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Are lenders using risk-based pricing in the consumer loan market? The effects of the 2008 crisis

by Silvia Magri

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# ARE LENDERS USING RISK-BASED PRICING IN THE CONSUMER LOAN MARKET? THE EFFECTS OF THE 2008 CRISIS

by Silvia Magri \*

## Abstract

This paper analyzes whether in Italy the price of consumer loans is based on borrower specific risk. Mispricing could threaten financial stability through negative effects on lenders' profitability; risk-based pricing also leads to a more efficient allocation of credit through lower prices for low-risk borrowers, with positive effects on economic growth and financial stability. The evidence available from data collected since 2006 through the Survey on Household Income and Wealth shows that consumer loan pricing has been more risk-based after the 2008 financial crisis. Households' economic and financial conditions (net wealth, number of income earners and education of the household head) became significant and economically important in influencing the interest rates in 2010-12. These are also the most important drivers of the probability of delinquency on consumer loans; lenders also focus on these variables in selecting borrowers. As a consequence of the 2008 crisis, lenders have therefore paid more attention to borrowers' credit risk not only during the selection process, but also in deciding the price of the loan.

**JEL Classification:** D40, D82, E43.

**Keywords:** interest rates, consumer loans, risk-based pricing.

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\* Bank of Italy, Directorate General for Economics, Statistics and Research. Email: [silvia.magri@bancaditalia.it](mailto:silvia.magri@bancaditalia.it)



# 1 Introduction <sup>1</sup>

Risk-based pricing is the practice of lenders who charge each borrower, or each class of borrowers, an interest rate based on a measure of his specific credit risk. In principle, interest rates applied to borrowers should reflect their default risk (Geanakoplos, 2002; Chatterjee, Corbae, Nakajima and Rios-Rull, 2007). Mispricing could threaten financial stability through negative effects on banks' profitability that have been vivid during the sub-prime loans' crisis. Better pricing also leads to a more efficient allocation of credit and improve access to credit market. This happens thanks to less and more tailored rationing and lower prices for low-risk borrowers that can induce them to take up credit and smooth more their consumption.

However, there are limits in the application of this price strategy. If there is high asymmetric information and lenders cannot discriminate among borrowers, they could increase interest rates too much and end up attracting the riskiest borrowers (adverse selection).<sup>2</sup> In this case it is rational to fix an upper-bound for the interest rate and reject the applications of the borrowers who are *perceived* as the riskiest (Stiglitz and Weiss, 1981). Even when asymmetric information can be reduced with the use of credit scoring models, there are still some limits to the possible increases in interest rates related to borrowers' affordability and usury laws. Hence, the riskiest borrowers could be nevertheless left out of the market, though they are better identified thanks to more detailed information.<sup>3</sup>

The aim of this paper is to evaluate the extent of use of risk-based pricing in the Italian market for consumer loans different from mortgages, such as loans to buy cars, furniture or to finance other expenditures. Two important trends need to be underlined in order to further motivate the paper. First, the cost of credit scoring has likely decreased thanks to the spreading of big data, which also allow faster decisions required in granting loans of small amount. Secondly, the negative effects of mispricing on financial stability have become clearer during the financial crisis<sup>4</sup>; the natural consequence is that lenders have paid more attention to the borrowers' risk, even for loans of small amounts

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<sup>1</sup>I would like to thank for their useful comments Giorgio Gobbi, Bingin Li, Andrea Resti, two anonymous referees and the participants at the 60th Annual Meeting of the Midwest Finance Association (2011), at the 12th Greta International Conference on Credit Risk Evaluation (2013), at the 54th Annual Meeting of the Southwestern Finance Association (2015) and at the 10th International Risk Management Conference (2017). The views expressed in this article are those of the author and do not involve the responsibility of the Bank of Italy.

<sup>2</sup>Gross and Souleles (2002) and Alessie, Houchguertel and Weber (2005) find that the elasticity of demand to the price of credit is lower for constrained households or, more in general, for households facing financial difficulties. Hence, if lenders do not have enough information on their borrowers, when they increase interest rates they end up attracting the riskiest borrowers whose demand is less elastic to price.

<sup>3</sup>Getter (2006) argues that these households are income constrained more than credit constrained.

<sup>4</sup>Mian and Sufi (2009) find that lax credit standards, including too low interest rates, were able to explain the sub-prime mortgage crisis in the US.

(Cristaudo, Magri, Pico and Zavallone, 2014). The focus of this paper is then specifically in understanding the impact of the 2008 financial crisis in the use of risk-based pricing for consumer loans. The analysis is based on consumer loans different from mortgages because we have already uncovered that in Italy lenders have been increasingly using risk-based pricing for mortgages (Magri and Pico, 2011).

Italy is an interesting case study. At the beginning of the last decade the size of the market for consumer loans was much smaller compared with other European countries. From then on, this market increased sharply until 2009 thanks to positive economic conditions and reductions in interest rates, and is now comparable in size to those of the other main European countries (Figure 1). However, interest rates are still much higher than in other euro area countries: on new consumer loans the gap in interest rates has been around 1.5 percentage points since the beginning of the last decade, while it was almost zero for the rates on new mortgages.<sup>5</sup> Do these higher interest rates depend on the borrowers' specific credit risk or on more general risk, linked for example to the area of residence of the household? In the latter case, some good borrowers that could use credit to smooth consumption with positive effects on the economy, would not due to the higher prices compared with their intrinsic level of risk; on the contrary, bad borrowers would benefit of lower rates, with respect of those adjusted for their actual riskiness, and this could be detrimental for banks' profitability. Hence, the analysis of this topic is particularly worthy in Italy.

Italy also offers nice data for the analysis. In the biennial Survey on Household Income and Wealth (SHIW) since 2006 households are asked about the interest rates charged by lenders to consumer loans. The set-up is very useful as the survey also collects a fair amount of data about households' financial and economic conditions and other demographics. This allows us to model the interest rates as a function of different household characteristics that are considered as proxies of its specific credit risk, essentially the risk of being late in payment and ultimately the risk of default.

The evidence reported in the paper points at correlations between interest rates and households' specific credit risk. We find that the pricing of consumer loans is more risk-based after the 2008 crisis. The model explaining the interest rates with household characteristics, proxies of credit risk, accounts for a much higher variance of the rates in 2010-12 than in 2006-08. Moreover, households' economic and financial conditions, above all net wealth, but also number of income earners and education as a proxy of permanent income, become significant and economically important in influencing the interest rates during the period 2010-12. The same variables are also among the most important determinants of the probability of being delinquent on a consumer loan. The

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<sup>5</sup>MIR interest rates reported in the Supervisory reports.

results are confirmed when sample selection is taken into account, i.e. the fact that interest rates and delinquencies are observed only for households who have a consumer loan. All in all, it seems that after the crisis lenders are focusing more on the drivers of the specific credit risk of the borrower to decide the price of a loan. Finally, when households search for a better contract they indeed end up paying lower interest rates.

In order to have a wider picture of the consumer loan market, in the last part of the paper we extend the analysis to the probability of having a consumer loan, which is largely influenced by many household characteristics. Some of this evidence depends on supply equation: in rejecting borrowers, lenders pay great attention to the same households' economic and financial conditions influencing the probability of delinquency and that matter for interest rates after the 2008 crisis; this evidence is confirmed when selection issues are taken into accounts.

This paper contributed to different strands of literature. As previously mentioned, theoretical studies have reached consensus on the idea that interest rates applied to borrowers should reflect their default risk (Geanakoplos, 2002; Chatterjee et al., 2007; Einav, Jenkins and Levin, 2012; Livshits, MacGee and Tertilt, 2011). However, due to the paucity of data on interest rates, the empirical literature on household credit market has mainly focused on credit rationing (Jappelli, 1990; Runkle, 1991; Duca and Rosenthal, 1993). The evidence on the risk-based pricing on consumer loans is still scant and almost confined to the United States. Even in the United States, as late as the early 1990s most providers of consumer credit simply offered one single interest rate for each type of loan and rejected most high-risk borrowers (Johnson, 1992; Edelberg, 2006). During the 1990s, following a drop in data storage costs and an improvement in the techniques of scoring (Bostic, 2002), lenders started to estimate the specific default risk of each borrower in order to better assess the price for consumer loans. Edelberg (2006) studies the spread between the price to the high- and low-risk households in the United States in the second half of the 1990s: she finds that the component of risk of the price has increased in the households' loans market, but only for collateralized credits such as mortgages and car loans; the results for unsecured loans are much less clear. However, Getter (2006) finds evidence of risk-based pricing in the US credit card market.<sup>6</sup> In this paper we turn our attention to Italy where the adoption of credit scoring model started much later than in the US<sup>7</sup> and was for a long time confined to business loans.<sup>8</sup>

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<sup>6</sup>McCorkell (2002) shows that in the US the use of credit scoring has improved the evaluation of loan applications across the population and has increased the access of households traditionally under-served in the credit market. The high-risk applicants would indeed receive credit that they would not otherwise be given under the rule of a "single house rate", albeit at a higher price. The low-risk consumers would be charged a lower rate and not partially subsidize high-risk customers as in the "one house rate" case.

<sup>7</sup>Bofondi and Lotti (2006) show that at the beginning of the '90s, the diffusion of this technology was still at an early stage in Italy, mainly because of a heavy use of "soft", i.e. qualitative, information, which made the adoption of automated credit scoring techniques more difficult.

<sup>8</sup>As for business loans, Panetta, Schivardi and Shum (2009) find that in Italy, after a bank merger,

This paper also contributes to the literature on the importance of financial education in avoiding errors or extra-costs (Disney and Gathergood, 2013; Agarwal, Chomsisengphet, Liu and Souleles, 2006): we find that a household searching for better financial terms of the contract can pay almost 40 basis point less, in line with the results found by Getter (2006) for the US.

The rest of the paper is organized as follows. Section 2 presents the data, Section 3 focuses on the estimation strategy related to the interest rates and Sections 4 presents the results. In Section 5 the analysis is extended to the determinants of delinquencies, while Section 6 focuses on an estimation of the probability to have a consumer loan, and specifically on the demand and supply side of the market. Section 7 discusses the evidence and concludes.

## 2 Description of the data

The biennial Survey of Households' Income and Wealth (SHIW) contains information on consumer loans with the following breakdown: a) loans for the purchase of motor vehicles, b) loans for the purchase of furniture and appliances and c) loans for non-durable goods (holidays, education, other expenditures). Starting from 1989, households were asked about the outstanding amount of debt at the end of the year; since 2006 the questionnaire also recollects an indication of interest rates charged by lenders.<sup>9</sup> We have therefore data on interest rates for four consecutive surveys (2006, 2008, 2010 and 2012) though the framing of the question changed overtime with an impact on the number of missing answers.

In 2006 households were asked to declare either the specific level of interest rates charged or approximately a range in which the interest rate is included.<sup>10</sup> In 2008 and 2010 households were asked to report only the level of interest rate allowing for a missing answer (i.e. not answering this question would allow the interviewer to go ahead with the questionnaire), while in 2012 the missing answer was not allowed, meaning that households need to look up in the papers when they cannot recollect the figure. The effect of the framing of the question is that we are able to match an interest rate to each

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which should increase the information about customers and the bank ability to screen borrowers (i.e. reduce adverse selection), the relation between the default probability of each firm and its loan rate becomes steeper.

