

Does Poor Legal Enforcement Make Households Credit-Constrained?*

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Abstract

This paper analyzes the relation between the quality of the legal enforcement of loan contracts and the allocation of credit to households, both theoretically and empirically. We use a model of household credit market with secured debt contracts, where the judicial system affects the cost incurred by banks to actually repossess the collateral. The model shows that the working of the judicial system affects both the probability of being credit-constrained and the equilibrium amount of debt. In the empirical part, we test our predictions using data on Italian households and on the performance of Italian judicial districts. Controlling for household characteristics, unobserved heterogeneity at judicial district level and aggregate shocks, we document that an increment in the backlog of trials pending has a statistically and economically significant positive effect on the household probability of being turned down from the credit. Endowing the households living in high-cost judicial districts like Campobasso or Caltanissetta (in southern Italy) with the best enforcement in the sample would reduce the probability of their being credit-constrained by 70% and 63%, respectively. This effect is stronger for poorer than for wealthier households. Moreover, we document that an increment in the backlog of trials pending reduces the availability of credit for poorer households but, surprisingly, has the opposite effect on wealthy households, whose debt volume increases. Again, this effect is found to be significant both statistically and economically.

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1 Introduction

In the last few years a new line of research has begun to investigate the economic implications of different legal systems. Most of this literature focuses on corporate credit and identifies two channels by which legal institutions may affect financial markets: the content of the law and the quality of its enforcement.

Among others, La Porta et al. (1997) document that corporate debt is higher in countries where creditors' rights are better protected. Cristini, Moya and Powell (1999) show that the quality of judicial enforcement affects the size of regional credit allocated to the corporate sector in Argentina, while Bianco, Jappelli and Pagano (2000) find that in Italy, where the backlog of trials pending is relatively large, credit is less widely available to firms than elsewhere and the default rates are larger.¹ Similar evidence is documented for the case of Spain by Fabbri (2001). She finds that differences in firms' external finance and size, as well as in banks' lending rates can be explained by differences in the performance of courts in different judicial districts.

Only a few papers examine the household credit market, all offering empirical evidence on how different legal bankruptcy arrangements affect this market and all focusing exclusively on the United States. For example, Meador (1982) and Jaffee (1985) provide evidence that U.S. mortgage interest rates were generally higher in states where the foreclosure process is longer and more costly. Only Gropp, Sholz and White (1997) look at the impact of different degrees of creditor protection on the households debt volume and credit constraints. Using data coming from the Survey on Consumer Finance, they document that the size of asset bankruptcy exemptions has a statistically and economically significant, positive effect on the household probability of being turned down from the credit. They

¹Recently also Guiso, Sapienza and Zingales (2001) have used Italian data to investigate the institutional determinants of financial development. Unlike our work, they focus on the role of social capital, measured by the electoral turnout at the province level. They find that in areas of the country with higher level of social capital, households invest less in cash and more in stock, have easier access to the institutional credit market and make less use of informal credit. They also provide evidence that the effect of social capital is stronger where legal institutions are weaker.

also find that an increment in asset bankruptcy exemptions reduces the volume of credit for households in the lower half of the the asset distribution, while it increases the availability of credit to households in the upper half of the asset distribution.

The allocation of credit to households might depend both on the content of laws which regulate credit contracts and on the degree of enforcement on these rules by the courts. The objective of this paper is to measure the effect of the latter. More precisely, we test whether the behavior of courts in enforcing credit contracts is able to explain differences in the household credit market. To this end, we use data on Italian households drawn from the Survey of Household Income and Wealth and we combine them with data on Italian judicial districts. This data set is particularly well suited for our problem, since in Italy the rules on credit relations are the same nationwide, but enforcement differs considerably across judicial districts. Italy thus offers a useful if not unique natural experiment that can disentangle the enforcement effect from the legislative effect. Our focus on the quality of the enforcement of credit contracts distinguishes us from Gropp, Sholz and White (1997). They investigate how differences in the content of bankruptcy laws affect household credit market, without controlling for possible differences in the enforcement of laws.

Unlike Gropp, Sholz and White (1997), we base our empirical analysis on a theoretical model, which is suitable to describe an economic mechanism through which courts may affect the credit market. We consider the household credit market with secured debt contracts and strategic default, where the judicial system affects the costs paid by creditors to enforce their right to repossess the collateral, by determining when the transfer of the assets takes place. The model identifies two main effects of weak judicial enforcement. First, households are more likely to be credit-constrained when judicial costs are high, i.e. the quality of enforcement is poor, because when contracts are weakly enforced the household's incentive to repay decreases and banks respond by rationing credit. Second, the higher the judicial costs, the smaller the amount of credit provided to households in equilibrium, because banks compensate for the lower net revenues from the liquidation of the collateral asset by

charging higher interest rates.

We test the validity of these theoretical predictions by proxying the amount of legal costs (i.e. the degree of enforcement) with measures based on the backlog of civil trials. First, we investigate whether the probability of a given household's being credit-constrained depends on judicial costs. Second, we test whether the level of the household's debt is also sensitive to judicial costs. Controlling for household characteristics, unobserved heterogeneity at judicial district level and aggregate shocks, we document that a poorly functioning legal system does cause Italian households to be credit-constrained: households living in judicial districts where the quality of legal enforcement is poorer have a higher probability of being denied loans.

To quantify this distortion, we compute how much the probability of being credit-constrained would change on average, if we endowed all the households with the same degree of enforcement. Other things being equal, endowing the households living in high-cost judicial districts like Campobasso or Caltanissetta (in southern Italy) with the best enforcement in the sample would reduce the probability of their being credit-constrained by 70% and 63%, respectively.

We also document a second welfare implication of poor legal enforcement: the amount of debt decreases as the quality of enforcement worsens. The elasticity of household debt with respect to the quality of enforcement is about 34%, meaning that a 1% increase of the legal costs (corresponding to a 1,500 units increase of trials pending) corresponds with a reduction of €300 in the debt.

Although our analysis suggests that stronger legal enforcement seems to occur much more often in the wealthier northern part of Italy than in the less wealthy southern regions, there is no reason to suspect that the coefficient of the legal variable is indeed picking up regional differences in social or economic factors that are correlated with our measures of legal enforcement. This is because in all the estimations we control for unobserved heterogeneity using judicial district dummies.

As opposed to Bianco, Jappelli and Pagano (2000), we focus on the household rather than on the corporate credit market. Moreover, we use micro-data (at the household level) instead of aggregate data (at the provincial level), which has two main advantages. First, with data at the household level we obtain more robust results, as potential problems of endogeneity in our estimates are removed. Second, we are able to test a larger set of predictions. For instance, our data enable us to look at the effect of the legal variable on the household probability of being credit-constrained. Furthermore, they allow us to control for compositional effects. That is, we are able to investigate how the effect of the legal enforcement on the probability of being credit-constrained and on the debt volume depends on household characteristics.

To this regard, we document two new features of the Italian credit market. First, the effect of legal enforcement on credit constraints is much stronger for low asset households. The probability that a household in the first quartile of the asset distribution is credit-constrained ranges from 60% in the worst judicial district to 18% in the best judicial district. This jump is strongly reduced if we consider households in the last quartile, where the probability ranges from 23% in the worst judicial district to 12% in the best judicial district.

Second, we find that a worsening in the legal enforcement reduces the amount of debt of households in the first and second quartile, but it increases the availability of credit for households in the upper half of the asset distribution. This effect is significant not only statistically but also economically. Computing the elasticity of the household debt with respect to the legal variable, we find that a 1% increase of the legal costs is associated to a reduction of €9000 in the debt volume of low asset households and an increment of €4000 in the debt volume of high asset households.

Surprisingly, this last finding seems to suggest that an ill-functioning legal system re-distributes credit toward borrowers with higher assets.

The paper is organized as follows. In section 2, we develop a simple model of the households credit market and derive testable implications of the role of the judicial system.

Section 3 describes the data and discusses the measures used to proxy the quality of legal enforcement. Section 4 presents the results of the empirical analysis. Section 5 concludes.

2 The Model

We consider a credit market with secured debt contracts where households borrow and banks lend.

Each household lives for two periods and is endowed with an illiquid asset, A_i . The household works only in the second period, earning a stochastic positive wage, denoted by w_i in the good state of nature, which occurs with probability p_i , and zero otherwise.

Utility depends on consumption, c_i , and on the property of the illiquid asset A_i . It is time-additive and given by: $U_i = [\log(A_i + c_{1i})] + \beta_i [\log(A_i + c_{2i})]$. Households want to smooth consumption over time. To finance first-period consumption, they can either borrow or dispose of the illiquid asset. Since we are interested in how the judicial system affects the credit market, however, we posit that the unit selling price of A_i , denoted by α , is low enough that it is always optimal not to sell but hold the asset as collateral in a credit contract. This assumption captures two different but common facts: first, the presence of transaction costs, which may sharply reduce the secondary market price of these goods; second, the personal value of goods to the owner that cannot be reflected in the market price. An example for the type of good that we have in mind is the house of residence.

The credit is provided by risk-neutral banks in a free-entry market. For simplicity, we assume a fixed interest rate, \bar{r} , on deposits.

Since the credit is provided in the first period and repayment is made only in the second, households face a commitment problem. According to the literature on credit rationing and imperfect information,² in this case it is optimal for both banks and households to sign a collateralized credit contract. Under the assumption of limited liability, the contract establishes that if the borrower fails to repay, the title to the asset A_i is transferred to

²See, among others, Bester (1987).

the bank. However, the collateral asset does not entirely eliminate the incentive to default for households with low levels of wealth. In this case, banks are forced to ration credit to induce them to repay. Notice that even if all borrowers have the incentive to repay their debt, there still exists the possibility that banks ask the courts to enforce their right to repossess, namely in cases of involuntary default, happens when households are hit by a negative income shock.

A key assumption concerns the enforcement procedure. We assume that the judicial system determines when the collateral is transferred in case of default. The worse the performance of courts, the later the transfer, and hence the liquidation of the asset. From the lender's point of view, weak legal enforcement is a cost. This cost may consist in legal expenses that depend on the length of the trial or else in a decrease in the asset's value due to depreciation. In both situations, the effective liquidation value of the collateral asset, and hence the bank's total revenues, are lower the poorer the quality of legal institutions. If we denote the degree of legal enforcement by g , where $0 \leq g \leq 1$, the liquidation value of each unit of the asset is equal to αg . Conversely household's utility increases when legal institutions are weaker, since the defaulting borrower retains ownership of the asset until the court orders its transfer. Specifically, the borrower's utility is $(1 - g)$ for each unit of collateral.

