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ITALIAN HOUSEHOLDS' DEBT: DETERMINANTS OF DEMAND AND SUPPLY

by Silvia Magri [*]

Abstract

This paper analyzes the determinants of Italian households' *participation* in the debt market, considering both demand and supply effects and using the Bank of Italy's Survey of Household Income and Wealth. The probability of debt is positively influenced by age (until 35 years), which essentially acts as a demand factor. Among the economic variables, the role of income is important: it shows a positive correlation with the probability of debt, determined by forces acting in the same direction on both sides of the market. The uncertainty of income reduces the demand for loans, with the exception of self-employed workers, who are nevertheless subject to very rigid evaluation by lenders. Living in very small municipalities negatively affects loan demand, probably because of higher entry costs in the debt market. Education influences both the demand side, through entry costs, and banks' evaluation. Residence is a crucial parameter: beyond the negative impact of a greater economic risk, living in regions where banks face higher enforcement costs increases the probability that the loan demand is not accepted. The final part of the paper considers the *size of desired debt*, which seems positively linked to net wealth and future income profile. The recovered share of loans in the case of default has a positive effect on desired debt. In general, enforcement costs have increased in importance in the recent period.

JEL CLASSIFICATION: D12, D91 and E21

Keywords: household debt, enforcement costs for loan contracts

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1. Introduction[1]

Italian households have a low level of debt. Despite the recent large increase in lending to households by banks and other financial companies, the household sector's financial liabilities were equal to 30 per cent of GDP in 2000, a far lower ratio than in other industrialised countries. A comparison with countries for which survey data are available confirms this point: at the end of 1998, in Italy only 19 per cent of the households carried a debt; less than 10 per cent had borrowed to buy a house, compared with 27 per cent in Germany and more than 40 per cent in the Netherlands, in the United Kingdom and in the United States (Table 1).

The decision to enter the debt market may depend on both supply and demand factors. The first aim of this paper is to analyze the determinants of Italian households' *participation* in the debt market, considering both sides of the market and disentangling their effects. The analysis is based on an evaluation of the characteristics of indebted households using probabilistic model. This type of approach has been used in only a few studies on foreign countries, with the aim of gauging the gap between actual and desired debt (Cox and Jappelli, 1993, and Duca and Rosenthal, 1993, for the US; Leece, 1995 and 2000, for the UK); to our knowledge it has not yet been applied to Italian households. Studies of Italian households' low participation in the debt market have used different strategies based on consumption attitudes (Jappelli and Pagano, 1988 and 1989; Guiso, Jappelli and Terlizzese, 1994). Some other inquiries have evaluated the probability of being liquidity-constrained in Italy by a lender (Cannari and Ferri, 1997; Fabbri and Padula, 2001): we also use this type of analysis in order to improve the distinction between supply and demand effects. Compared with other studies on households' debt, in this paper we use more explanatory variables in order to capture the characteristics of the local credit markets, especially the enforcement

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costs related to the loan contract, which in Italy are very high and exhibit marked regional variability.

The results concerning participation in the debt market are partly in line with previous empirical evidence concerning Italy, which has stressed the importance of supply conditions in determining the scant diffusion of debt among Italian households; in particular, the impact of downpayment requirements has been highlighted (Jappelli and Pagano, 1989; Guiso, Jappelli and Terlizzese, 1994). Among the supply factors, this paper sheds light on the significance of loan recovery costs in the event of default, which may partly explain the regional variability of liquidity-constraints. Other points to note are that, unlike in previous studies, age seems to act essentially on the demand side and that, among the economic variables, income seems to be more important than net wealth.

Our second aim is to analyze the *size of the participation* in the debt market through a study of the amount of debt desired by Italian households, considering only households that have a debt and are not liquidity constrained. From an econometric point of view, this means estimating the determinants of loan size considering a double selection mechanism. The evidence is fairly consistent with results obtained in other countries, mainly the US and the UK: desired debt is positively linked to net wealth and future income profile, as the theory predicts. It is also worth noticing that the loan recovery ratio in the event of default correlates positively with the quantity of debt demanded by households.

The paper is organised in seven sections. A brief review of the relevant theory and the empirical evidence is carried out in Section 2 and is followed in Section 3 by an illustration of trends in Italian households' debt. Sections 4 and 5 report the results of the econometric analysis regarding the determinants of Italian households' participation in the debt market. The study of the size of desired debt is in Section 6. Section 7 concludes the paper.

2. Theory and evidence about liquidity constraints and households' debt

The maximization of the utility function of a household subject to an intertemporal budget constraint determines a demand for debt that depends on the household's current and future endowment, on its uncertainty about future income, on its preferences (discount rate and intertemporal elasticity of substitution) and on the interest rate at which the market allows the transfer of money from the current to the future period.

In a world with perfect information and complete markets, the consumer gets the amount of money he desires to implement his plan of consumption smoothing**.** The presence of information asymmetries hinders this process and some households are liquidity constrained, because they are unable to obtain the same amount of credit they could receive if information were perfect and markets complete. Hence, in determining the *participation* of consumers in the debt market and its *size*, supply factors also play a role, with the bank evaluating the probability of default on the loan and the amount it can recover in this event.

Empirical analysis has considered the existence of liquidity constraints with respect to the hypothesis of permanent income in a capital market with perfect information, using both aggregate and individual households' data. A possible way to implement this analysis consists in estimating a consumption function, to check whether consumption expenditure depends not only on permanent income but also on other variables, especially current income, a result that would suggest the existence of some type of liquidity constraint. Another way of carrying out the analysis is based on the first-order condition of the optimization problem (Euler condition) and has often been preferred because it does not require a closed form solution for consumption, which is not always available (Hayashi, 1985b). In both cases, the usual assumption is that consumers form their expectations in a rational way.

From the first-order condition of the intertemporal choice problem, it is has been found that the marginal rate of substitution between current and future consumption, i.e. the ratio between marginal utility of consumption at time t and $t+1$, is equal to the marginal rate of transformation which characterizes the capital market ($1+r$):

$$U'(C_t)/b * E_t[U'(C_{t+1})] = (1+r) \tag{1}$$

The approach based on the Euler condition essentially implies checking that no information available at time t should be significant in explaining consumption flow. [2]

The analyses on aggregate data have generally led to the conclusion that the permanent income hypothesis is not completely verified. The evidence is for an excess sensitivity of consumption to current income, even after considering its information content about changes in permanent income (Sargent, 1978; Flavin, 1981; Jappelli and Pagano, 1989; Hall, 1978, for contrary evidence). However, it was not clear if this result was determined by the existence of credit market imperfections or, on the other hand, either by data aggregation problems or by myopia of the consumers, who would not have rational expectations (Hayashi, 1985b).

Studies based on households' data allow the hypothesis of imperfections in capital markets to be tested with greater precision, because they avoid the aggregation problem and permit the liquidity constrained households to be singled out, directly or indirectly. Using these data, tests based on the Euler condition have often confirmed previous empirical evidence about the existence of liquidity constraints (Hall and Mishkin, 1982; Zeldes, 1989).

On the other hand, tests based on consumption growth cannot be used with cross-section data. As an alternative, Hayashi (1985a) has suggested a reduced form approach to model desired consumption by a household that maximises its utility function subject to liquidity constraints in all future periods, but not in the current one. This approach uses the coefficients of the consumption function, estimated for households which are assumed not to be liquidity constrained, to evaluate the gap between desired and actual consumption for those households which, on the contrary, are potentially rationed in the credit market. This type of analysis also suggests that credit market imperfections are likely to be widespread (Hayashi, 1985a; Jappelli and Pagano, 1988; Guiso, Jappelli and Terlizzese, 1994).

[2] However, Attanasio (1999) specifies that it is not obvious that one should interpret a failure of the Euler condition as evidence of the empirical failure of the permanent income model without considering explicitly the possibility of important demographic effects and that consumption and leisure are not separable. Hence, such tests could be a poor tool to identify the presence of borrowing restrictions, which could be better captured using direct questions in surveys.

Although other papers based on households data have reached different conclusions,[3] the existence of liquidity constraints in the credit market, more widespread in some countries, is generally accepted.[4] The consequences of liquidity constraints vary across different categories of households. Along with the excess sensitivity analysis on consumption, a parallel and very promising line of research has focused on the characteristics of the households that are more likely to be rationed (for the United States Jappelli, 1990), overcoming the limits of tests based on Euler condition and stressing above all the microeconomic effects of the existence of credit market imperfections. The influence of households' social and economic characteristics on the probability of their being rationed is also the focus of some studies concerning Italian data (Cannari and Ferri, 1997, and Fabbri and Padula, 2001[5]).

In the context of this last field of research, a more limited number of studies have focused on the characteristics of the households that have a debt with a bank, taking into account the existence of liquidity constraint and evaluating the gap between desired and actual debt for constrained households (Cox and Jappelli, 1993; Duca and Rosenthal, 1993; Leece, 1995, 2000). Moreover, their results were not always clear-cut. Generally, age seems to be a relevant factor, with the probability of debt rising with the age of the household head until it reaches a maximum. A greater discontinuity of evidence emerges for economic variables; however, in most of the cases the probability of debt appears to be weakly

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[3] Runkle (1991) finds strong evidence in favour of the permanent income hypothesis, while the evidence by Shea (1995) is inconsistent with the permanent income hypothesis, with rationing in credit market and also with an assumption of consumers' myopic behavior.

[4] The share of liquidity constrained households is estimated to be nearly 15-20 per cent in studies referring to the United States (see Jappelli, 1990). However, some households that describe themselves as liquidity constrained in the surveys may not actually be; their loan applications may have been turned down on the grounds of risk. In Italy, the share of households reporting they are liquidity constrained, in the Bank of Italy's biennial Survey of Household Income and Wealth (SHIW), is far lower and is near 4 per cent; however the question about the rationing process refers *only to the year of the interview*, while in the Survey of Consumer Finance for the United States the household is asked whether *in recent years* it has been subject to liquidity constraints.

[5] Cannari and Ferri (1997) find that the probability of rationing is higher for households that are younger or live in the South, while it is lower when income rises, if the household owns its house and lives in an area where the bank concentration is higher and when the length of the relationship between bank and the customer is longer, a result to which the authors gave strong emphasis. Fabbri and Padula (2001) stress in particular the negative relationship between the probability of being constrained and the efficiency of the administration of justice.

correlated with current income and net wealth but linked with a measure of permanent income. Still more fragmented are the results for other variables.[6]

An analysis of the probability of debt has not yet been applied to Italy. We use this approach because we want to evaluate the decisional process of contracting a loan, trying to single out demand and supply factors despite some identification problems. In order to overcome these problems, in a subsequent step of the analysis we try to study separately the probability of applying for a loan and the probability of rationing; as said, the analysis of rationing has already been carried out on Italian data. We think that merging the results obtained with these two steps of the analysis on the debt market participation is particularly interesting.

Finally, our investigation concludes with a consideration of the determinants of the size of debt desired by Italian households, in order to evaluate the wide dispersion in loan amounts that the following descriptive analysis highlights.

3. Italian households' debt: some relevant trends

In Italy, bank lending to households has been increasing rapidly since the beginning of the 1990s. Using the Bank of Italy's Survey of Household Income and Wealth (SHIW), it is

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[6] Most of these analyses consider a probit model for participation in the debt market to calculate the term of correction for non-random sample selection in a following equation for desired size of debt and generally they work with a cross-section. As far as the influence of current income is concerned, in Cox and Jappelli (1993) the effect on the probability of debt is positive, but marginally significant; however, the coefficient of permanent income is strongly significant and positive. In Leece (1995, 2000) income is not significant; in King and Leape (1998), who estimate the probability of having different types of financial assets and two types of liabilities, without taking into account the existence of liquidity constraints, income is significant and positive only for mortgages; in Duca and Rosentahl (1993), who restrict the sample to households under age 35, income is not significant in a bivariate probit model which estimates the probability of debt and of being liquidity constrained.

As for net wealth, in Cox and Jappelli (1993), after being instrumented this variable has a negative on the probability of debt and is not significant; in Leece (1995), total expenditure, used as a proxy for wealth, after being instrumented has a positive sign and is significant; in King and Leape (1998), the relationship between the probability of debt and net wealth is concave and positive; in Duca and Rosenthal (1993) instrumented net wealth is not significant.

Education is not always considered and is significant only in King and Leape (1998) for mortgages, while it does not matter in Cox and Jappelli (1993) and Duca and Rosenthal (1993). As for indicators of income uncertainty, different proxies are used but no clear pattern emerges. Indicators of bank supply are never used.

possible to carry out a descriptive analysis of the characteristics of households that have been granted a loan in the past years and to focus on some recent changes. From this descriptive analysis we also obtain some clues on the variables to consider in the following econometric investigation.

The SHIW, which is carried out every two years, contains detailed information on income, wealth composition and social, demographic and economic characteristics of a sample of approximately 8,000 households (see the Appendix for details)[7].

In the most recent surveys, the share of households with a loan for personal purposes is close to 20 per cent. House purchase or renovation is the main reason households apply for loans, followed by the need to finance the purchase of a car or other vehicles (Table 2).

Table 3 shows that the percentage of households with debt increases with the age of the head, until a maximum in the class between 31-40 years. Moreover, participation in the credit market is positively correlated with household net wealth and, above all, with income. As far as social and demographic features are concerned, the level of education has a positive effect on the probability of debt, up to the high school diploma. Households living in a municipality with fewer than 20,000 inhabitants or in southern regions are less likely to carry debts. The distribution of the average amount of the loan, according to social and economic characteristics and only for those households with a positive debt, gives a picture which is quite similar to that of participation in the loan market: in classes where the frequency of debt is higher, the amount of the loan is on average larger (Table 4). [8]

From the SHIW it is also possible to outline some recent trends. Italian households' participation in the debt market strongly increased at the beginning of the 1990s, both for mortgages and consumer loans, then stabilized and finally showed a decrease in 1998 as a result of two opposite trends: a rise in consumer credit, essentially for the purchase of vehicles, and a fall in mortgages (Table 2).

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[7] For a comparison between the SHIW, national accounts and financial accounts, see Brandolini and Cannari (1994) and Brandolini (1999).

[8] This is not true for self-employed workers, who show a noticeably larger average amount of debt than employees, despite the latter's higher frequency of debt, especially in the earlier surveys.

These trends are quite consistent with the indications provided by Bank Supervisory Reports on bank lending to consumer households, which increased substantially at the beginning of the 1990s and then stabilised around the middle of the decade. On the contrary, the recent reduction in the mortgage participation rate is inconsistent with the evidence from Bank Supervisory Reports, which highlights an acceleration in the households' loans at the end of the 1990s. However, this reduction can be better understood if this piece of information is read together with the increase in the average mortgage amount (only for households with debt) recorded between the 1995 and 1998 (19,191 to 22,660 euros; Table 5). Another partial explanation lies in the fact that the SHIW tends to underweight the class of the self-employed workers (Brandolini and Cannari, 1994), who in recent years have strongly increased their demand for loans, as we will see in Section 5. More precisely, in Table 5 one may further observe that the recent increase in the average amount of mortgages has mainly concerned households whose head is self-employed, has a high-school diploma, a high income (above the median) and living in the North (especially in the North-East). The increase is also marked for those holding financial assets and, particularly, with medium and high-risk financial portfolios.

4. The determinants of participation in the debt market

4.1 Two types of analysis of debt market participation

To disentangle the impact of different factors influencing the probability of debt and overcome the limits of the previous univariate descriptive analysis, two directions are followed in the econometric investigation.