<sup>9</sup>If more than one debt has been contracted within one of the three categories, households are asked to refer to the largest loan. Some households have a loan in more than one of the three categories: to obtain one interest rate per household, we calculate a weighted average with weights equal to the amounts of each loan. The SHIW contains detailed information on income, consumption, wealth and social, demographic and economic characteristics of a sample of approximately 8,000 households; it is also rich in questions on households' debt. For a comparison between the SHIW, national accounts and financial accounts, see Brandolini and Cannari (1994).

<sup>10</sup> The classes of interest rates, among which households who indicate a range can choose, are the following: 0-6 per cent, 6-9 per cent, 9-12 per cent, 12-15 per cent and more than 15 per cent. For the households who choose to declare a range, we recover a point indication of the price of the loan by using the lower bound of the range plus a random value inside the range using a uniform distribution.

household with a consumer loan for the 2006 and 2012 surveys, while for the 2008 and 2010 surveys more than 50 per cent of the indebted households do not provide any rate.

To tackle this problem, we verify whether in these two surveys (2008 and 2010) the sample of households who declare an interest rate is similar, according to the main household characteristics, to the sample of those not declaring an interest rate. There are indeed some significant differences, stronger for the area of residence and the share of immigrants, but overall the two samples are not too different (Table 1).<sup>11</sup> We can therefore exclude that distortions in the sample of respondents can strongly bias our results. Furthermore, we repeat our estimations only for the years when there are no missing interest rates, i.e. 2006 and 2012. Other methods of imputations for our main variable of interest, based on households' characteristics, would strongly bias the results in favour of finding a link between interest rates and household credit risk; hence, we prefer to work with raw data.

There is a further caveat in using survey data for this kind of analysis. The interest rates reported in the SHIW are those that households remember if they do not look them up in the documents. These data can therefore be affected by recollection problems and measurement errors. In order to have a more precise indication of the interest rate offered by lenders, we could have used administrative data gathered directly by credit institutions. However, these data are not easily available and, should they be available, their important drawback would be the lack of detailed information on many households' characteristics that are viceversa in the SHIW.

In order to evaluate the quality of the data, and hence the impact of missing data and measurement errors, we compare the average interest rates on the outstanding amount of the loan from the SHIW (excluding zero interest rates) with those reported by lenders in the Supervisory reports (MIR interest rates) in the same year of the survey. The evidence is reassuring: there are some differences, in the range of 0.5 percentage points, which are lower in the years when all households answer the question (Figure 2).<sup>12</sup> All in all, we think the interest rates in the SHIW are a good representation of the cost of consumer loans in the different years of the analysis.

In table 2 (upper panel) we report descriptive statistics on interest rates in SHIW for each survey with the corresponding number of households declaring interest rates. The average interest rate on consumer loans shows a slight downward trend, from 6.4

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<sup>11</sup>As for the age classes, there are some differences in the two classes 45-54 and 55-64; similarly for the second and third quartiles of net wealth, though overall the average age and net wealth are very similar across the two samples. There is also a significant difference as for the share of household with high debt-income ratio, which however is not a variable that matters among the results we find.

<sup>12</sup>As a percentage of the average interest rate in the SHIW, the difference between average rates reported by households in the SHIW and average rates reported by lenders has an incidence of 6-7 per cent in 2006 and 2012 (the years with no missing rates), 12 per cent in 2010 and 16 per cent in 2008; the evidence with median value of interest rates is similar.

per cent in 2006 to 6.1 per cent in 2012. The higher coefficient of variation in 2012 is an indication of greater dispersion of interest rates, which was nonetheless even higher in 2006. In this paper we are not interested in the dispersion of interest rates per se, while we want to understand if the dispersion of interest rates is explained by different level of borrower's specific credit risk. In the other panels of the table we report some descriptive statistics for the dependent variables and regressors used in the estimations, most of which are categorical variables.

Given the question we want to address in this paper, we exclude from the analysis the households declaring zero interest rates as this level of rates is normally decided by dealers and not by lenders. When a household declares a zero interest rate, financial costs are indeed entirely borne by dealers. Bertola, Hochguertel and Koeniger (2005) argue that dealers can sometime have an incentive to bear these costs in order to discriminate their borrowers so as to offer different prices to cash-rich and liquidity constrained households. Zero interest rates on consumer loans are not a rare event for Italian households: the fraction declaring a zero rate was 9 per cent in 2006 and increased to 15 per cent in 2012. In order to have an understanding of this phenomenon, we analyse which borrowers are more likely to obtain a zero interest rate. In an unreported estimation, we find that the probability of zero rate is much lower for low-wealth households, when the head has an uncertain job or is an immigrant; it is also decreasing in the amount of the loan. Overall, it seems that the benefits of zero rates go primarily to more affluent households and for loans of small amount.

### 3 Estimation strategy

In estimating the link between the specific borrower's risk and the interest rate charged by lenders on consumer loans, we follow a setup similar to the one proposed by Edelberg (2006). Assume that a household demands a loan amount  $A_i$  with maturity  $M_i$  and offers collateral to ensure a recovery rate  $l_i$ . After considering these loan attributes, the borrower's default risk  $d_i$  and his costs of funding  $c$ , the lender decides whether or not to accept the application and then offers an interest rate  $I_i$  to the household. The household signs the contract if the offered rate  $I_i$  is lower than his reservation interest rate  $R_i$ , based on his characteristics and on the loan attributes  $A_i$ ,  $M_i$  and  $l_i$ .

In this case, we therefore observe the interest rate  $I_i$  charged by the lender to the household  $i$

$$I_i(d_i, A_i, M_i, l_i, c) = X_i\gamma + \epsilon_i \quad (1)$$

where  $X_i$  is a vector of variables that are measures or proxies for  $d_i$ ,  $A_i$ ,  $M_i$ ,  $l_i$ ,  $c$ . The borrower's default risk  $d_i$  is the focus of our estimation.

We follow the strategy of testing with an OLS model the explanatory power of all the variables that other studies find important in explaining the borrowers' default risk (Edelberg, 2006; Magri, Rampazzi and Pico, 2011; Tudela and Young, 2003). In a following section of the paper we also verify whether the same variables are relevant in influencing the probability of arrears on consumer loans in Italy, the only negative event measured in the SHIW. In detail, we start with a baseline and parsimonious specification with only household net wealth (quartiles) and the age of the household head (classes) as a measure of borrower's credit risk. We also try to use household income instead of net wealth and the results are were similar (available upon request). However, when including together household income and net wealth, the first one is much less important and seldom significant. We have therefore decided to keep net wealth as the main indicator of household financial conditions and capture the impact of income through the number of income earners<sup>13</sup>.

In a richer specification we add more social, economic and demographic household characteristics as further proxies of credit risk, such as being married, being a self-employed, and the number of income earners, which proxy for income variability and level. We add dummies for immigrants and for people with an uncertain job<sup>14</sup>, which also proxy for high uncertainty of income that can translate in higher credit risk, and different classes of education to control for expected income; as a final control, we include the sex of the household head. In all specifications, we also include a dummy for living in large municipalities (>500,000 inhabitants) and regional dummies.<sup>15</sup> In order to understand what are the local features influencing the pricing of loans, in some estimations we include indicators of the quantity of the loan recovered and the time for recovery in the case of borrowers' default (at regional level), the length of civil trials (at provincial level) and a variable capturing the incidence of bad on total loans (at provincial level). The first two variables are a proxy of  $l_i$ , the expected recovery rate of the loan.<sup>16</sup>

We finally add in the specification some controls related to the contract or the relationship with the bank. Most of consumer loans are granted at a fixed interest rate;<sup>17</sup> it is hence important to verify the possible correlations of the fixed rate with the ini-

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<sup>13</sup>The amount of household net wealth is generally well known to the bank. Households have frequently a relationship with a single bank where they have a current, saving or securities account from which the bank knows the amount of financial wealth; as for real wealth, frequently the house of residence is bought with a mortgage and hence the bank can easily know the value of the real estate.

<sup>14</sup>For measuring uncertain job, we include a dummy equal to 1 for the employees that have fixed-term contracts and the self-employed that have non-standard contracts such as occasional collaborations, works on a single project, etc. For more details on the variables used in the estimations see the Appendix.

<sup>15</sup>We sometime report in the tables, as memo items, the coefficients of the area dummies (Center and South): though the regressions with area dummies have a lower explained variance than those with regional dummies, the coefficients of area dummies are easily readable.

<sup>16</sup>Due to the high correlation of these indicators with regional or area dummies, we need to drop the latter. For more details on these variables see the Appendix.

<sup>17</sup>Around three quarters of the contracts are granted at fixed interest rates over the period under analysis (source MIR interest rates statistics).

tial amount of the loan and the original maturity ( $A_i$ ,  $M_i$ ). However these variables are available only since the 2010 SHIW; in the more general specifications we just add the debt outstanding, available in all surveys. We also include a dummy equal 1 for households who, in choosing the contract, search for lenders who offer better financial conditions.<sup>18</sup> As a final proxy of credit risk, in this case related to the contract as well as to household characteristics, we add an indicator of high debt-income ratio (dummy equal 1 if debt-income is in the highest quartile of the distribution for each survey.).

The cost of funding for the lenders  $c$  is assumed constant over a year and is captured by year dummies. Another variable measuring bank costs, and more in general bank market power, is an indicator of banking concentration in the local credit markets measured by the Herfindahl index, based on the number of bank branches in the 95 Italian provinces, which is included in some specifications.

However, the interest rates are observed only for households who have a consumer loan and this selection bias needs to be taken into account. Formally:

$$Prob(consumer - loan) = \Phi(Z_i\beta) \quad (2)$$

the probability of having a consumer loan is a function of a vector of variables  $Z$  that help predicting whether the interest rate  $I_i$  is observed, i.e. whether the household  $i$  has a consumer loan. This vector  $Z$  contains both factors influencing the demand attitude towards consumer loans and variables affecting the lenders' decision about the loan application made by the household. A household who has not a consumer loan could be either one who is not interested in having such a kind of loan (demand effect) or one who has asked for a consumer loan, but was turned down by the lender (supply effect, i.e. credit rationing).

In this framework, in order to verify the results on interest rates we use a sample selection Heckman model for the estimation in (1). To identify the model we need to find at least one variable that is in  $Z_i$  and not in  $X_i$ . Edelberg (2006) uses some variables capturing the demand attitude towards debt, i.e. whether households consider borrowing to be good, bad or simply acceptable and whether they believe borrowing is acceptable in certain circumstances, such as to cover for a loss in income or to buy a house. We do not have such kind of variables in the SHIW. As an exclusion restriction, we hence use a dummy equal to 1 for households who face difficulties to make ends meet with their disposable income. This variable is highly significant in the probability model to demand and to have a consumer loan because these liquidity constrained households are

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<sup>18</sup>Since 2006 households are asked why they choose the bank that granted them the consumer loan. The possible answers are: 1) it is the unique bank that granted me the loan 2) it is the bank that offered better *financial* conditions compared to competitors 3) it is the bank that offered better *non financial* conditions (for example faster application) 4) it is the first bank I asked for the loan. More than 40 per cent of households choose the bank using the second criterion (Table 2).

in greater need of a consumer loan. However, this is as a private information of the household and cannot be used by lenders in determining interest rate: in fact, it has no explanatory power in the price equation. As a robustness test, other variables are used as exclusion restrictions such as a dummy for purchasing durables, for using credit card or overdraft facilities.

