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INFORMAL LOANS, LIQUIDITY CONSTRAINTS AND LOCAL CREDIT SUPPLY: EVIDENCE FROM ITALY

by Michele Benvenuti*, Luca Casolaro**, and Emanuele Ciani***

Abstract

Using data from the Italian Survey on Household Income and Wealth from 1995 to 2014, we study the relation between informal credit (loans from relatives and friends) and a household's access to bank credit. While most of the literature has focused on the substitutability channel, we highlight that even households with full access to the formal credit market are more likely to be indebted to relatives or friends when compared to those not interested in formal loans. This complementarity is stronger for households who have problems paying back their loans, suggesting the presence of a caretaker effect on the part of relatives and friends towards distressed families. Finally, we estimate the overall impact of an expansion of local credit supply on the diffusion of informal loans, using an IV approach. The results suggest that the complementarity effect prevails, but the positive effect on informal loans is economically very small.

JEL Classification: D14, E21.
Keywords: informal credit, local credit markets, inter vivos transfers.

Contents

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1 Introduction[1]

The study of informal loans (credit from relatives or friends) is a relatively unexplored issue in the context of household financial choices and is only marginally mentioned in recent surveys of the literature on household finance, such as Campbell (2006) and Guiso and Sodini (2012). Nevertheless, this kind of loans are widespread adopted. Informal credit is often used in EU countries (see ECB, 2013); for the United States, the Financial Diaries Project estimates it to be the second most common form of credit, used by two out of every five households.

Two main approaches have been taken in investigating the relationship between formal and informal credit supply, with both approaches converging towards substitutability between the two forms of credit.

The first approach looks at the demand side and mainly relates to low-income countries. It starts from the idea that not every household has access to or is aware of the various sources of credit (see, for example, Campero and Kaiser, 2013). This results in the segmentation of the credit market, where a household's income, education, employment condition, size, and location are capable of affecting its propensity to apply for formal credit.

The second approach looks at the supply side: credit markets, dominated by asymmetric information, are plagued by the phenomena of adverse selection and moral hazard. This results in decreased loan supply and prevents people from borrowing the desired level of money. Such liquidity constraints may impair the life cycle consumption profiles, leading to sub-optimal consumption choices and losses in personal utility.

Either because households are not willing to apply for formal credit or because they are constrained, non-market (informal) arrangements may arise as an endogenous solution to market deficiencies (see Batini et al., 2010, for a review). According to this view, informal transfers would act as a substitute for formal credit: households ask relatives or friends for money when they are not willing or able to access bank credit. As a consequence, a positive relation is expected between being constrained and the occurrence of informal transfers. Indeed, declining liquidity constraints - arising, on the demand side from an increase in income or education level and, on the supply side, from an increase in banking competition or the expansion of bank branch networks - should result in a reduction in informal transfers. Furthermore, to the extent credit

[1]We thank Laura Bartiloro, Raffaello Bronzini, Conchita D'Ambrosio, Paolo Sestito, and participants at the 3rd "Household Finance and Consumption" workshop (Luxembourg) and at internal seminars at the Bank of Italy for useful comments. The views expressed here are those of the authors and do not necessarily correspond to those of the institutions with which they are affiliated.

rationing behaves anticyclically, so should informal transfers.

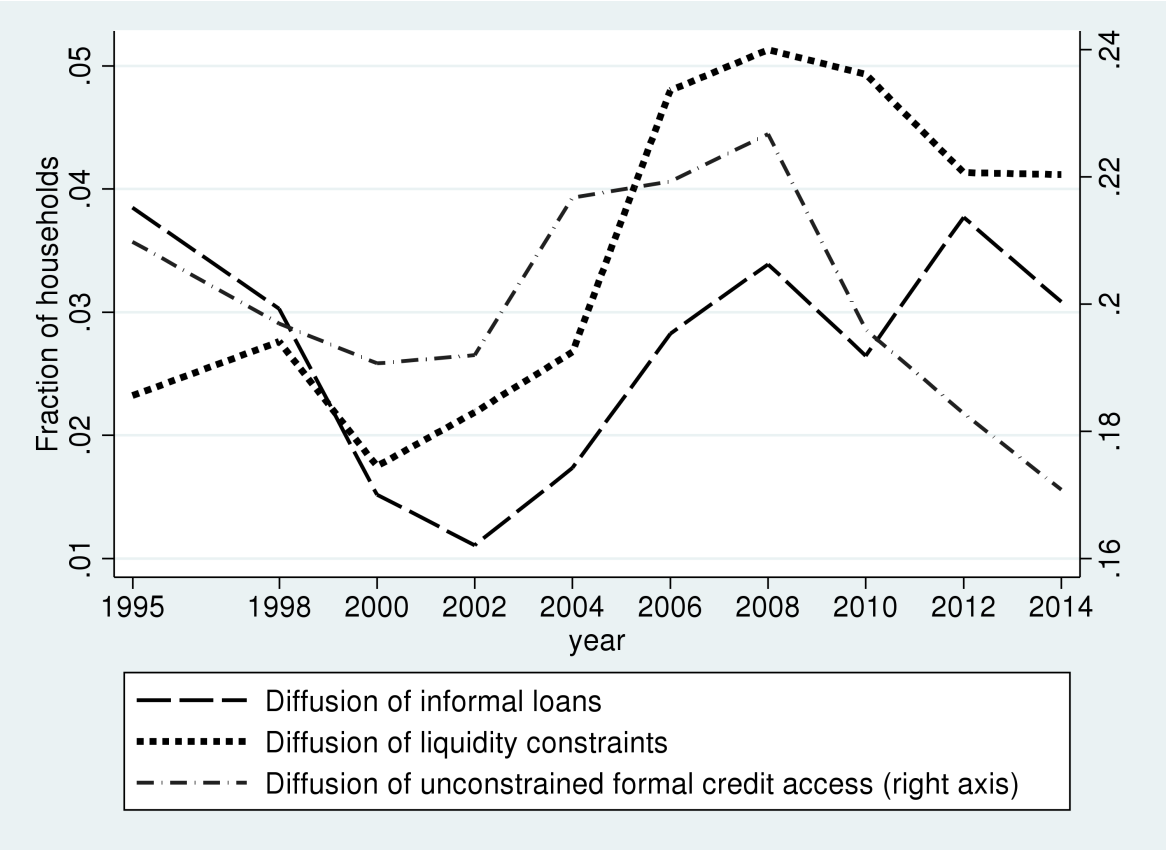
An initial theory was provided by Arnott and Stiglitz (1991). Focusing on the insurance market, the authors show that, under certain conditions, peer monitoring by relatives or friends mitigates moral hazard in the formal market. This view is corroborated by the few theoretical and empirical papers investigating this issue. Jain (1999) argues that formal and informal credit markets trade off each other: the former benefits from higher deposit mobilization while the latter exhibits an informational advantage in assessing borrowers' creditworthiness. Empirical applications to the credit market were performed by Cox (1990) and Guiso and Jappelli (1991). The first shows that households with low present and high permanent income (those with a higher probability of being liquidity constrained) are more likely to receive private transfers. The second adopts a model describing the pattern of transfers across generations where the probability of receiving a transfer depends both on whether desired consumption exceeds current consumption and whether liquidity constraints occur. Using the 1987 cross section from the Bank of Italy's Survey on Household Income and Wealth, they find that private transfers are mainly targeted towards liquidity constrained households. The probability of receiving a transfer is 1.7 per cent higher for them, whereas the unconditional probability is 2.7 per cent.