First, the probability of having a loan is analyzed using a question of the SHIW in which households are asked whether, at the end of the year preceding the interview, they had a debt with banks or other financial companies for personal purposes. If the household has a loan for one out of the five different categories in the question (Table 2 and Appendix), the event occurs. The five categories of debt are then aggregated in the two classes of mortgages and consumer loans, for an analysis aimed at distinguishing between these two types of household financing.

An important drawback of this type of analysis derives from the fact that if we observe a household with zero debt we cannot be sure that this is the exclusive outcome of the demand process, as it could also reflect rejected loan applications. In other words, we face an *identification* problem, which we try to overcome by imposing restrictions on some variables, included only in the supply schedule and not in the demand function or viceversa. Nevertheless, there remain some factors acting on both sides of the market, i.e. income, net wealth, education and residence area. However, we decide to use this question of the SHIW because it has been asked continuously during various years, allowing us to work with a more informative dataset; moreover, it also makes it possible to single out the determinants of the two main categories of debt, mortgages and consumer loans.

To better tackle the identification problem, we then try another direction, based on a different group of questions, allowing us to single out those households that asked for a loan in the year, those whose applications had been totally or partially rejected, and those that did not apply for a loan, because they expected to receive a negative answer (see the Appendix for further details). In this second exercise we are therefore able to study the probability of demanding a loan *separately* from the probability of being rationed, conditional on application for a loan. This second analysis has the advantage of overcoming to a large extent the above-mentioned identification problems, as we can separately observe the determinants of loan demand and the variables affecting the bank's evaluation process; the shortcomings are that it cannot be carried out on a continuous basis (only for the 1989, 1995 and 1998 surveys[9]), it cannot distinguish between the different categories of loans and it does not offer any information about the size of the loan.

This section contains the results of the first empirical estimation. The evidence referring to the second type of the participation analysis is discussed in Section 5.

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[9] In 1991 and 1993 households were not asked whether in the previous year they had applied for a loan.

4.2 The structure of the model

The demand for a loan by a household D^*, which derives from the difference between desired consumption and actual endowment, depends on different economic, social and geographical factors and on the entry costs in the debt market.

Thus, let

(2) $$D^* = a' X_1 + e$$

where X_1 denotes the set of observable variables determining the household's demand for a loan and e is a stochastic error capturing unobservable factors, normally distributed with mean 0 and variance s_e^2.

The outcome of the demand for a loan, A^*, hinges on the evaluation by the lender, which is based on a group of determinants, X_2, which may overlap with X_1 (in particular, income, net wealth, education and residence) and also contain other factors, such as customer credit history and the costs of operating in a particular area, which should be mainly relevant in the supply schedule. Then let

(3) $$A^* = g' X_2 + m$$

where m is a stochastic error, normally distributed with mean 0 and variance s_m^2.

We are able to observe only the final outcome of these two decision-making processes and therefore only whether the household has a debt (D=1) or not (D=0). The possible cases that may occur are:

(4) $D = 1$ if $D^* > 0$ and $A^* > 0$[10] or

(5) $D = 0$ if $D^* > 0$ and $A^* = 0$ or

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[10] If A*<D* the household is only partially constrained, but it does have debt and belongs to the group of households for which the event occurs; this group accounts for 49.7 per cent of the liquidity constrained households and for 2.2 per cent of the households with debt (weighted frequencies calculated on all the five surveys of the SHIW). If A* >D* the household is not constrained.

(6) $$D = 0 \quad \text{if} \;\; D^* = 0$$

Under (5) the consumer is totally liquidity constrained, while under (6) he has a desired debt equal to zero.

As already mentioned, when using the first group of questions we are not able to separately identify demand and supply effects. Therefore, we estimate the following probability model for the event of holding a loan:

(7) $$P(D = 1) = \Phi(b' X)$$

where D=1 if the household has a debt with a lender, Φ is the distribution function of the standardized normal and X stands for debt determinants which include demand factors and the entry costs (X_1) and also supply-side aspects (X_2). A vector of coefficients b , which is a combination of the two vectors a e g not separately determinable, is estimated. A variable can be exclusively considered either a demand or a supply factor only if the effects coming from the two sides of the market act in the opposite direction.

4.3 The relevant variables

As to *demand factors*, theory suggests different explanatory variables. *Age* is one of the most important and there is a fairly wide consensus about its sign, both on theoretical and empirical grounds. Young households, with expectations of growing income and a high marginal utility of consumption, due both to the likely modest level of current income and to the needs connected with creating a new family, should express a high demand for debt, which is likely to decrease beyond a certain age threshold. In order to capture some non-linearities in the relationship, age enters the model both in a linear and a quadratic term.

A second important factor is *net wealth* as an indicator of households' current and future endowment. The sign of net wealth is not easy to define a priori. When the endowment grows, households can autonomously finance a greater share of desired consumption and the probability of debt should fall, at a rate that is higher the more liquid is their wealth. However, at intermediate levels of wealth, an increase in the endowment could also translate into a noticeable rise in consumption needs and hence in the frequency of debt. Moreover, for these latter households it may be easier to satisfy the downpayment conditions required by lenders. In empirical works, as mentioned earlier, one can find heterogeneity of results (see footnote 6).

As regards income, what matters is the steepness of the *expected income profile*: in the case of flat expected income there is no need to anticipate financial resources through debt. Therefore, the probability of a loan should be positively correlated with the expectation of a sharp increase in earning capacity, which we try to capture with an education dummy. Other variables are used to gauge the degree of uncertainty of future income.

As regards the relationship with *current income*, there exists uncertainty about its sign, as in the case of net wealth. Theory suggests that when current income increases, the probability of debt should diminish. However, at low and intermediate levels of income, for different reasons the probability of debt may also increase when income rises. First, at low levels of income the marginal utility of consumption is very high and an increase in earnings may translate into a rise in expenditure and hence into a greater demand for loans. Secondly, very low levels of income are normally associated with greater income variability, which tends to reduce the probability of debt. Finally, an increase in income, especially near the median of the income distribution, raises the probability that the household may more easily satisfy downpayment conditions. Thus, the sign of the overall income effect is ambiguous like the empirical evidence (footnote 6). We try to capture these aspects by inserting a second-order polynomial in income.

Another factor affecting the decision to apply for a loan is the *risk level in the residence area*, captured with a dummy: in the South, where the unemployment rate is sharply higher and the level of background risk stronger, the consumer might be less inclined to ask for a loan. The *risk attitude* in the composition of financial portfolio is also considered, following the evidence emerging from the descriptive analysis, which highlights a recent positive correlation between this variable and the frequency of debt.

Education, beyond reflecting the potential expansion of income, is likely also to capture aspects linked to the *entry costs* in the debt market. Households with a high school diploma are likely to bear lower entry costs, since they face fewer difficulties in collecting and evaluating the information needed for the decision to contract a loan. The *entry costs* can also be affected by other variables, such as residence in a very small municipality with poorly diversified bank supply. We use a dummy that takes a value of one when the household lives in a municipality with fewer than 20,000 inhabitants.

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The *evaluation by the bank* is based on the probability of customer's default and on the amount the bank may recover in this case. Therefore, it depends on the household's social and economic characteristics, such as the age of the head, net wealth, current and expected income, education and the residence area. As both sides of the market are influenced by these variables, the interpretation of their coefficients is tricky.

We can argue that the probability that a loan application will be approved increases with *age*, consequently opposing the force of the relationship emerging on the demand side, where the need for a loan is strongest for the youngest classes. Moreover, the probability of liquidity constraints should be negatively correlated with *income and net wealth*: such an effect might either reduce the power of the relationship arising on the demand side or, on the contrary, reinforce it, in the event that the correlation between income/net wealth and the probability of demanding a loan is positive.

Finally, the probability of approval should increase with *education* and be lower in regions with a *greater economic risk*: therefore, the impact of these two factors on the supply side is added to that on the demand side, blurring and making it hard to separate the two effects.

Other factors that may affect the decision of lenders are those concerning the *customer relationship*.[11] Where this relationship is stronger and more lasting, it might be easier for the bank to evaluate the customer's reliability and hence it is more likely that the loan contract is signed (Petersen and Rajan, 1994). According to Stiglitz and Weiss (1981), banks may rationally avoid finding an equilibrium on the credit market through the interest rate, since an increase in the interest rate might attract the riskiest customers (*adverse selection*) or induce firms to implement the most difficult projects with the greatest return variability

[11] The evaluation by lenders also depends on the customer's credit history, but on this issue there is no information in the SHIW.

(*moral hazard*). In this case, the choice of rationing may be optimal for banks. For households, likewise, a greater amount of information for the bank, through a longer relationship with the customer, could reduce uncertainty and hence lead to a greater probability of debt. We try to capture these aspects using a Herfindahl index, on the assumption that higher bank supply concentration allows better knowledge of the customer; for a shorter period (1993-1998) the length of the relationship between customer and bank is also used as an indicator of its intensity.

In order to give a better representation of the factors considered by the bank in its evaluation process, two other variables are taken into account to gauge the *enforcement costs:* loans' average regional recovery time and share. The variability of these costs across Italian regions is very substantial (Table 6). Considering loan recovery time, it is worth noting that southern regions rank far below those of the North. However, the picture is quite different for loan recovery share, as some southern regions rank high, while the situation of the North is very diversified. As a general statement, the probability of debt should be stronger in regions where the recovery share is higher and/or the recovery time is shorter.

Finally, the interest rate that banks apply to consumer households on a provincial basis is considered as a proxy of the rate of return to which the market allows resource transfers between different periods. Moreover, in all the regressions time dummies are also included, to take into account possible shocks concerning the whole economy or improvements in the credit market.

4.4 The dataset

Households' socio-economic characteristics are drawn from the Survey of Household Income and Wealth (SHIW). The surveys considered cover the years 1989, 1991, 1993, 1995 and 1998. The nominal variables are expressed in real terms using the consumer price index, whose base year is 1995. The decision to start from 1989 is based on the consideration that the questions in the 1987 survey were markedly different from those in the following years; moreover, affluent households were oversampled in 1987.

We use households' residence and merge social and economic data with information drawn from other sources. Data on bank supply are from Bank Supervisory Reports.[12] Interest rates, from the Central Credit Register, are short-term rates on loans granted by banks to households. Data on the enforcement costs are taken from a questionnaire sent by the Bank of Italy to a representative sample of banks for the years 1992-1993 and hence this information does not show time variability (see Appendix for more information).

In order to avoid outliers influencing the estimation's results, households belonging to the 1st and to the 99th percentiles of income and net wealth are dropped from the following econometric analysis; households with missing values on the dependent variable and whose head is younger than 20 or older than 70 are also excluded, because they are presumably not involved in the decision-making process under examination.

4.5 The results of the first empirical analysis on participation

This subsection is mainly based on the results obtained with the *panel* estimation of the probability model of interest, which is the preferred specification and generalizes the special case of the *pooled* regression of all the observations under the hypothesis of independent errors. Using the panel component of the SHIW allows us to shape in a more precise way the differences in the households' behaviour, but greatly reduces the number of observations: the panel is built considering all the households that are in the SHIW at least twice in the period under analysis (see the Appendix for further details); observations where a change of the head occurred are deleted. The regression on the panel component therefore uses 13,793 observations, while in the pooled regression 32,588 observations are considered. To offset the effects of this large reduction, the results based on the pooled specification are sometimes referred to as a term of comparison.

We estimate a probit panel model with random effects, where the error term becomes:

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[12] For special credit institution a different source of data was used for the years before 1995, when special credit institutions reported loans not disaggregated by geographical area. The split of the data by provinces was carried out using the shares calculated in the first year when special credit institutions reported to Bank Supervisory Reports and transposing them for previous years.

(8) $$e_{it} = v_{it} + u_i$$

where i is the *i-th* household, t is the year, v_{it} denotes the usual random error and u_i is a household-specific stochastic disturbance, constant over time, with zero mean and variance s_u^{2}. The hypothesis is that the two errors are independent and therefore:

(9) $$\mathrm{Var}[e_{it}]=1+ s_u^{2}$$

(10) $$\mathrm{Corr}[e_{it}, e_{is}] = s^{2}_{u} / 1 + s^{2}_{u} = r$$

In such a case, the errors referring to the same household (i) and two distinct periods (t, s) are not independent, as is assumed in the less general case of a pooled regression.

A *Likelihood Ratio* test rejects the hypothesis that the correlation between the errors in two different periods is equal to zero (Table 7, the test that panel level variance is equal to zero). The variance component introduced by the difference of each household with respect to the others is therefore significant. Thus, errors are not independent and, as said, the panel specification is the preferred one.

* * *

As expected on the basis of the theory and in line with previous empirical evidence, the probability of debt increases with *age* (Table 7) and reaches a maximum for people aged 35 (Figure 1). The marginal effect of ageing from 20 to 35 years on the estimated probability of debt is equal to 7 percentage points (from 0.17 to 0.24), while over the following 20 years the probability decreases by 11 percentage points (0.13 for people aged 55). [13] It seems that demand is the main channel for the age effect, with people asking for loans when young, rather than supply, with banks favouring later entrance in debt market.

As far as *net wealth* is concerned, in the pooled regression it shows a positive relationship with the probability of debt, but this relationship fades off in the panel estimation, where net wealth is no longer significant (Table 7). Moreover, net wealth may

[13] The marginal effects of each variable are calculated at the mean value of the other regressors.

suffer from simultaneity problems, which are particularly evident for consumer credit. In the consumer credit case, after an increase in debt probability caused by unobservable factors, a reduction in net wealth may follow, creating a correlation between errors and explanatory variables that causes inconsistency of the estimator. This is not necessarily true in the case of mortgages, because an increase in debt is normally followed by a rise in real assets, so that there is no substantial effect on net wealth. To tackle the simultaneity problem, we use the lag of net wealth that is not significant as well. Since lagging net wealth cannot be enough to avoid endogeneity, we run a panel regression with random effects excluding net wealth. The main results hold (Table 7). It is therefore possible to argue that both in the decision to ask for a loan and in the evaluation by the bank there are more important variables than the household’s net wealth. This result will be confirmed in the next empirical estimation, reported in Section 5.

Another point to stress is that the probability of debt increases with *disposable income* (Table 7), although this relationship weakens for higher incomes and changes sign after a value of income equal to 46,000 euros (between 90 and 95 percentile of the distribution; Figure 2). Moreover, the marginal effect of income is rather important: moving from the first to the third quartile of the distribution (15,000 to 31,000 euros) raises the probability of debt by more than 4 percentage points. The greater importance of income with respect to net wealth is an interesting result, because it distinguishes Italy from other countries, where the probability of debt appears to be weakly correlated with current income.

The analysis concerning income is further carried out separately for the two types of debt, mortgages and consumer loans (see the subsection 4.6). The evidence is that income has a positive and significant effect on the probability of a mortgage only in the central part of the distribution (40th-80th percentiles), while the influence on the probability of a consumer loan is important for a wider part of the income distribution. It is therefore possible to argue that when income is at low-medium levels, the relationship between the probability of debt and income is positive, essentially because the high marginal utility of consumption translates all the income upswing into expenditure rises, which are frequently financed by debt. In the subsequent part of the income distribution (near the median and beyond), the greater possibility of satisfying the mortgage downpayment conditions could also help to explain the positive relationship between current income and the probability of debt. On the other hand, this result could also be linked to supply-side factors: when income increases, the probability of rationing should decrease, as is confirmed in the analysis carried out in Section 5.