## 4 The price of the loan and the household credit risk

### 4.1 OLS estimations

In this section we comment the results concerning the pricing strategy of consumer loans. The baseline estimation reported in the first column of Table 3 for the whole period (2006-2012) shows the importance of household wealth in influencing the price of the loan. Including more household characteristics, proxies of its credit risk, barely increases the explained variance of the model (the  $R^2$  goes from 0.044 to 0.048 in the second column of the table).

More interestingly, the last two columns of the table show an important change in the pricing strategy after the crisis. The variance explained when modelling the price of a loan as a function of proxies of borrower credit risk is much higher in 2010-2012 than in 2006-2008 ( $R^2$  is 0.11 versus 0.07). Moreover, net wealth becomes significant and economically important in influencing the price of a consumer loan only in 2010-2012: *ceteris paribus*, households in the first quartile of net wealth pay 1.2 p.p. more than households in the highest quartile (those in the second quartile pay 0.8 p.p. more). As previously mentioned, when using household income alone results are similar. Moreover, after the crisis other proxies of the household economic and financial conditions become significant and economically relevant: having a college degree, a proxy for higher expected income, reduces the price of loans by 0.5 p.p., while one more income earner reduces it by 0.2 p.p. In the period 2010-2012 it also appears that young households (<44) pay less on consumer loans (around 0.6-0.8 p.p.) than aged households (>65).

This is a totally different pricing strategy than that applied by lenders before the crisis, when the most important determinants of the interest rates were related to the household residence, and therefore to a sort of a *general* and not a *specific* credit risk of the borrower. During 2006-2008, households living in a Southern region pay 1 p.p. more on consumer loans; a similar result is true for households living in large municipalities. An evidence more correlated with the specific borrowers' credit risk is that the uncertain job of the head entails higher rates (by 0.8 p.p.), while when the head is married interest rates are lower (by 0.5 p.p.). On the contrary, after the crisis lenders have directly focused on the borrower's economic conditions, such as net wealth, creating the possibility of more tailored prices for those who have uncertain jobs, a working-status that has been

spreading in Italy, but acceptable or even good economic conditions.

The most important results, specifically those concerning net wealth, are confirmed when the same estimations are run only for the surveys 2006 and 2012 with no missing interest rates.<sup>19</sup> In 2006 almost no variables are significant in the price equation, but the head with an uncertain job (0.9 p.p.) and regional dummies for Southern regions (0.9 p.p.); in 2012 belonging to the first quartile of net wealth is still highly significant and important (0.9 p.p.); similarly for the result on income earners (results are available upon request).

In table 4 we add to the previous specification some controls related to the loan contract and the relationship with the bank. These variables slightly increase the explained variance of the model and do not alter the previous results. In this specification we also include the initial amount of the loan and the loan maturity (both available since 2010) that could be correlated with the interest rates, though they are not, at least after the crisis. In the period 2006-2008 we are able to just include the debt outstanding as a proxy of the initial amount: we find that interest rates tend to be lower for loans of larger amount. Smaller loans are indeed more costly for lenders, when considering the fixed cost of processing the papers as a percentage of the amount of the loan, and riskier given that they generally lack collateral that is normally available only for loans of large amount used to purchase a vehicle. This is another sign that before the crisis the pricing was more related to the characteristics of the product rather than to those of the customer.<sup>20</sup>

An important result from this estimation is that households who search for better economic terms of the contract end up getting lower interest rates (by 0.4 points); this evidence is true across all periods and is very telling about the importance of financial education in avoiding mistaken choices.<sup>21</sup> This variable could indeed be endogenous, i.e. influenced by some unobservable features. However, in this estimation we have included many household characteristics; hence, though we do not want to stress the causal nature of this effect, we think that endogeneity problems are reduced at a very low level. This is therefore an interesting result given that indications on searching attitude are not widespread in the surveys and are sometimes inferred from other answers (Disney and Gathergood, 2013).<sup>22</sup>

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<sup>19</sup>These estimations are not reported to preserve space, but are available upon request.

<sup>20</sup>The economic impact of the residual amount of the loan was nonetheless small in the period 2006-2008: increasing the amount by 1 standard deviation (12,000 euro) reduces the rate by a bit more than 0.1 p.p.

<sup>21</sup>We also interact the search dummy with different household characteristics so that to understand whether financial literacy and searching attitude are more important for some specific categories of households. No indirect effects of such types are detectable.

<sup>22</sup>Getter (2006) finds that a great deal of shopping for best terms in the US reduces interest rates for mortgages and credit card, but not for auto loans. Disney and Gathergood (2013) find that in the UK financial literacy strongly reduces interest rates on consumer loans and interpret this result as a purely demand-side effect representing the efficiency of *search* for credit product on the part of the households.

## 4.2 Heckman estimations

In Table 5 we report the results of Heckman estimations accounting for sample selection. As mentioned in Section 3, we use as an exclusion restriction an indication about difficulties that households face to make ends meet: as a private information of the household, this variable do not enter the interest rates equation applied by lenders and indeed has no explanatory power in the interest rates equation.<sup>23</sup>

In order to get the convergence of the maximum likelihood Heckman estimation we have to include net wealth in level at a constant prices (first and second degree of wealth) rather than through categorical variables (quartiles). A Wald test, reported at the bottom of the table, never rejects the hypothesis that the two equations, the interest rate and the probability model for having a consumer loan, are independent; hence they can be estimated per se.<sup>24</sup>

As a consequence of this independence, the results of the interest rate equation, after considering the selection problem, are very similar to those reported in Table 4. Specifically, we still find that net wealth becomes significant in influencing the interest rate only after the crisis: in the last column of Table 5, referring to 2010-2012, interest rates decline with net wealth at a decreasing rates; also the other proxies for economic and financial conditions, such as education and the number of income earners, are relevant only in 2010-2012.

Households with great difficulties to make ends meet are also more likely to be in arrears in paying back their loans; this information could hence be available to the bank, invalidating the identification strategy. We therefore redefine a new dummy only for households who just have some difficulties to make ends meet and are not in arrears in paying back loans: the results are widely confirmed. Furthermore, we test the robustness of the results when using as exclusion restrictions other variables that could be relevant for having a consumer loan, but that should not be significant in influencing the interest rates and indeed they are not, i.e. a dummy for purchasing furniture or equipment or a dummy for using overdraft facilities. The results for the households' wealth are very similar to those previously commented.<sup>25</sup>

From the selection equation we get the evidence that many social, economic and demographic household characteristics are highly significant and economically important

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This is on the basis that financial literacy is not observable to lenders and so does not enter lender credit supply functions.

<sup>23</sup>We capture this aspect by using a dummy equal to 1 when households declare to have from some to great difficulties to make ends meet; this dummy has no explanatory power in the interest rate equation even when included just in the baseline equation with net wealth and age and no other household controls.

<sup>24</sup>The selection equation in the Heckman model considers only those households that have a consumer loan and report an interest rate; these are all households with consumer loans in 2006 and 2012, though for the surveys 2008 and 2010 part of them are not included as they do not indicate any interest rates.

<sup>25</sup>Results are available upon request.

in influencing the probability to have a consumer loan. We will deepen this topic in Section 6 where we will also try to single out whether these household characteristics are important for supply or demand reasons in order to have a more comprehensive picture of lenders' attitude.

### 4.3 Extensions and sensitivity analysis

In this section we analyse some extensions of the previous estimations and we try the sensitivity of the main results when changing some features of the regressions.

As an extension of the analysis, we want to evaluate what are the most important local factors explaining the relevance of living in Southern regions for the level of interest rates applied in the period 2006-2008, before the crisis. We have different possible explanations: enforcement costs of the loan contracts, i.e. the time required to recover a loan in case of borrowers' default or the length of civil trials, the incidence of bad on total loans, or the banking concentration as a proxy of bank market power in deciding interest rates. Most of these variables have a worst ranking in Southern regions.<sup>26</sup> In Table 6 we just report the coefficients of these local factors in some specifications, referring to the whole sample, where we need to drop the regional and even the area dummies due to the high correlation (around 0.5-0.7 with the dummy South). In the first panel of the table we focus on the recovery of the loan, in the intermediate panel on the incidence of bad loans and in the last panel on the length of civil trials; in all specifications we always include also the index of banking concentration (Herfindahl). The evidence is that in the period 2006-2008 the local factors that can explain the higher interest rates in the Southern regions are the longer time for the recovery of the loan, the associated longer length of civil trials and the larger incidence of bad loans. As for the economic impact, the incidence of bad loans appears to be the most important factor.<sup>27</sup> The bank market power is never significant. None of these local features are relevant after the crisis, when lenders focus more on the specific credit risk of the borrower.

We can identify two main categories of consumer loans. On the one hand, there are loans to purchase cars, which are of larger amount, longer maturity and carry a collateral (the car). As collateral helps in screening borrowers (Bester, 1985; Bester, 1987), there is less asymmetric information. On the basis of the Stiglitz and Weiss (1981) model, the

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<sup>26</sup>The time required to recover a mortgage is around 80 months versus 55 months in the Northern regions and 66 in the Center; similarly, the length of civil trials is almost 4 years in the South compared with 3 years in the North and 3.5 years in the Center; the incidence of bad loans is around 5 per cent in the South and 3 per cent in the other areas of the country. Details on these variables are in the Appendix.

<sup>27</sup>When increasing the incidence of bad loans by 1 standard deviation, interest rates are 0.36 p.p. higher (around 0.23 p.p. higher when moving the variables connected with the time to enforce the contract); when the incidence of bad loans increases from the 5th percentile to the 95th percentile of the distribution, interest rates rise by 1 p.p. (around 0.7 p.p. when changing variables connected with the time of loan recovery.)

interest rate could therefore be a more useful device to clear the market in this case, as it can be better tailored on the risk of the borrower. Moreover, the parameter  $l_i$ , which measures the recovery rate in the model in section 3, could be different for these loans. On the other hand, there are loans to purchase furniture and non-durable goods, which are of lower amount, shorter maturity and without collateral. The first category is predominant: around 60 per cent of households with a consumer loan have only a loan to buy a car.<sup>28</sup> We want to verify whether the results are common to both categories or are driven by one category, namely the auto loans. In Table 7 we report the results of specifications run separately for the two categories of loans and for the two sub-periods considered. The number of observations decreases and this entails that some variables lose their significance.<sup>29</sup> It is nonetheless true that household wealth becomes crucial in influencing the interest rates after the crisis, i.e. in the period 2010-12, for both categories of loans. Another result is that the other household characteristics that we find important in the period before the crisis, such as uncertain job, larger municipality, and residence in Southern regions, matter only for car loans (first column): this is an indication that before the crisis lenders tried to give a risk content to the interest rates of these loans, carrying a collateral, though using mainly an indication about general credit risk (residence of the household); after the crisis they focus on the specific credit risk of the borrower, i.e. only on net wealth for car loans and also on education for the other loans. Finally, searching is important in getting lower interest rates only for car loans.

We then verify the sensitivity of the results by windsorizing the highest values of the interest rates to the 1<sup>st</sup> and 99<sup>th</sup> percentiles of their distribution in each survey. All the previous findings are almost unchanged, specifically those concerning the importance of household net wealth in influencing the interest rates in the period 2010-2012. After the crisis it is even clearer that the oldest age classes (>55) pay higher interest rates than all the other age classes. The evidence that households searching for better conditions get lower interest rates is also widely confirmed for the whole period (Table 8 first two columns). Among the local factors significant before the crisis, the most robust is the the time required to recover a loan in the case of borrowers' default. We also try an unreported windsorization at the 5<sup>th</sup> and 95<sup>th</sup> percentiles, which is even too strong: however, also in this case the main result concerning the strong correlation of net wealth and the interest rates after the crisis still holds.<sup>30</sup>

<sup>28</sup>This percentage is almost unchanged in the two periods analyzed; on the contrary, in terms of total amount of the loans, the fraction of car loans decreased from 72 per cent in 2006-08 to 59 per cent in 2010-12.

