TULLIO JAPPELLI
MARCO PAGANO
MAGDA BIANCO

Courts and Banks: Effects of Judicial Enforcement on Credit Markets

The cost of enforcing contracts is a key determinant of market performance. We document this point with reference to the credit market in a model of opportunistic debtors and inefficient courts. According to the model, improvements in judicial efficiency should reduce credit constraints and increase lending, with an ambiguous effect on interest rates that depends on banking competition and on the type of judicial reform. These predictions are supported by panel data on Italian provinces. In provinces with longer trials or large backlogs of pending trials, credit is less widely available.

JEL codes: G2, K4
Keywords: enforcement, judicial efficiency, credit market, interest rates.

May you have lawsuits—and win them.
—Old gypsy curse[1]

A BORROWER MAY default on a loan because he is unable (accidental default) or because, though potentially solvent, he is unwilling to repay (strategic default). Besides being intrinsically different, inability and unwillingness

1. This double curse about the slowness of trials and the difficulty of obtaining damages once they are awarded is drawn from the *Financial Times*, Weekend December 12–13, 1998, p. 3.

We thank the editor and two anonymous referees for providing insightful suggestions. Helpful comments were provided by seminar participants at the Banque de France, the European University Institute, the European Central Bank, and the University of Naples and particularly by Olivier de Bondt, Francesco Giavazzi, Reint Gropp, Andrea Ichino, and Lucio Scandizzo. This research has been partly supported by grants awarded by the Fondation Banque de France, the Italian Ministry of Education, University and Research (MIUR), and the European Commission (Research Training Network on Understanding Financial Architecture: Legal and Political Frameworks and Economic Efficiency). The views expressed here are those of the authors and do not involve the responsibility of the Bank of Italy.

TULLIO JAPPELLI *is affiliated with Università di Salerno, CSEF and the Centre for Economic Policy Research* (*E-mail:* tulliojj@tin.it). MARCO PAGANO *is affiliated with Università di Napoli Federico II, CSEF and the Centre for Economic Policy Research* (*E-mail:* mrpagano@tin.it). MAGDA BIANCO *is a research economist at the Bank of Italy* (*E-mail:* bianco.magda@insedia.interbusiness.it).

Received April 22, 2003; and accepted in revised form June 9, 2003.

Journal of Money, Credit, and Banking, Vol. 37, No. 2 (April 2005)

to repay depend on totally different factors. A borrower is unable to repay if his project fails, which may in turn depend on bad luck, incompetence, poor effort in managing the project, or a combination of all three factors.

A solvent borrower may be unwilling to repay if the gain from defaulting is greater than the perceived cost of the presumed sanctions. The perceived cost of these sanctions does not depend only on the lender's willingness to inflict them but also on the entire set of institutional arrangements governing the credit market. The law and its enforcement by the judiciary are central to these arrangements. Historically, countries have developed different legal systems, which feature varying degrees of protection of creditors' rights. This is documented by the influential contributions of La Porta et al. (1997, 1998), who propose a measure of the international differences in the degree of creditor rights' protection and find that this variable is positively correlated with the breadth of credit markets.

However, even countries with similar legal rules may enforce them to a differing extent depending on the efficiency and honesty of their judiciary. And even within the same country, the efficiency of courts can vary a great deal depending on the allocation of resources and the geographical distribution of the "demand for contract enforcement." By affecting the borrower's future willingness to pay, these features help determine the *ex ante* willingness of creditors to extend loans and the terms they will ask. By the same token, they determine the effectiveness of credit markets in intermediating and allocating savings among alternative users.

This paper explores the impact of the judicial enforcement of debt contracts on the amount of lending, interest rates, and default rates theoretically and empirically. We present a model of opportunistic debtors and inefficient courts. Judicial efficiency is measured by the fraction of inside or outside collateral that lenders can expect to recover from an insolvent borrower at the end of a trial.[2] According to the model, an improvement in judicial efficiency unambiguously increases aggregate lending, by opening the credit market to borrowers with little collateral. The impact of judicial efficiency on the average interest rate is ambiguous, in that it depends on the structure of the credit market (competitive or monopolistic) and on the specific judicial reform (improvement in the recovery of inside or outside collateral).

We then test these predictions empirically, using a specially designed Italian panel on interest rates, lending, overdrafts, default rates, and indicators of judicial inefficiency in each province. The evidence is that judicial enforcement is important to the performance of credit markets. Our findings are that judicial efficiency correlates positively with the volume of lending and negatively with proxies for credit constraints. The correlation with average interest rates and default rates is ambiguous, in line with the prediction of the model. In our estimates, we control for unobserved heterogeneity among judicial districts via fixed effects in our panel. Therefore, our results are not driven by cross-sectional differences among provinces, such as

2. The assumption that there is a wedge between the collateral value for the borrower and the lender is present in several contributions in the theoretical literature on financial contracting (see Bester, 1985, 1987, Besanko and Thakor, 1987, Chan and Kanatas, 1985).

differences in social, cultural, or economic institutions, that are potentially correlated with local credit market activity and judicial efficiency.

In Section 1 we discuss the theoretical channels through which judicial efficiency can affect credit market performance. In Section 2, we present our province-level data and the corresponding regression results. Section 3 provides the conclusion.

1. A MODEL OF JUDICIAL ENFORCEMENT AND CREDIT MARKETS

The key function of courts in credit relationships is to force solvent borrowers to repay when they fail to do so spontaneously. Hence, poor judicial enforcement will increase opportunistic behavior on the part of borrowers: anticipating that creditors will be unable to recover their loans easily and cheaply via the courts, borrowers will be tempted to default. Lenders respond by reducing the availability of credit.[3]

We illustrate how judicial inefficiency affects credit market performance in a model of risk-neutral banks facing a continuum of potential borrowers. Each borrower i has no liquid wealth but owns illiquid collateral C_i. He can invest in a project requiring a loan of size L_i, so that his collateral–loan ratio is $c_i \equiv C_i/L_i$. Projects succeed with common probability p and fail with probability $1 - p$. All successful projects yield $1 + \pi$ per unit invested, and failed projects yield zero. All projects have positive net present value (NPV), that is, their expected profitability exceeds the banks' cost of raising funds, $\bar{r}$:

$$p(1 + \pi) > 1 + \bar{r}\,.$$

Since $\bar{r}$ is also the opportunity cost of capital for entrepreneurs, all of them would like to undertake their projects.

Banks can observe whether projects succeed or fail, so that there is no asymmetric information.[4] In either case, the borrower can dispute the bank's claim. In case of dispute, the bank can attempt to recover the loan in court. But it will recover only a fraction ϕ_p of the project's revenue[5] and a fraction ϕ_c of the collateral. The parameters ϕ_p and ϕ_c can be regarded as indicators of judicial efficiency. Both range from 0 (no enforcement) to 1 (perfect enforcement).

There are two possible interpretations of this assumption. First, by disputing the repayment and forcing the lender to go to court, the borrower retains a fraction of the payment owed. For each dollar lent, the lender is not able to recover more than $\phi_p(1 + \pi) + \phi_c c_i$ in case of success and $\phi_c c_i$ in case of failure. If the project is successful and the agreed payment $1 + r_i$ exceeds $\phi_p(1 + \pi) + \phi_c c_i$, the borrower

3. In a multi-period model, reputation constraints can provide an incentive mechanism that limits strategic default. Thus, in models with reputation the importance of judicial efficiency may be lower than that in the present setting.

4. The model can also effectively capture the case where the lender cannot observe the outcome of the project. In this case, the borrower will always claim that the project has failed. Anticipating this, the lender will extend credit only if repayment is guaranteed by collateral. In the model, this case would obtain with $\phi_p = 0$.