The variables measuring the *uncertainty of income* are significant and have the expected signs. Self-employed workers (Table 7), whose income is subject to greater variability, and employees that work in small firms (fewer than 20 employees; Table 8) have a lower probability of contracting a loan; the marginal effect is respectively 3.0 and 3.4 percentage points (around one fifth of the estimated probability). The number of income-earners in the household and the expectation of retirement income, which on the contrary should bring greater certainty in the calculation of permanent income, are significant, have the expected positive sign and a marginal effect that is equal to 2.0 percentage points for each additional income-earner and 3.0 points for the dummy that captures the existence of a retirement income (Table 7; 14.0 and 21.6 per cent of the estimated probability). For such variables it is possible to assume that demand and supply effects move in the same direction; more precise indications are drawn from the subsequent analysis. Comparison with foreign studies is not easy, as different variables are used, but in general no clear pattern emerges.

Obtaining a *high school diploma* increases the probability of debt, with a marginal effect of 2.4 percentage points (Table 7; 17.4 of the estimated probability). This relationship may either reflect the expectation of higher future income or the ability to process the information, which reduces the entry costs in the debt market. In the first case, education should have greater importance for young people. However, once interacted with age classes, the education dummy is significant only for people between ages 40 and 65 (Table 9), a result that lets us suppose that the second aspect might be prevailing. According to the interpretation offered by King and Leape (1998), information flows with age, and as people age the ability to process this flow of information becomes more important.[14] Reinforcing this hypothesis, an index of knowledge of financial assets (see the Appendix) is highly significant in determining the probability of debt (Table 8): moving from the first to the third

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[14] King and Leape (1998) refer to information on the investment opportunities for an optimal financial portfolio, but a similar argument might well also hold for information concerning households' financial liabilities.

quartile of its distribution, the estimated probability of debt increases by 4 percentage points (one fifth of the estimated probability). From this evidence, education appears mainly as a demand factor, given that for the supply side it should have greater weight as an indicator of future income and hence when the head of the household is younger. Generally, education does not matter in previous empirical works, but a measure of permanent income is highly significant in Cox and Jappelli (1993).

In this estimation, it is also clear that in very small towns households are less indebted: the entry difficulties in debt market, mainly due to limited choice of banks, and the more pervasive presence of informal credit markets, decrease the probability of debt by 3.7 percentage points (26.2 of the estimated probability; Table 7).

In the areas characterized by *economic fragility*, with high unemployment, the probability of debt should be lower. However, the dummy South, which should reflect this aspect, is not significant; what we can notice is that the probability of debt is far higher for people living in the central part of Italy (Table 7), where, as we will see in the next section, loan demand is stronger. Therefore, the aspects linked to the economic risk do not allow us to capture all the geographical variability characterizing households' participation in the debt market.

As far as the *enforcement costs* are concerned, the probability of debt is positively influenced by a higher share of recovered loan (Table 7) and this effect is important from an economic point of view: the estimated probability of debt increases by more than 8 percentage points moving from the minimum (41) to the maximum (84.5) recovered share of a loan (Figure 3). By contrasts, the length of recovery time does not seem to be important, although it has the expected negative sign.

Finally, the other variables related to the *bank supply* show a situation where an excessive supply fragmentation does not seem to favour the probability of debt, which increases with *bank concentration*, as measured by a Herfindahl index (Table 7). However, this effect is not very strong: moving from the first to the third quartile of the Herfindahl index increases the probability of debt by a little more than 1 percentage point. The *length of the bank relationship*, a variable available from the SHIW only for the 1993-98 period, has a positive and significant effect: a relationship lasting between 5 and 10 years increases the probability of debt by 4.1 percentage points (around a quarter of the estimated probability; Table 8). Previous studies did not consider supply variables in the estimation of the probability of debt.

Lastly, the interest rate's coefficient has the expected negative sign, as in other studies considering this variable (Leece, 1995 and 2000), but it is only marginally significant (Table 7). The scant importance of the interest rate might stem from the fact that its determinants are already considered in the regression: a measure of the customer risk is captured through other variables, while bank's market power can be gauged by the index of supply concentration.

* * *

As a check of robustness of the results, we consider the fact that in the SHIW sampling occurs in two stages, first at the municipal level and then at the household level; therefore, neighbourhood effects might induce a correlation among observations, affecting standard errors. We take into account the possibility that observations are independent among different municipalities in the SHIW (almost 300 in each survey), but there could be dependence among the observations in a municipality. Correcting standard errors for clustering on municipality, the interpretation of the results does not change (we do not report these results referring to a pooled specification).

Moreover, taking into account the rather high correlation between dummies capturing the expectation of a retirement income and the number of children, which are correlated with the age of the head (the correlation is near 0.5), a regression excluding these variables is run: we do not observe any important change in the coefficients of the other explanatory variables (the results are note reported).

The last check of robustness of the results is based on an analysis over the two subperiods, 1989-93 and 1995-98 (Table 9). The most important differences concern the variables related to the households' residence: the recovered share of loans is significant in both periods**,** but it has a far stronger marginal effect in the most recent one; the dummy South is never significant, but it has a negative sign for 1995-98**.** It is therefore possible to argue that in recent years, even in a context of a growth trend in lending to households, the degree of credit rationing across areas, essentially caused by growing difficulties in recovering loans in the event of default, has been increasing. Another clear difference arising in the most recent period is that the self-employment dummy is no longer significant, suggesting that credit rationing towards such workers has weakened and/or that their demand for loans has greatly increased.

4.6 The differences between mortgages and consumer loans

In order to verify whether the decision-making process for mortgages has different determinants than that for consumer loans, we consider separately the two types of decisions. From the estimation of a *bivariate probit model* pooling all the observations, these decisions appear to be linked and an estimation taking into account the correlations between errors is therefore more efficient (Table 10).

The specification for the bivariate probit model is the following. Let MD^* and CD^* denote respectively the desired demand for mortgages and consumer loans and MA^* and CA^* the corresponding outcomes after lenders' evaluation process:

(11) $$MD^* = b_1' X_1 + e_1 \qquad MA^* = g_1' X_2 + m_1$$

(12) $$CD^* = b_2' X_1 + e_2 \qquad CA^* = g_2' X_2 + m_2$$

The assumptions about the stochastic errors are:

(13) $$\mathrm{E}[e_1]=\mathrm{E}[e_2]=\mathrm{E}[m_1]=\mathrm{E}[m_2]=0$$

(14) $$\mathrm{Var}[e_1]=\mathrm{Var}[e_2]=\mathrm{Var}[m_1]=\mathrm{Var}[m_2]=1$$

(15) $$\mathrm{Cov}[e_1, e_2]= r$$

with r measuring the correlation between the unobservable factors $[e_1, e_2]$ affecting the households' decisions. We are able to observe only the binary variables y_1 and y_2:

(16) $$y_1 = 1 \text{ if } MD^* > 0 \text{ and } MA^* > 0 \qquad y_1 = 0 \text{ otherwise}$$

(17) $$y_2 = 1 \text{ if } CD^* > 0 \text{ and } CA^* > 0 \qquad y_2 = 0 \text{ otherwise}$$

reflecting the underlying decisional processes, with $y_1 = 1$ ($y_2 = 1$) denoting the event of a positive demand for a mortgage (consumer loan) that has been met by lenders. The main hypothesis made here is that the factors affecting the two decision processes are supposed to be the same and represented on the demand side by X_1 and on the supply side by X_2.

A Wald test reveals that the coefficients of the same regressors are significantly different in these two equations (Table 10, the last test). With regard to *age*, the probability of a mortgage reaches a maximum for people near 37, while for consumer loans the highest frequency comes earlier, around age 29. This evidence may be connected with the fact that people ask for consumer loans when younger, for example they buy a car before a house; moreover, as we will see, banks are more likely to grant consumer loans than mortgages to riskier borrowers, like the youngest are. As far as *income* is concerned, the marginal effect is more important for consumer debt: moving from the first to the third quartile of the income distribution, the estimated probability of a consumer loan increases by nearly 3.5 percentage points (more than one third of the estimated probability), while the effect on the probability of a mortgage is around 2 percentage points. The impact of earnings on the probability of a mortgage is significant only in the central part of the income distribution, while the effect on consumer loans is significant in almost all the distribution (Table 10).

With regard to *net wealth*, which did not appear to be a main explanatory variable, we find the most substantial differences: for mortgages the relationship is positive, while for consumer loans it is negative (Table 10). Moreover, this result holds up in the estimation of two independent panel models (the results are not reported), while for the general case net wealth was not significant in the panel estimation (Table 7). Finally, using the lag of net wealth to avoid simultaneity problems, we find that this variable still matters only for mortgages, but is no longer significant for consumer loans (the results are not reported).

Generally, the probability for consumer loans also seems less influenced by *uncertainty of income*: the self-employed dummy is not significant and the dummy South has a positive sign and is significant at a confidence level of 10 per cent (Table 10). The coefficient of the interest rate is negative and significant for mortgages, while it turns positive, but losing its significance for consumer loans, probably owing to a sort of substitution effect.[15] In conclusion, households which are granted a consumer loan seem potentially riskier than the ones with mortgages, for which the screening by lenders appear to be more careful: however, the risk of a loan also hinges on its size and length and it might therefore be easier for risky households to obtain a consumer loan, given that the amount granted is generally lower and the maturity shorter.

It is worth also considering that *education* is a significant variable only for mortgages.[16] A possible explanation may lie in the fact that today a consumer loan is considered as an additional element of a consumer-durable purchase and the only entry cost for the consumer consists in evaluating if the interest rate is appropriate. On the other hand, this result could also be explained by the fact that a bank granting a mortgage attributes greater importance to education, which is a proxy for the slope of income profile and matters only if the length of the loan is long.

Finally, in regions where the loan's recovered share on default is larger, the probability of debt is higher for both types of loan: *enforcement costs* thus seem to have similar effects.

5. The probability of demanding a loan and of being liquidity constrained

5.1 The model

In this section we carry out a second analysis of participation in the debt market to sharpen the distinction between supply and demand factors.

First we estimate the probability of a household *demanding* a loan, using as explanatory variables the ones of the baseline specification in Table 7, in order to single out those factors acting on the demand schedule. The latent demand function is:

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[15] The interest rate used is that demanded by *banks* essentially on mortgages: possibly, when this rate increases, people may be induced to ask for more consumer loans.

[16] Also in King and Leape (1998), who estimate a model of the allocation of portfolio among different financial assets and two liabilities, education is significant only for mortgages and not for consumer credit.

(18) $$D^* = a' X_1 + e$$

and the binary variables that we observe are:

(19) $$D = 1 \text{ if } D^* > 0 \quad \text{or otherwise}$$

(20) $$D = 0 \text{ if } D^* = 0$$

In order to evaluate separately the *supply side* of the market, we also estimate a credit rationing equation by the bank, only for households that asked for a loan (probability of rationing conditional on the loan demand), where we use as explanatory variables the factors that a bank considers as relevant in the decision to grant a loan: we exclude from the estimation only the variables related to customer' attitude towards risk on financial investments and the interest rate. The main purpose of this exercise is to evaluate the relative weights of the factors acting in the supply schedule.

The bank's latent evaluation function is:

(21) $$A^* = g' X_2 + m$$

where A^* denotes the maximum value of the loan that the bank agrees to grant to the customer. The binary variables observed are:

(22) $$RAZ = 1 \quad \text{if } D^* > 0 \text{ and } A^* = 0 \quad \text{otherwise}$$

(23) $$RAZ = 1 \quad \text{if } D^* > 0 \text{ and } A^* < D^* \quad \text{otherwise}$$

(24) $$RAZ = 0 \quad \text{if } D^* > 0 \text{ and } A^* > D^*$$

Under 22 and 23 credit rationing is either total or partial; households that belong to case 24 are not liquidity constrained.

The period under analysis is shorter than in the previous exercise: there are 22,620 observations for the analysis of the probability of loan demand and just 1,287 for probability of rationing, conditional on the loan demand.[17] Because of the modest number of observations in the latter model, estimations are based on a pooled regression, also considering that from the estimation of a panel regression with random effects of the probability of asking for a loan and of being liquidity constrained *not conditional* on the demand, the variance component brought in by each household is not significantly different from zero and the pooled specification is therefore the preferred one. This analysis is similar to the one performed by Cannari and Ferri (1997) and Fabbri and Padula (2001). The results are presented in Table 11.[18]

5.2 The results of the second empirical estimation of participation

The probability of demanding a loan increases with the *age* of the head, reaching a maximum at 29 years and falling by one half at around 55; by contrast, this variable is not significant in the probit estimation concerning the evaluation by the bank (Table 11). Age confirms its role essentially on the demand side, with a fairly large marginal effect. This result differs from those of previous analyses, where the probability of credit rationing decreases with the age of the head (Jappelli, 1990; Cannari and Ferri, 1997; Fabbri e Padula, 2001[19]).

Net wealth is weakly significant in the loan demand equation and does not seem to be a determinant factor for the bank either. Such evidence confirms the scant importance of this variable already noticed in our earlier empirical investigation and also in other studies (Cannari and Ferri, 1997).[20]

[17] To avoid a further reduction in the number of observations, we do not exclude households whose head is younger than 20 or older than 70. However, the results hold even with this exclusion.

[18] The reported results for the probability of rationing refer to a model only for those households that have demanded a loan. In a probit estimation that takes this censoring into account (where the identification is obtained by including the debt-market entry costs, i.e. the dummy for small municipalities, only in the probit for the loan demand and not in the rationing equation) the results are not very different**.**

[19] However, Jappelli (1990) and Fabbri and Padula (2001) consider only the liquidity constrained probability non conditional on the demand for a loan. In Cannari and Ferri (1997) age is also significant only in determining the probability of rationing non conditional on the loan application.

[20] In Jappelli (1990), the probability of credit rationing is influenced by net wealth, which is, however, less important than disposable income. Fabbri and Padula do not use net wealth.

Disposable income has a positive effect on the demand for loans; moving from the first to the third quartile of income, the estimated probability increases by less than 1 percentage point, but almost one fifth of the estimated probability. The positive relationship between income and the probability of debt, observed in the previous empirical investigation, is also emphasized by the negative sign in the probit model related to the supply side. The probability of rationing decreases when disposable income rises, with an important marginal effect: moving from the first to the third quartile of income, the probability of rationing decreases by nearly 6 percentage points (60 per cent of the estimated probability). This result increases the evidence that income acts in the same direction on both sides of the market. The importance of disposable income also emerges in Jappelli (1990) and Cannari and Ferri (1997).

The most important finding about the *uncertainty of income* is that, despite the greater volatility of their earnings, self-employed workers are more likely to ask for a loan. The self-employed dummy has a positive sign for the probability of loan demand, but is significant only at the 10 per cent level; its level of significance increases to 1 per cent in the period 1995-98, confirming that self-employed households have recently contributed to the acceleration in the demand for loans. However, self-employed workers are more frequently subject to credit rationing: the probability of being liquidity constrained increases by 5 percentage points when the self-employment dummy is equal to 1 (more than 50 per cent of the estimated probability). The negative sign of the probability of having a debt for this category of households, found in the previous empirical investigation in Section 4, is therefore essentially due to supply factors. On the other hand, the other dummies capturing income uncertainty, the number of income earners and the expectation of retirement income, are significant and positive only on the demand side, while they are not significant factors for the bank. Other studies also show that the self-employed workers are more likely to be rationed (Cannari and Ferri, 1997; Fabbri and Padula, 2001).

