_high</i>	0.355	0.479	0.092	0.290	-2.9538*
Education: bachelor (yes=1)	<i>edu_bachelor</i>	0.129	0.335	0.108	0.310	-1.5433
Marital status (married=1)	<i>married</i>	0.593	0.491	0.499	0.500	-4.6107*
Number of children	<i>children</i>	1.331	1.270	1.424	1.321	1.7284*
House (ownership=1)	<i>house_own</i>	0.054	0.226	0.042	0.200	-1.3387
Knowledge Italian language (1=yes)	<i>Italian_lang</i>	0.786	0.410	0.791	0.407	0.3113
Stable employment position (yes=1)	<i>stable_work</i>	0.750	0.433	0.879	0.327	7.9114*
Monthly income (th. euro)	<i>income</i>	1.044	0.457	1.088	0.385	2.4423*
Sends money home (yes=1)	<i>money_home</i>	0.549	0.498	0.620	0.486	3.4766*
Monthly savings (th. euro)	<i>savings</i>	0.600	0.994	0.479	0.295	-3.7491*
Consumer lending	<i>loan_cons</i>	0.771	0.421	0.872	0.335	6.3103*
Loan: principal (th. euro)	<i>principal</i>	6.327	3.487	4.087	2.207	-17.9924*
Date loan starts (months) <sup>(d)</sup>	<i>loan_start</i>	41.867	9.822	44.604	10.410	6.5300*
Installments: number	<i>install_number</i>	34.256	12.824	27.755	11.598	-12.7087*
Installments: amount (th. euro)	<i>install_amount</i>	0.220	0.087	0.170	0.061	-15.4772*
Interest rate (%)	<i>interest_rate</i>	11.297	1.648	10.069	3.374	-11.5742*
Network guarantee (yes=1)	<i>net</i>	0.196	0.397	0.414	0.493	11.8694*
Cosigner (yes=1)	<i>co_yes</i>	0.562	0.496			
Cosigner: next-of-kin, spouse, sibling, other relative (yes=1)	<i>co_weak</i>	0.217	0.413			
Cosigner: next-of-kin, spouse, sibling (yes=1)	<i>co_close</i>	0.127	0.333			
Cosigner: monthly income (th. euro)	<i>co_income</i>	1.056	0.497			

<sup>(a)</sup>1,321 obs.; <sup>(b)</sup>1,029 obs.; <sup>(c)</sup> t statistic is reported, \* indicate significance at either 1, 5 and 10 per cent level; <sup>(d)</sup> Initial date: 01/01/2008.

**Table 3 - Instrument: summary statistics**

Variable	Sample	Obs	Mean	Std. Dev.	Min	Max
<i>thresbold</i> (loan is above € 5,000)	Non cosigned loans <i>co_yes=0</i>	1029	0.34	0.47	0	1
	Cosigned loans <i>co_yes=1</i>	1321	0.65	0.47	0	1
	Loans cosigned by all relatives <i>co_weak=1</i>	591	0.60	0.49	0	1
	Loans cosigned by next-of-kin, spouses, siblings (close kinship) <i>co_close =1</i>	299	0.56	0.49	0	1

Source: PerMicro database

**Table 4 - Correlation between the instrument and variables measuring the intensity of kinship relations between borrowers and cosigners**

	<i>thresbold</i>	<i>default</i>	<i>co_yes</i>	<i>co_weak</i>
<i>default</i>	-0.0301	1		
<i>co_yes</i>	0.3050*	-0.0034	1	
<i>co_weak</i>	0.1856*	0.0443*	0.4652*	1
<i>co_close</i>	0.1301*	0.0726*	0.3370*	0.7243*

Source: PerMicro database; all correlation coefficients significant at the 5% level or better are starred

**Table 5 – Effect of the presence of cosigners on loan default rates**

	<i>co_yes</i>		<i>default</i>		<i>co_weak</i>		<i>default</i>		<i>co_close</i>		<i>default</i>	
	First-Stage	2SLS Second-Stage		First-Stage	2SLS Second-Stage		First-Stage	2SLS Second-Stage		First-Stage	2SLS Second-Stage	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(l)	(m)	(n)
<i>threshold</i>	0.146*** (0.053)				0.085*** (0.019)				0.053*** (0.017)			
<i>co_yes</i>		-0.209 (0.131)	-0.230 (0.158)	-0.192 (0.137)								
<i>co_weak</i>						-0.358** (0.164)	-0.421** (0.205)	-0.312* (0.162)				
<i>co_close</i>										-0.581** (0.282)	-0.604* (0.309)	-0.501* (0.261)
Covariates	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
<i>Fixed-effects</i>		Job sector	Loan purpose	Branch		Job sector	Loan purpose	Branch		Job sector	Loan purpose	Branch
R <sup>2</sup>	0.28				0.14				0.17			
N	2,350				2,350				2,35			
Kleibergen-Paap F		32.67	25.88	25.81		13.51	9.29	11.40		8.11	9.15	9.00

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . Standard errors clustered at the national level in parentheses. *co\_yes*=1 if the borrower has a cosigner; *co\_weak*=1 if the cosigner is next of kin, spouse, sibling, other relative; *co\_close*=1 if the cosigner is next of kin, spouse, sibling.