5. The subscript p stands for "project," since in this case the project itself acts as inside collateral.

has the incentive to dispute the lender's claim and pay only $\phi_p(1 + \pi) + \phi_c c_i$. If $1 + r_i \leq \phi_p(1 + \pi) + \phi_c c_i$, the borrower does not go to court and repays $1 + r_i$. If instead the project fails, the borrower will dispute the lender's claim if $1 + r_i > \phi_c c_i$ and will repay otherwise.

A second interpretation is that a fraction of the payment owed is dissipated by the judicial process itself (legal fees, asset mismanagement, bribes to corrupt officials, etc.), rather than retained by the borrower. In this interpretation, judicial costs effectively operate as a tax on credit transactions. In principle, this tax can be avoided by settling out of court, two parties having to agree on how to split the resources that they would have otherwise wasted. Suppose that judicial costs are borne entirely by the lender. If $1 + r_i > \phi_p(1 + \pi) + \phi_c c_i$, in case of success the borrower will make a take-it-or-leave-it offer to repay the minimum of $\phi_p(1 + \pi) + \phi_c c_i$ and $1 + r_i$ per dollar lent. In case of failure, he will offer to repay the minimum of $1 + r_i$ and $\phi_c c_i$. In both cases, the lender will be indifferent between accepting the borrower's offer and taking him to court. So the borrower retains the whole cost of the trial, and the two alternative interpretations lead exactly to the same outcome. If judicial costs are more evenly distributed between the two parties, the borrower could keep only part of the cost of the trial. Even so, by threatening to go to court, he can extract that portion from the lender.[6]

In short, borrowers' opportunistic threat to turn to an inefficient enforcement mechanism implies that lenders cannot recover more than $\phi_p(1 + \pi) + \phi_c c_i$ per unit lent in case of success, and $\phi_c c_i$ otherwise. Thus, to ensure repayment in case of success, the lending rate charged to borrower i, r_i, cannot exceed the limit:

$$1 + r_i \leq \phi_p(1 + \pi) + \phi_c c_i \,. \tag{1}$$

All banks know the success probability p, the projects' profitability π, the judicial efficiency parameters ϕ_p and ϕ_c, and the individual borrower's collateral–loan ratio c_i.

1.1 Competitive Banks

In equilibrium, expected profits are zero, so that the cost of funds equals the expected return per unit lent to borrower i:

$$1 + \bar{r} = p \min[1 + r_i, \phi_p(1 + \pi) + \phi_c c_i] + (1 - p) \min[1 + r_i, \phi_c c_i] \,, \tag{2}$$

where the two terms on the right-hand side capture the opportunistic choices of the borrower in case of success and failure, respectively. Suppose that the agreed interest rate is set so as to ensure repayment at least in case of success, so that Constraint (1)

6. If lenders bear only a fraction γ of judicial costs, the borrower's take-it-or-leave-it offer will be accordingly reduced to $[1 - \gamma(1 - \phi_p)](1 + \pi) + [1 - \gamma(1 - \phi_c)]c_i$ in case of success and to $[1 - \gamma(1 - \phi_c)]c_i$ in case of failure. Constraint (1) and all subsequent expressions must be redefined accordingly. All the comparative static concerning an improvement in judicial efficiency are qualitatively unchanged.

holds. Then, Equation (2) defines the break-even interest rate r_i charged to each borrower:

$$1 + r_i = \frac{1 + \bar{r}}{p} - \frac{1 - p}{p} \min(1 + r_i, \phi_c c_i), \quad \text{for } c_i \geq c_{\min}, \tag{3}$$

where:

$$c_{\min} = \frac{1 + \bar{r}}{\phi_c} - \frac{p\phi_p(1 + \pi)}{\phi_c}. \tag{4}$$

The minimum level of collateral in Equation (4) is obtained by substituting Constraint (1) (taken with equality) into Equation (3). To break even, banks do not finance entrepreneurs with collateral–loan ratio below $c_{\min}$, even though with internal financing their projects would be profitable. This is due to the interaction of judicial inefficiency and opportunistic behavior. With efficient courts ($\phi_c = \phi_p = 1$), all entrepreneurs would have access to credit.[7] And even with inefficient courts, they would all get credit if they could pledge not to dispute. But since they cannot credibly commit to do so, entrepreneurs with collateral below $c_{\min}$ are credit rationed.

The zero-profit condition (Equation 3) defines two lending regions. If $\phi_c c_i > 1 + r_i$, collateral is large enough that loans are safe and competition equates the lending rate to the cost of capital. Setting $r_i = \bar{r}$ in Equation (3) yields the level of collateral above which this happens:

$$\bar{c} = \frac{1 + \bar{r}}{\phi_c}. \tag{5}$$

In the second region, $\phi_c c_i < 1 + r_i$ or equivalently $c_i < \bar{c}$: collateral is not sufficient to shield the bank completely from loss if the project fails. To break even, the bank must offset this expected loss with a higher interest rate in case of success: from the standpoint of the bank, collateral and lending rates are substitutes. Therefore, for $c_{\min} < c_i < \bar{c}$, the zero-profit condition (Equation 3) defines a negative relation between the collateral–loan ratio, c_i, and the lending rate, r_i. This is plotted as the segment AB in Figure 1. To the left of point A, borrowers have no access to credit. To the right of point B, the lending rate equals the cost of capital.[8]

All entrepreneurs will borrow, since their participation constraint is always met. To see this, note that the expected utility level of borrower i is:

$$u_i = p[(1 + \pi) + c_i - (1 + r_i)] + (1 - p)[c_i - \min(1 + r_i, \phi_c c_i)] \tag{6}$$

$$= \begin{cases} p(1 + \pi) - (1 + r_i) + c_i & \text{if } c_i \geq \bar{c} \\ p[(1 + \pi) - (1 + r_i)] + [1 - \phi_c(1 - p)]c_i & \text{if } c_i < \bar{c} \end{cases}.$$

7. Recall the positive-NPV condition $p(1 + \pi) > 1 + \bar{r}$. Then, setting $\phi_c = \phi_p = 1$ in Equation (4) implies a negative $c_{\min}$.

8. In equilibrium, borrowers with collateral $c_i \in [c_{\min}, \bar{c}]$ repay in case of success and default strategically in case of failure. Instead, borrowers with $c_i > \bar{c}$ always repay. So the probability of default is endogenous: it is $1 - p$ if $c_i \in [c_{\min}, \bar{c}]$ and 0 if $c_i > \bar{c}$.

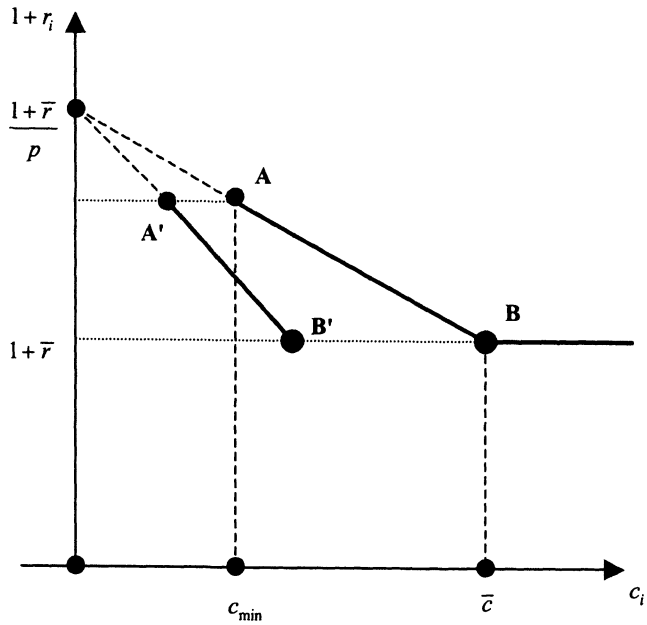

FIG. 1. An Increase in Recoverable Outside Collateral (ϕ_c) under Competition

If the individual i does not borrow, however, his utility is just the collateral c_i. Using Equations (3) and (6), the participation constraint $u_i \geq c_i$ reduces to $p(1 + \pi) - (1 + \bar{r}) \geq 0$. Given the assumption that NPV > 0, this condition is always met.