2.1 The Optimal Credit Contract

Given the assumption of free entry into the banking industry, the rents generated by the transaction are kept by the borrower, and the expected profits of the bank are zero. This means that the optimal credit contract is a pair of debt and interest rate (b_i, r_i) that maximizes the household's utility under its incentive compatibility constraint and the participation constraint of the bank. The problem is thus described by:

$$\max_{b_i, r_i} EU_i = \log(A_i + b_i) + \beta_i p_i \log(A_i + w_i - b_i r_i) + \beta_i (1 - p_i) \log[A_i(1 - g)]$$

s.t.

$$b_i \bar{r} \leq p_i b_i r_i + \alpha(1 - p_i) g A_i \quad (1)$$

$$\log [(1 - g) A_i + w_i] \leq \log (A_i + w_i - r_i b_i) \quad (2)$$

Notice that the assumption of limited liability implies that the second-period consumption in the bad state is equal to zero.

Condition 1 is the participation constraint of the bank. The assumption of free entry implies that this condition always holds with strict equality. Since the credit is collateralized, the bank's expected return is given by the repayment of the debt and the collateral's liquidation value asset. As can be seen, this second term is affected by the quality of judicial enforcement, g . To be precise, in case of default the bank only gets the lesser between the liquidation value of the asset ($g\alpha A_i$) and repayment of the debt ($b_i r_i$). Consider a credit contract between a bank and a consumer whose wealth is larger than his debt ($A_i > \bar{A}_i = \frac{w_i}{[g\alpha(1+\beta_i)+(\beta_i\bar{r}-1)]}$). This corresponds to the case in which the bank grants the credit demanded at the lowest possible price ($r_i = \bar{r}$) without rationing, it is not worried about possible default, because the loan will always be repaid even in the bad state of nature, by foreclosure and liquidation of the collateral. Since our subject is on how legal institutions affect borrowing restrictions, we focus on situations where the value of the collateral is not enough to cover the entire debt. In this case ($A_i < \bar{A}_i$), the bank's participation constraint is defined by condition 1.

Condition 2 is the borrower's incentive compatibility constraint. It requires that the utility from strategic default (left-hand side) must be lower than that from repayment (right-hand side). The condition also tells us that the incentive to default in the second period is negatively related to the value of the collateral: as that value increases, the utility of repaying the loan increases more than that of defaulting. Finally, it shows that the incentive to misbehave depends negatively on the legal variable: better legal enforcement rises the cost of default (the borrower loses the property sooner) but not the benefit.

In solving the maximization problem, we first assume that the incentive compatibility constraint is not binding. This may happen if, for instance, the household is wealthy enough so that the cost of strategic default (the loss of the asset) is always greater than the benefit. In this case, we obtain the optimal credit contract by solving the maximization problem neglecting equation 2. This yields the following level of debt and interest rate:³

$$b_i^* = \frac{p_i w_i + [p_i + \alpha(1 - p_i)g - \bar{r}\beta_i p_i]A_i}{\bar{r} \left(\beta_i + \frac{1}{p_i} \right) p_i} \quad (3)$$

$$r_i^* = \bar{r} \left[\frac{w_i + [1 - \alpha(1 - p_i)g\beta_i - \bar{r}\beta_i]A_i}{p_i w_i + [p_i + \alpha(1 - p_i)g - \bar{r}\beta_i p_i]A_i} \right] \quad (4)$$

By substituting the two terms given by equations 3 and 4 into the incentive compatibility constraint of the borrower, we find the condition under which the borrower's promise to repay is credible:

$$[gp_i + \alpha(1 - p_i)g + \bar{r}] \beta_i A_i \geq w_i + (1 - g)A_i \quad (5)$$

Condition 5 tells us that the initial endowment of wealth, the discount factor, and the quality of enforcement all help to determine whether a consumer is rationed in the credit market. We discuss this condition in more detail in the next section. Here, we can say that if this condition is not satisfied, then the debt-interest rate pair we found earlier is not the optimal credit contract. To find the optimal, we must maximize the household's utility function simultaneously under the bank's participation constraint and the borrower's incentive compatibility condition. This amounts to solving the system consisting of the two constraints (equations 1 and 2) in the two unknowns (b_i, r_i) . The solution is given by:

$$b_i^c = \frac{gA_i[p_i + \alpha(1 - p_i)]}{\bar{r}} \quad (6)$$

³Notice that the following two expressions are the true solutions only if they are positive. It is easy to show that this is satisfied for almost all reasonable parameter values.

$$r_i^c = \frac{\bar{r}}{p_i + \alpha(1 - p_i)} \quad (7)$$

2.2 Comparative Statics

This section derives testable implications on how the quality of judicial enforcement affects the household credit market. That is, we examine whether and to what extent the legal variable affects the probability of being credit-constrained and the amount of credit received by constrained and unconstrained consumers. In what follows, before deriving the probability of being liquidity-constrained, we discuss the role of the wealth endowment.

The wealth endowment is pledged as collateral in the credit contract, affecting the consumer's incentive compatibility constraint and the bank's participation constraint. It serves as a device to reduce the borrower's incentive to default. This is captured by condition 5. On the other hand, the bank uses it to generate positive income in case of default, which is reflected in condition 1 where bank's revenue depends on the liquidation value of the asset.

Inequality 5 may be interpreted as a condition bearing on the amount of collateral necessary to avoid being credit-constrained. It has a unique solution in A_i , since the left-hand side is monotonically increasing in A_i while the right-hand side is constant. We denote this unique solution by \tilde{A}_i . This is the minimum collateral requirement on the consumer in order to receive his optimal amount of credit, which depends on individual characteristics such as wage and time preferences. Notice that, by definition, \tilde{A}_i is strictly lower than \bar{A}_i .

To clarify the relation between the two thresholds, one can consider the case of three consumers who are equal in all individual characteristics except for wealth. In particular, let us assume that $A_1 > \bar{A}$, $\tilde{A} < A_2 < \bar{A}$ and $A_3 < \tilde{A}$. The three agents have the same demand for credit but get three different loans in equilibrium. The intuition is as follows. The first consumer is so wealthy that the effective liquidation value of the collateral is larger than the debt repayment. Hence, the bank is willing to supply the funds demanded at the

lowest price, \bar{r} . In this case the bank has no risk and legal institutions play no role. The second consumer has collateral value lower than his repayment liability, so in order to break even the bank raises the interest rate above the minimum level up to the point where the supply of credit equals the demand. In this second case, the consumer receives less credit but is not rationed, since his collateral is enough to make his promise to repay credible. Finally, the third consumer is credit-rationed, because if the bank were to give him the same amount of credit provided to the second consumer he would elect not to repay, as the cost of defaulting (the loss of his asset) is very low. To avoid this situation, the bank reduces the availability of credit to the point where the consumer is indifferent between defaulting and repaying the loan. Only in the last two cases does the degree of legal enforcement affect the allocation of credit.

Using the Implicit Function Theorem, one can show that the minimum collateral requirement is negatively related to the legal variable. It increases when the quality of legal enforcement is poorer, because households have a stronger incentive to default where courts are slower in enforcing credit contracts, in that they may continue to enjoy the property of the asset, before the final transfer of title.

Let us now derive the probability of being credit-constrained. Consider a population of heterogenous agents with different discount factors. Individuals with high β_i assign a greater weight to second-period consumption and thus have lower demand of credit, which is used to finance first-period consumption. From condition 5, we can derive the threshold value $\tilde{\beta}_i$ that splits households with the same characteristics (wage, wealth etc.) into two groups: those with high credit demand (β_i lower than the threshold), who will be credit-constrained, and those with low demand (β_i higher than the threshold), who will not be rationed:

$$\tilde{\beta}_i = \frac{w_i + (1 - g)A_i}{A_i [gp_i + \alpha(1 - p_i)g + \bar{r}]} \quad (8)$$

Since β_i and some of its determinants may be unknown to us as econometricians, we treat

it as a random variable and assume that it is distributed across the population of households according to a probability function. So, we can define the probability that a generic household is credit-constrained, after controlling for its observable characteristics, as the value of the cumulative distribution function at $\tilde{\beta}_i$.

With the Implicit Function Theorem it is easy to show that this threshold level is decreasing in the legal variable:

$$\frac{\partial \tilde{\beta}_i}{\partial g} = -\frac{1 + \beta_i[\alpha(1 - p_i)]}{[gp_i + \alpha(1 - p_i)g + \bar{r}]} < 0$$

Since the threshold is lowered when the quality of judicial enforcement improves, the probability of being credit-constrained is a decreasing function of the quality of judicial enforcement. Notice further that, other things being equal, an increment in the collateral asset and in p_i (the probability of a household's receiving a positive income in the second period) lowers the threshold $\tilde{\beta}_i$, while an increment in the income has the opposite effect on $\tilde{\beta}_i$.⁴

Next, we consider the effects of the quality of legal enforcement on the optimal amount of debt. One can show that the derivatives of b_i^* and b_i^c with respect to the parameter g are both positive:

$$\begin{aligned} \frac{\partial b_i^*}{\partial g} &= \frac{\alpha(1 - p_i)A_i}{\bar{r} \left(\beta_i + \frac{1}{p_i} \right) p_i} > 0 \\ \frac{\partial b_i^c}{\partial g} &= \frac{A_i [\alpha(1 - p_i) + p_i]}{\bar{r}} > 0 \end{aligned}$$

These results show that when the quality of judicial enforcement increases, so does the amount of credit received by constrained and unconstrained consumers and in an unambiguous way. The intuition is that if the consumer is not credit-constrained an improvement in the quality of enforcement eases the bank's participation constraint by increasing effective liquidation values. Since collateral and interest rate are substitutes, and given free

⁴If we calculate the derivative of the threshold $\tilde{\beta}_i$ with respect to A_i , p_i and w_i , we find the following expressions: $\frac{\partial \tilde{\beta}_i}{\partial A_i} = -\frac{w_i}{A_i^2 [gp_i + \bar{r} + \alpha(1 - p_i)g]} < 0$; $\frac{\partial \tilde{\beta}_i}{\partial p_i} = -\frac{\tilde{\beta}_i(1 - \alpha)g}{[gp_i + \bar{r} + \alpha(1 - p_i)g]} < 0$; $\frac{\partial \tilde{\beta}_i}{\partial w_i} = \frac{1}{A_i [gp_i + \bar{r} + \alpha(1 - p_i)g]} > 0$.

entry into the banking, the higher liquidation value induces the bank to reduce the cost of credit, which raises its availability in equilibrium. If the household is credit-constrained, a reduction in legal costs relaxes not only the bank's participation constraint but also the household's incentive compatibility constraint. Both effects work in the same direction and so enlarge the set of feasible solutions of the transaction. Again the result is that banks are willing to expand the availability of credit.

Finally, households with larger endowments of wealth or higher income have greater access to credit.

The testable implications derived in the theoretical analysis can be summarized as follows:

Proposition 1 *When legal enforcement improves, the probability of being credit-constrained decreases and the amount of credit received by constrained and unconstrained consumers increases.*

The next section checks whether the empirical evidence is consistent with these theoretical predictions.

3 Data

3.1 Household Data

Household data come from the Survey of Household Income and Wealth (SHIW), which the Bank of Italy has conducted every other year since 1984. The SHIW is a representative national household survey providing data on income, consumption and households' characteristics. See Brandolini and Cannari (1994) for a detailed description of the survey.

Here we use data from three waves: 1989, 1995 and 1998,⁵ a total of 23,556 observations.

