DOES CORRUPTION "GREASE OR SAND THE WHEELS": THE EFFECT OF CORRUPTION ON LOAN CONTRACTUAL TERMS

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Abstract

The aim of this paper is to study the consequences of corruption on loan contractual terms offered to borrowing firms. Based on the Business Environment and Enterprise Performance Survey (BEEPS) that covers firms in countries with economies in transition and several countries of Western Europe, my analysis suggests that corruption adversely affects loan contractual terms increasing interest rates and shortening loan maturities. Moreover, high level of corruption increases the likelihood that borrowers will be asked to pledge collateral against the loan. These results are statistically significant and robust to using alternative corruption measures, both the Corruption Perceptions Index developed by the Transparency International and sector-size averages of firms' perceptions of corruption.

Acknowledgment

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Introduction

Banks are one of the key providers of external finance across the globe. Debt markets where banks and other financial intermediaries operate efficiently facilitate the flow of financial resources to the most productive investment projects thus improving a country's overall economic performance (King and Levine, 1993). Since bank lending is sometimes the only available source of external finance for enterprises, especially in developing and emerging economies, a banking system with better-developed financial institutions can also alleviate poverty and reduce income inequality (Beck, Levine, Demiriguc-Kunt, 2004).

Unfortunately, there are still countries that are a long way from building efficient banking systems. Banks in these countries are susceptible to corruption obstacles that significantly influence banks' willingness to grant credits to already existing or newly established entities (Qian and Strahan, 2007). When lending money to a firm in an emerging economy, banks have to take into consideration not only the credit quality of a particular borrower but also risks associated with institutional and business environments in which this firm operates. Banks can mitigate firm-specific or idiosyncratic risks by making a diversified portfolio of loans. Systematic risks which include corruption, poor law enforcement, weak legal institutions and other system-wide risks are not diversifiable hence banks are very likely to alter loan terms to offset these risks (Qian and Strahan, 2007).

This paper's aim is to assess how corruption obstacles affect price and non-price loan contractual terms, particularly, interest rates charged on loans (price term), collateral requirement and loan duration (non-price terms). To mitigate risks banks are expected to increase interest rates, require collateral more frequently and reduce loan maturities when they

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lend to firms operating in countries with high levels of corruption. To test the hypothesis I use the Business Environment and Enterprise Performance Survey (BEEPS) covering over 19 000 firms from the Former Soviet Union and Central and Eastern Europe. The dataset is advantageous in a way that it allows me to analyze how firms from different legal and financial backgrounds perceive corruption and financial obstacles and whether, in fact, there is an association between reported perceptions and loan contractual terms.

To begin the empirical analysis I have checked firms' responses about major obstacles affecting their businesses to see whether the problem in scope is relevant for the chosen sample. The bar chart below shows factors which firms perceived as major obstacles for the operation and growth of their businesses. Almost 80 percent of the interviewed firms (3124 firms) in 2005 reported tax rates to be the major obstacle for their businesses. Macroeconomic instability (e.g., interest rate, exchange rate) and economic policy uncertainties are next troublesome issues for more than 50 percent of included in the survey firms. Corruption, cost of financing (e.g. interest rates and charges) and access to financing (e.g. collateral required or financing not available from banks) are reported as significant impediments to firms' smooth running of business.

Figure 1: Factors reported by firms as major obstacles for their businesses

Compiled from the BEEPS dataset
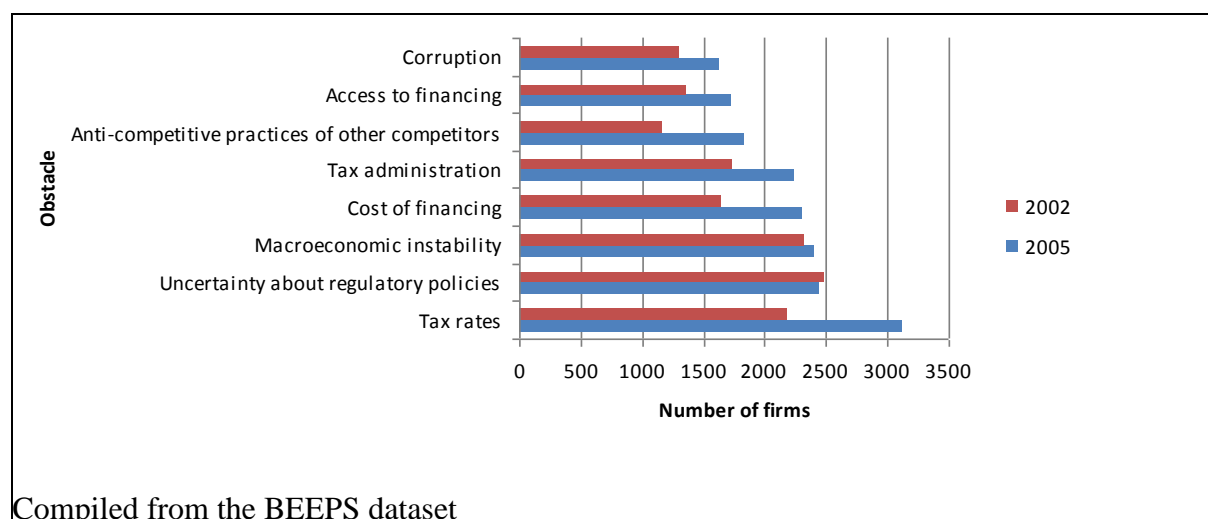
Since interviewed firms report corruption and financing obstacles to affect their performance it is worthwhile studying the influence of corruption on loan structure and pricing further. As efficient bank lending has been shown to be positively correlated with economic growth (Rajan and Zingales, 1998), this study can advance our understanding of the potential effects of corruption on countries' economic developments.

The thesis is organized as follows. Section I presents literature review. Section II covers data description and variable definition. Section III describes methodology. Section IV presents estimation results. Section V concludes the paper.