Now consider an improvement in judicial efficiency. This can take two forms: an increase in ϕ_c or in ϕ_p, the fractions of external and internal collaterals that lenders can recover. We examine these two cases in turn.

An increase in ϕ_c shifts the downward-sloping portion of the zero-profit locus inward from AB to A′B′. The minimum collateral declines to the level corresponding to A′, and the region where credit is constrained shrinks: the improvement in judicial efficiency turns some loss-making loans into viable ones. Borrowers with collateral ratios between $c_{\min}$ and $\bar{c}$ already had access to credit, but now they pay less interest. Therefore, for any given borrower i, the interest rate either decreases or stays unchanged. However, the *average* lending rate may also increase depending on how the composition of the borrowers' pool changes as the credit market expands. The effect on the average rate is negative when initially borrowers are not credit constrained. This effect is attenuated and can even change sign depending on how many initially excluded borrowers gain access to credit when ϕ_c increases.[9]

9. To see this, consider two examples. If borrowers' collateral–loan ratios are uniformly distributed between $c_{\min}$ and $\bar{c}$, the average interest rate can be shown to decrease. Suppose instead that there are two groups of potential borrowers, A and B. Group A is a fraction q of the population and has collateral–loan ratio $c_A \geq \bar{c}$. Group B has collateral–loan ratio $c_B < c_{\min}$ for the initial value of ϕ_c and is drawn into the credit market after the increase in judicial efficiency. It is immediately clear that in this second example the average interest rate increases from its initial level $\bar{r}$.

Next, consider an increase in ϕ_p. In this case the downward-sloping portion of the zero-profit locus in Figure 2 expands from AB to A′B. As a consequence, the region where entrepreneurs are credit constrained shrinks and lending increases. The rates charged to those who were already borrowing are unchanged. To understand this difference, consider that in Figure 1 the increase in ϕ_c implies that borrowers effectively pledge more external collateral. Since the latter is a substitute for the interest rate, competition forces banks to lower rates. In Figure 2, instead, borrowers can pledge more internal collateral, which protects the bank only when the project succeeds. But for borrowers who were not credit rationed, banks were already protected by inside collateral in case of success, so the zero-profit interest rate is unaffected. Borrowers who were previously rationed now have access to credit at a higher interest rate, since raising the rate is the only way the bank can exploit the increased inside collateral. Thus, unlike an increase in ϕ_c, an increase in ϕ_p always increases the average lending rate.

So far we have considered the probability of success as an exogenous parameter p common to all entrepreneurs: by assumption, judicial efficiency does not affect the default rate $1 - p$. But in general the probability of a project's success is endogenous, being determined by entrepreneurial effort to avoid default. Consider a situation where lenders can observe (and contract upon) the entrepreneur's effort to avoid default, p_i. In Appendix A, we show that in this case judicial efficiency tends to raise the average default rate, although it leaves the individual default probability unaffected. More specifically, the average default rate increases whenever there are some entrepreneurs who were denied credit before the judicial reform. The reason

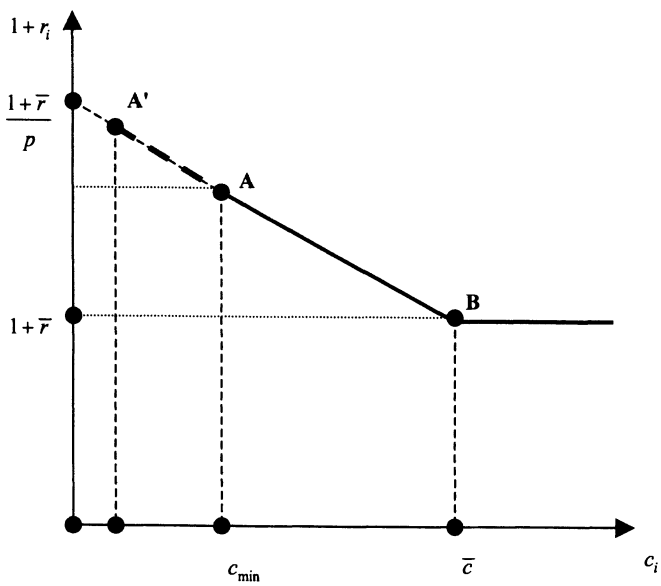

FIG. 2. An Increase in Recoverable Inside Collateral (ϕ_p) under Competition

is that a more efficient judiciary reduces the region of credit constraints, opening the market to lower-grade borrowers.[10] The deterioration of the borrower pool due to this endogenous response of p_i tends to raise the average interest rate, acting through a channel that is absent when p is exogenous. In the case of an increase in ϕ_p, this effect reinforces the increase in the average interest rate. In the case of an increase in ϕ_c, it expands the region of parameters for which the average interest rate increases.

To summarize, under perfect competition, an improvement in judicial efficiency reduces credit constraints and increases lending. It can also increase the average default rate if there were prior credit constraints. The effect on interest rates depends on the specifics of the reform: better recovery of external collateral (ϕ_c) has ambiguous effects, while better recovery of internal collateral (ϕ_p) raises interest rates.

1.2 Monopoly

To explore the effects of judicial reform in non-competitive credit markets, consider a situation in which the credit market is geographically segmented and banks are local monopolists. Also the monopolist cannot extract more than $\phi_p(1 + \pi) + \phi_c c_i$ per dollar lent. Since we assume that the demand for credit is inelastic, the monopolist extracts from borrower i the entire surplus, setting:

$$1 + r_i = \phi_p(1 + \pi) + \phi_c c_i, \quad \text{for } c_i \in [c_{\min}, c_{\max}]\,. \tag{7}$$

The collateral $c_{\min}$ is the same as in Equation (4), since a loan to an entrepreneur with lower collateral entails an expected loss. The maximum collateral $c_{\max}$ that a borrower is willing to pledge is obtained by substituting Equation (7) into the participation constraint:

$$u_i = p[(1 + \pi) + c_i - (1 + r_i)] + (1 - p)(1 - \phi_c)c_i \geq c_i\,,$$

which yields:

$$c_{\max} = \frac{p(1 + \pi)(1 - \phi_p)}{\phi_c}\,. \tag{8}$$

The interest rate that corresponds to this collateral level is $1 + r_{\max} = (1 + \pi)[\phi_p(1 - p) + p]$.

Equation (7) shows that, in contrast to the competitive case, under monopoly there is a positive correlation between the lending rate and the collateral–loan ratio. With no competition, the bank can charge higher rates to those who pledge more collateral. The relationship between r_i and c_i is graphed as the line AB in Figure 3.

10. The judicial reform may also raise the default rate via another channel. Banks are more protected by collateral in case of default, and so have less incentive to screen (collateral and screening being substitutes from their point of view). Less screening will increase the riskiness of their loans and the average default rate, as shown by Manove, Padilla, and Pagano (2001).

As under competition, if the collateral–loan ratio is lower than c_{min}, no credit is granted.

Figure 3 illustrates that an increase in ϕ_c shifts the AB locus upward and to the left. The new locus A′B′ features lower c_{min} and c_{max}. So the credit-rationing region shrinks and lending increases, as under competition. Lending rates rise for all borrowers. An increase in ϕ_c effectively raises the pledgeable portion of collateral and so enables the bank to extract a higher surplus by raising interest rates. In Figure 4, we repeat the analysis for an increase in ϕ_p. In this case, the interest rate locus has a parallel upward shift, with similar qualitative effects. In short, under monopoly an improvement in judicial efficiency reduces credit constraints, increases lending, and raises interest rates.