⁵The variables used in this paper are available only for these three waves; that is, only for these three years can we distinguish households that applied for a loan from those that did not.

This survey is an invaluable source of information for our inquiry, mainly because self-reported measures allow us to identify households that are credit-constrained, not requiring arbitrary identification restrictions. We define as credit-constrained each household that responds positively to the following question: “During the year did you or a member of your household apply for a loan to a bank or other financial intermediary and have the application partially or totally rejected?”. On this basis,⁶ we find that around 2.44% of the sample households are credit-constrained. However, around 30% of the households that actually apply for a loan (7.86% of the sample apply) are subject to credit rationing.

The survey also gives detailed information on real assets. This is quite important because it allows us to experiment with different proxies for the collateral, which is not observable.⁷ Real assets include houses, lands, valuables and the business, if any, owned by the households and average €110,075 of 1998 prices. Around 64% of the sample own their primary residence, which is worth on average €100,704.

Data on liabilities are also quite detailed, and they allow to identify the amount borrowed to finance the purchase of houses, real goods such as valuables and jewelry, cars, other durable good such as furniture and appliances, and non-durable consumption. The average amount of debt is €2,508. Around 81% of this credit goes to purchase a house, 0.28% to buy real goods, such as valuables and jewelry, 14% for cars and 2.9% for other durables. The rest is used to finance non-durable consumption.

Conditional on being actually indebted, the amount borrowed to finance these types of consumption were, respectively: €20,651, €2,927, €5,901, €2,381, and €4,615 at the end of the year.

The proportion of households who are indebted to finance these purchases were, respectively: 10.74%, 0.26%, 6.22%, 3.12%, and 0.96% at the end of the year. These figures together show that households borrow almost entirely to purchase houses, cars, and other

⁶A similar definition appears in Jappelli (1990) who uses an American survey, the Survey of Consumer Finances, with a structure similar to the SHIW to identify credit-constrained households in the U.S..

⁷As a rule, of course, mortgage contracts require the house being purchased to be used as collateral for the loan.

durables.

Table 1 summarizes these statistics and provides the sample means of the household variables used in the estimations.

3.2 The Quality of Judicial Enforcement

This section documents the differences between Italian judicial districts in the degree of legal enforcement of creditor rights. Before illustrating our measures and their geography, a brief discussion on how the judicial system works will be helpful.

Italy is a civil-law country. This implies that the main attribute of the judicial system is enforcing the law. Italian laws regulate criminal and civil offenses separately. Correspondingly, separate branches of the judicial system deal with them.

Civil trials can undergo three degrees of judgment. The first degree (lower court), a second degree (appeals court), and a third degree that can only deal with formal aspects of the summon issued in the former degrees. Readers familiar with the American system will recognize some similarities. This work concentrates on civil trials in the lower and appeals courts, which are the most relevant when households fail to honor their debts.⁸ By law, the competent court is that of the borrower's district of residence.

We draw data on trials from an annual survey conducted by the National Institute of Statistics (ISTAT), for the years 1989-1998. The primary sample units are the judicial districts. Roughly, each district corresponds to a region. In some regions (Lombardy, Campania, Puglia, Calabria, Sicily and Sardinia) there is more than one judicial district,⁹ while, Valle d'Aosta is in the Piedmont judicial district. Table 2 shows the matching of judicial districts with regions and provinces.

Consistently with our model, we assume that the cost faced to a lender of enforcing the right to repossess in case of default depends on the degree of congestion of the judicial dis-

⁸The data used to construct our indicators of legal enforcement include all civil trials except labor and work-related cases.

⁹About 30% of the Italian population resides in those regions.

trict. This is proxied by the backlog of trials pending. However, this variable depends on the size of the judicial district and does not necessarily reflect poor functioning. Accordingly, we normalize backlogs by using alternatively the number of incoming trials, the population,¹⁰ the number of judges, and the number of judges and the administrative staff.¹¹

Figure 1 displays the backlog of trials pending divided by the number of incoming trials. Each of the four panels shows the evolution of this measure in different areas of the country, i.e. northern, central and southern Italy and the island regions. In figures 2, 3 and 4 the number of trials pending is divided by the population, by the number of judges, and by the number of judges plus administrative staff.

All the measures trend upward in all districts: this means that the quality of judicial enforcement is worsening across the country. However, the differences between districts persist. The horizontal line in each graph is the country-wide average in the sample period. The backlog whether normalized by the number of incoming cases, the population, the number of judges or the size of the administrative staff plus judges is higher than the country-wide average in Southern Italy and in some of the districts in Sicily and Sardinia. For instance, in Catanzaro the stock of trials pending divided by incoming cases averages 2.9, ranging from 1.77 in 1989 to 4.74 in 1998. Trento is the best district: the stock of trials pending divided by incoming cases averages 1.7 and it was 1.22 in 1989 and 1.69 in 1998 with a peak of 1.87 in 1997. The pattern emerging from the other graphs is similar: the quality of judicial enforcement is worse in southern Italy and in the island regions.

This is consistent with the evidence provided in table 3, showing that the sample correlation among these four measures is high, ranging from 0.52 to 0.94. However, these coefficients conceal some important differences. Namely, the number of incoming trials is a better proxy of the demand for justice, because it responds to the business cycle more closely than does the population, the number of judges or the size of the administrative

¹⁰Bianco, Jappelli and Pagano (2000) also proxy the degree of legal enforcement by using the backlog of trials pending divided by the population.

¹¹Data on the number of judges and the size of the administrative staff of each judicial district come from the Italian Ministry of Justice. We thank Tullio Jappelli and Marco Pagano for providing these data.

staff. This is because the population is almost constant in the sample period and the number of judges and the size of the administrative staff are set according to the population of each district.¹² Moreover, the number of incoming trials reflects differences in the degree of litigation, which are not captured by population and judicial personnel. For instance, the number of judges in the judicial district of Naples is 10% greater than in Milan but the number of incoming trials is almost twice as greater.

Therefore, in the empirical analysis we proxy the quality of judicial enforcement by using the backlog of trials pending divided by the number of incoming cases.

4 Results

4.1 Law Enforcement and Borrowing Restrictions

In this section, we explore the relation between the degree of legal enforcement and the probability of a household's being credit-constrained. As noted in section 3, we rely on self-reported measures to identify credit-constrained households. In our model, the probability of being credit-constrained depends on individual as well as on institutional variables. We include among the set of explanatory variables those commonly supposed to affect the consumer's demand for credit and those that are used by banks in screening.

We estimate a probit model with sample selection. We need to correct for selection because we exclude households that do not apply for credit, and the probability of asking for credit and the probability of being credit-rationed are potentially affected by the same set of unobservable factors. To estimate the model, we need to find at least one variable that affects the decision to ask for a loan, but not the probability of being credit-constrained. We chose the size of the city where the household resides, *City size*, since the coefficient of this variable turns out to be statistically significant in the decision to ask for a loan but not in the probit for credit-constrained households.

¹²The sample correlation coefficient between the number of judges and the population is 0.9; that between the size of the administrative staff and the population is 0.89.

Table 4 displays the probit estimation of the selection equation, where the dependent variable is a dummy, called *Credit market participation*, that takes value one when the household asks for credit.¹³ Table 5 reports the results for the probability of being credit-constrained. Here, the dependent variable is a dummy, *Credit rationing*, that takes value one if the household is credit-constrained.¹⁴

Each column of tables 4 and 5 refers to a particular measure of the collateral asset. We experiment with different measures because we cannot observe the asset that is actually pledged. The collateral is proxied by the amount of real assets held by the household, by the stock of land and houses, by the value of the house of residence and by the stock of land and houses less the value of the house of residence.

All the specifications include a set of year dummies, because households coming from different waves are pooled together, and, we add a full set of dummies at judicial district level to control for unobserved heterogeneity. Furthermore, in order to avoid any potential bias due to variation in sample design between waves, we use throughout the sample weights to compute our estimates. Finally, standard errors are corrected for clustering and stratification to take into account that SHIW has a panel component and is sampled in 51 strata.

Before analyzing the determinants of the probability of being credit-constrained, let us briefly describe the variables that affect the decision to apply for a loan. From table 4, we can see that this decision is positively correlated with the age of the household head in a non-linear way: the coefficient of age is positive and that of age squared is negative. This is in line with our model, as the assumptions that individual income increases with age and agents would like to smooth consumption over time imply that they want credit in the first period of life. An analogous argument explains the negative correlation between the probability of asking for a loan and individual income.

¹³We do not include in the group of people who participate in the credit market those households that are already indebted and do not need additional credit in the interview's year. The reason is that the credit-constrained question focuses only on households that are possibly credit-constrained in the interview's year.

¹⁴See the data appendix to know which questions were used to define these two dummy variables.

The probability also increases with household size, which can be considered as a proxy for family needs; and the probability is higher for people living in a city of more than 200,000 population. The reason why the variable *City size* shows a positive coefficient could be that family networks, which often provide an alternative to the formal credit market, are weaker in larger cities.

The same table also shows that the probability of asking for credit does not depend on the collateral, educational attainment or the marital status of the household head. Similarly, whether the household head is retired or not does not affect the decision to ask for a loan.

We also find that unemployed individuals are less likely to ask for credit. This is not surprising, given that losing the job reduces income and hence the desired level of consumption.

Finally, per capita GDP and the quality of legal enforcement in the district does not appear to affect the probability of asking for credit. One possible reason why the GDP is not significant may be that the heterogeneity has already been captured by the dummies at judicial district level. That the decision to ask for a loan is independent of the quality of legal institutions is reasonable, since it is presumed to be affected by individual more than by aggregate variables.

Let us now concentrate on the determinants of the probability of a household's being credit-constrained. From table 5, we see that this is higher for households headed by persons with more education or by the unemployed. The positive coefficient of *Years of schooling* may be due to the fact that the better educated have a steeper income profile, which is typically associated with greater desired consumption and borrowing restrictions early in life (typically, at the beginning of the career).

Now, consider the variable *Unemployed*. We can interpret this variable, according to our model, by relating it to the probability of receiving an income, p_i . Under this interpretation, unemployed individuals are the ones with a low p_i , and the converse for employed. From the comparative statics performed in section 2.2, we know that the effect of p_i on the threshold

$\tilde{\beta}_i$ is negative. The intuition behind this result is that an increment in p_i increases the bank's expected repayment (in the good state of nature) and so relaxes the participation constraint. Given the assumption of free entry, this induces the bank to increase the availability of credit, which reduces the probability of liquidity-constraints. This is in line with our evidence, since the positive coefficient suggests that being unemployed increases the probability of being credit-constrained.

Households able to pledge more collateral are less likely to be credit-constrained. Again, this result is in line with the predictions of the model (in section 2.2 we show that the threshold $\tilde{\beta}_i$ is decreasing in the collateral value), and it is also consistent with the evidence provided by Jappelli (1990) and Cox and Jappelli (1990) for the American household credit market. Also, married couples are less likely to be credit-constrained, perhaps because they can underwrite the loans jointly.

