

Corruption in Bank Lending to Firms: Cross-Country Micro Evidence on the Beneficial Role of Competition and Information Sharing

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Abstract: Building on the important study by Beck, Demirguc-Kunt and Levine (2006), we examine the effects of the both borrower and lender competition as well as information sharing via credit bureaus/registries on corruption in bank lending. Using the unique World Bank dataset (WBES) covering more than 4,000 firms across 56 countries with information on credit bureaus/registries, assembled by Djankov, McLiesh, and Shleifer (2007), and bank regulation data collected by Barth, Caprio and Levine (2006) to measure bank competition and information sharing, we find strong evidence that both banking competition and information sharing reduce lending corruption, and that information sharing also helps enhance the positive effect of competition in curtailing lending corruption. We also find that the ownership structure of firms and banks, legal environment, and firm competition all exert significant impacts on lending corruption.

JEL Classification: G21, L1, O16

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1. Introduction

Banks matter for countries at all stages of development and in all parts of the world. Banking systems that operate efficiently facilitate the channeling and monitoring of savings to the most productive investment projects and thereby enhance the performance of economies. Since bank lending is a major source of external finance for business firms, especially in developing and emerging economies, a well-functioning banking system can also help reduce income inequality and poverty. Indeed, recent research suggests that banks exert a first-order impact on economic development (e.g., Levine, 1997 and 2005).

Unfortunately, banking systems do not always operate efficiently in countries. In particular, they are susceptible to corruption, which undermines their primary function of allocating scarce capital efficiently. This is a particularly serious problem in developing and transition countries to the extent they lack adequate laws, objective courts, prudential regulations, and other appropriate institutions to sufficiently contain corruption. In this regard, China, among other countries, has been moving aggressively to address the corruption problem. For example, 461 cases of bank fraud involving more than one million yuan (US\$125,000) each were uncovered in China in 2005. These cases alone amounted to 7.7 billion yuan in fraudulent activity¹. As another example, Turkey's banking sector in 2000 suffered losses of \$12 billion (about 6% of GDP). Some of the worst performing banks had been run by some of Turkey's top business and political figures. The banking crisis prompted an anti-corruption drive². These and other examples of bank corruption in countries everywhere are quite costly because when bank managers take deposits and then pass them along to businesses not solely based on efficiency considerations, fewer funds are available to support more worthy business initiatives. The poor and unconnected individuals with innovative ideas are also denied funds to realize their dreams and improve their economic condition (Barth, Caprio, and Levine, 2006).

Despite its importance, there are surprisingly few studies, either theoretical or empirical, of the determinants of corruption in obtaining bank loans by firms. Indeed, the only one of which we are aware is by Beck, Demircug-Kunt and Levine (2006, BDL hereafter). In an empirical study, they rely on the answer to a survey question in the World Business Environment Survey (WBES) - "Is the corruption of bank officials an obstacle for the operation and growth of your business?"- to measure the degree of

¹ *Yahoo! News Asia*, Nov. 1, 2006.

² HighBeam Research, www.highbeam.com/doc.

corruption in bank lending. BDL then examine the relationship between bank supervisory power and lending corruption and find that strengthening traditional official supervision does not have a positive impact on the integrity of bank lending. Instead, a supervisory strategy that focuses on empowering the private monitoring of banks through the disclosure of accurate and timely information reduces lending corruption.

The BDL study is important because it overcomes the difficulty of measuring the degree of bank corruption by resorting to a firm-based survey question on the obstacles for operating and growing a firm due to bank-lending corruption. It also has significant policy implications insofar as it finds that the conventional official regulatory framework that relies on empowering official supervisory agencies to directly monitor, control, and discipline banks does not improve the integrity of bank lending. Rather, BDL find that empowering private monitoring of banks works best to promote integrity in bank lending.

In contrast to BDL, who focus on bank supervision, we study the role of competition and information sharing among lenders in alleviating corruption in bank lending. However, we follow their lead and measure lending corruption by using the same survey responses of firms regarding the obstacles in obtaining bank loans due to corrupt bankers.³ Importantly, we extend their study to examine whether bank competition and information sharing help to curtail corruption in bank lending.

Scholars and policy makers have long emphasized the role of competition in reducing corruption in commercial activities (e.g., Rose-Ackerman (1978), Shleifer and Vishny (1993)), but studies of its importance for the banking industry are lacking. We argue that greater competition among banks, by enhancing the bargaining power of the firm over that of the banker, reduces lending corruption. In contrast, increased competition among firms could increase lending corruption since greater competitive pressure in their market could force a firm manager to be more aggressive in seeking a bank loan. In our framework, presented in the next section, this particular situation implies lower bargaining power of the firm manager and thus a greater resort to bribery in bank lending.

Information sharing via private bureaus and public credit registries has become ever more important as part of recent developments in modern banking. In many countries, banks routinely share information on the creditworthiness of their borrowers. According to a large scale World Bank survey described in Miller (2003), over half of the 77 countries surveyed had established a public credit registry by 2000, and over 40 percent of these countries had also set up a private bureau.

It is well known that banks are exposed to problems of information asymmetry, in which lenders

³ According to BDL, although the measure of lending corruption is based on the managers' subjective view of financing obstacles when dealing with banks, any potential biases do not affect the results in any particular direction. In fact, to the extent that any measurement error problems are not systematically related to country characteristics, this may be less of a concern when studying variations in corruption across countries. See section 3 of our paper for greater detail on this point.

and borrowers possess different information about the risk of default. Due to imperfect information in the lending process, there is a significant amount of discretion possessed by the lending officer in terms of lending, such as loan rates, maturities, or type of collateral required, if any. This discretion available to lending officers creates room for bribery. We argue that information sharing, by reducing the degree of discretion that can be exercised in evaluating loan applicants, helps decrease bank-lending corruption. Information sharing also facilitates and enhances the monitoring of lending officers and increases the probability of detecting corruption, thereby reducing it. Moreover, information sharing may also reduce the informational rents that banks can extract from their clients within lending relationships (Padilla and Pagano, 1997), which will further enhance competition in the lending market and thereby reduce lending corruption.

We first present a simple Nash bargaining model between a loan applicant and the bank loan officer. This model predicts that the equilibrium amount of a bribe increases with the rate of interest that would prevail in the absence of bribery (normal rate of interest), the discretion of the bank officer in evaluating loan applications due to the imperfect information about the applicant, the bargaining power of the loan officer, and decreases with the probability of detecting corruption. It then follows that: (1) bank competition reduces corruption in lending by lowering the normal interest rate and the bargaining power of the loan officer; (2) competition in the product market of the borrower leads to more corruption by raising the default risk of the firm and lowering its bargaining power; and (3) information sharing helps combat bank lending corruption based on the arguments provided above. It is also argued that both competition in the banking sector and information sharing among lenders help overcome credit rationing, by increasing the amount of credit, and by reducing adverse selection and moral hazard which are the two main causes of credit rationing.

We test the hypotheses from our analysis by combining information from three main databases. First, as mentioned above, we follow BDL in measuring lending corruption by using the same survey question from the WBES. Second, we rely on Barth, Capiro, and Levine (2006, BCL hereafter) to measure various dimensions of bank regulation across different countries. BCL present and discuss a new database on bank regulation in 152 countries during 2001-2003. In particular, it includes detailed measures of bank entry regulations, capital requirements, supervisory powers, explicit deposit insurance schemes, private monitoring, and types of bank ownership, among other regulatory variables. Third, we obtain measures of information sharing among lenders mainly from Djankov, McLiesh, and Shleifer (2007, DMS hereafter). DMS collect data on the existence of public credit registries (i.e., government-owned) and private credit bureaus in 129 countries during 1978-2003. These registries/bureaus collect information on the credit histories and current indebtedness of various borrowers and share it with lenders. As argued in our analysis, both banking competition and information

sharing are important determinants of bank lending corruption.

We obtain two main empirical results. First, greater competition in banking helps curtail corruption in lending.⁴ Various measures of competition (i.e., top-5 bank concentration ratios, Herfindahl Index, regulatory entry barriers, H-statistic) are used in our analysis and the results are highly robust.

Second, we find that information sharing helps reduce corruption in bank lending. There also seems to be reinforcing effects of information sharing on the positive effect of bank competition on reducing lending corruption. However, we find that only private bureaus have a significant effect in reducing lending corruption. We believe that this has to do with the fact that private bureaus generally contain finer information about borrowers than public registries. In particular, the information available from public credit registries consists mainly of credit data above a certain threshold (minimum loan size) and is disseminated in consolidated form (no details on individual loans). The private credit bureaus, in contrast, offer details on individual loans and merge the credit information with data from other sources (e.g., courts, tax authorities, and financial statements).⁵ We also find that the information content of credit reporting matters. In particular, credit bureaus with longer histories and with both negative and positive information play a more important role in curbing corruption in lending.

Beyond these two major findings, we obtain several additional results: (1) Government- and foreign-owned firms tend to be subject to less lending corruption. Our explanation for this finding is that government-/foreign-owned firms tend to have more bargaining power in negotiations for loans with banks. (2) Exporting firms tend to be subject to less lending corruption. An explanation is that they may also have greater access to external finance and hence more bargaining power in negotiations for loans with banks. (3) Objective courts and better law enforcement tend to reduce lending corruption. This is expected since lending corruption is generally related to other illegal activities and the expropriation of creditors' rights so that a well-functioning legal environment helps reduce these practices. (4) Private and foreign ownership of the banking industry are associated with more integrity in lending. (5) As in BDL, enhancing official supervisory power does not help in curtailing bank-lending corruption.

We perform a number of robustness tests as a check on our results. Specifically, we expand our control variables to include major macro-economic and institutional measures. We also examine potential endogeneity in our analysis by performing IV regressions. The results are robust to these additional regression analyses.

We contribute to the corruption literature insofar as there is a lack of convincing empirical evidence supporting the beneficial role competition may play in reducing corruption (e.g., Svensson 2005). In the existing literature, there is also no discussion about the role of information sharing in

⁴ However, as in BDL (2006), increased competition among firms does not significantly reduce lending corruption.

⁵ See section 3.4 for more discussion on the differences between private bureaus and public registries.

reducing corruption⁶. We provide the first evidence indicating that information sharing helps reduce bribery in bank lending.

We also contribute to the bank competition literature. Berger et al. (2004) survey an extant literature on the effect of bank competition on the performance of banks (e.g., bank efficiency, bank net interest margins (profits), and bank risk-taking), firms' access to external financing, and financial stability. More recently, for instance, Beck et al. (2004) study the effect of banking-market structure on the access of firms to bank finance, using firm-level survey data in 74 countries. They find that bank concentration reduces firm access to finance, but only in countries with lower levels of economic and institutional development. Claessens and Laeven (2004) use an alternative measure of bank-market contestability, the H-statistic, developed in the industrial organization literature, to evaluate the level of bank competition in 50 countries. However, to the best of our knowledge, no study has examined the impact of bank competition (and the interactive effect of information sharing through bank competition) on bank-lending corruption. Our paper therefore fills this gap by providing a theoretical reasoning and relevant empirical evidence on this issue.

In addition, the surveyed literature seems to provide no clear answer to the question as to whether bank competition is "good" or "bad" from a social perspective (e.g., Allen et al., 2001). Our paper indicates that a positive and important contribution of bank competition is in reducing lending corruption, apart from any impacts on bank efficiency and stability.

There is now a small but growing literature on the role of information sharing among lenders. In their theoretical work, Pagano and Jappelli (1993) show that information sharing reduces adverse selection by improving the pool of borrowers. It can also be valuable in addressing moral hazard problems through its incentive effects on curtailing imprudent borrower behavior (Padilla and Pagano, 1997). Using cross-country data, Jappelli and Pagano (2002) find that the breath of credit markets is associated with information sharing. Kalberg and Udell (2003) document that trade credit history in Dun & Bradstreet reports improves default predictions relative to financial statements alone. Using firm-level data, Love and Mylenko (2003) find that private bureaus are associated with lower perceived financial constraints. In their study of the effect of bank competition on firm access to finance, Beck et al. (2004) look at an effect of credit registries, finding that information sharing dampens the negative impact of concentration on access to finance. Most recently, Djankov, McLeish, and Shleifer (2007) find that both

⁶ In the existing corruption literature, researchers typically study cross-country, macro measures of public corruption (e.g., Knack and Keefer, 1995; Mauro, 1995). Few studies rely on micro- and firm-based measures of corruption. Some exceptions are Svensson (2003), Fisman and Svensson (2001), and Clark and Xu (2004). For instance, Fisman and Svensson (2001) find that bribery is negatively correlated with firm growth. Clarke and Xu (2004) use enterprise-level data in 21 transition economies to examine how characteristics of the public utilities taking bribes and the firms paying bribes affect corruption in the sector. In this paper, we follow these more recent studies insofar as relying on micro-based measures of corruption in the form of firm-survey data to study bank-lending corruption.

creditor protections through the legal system and information-sharing institutions are associated with higher ratios of private credit to gross domestic product using country-level data in 129 countries. Our paper adds to the literature by finding evidence that information sharing is also an effective device in fighting bank lending corruption. Moreover, our detailed analysis shows that the type of credit agency (public registry or private bureau), its age, and the information content of credit reporting (positive and/or negative) all matter for corruption in bank lending.

The remainder of the paper is organized as follows. Section 2 presents a Nash bargaining model between a firm and a bank loan officer in the loan application process. Section 3 describes our data and provides variable definitions used in the empirical work. Section 4 presents and discusses our empirical results. Section 5 presents some robustness tests of our major results. Section 6 concludes the paper with a discussion of some policy implications of the results.

2. A Simple Bargaining Model

As mentioned earlier, the only existing study on bank lending corruption is Beck, Demircuc-Kunt and Levine (2006), which focuses on the role of bank supervision. The general literature on corruption, however, can offer insights on whether and how competition and information sharing might also affect corruption in bank lending.

An important issue in the broad corruption literature is whether increased competition can reduce corruption. Rose-Ackerman (1978) argues that increased competition among the officials receiving the potential bribes reduces corruption. Shleifer and Vishny (1993) argue that when officials dispense government-produced goods, such as passports, the existence of a competing official in which to reapply to when asked for a bribe will bid down the equilibrium amount of corruption. As regards competition among bribery payers, some show that greater firm competition could lead to less corruption because firms' profits are driven down by the heightened competitive pressure to the point at which there are no excess profits from which to pay bribes (Ades and Di Tella, 1999). Others, such as Bliss and Di Tella (1997), postulate that the level of graft demanded per firm depends on the likelihood that firms in the market are more or less likely to exit due to a marginal increase in graft demanded, not on the number of firms in the market or the degree of "natural" competition.