2. EVIDENCE FROM A PANEL OF JUDICIAL DISTRICTS

The model illustrates that improvements in judicial efficiency reduce credit constraints and increase aggregate lending. Interest rates can either rise or fall, depending on the competitive structure of the banking sector and on the specific channel through which judicial reforms enhance enforcement. We now bring empirical evidence to bear on these issues, using Italian panel data on lending to firms, indicators of credit constraints, interest rates, and insolvency rates.

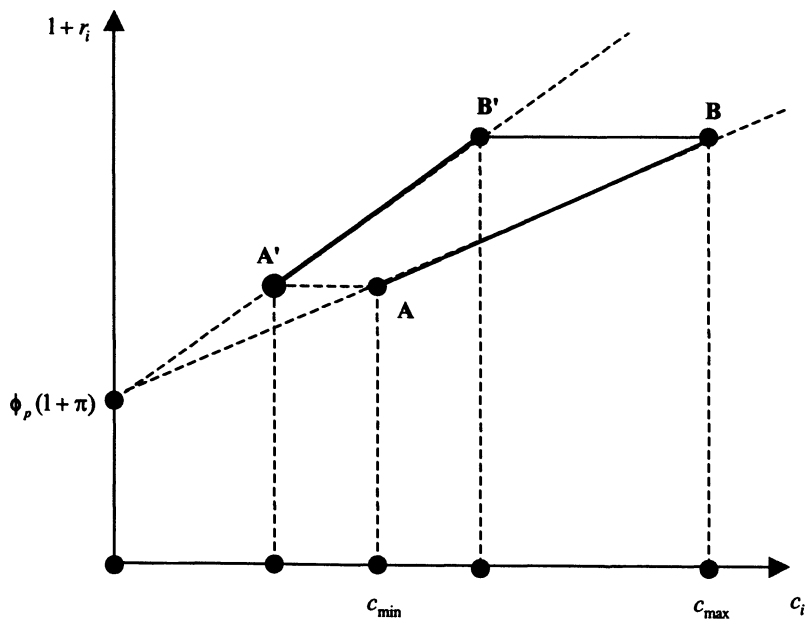

FIG. 3. An Increase in Recoverable Outside Collateral (ϕ_c) under Monopoly

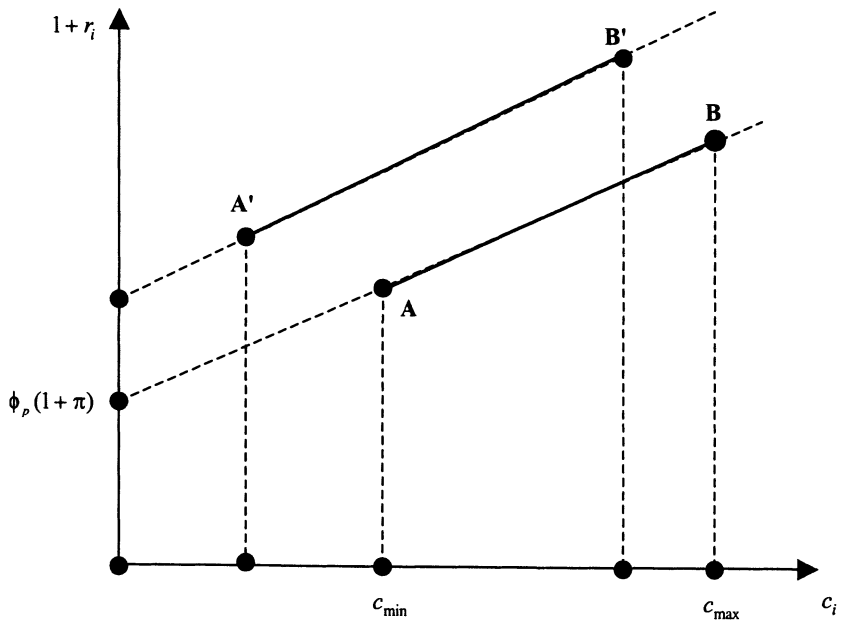

FIG. 4. An Increase in Recoverable Inside Collateral (ϕ_p) under Monopoly

2.1 Data

To repossess collateral after a default, in Italy, creditors must resort to a judicial court. If they do not, they would commit a crime.[11] Even when creditor rights are particularly protected by the law, such as when the debtor has issued an I.O.U. or a check, the creditor needs a court order to obtain repayment in case of default. His only advantage in this case is avoiding an action for the adjudication of his rights, but he still needs an action to enforce such rights.[12]

To study the relationship between judicial efficiency and credit market performance, we merge judicial data for 27 districts with credit market data for 95 Italian provinces. Districts are jurisdictional units, while provinces are administrative units. Each district includes one or more provinces: for instance, the Turin judicial district includes seven provinces, while the Salerno district includes only one.

We rely on two indicators of judicial inefficiency, using data from the Italian National Institute of Statistics (ISTAT). The first indicator is the length of ordinary civil trials from 1984 to 1998. It measures the time elapsing between the date of initial recording of a trial and that of the court sentence for actions requiring adjudication of substantive rights concerning credit and commercial matters: loans,

11. By article 392 of the criminal code, the "arbitrary exercise of one's rights" is punished by a fine.
12. If debtors do not show up in courts when sued by creditors, judicial procedures are faster. However, by article 2697 of the civil code, the creditor must still prove his rights in court to obtain recognition of his rights and/or liquidation of the borrower's assets.

sale of real estate or goods, rentals, negotiable and quasi-negotiable instruments, and insurance.[13] Enforcement cost is directly related to the length of the judicial process. A long trial increases legal expenses, and for disputed loans, the interest income forgone when collateral does not cover judicial costs. Moreover, during the trial, the creditor is exposed to the danger of asset substitution by the debtor and to unexpected changes in the value of collateral.

The second indicator of judicial inefficiency is the number of civil suits pending per thousand inhabitants. It refers to all actions requiring adjudication of substantive rights, including appeal trials, from 1984 to 1998. The stock of trials pending is a key determinant of the duration of future trials; in fact, the two indicators are strongly correlated (the correlation coefficient is 0.58 with a standard error of 0.02).

In Italy, the length of trials is particularly high by international standards. Djankov et al. (2003) compare durations for the procedure to evict of a tenant and to collect a defaulted check. In both cases, in Italy, duration is about three times the average duration in a sample of 109 countries. Our indicators show that in Italy the length of civil trials has also increased considerably over time, doubling from 26.3 months in 1984 to 52.9 months in 1998. The number of trials pending per 1000 inhabitants increased from 23.4 in 1984 to 37.9 in 1996, then edging down to 35.7 in 1998. These trends may be explained by the increasing assignment of judges and resources to criminal justice, by the increasing number and complexity of civil laws, and by rising litigation. However, these national trends hide considerable differences across judicial districts. Trials are longer and backlogs are larger in the South and in the Islands than in the North and Center.

Furthermore, as shown in Figure 5, the backlog shows widening geographical disparities. In 1984, the number of trials pending was 20 in the North and 27 in the South and, in 1998, 23 in the North and 44 in the South. Furthermore, the North shows more marked signs of improvement after 1993, when its backlog peaked at 27.4. In a panel regression framework, variability of the length of trials between different years and different districts is crucial to identify the effect of judicial inefficiency on credit market performance.

Both of our indicators may suffer from measurement error. The cases used to measure length include many disputes on matters other than credit. The stock of trials pending refers to the even broader aggregate of all civil cases. Indirect evidence on the reliability of these indicators comes from a 1994 survey of 269 Italian banks, representing 90% of total loans.[14] The survey was designed by the Bank of Italy to gather information on credit recovery costs and procedures in the presence of insolvent borrowers. It allows us to compare our measures of judicial inefficiency, which are based on ISTAT data, with the bank's own assessment of the length of the judicial procedures by region. Since the survey refers to 1994, we aggregate the ISTAT district-level judicial data by region (20 in total, with one to nine provinces each) and relate the resulting measures to the self-reported indicator.