1. Literature review

Corruption, defined by the Transparency International as "the abuse of entrusted power for private gain", is commonly viewed as an obstacle to development and growth. This view has gained a lot of empirical support in recent years. Mauro (1995), who laid the foundation for the literature on corruption and growth, found that corruption significantly decreased investment rates which extended to a slowdown of economic growth. Empirical works by La Porta *et al.* (1998), Levine (1999) and others recognized a strong link between law enforcement and corruption and pointed to a detrimental effect of corruption on economic development.

However this view has not always been common sense among economic thinkers. The stream of empirical studies on corruption originating in the 1960s created a lot of controversy among economists and led to the emergence of an alternative view on corruption as being beneficial. The two contradictory views are known in the economic literature as the "grease the wheels" and the "sand the wheels" hypotheses. Advocates of the former hypothesis state that corruption tends to foster economic development, proponents of the latter hypothesis claim that corruption hampers economic development.

The debate started off with papers by Leff (1964), followed by Leys (1965) and Huntington (1968). The "grease the wheels" hypothesis proposed by them suggests that corruption may be beneficial in countries with poor governance and bureaucratic inefficiencies. According to them there are three channels through which corruption may stimulate economic growth. The first channel is through the so called "speed money" that helps to speed up processes (e.g. getting certificates or licenses for business operation) in a sluggish administrative

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environment. The second channel is through improved quality of civil servants and the third is through improved quality of investment.

Leys (1965) and Lui (1985) provide evidence for the first channel and find that corruption can significantly reduce time spending in queues in public offices thus serving as "speed money". This "speedy money" idea is however proved wrong by Myrdal (1968) who argues that officials have incentives to create delays and queues in the first place for the sake of extracting benefits. Shleifer and Vishny (1993) also present evidence that corruption slows down projects when the number of officials needed at different stages of project authorization increases.

The second channel through which corruption can be beneficial for economic growth is through improved civil service. Leys (1964) and Bailey (1966) claim that if civil servants are not paid sufficiently then having an opportunity to take bribes will motivate able workers to take government positions thus increasing the quality of civil service. Kurer (1993) however finds no evidence that corruption is helping with the quality of servants and points out that in fact civil servants are incentivized to create more distortions to increase the base of the bribe tax and inhibit entry of new servants to keep corruption rents to themselves.

Finally, the last channel through which corruption can exert influence on economic growth is through improved investment quality. Leff (1964) argues that corruption under certain conditions may enhance the quality of investment. He believes that if corruption is a channel of tax evasion then revenues from public taxes that do not reach public budget will help to improve investment quality provided bribers are good at picking investment opportunities. The argument about increased investment efficiency does not have enough supportive

evidence at the macro-level. For example, Mauro (1995) tries to identify channels through which corruption affects economic development using judiciary system, corruption and red tape indices (bureaucratic efficiency index) and finds that bureaucratic inefficiencies significantly decrease investment rates.

The debate on the "grease" vs. the "sand the wheels" hypotheses is largely conditional on governance structures. The "grease the wheels" hypothesis seems to work in the presence of bureaucratic inefficiencies and poor governance which means that corruption is not beneficial everywhere. The natural question that arises here is the effect of corruption on growth and economic efficiency if weak institutional environment is not assumed. A number of recent empirical works have studied this hypothesis in a greater detail varying levels of governance and/or corruption.

Meon and Sekkat (2005) investigate the effect of corruption on growth and investment taking into account the quality of governance. They conclude that in countries with a low quality of governance corruption only enhances the detrimental effect on economic growth ("sand the wheels" hypothesis can not be rejected) and does not compensate for bureaucratic inefficiencies ("grease the wheels" hypothesis rejected).

Mendez and Sepulveda (2006) divide countries into two sub-samples depending on how widespread corruption is and then look at the effect of corruption. Their conclusion is that countries with low levels of corruption tend to benefit from it however when countries have high levels of corruption the detrimental effect kicks in. Overall, the results of the most recent tests of the "grease the wheels" hypothesis reveal that the marginal effect of corruption

depends on the institutional quality in a given country and that corruption is beneficial up to a certain degree.

Whether the effect of corruption is detrimental or beneficial it is found to influence economic and financial indicators. Since my work focuses on the relationship between corruption and loan contractual terms I am interested in empirical works that explore the link between corruption obstacles and the development of financial markets. Most of these works study the effect of legal and institutional environments on the size of debt and equity markets. For example, La Porta et al. (1998) including corruption along with the efficiency of the judicial system, the rule of law, the risk of expropriation by the government and the likelihood of contract repudiation by the government as measures of law enforcement empirically prove that countries that fail to protect investors and creditors have significantly smaller equity and debt markets. The intuitive explanation for underdeveloped equity/debt markets is that banks do not have enforcement tools to secure their loans (force repayments, receive collateral) in case a borrower defaults. Thus in countries with poor legal institutions and weak law enforcement policies banks are vulnerable to uncertainty and constrained in their ability to enforce rights on defaulted borrowers hence decreasing their propensities to lend.

Djankov, McLiesha, Shleifer (2007) analyze the variation in the size of private credit markets across 129 countries using different controls for legal and institutional environments (creditor rights and a number of private credit registries) to find that both better creditor rights and credit registries lead to a higher ratio of private credit to GDP. Levine (1999), Demirguc-Kunt and Maksimovic (1998), Rajan and Zingales (1998) in a similar fashion proceed examining the influence of legal and institutional environments on financial and economic growth indicators and obtain similar results.

La Porta *et. al*, Levine, Djankov *et al.* and others study the problem on the "extensive (macro) margin" that is how the total supply of credit and the size of the private credit market are affected by institutional and legal environments. There is however a small stream of literature that seeks to look at the problem at the "intensive (micro) margin". This literature addresses the question whether creditor and/or property rights and their enforceability matter for loan contractual terms and if they do then how they affect interest rates, loan maturities and collateral requirements.