We view bribery in bank lending as a result of private negotiation between the bribe taker (the lending officer) and the bribe payer (the firm) that is best described by a bargaining framework. The lending officer could have an incentive to ask for a bribe to enhance his/her income. He/she will evaluate the gain from receiving a bribe from the borrower against the cost of being caught and penalized. The firm could have an incentive to bribe the lending officer to seek loans with better terms, such as lower loan rates, longer maturities, and/or loans without collateral. The firm will thus weigh the benefit of

receiving loans with better terms against the cost of bribery. These factors and the relative bargaining power of the two parties will determine the likelihood as well as the amount of a bribe⁷.

This section contains a simple Nash bargaining model between a firm and a bank. The firm desires to secure one unit of a loan for an investment project. The bank has to decide whether to provide the loan to the firm and, if it does, the interest rate to charge. Once the loan application of the firm is submitted, the banker (a loan officer) will examine the creditworthiness of the borrower and decide upon an interest rate to charge.

Let R denote the “fair interest rate” the firm should pay for its investment project, in the absence of corruption. We postulate that this rate depends on the degree of competition in both the banking sector and the product market of the firm, as well as the relevant information about the creditworthiness of the firm. The more competition in the banking sector, the lower will be R . Similarly, the more competition the firm faces in its product market, the lower a firm’s return from the investment project, and hence the lower its ability to pay back a loan. This would lead to a higher interest rate to compensate for the greater default risk.⁸

Given the market structure, information about the creditworthiness of the firm also affects the price of the loan. Let I denote the amount (or the set) of information available to the bank (loan officer) when examining the loan application. I contains all the relevant information the bank can assess regarding the firm’s proposed investment project, corporate governance, financial strength, and credit history. An important source of this type of information about the borrower that may be available is credit registries or credit bureaus. When information-sharing facilities like these are available, a bank is able to obtain more information about the firm so as to determine the level of default risk and thereby whether to lend money and, if so, the interest rate to charge. We can thus express the relationship as follows:

$$R = R(Comp_b, Comp_f, I),$$

where $Comp_b$ stands for the degree of competition in the banking sector and $Comp_f$ the degree of competition the firm faces in its product market.

The effects of information I on R are more subtle. First, at a given point in time, positive information about a borrower (e.g., from its past repayment records for loans from other banks,) lowers the normal interest rate it should pay, whereas negative information leads to a higher rate.

Second, information sharing may also influence borrower incentives and even the degree of competition in the banking sector over a longer term. Specifically, information sharing can create

⁷ Svensson (2003) uses a bargaining framework to discuss the determinants of bribery payments by Uganda firms to public officials.

⁸ Our focus here is on the possibility of bribery between the firm and the loan officer, so we simply use R to capture all the underlying uncertainty that may be associated with the firm’s investment project.

incentives for borrowers to perform in line with banks' interests: they are motivated to exert more effort in their investment projects because a default is a signal of bad quality and would lead to higher interest rates or even no access to credit in the future (Vercammen, 1995, and Padilla and Pagano, 2000). This disciplining effect lowers the default risk of a loan, and thus the rate of interest. Moreover, information sharing mechanisms could also encourage a more competitive loan market. This may occur because information sharing among banks may reduce the informational rents that banks can extract from their clients within lending relationships (as in the model of Padilla and Pagano, 1997). In the absence of information sharing, banks may have private information about borrowers that confers to the banks some market power over their customers. The exchange of information among banks can reduce or even eliminate such an informational advantage of banks. In their recent studies based on firm-level cross-sectional and panel data covering transition economies, Brown, Jappelli, and Pagano (2007) find that information sharing is associated with improved availability and a lower cost of credit.

We now turn to lending corruption. Given the degree of competition on both the lenders' and the borrowers' sides, and the amount of information about a firm in our model, the loan officer may offer a lower rate, $R - \Delta$, to the firm in exchange for a bribe, B , $B \leq \Delta$. One can think of $R - \Delta$ as an acceptable rate of interest to the bank, given that information about a borrower is in general imperfect (or asymmetric). The idea is that absent perfect information about the loan applicant, there is always some level of discretion that must be used in setting the loan rate, even by an uncorrupted loan officer.⁹ Of course, the extent of such discretion (or ambiguity as to whether the interest rate reflects bribery or not) that exists or may be exercised depends on the amount of information available to the bank prior to granting the loan, among other things, and the degree of competition on both the lender and the borrower sides, i.e., $\Delta = \Delta(I, R)$.

If the loan officer and the firm can strike a deal, then the firm receives the loan at a lower interest rate than otherwise, and the loan officer takes the bribe. If they fail to strike a deal, then the firm receives the loan at the rate R , and the loan officer gets nothing extra personally from the transaction. Therefore, the disagreement point of the firm is $d_f = \pi - R$ and the disagreement point of the loan officer is $d_b = 0$, where π is the profit of the firm from its investment project.

Bribery, of course, may be detected and thus punished by the bank manager and/or regulators, in which case the loan officer will be penalized (e.g., demoted, fined and/or even face more stringent legal

⁹ It is useful here to not consider Δ as a decision variable in the bribery deal. Rather, $R - \Delta$ can be regarded as the lowest interest rate that would be acceptable to the bank, given the information set I and the fair rate R . In fact, even when Δ is a decision variable it will then be in the best interest of the bargaining parties to choose $R - \Delta$, to be the lowest acceptable level, so as to maximize the amount that can be shared between them in the bribery bargaining game.

sanctions). Let p denote the probability of detecting bribery and $c(B)$ the amount of penalty imposed on a loan officer, where B is the amount of bribe taken, $c'(B) \geq 0$ and $c''(B) \geq 0$.¹⁰ In addition to $c(B)$, the bribe will be confiscated by the bank. Thus, the expected payoff to the loan officer is $(1-p)B - pc(B)$. We also assume that if the bribery is discovered, then the rate of interest owed on the loan amount will be adjusted upwards to the fair rate R for the firm (gross of the bribe amount). Hence, the expected payoff of the firm is $(1-p)(\pi - R + \Delta - B) + p(\pi - R - B) = (1-p)\Delta + \pi - R - B$.

The Nash bargaining problem is thus given by¹¹

$$\begin{aligned} \text{Maximize } & [(1-p)B - pc(B) - d_b]^\alpha \times [(1-p)\Delta + \pi - R - B - d_f]^{1-\alpha} \\ = & [(1-p)B - pc(B)]^\alpha \times [(1-p)\Delta - B]^{1-\alpha} \end{aligned}$$

with respect to B , where α measures the bargaining power of the bank loan officer, and $1-\alpha$ that of the firm. Taking the logarithm of the objective function, we get the first-order condition for the Nash bargaining solution, which we denote as $B^*(\alpha, \Delta, p)$:

$$\alpha \frac{(1-p) - pc'(B)}{(1-p)B - pc(B)} - (1-\alpha) \frac{1}{(1-p)\Delta - B} = 0$$

Differentiating the first-order condition with respect to α , Δ , and p , respectively, we obtain that (1) $\partial B^* / \partial \alpha > 0$; (2) $\partial B^* / \partial \Delta > 0$; and (3) $\partial B^* / \partial p < 0$, if $c'(B^*) \geq c(B^*) / B^*$. Therefore, the amount of bribe decreases if the bargaining power of the lending officer becomes smaller or the size of the “pie” to bargain over decreases, or the probability of detecting bribery goes up.¹² It is clear that the expected utility of the bank official also decreases as B^* decreases.¹³ The condition that $c'(B^*) \geq c(B^*) / B^*$ is a

¹⁰ The value of p may depend on many factors, including the overall legal and enforcement environment in an economy, as well as internal controls of the bank.

¹¹ The existing theoretical literature on corruption has focused on bribery between a government official (e.g., a regulator) and a firm applying for a license. Bargaining models in the literature thus postulate that the government official has full bargaining power (Bliss and Di Tella, 1997 and Ades and Di Tella, 1999). In our model, because there is competition on both the bribery taker and bribery giver sides, we use a generalized Nash bargaining framework.

¹² It can be shown that

$$\frac{\partial B^*}{\partial p} = \frac{1}{H} \left[\frac{\alpha [B^* c'(B^*) - c(B^*)]}{[(1-p)B^* - pc(B^*)]^2} + \frac{(1-\alpha)\Delta}{[(1-p)\Delta - B^*]^2} \right],$$

where $H(\cdot) \equiv \alpha \frac{-pc''(B^*)[(1-p)B^* - pc(B^*)] - [(1-p) - pc'(B^*)]^2}{[(1-p)B^* - pc(B^*)]^3} - \frac{1-\alpha}{[(1-p)\Delta - B^*]^3}$ which is negative by the second order

condition for the Nash bargaining problem.

¹³ By the first-order condition, B^* is smaller than the one that maximizes $(1-p)B - pc(B)$.

plausible one; it simply requires that the marginal penalty on the corrupted bank official be progressive.¹⁴

The key parameters, α , Δ and p , are affected by the underlying industrial structure and the information gathering technology that banks have in assessing loan applicants.

A more competitive banking market, one with lower concentration and/or lower entry barriers, will increase the options of the loan applicant and thus weaken the bargaining power of the loan officer (α) in seeking bribery. Competition in the banking industry also decreases the rents that bank loan officers can extract from borrowers (R and thus Δ). These factors will result in a lower likelihood and amount of bribery. By contrast, competition on the firm side lowers the bargaining power of the firm in the lending application process, resulting in greater bank lending corruption. In addition, increased competition on the borrowers side tends to increase the probability of default, which implies a higher interest rate for the loan being requested, resulting in a larger “pie” for the loan officer and the firm to bargain over. We thus have the following hypothesis.

Hypothesis 1:

1.1 Higher concentration (less competition) in the banking sector is associated with more bank lending corruption.

1.2 Higher entry barriers (less competition) in the banking sector is associated with more bank lending corruption.

1.3 Competition on the borrowers’ side is associated with more bank lending corruption.

We next turn to information sharing. It is well known that banking suffers from substantial information-asymmetry problems. The information wedge between lenders and borrowers may prevent the efficient allocation of lending, leading to credit rationing (e.g., Jaffee and Russell, 1976; Stiglitz and Weiss, 1981) or to a wedge between lending and borrowing rates (e.g., King, 1986). Information sharing among lenders, by increasing information accuracy and timeliness, helps to mitigate the problem of adverse selection (Pagano and Jappelli, 1993). It can also be valuable in addressing moral hazard problems through its incentive effects on curtailing imprudent borrower behavior (Padilla and Pagano, 1997). In this way, information sharing contributes positively to the functioning of credit markets (Djankov, McLiesh, and Shleifer, 2007).

Information sharing among lenders helps curtail bank-lending corruption in the following ways. First, it improves the bank’s accuracy in evaluating loan applicants and hence reduces the degree of discretion on the part of loan officers in granting loans. This will reduce the bargaining room for bribes in our model (i.e., Δ becomes smaller as the amount of information increases). In practice, some

¹⁴ This condition holds for all convex penalty functions of the form $c(B) = aB^\lambda$, $a > 0$, $\lambda > 1$, for example.

(sophisticated) credit bureaus use statistical models to provide “credit scoring” services to lenders, by which they rate borrowers according to their characteristics and credit history. In the presence of such credit scores, it is more difficult, if not impossible, for a loan officer to demand a bribe from a loan applicant in return for a lower interest rate or a better loan package.

Second, information sharing can also facilitate monitoring of lending officers by their supervisors. Bank managers may be able to detect bribes for a loan approved by its loan officer but later defaulted upon by checking on the borrower’s relevant information with the help of information sharing facilities. More effective monitoring (an increase in the p in the model) will discourage bank-lending officers to seek bribes from borrowers. All these factors weaken the bargaining power of the banker vis-à-vis the firm and likely result in less bribery.

Third, as mentioned earlier, information sharing can also have a disciplining effect that induces borrowers to exert more effort in their investment projects because a default is a signal of bad quality and would lead to higher interest rates or even no access to credit in the future (Vercammen, 1995, and Padilla and Pagano, 2000). This lowers the default risk of a loan, leading to greater bargaining power of the borrower and a smaller pie for the loan officer and the borrower to bargain over. Also, information sharing mechanisms could encourage a more competitive loan market, by reducing the informational rents that banks can extract from their clients within lending relationships. This suggests that information sharing helps enhance the benefits of banking competition on curtailing corruption. We therefore expect that the presence of information sharing mechanisms will attenuate the impact of bank concentration and bank entry barriers on lending corruption.

Based on the above arguments, we have the following hypothesis.

Hypothesis 2:

2.1 Information sharing among lenders is associated with less bank-lending corruption.

2.2 Information sharing among lenders also reduces bank-lending corruption through its attenuating effect on the impact of bank concentration and entry barriers on lending corruption (as in Hypotheses 1.1-1.2).

Corruption in bank lending can also be linked to credit rationing. According to the classic definition, credit rationing occurs whenever some borrower’s demand for credit is turned down, even if this borrower is willing to pay all the price and non-price elements of the loan contract (Baltensperger, 1976, 1978). It is well known that credit rationing can be caused by either an adverse selection problem (Stiglitz and Weiss, 1981) or a moral hazard problem (Jaffee and Russell, 1976, Bester and Hellwig, 1987). As standard economic theory suggests, black markets tend to develop whenever there is a shortage. In the bank loan market, if a borrower is or anticipates rationing in its loan application, he/she may resort to bribing the bank loan officer. The greater the extent of credit rationing, the more likely it is that corruption in bank

lending will occur.¹⁵

Our hypotheses can be further strengthened by the credit rationing based arguments. First, competition in the banking sector makes it easier for firms to gain access to finance.¹⁶ This implies less of a problem with credit rationing and thus reduced corruption in lending. Increased competition in the product market of the borrowers, however, may raise the demand for loans and thus exacerbate the problem of credit rationing, resulting in greater corruption. Moreover, as argued above, information sharing among lenders helps reduce the information gap about borrowers at the loan screening stage and thus lessens the adverse selection problem. It also helps discipline the borrower after the loan is made, thereby lowering the moral hazard problem on the borrower's side. Both of these effects lead to less credit rationing and hence less bank lending corruption.¹⁷

In addition to the two main hypotheses, we also argue that ownership of banks and firms will influence the bargaining process between the lending officer and the borrower. State ownership of the firm (borrower), due to its political influence, may have an upper hand in negotiating with lending officers on terms of loans. The enhanced bargaining power will lead to less bribery in lending. Furthermore, SOEs sometimes can obtain bank loans due to government policy so there is less of a need to bribe bank officers. In the case of foreign-owned firms, they may have alternative channels for obtaining funding for their investments (e.g., from their parent companies). Alternatives to bank loans in turn imply greater bargaining power and result in less bribery in lending. On the lenders' side, it is not that clear what form of ownership facilitates combating bank-lending corruption. It can be argued that foreign banks or private banks may care more about their corporate reputation and thus exert greater effort in preventing bribe taking by their loan officers, relative to state-owned banks. Furthermore, private and foreign ownership may have better corporate governance mechanisms to monitor potential corruptive behavior of employees, thus reducing bribes. Moreover, bank corruption once detected has wider negative externalities among branches and subsidiaries of multinational banks operating in different countries, which gives foreign banks an extra incentive to fight lending corruption. In the following sections, we will also consider how firm and bank ownership affects corruption in banking lending.