<sup>29</sup>The sum of the observations in the two categories does not match with the observations for all consumer loans, as some households have loans in more than one category.

<sup>30</sup>In the last specification, in the period 2010-2012 the other two proxies for household economic and financial conditions, education and the number of income earners, loose their significance in influencing

Lenders evaluate the potential borrowers at the moment of the loan application, while before we have used the household characteristics at the time of the survey when borrowers report the interest rates. Although for some important household characteristics the change could be small or even nil, to take into account this fact we decide to use the values of the household characteristics, when available, in the previous survey given that we do not have specific indication about the year when the loan was granted and consumer loans have normally short maturity (less than 5 years, Table 2). The number of observations consequently decreases almost by half, to 1147 for the whole period (from 2112 in previous estimation).<sup>31</sup> The most important evidence is unchanged (Table 8, last two columns). Specifically, the result about the relevance of net wealth in the period after the crisis is strongly confirmed: from this estimation even households in the third quartile of net wealth pay higher rates (by 0.7 p.p.) than the richest quartile; the oldest age class (>65) pay more than 1 percentage point than all the other age classes. In the period before the crisis (2006-2008) the evidence about the importance of having an uncertain job is magnified: the coefficient is highly significant and the effect on the interest rates is stronger than in previous estimations (1.6 p.p. more compared with 0.8 p.p. in Table 4); this is true also for the importance of dummy areas. In this specification, net wealth is mildly relevant even before the crisis: households in the second quartile of net wealth pay 0.6 p.p. more than the richest households in 2006-2008; nonetheless, we find no evidence of higher interest rates for households in the lowest quartile of net wealth.

In the previous estimations standard errors are clustered at a provincial level (95 provinces) to allow for possible correlations of the unobserved features at a local level. We try the sensitivity of the results when clustering standard errors at the household level to account for a possible correlation of the errors within the same household. In an unreported estimation the most important results are confirmed, specifically those concerning the relevance for the interest rates of the household net wealth after the crisis and of the household residence before the crisis.

We also try an unreported estimation using median regressions to find out whether the lenders' decision about the interest rates on the typical (median) household is based on different features compared with those found before on the average interest rates. The main evidence about the importance of net wealth in influencing the interest rates after the crisis is unaffected; this is also true for the relevance of searching attitude in reducing interest rates over the entire period under analysis.

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the interest rates.

<sup>31</sup>In the period 2006-2008 the number decreases to 648 from 1249; in the period 2010-2012 to 499 from 863. The search dummy available since the 2006 Survey has not been lagged.

## 5 The determinants of the probability of arrears

A crucial question that arises after this evidence is whether the variables we find important in influencing interest rates, specifically net wealth, are really affecting the probability of borrowers' default on consumer loans. We have focused on the household characteristics that the empirical literature has found important in capturing the household credit risk in consumer loans' markets, but it is crucial to find out their correlations with borrowers's default on consumer loans in Italy. In the SHIW, households are not asked about their default on loans, though there is a question on delinquencies longer than 90 days since the 2008 Survey.<sup>32</sup>

In this section we hence focus on a Probit estimation of a standard credit score model, i.e. a model of the probability that a household is delinquent on consumer loans

$$Prob(\text{delinquency}) = X_i\gamma + \epsilon_i \quad (3)$$

including as covariates in  $X_i$  the same household characteristics and some other features related to the loan contract used in the previous estimations. We also include dummies for different values of debt-service income ratio, which is an important determinant of households' delinquencies,<sup>33</sup> Furthermore, we try the explanatory power of a variable measuring the difficulties the household faces to make ends meets in order to evaluate its impact on the credit risk; however, as this is a private information of the household, not available to lenders, we prefer to focus on the model without this variable (from second to fourth column of Table 9).

In the first column of Table 9 we report the results of the estimations for the whole period (2008-2012). Belonging to the first quartile of net wealth and education are the most significant and economically important determinants of the probability that a household is delinquent on a consumer loan. For households in the lowest quartile of net wealth the probability of being delinquent is 4.9 percentage point higher than for the richest households, almost doubling the average probability of being delinquent; when the head has a college education this probability is reduced by almost the same percentage (4.8 p.p.) compared with the case of a head who has less than high school education. Some other household characteristics, such as the head being a self-employed, an immigrant, a worker with an uncertain job, are also important, though their correlation with the probability is lower (a positive marginal effect of around 3-4 p.p.).

We also find that an incidence of debt-service on income higher than 40 per cent

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<sup>32</sup>Using data from Italian Credit Register on the households' status of credit, only one fourth of the loans for which borrowers were delinquent at the end of 2012 improved their status in 2013 and around half worsen it; considering the last group, more than one fourth were in default after one year.

<sup>33</sup>In the estimations, if a household is delinquent in one survey is then discarded from the following surveys to avoid to count it more than once; the number of these cases is very small.

increases the probability of arrears by more than 4 p.p. with respect to households for which the incidence is less than 20 per cent.<sup>34</sup> It is worth noticing that households who search for better financial conditions of the contract are also less likely to be delinquent (1.5 p.p. less): hence searching could also be a signal for lenders about the borrower's determination to pay back the loan. Households who face difficulties to make ends meet are by far more likely to be delinquent: their probability of being in arrears is 6.7 p.p. higher than for those who have no difficulties. When in the second column of Table 9 we exclude this variable, the other results are almost unchanged, though the impact of net wealth and education is magnified due to the high correlation (0.3) among these proxies of household economic and financial conditions.

We then repeat the same estimation for the two sub-periods (2008 and 2010-2012, last two columns of the table). The evidence is that in 2008 the probability of arrears is affected almost exclusively by low net wealth, the number of income earners and college education; the last variable predicts perfectly the result of non being in arrears and is therefore excluded from the estimation. These are the same three variables that we find significant in influencing the interest rates on consumer loans after the crisis (Table 3). It seems therefore that, after the 2008 crisis, lenders decide their pricing strategy having in mind their credit score model with some lags; this is understandable given that they test their credit score models in periods preceding the one when they have to decide the price. In any case, net wealth and education are among the most important determinants of the probability of delinquency also after the crisis (2010-2012, last column). In this period, other household characteristics become significant in influencing the delinquency attitude (self-employed and immigrant); moreover, the effect of searching for better financial conditions is very strong: the associated reduction in the probability of being delinquent is more than 3 p.p..<sup>35</sup>

After controlling for other observed household characteristics, the young age of the household head does not matter in influencing the probability of arrears. This is to be kept in mind as we have seen the importance of age for the interest rates and, in the next section, we will uncover its relevance also for credit rationing. Finally, *ceteris paribus*, as for the household residence the evidence is mixed: in 2008, households living in Central regions have worse credit performance (3 p.p.), and this can explain why this feature has become relevant for lenders' pricing strategy in 2010-2012 (Table 3, last column). On the contrary, after the crisis is living in Southern regions that increases the probability

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<sup>34</sup>For households whose debt-service ratio is between 20-30 per cent or between 30-40 per cent the probability of delinquency is similar to those who have a debt-service ratio lower than 20 per cent.

<sup>35</sup>Although not reported in the table, the proxy capturing the difficulties to make ends meet significantly influences the probability of delinquencies only in the period after the crisis (2010-2012): this underlines the fact that in this period delinquencies are more strictly correlated with the difficult economic situation the household is facing.

of arrears (2 p.p), though the marginal effect is less than one third of the one associated with low net wealth (7.4 p.p.).

To verify the robustness of the results reported in this section, we also take into account the sample selection bias due to the fact that delinquencies on consumer loans are observed only for households who have a consumer loan. We use as an exclusion restriction the ratio between consumption for furniture or equipments and total consumption: this variable is correlated with the probability to have a consumer loan, but it should not influence the probability of delinquency and indeed it does not. All the main results are confirmed.<sup>36</sup>

Overall, the answer to the question we start with at the beginning of this section is that, after the 2008 crisis, Italian lenders in deciding the interest rates on consumer loans strictly focus on the household and loan contract characteristics that matter most in influencing their credit risk in consumer loan market. Credit scoring models indeed matter.

## 6 Lenders' selection in consumer loan market

In order to have a complete view of the consumer loan market in Italy, it is crucial to understand how lenders behave not only in pricing the loans, but also in the selection process of the borrowers. We start by looking at what household characteristics are correlated with the probability to have a consumer loan during the period 2006-2012; we then focus the attention on the demand and supply side of the market for which, unfortunately, we have detailed indications for consumer loans only in the last survey, referring to the year 2012.

The first model we estimate is a probability model to have a consumer loan as a function of households' characteristics:

$$Prob(consumer - loan) = X_i\gamma + \epsilon_i \quad (4)$$

The results of the probit estimations are reported in the first three columns of Table 10 (for the whole period, 31,847 observations, and in the two sub-periods). First we notice that, as mentioned in Section 4, many household characteristics are relevant; moreover, after the crisis there is a reduction in the frequency of consumer loans: the estimated probability decreases to 10.3 per cent in 2010-2012 from 12.3 per cent in 2006-2008).<sup>37</sup> Looking at the whole period, the probability to have a consumer loan is decreasing with the age of the household head: the marginal effects to have such a loan are more than 10

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<sup>36</sup>Results are available upon request.

<sup>37</sup>We do not consider households that use revolving credit card or overdrafts for which we do not have information on the interest rates; statistics referring to the frequency of households with all consumer loans are slightly higher (Magri et al., 2011).

p.p higher for the first three age classes than for old households ( $> 65$ ).<sup>38</sup> Interestingly, *ceteris paribus*, consumer loans are more used by households in the lowest quartile of net wealth and facing difficulties to make ends meet (the marginal effect is around 5 p.p.). Households that have more income earners, or with a head married, or more educated are also more likely to have a consumer loan (between 2 and 4 p.p.), while those whose head is an immigrant are much less likely (-5 p.p.). When the head has an uncertain job the probability to have a consumer loan strongly reduces after the crisis (-3 p.p.), while before the crisis it was the residence in Southern regions that was specifically relevant in decreasing the probability to have a consumer loan (-4 p.p.).

Overall, consumer credit is mainly used by households that are in great need to smooth their consumption as they are facing difficulties to make ends meet with their income, while their better education possibly creates an expectation of an improved income in the future. This evidence is in line with what has been found for other European countries (Magri et al., 2011). After the crisis, it appears that low-wealth households are even more likely to have a consumer loan.<sup>39</sup> The general credit risk linked to the household's residence also loses its significance. These are possible signs of an enlargement of the consumer loan market connected with a more widespread use of a risk-based pricing that we have detected in previous sections.

In these estimations we look at the equilibrium results in the market: some variables could hence be important for supply reasons, others for demand reasons. In order to disentangle these effects and have a clearer indication of what matters for lenders in the selection process, in the last two columns of Table 10 we analyse the probability that a household demand a consumer loan and the probability that is turned down by lenders, conditional on demand; this information is available for consumer loans only in the 2012 SHIW.<sup>40</sup>

We hence estimate a probability model of demanding a consumer loan as a function of households' characteristics:

$$Prob(demand) = X_i\gamma + \epsilon_i \quad (5)$$

From this demand equation (column four, 8,151 observations), the most important evidence is that households with difficulties to make ends meet demand consumer loans more frequently (2 p.p. more than households with no difficulties, almost twice as much

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<sup>38</sup>The marginal effects are indeed similar for the first three age classes and lower, around 9 p.p. for households whose head is between 55 and 64.