**Table 6 – Effect of the presence of cosigners on loan default rates – 6-month outstanding loans**

	<i>co_yes</i>		<i>default</i>		<i>co_weak</i>		<i>default</i>		<i>co_close</i>		<i>default</i>	
	First-Stage	2SLS Second-Stage		First-Stage	2SLS Second-Stage		First-Stage	2SLS Second-Stage		First-Stage	2SLS Second-Stage	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(l)	(m)	(n)
<i>threshold</i>	0.180*** (0.047)				0.088*** (0.020)				0.067*** (0.020)			
<i>co_yes</i>		-0.241** (0.120)	-0.250* (0.143)	-0.238* (0.131)								
<i>co_weak</i>						-0.496*** (0.187)	-0.571** (0.234)	-0.499** (0.198)				
<i>co_close</i>										-0.650** (0.270)	-0.676** (0.316)	-0.641** (0.283)
Covariates	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
<i>Fixed-effects</i>		Job sector	Loan purpose	Branch		Job sector	Loan purpose	Branch		Job sector	Loan purpose	Branch
R <sup>2</sup>	0.29				0.14				0.15			
N	1,789				1,789						1,738	
Kleibergen-Paap F		38.11	31.44	30.08		9.40	8.22	8.80	7.61	8.17		8.76

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . Standard errors clustered at the national level in parentheses. *co\_yes*=1 if the borrower has a cosigner; *co\_weak*=1 if the cosigner is next of kin, spouse, sibling, other relative; *co\_close*=1 if the cosigner is next of kin, spouse, sibling.

**Table 7 – Effect of cosigners’ presence and expected financial support on loan default rates**

	<i>co_yes</i>	<i>default</i>	<i>default</i>	<i>default</i>	<i>co_weak</i>	<i>default</i>	<i>default</i>	<i>default</i>	<i>co_close</i>	<i>default</i>	<i>default</i>	<i>default</i>
	First- Stage	2SLS Second- Stage	2SLS Second- Stage	2SLS Second- Stage	First- Stage	2SLS Second- Stage	2SLS Second- Stage	2SLS Second- Stage	First- Stage	2SLS Second- Stage	2SLS Second- Stage	2SLS Second- Stage
<b>Full sample</b>	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(l)	(m)	(n)
<i>threshold</i>	0.100**				0.077***				0.052***			
	(0.045)				(0.019)				(0.019)			
E.cosigner’ s intervention	0.468***	0.045	0.066	0.058	0.083	-0.041	-0.028	-0.024	0.004	-0.065**	-0.058**	-0.044
	(0.039)	(0.092)	(0.117)	(0.096)	(0.055)	(0.030)	(0.034)	(0.032)	(0.042)	(0.027)	(0.028)	(0.028)
<i>co_yes</i>		-0.240	-0.281	-0.240								
		(0.196)	(0.260)	(0.221)								
<i>co_weak</i>						-0.310*	-0.381*	-0.281				
						(0.177)	(0.223)	(0.179)				
<i>co_close</i>										-0.458*	-0.485*	-0.407*
										(0.256)	(0.272)	(0.243)
Covariates	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
<i>Fixed-effects</i>		Job sector	Loan purpose	Branch		Job sector	Loan purpose	Branch		Job sector	Loan purpose	Branch
R <sup>2</sup>	0.34				0.14				0.17			
N	2,350				2,350				2,350			
Kleibergen-Paap F stat		16.41	11.61	11.42		10.86	8.01	8.90		7.85	7.78	7.67
<b>6-m. outstanding loans</b>	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(l)	(m)	(n)
<i>threshold</i>	0.122***				0.076***				0.068***			
	(0.035)				(0.024)				(0.021)			
E.cosigner’ s intervention	0.536***	0.076	0.095	0.099	0.108**	-0.028	-0.008	-0.003	-0.011	-0.08***	-0.073**	-0.059*
	(0.032)	(0.096)	(0.118)	(0.100)	(0.051)	(0.040)	(0.046)	(0.048)	(0.046)	(0.031)	(0.033)	(0.034)
<i>co_yes</i>		-0.287	-0.315	-0.305								
		(0.176)	(0.227)	(0.199)								
<i>co_weak</i>						-0.460**	-0.559**	-0.495**				
						(0.212)	(0.274)	(0.238)				
<i>co_close</i>										-0.513**	-0.540**	-0.532**
										(0.244)	(0.275)	(0.260)
Covariates	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
<i>Fixed-effects</i>		Job sector	Loan purpose	Branch		Job sector	Loan purpose	Branch		Job sector	Loan purpose	Branch
R <sup>2</sup>	0.39				0.14				0.15			
N	1,789				1,789				1,789			
Kleibergen-Paap F stat		19.89	14.55	14.58		6.97	6.17	6.52		7.75	7.18	7.80

\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . Standard errors clustered at the national level in parentheses. *co\_yes*=1 if the borrower has a cosigner; *co\_weak*=1 if the cosigner is next of kin, spouse, sibling, other relative; *co\_close*=1 if the cosigner is next of kin, spouse, sibling.