However, looking at the plot of the percentage of Italian households receiving transfers in the period 1995-2014 (Figure 1), we note a mismatch between theoretical predictions and data. During the 1990s and in the first part of the early 2000s, informal loans exhibited a negative trend, ascribed to the development of formal market brought on by an extended deregulation (see Casolaro et al., 2005). We would have expected a continuation of the downward trend during periods of high development of bank lending, with a recovery in the event of a recession. Instead, the data show an unexpected pattern: both before and during the financial crisis the probability of receiving informal credit rose steadily, even in the 2004-2008 subperiod, which saw a large increase in the amount of formal credit to households, principally in the form of long-term loans (Figure 2).[2] This evidence suggests that a different interpretation of informal credit is warranted, as the standard view about the substitutability between formal and informal credit is not necessarily the most accurate.

In this paper we try to fill the gap by investigating the use of informal credit by households. We exploit data from the Bank of Italy's Survey on Household Income and Wealth (SHIW) in order to shed some light on the existence of different channels of demand with respect to the traditional substitution theory.

[2]Households' formal credit rose steadily in the medium- and long-term component between 1995 and 2008.

Figure 1: Trends in informal loans, monetary gifts and local credit supply, Italy, 1995-2014



Note: Diffusion is expressed as a fraction of households. Informal loans refer to households who report to being indebted to non-cohabiting relatives or friends at the end of the year. Households are liquidity constrained if they were rejected credit (at least partially) by a bank or if they chose not to apply for a loan thinking that they would have been rejected. Those with unconstrained access to formal credit have formal debt without being liquidity constrained. Sample weights have been used.

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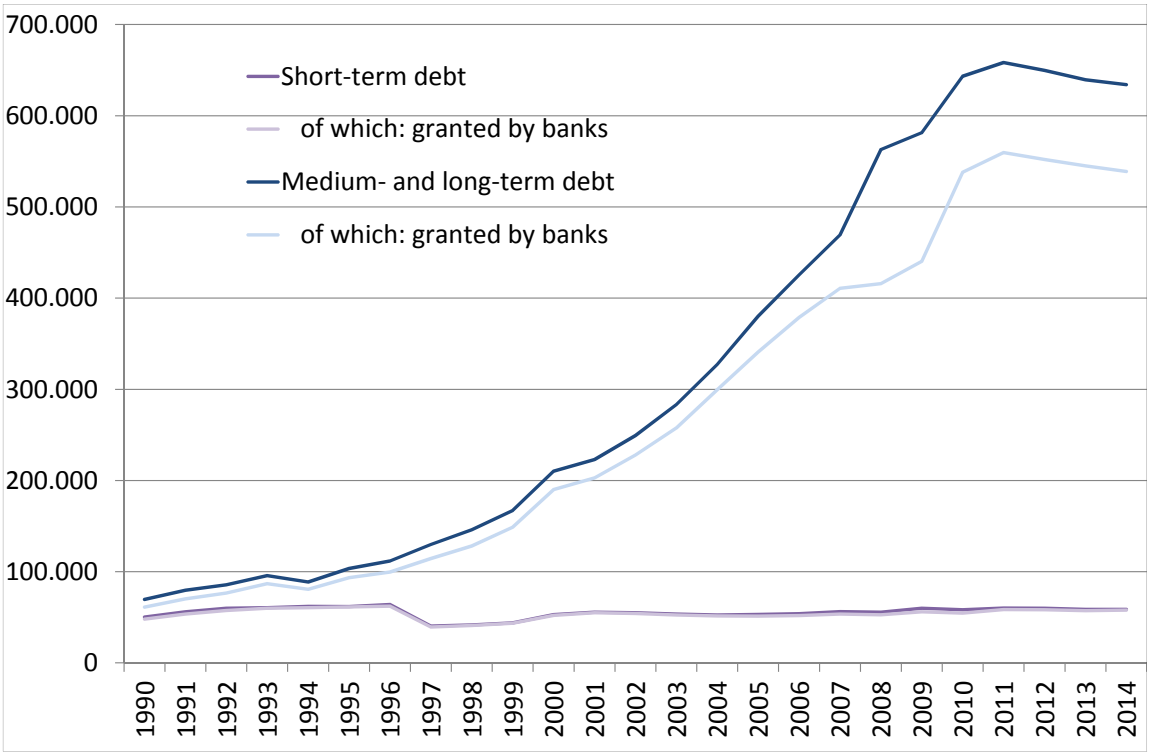
The Italian credit market is an interesting setting for the study of informal transfers. First, because of the availability of a high-quality data source, the SHIW, a bi-annual survey of more than 8,000 households with a panel component. Second, the Italian household loan market remained small for a long time by international standards, and it still is, despite a remarkable growth that began in the second half of the 1990s.

Bartiloro and Rampazzi (2015) use SHIW data to study the role of informal credit on consumption during the economic crisis. Unlike them, we exploit the SHIW over an extended period of time in order to provide a more comprehensive framework for informal credit. We move away from the notion that the use of informal transfers is a consequence of failures in the official credit market, showing that this only explains a fraction of informal loans. We find empirical evidence about the existence of a different channel, based on complementarity, where informal credit is used in addition

Figure 2: Trends in households' formal loans, Italy, 1990-2014, millions of euros.



to formal credit or as a backup to avoid default in the event of negative shocks. Finally, we measure the net effect of a change in formal credit supply in local markets.

The paper is organised as follows. Section 2 describes data about informal credit and liquidity constraints in the Italian household credit market. Section 3 reports our empirical analysis on substitution and complementarity channels and their net effect. Section 4 concludes.

2 SHIW data and descriptive

2.1 Informal credit and gifts: definition and features

SHIW provides detailed information on the economic situation (income, real and financial wealth, indebtedness, savings), consumption and several social characteristics for a stratified sample of over 8,000 households (about 24,000 individuals) from about 300 Italian municipalities. For our purposes, we make use of the period 1995-2014 (10 waves), including a longitudinal component reaching about 50 per cent of the sample. The survey includes a question on informal loans ("*At the end of last year did the household have debt with relatives or friends?*"). A different question also collects information on gifts ("*During the last year did you receive regular gifts or cash from*

relatives or friends?").

Guiso and Jappelli (1991), working on a cross section for 1987, focused their analysis on the probability of receiving a generic transfer, both in the form of an informal loan or as a monetary gift. In the present paper, we mostly focus on informal loans, as we believe that their relation with formal credit may be quite different. Furthermore, the SHIW question on informal loans is related to the stock of debt faced by the households, whenever incurred, while gifts are restricted to those received in the last year.

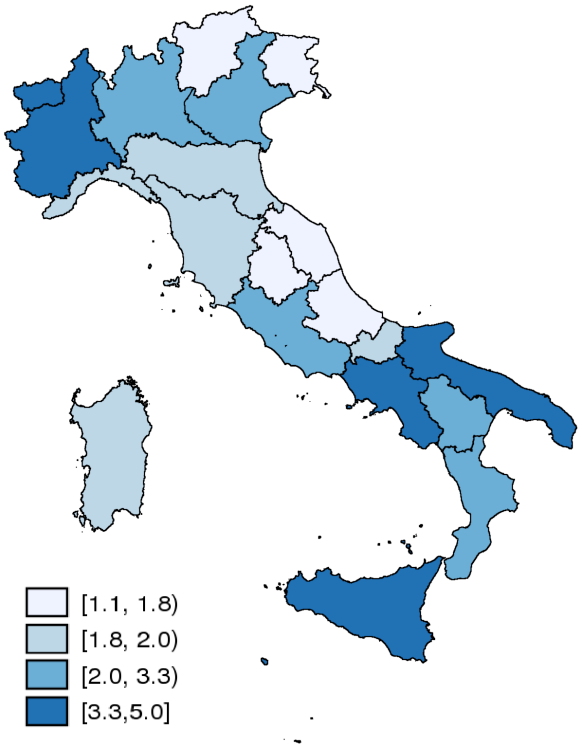
The regional map of the share of households with informal loans (Figure 3) shows that the densities do not follow the typical North-South divide which characterizes Italy's credit market and major macroeconomic indicators. The incidence of informal credit is higher in the South, as one would expect if banking loans and private transfers are considered substitutes, but there is strong heterogeneity across the regions. Moreover, the average value of transfers in the northern regions is almost double with respect to the southern ones.