In our empirical tests below, we utilize various measures of competition, the presence and the content of credit bureaus and public registries in a country for information sharing among banks, and widely used indices of the legal environment to measure the likelihood of detecting corruption.

¹⁵ It is beyond the scope of this paper to incorporate credit rationing in the bargaining model, which would require modeling adverse selection and moral hazard explicitly.

¹⁶ Two recent theories of bank portfolio allocation put forward by Allen and Franklin (2004) and Boyd and De Nicolo (2005), respectively, predict that banks will allocate larger shares of total assets to loans relative to bonds as competition increases. Boyd, De Nicolo, and Jalal (2006) find empirical evidence in support of these theories.

¹⁷ As mentioned earlier, Brown, Jappelli, and Pagano (2007) find empirical evidence from firm-level data in transitional economies that information sharing is associated with improved availability of credit.

3. Data and Variables

3.1 The Sample

The dataset used in this study is compiled from three main sources: (1) the World Business Environment Survey (WBES) on corruption in 80 countries; (2) the BCL (2006) dataset on bank supervision and regulation in 152 countries; (3) and the DMS (2007) dataset on information sharing in 129 countries. Most firm-level data used in the study come from the WBES, which was conducted in 2000 by a team from the World Bank. Managers from over 9,000 firms in more than 80 countries were surveyed with a standard questionnaire. The main purpose was to identify the driving factors behind and obstacles to enterprise performance and growth in countries. The questionnaire covered many aspects of a firm's operations, including questions on corruption, regulation, and institutional environment. BDL (2006) note three advantages in using the WBES data in studying bank corruption. First, it provides direct information on the degree to which corruption in lending represents an obstacle to firms. Second, the firms surveyed vary in size, ownership (both public and private), industrial sector, and organizational structure. In particular, the dataset covers a large proportion of small- and medium-size enterprises, whereas most other cross-country studies focus exclusively on large, listed firms. Third, the firm-level survey data allow us to control for firm-specific characteristics and hence to draw appropriate inferences about the relationships between competition, information sharing and bank corruption.

The banking competition and ownership data come from BCL (2006), which were compiled based on a World Bank survey on bank regulation and supervision in 152 countries during 2001-2003. The information-sharing variables come from DMS (2007), who collect data on private and public credit institutions in 129 countries during 1978-2003. Because of the incomplete overlap among the three datasets and missing firm-level and banking-sector variables, the final sample used in our study includes 4,214 enterprises in 56 countries all over the world¹⁸.

In addition to the three datasets mentioned above, we rely on six other data sources. Specifically, we use the World Development Indicator (WDI, 2004), the World Governance Indicator compiled by Kaufmann et al. (2006), and Triesman (2000), to control for macro- and institutional factors that might affect the overall level of bank corruption in a country. We use the BankScope database to construct alternative bank concentration and contestability measures. The World Bank survey on public credit registries in 92 countries from 1999-2002 (Miller 2003) and the survey conducted by Jappelli and Pagano (2002) on credit bureaus in 50 countries are used to construct information content measures of credit reporting. Tables 1 and 2 identify the

¹⁸ The countries include Albania, Argentina, Armenia, Azerbaijan, Belarus, Bolivia, Bosnia, Botswana, Brazil, Bulgaria, Canada, Chile, Colombia, Costa Rica, Cote d' Ivoire, Croatia, Czech Rep, Ecuador, Egypt, El Salvador, Germany, Ghana, Guatemala, Honduras, Hungary, India, Italy, Kazakhstan, Kenya, Kyrgyzstan, Lithuania, Malaysia, Mexico, Moldova, Pakistan, Panama, Peru, Philippines, Poland, Portugal, Romania, Russia, Senegal, Slovakia, Slovenia, South Africa, Spain, Thailand, Tunisia, Turkey, UK, US, Ukraine, Uruguay, Venezuela, and Zimbabwe.

data sources and provide brief descriptions and summary statistics of the key variables.

[Tables 1 and 2 here]

3.2. Bank Corruption

The bank corruption measure is the dependent variable in our analysis. Following BDL (2006), we construct the measure of corruption (*Corruption*) using data from WBES. Specifically, it is based on the key question concerning bank corruption in the survey. The question takes the following form: “Is corruption of bank officials an obstacle for the operation and growth of your business”? Answers vary between 1 (no obstacle), 2 (a minor obstacle), 3 (a moderate obstacle), and 4 (a major obstacle). Thus, a higher value indicates more severe and pervasive corruption in lending. Thus, the WBES data provide direct information for firms about the degree of specific, perceived obstacles.

As pointed out by BDL (2006), there are good reasons for believing that these self-reported data are not biasing the results in favor of their or our findings. BDL (2006) provide a detailed explanation and justification of this point (pp. 2136-2137). As argued in BDL, if a firm facing the same obstacles responds to questions differently in different institutional environments, then, to the extent that this represents pure measurement error, it would bias the results against finding a significant relationship between competition, information sharing and firm financing obstacles. Also, as in BDL, we obtain the same results when controlling for many country-specific traits. Finally, additional work done or cited in BDL show that firms’ responses to the survey on financing obstacles are capturing more than idiosyncratic differences in how firms rank obstacles; the survey data are associated with measurable outcomes in terms of efficiency of investment flows, firm growth, institutions, corruption and property rights, as shown in several recent and influential studies (e.g., Hellman et al., 2000; Djankov et al., 2003; Beck, Demirguc-Kunt and Maskimovic, 2005; Acemoglu and Johnson, 2005; Ayyagari et al., 2007). Beck, Demirguc-Kunt and Peria (2007) show an objective measure of access to and use of banking services across countries is closely related to the WBES measure of firm financing obstacles.

3.3. Competition

A key independent variable in our study is a measure of banking competition. As discussed in the theoretical model, bank competition helps reduce corruption in lending by lowering the interest rate (and thus Δ) and the bargaining power of the bank official (α). A widely used measure in this regard is the concentration ratio (e.g., Demirguc-Kunt, Laeven and Levine, 2004). We therefore use the share of the five largest banks in total bank deposits (*Banking Concentration (Deposit)*) from BCL (2006) to measure banking concentration. In the traditional literature, higher concentration is generally linked to a lower level of competition within the banking industry. We also use the share of total assets held by the five largest banks in the industry (*Banking Concentration (Asset)*) as an alternative concentration measure in

our analysis. In addition, we use the Herfindahl-Hirschman Index (*HHI*), which is equal to the sum of the squares of the market shares (deposits) of each individual bank in individual countries in the sample in 1999. The bank level data are from the BankScope database which has comprehensive coverage of banking firms in most countries, accounting for over 90% of all banking assets in those countries. The (normalized) Herfindahl-Hirschman Index ranges from 0 to 1 with a higher value indicating greater monopoly power. As will be seen, both measures yield very similar and consistent results.

As is well-known, concentration ratios mostly reflect the existing market structure and they may not capture the potential competition or contestability in an industry. In addition, concentration measures may endogenously reflect the market-share gains of efficient firms rather than represent an exogenous measure of competition. In their survey paper of banking concentration and competition, Berger et al. (2004) point out that bank competition is multifaceted insofar as it encompasses not only bank concentration but also regulatory restrictions, such as entry restrictions and other legal impediments that limit actual and potential bank competition. We therefore use two additional measures of bank competition based on the degree of bank-entry barriers. The first variable measures the stringency of entry requirements into the banking industry (*Entry Barrier*). It is a variable constructed on the basis of eight questions regarding whether various types of legal submissions (i.e., draft by-laws, intended organization chart, financial projections for the first three years, financial information on the main potential shareholders, the background of future directors and managers, sources of funds to be disbursed in the capitalization of the new bank and market differentiation intended for the new bank) are required to obtain a banking license. The index ranges from 0 (low entry requirement) to 8 (high entry requirement), with higher values indicating greater stringency. The second variable is the fraction of entry applications denied (*Application Denied*), which is the percentage of applications to enter banking that have been denied in the past five years. This variable varies significantly across countries. At one extreme, the ratio is above 85% in countries like Egypt, Kenya and Pakistan. At the other extreme, the ratio is below 5% in countries like France, Sweden and the United States. All these data are from BCL (2006).

Finally, following Claessens and Laeven (2004), we use the *H-statistic* as another measure of the contestability in the banking industry.¹⁹ Based on the premise that banks employ different pricing strategies in response to changes in input prices, depending on the market structure, Panzar and Rosse (1987) developed the H-statistic, which measures the elasticity of revenue with respect to input prices. Under perfect competition, an increase in input prices increases marginal costs and total revenue by the same amount as the initial total costs increase (so $H=1$). In a monopoly environment, an increase in input prices will increase marginal costs, reduce equilibrium output, and reduce total revenue ($H<0$). Under the assumption of constant elasticity of demand and a Cobb-Douglas production function, it can be shown

¹⁹ Claessens and Laeven (2004) find that the H-statistics do not seem robustly linked to concentration.

that the magnitude of the H-statistic can be interpreted as an inverse measure of the degree of monopoly power or, alternatively, as a measure of the degree of competition. Claessens and Laeven (2004) constructed H-statistics for 50 countries using panel data (1994-2001) and their sample has an overlap of 31 countries with our sample. We follow them in calculating H-statistics using individual country revenue functions and expand the sample size to 56 countries, based on the BankScope database²⁰.

3.4. Information-Sharing

Another key independent variable in our analysis is information sharing. Our theoretical model predicts that information sharing will help curtail banking lending corruption by reducing information asymmetry between borrowers and lenders (and thus Δ), enhancing monitoring of bribery (p), and reducing the information rent and hence the bargaining power of lenders (α). Following DMS (2007), we include two dummy variables to measure information sharing among lenders. The first indicates whether a public credit registry (*Public Credit Registry*) exists, which equals one if a public credit registry is operating in the country by the end of 1999, and zero otherwise. A public registry is defined as a database owned by a public authority, usually the central bank or banking supervisory authority, which collects information on the credit worthiness of borrowers and makes it available to financial institutions (DMS, 2007). In 2000, public registries operated in 35 countries in our sample. The second measure indicates whether a private credit bureau (*Private Credit Bureau*) exists, which equals one if a private credit bureau is operating in the country by the end of 1999, and zero otherwise. A private bureau is defined as a private commercial firm that maintains a database on the credit worthiness of borrowers, and its primary role is to facilitate the exchange of information among banks and other financial institutions (DMS, 2007). In 2000, private bureaus operated in 29 countries in our sample.

The major difference between public and private credit registries is that participation in a public credit registry is compulsory, and its rules are not contractual, but imposed by regulation. For this reason, public credit registries usually have larger coverage than that of private bureaus (Jappelli and Pagano, 2002). However, a public credit registry also has some limitations. It is quite common for public credit registries to set a minimum loan size and therefore to collect information only on loans in excess of this amount (Miller, 2003). Furthermore, the information from public credit registries consists mainly of credit

²⁰ One econometric constraint of the H-statistic is that an appropriate sample size (e.g., 50 bank-year observations in Claessens and Laven (2004) and in our calculation) is required for the individual country H-statistic estimation. Therefore, for many highly concentrated or small economies (e.g., Botswana, Cambodia, Ethiopia, Ghana, and Haiti in our sample), the sample size is not big enough to estimate H-statistics. This may reduce the sample variation since some countries with monopoly- or oligopoly- banking structures might be omitted. We therefore use the concentration and regulatory-entry barriers as the main measures in our study. The results based on H-statistics, as will be seen, are highly robust to our main findings.

data and is disseminated in consolidated form (so that details about individual loans are not available)²¹. In addition, public registries only collect data from supervised institutions like banks. In contrast, private credit bureaus offer details on individual loans and merge credit data with data from other sources (e.g., firms, leasing and finance companies, retail establishments, courts, tax authorities and financial statements), though they are less comprehensive in coverage (Jappelli and Pagano, 2002). More importantly, in most cases, historical data are not made available to financial institutions via the public credit registries (Miller, 2003). In fact, more than 80% of the public credit agencies in the survey reported providing less than one-year information to the lenders. Due to these differences, it is worthwhile to explore whether public credit registries and private bureaus have different impacts on lending corruption.

We also include a dummy variable (*Firm Auditing*) to measure the completeness and accuracy of the financial statements disclosed by firms. This variable equals one if a firm provides its shareholders with annual financial statements that have been reviewed by an external auditor, and zero otherwise. Better firm financial disclosure should improve the quality of information sharing and hence reduce the information gap between banks and firms. This, in turn, should reduce corruption.

Furthermore, we include the number of years since the establishment of public credit registries and private bureaus to measure the amount of information sharing. *Public Registry Age* is the number of years since the starting or establishment date of the public registry and *Private Bureau Age* is the corresponding number for the oldest private credit bureau in the country. Public credit registries/ private bureaus that have been around longer should contain longer credit histories of firms and thus contain more information for sharing. However, as Miller (2003) points out, the public registry data function as a kind of enforcement device in many countries; with the data on defaults or late payments erased once loans have been paid. In addition, many countries only distribute current data (e.g., data from last month). Therefore, the public credit registry does not provide a good historical record of a borrower's credit behavior (Miller, 2003). For this reason, the age of the public credit registry may not capture any additional information. Nevertheless, this is an empirical question that we explore.

In addition, as pointed out by previous studies (Jappelli and Pagano, 2002; Miller 2003), the information content of credit reporting varies across countries and regions. Some credit bureaus only report negative information (e.g., late payments, defaults and arrears); while others report both negative and positive information (e.g., credit exposure in good conditions, and patterns of on-time payments) as well. As Miller (2003) points out, in many developing countries and even some European countries, some institutions are reluctant to share positive information on their better clients and may voluntarily provide only partial reports, primarily of negative information, to credit-information registries. We therefore

²¹ Due to confidentiality concerns, the total credit exposure for a borrower is often aggregated, and the names of the lending institutions are omitted, before the information is distributed (Miller 2003).

classified countries into three categories using two sets of variables, respectively. Based on the existence of private bureaus, the sample is divided into those countries with private bureaus that provide only negative information (*Negative Information Only— Private Bureau*); those countries with private bureaus that provide both positive and negative information (*Negative and Positive Information— Private Bureau*) and those countries without private bureaus (the omitted benchmark group). Similarly, based on the existence of public registries, the sample is divided into those countries with public registries that provide only negative information (*Negative Information Only— Public Registry*); those countries with public registries that provide both positive and negative information (*Negative and Positive Information— Public Registry*) and those countries without public registries (the omitted benchmark group)²². In our final sample, 76% of the countries with private bureaus report both positive and negative information and 78% of the countries with public registries report both positive and negative information.