Bhattacharya and Daouk (2005) state that it is the enforcement of law that affects loan contracting process. Qian and Strahan (2007) find that it is stronger creditor protection and not property rights protection that leads to better contracting provisions in terms of lower interest rates, longer maturities, greater concentration of loan ownership and increased participation by foreign banks. Bae and Goyal (2009) however provide evidence that differences in creditor rights are not important when setting loan contractual terms. Their results suggest that in countries where property rights (measured by the corruption index along with the risk of expropriation of private property and the risk of contract repudiation) are well protected banks are willing to lend bigger amounts at longer maturities charging lower interest rates.

The above mentioned micro-level pieces of evidence are consistent with the "sand the wheels" hypothesis. Weill (2009) however examining the problem in scope provides evidence for the "grease the wheels" hypothesis as well. His country and bank-level estimations point to a detrimental effect of corruption on bank lending. However, in case of increased bank aversion when banks are more prone to thorough scanning firms that apply for loans the

detrimental affect of corruption is smaller meaning it may be at times beneficial to bribe bank officials to get easier access to loans.

The ongoing debate over "the grease or sand the wheels" hypotheses gives room for more research. The nature of the BEEPS dataset where corruption is self-reported by firm managers and employees rather than measured by expert judgments gives an opportunity to conduct another micro-level study.

2. Data description and variable definition

2.1 Data description

This study exploits the advantages of the Business Environment and Enterprise Performance Survey (BEEPS), a joint effort of the European Bank for Reconstruction and Development and the World Bank to collect firm-level data on a large scale since 1999. The first two rounds of the survey completed in 1999 and 2002 covered countries of Central and Eastern Europe (CEE), Former Soviet Union (FSU) and Turkey. In 2004 and 2005 the BEEPS survey was extended to include a range of comparator countries from Western Europe and East Asia. The latest round of the BEEPS survey on CEE and FSU countries and Mongolia was conducted in 2009.

The BEEPS survey was designed in a way to assess the extent to which government policies and public services facilitate or impede the environment in which firms operate. By interviewing firm managers and other employees the survey collects information on a firm's experience with financial system (e.g. access to and cost of financing), physical or communication infrastructure (e.g. power outages, telephone services) and legal and regulatory institutions (e.g. days to clear customs, unofficial payments to get things done). General information on firms is limited but firm-specific characteristics such as sales, exports, number of employees or competitors, largest shareholder and industry can be obtained. The survey also provides information on whether a firm has been receiving subsidies from the EU, national or local authorities and whether it has been making profits or losses.

In this study I will use BEEPS-2002 covering approximately 6500 firms in 28 transitional economies, BEEPS-2004 covering Germany, Greece, Ireland, Portugal, Spain, South Korea

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and Vietnam and BEEPS-2005 covering approximately 4000 enterprises in 26 transitional economies. Including BEEPS-2004 comparator data in the study results in a very high dispersion of gross national income between countries, however, controlling for some country specific characteristics (e.g. quality of institutional environment, level of economic and financial development) this concern can be ruled out and the sample size can be increased. BEEPS-1999 is excluded from the study as it does not provide information on loan contractual terms and BEEPS-2009 is excluded because of a sizable time lag and a lack of overlapping questions with the previous surveys.

The main weakness of the BEEPS dataset is a small sample size of firms within a particular country resulting from large scale coverage and limited budget (e.g. in BEEPS-2002 the average number of completed firm interviews in a given country is 240). This means that disaggregated firm-level analysis should be conducted with due caution and whenever possible analysis of more aggregated data should be preferred. The BEEPS's major advantage is a wide scope of questions on firm behavior and performance and the use of a consistent survey questionnaire across a large number of transitional economies.

2.2 Variable definition

2.2.1 Contractual terms and corruption variables

The objective of the study is to find empirical evidence that corruption adversely affects loan contractual terms. In this study I examine three aspects of loan contracting – interest rate charged on a loan, loan duration and collateral requirement. The data are taken directly from the BEEPS dataset in answer to the following questions a) What is the loan's annual cost (i.e. rate of interest); b) What is the duration of the loan in months; c) Thinking of the most recent loan you obtained from a financial institution, did the financing require collateral.

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Measuring corruption can be done in several ways. First, expert-based indices can be used. The most widely cited commercial expert-based data come from the International Country Risk Guide (ICGR) which incorporates 3 subcategories of risk: political, financial and economic risks with corruption entering the political subcategory. Second, to quantify corruption perception-based surveys can be used. Indicators in this group include the Corruption Perception Index (CPI) completed by the Transparency International or the indicator for Control of Corruption included in the World Governance Indicators completed by the World Bank. These three measures of corruption are highly correlated and either one of them can be used in cross-country comparisons and empirical studies. Finally, firm-level surveys may be used to measure corruption, among them is the BEEPS dataset which is unique in the sense that it allows to match corruption effects with firm and country-level characteristics.

To assess corruption I will use corruption perception measures reported by managers and employees when asked to evaluate on the scale from 1 (no obstacle) to 4 (major obstacle) corruption as a problematic factor for the operation and growth of their businesses. The variable is rescaled and takes values from 0 (no obstacle) to 1 (major obstacle). Alternatively, I will use the Corruption Perception Index for the year of 2005 which is a country-level index measuring corruption based on business and expert surveys. The Corruption Perception Index is rescaled and takes values from 0 (corruption-clean countries) to 1 (highly corrupt countries).

2.2.2 Firm-level variables

To construct firm-level controls it would have been advantageous to have data on assets and net/operating income to account for profitability (net income divided by assets) and firm size (log of total assets) but due to limitations of the BEEPS dataset on performance and finance

variables the only variables that may be of use are the profitability dummy and number of full time employees. The survey interviews three groups of firms. Small firms employ from 2 to 49 employees, medium-size firms employ from 50 to 249 workers and large firms provide from 250 to 10000 work places. In addition firm specific characteristics include a government or a foreign dummy (whether the largest shareholder is the government or a foreign company), an industry/services dummy and a subsidy dummy (whether a firm has received any subsidies from the EU, national or regional authorities). Detailed variable definition and the number of firms being surveyed in each country are presented in Appendix 1 and Appendix 2.