Table A2 in the Appendix shows that recourse to informal loans is more frequent for large, low-income families and for households living in large cities. Looking at individual characteristics, the incidence is higher for young, low educated individuals and for divorced people. These features, usually associated with potential difficulties in accessing the credit market, seem to support the traditional hypothesis of informal loans as a substitute for formal loans.

2.2 Informal loans and access to the credit market

The SHIW survey contains a specific section dedicated to loan applications and credit rationing. To identify households that are liquidity constrained, the survey asks households who have applied for a loan if they have been turned down, even partially; less than 1 per cent of the sample answered yes, and their share has grown slightly over time, ranging from 0.5 to 1.2 per cent in the period 1998-2014. Each household is also asked: "*During the year did you or a member of the household think of applying for a loan or a mortgage to a bank or other financial intermediary, but then changed your mind on the expectation that the application would have been turned down?*". Households answering yes to this question, i.e. "discouraged" households, are also potentially credit constrained. Our main dummy for liquidity constrained households therefore includes both cases. This variable has been used extensively in the literature since the seminal paper by Guiso and Jappelli (1991) (see, among others Guiso et al., 2004, 1996).

Figure 3: Geographical variation in the fraction of households with informal loans



Note: hhs stands for households. The fraction of households (per cent) hasve been calculated based on the pooled 1995-2014 sample. For the definition of informal loans definition, see Figure (1).

On the other hand, we define households with unconstrained formal credit access as those who either have a loan with a financial institution and did not apply for a new one in the current year, or who applied and obtained the full amount requested. We also exclude discouraged households from this definition. Figure 1 shows that the proportion of households with unconstrained access increased during the period 2004-2008, reaching its maximum of more than 22 per cent in 2008. Around 78 per cent of households are not liquidity constrained and either do not have loans or have not applied for them.

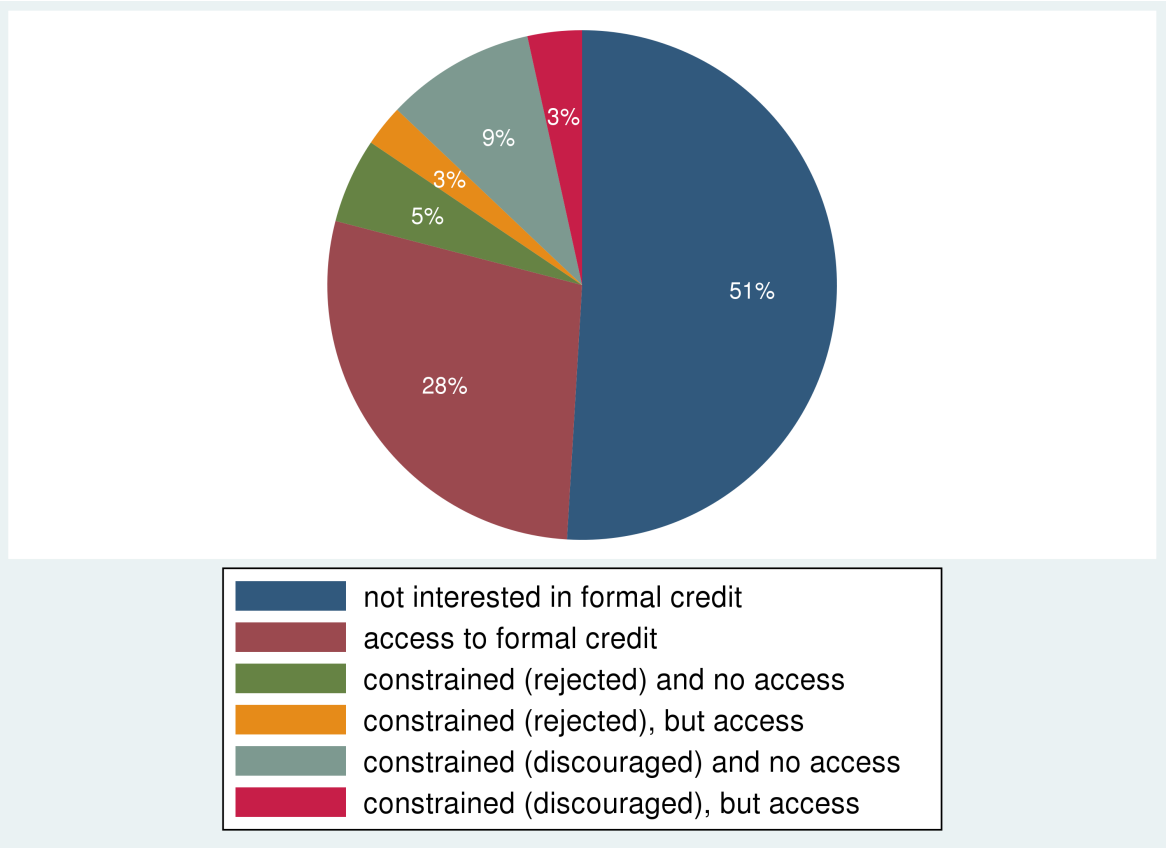
Figure 4 shows the distribution of households that received an informal loan with respect to their access to the formal credit market. Among households receiving informal loans, more than 50 per cent are not interested in the formal credit market, meaning they neither have loans, nor have they applied for one. Of these, about half do not even hold a bank account. Almost 30 percent of households with informal loans have unconstrained access to the credit market. The remaining 20 per cent faces some problems in accessing the formal market: 6 per cent of households already had a formal loan but were rejected when they applied for a new loan during the last year (or they did not apply because they thought they would have been rejected), while 15 per cent of households were constrained, having no previous access to the credit market. Monetary gifts display similar characteristics, with a higher incidence of households not interested in the credit market. For this group the share rises to about 66 per cent, while it is just 10 per cent for households who have no access to formal credit.

This preliminary evidence suggests that the economics of private loans appears to be more complex than postulated in the literature which considers them as pure substitutes for formal credit. In particular, looking at the data, we believe that private transfers to households could be driven at least by three distinct channels.

The first channel is based on a household version of the pecking order theory (Myers and Majluf, 1984): a certain number of households have a strong preference for a kind of internal liquidity related to transfers from relatives or friends. For this kind of household, informal credit is not an alternative to formal loans but rather is the preferred or even the only option, unaffected by changes in credit market conditions.