Italian households living in municipalities with fewer than 20,000 inhabitants are less prone to ask for loans: when the corresponding dummy is equal to one, the probability of demanding a loan falls by a quarter, probably because of *higher debt-market entry costs*; this variable is not significant in the supply schedule.

Education, which on the basis of the previous evidence was considered a factor potentially affecting entry costs, has the expected positive sign in the demand equation, but is significant only at the 10 per cent level. In contrast with our previous results, the education dummy is also important in the bank's evaluation process: the probability of credit rationing falls by more than half when the household head has a high school diploma. In general, the previous evidence on this point was mixed. [21]

Households living in the central Italy are more likely to ask for a loan, while it is not true those in the South are less likely to demand credit: the dummy South is not significantly different from zero, essentially because there are some southern regions, especially the Islands, with a high percentage of households demanding loans. However, households in the South are more frequently subject to credit rationing: the probability of being liquidity constrained increases by 12.8 percentage points when the dummy South is equal to one (more than the estimated probability). Therefore, the economic weakness of the area where the household lives is an important supply factor (see also Cannari and Ferri, 1997).

Moreover, after controlling for the households' residence, the demand for loans seems to be more widespread in regions where the loan's recovered share in the event of default is greater and where the recovery time is also longer; in this latter case there could be an incentive to act in this way.

From the equation concerning rationing we obtain the important result that lenders tighten their evaluation in regions where the *recovery time* is longer: moving from the first to the third quartiles (56 and 77 months respectively), the probability of credit rationing increases by 4 percentage points, nearly half of the estimated probability (Figure 4). However, this result is true only if we do not consider the dummy area in the rationing equation (Table 11, columns 2 and 3), as the ranking of regions by *recovery time* is matched by the classification based on a dummy area (Table 6): recovery time is the longest in the South and generally falls to its lowest level in the North.

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[21] Education was not significant in Jappelli (1990) and Cannari and Ferri (1997), but was significant in Fabbri and Padula (2001).

By contrast, the recovered share does not seem to be a relevant factor for the bank. Among the enforcement costs, it matters in determining the probability of debt, as observed in our previous analysis, while the probability of being constrained is correlated only with the recovery time. A possible explanation of this evidence may be that the demand for loans is higher in regions where the recovery time is longer and where, simultaneously, rationing is more widespread: demand and supply effects could therefore offset each other in the estimation of the probability of debt and recovery time is therefore not significant. On the other hand, the positive and significant coefficient of the recovered share in the estimation of the probability of debt could capture the fact that when the recovery rate is particularly high (as in the North-East, Lombardy and Umbria), the demand for loans is also stronger, but recovery time and hence credit rationing are modest. In conclusion, for our purposes the valuable information is that when loan recovery time increases, lenders become far more careful in selecting customers and that this form of selection coincides with a geographical one.

Finally, the degree of *bank concentration* is not significant in the demand equation, while it enters into the equation of rationing with the expected negative sign, even if it is significant only at 10 per cent level. This result is consistent with the evidence in Cannari and Ferri (1997).

6. The size of Italian households' desired debt

Italian households are characterized both by a relatively low incidence of borrowing and by large differences in their amount of debt (Table 4). To conclude the analysis, it is therefore worth evaluating which factors mainly affect *the size of desired debt.*

From an econometric point of view, the estimation of desired debt requires taking into account the widespread presence of zeros, which may actually represent different situations: zero debt may reflect either the equilibrium solution for a family whose desired debt is non-positive and is censored at zero; it may also represent the situation of a household that is completely liquidity constrained, but whose desired debt is positive. Both an OLS regression for the size of the loan estimated only for households with positive debt or an OLS for all the observations, with zero included, lead to inconsistent estimates. It is therefore essential to consider the particular nature of these data and the different meanings of the zeros, i.e. the limit observations (Maddala, 1983; Scott Long, 1997).

6.1 The Tobit model

We start the estimation of the size of desired debt with a Tobit model, whose general formulation is:

(25)
$$D^* = a' X_1 + e$$

$$D = D^* \quad \text{if} \quad D^* > 0$$

$$D = 0 \quad \text{if} \quad D^* \leq 0$$

In this specification all the households with non-positive desired debt are censored at zero. The log likelihood is made up of two parts: one corresponding to the classical regression model for the non-limit observations $D^* > 0$ and the other referring to the probabilities for the limit observations $D^* \leq 0$.

We express the dependent variable in logarithms in order to reduce heteroscedasticity and measurement errors, assuming that desired debt is equal to a very small amount when it is zero (Fishe et al., 1981; Maddala, 1983);[22] income and net wealth are also transformed in logarithm. In general, the evidence does not change substantially when the variables are expressed in levels rather than in logarithms. Finally, we refer to panel estimations with random effects, because a test on the variance component of each observation leads to the result that it is significant and therefore the panel specification is the preferred one (Table 12).

The evidence in Table 12 is quite similar, both as regards the signs of the coefficients and their significance, to the picture emerging from the probit model, which only analyzes the determinants of participation in the debt market (see Table 7). The size of the debt is concave in age, increases with current income and also rises when the variability of earnings

[22] Actually, we assign the observations with zero debt an amount of debt lower than the smallest figure observable in the sample.

is lower, whereas it appears to diminish for people living in regions where enforcement costs are higher.

Nevertheless, it has been argued that the Tobit specification is quite restrictive because it imposes that both the decision to borrow and the decision concerning the size of the loan depend on the same factors, which are also restricted to have the same sign (Cragg, 1971; Fin and Schmidt, 1984). These hypotheses are unlikely to be always met. Moreover, in the case under investigation, the Tobit specification considers all the zero observations as equilibrium solutions, representing non-positive desired debt, and it does not take into account the possibility of rationing in the credit market (Leece, 1995).[23]

6.2 The two-stage Heckman model

In order to increase the flexibility of the model, it is possible to estimate the size of desired debt in another way, based on a two-stage Heckman estimator (1979). In this specification, the dependent variable of interest is observable only according to one or more selection mechanisms.

In the case under examination, the regression equation of interest refers to the size of desired debt:

(26) $$D^* = a^{'} X_1 + e_1$$

However, we do not always observe D* because the actual debt is subject to a double selection mechanism.[24] Specifically, we observe the desired debt D* only if households enter the debt market and if they are not liquidity constrained.

Therefore, first we have to consider a latent function determining whether a household decides to borrow:

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[23] Fabbri and Padula (2001) estimate a Tobit model not allowing for the desired debt to be negative and then they consider a non-random sample correction in the Tobit estimation for the fact that the desired debt for totally rationed households is unobservable.

[24] In the following part we follow the estimation procedure of desired debt used by Cox and Jappelli (1993) and Duca and Rosenthal (1993).

(27) $\text{Prob}\,[D > 0] = \Phi(g^{'} X_2) + m_1$

where D is the observed debt and X_2 contains all the variables in X_1, affecting the size of desired debt, and also some additional factors that may influence the fixed costs related to market entry. The corresponding binary variable that we may observe is:

D=1 if $D > 0$

D=0 otherwise

A second latent function concerns the probability that the debt ceiling set by the bank A* exceeds D*, leaving the household not constrained in the credit market

(28) $\text{Prob}\,[A^* > D^*] = \Phi(h^{'} X_3) + m_2$

whose the observable counterpart binary variable is

NLC=1 if $A^* > D^*$

NLC=0 otherwise

D* is the household's desired debt and A* is the optimal amount of the loan for the lender: in X_3 we should therefore have the determinants of desired debt and the debt ceiling fixed by the bank.

Summing up, in the case under investigation, we are able to observe the size of desired debt D* only if the household has a positive actual debt and is not rationed in the credit market.

In the estimation of the model we assume that $[e_1 m_1 m_2]$ is distributed as a trivariate normal with mean zero and variance matrix V:

(29) $$V = \begin{bmatrix} s^2 & s_{1m_1} & s_{1m_2} \\ s_{1m_1} & 1 & s_{m_1 m_2} \\ s_{1m_1} & s_{m_1 m_2} & 1 \end{bmatrix}$$

The expected value of the error in the equation (26) is equal to:

(30) $$E(e_1 / m_1 > -g^{'} X_2, m_2 > -h^{'} X_3) = s_{1,m1} * M_{1,m_1} + s_{1,m_2} * M_{1,m_2}$$

where M_{1,m_1} and M_{1,m_2} are functions of $a' X_1$, $g^{'} X_2$, $h^{'} X_3$ and s_{m_1,m_2}. In the special case when s_{m_1,m_2}=0, i.e. the correlation between the errors in the probit models is equal to zero, they may be estimated independently and the two functions M_{1,m_1} and M_{1,m_2} collapse to the so-called Mills Ratio. In the more general case when s_{m_1,m_2} is different from zero, we have to estimate a bivariate probit model and then calculate M_{1,m_1} and M_{1,m_2}, whose expression are reported in the Appendix (Duca and Rosenthal, 1993; Maddala, 1983).

Hence, the conditional expectation of desired debt D* can be expressed as follows:

(31) $$E(D^* / D = 1, NLC = 1) = a^{'} X_1 + s_{1,m1} * M_{1,m_1} + s_{1,m_2} * M_{1,m_2}$$

Therefore, from an econometric point of view, we first estimate two probit models or a bivariate probit model for the two selection mechanisms and then we calculate the correction terms for non-random selection. In the second stage, we consider only households with positive amount of debt and not liquidity constrained to estimate the desired size of a loan, also including the correction terms. This correction is essential in order to avoid an omitted variable specification problem and is not required only if the errors in the probit model and in the size equation are not correlated, i.e. s_{1,m_1} and s_{1,m_2} are equal to zero (Greene, 1997).

In this specification it is necessary to *identify* the model for the desired size of loan vis à vis the model for the decision to borrow. The hypothesis is that living in a small municipality, with fewer than 20,000 inhabitants, is an important factor in modelling the entry costs in the debt market and thus for the decision whether or not to borrow, but that this is not an important factor in the decision concerning the amount of desired debt. This variable is therefore omitted in estimating the debt's size.

Table 13 reports the results for the desired debt obtained with the panel specification, the preferred one as the hypothesis that the variance contribution by each household is not significant is rejected by the Breusch-Pagan test. Hausman test is also not rejected: this means that the differences between the panel estimation with fixed and random effects are not greatly significant and because the latter estimator uses more information and is more efficient, the random effect panel estimation is the preferred specification. However, the table also reports the evidence from the pooled estimation, because of the strong reduction in the number of observation when using the panel dimension (only 1,949 households compared with 6,334 pooling all the observations; see the Appendix for further details). As the dependent variable is in logarithms, the effect should be interpreted as percentage changes. Finally, the quadratic terms are excluded from the estimation as not significant and standard errors are not corrected for the two-stage procedure.

The evidence is quite different from that based on the Tobit model. The table clearly reflects the importance of net wealth and of variables modelling the future income profile in determining the size of desired debt. The higher the level of net wealth, and consequently the more collateral households can give to the lender, the larger the size of desired debt: the estimated elasticity is around 0.3. Similar results have been found in other studies referring to the United States. [25] Moreover, *ceteris paribus*, the size of desired debt is larger by 17 per cent when the head is high school graduate (also in Fabbri and Padula, 2001) and by 16 per cent for each additional income earner in the household (Table 13, last column for two-stage Heckman estimation).

Contrary to the Tobit model, current income has a negative effect on desired debt, with an elasticity equal to 0.3: this is consistent with the fact that as actual resources increase, households prefer to finance both the purchase of a house and of the consumer durables with less debt. However, the evidence of previous studies is mixed on this point. [26]

Another important difference with respect to the Tobit specification concerns the self-employment dummy coefficient, which is positive in the Heckman two-stage specification:

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[25] Cox and Jappelli (1993) find a positive correlation between net wealth and the size of desired debt: a dollar increase in the former raises desired debt by 23 cents and the elasticity of debt with respect to net wealth at a sample mean is estimated equal to be equal to 0.78. They consider this result puzzling, because borrowing to finance current consumption should imply a negative coefficient for net worth. Duca and Rosenthal (1993) also find a positive correlation between net wealth and desired debt: a dollar increase in net wealth raises desired debt by 12 cents, but in this case the authors have not a strong a priori on the sign of this relationship.

[26] This is the same evidence found by Cox and Jappelli (1993): a dollar increase in current income reduces desired debt by 29 cents; however, in contrast with our procedure, they use a direct measure of permanent income, which has a positive influence on the size of debt, rather than an education dummy as an indirect measure. For Duca and Rosenthal (1993) current income has a positive effect on desired size of debt.

ceteris paribus, even if the volatility of their earnings is higher, self-employed workers desire 32 per cent more debt than employees, probably in part for work-related purposes. In the Tobit model this result was blurred by the fact that the coefficients of the decision to borrow and those of the size choice are constrained to be the same: the negative sign for the self-employment dummy in the decision to borrow (Table 7), which was essentially determined by more stringent bank evaluation, prevailed on the positive sign that arises in the equation of desired debt. This result is different from Fabbri and Padula (2001), but they essentially estimate a Tobit model with a correction for non-random selection.

In further contrast with the Tobit model, dummies for residence are not significantly different from zero. However, it is still true that the amount of desired debt falls in regions where the recovered share of debt is lower: a 1 point increase in the recovered share rises the amount of debt by 1.3 per cent and moving from a region where the recovered share is minimum to a region where it is maximum reflects in an increase in the size of desired debt of more than 50 per cent. In summary, this more general specification shows that residence is relevant for the size of desired debt, essentially because of a different distribution of the enforcement costs in the country. Likewise in Fabbri and Padula (2001) if the quality of judicial enforcement worsens, the debt held by unconstrained households decreases.

As in the Tobit model, in the two-stage Heckman specification the interest rate has the expected negative sign, even if its coefficient is not significant in the panel specification. Apparently, after taking into account different variables affecting the demand for loans, its cost is no longer a determinant factor. Finally, the sign of age is negative and an increase of 1 year at the mean reduces the size of desired debt by 1.2 per cent. [27] As regards the correction for non-random sample selection, in the pooled specification only the term referring to the probit model for non-liquidity constrained households is significant with negative sign, meaning that the unobservable factors increasing the probability of being non-rationed also reduce the size of desired debt [28] ; in the panel dimension no correction terms are significantly different from zero.

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[27] This is similar to the result obtained by Cox and Jappelli (1993) and Fabbri and Padula (2001).

[28] A similar result is obtained by Cox and Jappelli (1993).

* * *

To deepen the analysis we use two types of robustness checks. As already noted, net wealth can be affected by simultaneity problems leading to inconsistent estimates and so here too we try to use the lag of net wealth in the panel estimation. The reduction in the number of observations (only around 1,000 households) may strongly influence and skew the results, but this exercise is aimed only at verifying the change in the coefficient of net wealth. It turns out that the coefficient of lagged net wealth is still significant, but of nearly two thirds smaller; suggesting that in the previous estimates the reaction of the loan size to a change in net wealth may have been overvalued (the estimation is not reported).

The second check consists in running two separate regressions, one for 1989-93 and the other for 1995-98 (Table 14). We run two pooled regressions rather than the panel ones, to avoid an excessive reduction in the observations. In the period 1989-93 we have 3,429 households and the most important difference concerns the enforcement costs, which do not matter, while the negative effect of the interest rate is significant and strong; being self-employed workers does not influence the size of desired debt. In the period 1995-98 (2,905 households) the share of recovered loans is significant in affecting the size of desired debt, with a positive sign; the coefficient of the self-employment dummy is strongly significant and positive; on the other hand, the education dummy and the interest rate no longer matter.