3.5. Bank Ownership

As mentioned earlier, private and foreign ownership in the banking sector may help reduce corruption in lending due to a greater motivation in shaping appropriate managerial incentives, introducing more competition and maintaining a good reputation. We therefore include two variables to measure the ownership structure of the banking industry. *Foreign Bank Ownership* is the fraction of the banking system's assets in banks that are 50% or more owned by foreign investors. *Private Bank Ownership* is the fraction of the banking system's assets in banks that are 50% or more owned by private investors. In the regression analysis, the omitted group is state-owned banks.

3.6. Firm Characteristics and Controls

Previous literature (La Porta, Silanes, Shleifer, and Vishny, 1998, 1999, 2000, 2002) emphasizes the importance of the legal environment and contract enforcement to corporate governance, firm valuation, and reinvestment decisions. Our bargaining model also predicts that an improved legal environment and law enforcement discourage bank-lending corruption (i.e., both B^* and the expected gain of taking bribery decrease as p goes up). In our study, the empirical analysis includes two variables related to the legal environment and contract enforcement. The first variable is based on a question that asks about the fairness and impartiality of the court system in resolving business disputes (*Court Fairness*). The second variable is based on a question that asks about the enforceability of a court's decision (*Law Enforcement*). The survey offers respondents six choices: 1 (never), 2 (seldom), 3 (sometimes), 4 (frequently), 5

²² Our data come from three main sources: (1) the World Bank survey on public credit registries in 92 countries from 1999-2002 (Miller 2003); (2) the survey conducted by Jappelli and Pagano on credit bureaus in 50 countries (Jappelli and Pagano, 2002; Brown, Jappelli and Pagano, 2007); and (3) the DMS (2007) dataset on the existence of information-sharing registries in 129 countries. We merge the datasets by hand to enlarge the sample size.

(usually), and 6 (always). A larger number represents a better system in terms of fairness and enforceability.

As we discussed in section 2, state or foreign ownership of the firm may be associated with fewer bribery payments. We therefore include two dummy variables that identify a firm's ownership type. Dummy variable *Government* equals 1 if any government agency or state body has a financial stake in the ownership of a firm, and 0 otherwise. Dummy variable *Foreign* equals 1 if any foreign investor has a financial stake in the ownership of a firm, and 0 otherwise.

Following BDL (2006), we also include overall financing obstacle as an additional control variable (*General Financing Obstacle*) based on a firm's response to the question "how problematic is financing for the operation and growth of your business?" (1-no obstacle, 2-a minor obstacle, 3-a moderate obstacle, 4-a major obstacle). As BDL (2006) point out, if a firm manager is particularly pessimistic by simply complaining about other factors on the firm's performance, this should be reflected in its response to general financing obstacle and its response to corruption in lending as well. Incorporating this control could therefore lower the likelihood that the results are biased by idiosyncratic firm responses. In addition, Beck et al. (2004) find that bank concentration and the existence of a credit registry have a significant impact on a firm's overall financing obstacle. Therefore, incorporating this additional control variable enables us to establish that the link we find is with corruption, not with overall complaints about the financial sector.

In addition to the variables discussed above, we include several other enterprise-level controls. *Firm Size* is measured by the natural logarithm of total sales. *Competitor* is the number of competitors in the firm's main business line. *Exporter* is a dummy variable, which takes on a value of one if the firm exports, and 0 otherwise. As argued in section 2, we expect *Competitor* to be positively associated with lending corruption and *Exporter* to be negatively related to lending corruption. Lastly, industry classification variables are included in the analysis. For the sake of brevity, the coefficients of the industry classification variables are not reported in the tables, but are available upon request.

3.7. Additional Banking sector and Country Controls

We also control for *Deposit Insurance*, *Bank Accounting* and *Creditor Rights*. The first two variables are from BCL (2006) and the third one is from DMS (2007). *Deposit Insurance* indicates whether there is an explicit deposit insurance scheme (Yes=1, No=0) and, if not, whether depositors were fully compensated the last time a bank failed (Yes=1, No=0). The index ranges from 0 to 2. BCL (2006) point out that deposit insurance intensifies the moral hazard problem in banking because depositors no longer face the risk of losing their funds, which diminishes their incentives to and efforts at monitoring bank activities. Hence, higher values of this index indicate less private monitoring. *Bank Accounting*

measures whether the income statement includes accrued or unpaid interest or principal on performing and nonperforming loans and whether banks are required to produce consolidated financial statements. A higher value indicates more informative bank financial statements. The *Creditor Rights* index measures the powers possessed by secured lenders in a bankruptcy in four respects (DMS, 2007), as explained in table 1. The index ranges from 0 to 4, with higher values indicating stronger creditor rights. We expect that the “*Credit Rights*” index be negatively related to lending corruption.

The empirical analysis also includes several country-level variables to control for differences in economic development and institutions across countries. Since Svensson (2005) finds evidence that higher GDP per capita is related to less corruption, we include this variable in our analysis. Economic and political institutions, to the degree they restrict market and political competition, could influence the extent of corruption in a country. We use the variables *Openness* (imports as a share of GDP) and *Democracy* (long-term democracy from 1950 to 2000) from Triesman (2000) to capture these institutional factors. Furthermore, we include a series of other political and institutional quality indexes (World Governance Indexes, Kaufmann et al., 2006) as a check on the robustness of the results. The World Governance Indexes are constructed based on 276 individual variables taken from 31 different sources produced by 25 different organizations. The indexes measure various dimensions of governance such as voice and accountability, government effectiveness, rule of law and control of corruption. Detailed definitions of these indexes can be found in table 1.

In addition, we use the Transparency International Corruption Perception Index as an alternative measure of the overall corruption level of the country. The indices are used alternatively in our different models. The empirical results are robust to the inclusion of these additional variables.

We also checked the correlations among the banking variables and firm-characteristic variables and found that multicollinearity is not a serious problem. Most of the correlation coefficients are below 0.3, which makes us comfortable to include these variables in the models simultaneously. For brevity, the correlation matrix is not reported but is available from the author.

4. Empirical Results

4.1. Banking Competition and Corruption in Lending

To explore the impact of bank competition on corruption in lending, we assume a firm’s latent response can be represented as follows:

$$\begin{aligned} \text{Bank Corruption}_{i,j} = & \alpha + \beta' \text{Bank Competition Measures}_j + \alpha_1 \text{State}_{i,j} + \alpha_2 \text{Foreign}_{i,j} \\ & + \alpha_3 \text{Exporter}_{i,j} + \alpha_4 \text{Firm Size}_{i,j} + \alpha_1 \text{Industry Dummies}_{i,j} \quad (1) \\ & + \theta' \text{Macro Controls}_j + \varepsilon_{i,j} \end{aligned}$$

where the i and j subscripts indicate firm and country, respectively. The bank-competition measures and

country-control variables are as defined in the previous section. Unlike the latent variable, the observed dependent variable, *Bank Corruption_{i,j}* is a polychotomous variable with a natural order. Specifically, a firm classifies corruption in lending into 4 categories, with 3 threshold parameters, λ_s . We therefore use the ordered probit model to estimate the λ -parameters together with the regression coefficients simultaneously. We use the standard maximum likelihood estimation with heteroskedasticity robust standard errors. The basic results are reported in columns (1)-(8) of table 3.

[Table 3 here]

As BCL (2006, p.238) point out, questions arise as to whether this type of equation should be estimated using clustering or not. When clustering the standard errors by country, observations are not restricted to be independent within countries; rather, observations are required to be independent across countries. The assumption of clustering seems reasonable in our context and we therefore follow BDL (2006) with clustering the standard errors by country. The magnitude of the ordered probit coefficients cannot be simply interpreted as the marginal effects of a one-unit increase in the independent variables on the dependent variable, although the sign and statistical significance of the coefficients are similar to the linear regression interpretations. We quantify the magnitude of the impact on an average firm when we discuss the results in table 6 below.

In table 3, the most important finding is that banking competition reduces corruption in lending. As can be seen in the table, the coefficients of *Bank Concentration (Deposit)* and *Bank Concentration (Asset)* are positive and statistically significant at the 1% or 5% levels in most model specifications, suggesting that increased concentration (i.e., less competitiveness) results in a more severe problem of corruption in lending. The coefficients of the alternative concentration measure—Herfindahl-Hirschman Index (HHI) - are also positive and statistically significant at the 1% level in all specifications (column 5, 6 and 8), indicating that increased concentration is associated with more corruption in lending. The coefficients of *Entry Barrier* are positive and statistically significant at the 5% or 10% levels in all but one model specification. The coefficient of *Application Denied* is positive and statistically significant at the 5% level in model 6. All these results strongly support our theoretical hypotheses 1.1 and 1.2 that higher banking concentration, higher entry barriers and more stringent entry restrictions are associated with more corruption in lending. With respect to the contestability measure, the coefficients of the H-statistic are also negative and statistically significant at the 1% level in all specifications (column 7 and 8), suggesting that an increase in contestability reduces corruption in lending. In column 8, we include one market structure measure (HHI index), one competition measure (H-statistic) and one regulatory contestability measure (Entry Barrier) as a horse race among these different measures. As can be seen from the table, both HHI and H-statistic enter the model with statistical significance at the 1% level. The

entry requirement measure becomes statistically insignificant though its sign remains positive. Overall, the results bolster our main hypothesis that banking competition reduces corruption in lending²³.

Also consistent with our predictions in section 2, the coefficients of *Foreign Bank Ownership* and *Private Bank Ownership* are negative and statistically significant in some model specifications. These results provide some support of our hypothesis that greater private and foreign ownership in a country's banking industry reduce corruption in lending. In addition, in all specifications, state-owned firms and foreign-owned firms are less likely to rate bank corruption as an obstacle to growth. This finding is consistent with our expectation that firms that have more government connections, soft-budget constraints and stronger bargaining power suffer less from corruption.

Furthermore, as we expected, the coefficients of *Court Fairness* and *Law Enforcement* are negative and statistically significant, indicating that a better legal environment and contract enforcement help reduce corruption in lending. Firm characteristics also have some impact on corruption in lending. *Firm Size* generally is negatively related to corruption in lending, but only statistically significant in the models without clustering by country. *Exporting* firms are associated with less corruption in lending, as indicated by the negative and statistically significant coefficients in all model specifications. However, we do not find a significant relationship between firm competition and corruption in lending. *General Financing Obstacles* are positively associated with corruption in lending, as indicated by the positive and statistically significant (at the 1% level) coefficients, indicating that our finding is not biased by complaints of firm managers about the overall financial constraint.

4.2. Information Sharing, Competition and Corruption in Lending

In table 4, we add to the regressions in table 3 the information sharing measures discussed in section 3.4. The model can be expressed as follows:

$$\begin{aligned} \text{Bank Corruption}_{i,j} = & \alpha + \beta' \text{Bank Competition Measures}_j + \delta' \text{Information Sharing Measures}_j \\ & + \alpha_1 \text{State}_{i,j} + \alpha_2 \text{Foreign}_{i,j} + \alpha_3 \text{Exporter}_{i,j} + \alpha_4 \text{Firm Size}_{i,j} \\ & + \alpha_5 \text{Industry Dummies}_{i,j} + \theta' \text{Macro Controls}_j + \varepsilon_{i,j} \end{aligned} \quad (2)$$

The empirical results are presented in table 4, with robust standard errors clustered by country.

[Table 4 here]

Table 4 shows that the existence of a private bureau significantly reduces corruption in lending, as indicated by the negative and statistically significant coefficients of *Private Bureau* in all but one model specification. In contrast, the coefficients of *Public Credit Registry* are not statistically significant, which is probably due to the information available from public credit registries consisting mainly of credit data

²³ For brevity and to avoid a loss in sample size, we use the bank concentration and regulatory-entry barriers in our following analysis. The results, nevertheless, are robust to the other competition measures.

above a certain threshold (minimum loan size) and disseminating in consolidated form (no details on individual loans), as discussed earlier. The private credit bureaus, in contrast, offer details on individual loans and merge the credit data with data from other sources (e.g., courts, tax authorities, and financial statements), though they are less comprehensive in coverage. The empirical evidence shows that private bureaus play a more effective role in reducing the information gap between lenders and borrowers, and consequently corruption in lending. These results echo the findings by Djankov, McLiesh, and Shleifer (2007), who find that the existence of private bureaus is significantly associated with a higher ratio of private credit to GDP, while the existence of public credit registries does not have a significant relationship. The coefficients of *Firm Auditing* are negative and statistically significant at the 1% level in all model specifications, indicating that more accurate information disclosure lowers corruption in lending. Overall, the results strongly support our hypothesis 2.1 that information sharing reduces corruption in lending.

We also include the age of public credit registries and the age of private bureaus in model (3) and find that the age of private bureaus is negatively and statistically significantly associated with corruption in lending, which bolsters our earlier finding by showing that the information-sharing amount is negatively related to bank corruption. In contrast, the coefficient of public registry age is not statistically significant. As discussed earlier, this is probably due to the nature of public credit registries being used mainly as a kind of enforcement device in many countries. Only current data are distributed and the data on defaults or late payments are erased once they have been paid. Therefore, the public credit registries do not offer a historical record of a borrower's credit behavior (Miller, 2003). It is therefore not surprising to find that the age of the public credit registry is not associated with corruption in lending.

In column (4), we explore the impact of information content on corruption in lending. The coefficient of *Negative and Positive (Private Bureau)* is negative and statistically significant at the 5% level across model specifications. The coefficient of *Negative Only (Private Bureau)* is negative but statistically insignificant. These results indicate that private bureaus that report both positive and negative information play a more important role in reducing corruption in lending. In other words, more information content is associated with less corruption in lending. The public registries, consistent with our previous findings, are not found to have a significant impact on corruption in lending.

In columns (5)-(6), we include the key variables of banking competition and information sharing into the models simultaneously. The empirical results are very similar to our previous findings that information sharing and banking competition are associated with less corruption in lending.

The other variables that are included also yield similar results. *Foreign Bank Ownership* is negatively and sometimes significantly associated with corruption in lending. The coefficients of both *Fair Court* and *Law Enforcement* are negative and statistically significant in all models, indicating that a

better legal environment and contract enforcement reduce corruption in lending. State-owned firms and exporting firms generally suffer less from corruption in lending. *General Financing Obstacles* is positively associated with corruption in lending, as indicated by the positive and statistically significant (at the 1% level) coefficients in all model specifications. Furthermore, the existence of deposit insurance is associated with more corruption in lending, which echoes the finding by BCL (2006) that private monitoring improves the integrity of bank lending.