13. A narrower classification of legal actions (e.g., loans only) produces too few observations for each district–year cell to compute reliable indicators of judicial efficiency. For the same reason we do not consider the length of appeals civil cases and bankruptcy procedures.

14. Generale and Gobbi (1996) described the survey and its main findings.

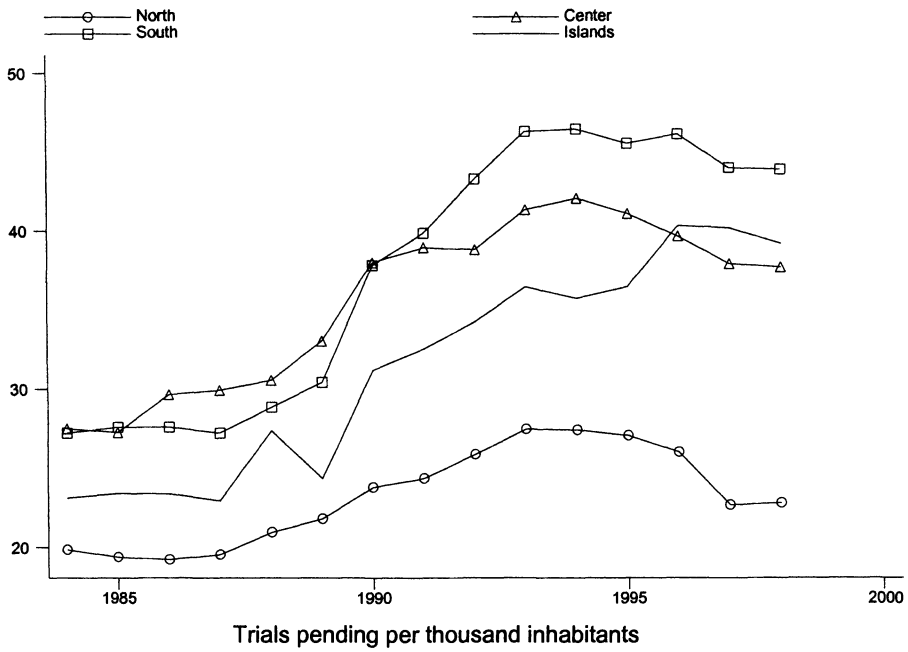

FIG. 5. Judicial Inefficiency, by Region. The graph displays the stock of pending civil trials (divided by the population of the district) in four Italian regions from 1984 to 1998.

We find that the length of trials and the stock of trials pending based on ISTAT data correlate positively with the banks' reports. The self-reported measure of the length of trial has a 0.79 correlation with the ISTAT measure of the same variable (statistically significant at the 1% level) and a 0.45 correlation with the ISTAT-based backlog (significant at the 5% level). We take this as evidence that our two ISTAT-based indicators of judicial inefficiency track lenders' perceived credit collection costs reasonably well.[15]

We merge these indicators of judicial inefficiency with measures of credit market performance: outstanding loans, indicators of credit constraints, interest rates on short-term loans to non-financial companies, ratio of non-performing to total loans, and the Herfindahl index of loan concentration.

Loans granted is total lending to domestic companies in each province divided by provincial GDP. Credit constraints are proxied by the proportion of overdrawn credit lines to non-financial firms in each province, that is, lines for which credit is drawn above the amount initially granted by the bank. This is widely regarded as a good indicator of the "tightness" of the credit market because the cost of credit rises steeply when firms overdraw. Interest rates are provincial averages weighted by loans. The ratio of non-performing loans to total loans is a proxy of the default

15. The self-reported indicator cannot be directly used in our regression analysis because it is available for only one year. Therefore, this variable is not identified in a panel data framework.

rate. All these variables are drawn from the database of the Italian public credit register (*Centrale dei Rischi*: see Appendix B for details on data sources and definitions). They are aggregated for the 95 Italian provinces from 1984 to 1995.

Table 1 reports unweighted provincial averages of the variables used in the empirical analysis for three subperiods. The total number of observations is 1140 (95 provinces for 12 years). The ratio of total outstanding lending to GDP increases from 31% to 41%. The proportion of overdrawn credit lines also increases, possibly a reflection of monetary policy tightening during Italy's run-up to the European Monetary Union. Both the lending rate and the T-bill rate declines over the sample period, reflecting disinflation. The differential between the two also narrows from 5% to 3.6%. The Herfindahl index declines from 17% to 15%, revealing increased competition in the loan market.

2.2 Descriptive Evidence

Figures 6–9 report evidence on the relation between credit market performance and judicial inefficiency in the various judicial districts. For brevity, we focus only on the stock of trials pending as the indicator of inefficiency: using the length of trials produces the same pattern of correlations. Averages are taken over the 1984–95 period. Figure 6 indicates that the district average amount of lending is negatively correlated with the stock of trials pending. The correlation is statistically different from zero at standard significance levels. For instance, in a relatively efficient judicial district like Venice there are about 22 pending trials per 1000 inhabitants, and lending is over 40% of the GDP. In Reggio Calabria, where the backlog is about 50 trials per 1000 inhabitants, lending is equal to just 10% of the GDP.

Figure 7 indicates that where the judicial backlog is heavier, our indicator of credit constraints is also higher: moving from Venice to Reggio Calabria, it approximately doubles. In Figure 8, we relate the interest rate spread (the difference between the lending rate and the T-bill rate) to the same indicator of judicial inefficiency.

TABLE 1

PANEL OF ITALIAN PROVINCES: DESCRIPTIVE STATISTICS

Variable	1984–87	1988–91	1992–95
Length of trials, months	30.00	40.08	44.15
Stock of pending trials, per thousand inhabitants	23.55	29.61	34.98
Loans granted/GDP, percent	31.23	39.75	40.67
Credit overdrafts, percent	11.48	15.23	19.44
Lending rate, percent	17.79	15.42	14.97
T-bill rate, percent	12.80	12.50	11.23
Non-performing loans/GDP, percent	2.34	1.24	2.14
Herfindahl index, percent	17.33	15.59	15.29
Real GDP (trillion of lire)	11.34	12.54	12.61
Number of observations	380	380	380

NOTES: The table reports unweighted period averages of the variables used in the regression analysis. See Appendix B for the definition of the variables.

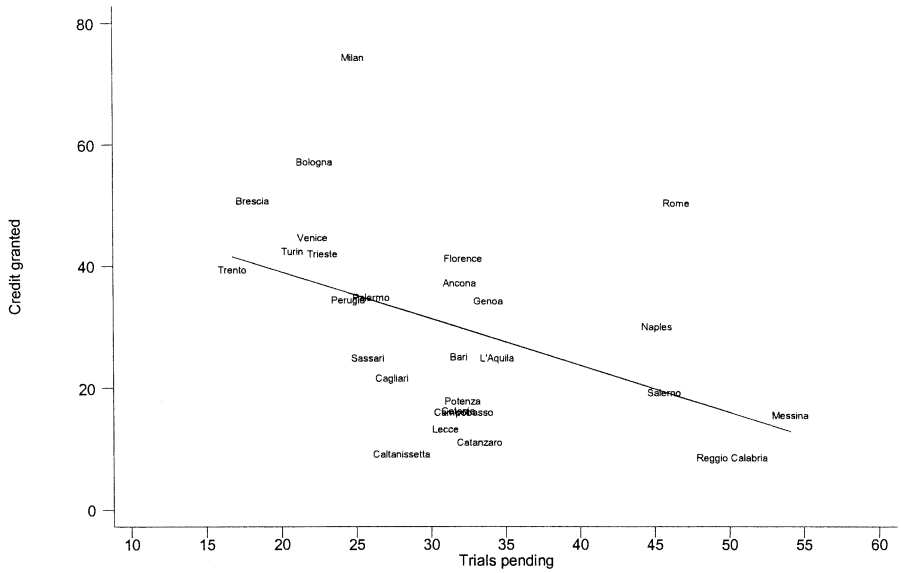

FIG. 6. Judicial Inefficiency and Lending

The correlation coefficient is positive and statistically different from zero at standard significance levels. The spread is more than 200 basis points greater in the least than in the most efficient districts. Figure 9 shows that, like the spread, the non-performing loan ratio is higher where courts are less efficient.