Summing up, in the recent period the size of desired debt appears to be substantially higher for the self-employed and indirectly linked to the area of residence, essentially through regionally differential enforcement costs.

7. Final remarks

Combining the results of the estimations concerning *debt-market participation*, we obtain a picture where different variables play an important role. Overall, the effects of direct or indirect supply-side factors are very strong: in particular, the low percentage of Italian households with debt may be due to credit rationing linked to the area of residence and to the judicial enforcement of the loan contracts. Among the enforcement costs, we find that when the recovery time increases, lenders become far more careful in selecting customers; this effect has grown in the recent period and particularly concerns the South.

Among the economic variables, net wealth is not so important as income. The latter acts on both sides of the market in the same direction: the higher the level of income, the higher the probability of debt. This is an interesting point, because in papers on other countries the probability of debt is not frequently linked to current income. Education, which should reflect the future income profile, is another important supply-side determinant and also matters in the demand equation, essentially because it reduces the costs of gathering and elaborating information.

As theory predicts, an increase in income uncertainty reduces the probability of demanding a loan. However, for self-employed workers the negative sign in the debt probability model is basically due to a more frequent rationing by lenders: self-employed households are not less inclined to apply for credit. Another evidence is that age plays a very important role, essentially on the demand side.

Again as theory predicts, the amount of *desired debt* is influenced mainly by net wealth and the level of education, reflecting permanent income. It is also affected by job status, as self-employed workers desire larger loans.

In regions where the loan recovery rates are higher desired debt is larger. This seems to be the only channel through which the residence area is at work, given that the dummy area, which should reflect the economic background risk, is not significant. As in the case of participation, the enforcement costs have increased in importance in the most recent period.

Appendix

Information on the Survey of Household Income and Wealth

The Survey of Household Income and Wealth (SHIW), carried out by the Bank of Italy every two years (except in 1998, when the interval was three years), collects information on social and economic characteristics of households, in particular income, real and financial assets and debts. Five surveys are used (1989, 1991, 1993, 1995, 1998) in this paper, all of them referring to more than 8,000 households, except that of 1998 (7,147 households).

The basic survey unit is the household, defined as a group of individuals linked by ties of blood, marriage or affection, sharing the same dwelling and pooling all or part of their income. Individuals who live together solely for economic reasons are not considered members of the same household.

The SHIW refers to a representative sample of the Italian population. The sampling is in two stages, first municipalities and then households. Municipalities are divided into 51 strata, defined by 17 regions and 3 classes of population size (more than 40,000, 20,000 to 40,000, less than 20,000). In each strata, first the municipalities where interviews are to be conducted are identified, including all those with more than 40,000 inhabitants and randomly extracting the others. Second, the households to be interviewed are randomly selected from the registry office.

The net response rate (ratio of answers to contacted households net of ineligible units) was 38 per cent in 1989, 33 per cent in 1991, 58 per cent in 1993, 57 per cent in 1995 and 43 per cent in 1998.

According to the sampling design, each unit is assigned a weight inversely related to its probability of being included in the sample; weights are then modified both to increase the estimators' accuracy and to adjust the sample's structure to that of the population for some important features.

Starting in 1989, in each survey some households are re-interviewed. The panel component of the SHIW has increased over time: 15 per cent of the sample was re-interviewed in 1989, 27 per cent in 1991, 43 per cent in 1993, 45 per cent in 1995 and 1998.

The households included in the panel are selected with criteria similar to those described above, except that in 1991 and 1993 they were chosen among those that had previously expressed their willingness to being re-interviewed. Since 1995, new units formed by persons leaving a household included in the panel are also included,

For a comparison with the national and financial accounts, see Brandolini (1999) and Brandolini and Cannari (1994). The latter also contains a detailed explanation on the sampling design and measurement errors. Even if both income and net wealth are subject to under-reporting compared with the national account data, the survey data match the time-series of the aggregate wealth/income ratio fairly well.

The panel used in the estimation

The unbalanced rotating panel used in the estimation of participation in the debt market is made up of 13,793 households, of which 33 per cent are interviewed twice, 26 per cent three times, 30 per cent four times and 11 per cent five times.

The panel component of the SHIW used in the estimation of desired debt is made up of 1,949 non-credit rationed households with debt, of which 51 per cent are interviewed twice, 30 per cent three times, 16 per cent four times and only 3 per cent five times.

The questions used in the analysis

The question of the SHIW used in the first analysis concerning participation in the debt market is:

1) We will now turn to debts (i.e. loans, mortgages, consumer credit, etc.) serving to meet needs of the household and the house (do not consider debts in connection with your business). At the end of 1998 (or the corresponding year) vis-à-vis banks or financial companies or for instalment payments did your household have:

a) debts for the purchase or restructuring of buildings?

b) debts for the purchase of real goods (e.g. jewellery, gold, etc.)?

c) debts for the purchase of motor vehicles (e.g. cars)?

d) debts for the purchase of furniture, electric appliances, etc.?

e) debts for the purchase of non-durable goods (holidays, furs, etc) or for other reasons?

If the answer to previous question is yes for some categories, precise the amount. These amounts are used in the analysis on the size of desired debt.

The question of the SHIW used in the second analysis concerning the participation in the debt market is:

2) In 1998 (or the corresponding year) did your household apply to a bank or a financial company for a loan or a mortgage?

Yes

No

This question is included only in the 1989, 1995 and 1998 surveys.

3) Was the application granted in full, in part or rejected?

Granted in full

Granted in part

Rejected

For the 1991 and 1993 surveys the choice is only between granted and rejected.

4) In 1998 (or the corresponding year) did you or another member of your household consider the possibility of applying to a bank or a financial company for a loan or a mortgage but then change his/her mind thinking that the application would be rejected?

Yes

No

The variables used in the econometric analysis

Age: the age of the household head.

Net wealth: real assets plus financial assets minus financial liabilities for personal needs, millions of lire at the 1995 prices.

Income: net disposable income, millions of lire at the 1995 prices. All income is recorded net of payments of taxes and social security contributions.

Education: dummy=1 if the head of the household has attained a high school diploma and 0 otherwise.

Self-employed: dummy=1 if the head of the household is either an entrepreneur or an independent professional.

Number of income earners: number of people in the household who earn an income.

Expectation of retirement income: dummy=1 if the head of the household has marked an age at which he will retire and he is younger than the retirement age.

Employee in a firm with fewer than 20 employees: dummy=1 if this is the case and 0 otherwise; this variable is available only since 1993.

Residence area: dummy Centre =1 if the residence area is in a region of central Italy and =0 otherwise; dummy South=1 if the residence area is in a region of the southern Italy and =0 otherwise.

Index of financial assets knowledge: this index is calculated (see Guiso and Jappelli, 2000) as the ratio between the number of assets that each household knows and the number of available assets (17 in total). Both the unweighted and the weighted index have been calculated, where the weights are the inverse of the aggregate share of the households knowing each financial asset. This variable is available only for 1995 and 1998.

The Herfindahl index at a provincial basis: this index is calculated considering the number of branches each bank has in a province and the total branches in the same province. The information is drawn from Bank Supervisory Reports.

Length of the relationship with the bank: dummy=1 if between 5 and 10 years and =0 otherwise; this variable has been included in the survey since 1993.

The recovered share of the loan: the amount of the loan recovered in mortgage proceedings for insolvency concerning the households, given in a questionnaire by a representative sample of banks and referring to 1992-1993.

The recovery time: the time to recover a share of the loan with the same characteristics as the previous variable.

Interest rates on loans: these provincial interest rates refer to the household sector and are based on a sample of around 70 banks. They are calculated considering the province of the branch (the only data available before 1997 in the Central Credit Register). They only concern loans greater than 80 million lire (41,317 euros) up to 1995 and loans greater than 150 million lire (77,469 euros) thereafter.

Correction term for non-random selection

In this part of the Appendix the expressions for M_{1,m_1} and M_{1,m_2} are shown, based on the work by Maddala (1983) and Duca and Rosenthal (1993). Assuming $k_1 = -g^{'} X_2$ and $k_2 = -h^{'} X_3$, M_{1,m_1} and M_{1,m_2} may be written in the following way:

(a.1) $$M_{1,m_1} = (1 - s^2_{m_1,m_2})^{-1} * [P_{m_1} - s_{m_1,m_2} P_{m_2}]$$

(a.2) $$M_{1,m_2} = (1 - s^2_{m_1,m_2})^{-1} * [P_{m_2} - s_{m_1,m_2} P_{m_1}]$$

where

(a.3) $$P_{m_1} = \int_{k_2}^{\infty}\int_{k_1}^{\infty} m_1 g(m_1, m_2) dm_1 dm_2 \,/\, G(-k_1, -k_2)$$

(a.4) $$P_{m_{21}} = \int_{k_1}^{\infty}\int_{k_2}^{\infty} m_2 g(m_1, m_2) dm_2 dm_1 \,/\, G(-k_1, -k_2)$$

and g and G are the standard bivariate normal density and distribution functions.

Expressions (a.3) and (a.4) can be simplified (Duca and Rosenthal, 1993) as:

(a.5) $$P_{m_1} = [\, f(k_1)(1 - F(k_2^*)) + s_{m_1 m_2} f(k_2)(1 - F(k_1^*))] / G(-k_1, -k_2)$$

(a.6) $$P_{m_2} = [\, f(k_2)(1 - F(k_1^*)) + s_{m_1 m_2} f(k_1)(1 - F(k_2^*))] / G(-k_1, -k_2)$$

where

(a.7) $$k_1^* = (k_1 - s_{m_1 m_2} k_2) / (1 - s_{m_1 m_2}^2)$$

(a.8) $$k_2^* = (k_2 - s_{m_1 m_2} k_1) / (1 - s_{m_1 m_2}^2)$$

and f and F are the unit normal density and cumulative function. M_{1,m_1} and M_{1,m_2} depends on the parameters g , h and $s_{m\ m_2}$ that can be estimated from a bivariate probit.

Tables and Figures

Table 1

HOUSEHOLDS' DEBT: AN INTERNATIONAL COMPARISON

	Ratio between financial liabilities and GDP	Share of households with debt	Share of households with mortgages	Share of households with consumer loans
France	46.0			
Germany	74.0	42.9	27.2	22.5
Italy	30.0	19.1	9.0	12.2
Netherlands		65.7	42.6	32.0
United Kingdom	77.0		31.8(45.0)	14.2
Spain	56.0			
United States	76.0	74.3	43.1	48.5

Source: The ratios between financial liabilities and GDP are taken from the Bank of Italy's Annual Report for 2001 and refer to 2000 (Spain refers to 1999). Participation in the debt market is determined on the basis of sample surveys: for the United Kingdom, the 1997/1998 Financial Research Survey and, for figures in brackets, the 1996 Family Expenditure Survey; for the United States, the 1998 Survey of Consumer Finance; for Germany, the 1993 Income and Expenditure Survey, and data refer only to West Germany; for the Netherlands, the 1998 CentER Savings Survey; for Italy the 1998, Survey of Household Income and Wealth.

Table 2

SHARE OF ITALIAN HOUSEHOLDS WITH DEBT (1)

(debt with banks and other financial companies)

	1989	1991	1993	1995	1998
Buildings	6.0	10.4	12.3	13.0	9.0
Other real assets	0.2	0.1	0.3	0.2	0.3
Vehicles	3.8	5.7	6.3	5.3	8.5
Durable goods	1.8	2.2	2.7	3.4	3.3
Non-durable goods	0.8	0.5	1.1	1.2	0.9
Debts for personal needs	11.5	17.3	20.1	20.5	19.1

Source: Survey of Household Income and Wealth. (1) The frequencies are weighted and refer to the whole sample of households.

Table 3

PERCENTAGE OF HOUSEHOLDS WITH DEBT FOR PERSONAL NEEDS ACCORDING TO SOCIAL AND ECONOMIC CHARACTERISTICS (1)

	1989	1991	1993	1995	1998	Number of households in 1998
Sex of the head						
Male	12.9	19.4	23.4	24,4	21,9	5,142
Woman	5.8	9.4	11.9	10.6	11.8	2,005
Age of the head						
Up to 30 years	19.1	23.5	26.3	34.2	28.0	351
31 to 40 years	20.3	28.3	33.1	31.9	31.2	1,251
41 to 50 years	16.4	27.2	29.9	30.9	29.6	1,415
51 to 65 years	9.4	14.3	18.1	19.8	17.6	1,924
Older that 65 years	2.2	5.2	5.1	4.8	5.3	2,206
Education of the head						
Without education	3.1	4.7	5.9	5.1	6.1	655
Primary school	8.8	11.6	13.6	12.2	11.6	2,095
Junior high school	12.5	22.1	26.4	26.6	23.6	1,896
High school	16.8	24.8	28.7	29.7	26.2	1,946
Degree	18.1	23.2	25.0	28.5	21.9	542
Specialization after degree	20.4	19.3	22.2	50.2	20.9	13
Job status of the head						
Employee	18.0	26.3	32.6	33.2	29.1	2,360
Self-employed	12.5	20.3	23.3	28.3	29.2	1,206
Non worker	4.4	7.5	9.3	9.2	9.1	3,580
Quartiles of income						
First quartile	5.1	6.1	10.6	10.5	9.6	2,106
Second quartile	11,7	17.7	19.3	17.6	18.4	1,798
Third quartile	14.6	22.1	24.7	25.8	25.9	1,630
Fourth quartile	15.5	23.4	26.9	29.2	25.4	1,613
Size of the municipality						
Up to 20,000 inhabitants	10.8	16.3	18.4	16.2	15.6	3,470
20,000 to 40,000 inhabitants	10.7	17.3	21.7	19.9	20.8	902
40,000 to 500,000 inhabitants	11.7	18.9	22.0	25.6	22.0	1,785
More than 500,000 inhabitants	14.6	17.2	21.4	27.1	24.4	990
Geographical areas						
North West	13.2	21.3	18.1	19.8	18.1	2,098
North East	9.0	16.0	18.3	21.4	20.1	1,335
Centre	12.4	18.1	27.5	25.9	22.6	1,362
South	10.7	14.0	19.5	17.4	15.3	1,563
Islands	11.8	13.6	17.5	17.9	21.5	789
Quartiles of financial assets						
First quartile	8.2	12.1	20.0	18.0	15.1	1,909
Second quartile	15.0	20.1	27.6	23.1	21.3	1,725
Third quartile	14.6	19.9	17.1	22.4	23.1	1,758
Fourth quartile	10.1	16.8	15.5	18.3	17.2	1,756
Quartiles of real assets						
First quartile	8.1	12.3	12.4	12.1	15.2	1,883
Second quartile	9.4	10.3	17.8	13.7	15.9	1,874
Third quartile	14.2	21.5	24.4	28.3	22.3	1,637
Fourth quartile	14.7	25.0	26.2	28.7	23.7	1,753

	1989	1991	1993	1995	1998	Number of households in 1998
Quartiles of net wealth						
First quartile	10.8	14.3	16.0	13.8	17.0	1,929
Second quartile	10.1	11.1	19.0	17.1	17.8	1,784
Third quartile	12.3	20.2	22.7	26.7	20.3	1,687
Fourth quartile	13.1	23.2	22.9	24.7	21.6	1,746
Number of households' members						
1 member	5.8	7.8	5.9	6.3	9.1	1,479
2 members	7.7	10.6	12.3	14.2	13.1	1,915
3 members	13.8	22.9	23.3	24.1	22.8	1,652
4 members	14.9	23.6	31.6	31.5	28.8	1,513
5 and more members	17.3	21.5	29.0	29.1	28.4	589
Number of income earners						
1 earner	10.0	14.6	16.4	15.9	15.1	3,343
2 earners	13.2	19.1	22.4	24.5	22.4	2,870
3 earners	11.4	19.6	24.9	20.9	24.6	738
4 earners and more	13.0	21.0	27.0	26.8	17.3	196
Attitude toward risk on financial investments (2)						
Class 0 (0 or only AA)	10.5	14.0	18.2	16.9	14.9	4,169
Class 1 (AA/ BB – only BB – all three AA/BB/CC)	13.8	21.0	22.9	24.2	24.7	2,179
Class 2 (AA/ CC or BB/CC or only CC)	13.0	32.2	22.3	28.8	25.7	800
Portfolio combinations (2)						
1 = no financial assets	5.5	3.9	10.2	9.6	6.7	945
2= only AA	11.6	16.5	20.8	19.5	17.3	3,224
3= only BB	10.8	9.5	29.5	35.4	23.0	47
4= only CC	0.0	47.3	31.6	27.5	25.1	11
5= AA and BB	14.1	20.0	23.8	23.7	25.4	1,279
6= AA and CC	13.2	32.1	22.3	28.3	25.7	788
7= BB and CC	100	0.0	0.0	69.6	100	1
8= AA, BB and CC	13.3	24.1	20.4	24.0	23.6	853
Total	**11.5**	**17.3**	**20.1**	**20.5**	**19.1**	**7,147**

Source: Survey of Household Income and Wealth. (1)The frequencies are weighted and refer to the whole sample; all the 5 categories of debt mentioned in Table 2 are considered. – (2) For financial assets, AA marks the category without risk, BB fairly safe assets and CC risky financial assets. The index that measures the attitude toward risk has a qualitative nature and is based on three groups of 8 different portfolio combinations: the first group includes all the households with either no financial assets or only safe assets AA (deposits); the second those that hold fairly safe financial assets BB (short-term bonds and life insurance) or the combination AA/BB and AA/BB/CC; the third those that have only risky assets CC (long-term bonds, shares, mutual funds, other form of asset management and pension funds) and the combinations AA/CC and BB/CC.