Households with higher income are less likely to be credit-constrained. At first sight this evidence might seem to contradict the prediction of the model derived in section 2.2, where we show that $\frac{\partial \tilde{\beta}_i}{\partial w_i} > 0$. However, in our model the consumer gets a positive income only in the second period. Hence, w_i is not only a measure of the income but also of the difference in the individual income levels over time. Given this and given the individual preferences for consumption smoothing, an increment in w_i always increases expected consumption and hence the demand for credit, which tightens borrowing restrictions. This would not be the case if we were to increase the income equally in both periods.

The other individual characteristics appear not to be correlated with the likelihood of being credit-constrained. For instance, we find that being retired or having a big family has no apparent effect. Similarly, the coefficients of age and age-squared are rightly signed but not significant at the standard levels. If we consider agents with income that is increasing in time and with preferences for consumption smoothing, as in our simple model, we should expect younger individuals to have higher demand for credit. Hence, other things being equal, we should find a negative correlation between age and credit-constraints, as in table

5. The lack of significance can be due to the fact that in the model age and income play the same role.

Having examined the effects of the individual variables, let us now consider the role played by macroeconomic and institutional variables. To account for macro-effects, we added regional per capita GDP, which has a coefficient that is negative but not statistically significant. Again, this may be because the heterogeneity has been already captured by the dummy variables for judicial districts, which broadly corresponds to the regions.

Finally, we come to the variable *Justice*, which proxies the quality of legal enforcement of credit contracts by measuring the backlog of pending trials divided by incoming trials in each judicial district. This is posited to capture the legal costs that the lender sustains to recover his credit if the borrower defaults. In line with our theoretical predictions, we find that the coefficient of *Justice* is positive and significant, meaning that the weaker legal enforcement the more likely households are to be credit-constrained.

To appreciate the importance of this distortion, we compute how much the probability of being credit-constrained changes on average if one endows all households with the same quality of legal enforcement (see table 6). Rows refer to judicial districts sorted from north to south and columns to different degrees of legal enforcement. In the first column, we set the quality of judicial enforcement equal to the maximum in the sample, in the second to the mean and in the third to the minimum. Each entry is computed as the ratio of the probability of being credit-constrained given the column's degree of legal enforcement (maximum, mean, minimum) to that in the row's judicial district minus one.

Table 6 shows that endowing all households with the best legal enforcement would reduce the probability of being credit-constrained. The decrease is generally more pronounced for southern judicial districts. For instance, endowing the households living in high-cost southern districts such as Campobasso and Caltanissetta with the best quality of legal enforcement would reduce the probability of being credit-constrained by 70% and 63%, respectively. These are the largest and second largest reductions in the sample. The smallest

(around 2%) corresponds to households in the Trento judicial district.¹⁵ In the second column of the table, when all households are assigned the mean value for legal enforcement, the probability of being credit-constrained decreases in southern districts and increases in northern. Finally, in the third column, where all the households are given the lowest degree of enforcement, the probability increases in all districts. As expected, the increase is greater in the best districts such as Turin, Milan and Trieste (in northern regions) and smaller in Campobasso and Salerno (in southern regions).

A look at table 6 suggests that stronger legal enforcement seems to occur much more often in the wealthier northern part of Italy than in the less wealthy southern regions. This could induce the suspect that the coefficient of the legal variable is indeed picking up regional differences in social or economic factors that are correlated with our measures of legal enforcement.¹⁶ However, micro-data allowed us to control for regional effects by including a full set of judicial district dummies to disentangle the quality of judicial enforcement from influences operating at regional level. Furthermore, the use of micro-data allows to satisfy the assumption that the quality of judicial enforcement is not affected by whether or not a household is credit-constrained, an assumption that would be much less tenable with macro-data, if the proportion of credit-constrained households affected the quality of judicial enforcement.

Finally, in order to check if the cost of enforcement differently affects households belonging to different wealth quartiles, we interact the legal enforcement variable with fourth wealth quartile dummies. The last column of table 5 shows the results. Our reference group are the households belonging to the first wealth quartile. As one can see, while the coefficients of the second and third interacted variables are not significantly different from the first, the last one is significantly lower, suggesting that the effect of legal enforcement

¹⁵The reason the probability of being credit-constrained changes even for households in Trento, which is the best judicial district, is that the probability of being credit-constrained in each district has been found by taking the average across periods, while the top quality of legal enforcement is the single highest value in the sample.

¹⁶It is well known that Italy displays enormous interregional differences in social and economic indicators.

on credit constraints is much weaker for wealthy households. Figure 6 helps illustrate our findings. It plots the estimated probability of being credit-constrained in three different judicial districts (corresponding to the lowest, the average and the highest degree of legal enforcement) after we split the sample in asset quartiles. In each asset quartile, households located in the judicial district with the lowest degree of legal enforcement are more likely to be credit-constrained than households located in other judicial districts, but low asset people are the most affected by strong legal inefficiency. The probability that a household in the first quartile is credit-constrained ranges from 60% in the worst judicial district to 18% in the best judicial district. This jump remains high even if decreasing, if we consider the second and the third quartile of wealth distribution, while it is strongly reduced in the last quartile where the probability ranges from 23% in the worst judicial district to 12% in the best judicial district.

Hence, these empirical results support the thesis that the poor performance of legal institutions can entail substantial social costs, restricting access to credit, mainly for low asset households. The effect on the probability of being credit-constrained is not the only welfare implication of poor legal enforcement. As the model suggests, there could also be a welfare effect on the volume of credit of all households, via the cost of finance. We now turn to this issue.

4.2 Law Enforcement, Collateral and the Availability of Credit

This section investigates how the relation between household debt and collateral is affected by the quality of law enforcement.

The collateral is used by banks to guard against accidental default. If a household does not repay, the bank repossesses the collateral, at a cost that depends crucially on the quality of judicial enforcement. The poorer the enforcement, the higher the cost of acquiring ownership of the asset. This lowers the effective liquidation value of the collateral and induces banks to compensate by charging a higher interest rate. Therefore, according

to our model, we should expect that if the quality of judicial enforcement improves, other things being equal, the equilibrium amount of debt increases. This holds true whether or not households are credit-constrained.

To test this theoretical prediction, we estimate a tobit model, since the data are censored to the left. Table 7 shows the results of the estimation. As in table 5, columns differ in the measure of collateral used. In the first column, we take real wealth, which includes land, houses and the business, if any, owned by the household. In the second column, we restrict the measure to land and houses. The third column proxies collateral by the value of the house of residence, while the fourth excludes from the stock of land and houses the house of residence.

All the specifications include a set of year dummies, because households coming from different waves are pooled together, and judicial district dummies to control for unobserved heterogeneity.

Consistent with previous evidence, debt volume is positively correlated with the age of the household head in a non-linear way: the coefficient of *Age* is positive and that of *Age Squared* is negative. Moreover, households able to pledge more collateral and higher-income have a larger amount of debt. The collateral positively affects the individual's credit rating because it provides better insurance for the bank. An increment in income has two effects: first, it increases the demand for consumption in the first period and, other things being equal, the demand of credit. Second, it relaxes the bank's participation constraint and increases the availability of finance. Therefore, in equilibrium at least a positive share of the new household demand is satisfied.

We also find that *Family size* and *Marital status* are positively related to debt while being unemployed is negatively related. This in line with expectations. Family-size proxies for needs and

debt is likely to increase with needs. Married couple are more likely to hold mortgages, which explains why the overall debt is higher for them. On the other hand, this is lower for

unemployed, which typically cannot borrow to buy a house.

The coefficient of the variable *Retiree* is negative, but not significant. More educated individuals held more debt, as witnessed by the positive coefficient of the variable *Years of schooling*. This might be capturing the fact that, as mentioned, the better-educated have a steeper income profile, which is typically associated with higher desired consumption and higher demand for credit early in life.

The effect of regional *Per-capita gross domestic product* is negligible, a likely consequence of the fact that our data span a limited time period and that the estimation already control for regional and time effects.

Finally, let us focus on the role played by judicial institutions. In line with our theoretical predictions, we find that the coefficient of the variable *Justice* is negative. Recalling that we are measuring the cost of a badly functioning judicial system, the negative coefficient means that if the quality of the judicial enforcement worsens, the amount of debt held by constrained and unconstrained households decreases. We interpret this finding, in our model, as evidence that poorer judicial enforcement is associated with higher cost of debt.

However, the coefficient of the variable *Justice* is not statistically significant in the first four columns of the table. We speculate that the lack of statistical significance is due to a composition effect, i.e. that households belonging to different wealth quartiles are differently affected by the quality of enforcement.

In the fifth column of table 7 we interact the quality of law enforcement with wealth quartile dummies. The reference group includes households belonging to the first quartile of wealth distribution. The results support our conjecture. The coefficient of the variable *Justice* is negative (-41.8822) and statistically significant, meaning that the amount of debt held by households in the first quartile of the asset distribution is negatively affected by the quality of legal enforcement. The effect is also negative but weaker for households belonging to the second wealth quartile (the coefficient of the interacted variable is statistically significant and equal to 22.4608). The opposite is true for the last two quartiles. The coefficients

of the two last interacted variables imply that an increment in the backlog of trials *increases* the debt volume of households belonging to the third and fourth wealth quartile, and that this effect is stronger for the most wealthy households. This finding, which is not captured by our theoretical model, seems to suggest that an ill-functioning legal system redistribute credit toward borrowers with high assets. The result has some similarities with that found by Gropp, Sholz and White (1997). They show in a different context that in the states with more bankruptcy exemptions less credit is available to low-asset households and more is available to high-asset households.

Table 8 quantifies the effect of enforcement on household debt. It shows how much a household's debt increases as judicial costs fall, by computing the semi-elasticity of households' debt with respect to the quality of judicial enforcement. In the first column we compute the semi-elasticity over the whole sample. In the other columns we compute the semi-elasticity for households belonging to each wealth quartile. In each column the collateral is proxied by the amount of real assets held by the household. From the first column it arises that, if the cost of enforcement increases by 1 percentage points,¹⁷ the household debt decreases by about €300. The effect is larger and still negative for households belonging to the first wealth quartile. In this case, a 1% increase of the cost of enforcement is associated to a reduction of €9000 of the debt. The opposite occurs for households in the last quartile of the asset distribution: a 1% increase of the cost of enforcement reduces the debt by around €4000.

Taken together, these results suggest that judicial costs do affect the average amount of household debt and that the effect varies greatly across wealth quartiles.

5 Conclusions

In this paper, we have analyzed the relation between the quality of judicial enforcement of creditors' rights and the allocation of credit to households, both theoretically and empiri-

¹⁷This corresponds to a 1,500 units increase of backlog of trials pending, whose sample average is 104,937.

cally.

The model identifies two main effects of poor enforcement. First, households are more likely to be credit-constrained because whenever contracts are weakly enforced, the household's incentive to repay is reduced and banks respond by rationing credit. Second, the quality of enforcement also affects household debt, through its effect on the cost of debt. We show that when enforcement is weak, banks tend to compensate for the lower liquidation value of the pledged collateral by raising interest rates, which reduces the equilibrium amount of debt.