The effect of competition and information sharing on corruption in lending is not only statistically significant, but also economically significant. In order to demonstrate the magnitude of the impacts of information sharing and competition on bank corruption, we use model (5) in table 4 to quantify the effect that information sharing and competition have on the probability that corruption in lending is rated as an obstacle to firm growth. Specifically, we compute the change in the probability that a firm rates corruption of bank officials as no obstacle (a minor obstacle, a moderate obstacle, or a major obstacle) due to a change in the bank competition and information sharing variables for an average firm. The empirical results of this illustrative exercise are presented in table 5.

[Table 5 here]

As can be seen, the magnitude of the economic impacts is quite large. For instance, the estimates imply that a one standard deviation increase in banking concentration would lead to a 3 percentage point increase in the probability that a firm rates bank corruption as a major obstacle (i.e., the probability that a firm rates bank corruption as a major obstacle) and a 6 percentage point decrease in the probability that a firm rates bank corruption as not an obstacle to firm growth. If banking concentration increases from the minimum to maximum in the sample, the probability that a firm rates bank corruption as a major obstacle to a firm growth increases by 13.6 percentage points and the probability that a firm rates bank corruption as not an obstacle to firm growth decreases by about 27 percentage points. The effects are quite substantial given that about 12% of the firms in the sample report that corruption in lending is a major obstacle to their growth and about 58% of the firms say that bank corruption is not an obstacle for growth.

Similarly, the estimates imply that a one standard deviation increase in *Application Denied* would lead to a 1.7 percentage point increase in the probability that a firm rates bank corruption as a major obstacle and a 3.5 percentage point decrease in the probability that a firm rates bank corruption as not an obstacle to firm growth. A one standard deviation increase in *Entry Barrier* would lead to a 3 percentage point increase in the probability that a firm rates bank corruption as a major obstacle and a 6.2 percentage point decrease in the probability that a firm rates bank corruption as not an obstacle to firm growth. Again, all these effects are quite substantial given that relatively few firms report that corruption in lending is a major obstacle to their growth and just over half of firms report that bank corruption is not an obstacle for growth.

Regarding the dummy variables, we calculate the discrete change in the probability that a firm rates bank corruption as an obstacle to growth due to a change in the dummy variable from 0 to 1. The existence of a private bureau would lead to a 5 percentage point decrease in the probability that a firm rates bank corruption as a major obstacle and a 12 percentage point increase in the probability that a firm rates bank corruption as not an obstacle to firm growth. The disclosure of audited financial statements would lead to a 4.2 percentage point decrease in the probability that a firm rates bank corruption as a major obstacle and a 9.9 percentage point increase in the probability that a firm rates bank corruption as not an obstacle to firm growth. The existence of a deposit insurance scheme would result in a 5.8 percentage point increase in the probability that a firm rates bank corruption as a major obstacle. The presence of foreign and government ownership would result in 4.7 and 1.8 percentage point decreases in the probability that a firm rates bank corruption as a major obstacle, respectively.

4.3. Competition and Corruption in Countries with and without Private Bureaus

As discussed earlier in the hypothesis development part, information sharing mechanisms could also encourage a more competitive loan market because information sharing among banks may reduce the informational rents that banks can extract from their clients within lending relationships. The exchange of information among banks can reduce or even eliminate the informational advantage of banks that possess more private information and consequently enhance banking competition on curtailing corruption in lending. In our empirical results, we therefore expect that the presence of good information sharing mechanisms will attenuate the impact of bank concentration and bank entry barriers on lending corruption. Based on the previous results, the existence of private bureaus has a significant impact in reducing corruption in lending. We therefore split the sample into countries with private bureaus (with good information sharing mechanisms) and without private bureaus (without good information sharing mechanisms) and explore the impact of banking concentration and entry barriers on corruption in lending in each sub-sample²⁴. The empirical results are presented in table 6.

[Table 6 here]

Table 6 shows that countries without private bureaus, higher banking concentration, higher entry

²⁴ An alternative approach is to add interaction terms in our original regression. However, we find that the interaction terms are often highly correlated with either the private credit bureau or concentration measures. The high correlations, often in the range of 0.95 and 0.98, could generate a serious multi-collinearity problem in the regressions. We therefore follow previous studies (e.g., Acemoglu and Johnson, 2005; DMS, 2007) in conducting the split-sample analysis. Splitting the sample could reduce the number of observations in regression models. Fortunately, in our case, each of our regressions in the split sample still has more than 1,600 observations. Nevertheless, we incorporated some interaction terms of private credit bureau with concentration and regulatory measures and found that the interaction terms between concentration (or entry barrier) and private credit bureau are negative and statistically significant in our regressions, suggesting that information sharing helps attenuate the adverse effect of concentration and entry barrier on lending corruption. The results are mostly consistent with our main hypotheses and available from the authors upon request.

barriers and more stringent entry restrictions mostly are positive and significantly associated with more corruption in lending. In contrast, in the countries with private bureaus, banking concentration and entry barriers do not have a significant impact on corruption in lending. This evidence provides strong support to our hypothesis 2.2 that information sharing among lenders also reduces corruption in lending through its attenuating effect on the impact of bank concentration and entry barriers on lending corruption.

5. Robustness Tests

5.1. Probit Analysis and Instrument Variable Analysis

The fact that we do not have a balanced distribution of responses across the four categories of answers regarding corruption of bank lending might invalidate the ordered probit estimates or a few outliers in one of the categories with a small number of responses could exert an undue influence on the results (see BDL, 2006). In order to allow us to use a comparatively balanced distribution of responses and lower the likelihood that idiosyncratic firm responses are biasing the results, we follow BDL (2006) in constructing a bank corruption dummy (*Corruption Dummy*) that takes on the value of zero if “no obstacle” and one if the firm’s response is “minor”, “moderate” or “major”²⁵. We use this lending corruption dummy as the dependent variable and repeat the entire analysis with the probit regressions. The results are reported in columns (1) – (3), Table 7.

[Table 7 here]

The results are very similar to our previous findings. The coefficients of *Banking Concentration*, *Entry Barrier* and *Application Denied* are positive and statistically significant in all model specifications, indicating that banking competition reduces the likelihood that a firm rates bank corruption as an obstacle. With respect to the information-sharing variable, the existence of a private bureau is negatively associated with corruption in lending. The existence of a public registry, however, does not have a significant impact on the probability that a firm rates bank corruption as an obstacle. Firm information disclosure reduces the probability that a firm rates bank corruption as an obstacle. In addition, both private and foreign bank ownership are negatively associated with the probability of corruption in lending, which is consistent with our previous findings.

Similarly, both the presence of government and foreign firm ownership reduce the probability that a firm rates bank corruption as an obstacle. A better legal environment reduces the likelihood that an average firm rates bank corruption as an obstacle. *General Financing Obstacle* is positively associated with probability that a firm rates bank corruption as an obstacle. The existence of a *Deposit Insurance Scheme* increases the probability that an average firm rates bank corruption as an obstacle, which echoes

²⁵ In our sample, 58% of firms responded that corruption in bank lending is not a significant barrier to firm growth, while 42% indicated that bank corruption is an obstacle, indicating it is either a minor, moderate, or major obstacle.

the finding by BDL (2006). Overall, the results provide illustrative evidence of the potential magnitude of the importance of our findings on competition and information.

In our study, the potential for endogeneity being a problem is less of a concern than in a pure cross-country analysis because we are examining the impact of banking-market competition and the existence of information-sharing agencies on individual firms. It seems unlikely that an individual firm's view about corruption in lending will influence nation-wide banking competition and information-sharing schemes (BCL, 2006). Even if there may be feedback from the corporate sector to policy making, if high levels of corruption in lending do generate calls for more banking competition and information sharing, the empirical relationship between banking competition/information sharing should be positive. However, we find a negative relationship between banking competition/information sharing and corruption in lending. Furthermore, among the countries with information-sharing schemes, more than 85% of them set up the schemes three or more years prior to our sample period.

Nevertheless, we conduct some robustness tests using instrumental variable probit analysis²⁶. The empirical results are presented in columns (4) – (6), table 7. We base the selection of instrumental variables on the theoretical and empirical work in the law, institution and finance literature (Acemoglu and Johnson, 2005, BDL, 2003, Easterly and Levine, 1997, and LLSV, 1998, 1999). From the law and finance perspective, LLSV (1999) and BDL (2003) show that historically determined differences in legal traditions help explain international differences in financial systems today. DMS (2007) find a pronounced legal origin effect in credit market institutions. Moreover, legal origin can be thought of as “exogenous” because it was imposed by colonial power in many emerging countries (Acemoglu and Johnson, 2005; LLSV, 1999). Furthermore, the legal origin itself is unlikely to have a direct impact on banking performance and activities. Instead, it may exert an indirect impact through the channels of various institutions and regulations. We therefore include legal origin (English, French) as instrumental variables for the banking competition measures using data from DMS (2007). The English legal origin includes the common law of England and its former colonies. The French legal origin includes the civil law of France, of countries Napoleon conquered, and of their former colonies. The endowment theory, on the other hand, focuses on the roles of geography and the disease environment in shaping the political and financial institutional development (Acemoglu et al., 2001, Beck et al., 2003). Beck et al. (2003) find strong evidence that geographical endowment has substantial impacts on the formation of long-lasting institutions that shape financial development. We therefore follow BDL (2005, 2006) in using latitude²⁷ as

²⁶ To our knowledge, the instrumental variable estimators have not been developed for the ordered probit analysis used in the earlier section.

²⁷ The absolute value of the latitude of the country, scaled to take a value between 0 and 1, is from LLSV (1999).

an instrumental variable for the competition and information-sharing measures²⁸. We also include the ethnic fractionalization²⁹ as an instrumental variable because it has been found that economies with greater ethnic diversity tend to choose institutions that allow those in power to expropriate resources from others (BDL 2003, 2006).

Lastly, we follow BDL (2006) and include the percentage of years that the country has been independent since 1776 as an additional IV in model 6 (column 6, table 8) because “countries that gained their independence in the 18th or 19th centuries had more opportunity to modify colonial institutions and policies and adopt policies more conducive to broad-based economic growth (p.2154, BDL 2006)”. Furthermore, it is also reported that a country’s culture heritage, as proxied by religion composition, has a significant impact on shaping its political and financial institutions (LLSV, 1999, Stulz and Williamson, 2003). In model 6 (column 6, table 7), we therefore include religion composition as an additional IV. All these instruments that we employ pass the exogeneity test of instrumental variables, which is consistent with the hypothesis that these instruments only exert an impact on corruption in lending through their effect on banking competition and information sharing. In fact, if we simply regress the bank corruption measure on these instruments, the hypothesis that the instruments enter with zero coefficients cannot be rejected. In addition, we conduct an F-test of the excluded exogenous variables in the first-stage regressions. The null hypothesis of the test is that the instruments do not explain cross-sectional differences in banking competition and information sharing measures. We reject the null hypothesis at the 1% level in all model specifications. In fact, the instrumental variables enter the first stage regressions with statistical significance at the 1% level in almost all cases. Along with the other regressors, the instrumental variables explain about 40% -80% of the cross-country variation in potentially endogenous variables. For brevity, we only report the p-values of the F-tests in the last row of table 7. The first-stage regressions are available from the authors upon request³⁰.

The empirical results are rather robust. The coefficients of *Banking Concentration* remain positive and statistically significant in all model specifications, indicating that banking competition reduces the likelihood that a firm rates bank corruption as an obstacle. The coefficients of *Entry Barrier* and *Application Denied* are also positive and statistically significant across the model specifications. All these results bolster our finding that banking competition, in terms of lowering concentration, lowering entry barriers and imposing less stringent entry restrictions, is associated with less corruption in lending.

²⁸ We do not use the mortality ratio proposed by Acemoglu and Johnson (2001) because there is little overlap with the sample of countries we are using.

²⁹ We use the average value of five different indices of ethnical fractionalization. The data are from Easterly and Levine (1997).

³⁰ Similar to the claim in BDL (2006), we are not claiming that these variables are the best instrumental variables. Instead, we hold that the instruments are reasonably exogenous and have decent explanatory power of bank competition and information sharing measures, as the literature points out.

Regarding the information sharing variable, the empirical result is also consistent with our previous findings. The existence of a private bureau reduces the probability that a firm rates bank corruption as an obstacle. Again, we do not find a significant relationship between the existence of a public registry and corruption in lending. In addition, the IV coefficients are larger than the OLS coefficients, indicating the existence of potential measurement error, which would tend to “attenuate” the coefficient estimate toward zero (Laeven and Levine, 2006; Rajan and Subramania, 2005). It is also worth noting that our main results do not depend on instrumentation, although the latter increases the magnitude of the coefficients. In fact, this is a regular finding in the finance and growth literature (e.g., Beck, 2002; Laeven and Levine, 2006; Laeven and Woodruff, 2006).

Regarding the control variables, private and foreign ownership of the banking industry are negatively associated with corruption in lending. The presence of government and foreign ownership is negatively associated with the probability that a firm rates bank corruption as an obstacle. The coefficients of *General Financing Obstacle* remain positive and statistically significant across model specifications. Moreover, the coefficients of firm competition are positive and statistically significant in the IV regressions, which is consistent with our theoretical hypothesis. Overall, the results are very consistent with our previous findings and predictions.

5.2. More Macro Controls

Next, we address the issue of potential omitted variables. Since the overall quality of the institutional environment might influence corruption in lending, we include a series of macro-institutional indexes in our model to test the robustness of the results.

We first include one of the World Governance Indexes compiled by Kaufmann et al. (2006) to control for the overall level of corruption and alternatively the corruption perception index compiled by Transparency International. We then include an index of official supervisory power and an index of private monitoring³¹ in the model to test the robustness of the results. Since the composition of the private monitoring index already takes the existence of deposit insurance scheme and bank accounting disclosure into account, we do not include them in models (5) and (6). The other components of the World Governance Indexes (Kaufmann et al., 2006) are also used to capture different aspects of the institutional environment (voice and accountability, government effectiveness and rule of law). Furthermore, we control for *Democracy* (long-term democracy from 1950 to 2000) and *Openness* (imports as a share of GDP), using data from Triesman (2000). The detailed definitions of the indexes are presented in section

³¹ BDL (2006) find that greater official supervisory power is associated with more corruption in lending and greater private monitoring is associated with less corruption in lending. The details concerning these two variables can be found in table 1.

3³². Because some indexes are highly correlated with each other, we include the indexes individually in the models.