<sup>39</sup>In 2006-2008 the probability that low-wealth households have a consumer loan is 4 p.p. more than the richest households, one third of the average estimated probability; in 2010-2012 the marginal effect for low-wealth households is 5 p.p, one half of the average estimated probability.

<sup>40</sup>In previous surveys, we have indications for demand and supply referring to all loans requested by households, including mortgages and loans for business purposes demanded by households with business activity.

as the average probability of demanding a loan). When in an unreported estimation we exclude this proxy, this effect is captured by low-wealth households that are more likely to demand a loan, while the negative coefficients for the households in the second quartile of net wealth disappears.<sup>41</sup> Demand of consumer loans is, as expected, much less frequent among old households (head >65).

The last estimation on the supply side of the market is the following, only on those households that have asked for a loan

$$Prob(rationing) = X_i\gamma + \epsilon_i \quad (6)$$

The supply equation (column five, 158 observations)<sup>42</sup>, referring to the year 2012, shows that lenders in selecting applications pay great attention to the household economic and financial conditions that are also important in determining their credit risk (Table 9). When the head is better educated, the rationing is less likely: the marginal effect is -13 p.p. for households whose heads have a high school diploma compared with households with a head who did not complete the high school (the estimated probability of rationing is pretty high after the crisis, equal to 35 per cent).<sup>43</sup> Similarly, we find evidence that one more income earner reduces the probability of rationing by more than 10 p.p.. It is also true that lenders prefer to grant credit to households in the second quartile of net wealth: their rationing rate is 22 p.p. lower than for the richest households and the coefficient is statistically different from the one referring to low-wealth households as well.

All the results of these last estimations are confirmed when we consider that rationing is observed only for households asking for a loan. In unreported estimations we use as an exclusion restriction the dummy for households that have difficulties to make ends meet, which is important in influencing the probability for asking for a loan, but, as a private information of the household, is not known by the bank and is indeed not significant in the rationing equation. Similar results are obtained when we also try other exclusion restrictions such as a dummy for households buying furniture or equipments or for households using overdraft facilities: these dummies are correlated with the probability of demanding a loan, though they do not influence the probability of rationing.<sup>44</sup>

We are not able to evaluate the change in the importance of these variables with respect to the period 2006-2008, though we have seen that consumer loans are more widespread among low-wealth households during 2010-2012. We could hence infer that

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<sup>41</sup>The correlation between the dummy capturing difficulties to make ends meet and the first quartile of net wealth is more than 0.2.

<sup>42</sup>We consider only those households that have asked for a consumer loan.

<sup>43</sup>The college education dummy is dropped as it predicts perfectly that the household is not rationed.

<sup>44</sup>Results are available upon request.

household wealth has become less important in the selection process, while it has acquired relevance for the pricing strategy. This is consistent with a framework where lenders know better the credit risk of their applicants, through a larger use of credit scoring models, are accepting slightly riskier borrowers, but use the information about the borrower's credit risk also to apply a more tailored price of the loan.

It is nonetheless true that there are still some household features that are strongly important in the selection of borrowers while their power in explaining loans' delinquencies is very small or nil. *Ceteris paribus*, households whose head has an uncertain job are much more frequently turned down by lenders (29 p.p.), though their probability of being delinquent is only marginally significantly higher than for the other categories of workers on the whole period of the analysis and this effect vanishes in the two sub-periods (Table 9). This is even more noticeable for young households (head <35): their probability of being rejected by a lender is almost 30 p.p. higher than for old households, though, *ceteris paribus*, they are never more delinquent.<sup>45</sup>

## 7 Discussion and conclusions

In a recent paper Zinman reviews theories and empirical evidence on inefficient consumer credit supply (Zinman, 2013). He argues that many policy questions regarding consumer credit begin with a presumption about whether, and to what extent, markets fail to supply an efficient quantity of credit. Theories abound for both over- and under-supply. He concludes his survey by saying that there is indeed a lack of convincing evidence on whether consumer credit markets err, and in which directions, much less why.

We could add that even less has been discovered or even studied about the pricing of consumer loans, specifically loans different from mortgages. And the price of the loan is crucial for evaluating the supply of loans as well. When this price is far apart from the intrinsic credit risk of the borrower, many potential borrowers can be induced to shun consumer credit market when they need to smooth consumption or improve their social mobility, for example by obtaining loans to increase their education.<sup>46</sup> This paper brings some evidence on this topic in a country like Italy where interest rates on new consumer loans have been on average much higher than in other euro area countries.

The consumer loan market in Italy is certainly changing, specifically after the 2008 financial crisis. In this paper we have uncovered that in the period 2010-2012 the pricing of consumer loans is correlated mainly with households' economic and financial conditions, primarily net wealth, but also the number of income earners and the education of

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<sup>45</sup> Another similar evidence concerns sex: male heads are much less likely to be turned down (-12 p.p.) than female heads, while sex is not a determinant of the probability to be delinquent after controlling for household economic and financial conditions.

<sup>46</sup> These are also borrowers that care about the interest rates to pay: they are hence determined to pay the loan back and do not think about strategic default.

the household head, proxy of his future income. Before the crisis (2006-2008) interest rates were based more on the household residence, a sort of local risk explained mainly by the wider incidence of bad loans and the higher enforcement costs in Southern regions; these correlations disappear after the 2008 crisis. Or they were correlated to the uncertain job of the household head, without a more specific attention to households' economic and financial conditions.

Lenders have therefore paid much more attention to the specific credit risk of the borrower after the 2008 crisis. We uncover that net wealth, education and the number of income earners are actually the most important factors in determining the delinquent attitude of the borrowers in consumer loan market. In 2010-2012 low-wealth households are, *ceteris paribus*, more likely to be in arrears by a factor that is more than three times as high as the one referring to households living in Southern regions.<sup>47</sup> Overall, it seems like, after the 2008 crisis, the consumer loan market in Italy is a world different from the one drawn in Stiglitz and Weiss (1981): banks are more willing to evaluate the specific borrower's credit risk, even for these loans of small amount, and more able to discriminate among customers in deciding prices as well. This has also consequences for the access to the credit market.

In the final part of the paper we hence look at the probability to have a consumer loan and the lenders' selection process. After the crisis, low-wealth households are relatively more likely to have a consumer loan and those living in Southern regions are no longer less likely, consistently with a more widespread use of risk based pricing and less rationing on the perceived riskiest borrowers. We also find that the lenders' selection process is connected with the same household characteristics that are important in determining borrowers' credit risk and that matter in deciding the prices of loans (wealth, education, income earners).

However, there is evidence that some credit rationing in the consumer loan market is still difficult to explain. Specifically, the loan applications of young households (head < 35) are much more likely to be turned down by lenders. This happens in a framework where credit scoring models signal that the young age of the household head is not significant in explaining the delinquent attitude for consumer loans after controlling for other household characteristics and sample selection. Granting loans to young households is particularly important as they are at the initial stage of their life cycle, when credit plays a crucial role in supporting consumption and in sustaining social mobility.

A final result of this paper is that households can also do more to get better prices and hence more credit. We have uncovered that households searching for better financial

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<sup>47</sup>In 2010-2012 the probability of being delinquent increases by 7.4 p.p. for low-wealth households and by 2.3 p.p. for households located in Southern regions; the average probability of being delinquent in the period is 6.2 per cent.

conditions get interest rates that are 0.4 p.p. lower than those paid by non searching households. When considering the average amount of consumer loans (8,576 euro at current prices), the average maturity (around 5 years), and the average interest rate (6.3 per cent) over the period under analysis, this implies a saving for the entire maturity of the loan of around 100 euro (6.6 per cent of total debt service paid at the higher rate). Better products are hence available to customers who need to search for them. All in all, more efficient credit markets could arise from different attitudes on both sides of the market.

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## Appendix

### *Detailed description of the variables used in the estimation*

**Interest rates:** Interest rates reported by households in the Survey. Source: SHIW.

**Age classes:** Dummy equal 1 when the age of the head of the household is in the class; residual class age  $\geq 65$ . Source: SHIW.

**Net wealth quartiles:** Dummy equal to 1 when the household equivalent net wealth is in the quartile; residual class is the 4th quartile. Dummies are measured in each survey. In the Heckman estimation, net wealth is at constant prices. Source: SHIW.

**Married:** Dummy equal 1 when the head of the household is married. Source: SHIW.

**Self-employed:** Dummy equal 1 when the head of the household is self-employed. Source: SHIW.

**No. income earners:** Number of people earning an income inside the household. Source: SHIW.

**Immigrant:** Dummy equal 1 when the head of the household is an immigrant from a country outside the European Union. Source: SHIW.

**Uncertain job:** Dummy equal 1 when the head of the household is an employee with a fixed-term contracts or a self-employed with non-standard contracts such as occasional collaborations, works on a single project. Source: SHIW.

**High school or college:** Dummy equal 1 when the head of the household has completed the high school or is graduate; residual category is made of households whose head has less than high school education. Source: SHIW.

**Large municipality:** Dummy equal 1 when the household lives in a municipality with more than 500,000 inhabitants. Source: SHIW.

**Male:** Dummy equal 1 when the household head is a man. Source: SHIW.

**Debt outstanding:** The household's residual amount of consumer loans, expressed in thousand of euro and at 1995 prices. Source: SHIW.

**Search:** Dummy equal 1 when the household searches for better financial term of the contract in choosing the lender who granted the loan. Source: SHIW.

**High debt-income:** Dummy equal 1 when the household is in the highest quartile of the total debt-income distribution among the households with consumer loans and for each survey. Source: SHIW.

**Center or South:** Dummy equal 1 when the household is resident in Central or Southern regions; the residual class is made of households resident in Northern regions. Source: SHIW.

**Hs difficulties:** Dummy equal 1 when the household has from many to some difficulties to make ends meet. Source: SHIW.

**Initial loan amount:** The original amount of consumer loans, expressed in thousand of euro. This variable is available since the 2010 Survey and cannot be expressed at the price of a reference year as we do not know in what year the loan was granted. Source: SHIW.

**Original loan maturity:** The original maturity of consumer loans, expressed in months. This variable is available since the 2010 Survey. Source: SHIW.

**Quantity recovered:** The share of the loan that is recovered at the end of mortgage proceedings for insolvency; data are measured at regional level. Source: Bank of Italy, questionnaire to a representative sample of banks referring to the years 1992-3.

**Time for recovery:** Time, expressed in months, to recover a loan after borrowers' default. Only mortgage proceedings for insolvency are considered; data are measured at regional level. Source: Bank of Italy, questionnaire to a representative sample of banks referring to the years 1992-3.

**Incidence of bad loans:** The share of bad on total household loans, measured at provincial level and for the period of the analysis. Source: Bank of Italy, supervisory reports.

**Length of civil trials:** The length of civil trials in Italy in the period 1995-1998; data are at provincial level and expressed in years. Source: Ministry of Justice.

**Herfindahl:** The index is the sum of the squares of the shares of each bank, measured with the number of branches at provincial level. The index varies between 0 (perfect competition) and 1 (monopoly). The index is measured for the period under analysis. Source: Bank of Italy, supervisory reports.