To test our theoretical predictions we use data on Italian households drawn from the Survey of Household Income and Wealth, and data on the performance of judicial districts. An important characteristic of our data set is that it has a self-reported indicator of credit-constrained households. To be consistent with our model, where the working of the legal system is supposed to affect the costs of repossession, we proxy the quality of legal enforcement by using measures based on the backlog of trials pending.

Our theoretical predictions are supported by the data. Controlling for household characteristics, unobserved heterogeneity at judicial district level and aggregate shocks, we document that better quality of judicial enforcement reduces the probability of being credit-constrained: households in judicial districts where enforcement is poorer are more likely to have a loan application denied. This effect is found to be larger for poorer households.

We also document that if the backlog of trials pending increases, the availability of credit for poorer households decreases but that for wealthy households *increases*. This effect is significant not only statistically but also economically. Surprisingly, the last finding seems to suggest that an ill-functioning legal system redistributes credit toward borrowers with higher assets.

Table 1: Summary Statistics

	<i>Mean</i>
<i>Real assets</i>	110075
<i>House of residence</i>	100703.6
<i>Percentage of home-owners</i>	0.64
<i>Debt for house purchase</i>	20650.87
<i>Debt for purchase of valuables</i>	2927.016
<i>Debt for car purchase</i>	5900.812
<i>Debt for other durables purchases</i>	2380.99
<i>Debt for non-durable consumption</i>	4615.367
<i>Percentage of households holding debt for house purchase</i>	10.74
<i>Percentage of households holding debt for purchase of valuables</i>	0.26
<i>Percentage of households holding debt for car purchase</i>	6.22
<i>Percentage of households holding debt for other durables purchases</i>	3.12
<i>Percentage of households holding debt for non-durables consumption</i>	0.96
<i>Percentage of credit-constrained households</i>	2.44
<i>Percentage of households that participate to the credit market</i>	7.86
<i>Age</i>	53.367
<i>Labor household income</i>	9698.567
<i>Years of schooling</i>	8.250413
<i>Family size</i>	2.8866
<i>Retiree</i>	0.3935
<i>Unemployed</i>	0.0260
<i>Marital status</i>	0.7154
<i>Per-capita gross domestic product</i>	8044.585

Note: figures are in 1998 euro except for those that are explicitly cited as percentage. Debt is measured as the amount of end-of-year household liabilities. The figures for debt are computed including only those households that are actually indebted. The inverse of the inclusion probability has been used as sample weight.

Table 2: Matching of Judicial Districts with Regions and Provinces

<i>Judicial Districts</i>	<i>Corresponding Regions and Provinces</i>
Turin	<i>Piedmont</i> (all provinces), <i>Valle d'Aosta</i> (all provinces)
Genoa	<i>Liguria</i> (all provinces) and <i>Tuscany</i> (Massa Carrara)
Milan	<i>Lombardy</i> (Milan, Como, Varese, Pavia, Sondrio, Lecco, Lodi)
Brescia	<i>Lombardy</i> (Brescia, Bergamo, Cremona, Mantua)
Trento	<i>Trentino-Alto Adige</i> (Trento)
Bolzano	<i>Trentino-Alto Adige</i> (Bolzano)
Venice	<i>Veneto</i> (all provinces)
Trieste	<i>Friuli-Venezia Giulia</i> (all provinces)
Bologna	<i>Emilia Romagna</i> (all provinces)
Ancona	<i>Marche</i> (all provinces)
Florence	<i>Tuscany</i> (all provinces excluding Massa Carrara)
Perugia	<i>Umbria</i> (all provinces)
Rome	<i>Lazio</i> (all provinces)
Naples	<i>Campania</i> (Naples, Avellino, Benevento, Caserta)
Salerno	<i>Campania</i> (Salerno)
L'Aquila	<i>Abruzzo</i> (all provinces)
Campobasso	<i>Molise</i> (all provinces)
Bari	<i>Puglia</i> (Bari, Foggia)
Lecce	<i>Puglia</i> (Lecce, Brindisi)
Taranto	<i>Puglia</i> (Taranto)
Potenza	<i>Basilicata</i> (all provinces)
Catanzaro	<i>Calabria</i> (Catanzaro, Cosenza, Crotona, Vibo Valentia)
Reggio Calabria	<i>Calabria</i> (Reggio Calabria)
Palermo	<i>Sicily</i> (Palermo, Agrigento, Trapani)
Messina	<i>Sicily</i> (Messina)
Caltanissetta	<i>Sicily</i> (Caltanissetta, Enna)
Catania	<i>Sicily</i> (Catania, Ragusa, Siracusa)
Cagliari	<i>Sardinia</i> (Cagliari, Oristano)
Sassari	<i>Sardinia</i> (Sassari, Nuoro)

Note: the table matches judicial districts with Italian regions and provinces. The names of the regions are italicized, those of provinces bracketed. Roughly, each district corresponds to a region. In a few regions (Lombardy, Campania, Puglia, Calabria, Sicily and Sardinia) there is more than one judicial district. Provinces located in two different regions (Valle d'Aosta and Piedmont) belong to one judicial district, called Turin. Finally, the judicial district of Genoa includes not only all the provinces located in Liguria but also one province in Tuscany. The source is ISTAT: "Annuario delle Statistiche Giudiziarie Civili".

Table 3: Matrix of Correlation Among the Measures of Legal Enforcement

	(1)	(2)	(3)	(4)
<i>Backlog of pending/incoming trials</i>	1.0000			
<i>Backlog of trials pending/population</i>	0.6834	1.0000		
<i>Backlog of trials pending/judges</i>	0.6229	0.8243	1.0000	
<i>Backlog of trials pending/judges plus staff</i>	0.5245	0.8138	0.9445	1.0000

Note: the table shows the sample correlations among the four measures of legal enforcement. The first column refers to the backlog of pending/incoming trials, the second to the trials pending/population, the third to the trials pending/judges and the fourth to the trials pending/judges plus staff.

Table 4: Credit Market Participation

<i>Age of the household head</i>	0.0190 (0.0084)*	0.0192 (0.0085)*	0.0197 (0.0086)*	0.0194 (0.0085)*
<i>Age squared of the household head</i>	-0.0374 (0.0086)**	-0.0375 (0.0086)**	-0.0378 (0.0087)**	-0.0376 (0.0086)**
<i>Labor household income</i>	-0.0035 (0.0011)**	0.0033 (0.0011)**	0.0033 (0.0010)**	0.0034 (0.0010)**
<i>Collateral</i>	0.0009 (0.0004)*	0.0007 (0.0004)	-0.0001 (0.0017)	0.0010 (0.0005)
<i>Years of schooling</i>	0.0034 (0.0048)	0.0036 (0.0048)	0.0045 (0.0049)	0.0039 (0.0048)
<i>Family size</i>	0.0566 (0.0096)**	0.0571 (0.0095)**	0.0580 (0.0096)**	0.0573 (0.0095)**
<i>Retiree</i>	-0.0739 (0.0439)	-0.0776 (0.0432)	-0.0790 (0.0431)	-0.0773 (0.0432)
<i>Unemployed</i>	-0.1856 (0.0687)**	-0.1889 (0.0694)**	-0.1912 (0.0685)**	-0.1899 (0.0696)**
<i>Marital status</i>	0.0737 (0.0421)	0.0746 (0.0424)	0.0761 (0.0416)	0.0753 (0.0426)
<i>City size</i>	0.1500 (0.0410)**	0.1497 (0.0409)**	0.1495 (0.0409)**	0.1496 (0.0409)**
<i>Per-capita gross domestic product</i>	0.0006 (0.0004)	0.0006 (0.0004)	0.0006 (0.0004)	0.0006 (0.0004)
<i>Justice</i>	0.3578 (0.5822)	0.3603 (0.5810)	0.3572 (0.5816)	0.3601 (0.5816)
<i>Constant</i>	-1.7876 (0.3114)**	-2.2080 (0.4976)**	-2.2374 (0.5088)**	-1.8086 (0.3119)**
<i>No. of observations</i>	23132	23132	23132	23132

Note: The dependent variable is a dummy, *Credit market participation*, that takes value equal to one if the household responds positively to the question: “During the year did you or a member of your household apply for a loan or a mortgage to a bank or other financial intermediary?”. Standard errors robust to unknown form of heteroskedasticity and corrected for the cluster effect are reported in parentheses. In the first column, the collateral is proxied by the amount of real assets held by the household, in the second by the stock of land and houses, in the third by the value of the house of residence, and in the fourth by the stock of land and houses minus the value of the house of residence. All the specifications include a full set of judicial district and year dummies. * significant at 5% level; ** significant at 1% level.

Table 5: Law Enforcement and the Probability of Being Credit-Constrained

<i>Age of the household head</i>	-0.0143 (0.0298)	-0.0130 (0.0302)	-0.0140 (0.0303)	-0.0156 (0.0307)	-0.0108 (0.0292)
<i>Age squared of the household head</i>	0.0230 (0.0342)	0.0217 (0.0350)	0.0224 (0.0350)	0.0230 (0.0359)	0.0187 (0.0343)
<i>Labor household income</i>	-0.0095 (0.0040)*	-0.0084 (0.0039)*	-0.0079 (0.0036)*	-0.0083 (0.0040)*	-0.0085 (0.0041)*
<i>Collateral</i>	-0.0076 (0.0033)*	-0.0102 (0.0042)**	-0.0143 (0.0062)*	-0.0111 (0.0061)	-0.0001 (0.0002)
<i>Years of schooling</i>	0.0151 (0.0066)*	0.0159 (0.0064)*	0.0142 (0.0066)*	0.0126 (0.0059)*	0.0176 (0.0076)
<i>Family size</i>	0.0433 (0.0335)	0.0411 (0.0344)	0.0391 (0.0331)	0.0407 (0.0352)	0.0478 (0.0338)
<i>Retiree</i>	-0.3061 (0.1658)	-0.2834 (0.1685)	-0.2639 (0.1646)	-0.2876 (0.1666)	-0.3098 (0.1618)
<i>Unemployed</i>	0.7289 (0.2513)**	0.7469 (0.2492)**	0.7614 (0.2509)**	0.7542 (0.2562)**	0.7056 (0.2556)**
<i>Marital status</i>	-0.3976 (0.1320)**	-0.3989 (0.1311)**	-0.4048 (0.1338)**	-0.3993 (0.1332)**	-0.3908 (0.1444)**
<i>Per-capita gross domestic product</i>	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)
<i>Justice</i>	2.8573 (1.1972)*	2.8140 (1.7189)*	2.8583 (1.2003)*	2.8377 (1.7641)*	3.1926 (1.2466)**
<i>Second quartile dummy*Justice</i>					-0.3502 (0.3355)
<i>Third quartile dummy*Justice</i>					-0.9594 (0.5520)
<i>Fourth quartile dummy*Justice</i>					-1.8370 (0.6661)**
<i>Constant</i>	-2.3718 (1.7120)	-1.8312 (1.7535)	-2.3207 (1.1786)	-2.3759 (1.7641)	-2.1271 (1.4787)
<i>No. of observations</i>	1817	1817	1817	1817	1817

Note: the dependent variable is an indicator variable, *Credit rationing*, taking value equal to one if the household is credit-constrained, i.e. responds positively to the question: “During the year did you or a member of your household apply for a loan to a bank or other financial intermediary and have the application rejected partially or totally?”. Standard errors robust to unknown form of heteroskedasticity and corrected for the cluster effect are reported in parentheses. In the first column, the collateral is proxied by the amount of real assets held by the household, in the second by the stock of land and houses, in the third by the value of the house of residence, and in the fourth by the stock of land and houses minus the value of the house of residence. In the fifth column, the measure of enforcement is interacted with wealth quartile dummies and the collateral is proxied by the amount of real assets. All the specifications include a full set of judicial district and year dummies. * significant at 5% level; ** significant at 1% level.