The second channel relates to the complementarity between formal and informal credit, recently documented for Chinese firms by Degryse et al. (2013). Many households, far from considering private loans a surrogate for formal credit, use informal financing together with traditional financing. This is also related to the fact that down payments are usually requested, even in advanced financial markets, in order to mitigate adverse selection. Informal credit is often used to meet this requirement. Moreover, the high share of households receiving informal loans with access to the

Figure 4: Distribution of households with informal loans by credit access, Italy, 1995-2012

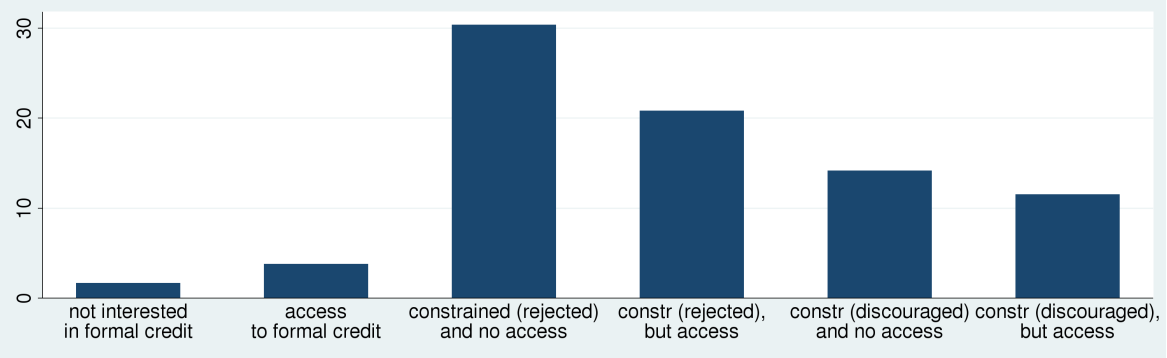


Note: access to formal credit refers to having any kind of formal debt. Liquidity constraint refer to those who report to be rejected at least partially by a bank, and to those who are discouraged (they chose not to apply for a loan thinking that they would have been rejected).

credit market could be linked to a caretaker effect on the part of relatives and friends towards households in financial distress, resulting in delays in loan repayments. In a nutshell, it might be that some households see the two kinds of credit as complementary goods, so that an increase in the availability of formal credit (a reduction in its price) leads to an increase in the demand of informal credit, although in the case of the caretaker effect this may take some time to materialize.

The third channel for informal loans is the one underlined by previous literature (Guiso and Jappelli, 1991), relating to the presence of liquidity constraints. Figure 5 shows the share of households receiving loans and their access to the credit market. Households without any interest in formal financing present a 2 per cent probability of receiving informal loans. The share doubles for households with full access to the credit market. If we focus on constrained households, the percentage with informal loans increases dramatically. On average, it reaches nearly 20 per cent, confirming

Figure 5: Households with informal loans by access to credit, Italy, 1995-2012



Note: see Figures 1 and 4 for the definitions. The bars represent the percentages of households with informal loans who belong to each group.

that credit rationing is an important channel for informal loan demand. The share increases to 23 per cent for households that requested credit and were turned down, while discouraged households represent about 13 per cent.

3 Empirical analysis

3.1 Informal debts and access to the credit market

We first start by examining how informal loans are related, at the household level, to their access to the credit market. The dependent variable in our estimations is a dummy equal to one if the household has received informal loans, zero elsewhere. The independent variables, related to the status of households with respect to the credit market, are the presence of credit constraints (rejected and discouraged households are considered both separately and jointly) and the existence of an unconstrained banking relation (both because the household already has a loan or because its application for a new loan has been accepted without rationing). The reference category is represented, therefore, by those households who neither have a formal loan nor have they applied for one.

We control for heterogeneity at the individual level by including covariates describing the head of the household (gender, age, civil status, education, employment status) and the whole household (number of components, number of people getting an income, income net of financial revenues).[3] We also include geographical controls (at the regional level r) and temporal dummies for each wave. Summary statistics for

[3]These variables also allow us to take into account the position of the specific household inside the life cycle, relevant in influencing borrowing decisions.

these variables are reported in the appendix (Table A3). To summarize, we estimate the following equation:

$$y_{it} = \delta \text{constraint}_{it} + \gamma \text{formal credit}_{it} + x'_{it}\beta + \gamma_t + \gamma_r + \epsilon_{it} \quad (1)$$

$$E[\epsilon_{it}|\text{constraint}_{it}, \text{formal credit}_{it}, x'_{it}, \gamma_t, \gamma_r] = 0 \quad (2)$$

where $i = 1, ..., N$ are households observed over different years $t = 1, ...T$ (the panel is unbalanced). This specification is drawn from Guiso and Jappelli (1991), but (i) we focus only on informal loans and not private transfers in general, (ii) we also study the relation with unconstrained access to formal credit, and (iii) we analyze a longer period of time, which also allows us to introduce household fixed effects.

Table 1, column (1), shows the results of our principal estimation, an OLS regression for the period 1995-2014 over a pooled sample of more than 70 thousand observations. The empirical analysis confirms the results found in the existing literature: credit-constrained households are 13 per cent more likely to receive informal loans than the rest of the sample. However, when compared with those who are not interested in the credit market (they do not have formal loans and have neither applied nor wanted to apply for them), even households with unconstrained access to the credit market are more likely to receive informal loans, corroborating our hypothesis about the presence of a complementary channel. The estimated coefficients for control variables have the expected signs: the probability of receiving transfers is higher for larger families and for divorced couples; it decreases with household income and the age of the head of household (coefficients available on request).

The results are robust to alternative specifications. We performed a logit estimation (column 2) and the results are completely in line with the previous ones, even in the magnitude of the marginal effects.

One possible concern is that there are household-specific cultural traits that make individuals less inclined to ask for formal credit and more prone to rely on relatives and friends. The sign of the bias is potentially unclear. Those who are skeptic towards formal credit are more likely to be among those who are liquidity constrained, in particular the discouraged, but also those who neither have a formal loan nor have applied for one. To address this issue we exploit the panel dimension of the dataset and run a fixed effect estimation. Since we expect these cultural traits to persist over time, the household fixed effects should capture most of this omitted variable bias. In FE estimates (column 3) the qualitative conclusions are confirmed, even if the coefficients on the dummies of interest are smaller: we still find that being liquidity constrained has a large effect and that there is a positive relation with unconstrained access to

Table 1: The relation between informal loans and access to formal credit, Italy, 1995-2014

	(1)	(2)	(3)	(4)	(5)	(6)
dependent var	1[informal loans]				Informal loans (euro 2010)	
	OLS	Logit (AME)	FE	OLS	OLS	FE
1[constraint]	0.1308***	0.0979***	0.0886***	0.1212***	966***	619***
	(0.0074)	(0.0063)	(0.0094)	(0.0128)	(145)	(175)
1[formal credit	0.0231***	0.0278***	0.0095***	0.0179***	228***	119*
(with no const)]	(0.0018)	(0.0022)	(0.0027)	(0.0032)	(39)	(63)
Observations	79267	79267	48672	27406	79267	48672
H_0: $1[constraint]_{t-1} = 0$			0.2073			0.2073
H_0: $1[formalcredit]_{t-1} = 0$			0.4795			0.4795
H_0: $1[constraint]_{t+1} = 0$			0.3183			0.8991
H_0: $1[formalcredit]_{t+1} = 0$			0.4126			0.9012

Note: p<.10 ** p<.05 *** p<.01. The unit of observation is the household. Standard errors clustered for households in brackets. The dependent variables are a dummy for the presence of informal loans at the end of the year (columns 1-4) and the quantity of informal loans in euros as at 2010 (columns 5-6, rescaled using the Italian consumer price index for the whole country - NIC). The explanatory variables are a dummy for being liquidity constrained (they either had a bank loan application rejected at least partially or they chose not to submit a loan application because they thought it would have been rejected) and a dummy for having any kind of formal debt without being liquidity constrained. The reference category is represented by those households that neither have formal credit, nor are liquidity constrained. Regressions include year and regional fixed effects, plus dummies for household size, number of income recipients, number of labor income recipients, logarithm of household income and the square of the logarithm, household head's age and age squared, dummies for household head's: gender, marital status and education. In Fixed Effects (FE) regressions (fixed effects at the household level) only households observed for at least two waves have been selected (gender and education have been kept among covariates because the household head may change across waves; regional fixed effects have been dropped because few households change residence). For FE regressions, the last four rows refer to two alternative dynamic specifications including either a lead or lag of the two explanatory variables. We show the p-value for a Wald test of the null hypothesis that the additional variable is equal to zero. In column (4) we selected only households who had neither formal nor informal credit in the previous wave.

formal credit. As a robustness check we tried adding lags or leads of the liquidity constraint dummies to the FE estimates, but they are not statistically significant at the 5% level. Finally, we replaced regional dummies with provincial dummies in the specification from column (1) and the results are virtually unchanged.