Table 4

AVERAGE AMOUNT OF DEBT FOR PERSONAL NEEDS ACCORDING TO SOCIAL AND ECONOMIC CHARACTERISTICS (1)
(only households with debt – data in euros)

	1989	1991	1993	1995	1998	Number of households in 1998
Sex of the head						
Male	8,479	11,342	13,882	14,726	14,780	1294
Woman	6,638	7,770	10,863	11,207	12,652	260
Age of the head						
Up to 30 years	8,581	14,123	12,276	12,750	9,005	94
31 to 40 years	8,612	12,249	13,994	17,197	15,023	398
41 to 50 years	8,807	11,365	13,365	13,140	17,289	493
51 to 65 years	7,482	9,483	14,318	14,109	13,922	461
Older that 65 years	6,513	5,951	8,957	8,880	8,029	108
Education of the head						
Without education	2,654	6,566	7,813	7,917	7,051	35
Primary school	7,475	8,909	10,674	11,655	11,074	274
Junior high school	7,369	9,717	13,380	12,965	10,395	490
High school	10,138	12,761	14,410	15,071	18,581	600
Degree	7,576	15,766	20,550	19,644	20,913	151
Specialization after degree	29,295	10,167	6,739	74,865	15,522	4
Job status of the head						
Employee	8,655	11,280	12,991	14,230	13,733	845
Self-employed	8,625	13,311	19,014	17,530	20,878	312
Non worker	6,293	6,973	9,079	10,804	8,853	397
Quartiles of household's income						
First quartile	7,596	12,213	13,407	9,887	9,153	202
Second quartile	7,440	7,388	9,940	12,399	10,800	373
Third quartile	7,721	9,940	12,535	13,547	14,940	480
Fourth quartile	9,773	13,900	16,691	17,622	19,350	499
Size of the municipality						
Up to 20,000 inhabitants	8,380	11,256	14,270	14,112	15,042	346
20,000 to 40,000 inhabitants	6,732	10,938	10,550	12,323	14,496	348
40,000 to 500,000 inhabitants	8,594	10,333	12,866	13,598	14,909	626
More than 500,000 inhabitants	8,550	11,112	14,481	16,967	12,118	234
Geographical areas						
North West	8,575	11,448	17,082	15,553	16,777	359
North East	9,824	12,948	14,954	16,318	18,484	300
Centre	8,925	10,615	11,716	14,633	12,520	371
South	7,094	8,138	10,645	10,191	10,646	301
Islands	6,488	11,337	10,421	12,669	11,388	223
Quartiles of financial assets						
First quartile	7,327	10,107	12,030	10,408	11,073	345
Second quartile	7,995	10,532	12,330	13,419	14,355	435
Third quartile	8,570	10,153	17,390	15,540	13,511	429
Fourth quartile	9,248	12,717	12,544	17,128	18,856	345

	1989	1991	1993	1995	1998	Number of households in 1998
Quartiles of real assets						
First quartile	4,527	4,688	4,083	3,761	4,259	281
Second quartile	4,625	8,776	9,179	8,456	10,688	343
Third quartile	10,625	11,349	13,961	15,274	13,730	445
Fourth quartile	10,610	14,169	20,176	20,756	24,688	485
Quartiles of net wealth						
First quartile	6,926	6,577	8,005	4,583	6,899	311
Second quartile	7,890	11,245	12,188	14,261	13,973	398
Third quartile	8,659	10,886	12,988	14,034	14,241	405
Fourth quartile	9,392	13,084	18,609	19,843	21,459	440
Attitude toward risk on financial investments (2)						
Class 0 (0 or only AA)	7,815	9,874	12,940	12,844	10,499	689
Class 1 (AA/ BB – only BB – all three AA/BB/CC)	9,510	11,956	13,958	14,558	18,218	637
Class 2 (AA/ CC or BB/CC or only CC)	5,285	11,901	13,493	19,366	16,267	228
Portfolios combinations (2)						
1 = no financial assets	2,409	6,649	8,372	9,329	5,210	86
2= only AA	8,389	10,063	13,648	13,473	11,096	603
3= only BB	6,028	14,256	12,304	11,381	9,385	12
4= only CC	0,000	6,405	10,329	23,785	25,823	2
5= AA and BB	9,865	10,978	14,001	13,835	17,461	377
6= AA and CC	5,301	12,051	13,550	19,084	16,175	224
7= BB and CC	3,615	0,000	0,000	19,898	7,952	2
8= AA, BB and CC	8,637	13,971	13,950	16,559	19,910	248
Total	**8,298**	**10,931**	**13,383**	**14,209**	**14,410**	**1554**

Source: Survey of Household Income and Wealth. (1)The frequencies are weighted and refer to the whole sample; all the 5 categories of debt mentioned in Table 2 are considered. – (2) For financial assets, AA marks the category without risk, BB fairly safe assets and CC risky financial assets. The index that measures the attitude toward risk has a qualitative nature and is based on three groups of 8 different portfolio combinations: the first group includes all the households with either no financial assets or only safe assets AA (deposits); the second those that hold fairly safe financial assets BB (short-term bonds and life insurance) or the combination AA/BB and AA/BB/CC; the third those that have only risky assets CC (long-term bonds, shares, mutual funds, other form of asset management and pension funds) and the combinations AA/CC and BB/CC.

Table 5

AVERAGE AMOUNT OF MORTGAGES
ACCORDING TO SOCIAL AND ECONOMIC CHARACTERISTICS (1)
(only households with mortgages – data in euros)

	1989	1991	1993	1995	1998	Number of households in 1998
Sex of the head						
Male	13,016	15,060	19,069	19,951	22,843	667
Woman	10,311	10,566	16,711	14,736	21,725	122
Age of the head						
Up to 30 years	18,199	17,998	20,203	20,991	26,263	35
31 to 40 years	12,965	17,403	20,617	24,006	23,835	211
41 to 50 years	12,672	13,984	17,423	17,174	23,930	267
51 to 65 years	11,448	13,979	18,689	17,928	21,600	228
Older that 65 years	9,135	6,843	14,528	11,395	13.831	48
Education of the head						
Without education	5,445	9,575	17,657	11,035	9,248	10
Primary school	11,663	12,530	17,685	16,519	16,625	108
Junior high school	10,784	13,149	18,210	17,279	18,023	228
High school	15,000	15,841	18,219	19,996	27,104	343
Degree	12,103	20,165	25,674	25,057	28,977	98
Specialization after degree	29,295	11,355	7,676	82,948	18,225	2
Job status of the head						
Employee	13,303	15,104	18,103	19,756	22,540	447
Self-employed	13,747	18,307	24,366	21,599	30,808	158
Non worker	9,229	8,512	14,037	14,908	13,802	184
Quartiles of household's income						
First quartile	14,915	20,379	24,631	18,729	17,422	78
Second quartile	12,204	9,186	16,217	17,554	17,763	159
Third quartile	10,906	13,164	16,800	17,937	26,121	251
Fourth quartile	14,287	17,684	19,892	21,055	24,478	301
Size of the municipality						
Up to 20,000 inhabitants	13,172	15,041	19,720	18,923	22,607	175
20,000 to 40,000 inhabitants	10,514	14,992	14,751	19,142	22,705	180
40,000 to 500,000 inhabitants	12,575	13,937	18,546	17,518	23,750	324
More than 500,000 inhabitants	13,216	14,075	19,498	22,808	20,761	110
Geographical areas						
North West	12,816	15,393	24,220	19,326	23,501	193
North East	13,721	17,453	20,614	20,110	32,671	166
Centre	14,404	13,763	15,292	19,381	19,799	176
South	12,610	11,067	15,711	17,240	16,032	152
Islands	8,674	13,731	14,917	18,892	17,962	102
Quartiles of financial assets						
First quartile	12,834	12,960	20,063	16,625	19,811	152
Second quartile	12,213	14,135	18,058	18,368	24,391	222
Third quartile	12,668	13,341	22,072	20,286	21,211	219
Fourth quartile	13,293	17,226	14,863	20,503	24,760	196

	1989	1991	1993	1995	1998	Number of households in 1998
Quartile of real assets						
First quartile	10,354	4,638	11,819	8,940	5,112	31
Second quartile	9,397	11,818	14,626	13,091	14,573	166
Third quartile	13,929	14,204	16,347	17,817	20,274	274
Fourth quartile	12,955	16,740	23,059	23,040	31,565	318
Quartiles of net wealth						
First quartile	16,740	12,862	25,595	12,049	14,914	51
Second quartile	14,457	14,095	17,605	20,125	20,255	223
Third quartile	11,323	13,700	15,269	16,460	22,055	236
Fourth quartile	11,881	15,760	21,437	22,335	27,015	279
Attitude toward risk on financial investments (2)						
class 0 (0 or only AA)	12,750	13,598	19,014	18,542	16,726	325
class 1 (AA/ BB – only BB – all three AA/BB/CC)	12,979	15,593	18,195	18,523	26,199	356
class 2 (AA/ CC or BB/CC or only CC)	9,669	14,405	19,746	26,074	30,491	108
Portfolios combinations (2)						
1 = no financial assets	4,268	10,301	17,517	17,232	11,077	27
2= only AA	13,180	13,718	19,152	18,698	17,105	298
3= only BB	1,706	18,696	15,225	18,006	15,425	3
4= only CC	0,000	6,257	10,329	31,293	25,823	2
5= AA and BB	13,339	14,204	19,035	17,673	27,095	198
6= AA and CC	9,669	14,705	20,029	26,014	30,695	105
7= BB and CC	0,000	0,000	0,000	20,131	15,494	1
8= AA, BB and CC	12,427	18,256	16,509	20,145	25,417	155
Total	**12,747**	**14,584**	**18,719**	**19,191**	**22,660**	**789**

Source: Survey of Household Income and Wealth. (1)The frequencies are weighted and refer to the whole sample; all the 5 categories of debt mentioned in Table 2 are considered. – (2) For financial assets, AA marks the category without risk, BB fairly safe assets and CC risky financial assets. The index that measures the attitude toward risk has a qualitative nature and is based on three groups of 8 different portfolio combinations: the first group includes all the households with either no financial assets or only safe assets AA (deposits); the second those that hold fairly safe financial assets BB (short-term bonds and life insurance) or the combination AA/BB and AA/BB/CC; the third those that have only risky assets CC (long-term bonds, shares, mutual funds, other form of asset management and pension funds) and the combinations AA/CC and BB/CC.

Table 6

THE ENFORCEMENT COSTS FOR LOAN CONTRACTS IN ITALIAN REGIONS (1)

Regions	Recovery time (in months)	Regions	Recovery share (in percentage)
Valle d'Aosta	*18.0*	**Calabria**	**84.5**
Trentino Alto Adige	*34.9*	**Basilicata**	**82.5**
Liguria	*49.2*	*Veneto*	*72.8*
Friuli Venezia Giulia	*51.5*	*Friuli Venezia Giulia*	*70.3*
Umbria	53.2	Umbria	70.1
Piedmont	*54.6*	**Sicily**	**70.1**
Lombardy	*55.8*	**Sardinia**	**67.5**
Veneto	*56.0*	*Trentino Alto Adige*	*66.8*
Tuscany	60.0	*Piedmont*	*65.5*
Emilia Romagna	*63.8*	**Molise**	**65.0**
Lazio	64.4	*Emilia Romagna*	*63.0*
Calabria	**65.6**	*Lombardy*	*60.4*
Abruzzo	**67.4**	Tuscany	60.0
Campania	**68.8**	**Puglia**	**59.9**
Molise	**73.5**	**Campania**	**57.6**
Sardinia	**77.0**	*Liguria*	*57.5*
Basilicata	**82.4**	Lazio	57.3
Puglia	**82.8**	**Abruzzo**	**52.6**
Marche	**88.8**	Marche	41.0
Sicily	**91.2**	*Valle d'Aosta*	*40.0*
Italy	62.9		63.2

Source: Bank of Italy questionnaire for a representative sample of banks referring to the years 1992-93. Only mortgage proceedings for insolvency are considered. (1) Southern regions are in bold, northern regions in italics

Table 7

PARTICIPATION IN THE DEBT MARKET (1)

(pooled and panel probit random effect estimation - 1989-1998)

	Marginal effects pooled estimation	Marginal effects panel estimation	Marginal effects panel estimation
Age	0.012 (7.53)	0.017 (5.07)	0.017 (5.13)
Age squared	-0.178 (-10.1)	-0.238 (-6.71)	-0.238 (-6.74)
Income	0.003 (8.89)	0.003 (4.51)	0.003 (5.11)
Income squared	-0.000 (-7.57)	-0.000 (-3.76)	-0.000 (-3.86)
Net wealth	0.000 (4.99)	0.000 (1.01)	
Net wealth squared	-0.000 (-4.34)	-0.000 (-0.12)	
Retirement income	0.035 (5.47)	0.030 (2.78)	0.029 (2.68)
Self-employed	-0.025 (-4.32)	-0.030 (-2.75)	-0.026 (-2.40)
No. of income earners	0.014 (4.07)	0.020 (3.22)	0.018 (2.96)
Married	0.051 (8.46)	0.064 (5.50)	0.064 (5.54)
No. of children	0.009 (3.35)	0.004 (0.85)	0.004 (0.86)
High school education	0.017 (3.23)	0.024 (2.39)	0.025 (2.50)
High risk in financial investment	0.021 (2.43)	0.009 (0.64)	0.009 (0.66)
Mun. <20,000 inhab.	-0.037 (- 6.86)	-0.037 (-3.43)	-0.036 (-3.31)
Centre	0.031 (4.28)	0.083 (4.81)	0.084 (4.89)
South	-0.002 (- 0.17)	0.013 (0.69)	0.013 (0.71)
Herfindahl index on a provincial basis	0.131 (3.51)	0.201 (2.76)	0.201 (2.76)
Loan interest rate	0.001 (0.21)	-0.010 (-1.63)	-0.010 (-1.66)
Recovered share	0.001 (4.23)	0.002 (3.16)	0.002 (3.17)
Recovery time	0.000 (0.30)	0.001 (-1.10)	0.001 (-1.10)
Number of observations	32,588	13,793	13,793
Period of time	1989-1998	1989-1998	1989-1998
Predicted probability	0.186	0.141	0.141
Pseudo R squared	0.075		
Prob Wald chi2 (all the Coefficients = 0)		0.000	0.000
Prob Likelihood ratio test ?=0 (the panel-level variance is =0)		0.000	0.000

(1) All the regressions include a constant and time dummies. T test are reported in brackets; in the pooled estimation standard errors are robust against heteroscedasticity and are calculated with the White method. Marginal effects are expressed at the mean value of the independent variables. The dummy “high risk in financial investment” is equal to 1 for households with risky combination of financial investments, such as either AA-CC or BB-CC or only CC, where AA marks safe financial assets, BB fairly safe financial assets and CC risky financial assets. The Herfindahl index is calculated considering the number of branches and on a provincial basis; the interest rate on loans is measured on a provincial basis and refers to households’ loans. The data on the recovery of financing are on a regional basis. The dummy South is equal to 1 for the households that live in the southern regions and 0 otherwise. The Likelihood ratio test is a test on the significance of the panel-level variance component and formally compares the pooled estimator with the panel estimator. For further information on the variables and about the panel component of the SHIW, see the Appendix.