2.2.3 Country-level variables

A number of empirical studies have presented evidence that strong creditor protection results in higher ratios of private credit to gross domestic product (e.g., Djankov and Schleifer, 2007). To capture the effect of better creditor environment on loan contractual terms between countries of different legal origins (countries of German, French and Socialist legal origins are included in the sample) the Creditor Rights Index constructed by Djankov and Schleifer is used. The index is constructed for the 1996-2002 period and includes 133 countries which is almost 2.5 times bigger than the original sample of countries studied by La Porta, Lopez-de-Silanes, Shleifer and Vishny (1998).

The index incorporates the following creditor rights in case of a borrower's default: 1) whether secured creditors can seize collateral once the petition for reorganization is approved, 2) whether secured creditors are the first to be paid in the distribution of proceeds in case of a default, 3) whether there is a restriction such as lender's consent if a borrower files for bankruptcy and 4) whether management is not responsible for running the business during the reorganization (Djankov and Schleifer, 2007). The index ranges from 0 (weak creditor

rights) to 4 (strong creditor rights). Since this is a measure of a country's legal environment which has very little time variation I use the average 1978-2003 index assuming no major legal changes have occurred since 2003. In fact, 90 percent of the observations are the same as in the 1995 index proving the fact that legal environment persists.

Countries with different levels of economic and financial development will have different total supplies of credit and different credit terms. Countries with better developed financial markets will tend to have higher levels of credit supply and thus more preferable contractual terms (Levine, 1999). To ensure that loan contractual terms do not pick up economic and financial development effects country-level controls should be included in the estimation. To account for inter-country differences in financial development domestic credit provided by banking sector, averaged over the period 2001-2003, is included. To account for inter-country differences in economic development logarithm of gross national income, averaged over the period 2001-2003, is included. Consistent with the previous studies of loan contractual terms (Boyd et al., 2001; Huybens and Smith, 1999), I also control for the average inflation rate, averaged over the period 1999-2003, as a measure of macroeconomic instability.

3. Methodology

My main objective is to analyze how loan contractual terms for firms in countries of Central and Eastern Europe and the Former Soviet Union are affected by corruption obstacles. Loan contractual terms are nominal interest rate (in percent), loan maturity (in months) and collateral requirement (indicator equal to one if a loan is secured and zero if it is not). The descriptive statistics for loan contractual terms are presented in Table 1. From this table we can see that the loan contractual terms vary a lot within the sample. Interest rates charged on loans vary greatly from just as little as a half percentage point to nearly 100 percent. Loan durations vary from one month to 35 years with an average loan maturity of 34 months. The majority of firms (6958 firms) were asked to provide collateral. Descriptive statistics for the remaining variables are summarized in Appendix 3.

Table 1: Descriptive statistics for loan contractual terms

	INTEREST RATE	LOAN DURATION	SECURED INDICATOR
Mean	13.57	33.92	0.81
Maximum	97	420	1
Minimum	0.4	1	0
Median	11	24	1
Standard devationa	10.4	34.86	0.39
N	7591	7591	8598

Choosing an adequate corruption measure for empirical analysis is a tricky issue as corruption is not easily quantifiable. Asking firm managers and employees about their perception of corruption expressed as the degree of severity may result in biases. The variable (PER) may reflect the so called perception bias (Kaufmann and Wei, 1999) arising when firms persistently overreport or underreport the true magnitude of obstacles based on their overall perception of their countries' business environments. For example it can be the case that a country's cultural norms or political freedoms can influence firms' willingness and ability to

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express their sincere opinion about the true state of corruption obstacles. To cope with this problem the Corruption Perceptions Index based on judgment of analysts and experts can be alternatively used together with firm perceptions.

However, using an alternative corruption measure does not rule out endogeneity concerns. Managers' responses on corruption may be endogenous to firm performance. Firms that are inherently more efficient (because of better access to information, business connections, incumbent industry or other unobserved reasons) can overcome corruption obstacles or mitigate their influence on their performance. This may result in reporting corruption obstacles as not being severe enough. Less efficient in coping with corruption obstacles firms will appreciate the real cost of corruption constrains on their business performance and will tend to overreport the magnitude of the obstacle. If these differences in efficiencies between firms are not accounted for, using firm-level responses on corruption will lead to biased estimation of the effect of corruption on loan contractual terms as omitted efficiency variables will be correlated with included regressors. Moreover, firm perception can also be biased because of the firm's recent experience with loans. If they were unlucky for some economic reason to get a loan, they may say that was because of corruption.

A good approach to deal with such endogeneity issues was proposed by Dollar (2005). To analyze the effect of different investment climate indicators reported by firms on firm growth he takes city-sector averages of firm-level observations. In my case, to attenuate the endogeneity bias corruption responses taken from the BEEPS dataset can be measured as country-sector-size averages of firms' responses. I first average out corruption perception responses within a given country for firms whose businesses are in industry or services. Then I average out corruption perception responses within a given country sector wise

(industry/services) and then size wise (small, medium or large enterprises) to get 6 averaged-out measures of corruption that enter empirical analysis.

The descriptive statistics for corruption variables are presented in Table 2. Firms on average report the severity of corruption obstacles for their businesses to be around 0.35 on the scale from 1 (major obstacle) to 0 (no obstacle), this is captured by FIRM_PER variable. The average cross-country measure of corruption the Corruption Perception Index varies from 0.18 to 0.78 on the scale for 0 (corruption-clean countries) to 1 (highly corrupt countries). Variable PER_COUNT_AVER gives firms' perceptions of corruption obstacles averaged out by countries. It's interesting to note that the severity of corruption reported by firms' managers and employees is smaller than the appraisal of corruption obstacles by experts. This information however is not sufficient to conclude that managers are overoptimistic or that the true severity of corruption is indeed not so frightening. The difference can possibly be the result of the above-mentioned perception bias. Additionally to these three corruption measures country-sector (PER_SEC) and county-sector-size (PER_SEC_SIZE) means will be used to mitigate endogeneity bias.