This descriptive evidence suggests that judicial efficiency is associated with a larger amount of lending, less credit constraints, and lower interest rates, in accord with the model of Section 1 assuming banking competition. However, these relations could be spurious because so far we have not controlled for other determinants of credit market performance. Furthermore, the cross-sectional evidence does not exploit the time-series dimension of the data. As we shall see, this dimension allows us to control not only for other covariates but also for unobserved heterogeneity at the provincial level. Therefore, we turn to regression analysis.

2.3 Regression Analysis

In our regression analysis we relate lending, fraction of firms with overdraft loans, interest rates, and non-performing loans to length of trials and judicial backlog, controlling for credit market concentration, provincial GDP, calendar-year effects, and provincial effects. Other things equal, we expect market concentration to reduce lending and raise interest rates, reflecting a less competitive credit market and possibly closer bank–firm relations, a further channel for higher interest rates and less lending according to Petersen and Rajan (1995). One would expect a larger GDP

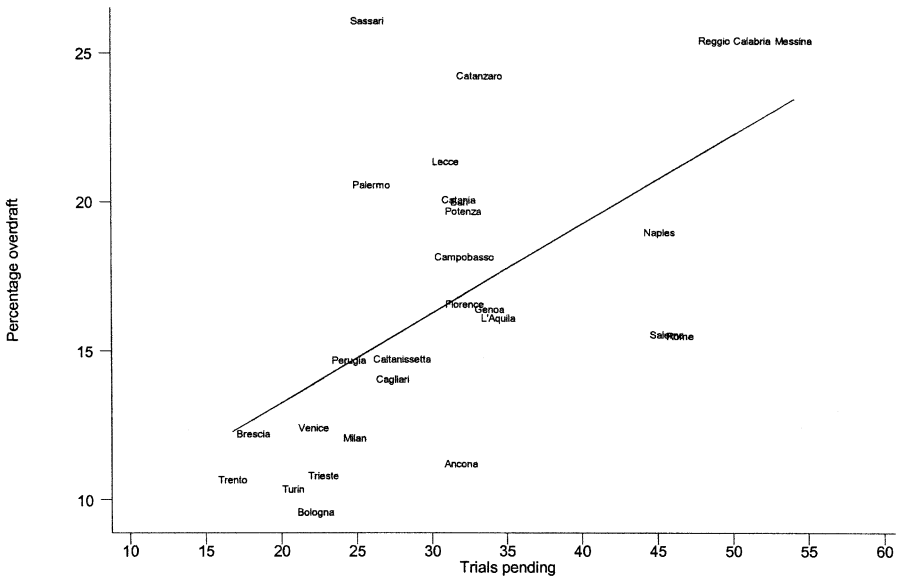

FIG. 7. Judicial Inefficiency and Overdraft Loans

to increase the demand for loans and thereby raise interest rates. To avoid endogeneity, the GDP variable is lagged. Calendar-year dummies control for the effect of aggregate shocks on the credit market.

Table 2 reports fixed-effect estimates. The fixed effects control for unobserved heterogeneity at the province level provided that the time variation of judicial inefficiency in each province is not correlated with potential omitted variables (such as credit risk or bank efficiency). The first two regressions show that the length of trials and the size of the backlog are associated with less lending and more overdraft loans, in keeping with the descriptive evidence of the previous section. In particular, the coefficients of the stock of pending trials are statistically different from zero at the 1% level. In economic terms, moreover, these coefficients are sizeable. For instance, an extra 10 trials pending per 1000 inhabitants is associated with a reduction of 1.5% in the lending/GDP ratio and an increase of one point in the percentage of firms with overdraft loans. These results dovetail with the predictions of the model, insofar as overdrafts proxy for credit constraints.[16]

A potential criticism is that we take the number of pending trials as a technological or institutional parameter, describing the functioning of the local jurisdiction. In a

16. A caveat is that if the judicial process is excessively long or costly, private parties may bypass the courts for alternative forms of dispute settlement. The substitution of out-of-court settlement could be significant in bankruptcies, suggesting that the relation between credit conditions and judicial enforcement may be non-linear. For short or moderate trial times, credit market performance (loans, interest rates, and so forth) responds to our indicators of judicial inefficiency. Since beyond a critical length the relation between judicial inefficiency and credit market performance may weaken or disappear, we introduce quadratic terms in the indicators of judicial inefficiency in the regressions of Table 2, but these prove to be not statistically different from zero.

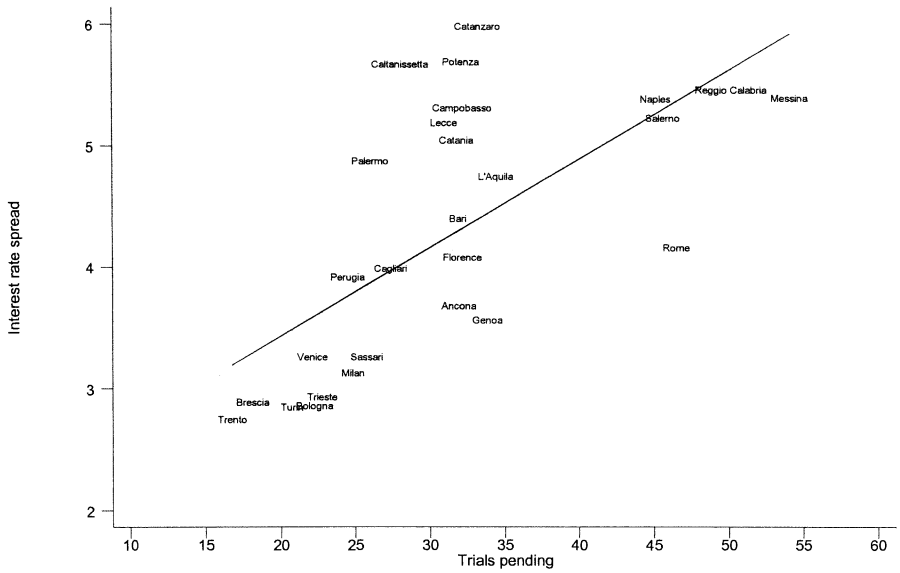

FIG. 8. Judicial Inefficiency and Interest Rate Spread

more general setting, the number of pending trials could result from the interaction between the "supply of judicial enforcement," driven by the resources allocated to the judiciary, and the "demand for judicial enforcement," as determined by actual or potential litigation. This demand might be positively related to the degree of local economic development and therefore also to the depth of the local credit market. This demand-driven effect tends to offset the negative, supply-driven relation between judicial inefficiency and credit market activity. Although we cannot disentangle demand from supply effects, we find that the overall correlation between these two variables is negative. As this occurs despite the potential counter-effect described above, our conclusion that credit is constrained by the supply of enforcement services is reinforced.

The interest rate spread correlates positively with the length of trials and negatively with the stock of pending trials. While the former correlation is statistically different from zero and agrees with the descriptive evidence in the top panel of Figure 8, the latter is not statistically different from zero. The positive correlation between judicial inefficiency and interest rate spread is not inconsistent with our model, which predicts that under competition an improvement in judicial efficiency may translate into lower interest rates.[17]

17. According to the model in Section 1, under competition, judicial inefficiency has an ambiguous effect on the average interest rate, while under monopoly, it should reduce it. To test for this asymmetric effect, we add to the regression interactions of the Herfindahl index with the two indicators of judicial inefficiency. The sign of the interaction coefficients are negative, consistently with the prior that monopoly power attenuates the positive relation between judicial inefficiency and interest rates. However, the coefficients are not statistically different from zero at conventional significance levels.