Table 8

PARTICIPATION IN THE DEBT MARKET: INFORMATION ON FINANCIAL ASSETS, RELATIONSHIP WITH THE BANK AND WORKING IN SMALL FIRMS

(panel probit random effect estimation - different periods)

	Marginal effects	Marginal effects	Marginal effects
Age	0.021 (2.59)	0.022 (4.18)	0.023 (4.42)
Age squared	-0.276 (-3.30)	-0.292 (-5.39)	-0.301 (-5.56)
Income	0.005 (3.61)	0.004 (4.24)	0.003 (4.36)
Income squared	-0.000 (-3.19)	-0.000 (-3.59)	-0.000 (-3.67)
Net wealth	0.000 (-1.02)	0.000 (-0.29)	0.000 (-0.25)
Net wealth squared	0.000 (-1.43)	0.000 (0.65)	0.000 (0.62)
Retirement income	0.059 (2.42)	0.052 (3.27)	0.046 (3.00)
Self-employed	-0.018 (-0.71)	-0.024 (-1.38)	-0.018 (-1.03)
No. of income earners	0.013 (0.95)	0.016 (1.82)	0.015 (1.72)
Married	0.100 (3.96)	0.080 (4.76)	0.080 (4.77)
No. of children	-0.003 (-0.26)	0.005 (0.66)	0.005 (0.62)
High school education	0.029 (1.35)	0.032 (2.16)	0.033 (2.22)
High risk in financial investment	-0.031 (-1.21)	-0.004 (-0.22)	-0.005 (-0.25)
Mun. <20,000 inhab.	-0.075 (-3.39)	-0.055 (-3.54)	-0.053 (-3.42)
Centre	0.080 (2.42)	0.093 (3.73)	0.092 (3.71)
South	-0.014 (-0.33)	-0.008 (-0.28)	-0.009 (-0.32)
Herfindahl index on a provincial basis	0.043 (0.28)	0.255 (2.37)	0.261 (2.43)
Loan interest rate	0.010 (0.78)	-0.002 (-0.29)	-0.002 (-0.26)
Recovered share	0.005 (3.59)	0.003 (2.91)	0.003 (2.89)
Recovery time	0.000 (0.05)	0.000 (0.02)	-0.000 (-0.05)
Index of financial knowledge (1)	0.098 (2.55)		
Working in a firm with fewer than 20 employees		-0.034 (-1.71)	
Relationship with bank between 5 and 10 years			0.041 (3.02)
Number of observations	3,696	7,536	7,536
Period of time	1995-1998	1993-1998	1993-1998
Predicted probability	0.186	0.155	0.155
Prob Wald chi2 (all the coefficients=0)	0.000	0.000	0.000
Prob Likelihood ratio test ?=0 (the panel-level variance is =0)	0.000	0.000	0.000

(1) For the construction of the index, see the Appendix.

Table 9

PARTICIPATION IN THE DEBT MARKET: EFFECT OF EDUCATION AND ANALYSIS ON TWO SUBPERIODS

(panel probit random effect estimation – different periods)

	Marginal effects	Marginal effects 1989-1993	Marginal effects 1995-1998
Age	0.017 (4.82)	0.014 (3.51)	0.021 (2.69)
Age squared	-0.240 (-6.43)	-0.205 (-4.74)	-0.288 (-3.44)
Income	0.003 (4.51)	0.002 (2.49)	0.005 (4.09)
Income squared	-0.000 (-3.76)	-0.000 (-2.10)	-0.000 (-3.45)
Net wealth	0.000 (-1.01)	0.000 (1.95)	-0.000 (-0.82)
Net wealth squared	0.000 (-0.12)	-0.000 (-1.24)	0.000 (1.29)
Retirement income	0.030 (2.78)	0.025 (1.80)	0.060 (2.45)
Self-employed	-0.030 (-2.75)	-0.041 (-3.23)	-0.018 (-0.70)
No. of income earners	0.020 (3.22)	0.027 (3.52)	0.010 (0.72)
Married	0.064 (5.50)	0.043 (3.04)	0.102 (4.02)
No. of children	0.004 (0.85)	0.009 (1.42)	-0.004 (-0.33)
High school education		0.018 (1.53)	0.036 (1.67)
High school*age1 (1)	0.026 (1.64)		
High school*age2	0.024 (1.92)		
High school*age3	0.032 (0.76)		
High risk in financial investment	0.009 (0.64)	0.021 (1.05)	-0.029 (-1.10)
Mun. <20,000 inhab.	-0.037 (-3.43)	-0.024 (-1.95)	-0.078 (-3.50)
Centre	0.083 (4.81)	0.064 (3.07)	0.077 (2.32)
South	0.013 (0.69)	0.020 (0.95)	-0.024 (-0.58)
Herfindahl index on a provincial basis	0.201 (2.76)	0.164 (1.91)	0.074 (0.49)
Loan interest rate	-0.010 (-1.63)	-0.017 (-2.08)	0.009 (0.73)
Recovered share	0.002 (3.16)	0.001 (2.07)	0.005 (3.57)
Recovery time	0.001 (-1.10)	-0.000 (-0.68)	0.000 (0.00)
Number of observations	13,793	7,824	3,696
Period of time	1989-1998	1989-1993	1995-1993
Predicted probability	0.141	0.121	0.187
Prob Wald chi2 (all the Coefficients=0)	0.000	0.000	0.000
Prob Likelihood ratio test ?=0 (the panel-level variance is =0)	0.000	0.000	0.000

(1) Age1= the head is aged 20 to 40; age2= 40 to 65; age3=above 65

Table 10

PARTICIPATION IN THE MORTGAGE AND CONSUMER LOAN MARKET

(bivariate probit model – pooled estimation 1989-1998)

	Mortgages Marginal effects	Consumer loans Marginal effects	Mortgages Marginal effects	Consumer loans Marginal effects
Age	0.010 (8.13)	0.004 (3.22)	0.010 (8.13)	0.004 (3.37)
Age squared	-0.136 (-9.97)	-0.065 (- 5.11)	-0.136 (-9.97)	-0.067 (-5.25)
Income	0.001 (4.99)	0.002 (8.20)		
Income squared	0.000 (-4.70)	-0.000 (- 6.51)		
1° quintile income			0.001 (-1.21)	0.000 (0.04)
2° quintile income			0.000 (0.97)	0.001 (2.89)
3° quintile income			0.001 (1.99)	0.001 (3.64)
4° quintile income			0.000 (2.31)	0.001 (4.13)
5° quintile income			0.000 (1.29)	0.001 (4.52)
Net wealth	0.000 (16.4)	0.000 (-11.1)	0.000 (17.1)	0.000 (-10.2)
Net wealth squared	0.000 (-10.9)	0.000 (8.63)	0.000 (-11.4)	0.000 (7.45)
Retirement income	0.021 (4.31)	0.017 (3.71)	0.021 (4.42)	0.019 (4.05)
Self-employed	-0.029 (-6.92)	0.005 (1.20)	-0.029 (-7.05)	0.004 (0.98)
No. of income earners	0.008 (3.75)	0.008 (3.33)	0.009 (3.66)	0.011 (4.73)
Married	0.034 (7.40)	0.021 (4.85)	0.034 (7.35)	0.022 (5.04)
No. of children	0.003 (1.67)	0.005 (2.45)	0.003 (1.64)	0.005 (2.40)
High school education	0.023 (5.96)	-0.006 (-1.51)	0.023 (6.12)	-0.004 (-1.00)
High risk in financial investment	0.004 (0.63)	0.021 (3.34)	0.004 (0.69)	0.023 (3.52)
Mun. <20,000 inhab.	-0.017 (-4.35)	-0.023 (-5.94)	-0.018 (-4.45)	-0.023 (-6.09)
Centre	0.013 (2.34)	0.027 (5.04)	0.012 (2.28)	0.027 (4.97)
South	-0.007 (-0.96)	0.013 (1.84)	-0.007 (-0.92)	0.012 (1.75)
Herfindahl index on a provincial basis	0.067 (2.39)	0.080 (2.99)	0.065 (2.32)	0.080 (3.00)
Loan interest rate	-0.005 (-1.91)	0.004 (1.46)	-0.005 (-1.91)	0.003 (1.42)
Recovered share	0.001 (4.86)	0.001 (2.71)	0.001 (4.76)	0.001 (2.55)
Recovery time	0.000 (0.98)	-0.000 (-0.10)	0.000 (0.92)	-0.000 (-0.24)
Number of observations	32,588	32,588	32,588	32,588
Period of time	1989-1998	1989-1998	1989-1998	1989-1998
Predicted probability	0.098	0.090	0.098	0.090
Prob Wald test all the Coefficients =0	0.000	0.000	0.000	0.000
Prob Wald test no correlation between decisions	0.000	0.000	0.000	0.000
Prob Wald test the coefficients are equal in the two equations	0.000		0.000	

Table 11

THE PROBABILITY OF DEMANDING A LOAN AND OF BEING CREDIT RATIONED

(pooled probit estimation 1989-1993-1995)

Loan demand	Marginal effects	Credit rationing	Marginal effects	Marginal effects without dummy area
Age	0.002 (3.06)	Age	0.001 (0.56)	0.001 (0.97)
Age squared	-0.038 (-5.24)			
Income	0.001 (3.02)	Income	-0.002 (-3.44)	-0.002 (-3.71)
Income squared	0.000 (-3.10)			
Net wealth	0.000 (-1.00)	Net wealth	0.001 (0.00)	0.000 (-0.04)
Net wealth squared	0.000 (2.09)			
Retirement income	0.006 (1.57)	Retirement income	-0.042 (-1.67)	-0.041 (-1.60)
Self-employed	0.006 (1.83)	Self-employed	0.055 (2.43)	0.054 (2.36)
No. of income earners	0.008 (3.78)	No. of income earners	0.002 (1.42)	0.014 (1.16)
Married	0.008 (2.12)	Married	-0.091 (-3.33)	-0.074 (-2.77)
No. of children	0.003 (1.99)	No. of children	0.016 (1.82)	0.021 (2.36)
High school education	0.005 (1.66)	High school education	-0.045 (-2.41)	-0.042 (-2.22)
High risk in financial investment	-0.006 (-1.27)	High risk in financial investment		
Mun. <20,000 inhab.	-0.015 (-5.00)	Mun. <20,000 inhab.	0.003 (0.12)	0.003 (0.12)
Centre	0.010 (2.41)	Centre	0.038 (1.40)	
South	-0.005 (-0.80)	South	0.128 (3.68)	
Herfindahl index	0.016 (0.75)	Herfindahl index	-0.219 (-1.60)	-0.118 (-0.87)
Loan interest rate	0.003 (1.65)			
Recovered share	0.001 (3.24)	Recovered share	-0.001 (-0.66)	0.000 (0.42)
Recovery time	0.000 (2.45)	Recovery time	-0.001 (-0.75)	0.002 (3.29)
Number of observations	22,620		1,287	1,287
Period of time	1989-1995-1998		1989-1995-1998	1989-1995-1998
Predicted probability	0.043		0.099	0.083
Pseudo R squared	0.068			

Table 12

TOBIT ESTIMATION OF THE DETERMINANTS OF THE LOAN'S SIZE (1)
(pooled and panel random effects estimation - 1989-1998)

	Tobit model pooled estimation	Tobit model panel estimation
Age	0.591 (7.77)	0.668 (5.05)
Age squared	-8.690 (-10.5)	-9.598 (-6.83)
Log Income	8.758 (5.06)	5.830 (2.22)
Log Income squared	-0.999 (-4.21)	-0.644 (-1.80)
Log Net wealth	1.406 (6.03)	0.161 (0.50)
Log Net wealth squared	-0.048 (-1.57)	0.071 (1.66)
Retirement income	1.445 (4.85)	1.053 (2.42)
Self-employed	-1.300 (-4.77)	-1.265 (-2.78)
No. of income earners	0.872 (5.68)	0.964 (4.14)
Married	2.411 (8.22)	3.001 (5.81)
No. of children	0.360 (2.79)	0.079 (0.38)
High risk in financial Investment	0.870 (2.28)	0.385 (0.75)
High school education	0.788 (3.43)	0.913 (2.35)
Mun. <20,000 inhab	-1.814 (-7.15)	-1.595 (-3.56)
Centre	1.310 (3.90)	2.743 (4.51)
South	0.006 (0.01)	0.495 (0.66)
Herfindahl index	5.179 (3.05)	7.603 (2.63)
Loan interest rate	-0.015 (-0.10)	-0.314 (-1.37)
Recovered share	0.054 (3.88)	0.066 (2.69)
Recovery time	0.001 (0.06)	-0.029 (-1.36)
Constant	-60.310 (-13.6)	-45.846 (-6.57)
N. of observations	31,588	13,340
N. of uncensored observations	6.460	3,071
N. of censored observations	25,128	10,269
Period	1989-1998	1989-1998
Prob Likelihood ratio/Wald test all the coefficients =0	0.000	0.000
Prob Likelihood ratio test ?=0 (the panel-level variance is =0)		0.000

(1) The dependent variable is the logarithm of the households' debt.