Table 6: Changes in the Probability of Being Credit-Constrained

<i>Judicial District</i>	<i>Enforcement equal to the sample:</i>		
	<i>Max</i>	<i>Mean</i>	<i>Min</i>
<i>Turin</i>	-0.1590	0.2125	1.6104
<i>Genoa</i>	-0.1763	0.0555	0.6934
<i>Milan</i>	-0.1033	0.2316	1.3537
<i>Brescia</i>	-0.1626	0.0672	0.6981
<i>Trento</i>	-0.0284	0.1889	0.7202
<i>Venice</i>	-0.2590	0.0199	0.9766
<i>Trieste</i>	-0.2417	0.0342	1.1610
<i>Bologna</i>	-0.1393	0.0789	0.6872
<i>Ancona</i>	-0.2857	-0.0683	0.5706
<i>Florence</i>	-0.1641	0.0924	0.8434
<i>Perugia</i>	-0.1625	0.0759	0.7749
<i>Rome</i>	-0.2760	-0.0687	0.5333
<i>Naples</i>	-0.1616	0.0026	0.4034
<i>Salerno</i>	-0.2812	-0.1182	0.3237
<i>L'Aquila</i>	-0.0834	0.1469	0.7293
<i>Campobasso</i>	-0.7059	-0.5403	0.1381
<i>Bari</i>	-0.1935	-0.0124	0.4181
<i>Lecce</i>	-0.3416	-0.0608	0.9803
<i>Taranto</i>	-0.5262	-0.2724	0.7162
<i>Potenza</i>	-0.2237	-0.0282	0.4831
<i>Catanzaro</i>	-0.2514	-0.0751	0.4146
<i>Reggio Calabria</i>	-0.5167	-0.3046	0.4729
<i>Palermo</i>	-0.2726	-0.0244	0.8483
<i>Messina</i>	-0.3050	-0.0906	0.4763
<i>Caltanissetta</i>	-0.6346	-0.3196	1.5934
<i>Catania</i>	-0.1664	0.0819	0.7877
<i>Cagliari</i>	-0.2269	0.0663	0.9599
<i>Sassari</i>	-0.5632	-0.3450	0.4594

Note: Rows refer to judicial districts sorted from north to south and columns to different qualities of legal enforcement. In the first column, we set the quality of judicial enforcement to the sample maximum, in the second to the mean and in the third to the minimum. Each entry is computed as the ratio of the probability of being credit-constrained taking the degree of legal enforcement corresponding to the column (maximum, mean, minimum) to that in the row's judicial district minus one.

Table 7: Law Enforcement, Collateral and Households Debt

<i>Age of the household's head</i>	0.8427	0.8358	0.7222	0.9017	0.5151
	(0.1632)**	(0.1630)**	(0.1619)**	(0.1636)**	(0.1616)**
<i>Age squared of the household's head</i>	-1.3001	-1.2951	-1.2175	-1.3360	-1.0319
	(0.1661)**	(0.1659)**	(0.1646)**	(0.1666)**	(0.1639)**
<i>Collateral</i>	0.0080	0.0103	0.0419	0.0048	0.0030
	(0.0010)**	(0.0012)**	(0.0030)**	(0.0015)**	(0.0011)**
<i>Labour family income</i>	0.3073	0.2949	0.2787	0.2924	0.2917
	(0.0297)**	(0.0296)**	(0.0292)**	(0.0298)**	(0.0291)**
<i>Family size</i>	1.4972	1.5158	1.3816	1.6202	1.3376
	(0.2959)**	(0.2956)**	(0.2930)**	(0.2969)**	(0.2922)**
<i>Retiree</i>	-1.4091	-1.6662	-1.6899	-1.8222	-1.4321
	(1.0545)	(1.0518)	(1.0413)	(1.0584)*	(1.0371)
<i>Unemployed</i>	-7.5185	-7.7083	-7.1852	-7.9814	-5.3077
	(1.7903)**	(1.7885)**	(1.7712)**	(1.7980)**	(1.7687)**
<i>Marital status</i>	4.2998	4.3099	3.8528	4.5506	2.9646
	(0.8883)**	(0.8877)**	(0.8804)**	(0.8920)**	(0.8785)**
<i>Years of schooling</i>	0.3820	0.3634	0.2434	0.4610	0.1439
	(0.0748)**	(0.0751)**	(0.0750)**	(0.0745)**	(0.0755)*
<i>Per-capita gross domestic product</i>	0.0003	0.0003	0.0002	0.0003	0.0002
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)
<i>Justice</i>	-1.5608	-1.1018	-1.3676	-1.4362	-41.8822
	(10.8228)	(10.8155)	(10.7111)	(10.8743)	(11.2096)**
<i>Second quartile dummy*Justice</i>					22.4608
					(4.1546)**
<i>Third quartile dummy*Justice</i>					51.0357
					(3.9173)**
<i>Fourth quartile dummy*Justice</i>					60.5075
					(4.2496)**
<i>Constant</i>	-84.2610	-83.9954	-77.1825	-87.9204	-63.6320
	(8.2746)**	(8.2734)**	(8.1723)**	(8.3162)**	(8.1633)**
<i>No. of observations</i>	23132	23132	23132	23132	23132

Note: The dependent variable is households debt. Standard errors are reported in parentheses. In the first column, the collateral is proxied by the amount of real assets held by the household, in the second by the stock of land and houses, in the third by the value of the house of residence, and in the fourth by the stock of land and houses minus the value of the house of residence. In the fifth column, the measure of enforcement is interacted with wealth quartile dummies and the collateral is proxied by the amount of real assets. All the specifications include a full set of judicial district and year dummies. * significant at 5% level; ** significant at 1% level.

Table 8: Law Enforcement, Households Debt and Wealth Distribution, Elasticities

	<i>All sample</i>	<i>First quartile</i>	<i>Second quartile</i>	<i>Third quartile</i>	<i>Fourth quartile</i>
<i>Elasticity</i>	-0.3426	-9.1936	-4.2632	2.0093	4.0885
<i>Standard Errors</i>	(2.37572)	(2.46064)**	(0.8605)**	(0.8470)**	(0.8655)**

Note: Each entry is the semi-elasticity of the household debt. In the second row we report the standard errors. In the first column we compute the semi-elasticity over the whole sample. In the other columns we compute the semi-elasticity for households belonging to each wealth quartile. In each column the collateral is proxied by the amount of real assets held by the household.