**Being in arrears:** Frequency of being delinquent for more than 90 days on consumer loans; data are available since the 2008 SHIW and refer only to households with a consumer loan. Source: SHIW.

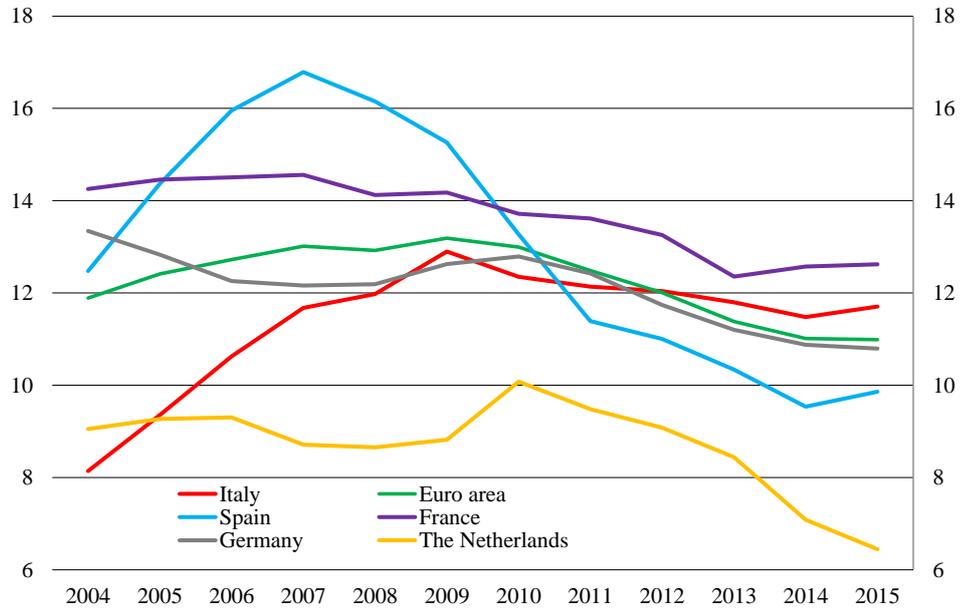
**Have a consumer loan:** Frequency of households with a consumer loan; revolving credit cards and overdrafts are excluded because they are not considered when households are asked about interest rates. Source: SHIW.

**Ask for a consumer loan:** Frequency of households who ask for a consumer loan; available only for the 2012 Survey. Source: SHIW.

**Turned down (among those who ask for a consumer loan):** Frequency of households asking for a loan who have been turned down by lenders, totally or partially; available only for the 2012 Survey. Source: SHIW.

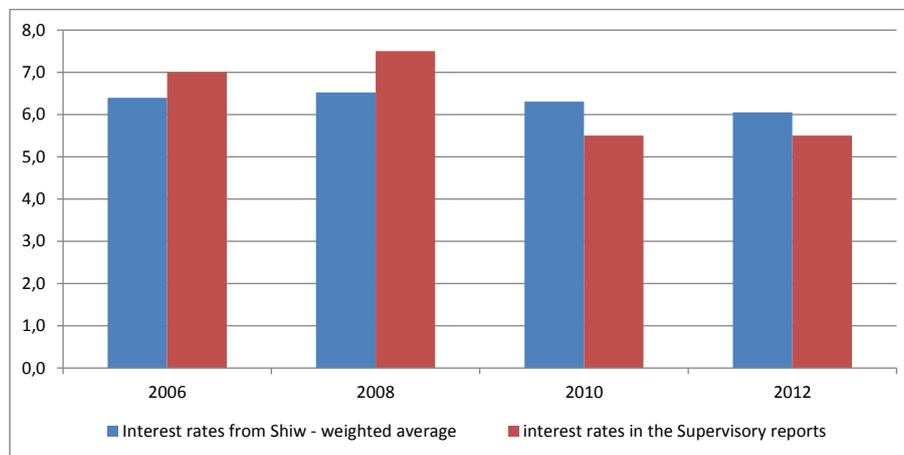
## Tables and figures

Figure 1: Consumer loans as a percentage of households' consumption



Source: Supervisory reports and Eurostat. At the numerator the outstanding amount of consumer loans.

Figure 2: Comparison between interest rates in SHIW and in the Supervisory reports



Interest rates on the outstanding amount of consumer loans.

Table 1: Comparison between samples of households declaring and not declaring interest rates

(over the period 2008-2010)

Variables	Without int. rates	With int. rates	p.value	
Age <35	14.6	17.6	0.25	
Age 35-44	31.3	29.4	0.55	
Age 45-54	29.6	23.7	0.05	**
Age 55-64	14.1	20.0	0.02	**
Age >=65	10.4	9.3	0.52	
Average age	47.4	47.2	0.75	
Net wealth 1q	33.9	31.4	0.43	
Net wealth 2q	30.5	25.5	0.09	*
Net wealth 3q	19.0	26.3	0.02	**
Net wealth 4q	16.6	16.8	0.93	
Net wealth (000 euro)	118	126	0.59	
Net income (000 euro)	19	20	0.25	
Married	71.5	70.0	0.63	
Self-employed	17.8	15.7	0.45	
No. income earners	1.77	1.83	0.21	
Immigrant	8.6	4.7	0.01	***
Uncertain job	8.4	5.6	0.11	
High school	30.9	32.3	0.66	
College	10.5	10.5	0.98	
Large municipality	13.6	11.6	0.41	
Male	75.2	75.2	1.00	
Debt outstanding (000 euro)	4,872	5,509	0.14	
Search	36.3	40.4	0.21	
High debt-income	27.4	20.0	0.01	***
North	43.6	60.0	0.00	***
Center	20.1	19.9	0.92	
South	36.3	20.1	0.00	***
No. observations	1307	660		

Average value of household characteristics used in the estimations for the two sample of households declaring interest rates on consumer loans and not declaring the rates over the surveys 2008 and 2010 pooled together. A detailed description of the variables is in the Appendix. Net wealth and income are measured on an equivalent scale. P.value refers to the difference of the average values between the two samples; \* significant at 10%, \*\* at 5% and \*\*\* at 1%.

Table 2: Descriptive statistics of the variables used in estimations  
(over the period 2006-2012)

Variables	mean	median	std. dev	no. obs.	coef. variation
<i>Statistics on interest rates</i>					
2006	6.4	6.5	3.5	815	54.3
2008	6.5	6.1	2.4	434	36.9
2010	6.3	6.1	2.4	226	37.7
2012	6.1	5.8	3.0	637	48.8
Variables	mean	median	std. dev	25 pct	75 pct
<i>Continuous variables</i>					
Interest rate	6.3	6.1	3.0	4.5	7.9
No. income earners	1.8	0.8	2	1	2
Debt outstanding (000 euro, 1995 prices)	6.3	4.1	12.3	1.7	8.1
Initial loan amount (000 euro)	13.3	10.0	13.2	5.4	16
Original loan maturity (months)	57.3	56.0	20.4	44	67
Quantity recovered (per cent of loan)	63.8	60.3	7.7	60.0	70.1
Time for recovery (months)	62.7	60.0	13.3	55.8	65.6
Incidence of bad loans (per cent)	3.8	3.3	2.1	2.1	5.2
Length of civil trials (years)	3.4	3.2	0.7	3.0	3.6
Herfindahl	0.11	0.10	0.05	0.08	0.12
<i>Dummy variables</i>					
Age <35	15.7				
Age 35-44	31.8				
Age 45-54	26.0				
Age 55-64	16.7				
Age >=65	9.8				
Net wealth 1q	33.0				
Net wealth 2q	26.0				
Net wealth 3q	22.6				
Net wealth 4q	18.5				
Married	70.8				
Self-employed	17.9				
Immigrant	5.6				
Uncertain job	7.2				
High school	36.5				
College	11.4				
Large municipality	13.5				
Male	76.8				
Search	42.8				
High debt-income	24.0				
Center	21.3				
South	26.4				
Hs difficulties	72.2				
<i>Dependent variables in the other estimations</i>					
Being in arrears	6.1				
Have a consumer loan	12.0				
Ask for a consumer loan	1.9				
Turned down (among those who ask)	38.5				

Statistics are weighted with sample weights and refer to the sample for which estimations have been run. Households declaring zero interest rates are excluded from the analysis. The average value of net wealth, expressed at 1995 prices, is 1,278 in the first quartile of net wealth, 87,451 in the second quartile, 189,819 in the third quartile, and 593,847 in the fourth quartile. Quartiles of net wealth are calculated on the entire population of households; this is the reason why the shares of households *with consumer loans* in the different quartiles of net wealth are not equal to 25 per cent. There is for example an over-representation of households with consumer loans in the first quartile of net wealth (33 versus 25 per cent).

Table 3: Borrowers' risk and consumer loans' interest rates  
(OLS estimations)

Variables	A baseline		B with hs controls		B 2006-08		B 2010-12	
Age <35	-0.334 (0.291)		-0.463 (0.302)		-0.249 (0.406)		-0.847 (0.392)	**
Age 35-44	-0.405 (0.254)		-0.444 (0.249)		-0.347 (0.353)		-0.615 (0.310)	*
Age 45-54	-0.450 (0.279)		-0.472 (0.277)		-0.413 (0.365)		-0.611 (0.374)	
Age 55-64	-0.387 (0.272)		-0.389 (0.268)		-0.305 (0.376)		-0.490 (0.318)	
Net wealth 1q	0.852 (0.186)	***	0.817 (0.218)	***	0.493 (0.347)		1.201 (0.303)	***
Net wealth 2q	0.558 (0.183)	***	0.567 (0.208)	***	0.493 (0.321)		0.755 (0.265)	***
Net wealth 3q	0.325 (0.182)	*	0.330 (0.194)	*	0.424 (0.297)		0.270 (0.225)	
Married			-0.224 (0.198)		-0.583 (0.261)	**	0.269 (0.214)	
Self-employed			0.170 (0.199)		0.177 (0.234)		0.087 (0.274)	
No. income earners			-0.008 (0.091)		0.101 (0.131)		-0.203 (0.116)	*
Immigrant			0.022 (0.278)		-0.375 (0.399)		0.565 (0.396)	
Uncertain job			0.582 (0.254)	**	0.812 (0.426)	*	0.231 (0.334)	
High school			0.010 (0.137)		0.049 (0.208)		-0.031 (0.194)	
College			-0.295 (0.167)	*	-0.100 (0.283)		-0.448 (0.257)	*
Large municipality			0.246 (0.417)	*	0.845 (0.458)	*	-0.468 (0.378)	
Male			0.209 (0.154)		0.352 (0.182)	*	0.003 (0.257)	
Constant	5.969 (0.308)	***	5.950 (0.390)	***	5.663 (0.561)	***	5.904 (0.471)	***
Center (memo)	0.073 (0.215)		0.107 (0.196)		-0.317 (0.229)		0.776 (0.236)	***
South (memo)	0.650 (0.308)	**	0.652 (0.264)	**	0.944 (0.423)	**	0.408 (0.307)	
No. observations	2112		2112		1249		863	
R <sup>2</sup>	0.044		0.048		0.068		0.112	
Period	2006-2012		2006-2012		2006-2008		2010-2012	

Region and year dummies are included in all estimations. Coefficients of area dummies are reported, as memo accounts, from other estimations as they are easier to read. Robust standard errors, adjusted for 95 clusters in provinces, are in brackets. \* significant at 10%, \*\* at 5% and \*\*\* at 1%. Households declaring zero interest rates are excluded. For the definition of the other variables see the Appendix.