To confirm the presence of a non-negligible complementarity channel, in column (4) of Table 1 we focus on the longitudinal sample. We check whether households with neither formal nor informal loans in one wave are more likely, in the following wave, to borrow from relatives or friends if they request and obtain a (formal) loan. Results are indeed very similar to the main ones.[4] With respect to the sample averages in the selected sample (2.6 per cent for informal loans), unconstrained access to the credit market is associated with an increase of more than 66 per cent in the share of households indebted to relatives or friends.

In the main results we focused on the extensive margin, that is, on the probability of receiving credit from relatives or friends. Exploiting information about the amount of credit, we can also check for the effects of credit rationing on the size of the informal loan, conditioning on the attainment of such a transfer. We therefore run the same regressions using the quantity of informal credit as the dependent variable (columns 5-6). Estimates confirm our previous conclusions.

Finally, results may be different for some socio-economic groups. Young and poorer individuals may have stronger needs for credit and at the same time are more likely to be liquidity constrained. There may also be significant geographical differences due to different attitudes toward formal credit and to the degree of familism, which is higher in the South. Table 2 shows that results are very similar between young and old households. Although the former are more likely to be liquidity constrained, the relation with informal loans is similar. Geographical heterogeneity is instead quite large for the coefficient on the constraint dummy, while it is negligible in the other variables. Those households with higher per-capita income are less likely to use informal loans in any case, as we intuitively expected. Overall, although some noticeable differences arise, in particular for the constraint dummy, qualitative conclusions are quite similar in all groups.

Complementarity may be stronger when households indebted to a financial institution have problems paying back their mortgage. We perform an estimation on a subsample of households who (i) hold a formal loan both in the current and previous wave, (ii) were not informally indebted and did not they receive a gift in the previous

[4]It would be interesting to understand whether complementarity also depends on the purpose of the formal loan. Unfortunately, direct information is fully available only for 2012, which is not sufficient to run the regressions (in 2010 only those who were rejected were asked).

Table 2: Heterogeneity in the relation between informal loans and access to formal credit, Italy, 1995-2014

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent var:	1[informal loans]					
Subsample:	Young households	Older households	Centre North	South	Per-capita income less than the median	Per-capita income above the median
1[constraint]	0.1140***	0.1340***	0.1050***	0.1743***	0.1557***	0.0840***
	(0.0170)	(0.0082)	(0.0084)	(0.0139)	(0.0099)	(0.0103)
1[formal credit	0.0270***	0.0219***	0.0220***	0.0244***	0.0307***	0.0162***
(with no const)]	(0.0050)	(0.0019)	(0.0020)	(0.0035)	(0.0029)	(0.0020)
Observations	9394	69873	52090	27177	39623	39644

Note: p<.10 ** p<.05 *** p<.01. OLS regressions. The unit of observation is the household. Standard errors clustered for household in brackets. Young households are those whose reference person is aged 35 or less. The median per-capita income is calculated separately for each year. The definition of the dependent variable and the additional covariates included in the regressions are the same as in Table 1.

wave, and presented no delays in payments in the previous wave.[5] The equation we estimate is[6]

$$y_{it} = \gamma \text{repayment delay}_{it} + x'_{it}\beta + \gamma_t + \gamma_r + \omega_{it} \tag{3}$$

$$E[\omega_{it}|\text{repayment delay}_{it}, x'_{it}, \gamma_t, \gamma_r] = 0 \tag{4}$$

The results presented in Table 3, column (1) show that the emergence of financial distress for households with formal loans (signaled by a delay in payments) increases the probability of receiving an informal loan by 16 per cent. This finding indicates that at least part of the observed complementarity is driven by a backup effect generated by relatives and friends with respect to households with financial problems. The analysis leads to a strong drop in the number of observations, due to both the small fraction of households with debt and the fact that the question about payment delays entered the survey in 2008, so the sample for the estimation (households having no delays in the past wave) only includes the waves from 2010 to 2014. We test the robustness of the results by relaxing the assumption of not having delays at time t-1 for households with loans. In this way we are able to include one more wave and increase the size of

[5]Also Bartiloro and Rampazzi (2015), analyzing the correlates of informal credit, note that those who are late in paying back their debts are more likely to have informal credit. However, in their estimates they do not exploit the longitudinal dimension, making it more difficult to interpret the positive correlation as a caretaker effect.

[6]We do not include a control for liquidity constraints, given that these households are already indebted in the credit market. Results are basically unchanged if we add the relative dummy among the regressors.

Table 3: Delay in debt-repayment and informal credit

	(1)	(2)
Dependent variable:	1[informal loans at t]	
Sample:	With formal debt at t and t-1, no informal loan at t-1, no delay at t-1	With formal debt at t and t-1, no informal loan at t-1
1[Delay in repayment]	0.1567**	0.1770***
	(0.0610)	(0.0452)
obs	1445	1977

Note: * p<.10 ** p<.05 *** p<.01. OLS regressions. The unit of observation is the household. Standard errors clustered for households in brackets. The main explanatory variable is a dummy for delays of more than 90 days in the repayment of formal debts. It is available from 2008. The definition of the dependent variable and the additional covariates included in the regressions are the same as in Table 1. The sample includes all households (i) who had a mortgage in the previous and current waves, (ii) who did not have informal loans in the previous wave and (iii) who did not have repayment delays in the previous wave (this requires using only 2010-12-14). In column (2) the (iii) selection criterion is removed (hence data are from 2008-10-12-14).

Table 4: Monetary gifts and access to formal credit, Italy, 1995-2014

	(1)	(2)	(3)
Dependent var:		1[monetary gifts]	
	OLS	Logit (AME)	FE
1[constraint]	0.1306***	0.0975***	0.0885***
	(0.0074)	(0.0063)	(0.0094)
1[formal credit (with no const)]	0.0227***	0.0279***	0.0097***
	(0.0018)	(0.0022)	(0.0027)
Observations	79267	79267	48672
Equality constraint for the coefficient in gift regressions vs informal loans (p-value):			
1[constraint]	0.000	0.000	0.000
1[formal credit (with no const)]	0.000	0.000	0.811

Note: p<.10 ** p<.05 *** p<.01. The unit of observation is the household. Standard errors clustered for households in brackets. The dependent variable is a dummy for the receipt of gifts from relatives or friends. The last two rows refer to a test for the difference of the coefficients from the equations on informal loans. The definition of the dependent variable and the additional covariates included in the regressions are the same as in Table 1.

the sample by 30 per cent. Results (column 2) are nevertheless quite similar.

Although our main focus is on informal loans, households may receive private transfers in the form of gifts. Table 4 shows that the relation between formal credit and gifts has similar characteristics to the relation between formal and informal loans, but the magnitude of the coefficient is generally smaller, apart from the case of the coefficient on unconstrained access to formal credit in FE regressions. We also checked the regressions with the monetary amount of gifts as a dependent variable (both OLS and FE), and the coefficients on the two dummies of interest were smaller than 30 (euros) and not statistically significant.