Table 2: Descriptive statistics for corruption variables

	FIRM_PER	CPI	PER_COUNT_AVER
Mean	0.35	0.59	0.35
Maximum	1	0.78	0.65
Minimum	0	0.18	0.08
Median	0.33	0.66	0.39
Standard deviation	0.38	0.17	0.13
N	18308	18308	18308

First I want to check how firms' access to financing is affected by corruption obstacles. The dependent variable is access to financing which is based on firms' perceptions of the obstacle. It is rescaled and takes values from 0 (no obstacle) to 1 (major obstacle) with an average

reported severity of the obstacle of 0.4. The dependent variable is regressed on various corruption measures and a set of firm-specific variables to rule out firms' poor management or other firm inefficiencies that may cause banks' unwillingness to enter into loan contracts with these firms. The regression equations take the form:

$$Access\ to\ financing = \alpha + \beta_1 Profit + \beta_2 Size + \beta_3 Year + \beta_4 Government + \beta_5 Foreign + \beta_6 Subsidy + \beta_7 Sector + \beta_8 Creditor\ Rights + \beta_9 Credit\ to\ GDP + \beta_{10} GNI + \beta_{11} Average\ Inflation\ Rate + \beta_{12} Corruption\ measure + \varepsilon$$

To prove that corruption has an adverse affect on a firm's access to financing I need to test whether the coefficient β_{12} on corruption measure is significantly different from zero.

Next, I regress different loan contractual terms on corruption measures and a set of country and firm-level variables discussed in Section II. The country controls are private credit to GDP, GNI, the Creditor Rights Index and the average inflation rate. Firm-specific controls are indicators for profitability, size (measured by the number of employees), ownership (separate for the government and a foreign company as the largest shareholder), sector (separate for industry and services) and an indicator for whether a firm receives subsidies. To account for possible shocks between the years of 2002, 2004 and 2005 year dummies are included. The regression equations take the form:

$$Loan\ contractual\ term\ (interest,\ loan\ maturity) = \alpha + \beta_1 Profit + \beta_2 Size + \beta_3 Year + \beta_4 Government + \beta_5 Foreign + \beta_6 Subsidy + \beta_7 Sector + \beta_8 Creditor\ Rights + \beta_9 Credit\ to\ GDP + \beta_{10} GNI + \beta_{11} Average\ Inflation\ Rate + \beta_{12} Corruption\ measure + \varepsilon$$

To prove that corruption has an adverse affect on loan contractual terms I need to test whether the coefficient β_{12} on corruption measure is significantly different from zero. I pool the BEEPS data for 3 years and estimate pooled OLS regressions. All OLS regressions are estimated with White Heteroskedasticity-Consistent Standard Errors.

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The secured indicator is a binary variable thus to analyze the effect of corruption on whether firms are required to provide collateral or not I run the Probit model. The regression equation takes the form:

$$Probit\ (Collateral_i = 1) = \Phi(\alpha + \beta_1 Profit + \beta_2 Size + \beta_3 Year + \beta_4 Government + \beta_5 Foreign +$$

$$\beta_6 Subsidy + \beta_7 Sector + \beta_8 Creditor\ Rights + \beta_9 Credit\ to\ GDP + \beta_{10} GNI + \beta_{11} Average\ Inflation$$

$$Rate + \beta_{12} Corruption\ measure)$$

where collateral equals one if banks/financial institutions required collateral and zero otherwise.

4. Estimation results

The main results are obtained by running OLS regressions of bank lending terms on a set of firm-level and country-level variables and corruption measures. To check the sensitivity of results alternative measures of corruption are used. First I regress firm-level survey responses about their access to finance on borrower characteristics, country-level indicators of financial, economic and legal development and corruption obstacles. The regression outcomes are presented in Table 3.

Table 3: Regressions relating access to finance to firm, country characteristics and corruption obstacles

Explanatory variables	Access to finance		
	(1)	(2)	(3)
Profit	-0.063**	-0.060**	-0.060**
	(0.009)	(0.009)	(0.009)
Small	0.084**	-0.034**	-0.030**
	(0.009)	(0.007)	(0.007)
Medium	0.053**	-0.085**	-0.074**
	(0.011)	(0.009)	(0.009)
Year2004	-0.141**	-0.084**	-0.097**
	(0.012)	(0.013)	(0.012)
Year2005	-0.040**	-0.038**	-0.039**
	(0.006)	(0.006)	(0.006)
Subsidy	0.012	0.018	0.016
	(0.010)	(0.010)	(0.010)
Government	-0.032*	-0.035*	-0.032*
	(0.011)	(0.011)	(0.011)
Foreign	-0.108**	-0.107**	-0.109**
	(0.011)	(0.010)	(0.011)
Industry	0.0583**	0.059**	0.060**
	(0.005)	(0.005)	(0.005)
Creditor Rights	-0.025**	-0.023**	-0.022**
	(0.004)	(0.004)	(0.003)
Credit to GDP	0.001**	0.0004*	0.0005*
	(0.0002)	(0.0001)	(0.0001)
Log (GNI)	0.009**	0.013**	0.011**
	(0.002)	(0.002)	(0.002)
Inflation	0.0000824	0.0005**	0.0005**
	(0.0001)	(0.0001)	(0.0001)

CPI	0.213** (0.037)		
PER_COUNT_AVER		0.413** (0.031)	
PER_SEC_SIZE			0.298** (0.023)
R-squared	0.034	0.042	0.041
N	18077	18077	18077

*Significant at 5%; **significant at 1%; standard errors in parentheses

All three corruption variables included in the regressions are significant and appear to make access to financing a severe obstacle which is consistent with the "sand the wheels" hypothesis. The effect of corruption on access to finance when averaged across firms tends to be the most detrimental – switching from the perception that corruption is not an obstacle to business (zero) to the perception that corruption is a major obstacle (one) results in a 0.414 point increase of the financial obstacle. This is probably because firms' corruption perceptions are endogenous to firm performance and averaging out firms' responses helps to correct for selection. Using alternative corruption measures gives similar results. This finding reflects that constrained access to financing can be the result of risky contracting environments.