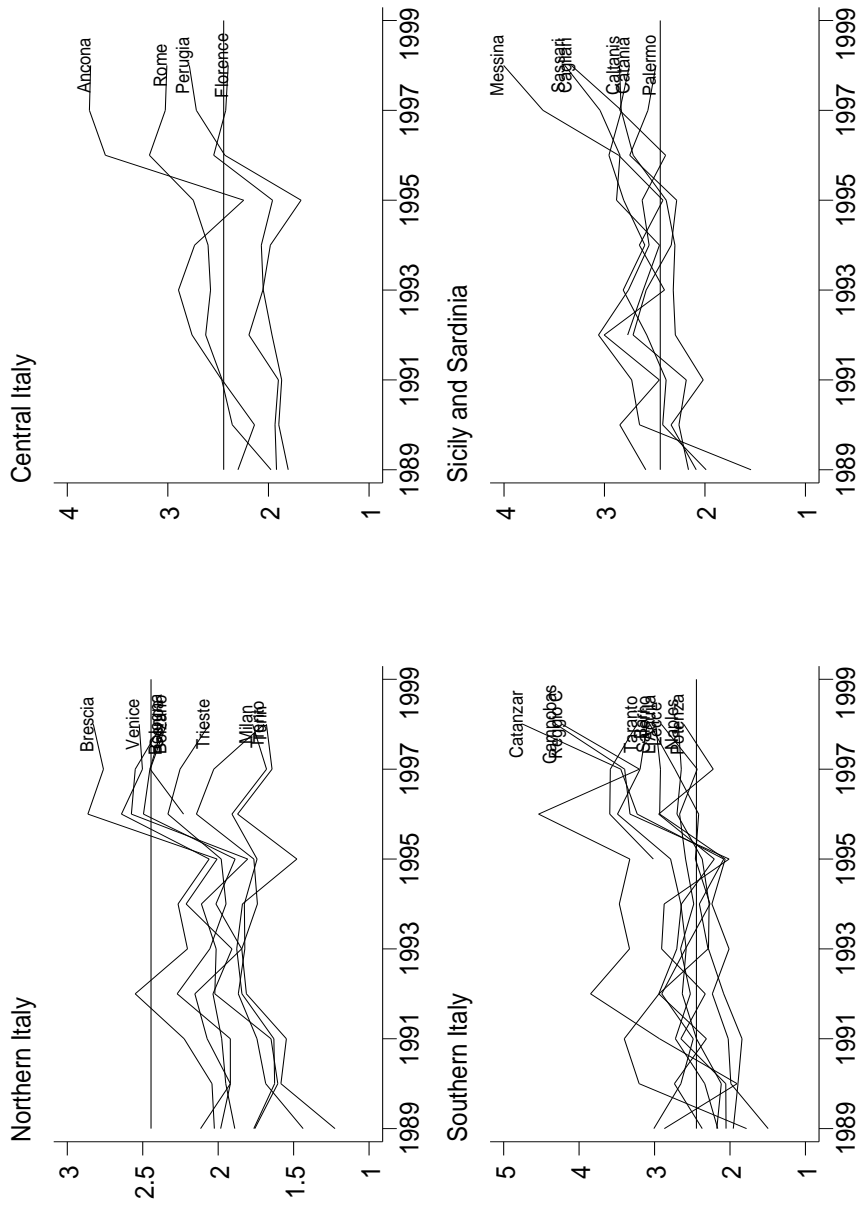


Figure 1: Backlog of trials pending divided by incoming trials

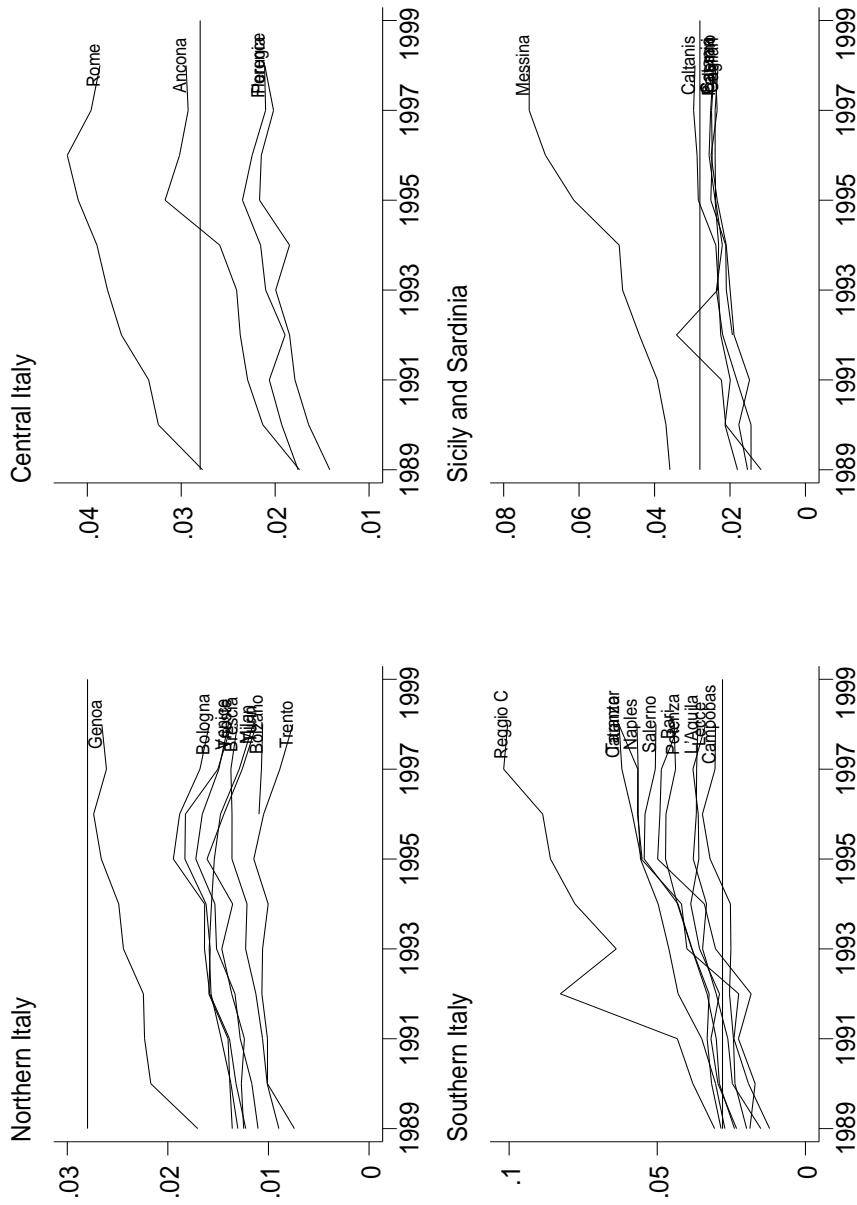


Figure 2: Backlog of trials pending divided by population

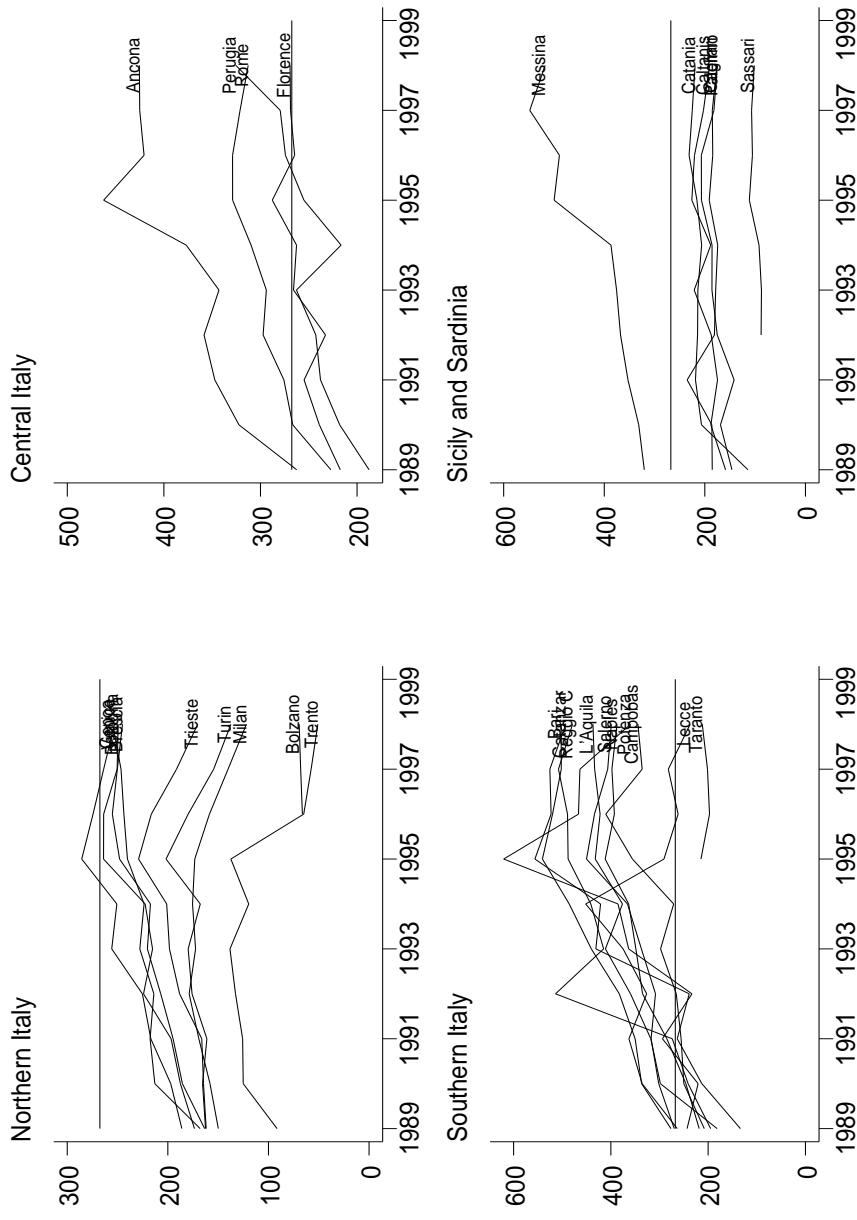


Figure 3: Backlog of trials pending divided by judges

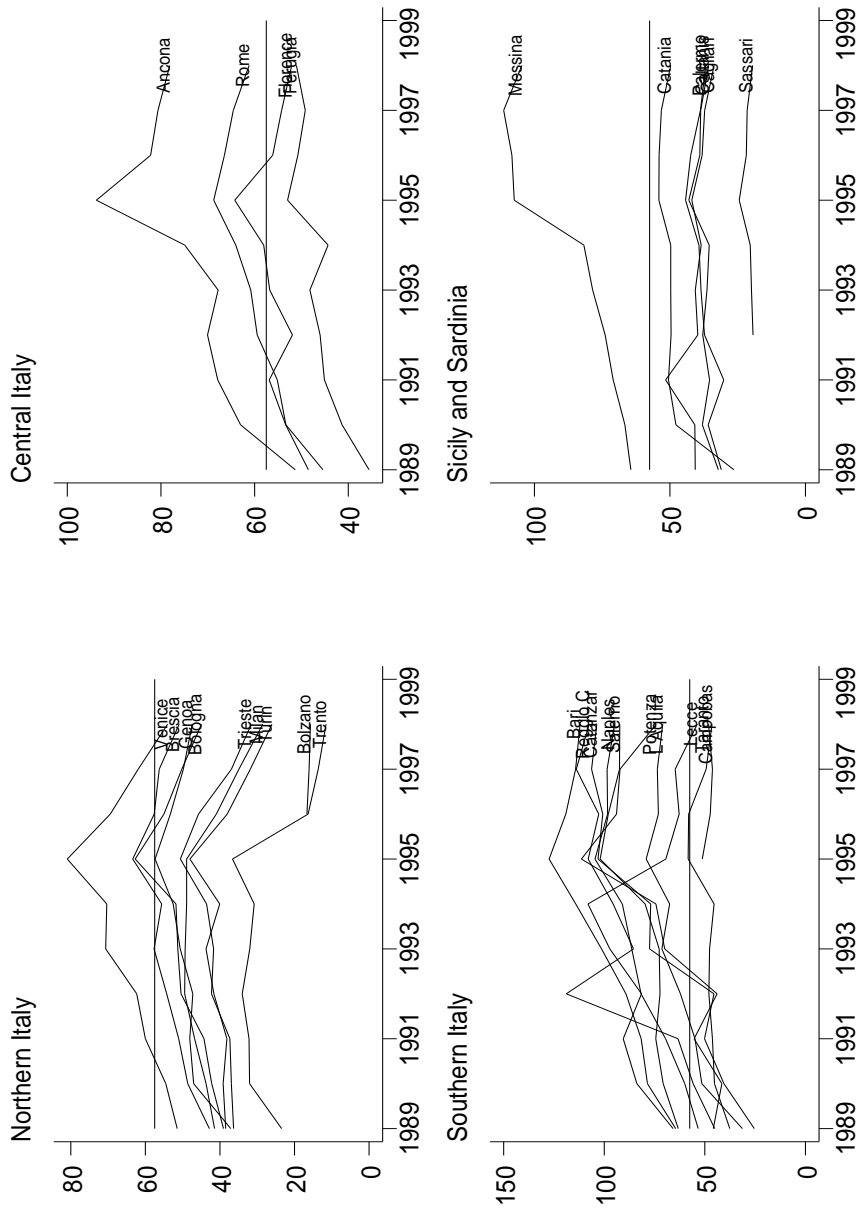


Figure 4: Backlog of trials pending divided by judges and staff

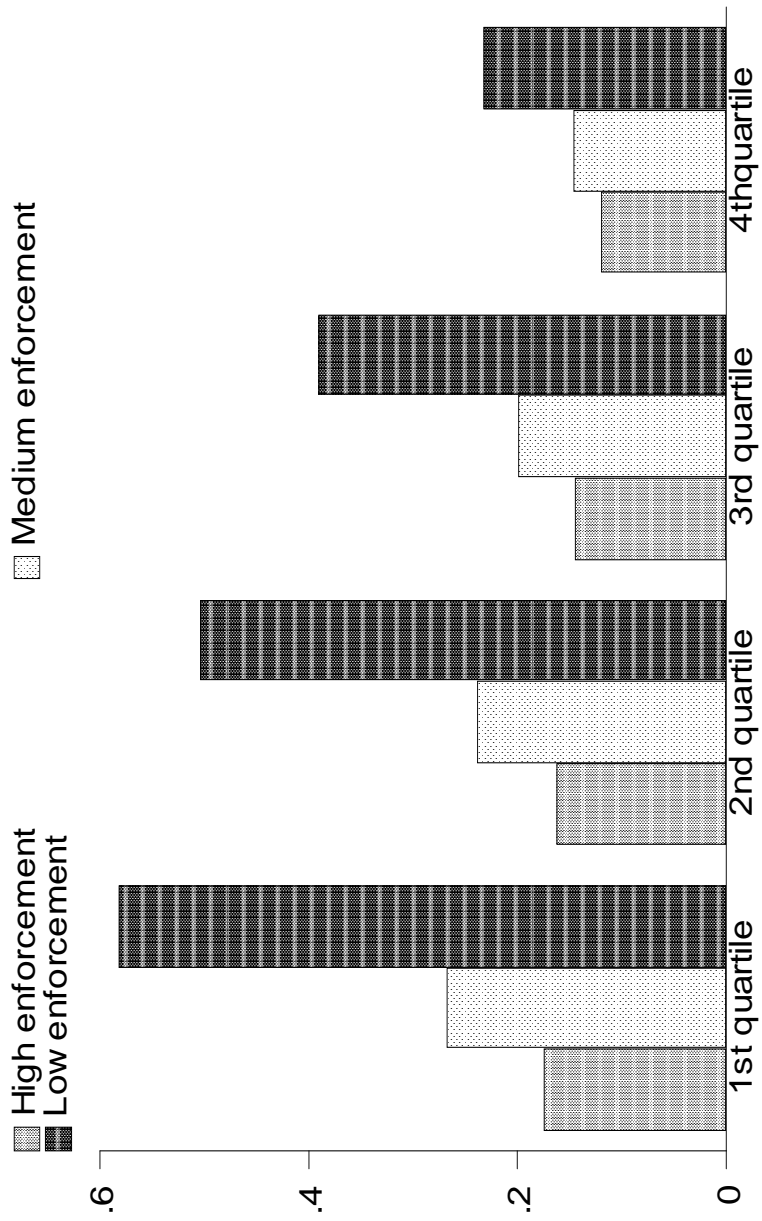


Figure 5: Probability of being credit-constrained and wealth distribution

A The Data

Household data are drawn from the 1989, 1995 and 1998 waves of the Survey of Household Income and Wealth, a national sample survey conducted by the Bank of Italy.

Data on the performance of judicial districts, the number of judges and the size of the administrative staff are available for the same years for 29 judicial districts. Each district is defined by the jurisdiction of an appeals court. Roughly, each district corresponds to a region. In a few regions (Lombardy, Campania, Puglia, Calabria, Sicily and Sardinia) there is more than one judicial district. In one case a district (denominated as Turin) comprises two different regions (Valle d'Aosta and Piedmont). Finally, the judicial district of Genoa includes not only all the provinces of Liguria but also one province of Tuscany. Table 2 shows the matching of judicial districts with provinces and regions. For the reader's convenience, we also give a map of Italy (see figure 6).

Below, find the definition and source of the variable used in the estimation.

Credit market participation, by household. Dummy variable that takes value equal to one if the household responds positively to the question: "During the year did you or a member of your household applies for a loan or a mortgage to a bank or other financial intermediary?". Source: *Survey of Household Income and Wealth*, years: 1989, 1995 1998, Bank of Italy.

Credit rationing, by household. Dummy variable that takes value equal to one if the household is credit-constrained, i.e. responds positively to the following question: "During the year did you or a member of your household apply for a loan to a bank or other financial intermediary and have the application rejected partially or totally?". Source: *Survey of Household Income and Wealth*, years: 1989, 1995 1998, Bank of Italy.

Debt, by household. Total amount of debt (i.e. amount borrowed to purchase houses, valuables, vehicles and other durable goods and to finance non-durable consumption) at the end of the year. Source: *Survey of Household Income and Wealth*, years: 1989, 1995 1998,

Bank of Italy.

Age of the household head, by household. Age in years. Source: *Survey of Household Income and Wealth*, years: 1989, 1995 1998, Bank of Italy.

Labor household income, by household. Sum of labor incomes of all members of the household who worked at least part of the year. It does not include pension income of retired members, income from capital and transfers. Source: *Survey of Household Income and Wealth*, years: 1989, 1995 1998, Bank of Italy.

Collateral, by household. Proxy for collateral assets as measured by the stock of real assets, the stock of land and houses, the value of the house of residence, and the stock of land and houses minus the value of the house of residence. Source: *Survey of Household Income and Wealth*, years: 1989, 1995 1998, Bank of Italy.

Years of schooling, by household. The variable is originally coded in the following classes: no education (0 years), completed elementary school (5 years), completed junior high school (8 years), completed high school (13), completed university (18), graduate education (20 years). In the regressions the variable is coded according to the values given in parenthesis. Source: *Survey of Household Income and Wealth*, years: 1989, 1995 1998, Bank of Italy.

Family size, by household. Number of the members of the household. Source: *Survey of Household Income and Wealth*, years: 1989, 1995 1998, Bank of Italy.

Retiree, by household. Dummy variable that takes value equal to one if the head of the household is retired. Source: *Survey of Household Income and Wealth*, years: 1989, 1995 1998, Bank of Italy.

Unemployed, by household. Dummy variable that takes value equal to one if the head of the household is unemployed. Source: *Survey of Household Income and Wealth*, years: 1989, 1995 1998, Bank of Italy.

Marital status, by household. Dummy that takes value equal to one if the head of the household is married. Source: *Survey of Household Income and Wealth*, years: 1989, 1995 1998, Bank of Italy.

City size, by household. Dummy that takes value equal to one if the household's city of residence has more than 200,000 inhabitants. Source: *Survey of Household Income and Wealth*, years: 1989, 1995 1998, Bank of Italy.

Per capita gross domestic product, by region. Gross domestic product divided by population. Source: *Conti Economici Regionali*, years 1989-1998, National Institute of Statistics (ISTAT).