3.2 Local credit supply and informal loans

Thus far we have shown that two different channels simultaneously influence the probability of receiving an informal loan. These channels act inversely with respect to formal credit dynamics: on the one side informal support is needed when formal credit is not available (or is believed to be unavailable); on the other side obtaining formal credit may actually foster informal credit. Indeed, analysing which one prevails may prove worthy in understanding the phenomenon and may provide useful insights with implications for policy. For this reason, as a final step, we try to measure the net effect on informal loans of the credit market dynamics at the local level.

In order to do so, we use data from the Bank of Italy's Supervisory Reports and Central Credit Register on the amount and quality of bank loans in local credit markets. These series are available from 1998, and therefore we exclude 1995 from this analysis.[7] In the baseline regression of this Section we exploit the panel dimension of our database estimating, at the provincial level, the impact of the flow of new formal loans per capita granted to households on the probability of increasing the usage of informal credit. However, in order to understand whether the two kinds of credit are on average complements or substitutes, we need to exploit changes in the amount of bank loans that are due to shocks to the supply of formal credit. In other words, we want to estimate whether an increase in the supply of bank loans leads to an increase or a decrease in the consumption of informal credit.

To this aim we introduce an instrument for credit supply obtained by exploiting the huge heterogeneity in non-performing loans to firms observed in the period of interest and in particular during the crisis. In 1998, focusing on credit to firms, the incidence of bad loans was 10 per cent; the value decreased until 2006 (8 per cent), then increased during the crisis, reaching 20 per cent in 2014. We obtain local indexes of the quality of firm credit by computing the fraction of non-performing loans over total loans for each bank and year at national level, and then projecting them in the local setting on the basis of the banks' market share in each province. We define this variable $\textit{credit-quality}_{gt}$.

The instrument is supposed to have a strong negative correlation with new loans granted to households, given that the emergence of bad loans, which decrease bank profitability and commit a larger amount of their capital, affects the propensity of banks to grant new credit. On the other hand, we also claim that, after controlling for household covariates and regional peculiarities, the quality of firm credit does not

[7] Data for the first quarter of 1998, not available in the Central Credit Register dataset, have been retroactively extrapolated by applying, at provincial level, the average growth rate of the last three quarters of the same year.

have a direct impact on informal loans to households, neither through its demand nor its supply. This assumption seems reasonable given that the dynamics of bad loans to firms is affected by variables that are different with respect to households (Bofondi and Ropele, 2011) and tend to occur over a different temporal pattern. Moreover, the way we construct our provincial indexes allows us to distribute local credit shocks on the basis of a bank's market share, thus weakening the correlation between the quality of loans to firms in the local market and household credit supply.

To summarize, we estimate the equation:

$$\Delta y_{igt} = \delta \text{credit-flow}_{gt} + \Delta x'_{it}\beta + \gamma_t + \gamma_r + \eta_{igt} \tag{5}$$

where the variable Δy_{igt} describes a household's changes in its informal credit status: it is equal to 0 if there is no change in status, equal to 1 if a household without an informal loan at time t obtains a loan from relatives or friends in the following period, while it is equal to -1 in the opposite case.[8] Even if we have to exclude the 1995 wave from the analysis, we still use it to calculate the changes for 1998. The variable $credit - flow$ represents the flow of new loans to households per capita, while $g = 1, ..., G$ stands for provinces. Although our regression is in first-differences, we still include regional dummies in order to capture differential linear trends across regions.[9]

Our empirical strategy is the following. We initially run OLS, assuming that the variation in bank loans is entirely due to changes in the supply of formal credit:

$$E[\eta_{igt}|\text{credit-flow}_{gt}, \Delta x'_{it}, \gamma_t, \gamma_r] = 0 \tag{6}$$

However, credit-flow$_{gt}$ is likely to be correlated with the unobserved component η_{igt}, both because formal and informal credit are likely to be jointly determined, and because of possible omitted variables.[10] We therefore move on to a different identification strategy, allowing for this correlation to be different from zero, but assuming that the quality of loans to firms represents a source of variation in the supply of formal credit which has no direct impact on informal loans:

$$Cov[\eta_{igt}, \text{credit-quality}_{gt}] = 0. \tag{7}$$

[8] We observe 648 positive changes and 703 negative ones.

[9] The variability of the credit-flow and of the instrument is not only at the provincial level, but also over time. However, in the specification we included only regional dummies, because the dependent variable has a limited variability within provinces over time. Nevertheless, estimates for the effect of interest are confirmed to be positive and significant, even if somewhat larger, when we also include provincial fixed effects.

[10] In particular, we expect the area with the best economic performances to present the most developed credit market.

Assuming this absence of correlation (exclusion restriction), we can estimate equation (5) by 2SLS, using *credit-quality*$_{gt}$ as an instrument for *credit-flow*$_{gt}$.

The results of the estimation, performed for the period 1998-2014 on the households belonging to the panel, are reported in Table 5. The OLS regression presented in the first column highlights a small, positive relation between the supply of new loans to households and the use of informal loans. An increase of 10 per cent in new loans to households in a province is associated with an increase in the probability of receiving an informal loan in the order of 0.1 percentage points. This result can be explained by a larger role played by the complementary effect on formal credit with respect to the substitution effect due to credit rationing. Also, our estimates may capture only part of the complementarity, because the caretaker effect discussed above is likely to materialize with some lag.

Table 5: Informal loans and local bank credit supply, Italy, 1998-2014

	(1)	(2)	(3)
Dependent var:	$\Delta 1[informalloans]_t$	$1[informalloans]_t$	$\Delta 1[informalloans]_t$
	OLS	OLS	2SLS
ln(flow of new formal bank	0.0102**		0.0202**
credit to households per capita)$_t$	(0.0041)		(0.0097)
ln(formal bank credit to		0.0178***	
households per capita)$_t$		(0.0040)	
Obs	35721	71150	35721
First-stage F			52.2

Note: * p<.10 ** p<.05 *** p<.01. The unit of observation is the household. Standard errors clustered for province (G=95) in brackets. See Table 1 for the definition of informal loans. Formal bank credit per capita is the total amount provided to households at the provincial level divided by total population. All regressions include annual and regional fixed effects. The regressions also control for a set of variables x_{it} that includes dummies for household size, number of income recipients, number of labor income recipients, logarithm of household income and the square of the logarithm, household head's age and age squared, dummies for household head's: gender, marital status and education. In columns (1) and (3) these variables x_{it} are in first difference (household head's gender and education are included, as the household head may change, but excluding them makes no difference). In the last column the instrument is the predicted ratio of deteriorated bank loans to firms at the provincial level (see text for more details); the first stage coefficient is -3.654 (s.e. .506).

As a robustness check, we perform an estimation using, as dependent variable, a dummy equal to one for households with informal loans and, as a proxy of credit supply, the stock of loans to households per capita at provincial level. The results, shown in the second column, are qualitatively unchanged, but larger.

In order to control for endogeneity and recover the actual effect of a shift in formal credit supply, we finally perform a two- stage estimation using the instrumental variable discussed before. The first stage, not shown in the tables, confirms our expectations. An increase by one percentage point in the predicted rate of deteriorated loans in the firm sector leads to a contraction in the flow of per-capita new formal credit

to households by 3.7 percent. The effect on informal loans, estimated by 2SLS and displayed in the third column, remains significant and positive. We observe a large increase in magnitude with respect to OLS, but it remains quite small from an economic perspective.