Table 3 shows that on average a firm's perception of constrained access to finance relates to a firm's ability to generate profits, size, sector of business and the largest shareholder. In all three regressions firms that were making profits in the years under examination have indicated less troublesome access to finance. Smaller firms report significantly higher obstacles in getting external financing than large firms. Firms that belong to the industrial sector also tend to report higher exposure to the financial obstacle and they are probably in more need as well. Firms owned by a foreign shareholder report to have less difficulties getting a bank loan than government-owned firms though state-ownership also tends to

release financial pressure on firms. The indicator whether a firm is subsidized does not seem to matter in explaining the financial obstacle.

Table 3 also shows that the level of financial development captured by the ratio of private banking credit to GDP positively relates to the financing obstacle. This is counterintuitive as greater credit supply should make access to financing easier. The counterintuitive sign however can be driven by loan demand, higher credit to GDP ratio may be a sign of higher demand which ultimately leads to higher interest rates and constrained access to financing. Better creditor protection on the country-level measured by the Creditor Rights Index tends to attenuate the financial obstacle as creditors are more willing to lend knowing that in case of defaults they will be able to secure granted loans. Inflation which proxies for macroeconomic instability in a given country is also associated with a more constrained access to finance, the signs on the average inflation coefficients in columns (2) and (3) are significant and positive. Overall, I can conclude that access to financing is responsive to firm characteristics and corruption obstacles. However, to determine whether corruption obstacles have a significant impact on external financing I should analyze the actual loan contractual terms offered to interviewed firms and how they are affected by these obstacles.

First I examine the effect of corruption obstacles on the loan price term - interest rates charged. Former works (e.g., Bae and Goyal, 2009) have looked at the relationship between loan interest rate spreads (spreads over LIBOR – London Interbank Offered Rate – or a similar benchmark rate) and creditor rights protection and have identified that weak creditor rights tend to increase loan spreads. By running OLS regressions, I expect to get similar results. A positive and significant sign on various corruption measures will indicate that

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corruption tends to increase interest rates offered to firms. Table 4 presents the main estimation results.

Table 4: Regressions relating interest rate to firm, country characteristics and corruption obstacles

Explanatory variables	Interest rate (Percent)			
	(1)	(2)	(3)	(4)
Profit	-0.628*	-0.522*	-0.511*	-0.514*
	(0.258)	(0.258)	(0.257)	(0.259)
Medium	-0.796**	-0.841**	-0.845*	-0.733*
	(0.238)	(0.238)	(0.235)	(0.237)
Large	-2.141**	-2.130**	-2.029**	-1.915**
	(0.281)	(0.281)	(0.280)	(0.280)
Year2004	-6.854**	-5.326**	-5.379**	-5.663**
	(0.349)	(0.323)	(0.316)	(0.322)
Year2005	-5.881**	-5.864**	-5.845**	-5.880**
	(0.286)	(0.285)	(0.283)	(0.285)
Subsidy	-0.544	-0.534*	-0.478	-0.563*
	(0.253)	(0.251)	(0.250)	(0.252)
Government	1.344*	1.275*	1.268*	1.398*
	(0.530)	(0.531)	(0.532)	(0.533)
Foreign	-1.072*	-1.053*	-1.086*	-1.100*
	(0.409)	(0.410)	(0.409)	(0.412)
Industry	0.575*	0.589*	0.634**	0.602*
	(0.183)	(0.182)	(0.182)	(0.183)
Credit to GDP	-0.032**	-0.069**	-0.057**	-0.068**
	(0.006)	(0.003)	(0.004)	(0.004)
Creditor Rights	0.206*	0.122	0.210*	0.145
	(0.076)	(0.076)	(0.076)	(0.076)
Log (GNI)	0.715**	0.759**	0.729**	0.687**
	(0.067)	(0.069)	(0.067)	(0.066)
Inflation	0.191**	0.205**	0.212**	0.206**
	(0.012)	(0.012)	(0.012)	(0.012)
CPI	11.027**			
	(0.901)			
PER_COUNT_AVER		10.916**		
		(0.886)		
PER_SEC			12.250**	
			(0.951)	
PER_SEC_SIZE				7.495**
				(0.827)
R-squared	0.462	0.464	0.468	0.462
N	7684	7684	7648	7648

*Significant at 5%; **significant at 1%; standard errors in parentheses

The key variables of interest on the right-hand side are different corruption indicators. All corruption coefficients are significant and have positive signs. If measured by the Corruption Perception Index, the worst state of corruption in a given country can result in a little more than 11 percent increase in the interest rate with an average interest rate of 13.63 for the sample. When corruption is estimated with averaged out firms' responses of corruption obstacles interest rates are expected to increase on average by 10.9, 12.25 and 7.94 percent if the worst severity of the obstacle is assumed. Higher interest rates charged on loans suggest that banks require additional compensation when lending to firms operating in highly-corrupt environments as banks face greater uncertainty.

Borrower characteristic variables have the expected signs. Large and foreign firms borrow at lower interest rates, the cost of financing to them is reduced by almost 2 and 1 percent respectively. This is very intuitive as large firms are typically more diversified and mature while foreign firms have exposure to foreign debt markets thus they are least likely to become default borrowers. Profitable firms that also have lower default risks are on average expected to be charged 0.5 percent less.