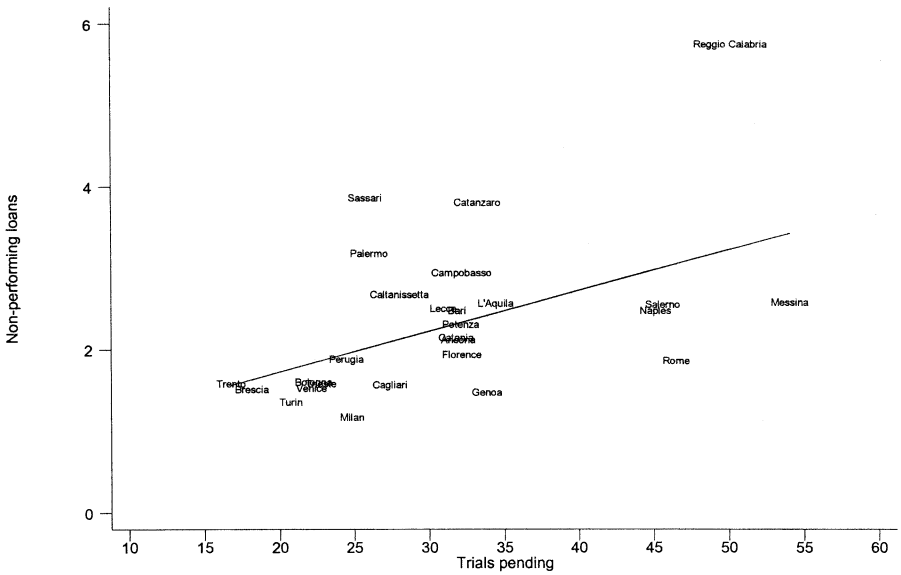

FIG. 9. Judicial Inefficiency and Non-Performing Loans

The last regression in Table 2 indicates that non-performing loans correlate negatively with both indicators of judicial inefficiency, overturning the descriptive evidence of Figure 9. To the extent that non-performing loans are a valid proxy for the average default rate in each province, this result is consistent with the predictions of the model: when the default rate is endogenous, as in the extension of Appendix A, judicial inefficiency tends to lower the average default rate, by keeping lower-grade borrowers outside the credit market.

TABLE 2

FIXED-EFFECT REGRESSION ESTIMATES

Variable	Lending/GDP	Overdrafts	Interest rate spread	Non-performing loans/total loans
Length of trials, months	−0.002 (−0.05)	0.011 (0.40)	0.007 (1.90)	−0.012 (−0.98)
Stock of pending trials, per thousand inhabitants	−0.147 (−2.86)	0.106 (3.72)	−0.005 (−1.47)	−0.045 (−3.45)
Herfindahl index	−0.209 (−3.11)	0.113 (3.01)	0.001 (0.25)	0.054 (3.14)
First lag of real GDP	−0.451 (−1.46)	−0.118 (−0.69)	0.026 (1.16)	0.011 (0.14)
Second lag of real GDP	−0.238 (−0.81)	−0.055 (−0.34)	0.001 (0.01)	−0.069 (−0.92)

NOTES: The dependent variables are the ratio of loans to GDP, an indicator of credit constraints (the fraction of loans for which credit used exceeds 100% of credit granted), the spread between the lending rate and the T-bill rate, and the ratio of values of non-performing loans to total loans. All variables are in percent. Each regression is estimated with a full set of year dummies. The sample consists of a panel of 1140 observations for 95 Italian provinces from 1984 to 1995. *T*-statistics are reported in parentheses.

The Herfindahl index is negatively correlated with lending, and positively correlated with the percentage of firms using overdraft credit, with interest rate spreads and with non-performing loans, although the coefficient in the interest rate regression is not statistically different from zero. This is consistent with conventional wisdom, as well as with previous studies of the Italian credit market based on individual loan contract data (Sapienza 1997, 2002). Finally, the GDP coefficients are not statistically different from zero.

To summarize, the econometric estimates confirm most of the descriptive evidence of Figures 6–9. According to the estimates, the judicial districts with better legal enforcement display more lending activity and less credit constraints. These results are consistent with the model of Section 1, which predicts that judicial efficiency will increase lending and decrease credit constraints under competition and monopoly alike. Also, the regressions for interest rate spreads and non-performing loans are broadly in line with the model's predictions.

These findings for Italian judicial districts are consistent with studies of other countries and markets. Castelar Pineiro and Cabral (2001) and Cristini, Moya, and Powell (2001) analyze how local variations in the effectiveness of the legal system in Argentina and Brazil affected the development of credit markets. They find less lending and more non-performing loans in provinces or states with poor enforcement. Similar results are reported for household credit in the U.S. and Italy. In the U.S., Meador (1982) found that mortgage interest rates were generally higher in states where the foreclosure process was longer and more costly. In Italy, Fabbri and Padula (2001) find that households located in judicially less efficient districts receive less credit, even after controlling for household characteristics.

3. CONCLUSIONS

Judicial inefficiency has high economic costs in credit markets. So far, these costs have never been measured. This paper takes a step in this direction by analyzing the effect of judicial efficiency on the availability and cost of credit, using a model of opportunistic debtors and inefficient courts. The model illustrates that improvements in judicial efficiency reduce credit constraints and increase the volume of lending. Interest rates can either increase or decrease depending on the competitive structure of banks, on the specific channel through which judicial reforms improve lenders' ability to repossess collateral, and on composition effects. For instance, greater judicial efficiency can open up the credit market to low-grade borrowers previously judged not creditworthy and thereby raise the average default rate.

These theoretical predictions receive support from panel data on Italian provinces. Controlling for unobserved heterogeneity at the provincial level, we find that where the backlog of pending trials is relatively large, credit is less widely available, average interest rate is lower, and default rate is higher.

APPENDIX A: THE MODEL WITH ENDOGENOUS DEFAULT

Assume that the utility of entrepreneur i is:

$$u_i = p_i[(1 + \pi) + c_i - (1 + r_i)] + (1 - p_i) [c_i - \min(1 + r_i, \phi_c c_i)] - V_i(p_i)\,, \tag{A1}$$

where the disutility of effort $V_i(p_i)$ is an entrepreneur-specific, increasing and convex function of the success rate p_i. We assume that p_i and c_i are observable and that the terms of the contract can be conditioned upon them. Therefore, the competitive interest rate charged to entrepreneur i reflects both. Entrepreneur i chooses his effort level p_i treating this interest rate r_i as an exogenous parameter. The first-order condition of the problem is:

$$\frac{\partial u_i}{\partial p_i} = [(1 + \pi) + c_i - (1 + r_i)] - [c_i - \min(1 + r_i, \phi_c c_i)] - V_i'(p_i) = 0. \tag{A2}$$

The second-order condition for a maximum is satisfied due to the convexity of $V_i(p_i)$.

The competitive interest rate is given by:

$$1 + r_i = \frac{1 + \bar{r}}{p_i} - \frac{1 - p_i}{p_i} \min(1 + r_i, \phi_c c_i), \quad \text{for } c_i \geq c_{\min,i}\,, \tag{A3}$$

where

$$c_{\min,i} = \frac{1 + \bar{r}}{\phi_c} - \frac{p_i \phi_p (1 + \pi)}{\phi_c}\,, \tag{A4}$$

is the minimum collateral that entrepreneur i must pledge to obtain credit. The higher the effort p_i, the lower the minimum collateral. In contrast with the case with constant p analyzed in the text (where the marginal borrower is identified only by his collateral), here Condition (A4) identifies a set of marginal borrowers. All entrepreneurs with collateral c_i and success rate p_i that satisfy Condition (A4) are marginal borrowers.