Table 4: Borrowers' risk and consumer loans' interest rates  
(OLS estimations)

Variables	C bank variables		C 2006-08		C 2010-12		C 2010-12	
Age <35	-0.449		-0.220		-0.864	**	-0.835	**
	(0.303)		(0.415)		(0.415)		(0.414)	
Age 35-44	-0.422	*	-0.305		-0.613	**	-0.601	*
	(0.250)		(0.360)		(0.340)		(0.335)	
Age 45-54	-0.362		-0.472		-0.629		-0.628	
	(0.281)		(0.381)		(0.384)		(0.386)	
Age 55-64	-0.381		-0.289		-0.482		-0.483	
	(0.269)		(0.377)		(0.317)		(0.322)	
Net wealth 1q	0.775	***	0.449		1.158	***	1.177	***
	(0.218)		(0.344)		(0.305)		(0.303)	
Net wealth 2q	0.518	**	0.424		0.714	***	0.729	***
	(0.206)		(0.325)		(0.263)		(0.258)	
Net wealth 3q	0.302	*	0.393		0.240		0.254	
	(0.196)		(0.299)		(0.222)		(0.219)	
Married	-0.212		-0.547	**	0.233		0.220	
	(0.196)		(0.258)		(0.218)		(0.213)	
Self-employed	0.184		0.208		0.095		0.088	
	(0.201)		(0.238)		(0.272)		(0.278)	
No. income earners	0.013		0.127		-0.184	*	-0.201	*
	(0.088)		(0.130)		(0.111)		(0.109)	
Immigrant	-0.050		-0.432		0.478		0.494	
	(0.282)		(0.399)		(0.378)		(0.389)	
Uncertain job	0.545	**	0.751	*	0.228		0.230	
	(0.262)		(0.440)		(0.340)		(0.338)	
High school	0.029		0.077		-0.030		-0.037	
	(0.135)		(0.203)		(0.193)		(0.193)	
College	-0.263		-0.050		-0.447	*	-0.458	*
	(0.167)		(0.285)		(0.256)		(0.258)	
Large municipality	0.224	*	0.834	*	-0.513		-0.520	
	(0.410)		(0.440)		(0.374)		(0.375)	
Male	0.228		0.376	**	0.016		0.013	
	(0.154)		(0.183)		(0.255)		(0.254)	
Debt outstanding	-0.006		-0.010	**	-0.002			
	(0.005)		(0.004)		(0.012)			
Search	-0.438	***	-0.435	**	-0.423	**	-0.419	**
	(0.157)		(0.188)		(0.202)		(0.205)	
High debt-income	0.053		0.084		0.047		0.035	
	(0.160)		(0.212)		(0.286)		(0.282)	
Initial loan amount							1.548	
							(6.068)	
Original loan maturity							0.003	
							(0.005)	
Constant	6.097	***	5.762	***	5.663	***	5.936	***
	(0.418)		(0.570)		(0.561)		(0.584)	
No. observations	2112		1249		863		863	
R <sup>2</sup>	0.054		0.075		0.117		0.118	
Period	2006-2012		2006-2008		2010-2012		2010-2012	

Specifications including variables connected with the bank relationship. Regional and year dummies are included in all estimations. Robust standard errors, adjusted for 95 clusters in provinces, are in brackets. \* significant at 10%, \*\* at 5% and \*\*\* at 1%. See other footnotes at Table 3.

Table 5: Borrowers' risk and consumer loans' interest rates  
(Heckman estimations)

Variables	interest rate		selection marginal effects		interest rate		interest rate	
Age <35	-0.364 (0.374)		0.113 (0.010)	***	0.086 (3.550)		-0.911 (0.481)	*
Age 35-44	-0.399 (0.322)		0.114 (0.009)	***	-0.034 (3.437)		-0.755 (0.446)	*
Age 45-54	-0.468 (0.344)		0.102 (0.008)	***	-0.139 (3.004)		-0.791 (0.482)	
Age 55-64	-0.416 (0.307)		0.077 (0.008)	***	0.134 (2.505)		-0.581 (0.367)	
Net wealth	-0.000 (0.000)		-0.000 (0.000)	***	-0.000 (0.001)		-0.002 (0.000)	***
Net wealth sq	0.000 (0.000)	*	0.000 (0.000)	***	0.000 (0.000)		0.000 (0.000)	***
Married	-0.213 (0.200)		0.032 (0.005)	***	-0.478 (0.846)		0.222 (0.224)	
Self-employed	0.117 (0.197)		-0.005 (0.007)		0.138 (0.212)		0.167 (0.268)	
No. income earners	-0.005 (0.090)		0.025 (0.003)	***	0.162 (0.620)		-0.226 (0.123)	*
Immigrant	0.105 (0.284)		-0.039 (0.012)	***	-0.430 (0.894)		0.709 (0.377)	*
Uncertain job	0.587 (0.265)	**	-0.015 (0.010)		0.763 (0.460)	*	0.288 (0.338)	
High school	-0.059 (0.133)		0.016 (0.006)	***	0.018 (0.265)		-0.070 (0.192)	
College	-0.373 (0.164)	**	0.017 (0.007)	***	-0.152 (0.281)		-0.474 (0.245)	*
Large municipality	0.217 (0.394)		-0.004 (0.010)		0.793 (0.473)	*	-0.522 (0.321)	
Male	0.210 (0.159)		0.022 (0.005)	**	0.401 (0.414)		-0.025 (0.248)	
Debt outstanding	-0.007 (0.005)				-0.010 (0.004)	***	0.004 (0.012)	
Search	-0.458 (0.157)	***			-0.443 (0.194)	**	-0.435 (0.204)	**
High debt-income	0.041 (0.157)				0.114 (0.276)		0.003 (0.262)	
Hs difficulties			0.045 (0.005)	***				
Constant	6.961 (0.888)	***			5.399 (12.751)		7.916 (1.108)	***
No. observations	31,553		31,553		15,606		15,947	
No. uncensored obs.	2112		2112		1249		863	
Wald test (pvalue)	0.610				0.957		0.182	
Estimated prob.			0.101					
Period	2006-2012		2006-2012		2006-2008		2010-2012	

Specifications including variables connected with the bank relationship. Net wealth is at constant prices. Regional and year dummies are included in all estimations. Robust standard errors, adjusted for 95 clusters in provinces, are in brackets. \* significant at 10%, \*\* at 5% and \*\*\* at 1%. The Wald test tests the null hypothesis that the two equations, interest rate and selection, are independent. See other footnotes at Table 3

Table 6: Geographical variables and consumer loans' interest rates  
(OLS estimations)

Variables	C 2006-12	C 2006-08	C 2010-12
Quantity recovered (region)	0.013 (0.019)	0.032 (0.026)	-0.018 (0.020)
Time for recovery (region)	0.008 (0.006)	0.017 (0.010)	* -0.004 (0.008)
Herfindahl (province)	1.356 (1.662)	1.111 (2.894)	2.245 (3.597)
No. observations	2112	1249	863
R <sup>2</sup>	0.034	0.045	0.066
Period	2006-2012	2006-2008	2010-2012
Incidence of bad loans (province)	8.853 (7.508)	17.128 (10.274)	* -0.660 (8.658)
Herfindahl (province)	1.500 (1.565)	0.947 (3.104)	2.017 (3.782)
No. observations	2112	1249	863
R <sup>2</sup>	0.034	0.039	0.0634
Period	2006-2012	2006-2008	2010-2012
Lenght of civil trials (province)	0.171 (0.167)	0.392 (0.208)	* -0.087 (0.198)
Herfindahl (province)	1.415 (1.590)	0.947 (3.104)	2.184 (3.687)
No. observations	2112	1249	863
R <sup>2</sup>	0.033	0.039	0.0634
Period	2006-2012	2006-2008	2010-2012

Specifications including variables connected with the bank relationship. Year dummies are included in all estimations; area and regional dummies need to be excluded due to high collinearity with the other geographical indicators analyzed in the table. Robust standard errors, adjusted for 95 clusters in provinces, are in brackets. \* significant at 10%, \*\* at 5% and \*\*\* at 1%. See other footnotes at Table 3

Table 7: Borrowers' risk and consumer loans' interest rates  
(OLS estimations)

Variables	car loans 2006-08	car loans 2010-12	other loans 2006-08	other loans 2010-12	
Age <35	-0.476 (0.621)	-0.348 (0.464)	-0.311 (0.549)	-0.799 (0.613)	
Age 35-44	-0.781 (0.574)	-0.206 (0.467)	0.509 (0.443)	-0.746 (0.483)	
Age 45-54	-0.574 (0.531)	-0.569 (0.434)	-0.264 (0.507)	-0.124 (0.443)	
Age 55-64	-0.527 (0.574)	-0.308 (0.460)	0.112 (0.404)	-0.442 (0.421)	
Net wealth 1q	0.488 (0.399)	1.285 (0.365)	*** 0.482 (0.533)	1.354 (0.684)	**
Net wealth 2q	0.230 (0.388)	0.536 (0.249)	** 1.170 (0.535)	** 1.170 (0.707)	*
Net wealth 3q	0.348 (0.360)	0.001 (0.302)	0.299 (0.514)	0.862 (0.621)	
Married	-0.640 (0.283)	** 0.248 (0.283)	-0.396 (0.364)	0.380 (0.388)	
Self-employed	0.273 (0.268)	0.364 (0.308)	0.522 (0.432)	-0.145 (0.503)	
No. income earners	0.177 (0.141)	-0.102 (0.129)	0.007 (0.264)	-0.201 (0.240)	
Immigrant	0.172 (0.545)	0.169 (0.474)	-0.305 (0.631)	0.167 (0.849)	
Uncertain job	1.126 (0.644)	* -0.279 (0.379)	0.695 (0.589)	0.374 (0.760)	
High school	-0.103 (0.244)	0.145 (0.231)	0.416 (0.394)	-0.542 (0.407)	
College	-0.150 (0.287)	-0.395 (0.343)	0.032 (0.425)	-0.813 (0.493)	*
Large municipality	1.143 (0.352)	*** -0.307 (0.308)	0.251 (0.812)	-0.851 (0.645)	
Male	0.612 (0.261)	** 0.122 (0.304)	-0.174 (0.342)	-0.408 (0.436)	
Debt outstanding	-0.005 (0.017)	0.006 (0.025)	0.101 (0.060)	* -0.009 (0.015)	
Search	-0.383 (0.217)	* -0.506 (0.180)	*** -0.405 (0.325)	-0.296 (0.483)	
High debt-income	0.023 (0.219)	-0.082 (0.395)	-0.265 (0.408)	0.282 (0.453)	
Constant	5.919 (0.655)	*** 5.675 (0.503)	*** 5.321 (0.759)	*** 6.318 (0.982)	***
Center (memo)	-0.471 (0.206)	** 0.666 (0.263)	** 0.098 (0.400)	1.155 (0.648)	*
South (memo)	1.026 (0.346)	*** 0.415 (0.319)	0.850 (0.818)	0.275 (0.508)	
No. observations	840	546	463	356	
R <sup>2</sup>	0.113	0.150	0.109	0.112	
Period	2006-2008	2010-2012	2006-2008	2010-2012	

Region and year dummies are included in all estimations. Coefficients of area dummies are reported, as memo accounts, from other estimations as they are easier to read. Robust standard errors, adjusted for 95 clusters in provinces, are in brackets. \* significant at 10%, \*\* at 5% and \*\*\* at 1%. Households declaring zero interest rates are excluded. For the definition of the other variables see the Appendix.