Firms that are subsidized from the EU, national or regional budgets are charged lower interest rates as banks probably consider them less risky for having additional financial backups. Firms operating in the industrial sector are predicted to have higher interest rates. This can be explained in many ways. It can be the case that banks in different countries predefine industries to which they channel most of their external finds thus having higher interests for non-core borrowers or it can be because industrial firms have longer production cycles hence it takes them longer to repay loans thus banks compensate themselves for this inconvenience with higher interest rates. Firms with the government as the largest shareholder are also

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predicted to pay more for taking loans. This is probably the case when a non-government bank lends to state-owned firms which it finds more suspicious of less-developed reporting standards for example.

Higher levels of financial development (private credit to GDP ratio) are associated with lower interest rates. The result may be driven by loan supply as a high ratio of private credit to GDP indicates greater supply of loans available on the debt market which leads to lower interest rates. The relationship however may be highly endogenous. It can be that lower interest rates offered by banks enable firms to borrow from the financial market thus the credit to GDP ratio increases. The coefficients on the credit rights index are significant in columns (1) and (3) but have counterintuitive signs. The coefficient on the average inflation rate which controls for macroeconomic instability has a positive sign which is consistent with the idea that firms operating in stable macro environments face fewer business impediments (Boyd, Levine, and Smith, 2001). A one percent increase in the average inflation rate leads to an average 0.36 increase in interest rates. Overall, macro indicators (private credit to GDP, inflation) have the best explanatory power in these regressions. The creditor rights indicator does not seem to matter for interest rates. Corruption indicators have the predicted signs and are fully consistent with "the sand the wheels" hypothesis.

Next I analyze the effect of corruption obstacles on non-price loan contractual terms – loan duration and collateral requirement. Former studies (e.g. Diamond, 2004) show that in countries where laws and contracts are poorly enforced banks often have to use loan maturities as a tool to mitigate risks. By running OLS regressions of loan maturities on corruption obstacles, I expect corruption to decrease loan maturities. Table 5 presents the results of the estimations.

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Table 5: Regressions relating loan maturity to firm, country characteristics and corruption

obstacles

Log of Maturity (Months)				
Explanatory variables				
	(1)	(2)	(3)	(4)
Profit	0.016 (0.032)	0.0005 (0.032)	-0,00004 (0.032)	-0,00008 (0.032)
Medium	-0.024 (0.024)	-0.029 (0.024)	-0.03 (0.024)	-0.035 (0.024)
Large	-0.052 (0.029)	-0.057 (0.029)	-0.063* (0.029)	-0.071* (0.029)
Year2004	0.244** (0.044)	0.101* (0.044)	0.104* (0.044)	0.114* (0.044)
Year2005	0.422** (0.023)	0.424** (0.023)	0.424** (0.023)	0.424** (0.023)
Subsidy	0.124** (0.029)	0.151** (0.029)	0.148** (0.029)	0.151** (0.029)
Government	-0.065 (0.041)	-0.072 (0.041)	-0.072 (0.041)	-0.077 (0.041)
Foreign	-0.088* (0.037)	-0.089* (0.037)	-0.087* (0.037)	-0.087* (0.037)
Industry	-0.086** (0.019)	-0.089** (0.019)	-0.092** (0.019)	-0.09** (0.019)
Credit to GDP	0.002* (0.0008)	0.009** (0.0006)	0.0091** (0.0006)	0.009** (0.0006)
Creditor Rights	0.024 (0.013)	0.036* (0.012)	0.031* (0.012)	0.035* (0.012)
Log (GNI)	-0.044** (0.006)	-0.041** (0.007)	-0.039** (0.007)	-0.037** (0.007)
Inflation	-0.003** (0.0004)	-0.005** (0.0004)	-0.005** (0.0004)	-0.005** (0.0004)
CPI	-1.668** (0.121)			
PER_COUNT_AVER		-0.602** (0.105)		
PER_SEC			-0.644** (0.096)	
PER_SEC_SIZE				-0.465** (0.082)
R-squared	0.227	0.212	0.213	0.212
N	7774	7774	7774	7774

*Significant at 5%; **significant at 1%; standard errors in parentheses

The coefficients on corruption obstacles are negative as expected and significant at a 1 percent significance level. The coefficient on the Corruptions Perception Index is the largest in magnitude. Firms operating in a country with the highest level of corruption (the CPI index equal to one) will face loan maturity reduction by almost 167 percent or 52 months. Averaged out measures of corruption produce similar results. If again the worst severity of the reported obstacle is assumed corruption obstacles averaged out across countries, sectors and then firm sizes shorten loan maturities by 60.2, 64.4 and 46.5 percent. Smaller loan maturities suggest that when corruption is an issue banks shorten loan durations to review their lending decisions more often and restrict flexibility of borrowers in uncertain legal environments.

The estimation results suggest that large, subsidized and foreign firms are expected to pay out their debts faster. This is logical as large firms are more solid and generate stable profits, foreign firms have a chance to borrow in international debt markets to repay loans. Moreover, these firms have been found to receive discounts off the loan price which also speeds up the process. Firms operating in industrial sectors have the worst contractual terms. Not only they have to pay higher interest rates but also their loan maturities are shortened by almost 9 percent or 32 months.

As opposed to interest rates creditor rights seem to matter for loan durations. The coefficients on the Creditor Rights Indices are significant in columns (2) - (4) and are found to be positively related to loan maturity. A one standard deviation increase in creditor rights leads to around 3 percent increase in loan maturities on average. The coefficient on inflation proxying for macroeconomic instability has the expected negative sign. When banks face uncertainty they tend to shorten loan maturities to revise contract terms more frequently to offset risks. Overall, I can conclude that bank loan maturity appears to be particularly

sensitive to corruption obstacles, the level of creditor protection in a given country and the level of inflation. Strong creditor protection favors longer loan durations while high corruption obstacles and inflation tend to decreases loan maturities. Loan maturity is also found to react to several borrower characteristics.