Replacing the competitive interest rate (Equation A3) in the first-order Condition (A2), one obtains the equilibrium success rate of any entrepreneur i:

$$V_i'(p_i) = 1 + \pi\,, \tag{A5}$$

irrespective of whether $\phi_c c_i$ is smaller or larger than $1 + r_i$. Condition (A5) establishes that at the individual level, the equilibrium success rate depends only on project profitability and on preferences and not on judicial efficiency. However, an increase in judicial efficiency can affect the *average* success rate via composition effects depending on the prevalence of credit constraints prior to the reform. From Condition (A4), an increase in ϕ_c or ϕ_p reduces the minimum required collateral $c_{\min,i}$ (given p_i) or, alternatively, reduces the minimum required effort p_i (given $c_{\min,i}$). Thus, a

new group of borrowers will gain access to credit: they feature lower c_i, lower p_i, or both. It follows that the average default rate of the pool of borrowers increases whenever some borrowers were credit rationed before the judicial reform. If, instead, no entrepreneurs were credit rationed ($c_i > c_{\min,i}$ for all i), then the average default rate remains unchanged.

The interest rate charged to each individual borrower i rises along with his default rate. To see this, notice that the interest rate charged to entrepreneur i is a decreasing function of his probability of success p_i and therefore an increasing function of his default rate:

$$\frac{\partial(1+r_i)}{\partial p_i} = \begin{cases} -\dfrac{1+\bar{r}}{p_i^2} < 0 & \text{if } c_i \geq \bar{c}, \\ \dfrac{-(1+\bar{r}) + \phi_c c_i}{p_i^2} = \dfrac{\phi_c(c_i - \bar{c})}{p_i^2} < 0 & \text{if } c_i < \bar{c}. \end{cases}$$

APPENDIX B: PROVINCIAL DATA

Credit market data are available for 95 Italian provinces for the period 1984–95. The data are drawn from the *Centrale dei Rischi* database. The *Centrale dei Rischi* is the Italian central credit register managed by a department of the Bank of Italy. Between 1984 and 1995 it recorded data on each loan over 80 million lire (approximately Euro 40,000) granted by Italian banks to companies and individuals. These data are compulsorily filed by banks and made available upon request to individual banks to monitor the total exposure of their customers. In addition, 88 banks (accounting for over 70% of total bank lending) have agreed to file detailed information about the interest rates charged on each loan. These data, which are collected for monitoring purposes, are highly confidential.

Judicial data are available from 1984 to 1998 for 27 judicial districts. Each district is defined by the jurisdiction of an appeal's court and comprises one or more provinces. Below we report the definition and source of the variables used in the estimation.

Length of trials, by judicial district (1984–98). Interval between the date of initial filing of a civil action and the date of the sentence, for actions requiring adjudication of substantive rights concerning the following matters: loans, sale of real estate or goods, rentals, negotiable and quasi-negotiable instruments, and insurance. Source: data kindly provided by the Italian National Institute of Statistics (ISTAT).

Stock of pending trials, by judicial district (1985–98). Number of pending civil trials based on actions requiring adjudication of substantive rights and scaled by the population of the corresponding district. Source: *Annuario Statistico dei Procedimenti Giudiziari Civili*, various years, Italian National Institute of Statistics (ISTAT).

Loans granted, by province (1984–95). Total credit granted to domestic companies for loans above 80 million lire. Source: *Centrale dei Rischi*.

Credit overdrafts, by province (1985–95). Proportion of credit lines overdraft (loans for which credit actually drawn exceeds credit granted) for a set of non-financial companies. The companies are those that are also present in the Company Account Data Service Centrale dei Bilanci, covering approximately 30,000 companies each year. Source: *Centrale dei Rischi*.

Lending rate, by province (1984–95). Lending rate on short-term loans in domestic currency to domestic companies for a sample of 88 banks that report on quarterly lending rates on loans exceeding 80 million lire. Data are aggregated by province, weighting interest rates by loan size. Annual data are computed as averages of quarterly data. Source: *Centrale dei Rischi*.

Non-performing loans, by province (1984–95). Ratio of non-performing loans to total loans in domestic currency to domestic companies. Annual data are computed as averages of quarterly data. Source: *Centrale dei Rischi*.

Herfindahl index, by province (1985–95). The index is the sum of squared market shares of loans of all banks in each province. Source: *Centrale dei Rischi*.

Real GDP, by province (1985–95). Source: Bank of Italy estimates based on data from Istituto Tagliacarne. The estimation method is described by Fabiani and Pellegrini (1997).

LITERATURE CITED

Besanko, David, and Anjan V. Thakor (1987). "Collateral and Rationing: Sorting Equilibria in Monopolistic and Competitive Credit Markets." *International Economic Review* 28, 671–689.

Bester, Helmut (1985). "Screening vs. Rationing in Credit Markets with Imperfect Information." *American Economic Review* 75, 850–855.

Bester, Helmut (1987). "The Role of Collateral in Credit Markets with Imperfect Information." *European Economic Review* 31, 887–899.

Castelar Pineiro, Armando, and Celia Cabral (2001). "Credit Markets in Brazil: The Role of Judicial Enforcement and Other Institutions." In *Defusing Default: Incentives and Institutions*, edited by Marco Pagano, pp. 157–188. Washington, WA: Johns Hopkins University Press.

Chan, Yuk-Shee, and George Kanatas (1985). "Asymmetric Valuations and the Role of Collateral in Loan Agreements." *Journal of Money, Credit, and Banking* 17, 84–95.

Cristini, Marcela, Ramiro A. Moya, and Andrew Powell (2001). "The Importance of an Effective Legal System for Credit Markets: The Case of Argentina." In *Defusing Default: Incentives and Institutions*, edited by Marco Pagano, pp. 119–156. Washington, WA: Johns Hopkins University Press.

Djankov, Simeon, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer (2003). "Courts." *Quarterly Journal of Economics* 118, 453–517.

Fabbri, Daniela, and Mario Padula (2001). "Judicial Costs and Household Debt." University of Salerno, CSEF Working Paper No. 65.

Fabiani, Silvia, and Guido Pellegrini (1997). "Education, Infrastructure, Geography and Growth: An Empirical Analysis of the Development of Italian Provinces." Temi di Discussione, No. 323, Bank of Italy, Rome.

Generale, Andrea, and Giorgio Gobbi (1996). "Il recupero dei crediti: Costi, tempi e comportamenti delle banche." Temi di Discussione, No. 265, Bank of Italy, Rome.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny (1997). "Legal Determinants of External Finance." *Journal of Finance* 52, 1131–1150.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny (1998). "Law and Finance." *Journal of Political Economy* 106, 1113–1155.

Manove, Michael, Jorge Padilla, and Marco Pagano (2001). "Collateral vs. Project Screening: A Model of Lazy Banks." *RAND Journal of Economics* 32, 726–744.

Meador, Mark (1982). "The Effect of Mortgage Laws on Home Mortgage Rates." *Journal of Economics and Business* 34, 143–148.

Petersen, Mitchell A., and Raghuram G. Rajan (1995). "The Effect of Credit Market Competition on Lending Relationships." *Quarterly Journal of Economics* 110, 407–443.

Sapienza, Paola (1997). "Le scelte di finanziamento delle imprese italiane." In *Le banche e il finanziamento delle imprese*, edited by Ignazio Angeloni, pp. 61–93. Bologna, Italy: Il Mulino.

Sapienza, Paola (2002). "The effects of Banking Mergers on Loan Contracts." *Journal of Finance* 57. 329–368.