Table 8: Borrowers' risk and consumer loans' interest rates

(OLS estimation)

Variables	winsorization 2006-2008	windsorization 2010-2012		lags 2006-2008		lags 2010-12	
Age <35	-0.185 (0.366)	-0.712 (0.348)	**	-0.056 (0.486)		-1.373 (0.611)	**
Age 35-44	-0.226 (0.309)	-0.494 (0.288)	*	0.170 (0.485)		-0.920 (0.450)	**
Age 45-54	-0.284 (0.330)	-0.542 (0.323)	*	0.306 (0.413)		-1.179 (0.454)	**
Age 55-64	-0.234 (0.327)	-0.439 (0.274)		0.053 (0.490)		-1.239 (0.398)	***
Net wealth 1q	0.463 (0.333)	1.073 (0.292)	***	0.327 (0.356)		1.045 (0.450)	**
Net wealth 2q	0.477 (0.303)	0.661 (0.264)	**	0.603 (0.332)	*	0.757 (0.447)	*
Net wealth 3q	0.389 (0.282)	0.199 (0.208)		0.442 (0.342)		0.707 (0.378)	*
Married	-0.508 (0.246)	** 0.303 (0.208)		-0.271 (0.285)		-0.268 (0.415)	
Self-employed	0.205 (0.235)	0.082 (0.266)		-0.606 (0.359)		0.403 (0.551)	
No. income earners	0.130 (0.125)	-0.165 (0.108)		-0.157 (0.173)		0.122 (0.139)	
Immigrant	-0.484 (0.375)	0.499 (0.375)		-0.964 (0.622)		1.038 (0.609)	*
Uncertain job	0.706 (0.407)	* 0.253 (0.359)		1.597 (0.495)	***	-0.115 (0.395)	
High school	0.094 (0.192)	0.002 (0.189)		0.002 (0.265)		-0.125 (0.255)	
College	-0.016 (0.279)	-0.430 (0.251)	*	0.010 (0.307)		-0.306 (0.355)	
Large municipality	0.863 (0.410)	** -0.507 (0.367)		0.398 (0.742)		-0.715 (0.394)	*
Male	0.345 (0.172)	** 0.027 (0.227)		-0.214 (0.273)		-0.059 (0.280)	
Debt outstanding	-0.009 (0.004)	** 0.003 (0.011)		0.034 (0.027)		-0.027 (0.027)	
Search	-0.476 (0.165)	*** -0.391 (0.193)	**	-0.399 (0.227)	*	-0.436 (0.255)	*
High debt-income	0.100 (0.204)	0.014 (0.270)		-0.408 (0.639)		0.180 (0.445)	
Center (memo)	-0.335 (0.209)	0.680 (0.233)	***	-0.688 (0.229)	***	0.960 (0.215)	
South (memo)	0.831 (0.431)	* 0.361 (0.284)		1.378 (0.365)	***	0.582 (0.376)	
Constant	5.683 (0.532)	*** 5.961 (0.477)	***	6.072 (0.637)	***	6.320 (0.725)	***
No. observations	1249	863		648		499	
R <sup>2</sup>	0.082	0.114		0.136		0.138	
Period	2006-2008	2010-2012		2006-2008		2010-2012	

Specifications including variables connected with the bank relationship. In columns 1 and 2 interest rates are winsorized at 1st and 99th percentile; in columns 3 and 4 we include 2-year lags of the regressors. Region and year dummies are included in all estimations. Coefficients of area dummies are reported, as memo accounts, from other estimations as they are easier to read. Robust standard errors, adjusted for 95 clusters in provinces, are in brackets. \* significant at 10%, \*\* at 5% and \*\*\* at 1%. See other footnotes at Table 3.

Table 9: The probability of delinquency on consumer loans  
(Probit estimation - marginal effects)

Variables	2008-2012	2008-2012	2008	2010-12
Age <35	-0.001 (0.019)	-0.007 (0.019)	-0.006 (0.027)	-0.003 (0.024)
Age 35-44	-0.007 (0.012)	-0.008 (0.012)	-0.016 (0.017)	0.000 (0.018)
Age 45-54	-0.006 (0.013)	-0.007 (0.014)	-0.040 (0.020)	** 0.008 (0.017)
Age 55-64	-0.023 (0.014)	* -0.022 (0.014)	-0.011 (0.017)	-0.032 (0.024)
Net wealth 1q	0.049 (0.017)	*** 0.064 (0.017)	*** 0.055 (0.023)	*** 0.074 (0.018)
Net wealth 2q	0.013 (0.018)	0.024 (0.017)	0.016 (0.026)	0.031 (0.019)
Net wealth 3q	0.017 (0.020)	0.022 (0.019)	0.021 (0.027)	0.020 (0.024)
Married	0.000 (0.012)	-0.002 (0.012)	-0.006 (0.015)	0.001 (0.016)
Self-employed	0.034 (0.013)	** 0.032 (0.013)	** 0.029 (0.020)	0.041 (0.018)
No. income earners	-0.005 (0.005)	-0.007 (0.006)	-0.019 (0.009)	** -0.001 (0.008)
Immigrant	0.037 (0.015)	** 0.039 (0.015)	** 0.023 (0.021)	0.053 (0.021)
Uncertain job	0.026 (0.015)	* 0.028 (0.015)	* 0.029 (0.024)	0.028 (0.020)
High school	-0.025 (0.009)	*** -0.029 (0.009)	*** -0.020 (0.014)	*** -0.037 (0.014)
College	-0.048 (0.021)	** -0.061 (0.021)	***	** -0.053 (0.025)
Large municipality	0.010 (0.018)	0.008 (0.017)	0.019 (0.027)	0.006 (0.011)
Male	-0.004 (0.011)	-0.007 (0.011)	-0.009 (0.014)	-0.007 (0.014)
Debt outstanding	0.001 (0.001)	0.001 (0.001)	0.002 (0.002)	0.001 (0.001)
Search	-0.015 (0.009)	* -0.017 (0.009)	* -0.011 (0.014)	*** -0.033 (0.010)
High debt-income	0.004 (0.012)	0.004 (0.013)	-0.062 (0.029)	** 0.026 (0.016)
Sevdeb 20-30	0.015 (0.011)	0.016 (0.012)	-0.024 (0.024)	0.028 (0.016)
Sevdeb 30-40	0.019 (0.018)	0.024 (0.019)	-0.002 (0.046)	0.035 (0.022)
Sevdeb >=40	0.043 (0.020)	** 0.048 (0.019)	** 0.076 (0.039)	** 0.047 (0.023)
Center	0.010 (0.012)	0.013 (0.012)	0.032 (0.019)	* 0.004 (0.016)
South	0.009 (0.013)	-0.014 (0.013)	0.004 (0.021)	0.023 (0.015)
Hs difficulties	0.067 (0.019)	***		
No. observations	2708	2708	943	1656
R <sup>2</sup>	0.136	0.117	0.130	0.147
Predicted probability	0.053	0.053	0.043	0.062
Period	2008-2012	2008-2012	2008	2010-2012

Area and year dummies are included in all estimations. Robust standard errors, adjusted for 95 clusters in provinces, are in brackets. \* significant at 10%, \*\* at 5% and \*\*\* at 1%. In the second column and the following we drop the information concerning difficulties to make ends meet, which is private information of the household, not available to banks. In the other cases, when the coefficient is not reported this is due to the drop of the variable that predicts results perfectly.

Table 10: The probability of having, demanding and be rationed on consumer loans  
(Probit estimation - marginal effects)

Variables	loan		loan		loan		demand		rationing	
Age <35	0.129	***	0.145	***	0.111	***	0.023	***	0.290	**
	(0.009)		(0.012)		(0.010)		(0.008)		(0.129)	
Age 35-44	0.126	***	0.137	***	0.115	***	0.016	***	-0.029	
	(0.008)		(0.010)		(0.010)		(0.005)		(0.091)	
Age 45-54	0.120	***	0.125	***	0.115	***	0.023	***	0.138	
	(0.007)		(0.010)		(0.008)		(0.005)		(0.098)	
Age 55-64	0.089	***	0.103	***	0.075	***	0.022	***	0.029	
	(0.006)		(0.010)		(0.008)		(0.004)		(0.095)	
Net wealth 1q	0.047	***	0.043	***	0.052	***	0.006		-0.065	
	(0.007)		(0.009)		(0.008)		(0.004)		(0.089)	
Net wealth 2q	0.015	**	0.008		0.020	**	-0.011	**	-0.217	*
	(0.006)		(0.008)		(0.008)		(0.005)		(0.123)	
Net wealth 3q	0.001		-0.008		0.009		-0.003		-0.155	
	(0.005)		(0.007)		(0.007)		(0.004)		(0.100)	
Married	0.039	***	0.045	***	0.032	***	0.006		-0.086	
	(0.004)		(0.006)		(0.006)		(0.004)		(0.069)	
Self-employed	-0.006		0.007		-0.020	**	-0.013	**	-0.084	
	(0.007)		(0.009)		(0.009)		(0.007)		(0.114)	
No. income earners	0.029	***	0.030	***	0.028	***	0.002		-0.110	**
	(0.003)		(0.004)		(0.004)		(0.002)		(0.050)	
Immigrant	-0.052	***	-0.054	***	-0.050	***	-0.000		0.170	
	(0.012)		(0.013)		(0.014)		(0.008)		(0.115)	
Uncertain job	-0.025	***	-0.012		-0.034	***	0.001		0.289	***
	(0.009)		(0.013)		(0.012)		(0.008)		(0.110)	
High school	0.015	**	0.017	**	0.012		-0.000		-0.131	*
	(0.006)		(0.007)		(0.008)		(0.000)		(0.074)	
College	0.012	*	0.014	**	-0.009		-0.004			
	(0.007)		(0.008)		(0.010)		(0.006)			
Large municipality	-0.001		-0.001		0.000		-0.074		0.006	
	(0.012)		(0.010)		(0.018)		(0.008)		(0.184)	
Male	0.018	***	0.016	**	0.019	***	-0.005		-0.119	*
	(0.005)		(0.006)		(0.006)		(0.005)		(0.067)	
Hs difficulties	0.050	***	0.057	***	0.042	***	0.021	***		
	(0.005)		(0.008)		(0.006)		(0.005)			
Center (memo)	0.017		-0.004		0.036		0.010	**	-0.145	
	(0.014)		(0.016)		(0.014)		(0.004)		(0.129)	
South (memo)	-0.025	*	-0.042	***	-0.007		0.008		0.199	**
	(0.013)		(0.015)		(0.014)		(0.005)		(0.092)	
No. observations	31,847		15,745		16,102		8,151		158	
Pseudo R <sup>2</sup>	0.099		0.100		0.106		0.070		0.312	
Estimated prob.	0.113		0.123		0.103		0.021		0.354	
Period	2006-2012		2006-2008		2010-2012		2012		2012	

Regional (area dummies for the last two columns) and year dummies are included in all estimations. Robust standard errors, adjusted for 95 clusters in provinces, are in brackets. \* significant at 10%, \*\* at 5% and \*\*\* at 1%. The number of observations is slightly larger than those in Table 5 because in that case the selection equation was on those households with consumer loans and declaring an interest rates. The variable hs difficulties is excluded from rationing equation as is a private information of the household. In the other cases, when the coefficient is not reported this is due to the drop of the variable that predicts results perfectly. For the estimations in the first three columns we report the coefficients of area dummies from another estimation as memo items.

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