One concern about our instrument is that it may violate the exclusion restriction for those households whose main source of income is from their own firms or self-employment, because in this case there may be a more direct link between the quality of loans in the firm sector with household demand for informal loans. We checked and the 2SLS estimate is quite similar if we exclude households whose main earner is self-employed or an entrepreneur (column 1 of Table 6), or if we focus only on those who are blue- or white-collar workers (column 2).

Table 6: Informal loans and local bank credit supply, Italy, 1998-2014, robustness checks for the 2SLS estimate

	(1)	(2)	(3)	(4)
Dependent var:		$\Delta 1[informalloans]_t$		
Sample:	Without self-employed or entrepreneurs	Only blue- or white-collar workers	Before 2008	From 2008
ln(flow of new formal credit to households per capita)$_t$	0.0249**	0.0213	0.0171	0.0158
	(0.0101)	(0.0140)	(0.0144)	(0.0263)
Obs	34222	12558	17685	18036
First-stage coeff on instr	-3.680	-3.732	-3.811	-3.211
First-stage F	54.5	58.9	29.3	8.1

Note: * p<.10 ** p<.05 *** p<.01. The unit of observation is the household. Standard errors clustered for province (G=95) in brackets. In all columns the instrument is the predict ratio of deteriorated loans in banking credit to firms at the provincial level. The employment status in columns (1) and (2) refers to the main earner. See Table 5 for more details.

Another possible issue is that during the crisis, when deteriorated firm loans expanded, household expectations became more pessimistic, leading to a contraction in the demand for non-durables and possibly in the demand for informal loans. Although we are controlling for changes in income and occupational status of the household head, this may still lead to an upward bias in our estimates. Columns (3) and (4) split the sample between the two periods. The first stage, despite showing similar coefficients, becomes weaker after 2008, which is partially due to decreased sample size, but also suggests that part of the identification comes from the variation occurring with the crisis. The 2SLS estimates become weaker and less significant. Nevertheless, they are not far in magnitude from the main results and confirm the positive, but small, impact on informal loans.

4 Conclusions

We tried to shed some light on the economics of informal credit used by households. The view of the mainstream literature is based on the general idea that informal markets take place when the functioning of formal ones is impaired. This way, as far as households are concerned, the diffusion of informal loans has been considered a proxy for credit market inefficiency: the larger, the more policy action is needed.

We enlarge this view using data over a relatively long period of time. As a first step we show that, indeed, this mechanism is at work, so that the probability of receiving an informal loan grows with the magnitude of credit rationing. However, we highlight the presence of a second channel, related to the complementarity between access to the formal credit market and demand for informal loans. As a result, the net effect is a priori unclear. Focusing on the local supply of formal banking credit, we show that the complementarity channel seems to prevail in our data, even if the overall impact on informal loans is rather limited.

This result has two important policy implications. First of all, the development of financial institutions does not necessarily lead to the disappearance of the informal market. Secondly, the presence of informal loans, usually considered an index of financial backwardness, may represent an important complement to the diffusion of formal credit and a valid support in the case of financial distress.

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Appendix: additional tables

Table A1: Summary statistics

	1995	1998	2000	2002	2004	2006	2008	2010	2012	2014
					Informal loans					
no.	299	242	102	85	137	185	257	227	286	237
ratio (percent)	3.7	3.4	1.3	1.1	1.7	2.4	3.2	2.9	3.5	2.9
mean	9,436	8,127	9,923	11,742	8,506	7,275	6,312	8,121	7,367	7,654
1st quarter	2,166	1,335	1,920	2,354	1,682	1,616	1,535	1,500	1,889	1,862
median	4,332	3,336	4,481	5,884	3,363	3,231	3,070	3,000	3,777	3,724
3rd quarter	10,830	8,007	12,802	11,768	5,605	5,385	5,117	6,500	7,554	7,449

Table A2: Share of households with informal loans (percent)

	Fraction of households in each category	Distribution across categories
	Area	
North West	2.8	25.5
North East	1.9	14.9
Centre	1.6	12.4
South	4.0	34.0
Islands	3.1	13.2
	Gender	
Men	2.6	68.9
Women	2.7	31.1
	Age	
Under 30	4.9	10.4
31-40	4.4	23.0
41-50	4.0	29.5
51-65	2.2	23.7
Over 65	1.1	13.4
	Marital status	
Married	2.6	61.5
Single	2.8	17.0
Separated/divorced	4.4	10.7
Widowed	1.8	10.8
	Education	
None or elementary school	2.3	26.7
Middle school	3.7	42.0
High school	2.3	24.2
University degree or higher	1.8	7.0
	Work status	
Blue-collar worker	4.4	32.0
Office worker, teacher	2.3	15.0
Junior manager	1.7	2.1
Senior manager	1.2	0.7
Freelance	2.2	2.2
Entrepreneur	2.9	10.2
Not employed	2.2	37.8
	Town size	
Under 20,000	2.2	22.4
20,000-40,000	2.1	15.3
40,000-500,000	3.0	49.2
Over 500,000	3.9	13.0
	Household members	
1	2.4	20.7
2	1.8	20.2
3	2.4	19.1
4 or more	4.0	40.1
	Distribution of income	
1st quarter	5.4	49.5
2nd quarter	2.2	20.6
3rd quarter	1.8	17.2
4th quarter	1.3	12.7

Table A3: Descriptive statistics for the main sample in Table 1

	mean	median	sd	min	max
inf loan (dummy)	.0259503	0	.158988	0	1
inf loan (quantity)	210.6284	0	2994.074	0	235353.5
constraint	.0329519	0	.1785119	0	1
formal credit (with no constraint)	.1920976	0	.3939519	0	1
women	.3043637	0	.4601403	0	1
hh size=1	.2277745	0	.419399	0	1
hh size=2	.2941451	0	.4556604	0	1
hh size=3	.2105416	0	.4076959	0	1
hh size=4	.1929555	0	.3946208	0	1
hh size=5	.0566692	0	.231211	0	1
hh size≥6	.0179141	0	.1326403	0	1
income recipients=1	.4759105	0	.4994225	0	1
income recipients=2	.4071934	0	.4913145	0	1
income recipients≥3	.1168961	0	.3212984	0	1
labour inc recipients=0	.384725	0	.4865333	0	1
labour inc recipients=1	.3383123	0	.4731384	0	1
labour inc recipients=2	.2334137	0	.4230059	0	1
labour inc recipients≥3	.043549	0	.2040907	0	1
married	.6213431	1	.4850555	0	1
single	.1553231	0	.3622147	0	1
divorced/separated	.062321	0	.2417392	0	1
widow	.1610128	0	.3675451	0	1
no qualification	.059041	0	.2357028	0	1
primary school	.2449695	0	.4300718	0	1
12th grade	.3079466	0	.4616472	0	1
high school	.2839643	0	.4509226	0	1
bachelor	.0986287	0	.2981647	0	1
post-graduate	.0054499	0	.0736227	0	1
blue collar	.1961346	0	.397074	0	1
white collar	.1754324	0	.3803389	0	1
manager	.0323716	0	.1769861	0	1
freelance	.016375	0	.1269137	0	1
entrepreneur	.0271361	0	.1624811	0	1
self-employed	.095008	0	.2932279	0	1
non-professional condition	.4575422	0	.4981972	0	1
age	56.08124	56	16.48573	18	104
age^2	3416.882	3136	1884.806	324	10816
log(hh income)	3.246529	3.281693	.6965267	0	7.046328
log(hh income)^2	11.0251	10.76951	4.292089	0	49.65074
monetary gift (dummy)	.0204373	0	.1414914	0	1
monetary gift (quantity)	81.6113	0	1685.234	0	283286.1
obs	79267				