Backlog of trials pending, by judicial district. Backlog of civil trials pending at the first and the second degree of judgement (lower and appeals court). Source: *Annuario delle Statistiche Giudiziarie Civili*, years 1989-1998, Italian National Institute of Statistics (ISTAT).

Number of incoming trials, by judicial district. Number of incoming civil trials at the first and the second degree of judgement (lower and appeals court). Source: *Annuario delle Statistiche Giudiziarie Civili*, years 1989-1998, National Institute of Statistics (ISTAT).

Population, by judicial district. Source: *Annuario delle Statistiche Giudiziarie Civili*, years 1989-1998, National Institute of Statistics (ISTAT).

Number of judges, by judicial district. Number of civil court judges of jurisdiction assigned to each judicial district. Source: *Italian Ministry of Justice*, years 1989-1998.

Size of the administrative staff, by judicial district. Number of administrative officers assigned to each judicial district. Source: *Italian Ministry of Justice*, years 1989-1998.

B The Econometric Model

This section describes how the probability of being credit-constrained is derived and estimated. To do so we run a probit model that allows for endogenous selection due to the fact that the decision to participate in the credit market and the probability of being credit-constrained may depend upon the same set of unobservable factors.

A household is credit-constrained if it is rejected for credit. This involves two logical steps in the construction of the model. First, we focus on the decision to apply for a loan. Household i applies for a loan if:

$$y_{i1}^* = x_{i1}\beta_1 + u_{i1} \geq 0$$

where y_{i1}^* is the utility of applying for a loan net of the costs and depends on observable (i.e. x_{1i}) and unobservable (i.e. u_{1i}) factors.

Second, among those that apply for a loan we distinguish constrained from unconstrained households. Household i is not credit-constrained if:

$$y_{i2}^* = x_{i2}\beta_2 + u_{i2} \geq 0$$

where x_{2i} and u_{2i} are, respectively, observable and unobservable variables.

We define:

$$y_1 = \begin{cases} 1 & \text{if } x_1\beta_1 + u_1 \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

and

$$y_2 = \begin{cases} 1 & \text{if } x_2\beta_2 + u_2 \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

Thus, y_1 and y_2 take value 1 for those that participate in the credit market and for unconstrained households, respectively.

We assume that u_1 and u_2 are jointly normal with mean zero and variance given by:

$$\Sigma_{12} = \begin{bmatrix} 1 & \rho \\ \rho & 1 \end{bmatrix}$$

The probability of being credit-constrained is thus specified as:

$$P(y_2 = 0 | y_1 = 1) = \frac{\int_{-x_1\beta_1}^{+\infty} \int_{-\infty}^{-x_2\beta_2} f(u_1 u_2) du_1 du_2}{\int_{-x_1\beta_1}^{+\infty} f(u_1) du_1}$$

where:

$$f(u_1 u_2) = \frac{1}{2\pi\sqrt{1-\rho^2}} \exp\left[-\frac{1}{2(1-\rho^2)} (u_1^2 - 2\rho u_1 u_2 + u_2^2)\right]$$

and

$$f(u_1) = \frac{1}{\sqrt{2\pi}} \exp\left[-\frac{1}{2} u_1^2\right]$$

The estimation is carried out using maximum likelihood.

References

- Bester, Helmut, 1987, The Role of Collateral in Credit Market with Imperfect Information, *European Economic Review* 31, 887–899.
- Bianco, Magda, Tullio Jappelli, and Marco Pagano, 2000, Courts and banks: Effects of Judicial Enforcement on Credit Markets, Mimeo.
- Brandolini, Andrea, and Luigi Cannari, 1994, Methodological appendix: The bank of italy’s survey of household income and wealth, in Luigi Guiso Albert Ando, and Ignazio Visco, ed.: *Saving and the Accumulation of Wealth: Essays on Italian Households and Government Behavior* . pp. 369–386 (Cambridge University Press: Cambridge).
- Cox, Donald, and Tullio Jappelli, 1990, Credit Rationing and Private Transfers: Evidence from Survey Data, *The Review of Economics and Statistics* 72, 445–454.
- Cristini, Nora Marcela, Ramiro Alejandro Moya, and A. Powell, 1999, The importance of an effective legal system for credit markets: the case of argentina, Working paper.
- Fabbri, Daniela, 2001, Legal Institutions, Corporate Governance and Aggregate Activity: Theory and Evidence, CSEF Working Paper n.72.
- Gropp, Reint, John Karl Scholz, and Michelle White, 1997, Personal Bankruptcy and Credit Supply and Demand, *Quarterly Journal of Economics* 112, 217–252.
- Guiso, Luigi, Paola Sapienza, and Luigi Zingales, 2001, The Role of Social Capital in Financial Development, CEPR Working Paper n. 2383.
- Jaffee, Austin, 1985, Mortgage Foreclosure Law and Regional Disparities in Mortgage Financing Costs, Pennsylvania State University, Working Paper n.85.
- Jappelli, Tullio, 1990, Who is Credit Constrained in the U.S. economy?, *Quarterly Journal of Economics* 105, 219–234.
- La Porta, Raphael, Florencio Lopez de Silanes, Andrei Shleifer, and Robert W. Vishny, 1997, Legal Determinants of External Finance, *Journal of Finance* 52, 1127–1161.
- Meador, Mark, 1982, The Effect of Mortgage Laws on Home Mortgage Rates, *Journal of Economics and Business* 34, 143–148.