[Table 8 here]

The empirical results are highly consistent with our previous findings. The competition and information-sharing variables are significantly and negatively associated with corruption in lending. As expected, the macro-corruption measures are negatively associated with corruption in lending and statistically significant in model (3). The official supervisory power variable, consistent with BDL (2006), is associated with more corruption in lending, as indicated by the positive and significant coefficients in models (5) and (6). Also consistent with BDL (2006), the private monitoring index is negatively associated with corruption in lending, though the effects are less significant. The empirical findings about banking competition and information sharing are very robust to the inclusion of these other institutional variables. We also include the other macro-control variables and find the results very robust. For brevity, the results are not reported in table 8 but available from the authors.

6. Conclusions

Our paper examines whether bank competition and information sharing help curtail corruption in bank lending. We use three unique datasets: (1) the World Bank Business Environment Survey (2000) which contains direct firm-level information on the degree to which corruption in bank lending represents an obstacle to firms; (2) the data compiled by Barth et al. (2006) which provides detailed information about various dimensions of bank competition and regulation across different countries during 2001-2003; and (3) the data from Djankov et al. (2007) on public credit registries and private credit bureaus in 129 countries during 1978-2003. We obtain two main results. First, greater competition in banking helps curtail corruption in bank lending. Second, information sharing via credit registries/bureaus helps reduce corruption in bank lending both directly and indirectly through its interaction with bank competition. These results are consistent with the predictions of a Nash bargaining model.

Beyond these two important results, we find that objective courts and better law enforcement tend to reduce lending corruption; government- and foreign-owned firms as well as exporting firms tend to be subject to less lending corruption; greater private and foreign ownership of the banking industry are associated with more integrity in lending. Both our major findings and other results pass a number of robustness tests.

Our findings complement the recent, pioneering work of Beck, Demirguc-Kunt and Levine (2006), which is to our knowledge the only existing study of the determinants of corruption in obtaining

³² Kaufmann et al. (2006) compile the world governance indicators from 1996 to 2005. We use the value of the index for 1999 in our analysis.

bank loans by firms. Using datasets (1) and (2) mentioned above, they examine the role of bank supervision in combating lending corruption. They find that strengthening traditional official supervision does not have a positive impact on the integrity of bank lending, but instead, a supervisory strategy that focuses on empowering private monitoring of banks through the disclosure of accurate and timely information reduces lending corruption. We focus on the role of market institutions, in particular on market competition and information-sharing mechanisms in the form of credit bureaus (and public credit registries) in reducing bank-lending corruption. Controlling for firm characteristics and including bank and macro controls, we find that both competition among banks and information sharing among lenders (especially via private credit bureaus) are both important in reducing corruption.

Our paper also contributes to the growing literature on information sharing among lenders by showing that information exchange among banks can help reduce the ability and incentive of loan officers to demand bribes from credit applicants. This is so because information sharing may reduce the informational rents banks can extract from their customers and may enhance detection of bank lending corruption.

Our findings have important policy implications. First, our results show that one positive and important aspect of banking competition is in reducing corruption, apart from any impacts on banking efficiency and stability. This should be a useful message to economies that are experiencing severe corruption in bank lending and are contemplating introducing more competition into the banking sector via deregulation and/or lowering barriers to foreign banks. Our findings regarding information sharing also shed light on the positive role that market institutions like private credit bureaus can play in reducing corruption in bank lending.

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Table 1 Definitions and Sources of Variables

Variable	Definition	Original Sources
Bank Corruption	Corruption of bank officials as an obstacle for the operation and growth of your business. (1-no obstacle, 2- minor obstacle, 3- a moderate obstacle, 4-major obstacle)	World Business Environment Survey (WBES, 2000)
Bank Concentration (Deposit)	The fraction of total deposits held by the five largest banks in the industry. The data are compiled based on a survey of banking regulators in 150 countries in 2001.	Barth et al. (2006)
Bank Concentration (Asset)	The fraction of total assets held by the five largest banks in the industry. The data are compiled based on a survey of banking regulators in 150 countries in 2001.	Barth et al. (2006)
Entry Barrier	Entry into Banking Requirement, which is a variable developed based on eight questions regarding whether various types of legal submission are required to obtain a banking license. Which of the following are legally required to be submitted before issuance of the banking license? (1)Draft by-laws? (2)Intended organization chart? (3) Financial projections for first three years? (4) Financial information on main potential shareholders? (5) Background/experience of future directors? (6) Background/experience of future managers? (7) Sources of funds to be disbursed in the capitalization of new bank? (8) Market differentiation intended for the new bank? The index ranges from 0 (low entry requirement) to 8 (high entry requirement). Higher values indicate greater stringency	Barth et al. (2006)
Application Denied	The percentage to which applications to enter banking are denied in the past five years. The data are compiled based on a survey of banking regulators in 150 countries in 2001.	Barth et al. (2006)
Herfindahl-Hirschman Index	The sum of the squares of the market shares (deposit) of each individual bank in individual countries in the sample in 1999. The (normalized) value of HHI ranges from 0 to 1.	Authors' calculations using bank data from BankScope
H-statistics	The variable measures the contestability and competition of a country's banking industry. It is sum of the elasticities of the reduced-from revenues with respect to input prices. The calculations follow the method proposed by Claessens and Laeven (2004).	Authors' calculations using bank data from BankScope
Foreign Bank Ownership	The fraction of the banking system's assets in the banks that are 50 percent or more owned by foreign investors. The data are compiled based on a survey of banking regulators in 150 countries in 2001.	Barth et al. (2006)
Private Bank Ownership	The fraction of the banking system's assets in the banks that are 50 percent or more owned by private investors. The data are compiled based on a survey to banking regulators in 150 countries in 2001.	Barth et al. (2006)
Public Credit Registry	The variable equals one if a public credit registry operates in the country by the end of 1999, zero otherwise. A public registry is defined as a database owned by public authorities (usually the central bank or banking supervisor authority) that collects information on the standing of borrowers in the financial system and makes it available to financial institutions.	Djankov et al. (2007)
Public Registry Age	Years of establishment since the starting date of the public registry.	Djankov et al. (2007)
Private Bureau	The variable equals one if a private credit bureau operates in the country by the end of 1999, zero otherwise. A private bureau is defined as a private commercial firm that maintains a database on the standing of borrowers in the financial system, and its primary role is to facilitate exchange of information amongst banks and financial institutions.	Djankov et al. (2007)
Private Bureau Age	Years of establishment since the starting date of oldest private credit bureau in the country.	Djankov et al. (2007)
Firm Auditing	Does the firm provide its shareholders with annual financial statements that have been reviewed by an external auditor (Yes=1, No=0)? Higher value indicates more information disclosure of the firm.	WBES (2000)

Negative Information Only (Private Bureau)	The variable equals to one if the private bureaus only report negative information (e.g. late payments, defaults and arrears, etc.), and 0 otherwise.	Miller (2003) Jappelli and Pagano (2002)
Negative and Positive Information (Private Bureau)	The variable equals to one if the private bureaus only report both negative information (e.g. late payments, defaults and arrears, etc.) and positive information (e.g. credit exposure in good conditions, patterns of on-time repayments, etc.), 0 otherwise.	Miller (2003) Jappelli and Pagano (2002)
Negative Information Only (Public Registry)	The variable equals to one if the public registries only report negative information (e.g. late payments, defaults and arrears, etc.), and 0 otherwise.	Miller (2003) Jappelli and Pagano (2002)
Negative and Positive Information (Public Registry)	The variable equals to one if the public registries only report both negative information (e.g. late payments, defaults and arrears, etc.) and positive information (e.g. credit exposure in good conditions, patterns of on-time repayments, etc.), 0 otherwise.	Miller (2003) Jappelli and Pagano (2002)
Deposit Insurance	This variable indicates whether there is an explicit deposit insurance scheme (Yes=1, No=0) and, if not, whether depositors were fully compensated the last time a bank failed (Yes=1, No=0). The index ranges from 0 to 2. Higher values indicate less private monitoring.	Barth et al. (2006)
Bank Accounting	Whether the income statement includes accrued or unpaid interest or principal on performing and nonperforming loans and whether banks are required to produce consolidated financial statements. Higher value indicates more informative bank account.	Barth et al. (2006)
Creditor Rights	The index measures the power of secured lenders in bankruptcy. A score of one is assigned when each of the following rights of secured lenders is defined in laws and regulations: First, there are restrictions, such as creditor consent, for a debtor to file reorganization. Second, secured creditors are able to seize their collateral after the reorganization petition is approved. Third, secured creditors are paid first out of the proceeds of liquidating a bankrupt firm. Last, management does not retain administration of its property pending the resolution of the reorganization. The index ranges from 0 to 4. Higher value indicates stronger creditor rights.	Djankov et al. (2007)
Government	Dummy variable equals to 1 if any government agency or state body has a financial stake in the ownership of the firm, 0 otherwise.	WBES (2000)
Foreign	Dummy variable equals to 1 if any foreign company and individual has a financial stake in the ownership of the firm	WBES (2000)
Law Enforcement	"In resolving business dispute, do you believe your country's court system to be decision enforced," categorical variable, 0-never, 1-seldom, 2-sometimes, 3-frequently, 4-usually, 5-always. Higher value indicates better law enforcement.	WBES (2000)
Fair Court	"In resolving business dispute, do you believe your country's court system to be fair and impartial," categorical variable, 0-never, 1-seldom, 2-sometimes, 3-frequently, 4-usually, 6-always. Higher value indicates better court quality.	WBES (2000)
Competition	Regarding your firm's major product line, how many competitors do you face in your market?	WBES (2000)
Exporter	This dummy variable takes on the value 1 if firm exports, 0 otherwise.	WBES (2000)
Firm Size	Nature logarithm of firm sales.	WBES (2000)
Inflation	3 year average percentage inflation, GDP deflator.	WBES (2000)
GDP per Capita	Logarithm of gross national product per capita in 1999.	WBES (2000)
Voice and Accountability	The indicator which measures the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and free media. The value of	Kaufmann et al. (2006)

		year 1999 is used in this study. Higher values mean greater political rights.	
Government Effectiveness		The indicator which measure the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. The value of year 1999 is used in this study. Higher values mean higher quality of public and civil service.	Kaufmann et al. (2006)
Rule of Law		The indicator which measure the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police, and the courts, as well as the likelihood of crime and violence. The value of year 1999 is used in this study. Higher values mean stronger law and order.	Kaufmann et al. (2006)
Control of Corruption		The indicator which measure the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. The value of year 1999 is used in this study. Higher values indicate better control of corruption.	Kaufmann et al. (2006)
TI Corruption Index		Corruption Perception Index developed by Transparency International. Higher values indicate less perception of corruption.	Transparency International (2001)
Official Power	Supervisory	Principal component indicator of 14 dummy variables: 1.Does the supervisory agency have the right to meet with external auditors to discuss their report without the approval of the bank? 2.Are auditors required by law to communicate directly to the supervisory agency any presumed involvement of bank directors or senior managers in elicit activities, fraud, or insider abuse? 3. Can supervisors take legal action against external auditors for negligence? 4.Can the supervisory authority force a bank to change its internal organizational structure? 5. Are off-balance sheet items disclosed to supervisors? 6. Can the supervisory agency order the bank's directors or management to constitute provisions to cover actual or potential losses? 7. Can the supervisory agency suspend the directors' decision to distribute: a) Dividends? b) Bonuses? c) Management fees? 8. Can the supervisory agency legally declare-such that this declaration supersedes the rights of bank shareholders-that a bank is insolvent? 9. Does the Banking Law give authority to the supervisory agency to intervene that is, suspend some or all ownership rights-a problem bank? 10.Regarding bank restructuring and reorganization, can the supervisory agency or any other government agency do the following: a) Supersede shareholder rights? b) Remove and replace management? c) Remove and replace directors?	Barth et al. (2006)
Private Monitoring Index		Principal component indicator of nine dummy variables that measure whether bank officials are legally liable for the accuracy of disclosed information; whether banks disclose information such as consolidated accounts, off-balance sheet items, accrued, unpaid interest/principal of non performing loan and/or risk management procedure to the public; whether banks must be audited by certified international auditors; whether largest 10 banks are rated by international and domestic rating agencies; whether subordinated debt is allowable as part of capital, and whether there is no explicit deposit insurance system and no insurance was paid the last time a bank failed.	Barth et al. (2006)
General Financing Obstacle		How problematic is financing for the operation and growth of your business? (1-no obstacle, 2-a minor obstacle, 3-amoderate obstacle, 4-a major obstacle).	WBES (2000)
Democracy		Democratic in all years since 1950 as of 2000	Treisman (2000)
Openness		Imports of goods and services as % of GDP, 2000.	WBES (2000)

Table 2 Summary Statistics of Key Variables

Variable	Observations	Mean	Standard Dev.	Minimum	Maximum
Bank Corruption	8032	1.776	1.050	1	4
Government	7726	0.117	0.322	0	1
Foreign	7752	0.192	0.394	0	1
Competitor	7771	2.342	0.731	0	9
Fair Court	7385	3.429	1.435	1	6
Law Enforcement	7325	3.424	1.456	1	6
Firm Size	7294	10.174	7.556	0.11	25.33
Exporter	7609	0.365	0.481	0	1
Bank Concentration (Deposit)	62	0.656	0.191	0.21	1
Bank Concentration (Asset)	64	0.629	0.188	0.14	1
Application Denied	52	0.229	0.287	0	1
Entry Barrier	69	7.464	0.964	3	8
Herfindahl-Hirschman Index	73	0.303	0.256	0.03	1
H-statistics	59	0.617	0.158	0.22	0.96
Public Registry	77	0.455	0.501	0	1
Public Registry Age	66	9.015	15.323	0	65
Negative Information Only (Public Registry)	70	0.086	0.282	0	1
Negative and Positive Information (Public Registry)	70	0.314	0.468	0	1
Private Bureau	77	0.377	0.488	0	1
Private Bureau Age	66	8.803	19.118	0	98
Negative Information Only (Private Bureau)	70	0.086	0.282	0	1
Negative and Positive Information (Private Bureau)	70	0.229	0.423	0	1
Deposit Insurance	69	0.696	0.464	0	1
Bank Accounting	66	3.576	0.583	2	4
Private Bank Ownership	61	42.713	30.405	0	95.2
Foreign Bank Ownership	62	38.567	30.398	1.9	100
Creditor Rights	77	1.935	1.104	0	4
GDP per Capita (log)	81	7.438	1.375	4.58	10.38
Voice and Accountability	81	0.013	0.823	-1.72	1.38
Government Effectiveness	81	0.018	0.897	-1.42	2.57
Rule of Law	81	-0.064	0.864	-1.34	2.04
Control of Corruption	81	-0.086	0.935	-1.34	2.48
Democracy	78	0.141	0.350	0	1