Table A4: Descriptive statistics for the sample used in Table 3, column (1)

	mean	median	sd	min	max
delay in repayment	.0283737	0	.1660955	0	1
inf loan	.0283737	0	.1660955	0	1
constraint	.0519031	0	.2219082	0	1
formal credit (with no constraint)	.9065744	1	.2911287	0	1
women	.2352941	0	.4243294	0	1
hh size=1	.0913495	0	.2882052	0	1
hh size=2	.2193772	0	.4139679	0	1
hh size=3	.2740484	0	.4461879	0	1
hh size=4	.3155709	0	.4649037	0	1
hh size=5	.0768166	0	.2663924	0	1
hh size≥6	.0228374	0	.1494365	0	1
income recipients=1	.3155709	0	.4649037	0	1
income recipients=2	.5356401	1	.4989008	0	1
income recipients≥3	.1487889	0	.3560035	0	1
labour inc recipients=0	.1377163	0	.3447212	0	1
labour inc recipients=1	.350173	0	.4771891	0	1
labour inc recipients=2	.4346021	0	.4958763	0	1
labour inc recipients≥3	.0775087	0	.2674894	0	1
married	.767474	1	.4225887	0	1
single	.116955	0	.3214779	0	1
divorced/separated	.0719723	0	.2585315	0	1
widow	.0435986	0	.204271	0	1
no qualification	.0062284	0	.0787011	0	1
primary school	.0809689	0	.2728817	0	1
12th grade	.366782	0	.4820932	0	1
high school	.36609	0	.4819012	0	1
bachelor	.1619377	0	.3685212	0	1
post-graduate	.0179931	0	.132972	0	1
blue collar	.250519	0	.433462	0	1
white collar	.3072664	0	.4615205	0	1
manager	.0782007	0	.2685801	0	1
freelance	.0352941	0	.1845861	0	1
entrepreneur	.0484429	0	.2147746	0	1
self-employed	.0775087	0	.2674894	0	1
non-professional condition	.2027682	0	.4022004	0	1
age	50.79377	50	11.48462	22	87
age^2	2711.812	2500	1214.247	484	7569
log(hh income)	3.597483	3.601611	.52952	0	5.714116
log(hh income)^2	13.22208	12.9716	3.721606	0	32.65112
obs	1445				

Table A5: Descriptive statistics for the sample used in Table 3, column (2)

	mean	median	sd	min	max
delay in repayment	.0419828	0	.2006006	0	1
inf loan	.0308548	0	.172968	0	1
constraint	.0581689	0	.2341219	0	1
formal credit (with no constraint)	.9084471	1	.2884667	0	1
women	.2311583	0	.4216801	0	1
hh size=1	.0925645	0	.2898945	0	1
hh size=2	.2139605	0	.4102031	0	1
hh size=3	.2807284	0	.4494687	0	1
hh size=4	.3110774	0	.4630515	0	1
hh size=5	.0768842	0	.266475	0	1
hh size≥6	.024785	0	.1555087	0	1
income recipients=1	.3171472	0	.465483	0	1
income recipients=2	.5321194	1	.4990935	0	1
income recipients≥3	.1507334	0	.3578794	0	1
labour inc recipients=0	.1390996	0	.346138	0	1
labour inc recipients=1	.3429439	0	.474813	0	1
labour inc recipients=2	.4390491	0	.4963966	0	1
labour inc recipients≥3	.0789074	0	.2696624	0	1
married	.7713708	1	.4200561	0	1
single	.1143146	0	.3182735	0	1
divorced/separated	.0698027	0	.2548787	0	1
widow	.0445119	0	.2062816	0	1
no qualification	.0060698	0	.0776918	0	1
primary school	.091047	0	.2877488	0	1
12th grade	.3697521	0	.4828596	0	1
high school	.3631765	0	.4810368	0	1
bachelor	.1537683	0	.3608178	0	1
post-graduate	.0161861	0	.1262229	0	1
blue collar	.2579666	0	.4376262	0	1
white collar	.2948912	0	.4561092	0	1
manager	.071826	0	.2582649	0	1
freelance	.0333839	0	.1796824	0	1
entrepreneur	.0495701	0	.2171099	0	1
self-employed	.0870005	0	.2819071	0	1
non-professional condition	.2053617	0	.4040679	0	1
age	50.47294	50	11.47852	20	87
age^2	2679.207	2500	1203.709	400	7569
log(hh income)	3.601964	3.621504	.5423949	0	5.714116
log(hh income)^2	13.26819	13.11529	3.773296	0	32.65112
Observations	1977				

Table A6: Descriptive statistics for the sample used in Table 5, columns (2) and (3) .

	mean	median	sd	min	max
Δinf loan	-.0015397	0	.1944726	-1	1
ln(flow of new formal credit per capita)	6.61734	6.678466	.5935173	4.897874	7.735868
flow of new formal credit to hh pc (euro)	879.2707	795.0989	478.0263	134.0046	2288.995
ln(stock of formal credit to hh per capita)	9.384073	9.493522	.6556706	7.091742	10.5136
stock of formal credit to hh per capita (euro)	14293.86	13273.46	7893.198	1202	36812.59
predicted ratio of deteriorated loans for firms	.106264	.0854422	.061969	.0249916	.3571568
Δ1[women]	.0134935	0	.3306605	-1	1
Δ1[hh size=2]	.0056549	0	.2907138	-1	1
Δ1[hh size=3]	-.0080065	0	.2953404	-1	1
Δ1[hh size=4]	-.0121497	0	.2433164	-1	1
Δ1[hh size=5]	-.005207	0	.1536265	-1	1
Δ1[hh size≥6]	-.0021556	0	.0899225	-1	1
Δ1[income recipients=2]	-.0071387	0	.4413274	-1	1
Δ1[income recipients≥3]	-.0036953	0	.2974091	-1	1
Δ1[labour inc recipients=1]	-.0121217	0	.4098368	-1	1
Δ1[labour inc recipients=2]	-.0163209	0	.3587603	-1	1
Δ1[labour inc recipients≥3]	-.0004199	0	.209716	-1	1
Δ1[single]	-.0022396	0	.2634841	-1	1
Δ1[divorced/separated]	.0036953	0	.147915	-1	1
Δ1[widow]	.0167409	0	.2068256	-1	1
Δ1[primary school]	.0013717	0	.2504717	-1	1
Δ1[12th grade]	.0050391	0	.2905324	-1	1
Δ1[high school]	-.0063548	0	.2782503	-1	1
Δ1[bachelor]	.0013997	0	.1629042	-1	1
Δ1[post-graduate]	.0012598	0	.0610067	-1	1
Δ1[white collar]	-.0087624	0	.330354	-1	1
Δ1[manager]	-.0012598	0	.2005691	-1	1
Δ1[freelance]	-.0003639	0	.123521	-1	1
Δ1[entrepreneur]	-.0009798	0	.1430516	-1	1
Δ1[self-employed]	-.0061588	0	.2400684	-1	1
Δ1[non-professional condition]	.0293105	0	.3212479	-1	1
Δ1[age]	1.88399	2	8.478577	-66	68
Δ1[age^2]	215.8872	232	880.0453	-8576	8052
Δ1[log(hh income)]	-.0050131	-.0050285	.4529089	-4.037378	4.023183
Δ1[log(hh income)^2]	-.0357944	-.031782	2.680683	-33.58869	37.68877
Observations	35721				

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