Table 13

TWO-STAGE HECKMAN ESTIMATION
OF THE DETERMINANTS OF THE LOAN'S SIZE (1)
(pooled and panel random effects estimation - 1989-1998)

	OLS pooled estimation	Panel estimation with random effects	Two-stage Heckman pooled	Two-stage Heckman panel
Age	-0.013 (-6.34)	-0.012 (-2.49)	-0.016 (-5.28)	-0.012 (-1.75)
Log Income	-0.095 (-1.96)	-0.249 (-2.93)	-0.188 (-2.54)	-0.321 (-2.51)
Log Net wealth	0.295 (24.5)	0.260 (9.25)	0.290 (22.7)	0.256 (8.74)
Retirement income	0.161 (3.30)	0.052 (0.56)	0.125 (2.01)	0.012 (0.11)
Self-employed	0.127 (2.95)	0.253 (2.66)	0.237 (3.52)	0.322 (2.43)
No. of income earners	0.084 (3.38)	0.143 (2.93)	0.133 (4.10)	0.161 (2.54)
Married	0.084 (1.56)	-0.016 (-0.13)	0.044 (0.68)	-0.059 (-0.43)
No. of children	-0.001 (-0.04)	0.056 (1.37)	0.048 (1.67)	0.072 (1.30)
High school education	0.163 (4.39)	0.200 (2.66)	0.119 (2.72)	0.170 (2.00)
High risk in financial investment	-0.005 (-0.08)	0.054 (0.55)	-0.054 (-0.82)	0.017(0.15)
Centre	-0.066 (-1.19)	-0.122 (-1.00)	-0.011 (-0.18)	-0.106 (-0.79)
South	-0.151 (-2.02)	-0.059 (-0.37)	0.031 (-0.34)	0.004 (0.02)
Herfindahl index	-0.114 (-0.41)	0.102 (0.17)	-0.311 (-1.05)	-0.035 (-0.05)
Loan interest rate	-0.066 (-2.66)	-0.072 (-1.56)	-0.052 (-2.03)	-0.067 (-1.43)
Recovered share	0.009 (3.75)	0.014 (2.61)	0.008 (3.12)	0.013 (2.33)
Recovered time	0.001 (0.46)	0.002 (0.53)	0.001 (0.33)	0.002 (0.48)
Constant	2.104 (4.63)	2.607 (2.84)	2.529 (3.57)	3.238 (2.37)
Non random sample correction for D=1			0.043 (0.22)	-0.149 (-0.38)
Non random sample correction for NLC=1			-4.389 (-2.36)	-2.195 (-0.65)
N. of observations	6,334	1,949	6,334	1,949
Period	1989-1998	1989-1998	1989-1998	1989-1998
R squared	0.129		0.129	
Prob Wald test all the Coefficients =0		0.000		0.000
Prob Breush-Pagan Test Var u=0		0.000		0.000
Prob Hausman Test H0=the differences in the coefficients between fixed and random effects estimations are not systematic		0.048		0.095

(1) The dependent variable is the logarithm of the households' debt. The number of observations is lower compared with the number of uncensored observations in Table 12 because in this specification we exclude from the sample not only households with zero debt, but also households that have been rationed at least once in the period under investigation. In the two-stage Heckman estimation the standard errors are not corrected.

Table 14

ESTIMATION OF THE DETERMINANTS OF THE LOAN'S SIZE FOR TWO SUBPERIODS

(pooled estimation – different periods)

	Two-stage Heckman pooled estimation 1989-93	Two-stage Heckman pooled Estimation 1995-98
Age	-0.015 (-3.13)	0.010 (-2.56)
Log Income	-0.187 (-2.11)	-0.179 (-1.43)
Log Net wealth	0.273 (15.6)	0.319 (16.6)
Retirement income	0.010 (0.13)	0.252 (2.65)
Self-employed	0.139 (1.69)	0.280 (2.57)
No. of income earners	0.092 (2.01)	0.125 (2.80)
Married	0.083 (1.05)	-0.037 (-0.33)
No. of children	0.019 (0.47)	0.022 (0.54)
High school education	0.181 (3.41)	0.061 (0.87)
High risk in financial investment	0.038 (0.40)	-0.109 (-1.21)
Centre	-0.041 (-0.48)	-0.058 (-0.65)
South	-0.022 (-0.18)	-0.189 (-1.42)
Herfindahl index	-0.425 (-1.10)	-0.196 (-0.40)
Loan interest rate	-0.095 (-2.56)	-0.021 (-0.57)
Recovered share	0.004 (1.26)	0.014 (3.55)
Recovery time	0.001 (0.38)	0.001 (0.24)
Non random sample correction for D=1	-0.132 (-0.48)	-0.069 (-0.26)
Non random sample correction for NLC=1	-1.401 (-0.65)	-4.408 (-1.36)
Constant	3.760 (4.11)	1.004 (1.11)
N. of observations	3,429	2.905
Period	1989-1993	1995-98
R squared	0.127	0.138

Figure 1

PROBABILITY OF DEBT AND AGE

Figures 1 to 3 report the effect on the probability of debt based on the coefficients of the panel regression in Table 7; Figure 4 hinges on the coefficients of the credit rationing pooled regression without dummy area reported in Table 11. Probabilities are estimated at the mean values of the independent variables different from that considered in the figure. Figures report the values of the explanatory variables corresponding to the 1st, 25th, 50th, 75th and 99th percentiles.

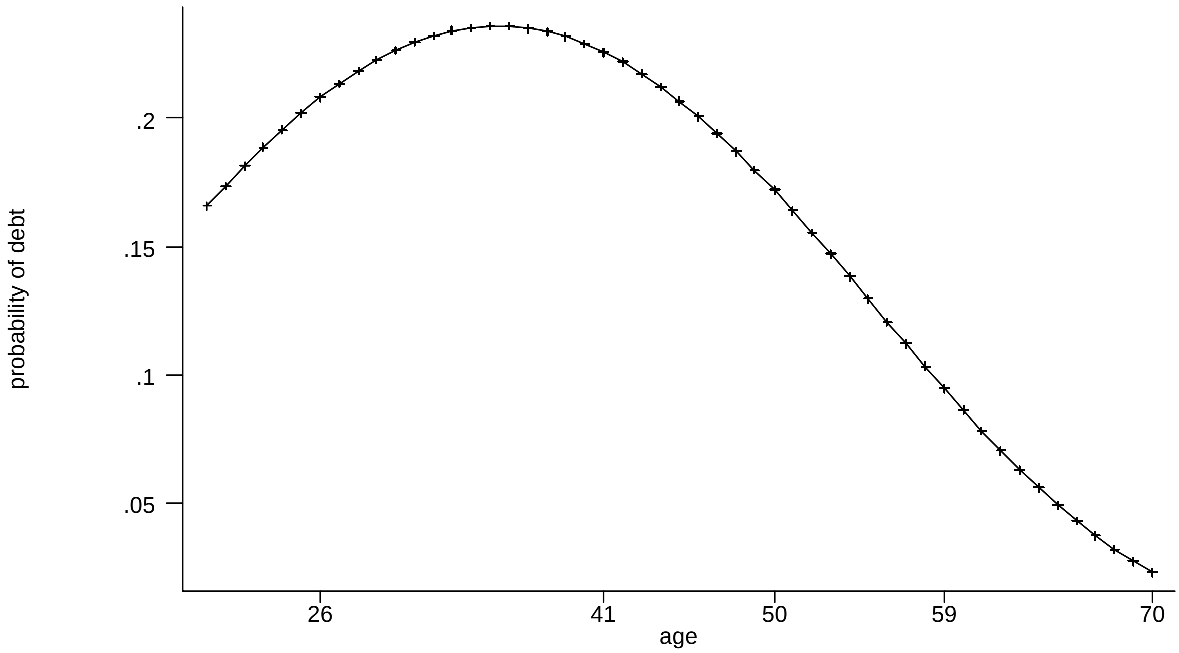


Figure 2

PROBABILITY OF DEBT AND INCOME

(income is expressed at 1995 prices and in thousands of euros)

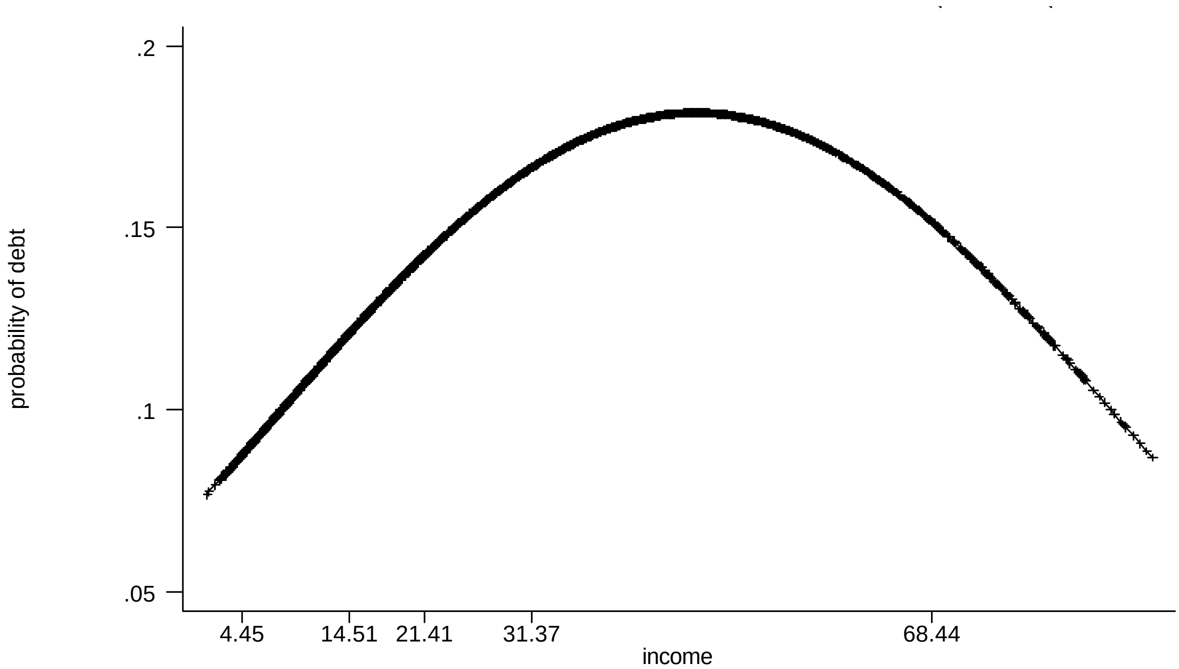


Figure 3

PROBABILITY OF DEBT AND RECOVERED SHARE OF THE LOAN
(recovered share is in percentage)

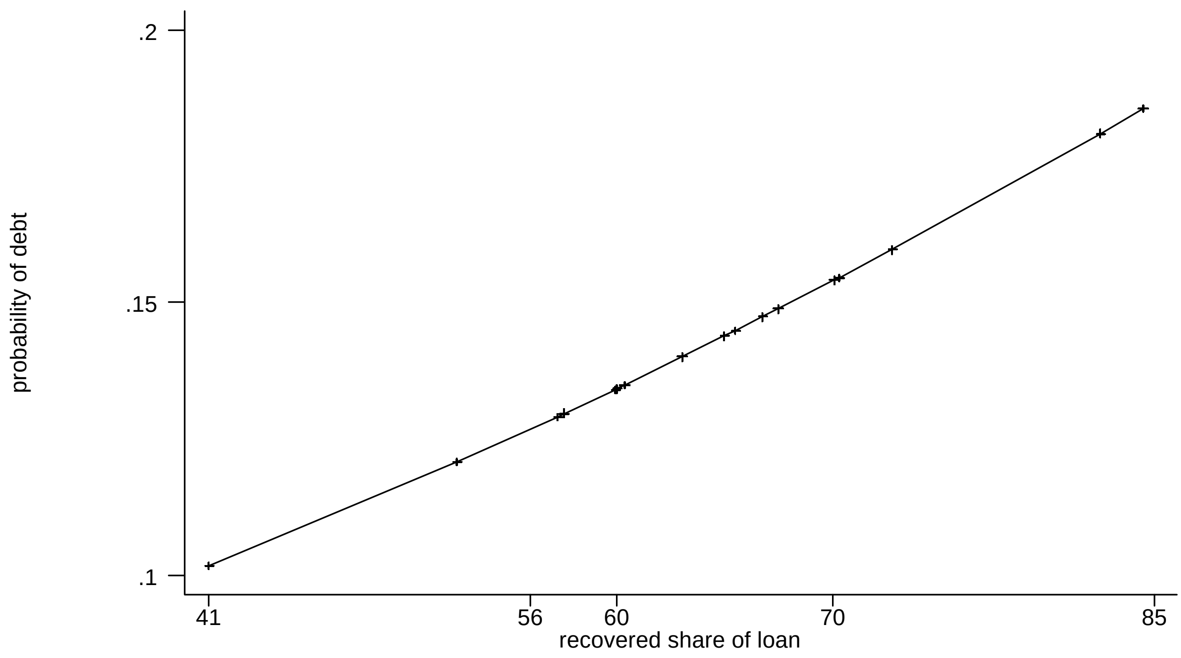
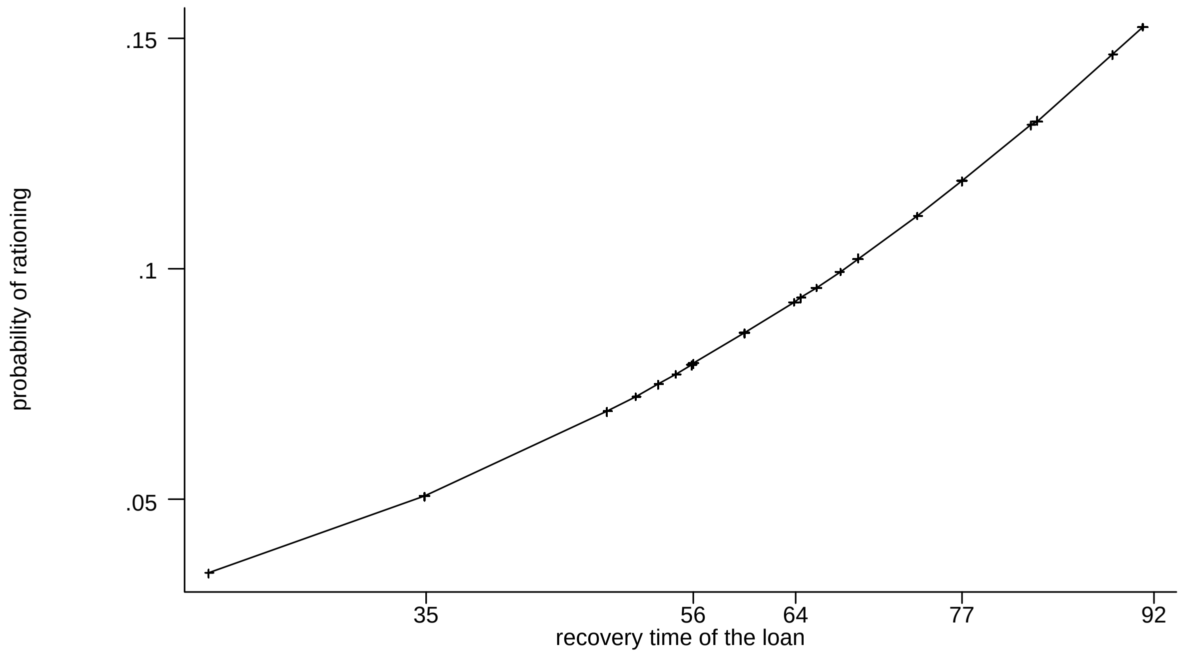


Figure 4

PROBABILITY OF RATIONING AND RECOVERY TIME
(recovery time is in months)



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