Table 3 Bank Competition and Corruption

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Banking Sector Variables</i>								
Bank Concentration (Deposit)	0.787 [0.032]**		1.155 [0.006]***					
Bank Concentration (Asset)		0.602 [0.067]*		0.847 [0.033]**				
Entry Barrier	0.124 [0.071]*	0.114 [0.093]*	0.214 [0.010]**	0.190 [0.017]**		0.155 [0.036]**		0.038 [0.588]
Application Denied			0.426 [0.129]	0.355 [0.215]		0.609 [0.045]**		
HHI					0.753 [0.003]***	1.113 [0.006]***		0.828 [0.001]***
H-Statistics							-1.369 [0.001]***	-1.222 [0.004]***
Private Bank Ownership	-0.005 [0.083]*	-0.004 [0.292]	-0.004 [0.236]	-0.003 [0.165]	-0.002 [0.603]	-0.005 [0.054]*	-0.005 [0.043]**	-0.006 [0.075]*
Foreign Bank Ownership	-0.009 [0.012]**	-0.011 [0.010]**	-0.01 [0.016]**	-0.005 [0.091]*	-0.006 [0.116]	-0.002 [0.523]	-0.002 [0.470]	-0.009 [0.014]**
<i>Firm-level Variables</i>								
Government	-0.248 [0.007]***	-0.286 [0.003]***	-0.285 [0.003]***	-0.237 [0.007]***	-0.294 [0.002]***	-0.247 [0.008]***	-0.252 [0.006]***	-0.246 [0.006]***
Foreign	-0.094 [0.072]*	-0.11 [0.051]*	-0.113 [0.055]*	-0.106 [0.036]**	-0.109 [0.057]*	-0.097 [0.090]*	-0.104 [0.059]*	-0.101 [0.056]*
Competitor	0.003 [0.955]	0.026 [0.650]	0.029 [0.616]	-0.036 [0.468]	-0.011 [0.847]	-0.049 [0.320]	-0.059 [0.221]	0.009 [0.854]
Fair Court	-0.038 [0.051]*	-0.04 [0.028]**	-0.04 [0.031]**	-0.047 [0.016]**	-0.044 [0.028]**	-0.029 [0.143]	-0.038 [0.055]*	-0.034 [0.075]*
Law Enforcement	-0.095 [0.000]***	-0.087 [0.000]***	-0.09 [0.000]***	-0.098 [0.000]***	-0.094 [0.000]***	-0.106 [0.000]***	-0.099 [0.000]***	-0.098 [0.000]***
General Financing Obstacle	0.259	0.235	0.237	0.255	0.232	0.261	0.258	0.259

	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***
Firm Size	-0.01	-0.018	-0.017	-0.013	-0.02	0.0004	0.0002	-0.01
	[0.268]	[0.082]*	[0.102]	[0.143]	[0.068]*	[0.957]	[0.975]	[0.236]
Exporter	-0.165	-0.17	-0.177	-0.151	-0.168	-0.18	-0.156	-0.164
	[0.006]***	[0.010]***	[0.007]***	[0.014]**	[0.010]***	[0.002]***	[0.011]**	[0.007]***
<i>Other Controls</i>								
Creditor Right	-0.035	-0.029	-0.025	-0.056	-0.056	-0.055	-0.045	-0.037
	[0.508]	[0.653]	[0.708]	[0.256]	[0.347]	[0.315]	[0.389]	[0.473]
Deposit Insurance	0.218	0.168	0.13	0.199	0.166	0.138	0.151	0.186
	[0.118]	[0.208]	[0.338]	[0.125]	[0.271]	[0.342]	[0.265]	[0.165]
Other Macro-controls	yes	yes	Yes	yes	yes	yes	yes	yes
Industry Dummies	yes	yes	Yes	yes	yes	yes	yes	yes
Number of Countries	54	56	44	44	53	41	48	47
Observations	4214	4256	3439	3439	4232	3362	3968	3948

Bank corruption is the response to the question “Is the corruption of bank officials as an obstacle for the operation and growth of your business (1-no obstacle, 2-minor obstacle, 3- a moderate obstacle, 4-major obstacle)”. Bank concentration (Deposit) is the fraction of total deposits held by the five largest banks in the industry. Bank concentration (Asset) is the fraction of total assets held by the five largest banks in the industry. Entry barrier measures the entry into banking requirement, which is a variable developed based on eight questions regarding whether various types of legal submission are required to obtain a banking license. The index ranges from 0 (low entry requirement) to 8 (high entry requirement). Higher values indicate greater stringency. Application Denied is the percentage to which applications to enter banking are denied in the past five years. Private Bank Ownership indicates that the banking system’s assets in the banks that are 50 percent or more owned by private investors. Foreign Bank Ownership indicates the share of banks owned by foreign investors. Government is a dummy variable, which equals to 1 if any government agency or state body has a financial stake in the ownership of the firm, 0 otherwise. Foreign is a dummy variable, which equals to 1 if any foreign company or individual has a financial stake in the ownership of the firm. Law enforcement is a firm level survey indicator, which measures the enforceability of court’s decision with a higher value indicating better law enforcement. Law enforcement is a firm level survey indicator, which measures the fairness and impartialness of court’s decision with a higher value indicating more fairness. Firm size is the natural logarithm of firm sales in US\$. Exporter is a dummy variable that takes on value one if the firm is an exporter and zero otherwise. Creditor Rights is an index which measures the power of secured lenders in bankruptcy defined in laws and regulations. The index ranges from 0 to 4 with a higher value indicating stronger creditor rights. Deposit Insurance indicates whether there is an explicit deposit insurance scheme and whether depositors were fully compensated the last time a bank failed. Other macro controls (GDP per capita and inflation) and industry dummies are also included. For brevity, the coefficients are not presented but are available upon request. The regressions are run with ordered probit, which is based on standard maximum likelihood estimation with heteroskedasticity-robust standard errors. Furthermore, we allow for clustering within countries to allow for possible correlation of errors in models. Detailed variable definitions and sources are given in the table 1. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively. P-values based on robust standard errors are in parentheses.

Table 4 Information, Competition and Corruption

	(1)	(2)	(3)	(4)	(5)	(6)
Public Credit Registry	0.108 [0.421]	0.15 [0.228]	0.079 [0.563]		0.045 [0.748]	0.068 [0.630]
Private Bureau	-0.411 [0.007]***	-0.334 [0.019]**	-0.188 [0.215]		-0.319 [0.033]**	-0.32 [0.034]**
Public Registry Age			0.005 [0.386]			
Private Bureau Age			-0.009 [0.001]***			
Negative Only (Private Bureau)				-0.276 [0.340]		
Negative and Positive (Private Bureau)				-0.42 [0.022]**		
Negative Only (Public Registry)				0.025 [0.945]		
Negative and Positive (Public Registry)				0.209 [0.161]		
Firm Auditing		-0.242 [0.002]***	-0.237 [0.003]***	-0.289 [0.000]***	-0.256 [0.002]***	-0.269 [0.002]***
Bank Concentration (Deposit)					0.956 [0.006]***	
Bank Concentration (Asset)						0.72 [0.064]*
Entry Barrier					0.182 [0.008]***	0.161 [0.016]**
Application Denied					0.351 [0.152]	0.292 [0.222]
Private Bank Ownership	-0.001 [0.736]	-0.002 [0.443]	-0.003 [0.222]	0.0001 [0.988]	-0.003 [0.268]	-0.003 [0.223]
Foreign Bank Ownership	-0.003 [0.442]	-0.003 [0.369]	-0.003 [0.300]	-0.001 [0.702]	-0.008 [0.023]**	-0.007 [0.035]**
Government	-0.284 [0.002]***	-0.257 [0.005]***	-0.258 [0.005]***	-0.238 [0.013]**	-0.295 [0.002]***	-0.29 [0.003]***
Foreign	-0.092 [0.074]*	-0.067 [0.234]	-0.083 [0.139]	-0.034 [0.606]	-0.097 [0.116]	-0.094 [0.130]
Competitor	-0.017 [0.726]	-0.014 [0.781]	-0.016 [0.748]	-0.005 [0.922]	0.007 [0.897]	0.011 [0.850]
Fair Court	-0.036 [0.040]**	-0.033 [0.078]*	-0.036 [0.054]*	-0.036 [0.058]*	-0.046 [0.010]***	-0.045 [0.008]***
Law Enforcement	-0.097 [0.000]***	-0.099 [0.000]***	-0.096 [0.000]***	-0.105 [0.000]***	-0.084 [0.000]***	-0.086 [0.000]***
General Financing Obstacle	0.252 [0.000]***	0.247 [0.000]***	0.25 [0.000]***	0.26 [0.000]***	0.22 [0.000]***	0.22 [0.000]***
Firm Size	-0.0001	0.004	0.006	0.003	-0.0001	-0.0004

	[0.990]	[0.705]	[0.517]	[0.807]	[0.994]	[0.973]
Exporter	-0.224	-0.191	-0.198	-0.189	-0.193	-0.2
	[0.000]***	[0.000]***	[0.000]***	[0.001]***	[0.003]***	[0.002]***
Creditor Rights	-0.054	-0.058	-0.032	-0.095	-0.037	-0.034
	[0.316]	[0.266]	[0.559]	[0.154]	[0.520]	[0.569]
Deposit Insurance	0.246	0.259	0.248	0.261	0.261	0.233
	[0.044]**	[0.028]**	[0.021]**	[0.089]*	[0.016]**	[0.031]**
Bank Accounting Disclosure	0.024	0.064	0.135	-0.051	0.113	0.108
	[0.811]	[0.490]	[0.193]	[0.704]	[0.272]	[0.332]
Other Macro Controls	Yes	yes	yes	yes	yes	yes
Industry Dummies	Yes	yes	yes	yes	yes	yes
Number of Countries	56	56	55	42	43	43
Observations	4212	3950	3888	3368	3154	3154

Bank corruption is the response to the question “Is the corruption of bank officials as an obstacle for the operation and growth of your business (1-no obstacle, 2- minor obstacle, 3- a moderate obstacle, 4-major obstacle)”. Public Credit Registry is a dummy variable, which takes on value one if a public credit registry operates in the country by the end of 1999, zero otherwise. Public Registry Age is the years of establishment since the starting date of the public credit registry. Private Bureau is a dummy variable, which takes on value one if a private credit bureau operates in the country by the end of 1999, zero otherwise. Private Bureau Age is the years of establishment since the starting date of oldest private credit bureau in the country. Firm auditing is a dummy variable, which takes on value one if the firm provide its shareholders with annual financial statements that have been reviewed by an external auditor, and 0 otherwise. Negative Only (Private Bureau or Public Registry) equals one if the private bureau/public registry only reports negative information, and 0 otherwise. Negative and Positive (Private Bureau or Public Registry) equals one if the private bureau/public registry reports both negative and positive information, and 0 otherwise. Bank concentration (Deposit/Asset) is the fraction of total deposits/asset held by the five largest banks in the industry. Entry barrier measures the entry into banking requirement, which ranges from 0 (low entry requirement) to 8 (high entry requirement). Higher values indicate greater stringency. Application Denied is the percentage to which applications to enter banking are denied in the past five years. Bank Accounting is an indicator, which measures whether the income statement includes accrued or unpaid interest or principal on performing and nonperforming loans and whether banks are required to produce consolidated financial statements. Higher value indicates more informative bank account. The other variables are defined as previously. Other macro controls (GDP per capita and inflation) and the industry dummies are also included. For brevity, the coefficients are not presented but are available upon request. The regressions are run with ordered probit, which is based on standard maximum likelihood estimation with heteroskedasticity-robust standard errors. Furthermore, we allow for clustering within countries to allow for possible correlation of errors in all the models. Detailed variable definitions and sources are given in the table 1. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively. P-values based on robust standard errors are in parentheses.

Table 5 Magnitude of the Effects: Competition, Information and Corruption

		1	2	3	4
Bank Concentration	1 standard dev. Increase	-0.061	0.013	0.018	0.030
	Change from Minimum to Maximum	-0.272	0.057	0.079	0.136
Application Denied	1 standard dev. Increase	-0.035	0.008	0.010	0.017
	Change from Minimum to Maximum	-0.139	0.023	0.040	0.076
Entry Barrier	1 standard dev. Increase	-0.062	0.014	0.018	0.030
	Change from Minimum to Maximum	-0.269	0.084	0.080	0.105
Private Bureau	Change from 0 to 1	0.122	-0.035	-0.037	-0.050
Firm Auditing	Change from 0 to 1	0.099	-0.027	-0.030	-0.042
Deposit Insurance	Change from 0 to 1	-0.104	0.016	0.030	0.058
Government	Change from 0 to 1	0.114	-0.033	-0.034	-0.047
Foreign	Change from 0 to 1	0.038	-0.009	-0.011	-0.018

The estimation is based on model 5 in table 5. Bank concentration is the fraction of total deposits held by the five largest banks in the industry. Application Denied is the percentage to which applications to enter banking are denied in the past five years. Entry barrier measures the entry into banking requirement, which is a variable developed based on eight questions regarding whether various types of legal submission are required to obtain a banking license. The index ranges from 0 (low entry requirement) to 8 (high entry requirement). Higher values indicate greater stringency. Private Bureau is a dummy variable, which takes on value one if a private credit bureau operates in the country by the end of 1999, zero otherwise. Firm auditing is a dummy variable, which takes on value one if the firm provides its shareholders with annual financial statements that have been reviewed by an external auditor, and 0 otherwise. Government is a dummy variable, which equals to 1 if any government agency or state body has a financial stake in the ownership of the firm, 0 otherwise. Foreign is a dummy variable, which equals to 1 if any foreign company or individual has a financial stake in the ownership of the firm. Numbers in column 1, 2, 3, 4, indicate the change in the probability that an average firm rates the corruption of bank officials as no obstacle, a minor obstacle, a moderate obstacle and a major obstacle, respectively due to the change of the bank competition and information variable as indicated in the second column.

Table 6 Competition and Corruption in Countries with and without Private Bureaus

	Countries With Private Bureau		Countries Without Private Bureau	
	(1)	(2)	(3)	(4)
Bank Concentration	-0.216 [0.602]	-0.506 [0.390]	1.538 [0.000]***	1.584 [0.000]***
Entry Barrier	0.094 [0.205]	0.095 [0.107]	0.103 [0.368]	0.215 [0.052]*
Application Denied		-0.515 [0.129]		0.927 [0.000]***
Private Bank Ownership	-0.004 [0.504]	-0.001 [0.896]	-0.004 [0.343]	0.003 [0.452]
Foreign Bank Ownership	-0.001 [0.865]	0.001 [0.870]	-0.009 [0.109]	-0.007 [0.135]
Government	-0.078 [0.661]	-0.07 [0.751]	-0.31 [0.001]***	-0.33 [0.002]***
Foreign	-0.097 [0.236]	-0.146 [0.128]	-0.068 [0.348]	-0.052 [0.502]
Competitor	-0.036 [0.570]	0.049 [0.452]	0.035 [0.586]	0.051 [0.450]
Fair Court	0.023 [0.469]	-0.007 [0.840]	-0.058 [0.006]***	-0.068 [0.001]***
Law Enforcement	-0.122 [0.000]***	-0.115 [0.001]***	-0.057 [0.053]*	-0.069 [0.026]**
General Financing Obstacle	0.212 [0.000]***	0.173 [0.000]***	0.272 [0.000]***	0.246 [0.000]***
Firm Size	0.003 [0.766]	-0.003 [0.824]	0.002 [0.821]	-0.016 [0.154]
Exporter	-0.153 [0.076]*	-0.048 [0.662]	-0.188 [0.003]***	-0.247 [0.000]***
Creditor Right	-0.213 [0.002]***	-0.264 [0.000]***	0.034 [0.664]	0.058 [0.344]
Deposit Insurance	0.342 [0.046]**	-0.052 [0.836]	0.092 [0.597]	0.084 [0.428]
Bank Accounting Disclosure	-0.077 [0.605]	-0.153 [0.457]	0.247 [0.084]*	0.078 [0.430]
Other Macro-controls	Yes	Yes	yes	yes
Industry Dummies	Yes	Yes	yes	yes
Number of Countries	26	18	27	25
Observations	1844	1225	2294	2138

The sample is split into countries with private bureau and countries without private bureaus. The variables are defined as previous tables. The regressions are run with ordered probit, which is based on standard maximum likelihood estimation with heteroskedasticity-robust standard errors clustering within countries. Detailed variable definitions and sources are given in the table 1. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively. P-values based on robust standard errors are in parentheses.

Table 7 Probit Analysis: Competition, Information and Corruption

	(1)	(2)	(3)	(4)	(5)	(6)
	Probit	Probit	Probit	IV Probit	IV Probit	IV Probit
Bank Concentration (Asset)	0.839 [0.074]*		0.775 [0.083]*	2.425 [0.000]***		1.24 [0.026]**
Bank Concentration (Deposit)		0.947 [0.039]**			2.461 [0.000]***	
Entry Barrier	0.23 [0.006]***	0.243 [0.007]***	0.194 [0.008]***	1.061 [0.000]***	1.134 [0.000]***	0.491 [0.000]***
Application Denied	0.521 [0.099]*	0.579 [0.069]*	0.41 [0.145]	2.095 [0.006]***	2.534 [0.001]***	0.79 [0.023]**
Public Registry			0.055 [0.728]			0.128 [0.419]
Private Bureau			-0.305 [0.054]*			-0.589 [0.001]***
Firm Auditing			-0.286 [0.006]***			0.04 [0.639]
Private Bank Ownership	-0.005 [0.197]	-0.004 [0.261]	-0.005 [0.062]*	-0.008 [0.001]***	-0.006 [0.012]**	-0.005 [0.143]
Foreign Bank Ownership	-0.009 [0.036]**	-0.009 [0.036]**	-0.009 [0.028]**	-0.011 [0.013]**	-0.009 [0.033]**	-0.006 [0.222]
Government	-0.305 [0.002]***	-0.305 [0.002]***	-0.311 [0.001]***	-0.334 [0.004]***	-0.33 [0.005]***	-0.314 [0.008]***
Foreign	-0.137 [0.031]**	-0.132 [0.031]**	-0.102 [0.136]	-0.151 [0.075]*	-0.13 [0.135]	-0.209 [0.012]**
Competitor	0.042 [0.509]	0.042 [0.511]	0.025 [0.668]	0.129 [0.026]**	0.133 [0.025]**	0.129 [0.031]**
Fair Court	-0.037 [0.039]**	-0.036 [0.045]**	-0.031 [0.089]*	0.016 [0.633]	0.023 [0.507]	0.004 [0.887]
Law Enforcement	-0.087 [0.000]***	-0.085 [0.000]***	-0.095 [0.000]***	-0.037 [0.149]	-0.035 [0.189]	-0.082 [0.003]***
General Financing Obstacle	0.212 [0.000]***	0.212 [0.000]***	0.211 [0.000]***	0.167 [0.000]***	0.16 [0.000]***	0.209 [0.000]***
Firm Size	-0.015 [0.145]	-0.015 [0.149]	0.005 [0.629]	0.005 [0.471]	0.002 [0.765]	0.011 [0.241]
Exporter	-0.189 [0.002]***	-0.181 [0.002]***	-0.168 [0.011]**	-0.123 [0.103]	-0.121 [0.117]	-0.12 [0.110]
Creditor Rights	-0.039 [0.559]	-0.039 [0.551]	-0.048 [0.455]	-0.034 [0.391]	-0.02 [0.639]	-0.094 [0.014]**
Deposit Insurance	0.249 [0.068]*	0.273 [0.052]*	0.28 [0.019]**	1.433 [0.000]***	1.564 [0.000]***	0.868 [0.000]***
Bank Accounting Disclosure	0.085 [0.573]	0.069 [0.628]	0.122 [0.351]	0.282 [0.009]***	0.18 [0.079]*	0.302 [0.029]**
Other Macro-controls	Yes	yes	yes	yes	yes	yes
Industry Dummies	Yes	yes	yes	yes	yes	yes
Number of Countries	43	43	43	32	32	31
Observations	3363	3363	3154	2263	2263	1929
F-Tests				0.000***	0.000***	0.000***

Bank Corruption Dummy is the response to the question, “Is the corruption of bank officials as an obstacle for the operation and growth of your business?”, where “no obstacle” is equal to zero and “minor”, “moderate” and “major” is equal to one. Bank concentration (Deposit) is the fraction of total deposits held by the five largest banks in the industry. Bank concentration (Asset) is the fraction of total assets held by the five largest banks in the industry. Entry barrier measures the entry into banking requirement, which is a variable developed based on eight questions regarding whether various types of legal submission are required to obtain a banking license. The index ranges from 0 (low entry requirement) to 8 (high entry requirement). Higher values indicate greater stringency. Application Denied is the percentage to which applications to enter banking are denied in the past five years. Public Credit Registry is a dummy variable, which takes on value one if a public credit registry operates in the country by the end of 1999, zero otherwise. Private Bureau is a dummy variable, which takes on value one if a private credit bureau operates in the country by the end of 1999, zero otherwise. Firm auditing is a dummy variable, which takes on value one if the firm provides its shareholders with annual financial statements that have been reviewed by an external auditor, and 0 otherwise. Higher value indicates more information disclosure of the firm. Private Bank Ownership indicates that the banking system’s assets in the banks that are 50 percent or more owned by private investors. Foreign Bank Ownership indicates the share of banks owned by foreign investors. Government is a dummy variable, which equals to 1 if any government agency or state body has a financial stake in the ownership of the firm, 0 otherwise. Foreign is a dummy variable, which equals to 1 if any foreign company or individual has a financial stake in the ownership of the firm. Law enforcement is a firm level survey indicator, which measures the enforceability of court’s decision with a higher value indicating better law enforcement. Law enforcement is a firm level survey indicator, which measures the fairness and impartialness of court’s decision with a higher value indicating more fairness. Firm size is the natural logarithm of firm sales in US\$. Exporter is a dummy variable that takes on value one if the firm is an exporter and zero otherwise. Creditor Rights is an index, which measures the power of secured lenders in bankruptcy defined in laws and regulations. The index ranges from 0 to 4 with a higher value indicating stronger creditor rights. Deposit Insurance indicates whether there is an explicit deposit insurance scheme and whether depositors were fully compensated the last time a bank failed. Bank Accounting is an indicator, which measures whether the income statement includes accrued or unpaid interest or principal on performing and nonperforming loans and whether banks are required to produce consolidated financial statements. Higher value indicates more informative bank account. Other macro controls (GDP per capita and inflation) and industry dummies are also included. For brevity, the coefficients are not presented but are available upon request. Regressions in column (1) to (3) are run with probit with clustered errors, while regressions in column (4) to (6) are run with IV probit. In column (4) and (5), we use the English and French legal origin, ethnic fractionalization, and absolute value of latitude as instrumental variables of bank competition measures, In column 6, we include the percentage of years in independence since 1776 and religion composition, the proxy of cultural heritage, as additional IVs for bank competition and information sharing measures. Detailed variable definitions and sources are given in the table 1. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively. P-values based on robust standard errors are in parentheses.

Table 8 Information, Competition and Corruption with More Controls

	(1)	(2)	(3)	(4)	(5)	(6)
Public Registry	0.148 [0.226]	0.044 [0.756]	0.156 [0.208]	0.051 [0.727]	0.128 [0.262]	-0.031 [0.833]
Private Bureau	-0.284 [0.064]*	-0.309 [0.051]*	-0.271 [0.077]*	-0.305 [0.060]*	-0.296 [0.025]**	-0.309 [0.030]**
Firm Auditing	-0.249 [0.001]***	-0.255 [0.002]***	-0.248 [0.001]***	-0.256 [0.002]***	-0.243 [0.002]***	-0.269 [0.001]***
Bank Concentration		0.947 [0.006]***		0.949 [0.006]***		0.814 [0.027]**
Entry Barrier		0.18 [0.011]**		0.177 [0.017]**		0.104 [0.083]*
Application Denied		0.35 [0.160]		0.341 [0.178]		0.35 [0.165]
Private Bank Ownership	-0.002 [0.449]	-0.003 [0.281]	-0.002 [0.465]	-0.003 [0.280]	-0.003 [0.345]	-0.003 [0.367]
Foreign Bank Ownership	-0.003 [0.286]	-0.008 [0.024]**	-0.003 [0.380]	-0.008 [0.029]**	-0.004 [0.163]	-0.007 [0.039]**
Government	-0.256 [0.004]***	-0.294 [0.002]***	-0.246 [0.006]***	-0.293 [0.002]***	-0.252 [0.008]***	-0.298 [0.002]***
Foreign	-0.068 [0.243]	-0.097 [0.117]	-0.071 [0.222]	-0.097 [0.115]	-0.071 [0.221]	-0.084 [0.165]
Competitor	0.002 [0.973]	0.01 [0.860]	-0.002 [0.972]	0.009 [0.870]	-0.006 [0.899]	-0.003 [0.949]
Fair Court	-0.022 [0.256]	-0.044 [0.025]**	-0.024 [0.237]	-0.044 [0.024]**	-0.032 [0.113]	-0.048 [0.011]**
Law Enforcement	-0.095 [0.000]***	-0.083 [0.000]***	-0.092 [0.000]***	-0.083 [0.000]***	-0.097 [0.000]***	-0.085 [0.000]***
General Financing Obstacle	0.239 [0.000]***	0.219 [0.000]***	0.24 [0.000]***	0.219 [0.000]***	0.243 [0.000]***	0.223 [0.000]***
Firm Size	0.003 [0.728]	-0.0003 [0.975]	0.003 [0.747]	-0.0004 [0.971]	0.003 [0.744]	0.003 [0.810]
Exporter	-0.176 [0.001]***	-0.189 [0.002]***	-0.176 [0.001]***	-0.189 [0.002]***	-0.2 [0.000]***	-0.194 [0.003]***
Creditor Right	-0.055 [0.262]	-0.038 [0.492]	-0.054 [0.275]	-0.038 [0.500]	-0.012 [0.812]	-0.013 [0.827]
Deposit Insurance	0.274 [0.021]**	0.267 [0.014]**	0.233 [0.042]**	0.259 [0.016]**		
Bank Accounting Disclosure	0.034 [0.735]	0.108 [0.307]	0.034 [0.722]	0.106 [0.309]		
Control of Corruption	-0.16 [0.126]	-0.032 [0.751]				
TI Corruption Index			-0.081 [0.090]*	-0.017 [0.756]		

Official Supervisory Power					0.051	0.045
					[0.012]**	[0.039]**
Private Monitoring Index					-0.022	-0.006
					[0.497]	[0.844]
Other Macro-controls	yes	yes	yes	yes	yes	yes
Industry Dummies	yes	yes	yes	yes	yes	yes
Number of Countries	56	43	56	43	55	43
Observations	3950	3154	3950	3154	3898	3154

Bank corruption is the response to the question “Is the corruption of bank officials as an obstacle for the operation and growth of your business (1-no obstacle, 2- minor obstacle, 3- a moderate obstacle, 4-major obstacle)”. Bank concentration (Deposit) is the fraction of total deposits held by the five largest banks in the industry. Bank concentration (Asset) is the fraction of total assets held by the five largest banks in the industry. Entry barrier measures the entry into banking requirement, which is a variable developed based on eight questions regarding whether various types of legal submission are required to obtain a banking license. The index ranges from 0 (low entry requirement) to 8 (high entry requirement). Higher values indicate greater stringency. Application Denied is the percentage to which applications to enter banking are denied in the past five years. Public Credit Registry is a dummy variable, which takes on value one if a public credit registry operates in the country by the end of 1999, zero otherwise. Private Bureau is a dummy variable, which takes on value one if a private credit bureau operates in the country by the end of 1999, zero otherwise. Firm auditing is a dummy variable, which takes on value one if the firm provide its shareholders with annual financial statements that have been reviewed by an external auditor, and 0 otherwise. Private/Foreign Bank Ownership indicates that the banking system's assets in the banks that are 50 percent or more owned by private/foreign investors. The other firm level controls are defined as previously. Control of Corruption measures the control of corruption in the country with a higher value indicating better control. TI Corruption index is the corruption perception index developed by Transparency International, with a higher value indicating less corruption. Official Supervisory Power is a principal components indicator of the power of supervisory agency to discipline and monitor banks. General Financing Obstacle is the response to the question “How problematic is financing for the operation and growth of your business (1-no obstacle, 2-minot obstacle, 3-moderat obstacle, 4-major obstacle)”. Other macro controls (GDP per capita and inflation) and industry dummies are also included. For brevity, the coefficients are not presented but are available upon request. We also include other macro institutional controls such as Government Effectiveness, Rule of Law, Voice and Accountability, Democracy, Openness. The empirical results are highly robust. For brevity, the coefficients are not reported here but are available from the authors. The detailed definition of the institution variables can be found in table 1. The regressions are run with ordered probit, which is based on standard maximum likelihood estimation with heteroskedasticity-robust standard errors. Furthermore, we allow for clustering within countries to allow for possible correlation of errors in all the models. Detailed variable definitions and sources are given in the table 1. ***, **, * indicate significance at the 1%, 5% and 10% levels, respectively. P-values based on robust standard errors are in parentheses.