Finally I analyze the effect of corruption obstacles on collateral requirement. Since many firms in the sample come from countries of the Socialist legal origin which rely more heavily on collateral, banks in these countries may have certain threshold values for the size of collateral that borrowing firms need to pledge (Davydenko and Franks, 2008). Since this makes it difficult to tell which part of collateral as a percent of loan value is a result of adhering to a certain threshold and which is the effect of regressors it's more meaningful to use the secured indicator – an indicator whether a loan has to be secured by collateral. Since the secured indicator is a binary variable I run a Probit model. I expect corruption obstacles to increase the likelihood that collateral will be required. Probit estimation results are presented in Table 6. In the table I report probit coefficients but to help interpreting the main findings I calculate marginal effects around the mean points for some variables of interest.

Table 6: Regressions relating collateral requirement to firm, country characteristics and corruption obstacles

Secured indicator				
Explanatory variables				
	(1)	(2)	(3)	(4)
Profit	-0.164* (0.056)	-0.162* (0.056)	-0.162* (0.056)	-0.163* (0.056)
Medium	0.114* (0.042)	0.101* (0.042)	0.106* (0.042)	0.114* (0.042)
Large	0.055 (0.049)	0.05 (0.049)	0.056 (0.049)	0.072 (0.049)
Year2004	0.1007 (0.071)	0.198* (0.072)	0.149* (0.072)	0.148* (0.072)
Year2005	0.201**	0.204**	0.203**	0.202**

	(0.039)	(0.039)	(0.039)	(0.039)
Government	-0.359** (0.065)	-0.381** (0.065)	-0.371** (0.065)	-0.369** (0.065)
Subsidy	0.061 (0.050)	0.091 (0.05)	0.079 (0.051)	0.08 (0.05)
Foreign	-0.296** (0.059)	-0.298** (0.059)	-0.298** (0.059)	-0.300** (0.059)
Industry	0.078* (0.033)	0.080* (0.032)	0.082* (0.033)	0.079* (0.032)
Credit to GDP	-0.004* (0.001)	-0.002* (0.001)	-0.002* (0.001)	-0.003* (0.001)
Creditor Rights	0.122** (0.021)	0.127** (0.021)	0.129** (0.021)	0.126** (0.021)
Log (GNI)	0.025* (0.012)	0.034* (0.012)	0.028* (0.012)	0.026* (0.012)
Inflation	0.002* (0.0007)	0.003* (0.0007)	0.0025* (0.0007)	0.002* (0.0008)
CPI	0.042 (0.216)			
PER_COUNT_AVER		1.061** (0.181)		
PER_SEC			0.625** (0.163)	
PER_SEC_SIZE				0.561** (0.143)
McFadden R-squared	0.025	0.029	0.027	0.027
N	8394	8394	8394	8394

*Significant at 5%; **significant at 1%; probit coefficients; standard errors in parentheses

Corruption obstacles except the country-level Corruption Perceptions Index variable are significant at the 1 percent significance level and enter the regressions with positive signs thus increasing the probability that banks will require collateral when granting a loan. In particular, corruption obstacles averaged out across countries, sectors and then firm sizes appear to increase the likelihood of getting a loan on a secured basis by about 26 percent. Relative to the proportion of loans that had to be secured with collaterals (80.9 percent), this is a fairly large probability, pointing that firms operating in corrupt environments face significantly less favorable access to finance than those operating in less corrupt or corrupt-free environments.

Firm specific characteristics enter the regressions as expected. Profitable, medium sized, both state and foreign-owned firms are less likely to borrow on a secured basis. Whether a firm is subsidized or not does not seem to be relevant for collateral requirement in this case. Firms operating in the industrial sector are more likely to be asked to provide collateral for a loan which is surprising as one may expect that fixed assets manufacturing or mining/quarrying firms have at their disposal can represent safe collateral. Unstable macro environment captured by inflation tends to increase the chance that collateral will be required. There is a positive association between the Creditor Rights Index and the secured indicator which is in line with the law and finance theory (La Porta, 1998). In all four regressions a one standard deviation increase in the Creditor Rights Index increases the likelihood that collateral will be required by almost 9 percent. Overall, based on the results of the Probit estimations I can conclude that banks tend to utilize collateral requirements as a tool to adjust to uncertain legal and institutional environments.

5. Conclusion

In this paper I have looked at how loan contractual terms such as interest rate, loan maturity and collateral requirement are affected by corruption obstacles. I have examined the question with a fairly large sample of firms from 32 countries that received external financing from banks or other financial institutions. The terms of loans actually made to borrowers and firms' perceptions of corruption obstacles enter the regression analysis. Using firm-level corruption perceptions may have resulted in selection problems as inherently more efficient firms may be more successful at reducing the effect of corruption obstacles on their operation, for instance, they may self-select to operate in less-corrupt sectors or deal with corruption-free third party contractors. These firms being less susceptible to corruption are likely to underestimate the effect of corruption obstacles on their businesses. To attenuate the endogeneity bias I measure corruption responses taken from the BEEPS dataset as sector-size averages of firms' responses. Additionally I use the Corruption Perception Index as an alternative measure of the overall corruption level in a given country. The results are significant and robust to using alternative corruption measures.

Access to financing and loan contractual terms are found to be very responsive to contracting environments. The estimation results support the "sand the wheels" hypothesis that points to a detrimental effect of corruption on bank lending. First, I find that access to financing reported by firms seems to be impeded if corruption obstacles are present. This finding suggests that weak legal and institutional environments where financial institutions have little or no protection against fraud, bribery, self-dealing and other types of misbehaviors induce banks to cut down credit supply and/or offer less favorable contractual terms.

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Second, I find that price and non-price loan terms set by banks respond to corruption obstacles. Banks lend on a secured basis more frequently, offer shorter maturities and charge higher interest rates in countries where firms report corruption obstacles to be a major problem for the operation and growth of their businesses. Varying loan maturities can be an especially useful contracting tool for banks when collateral is inefficient and/or banks are limited in their ability to change interest rates as they have to adhere to banking regulations set for all financial institutions.

Beyond these two important results, I find that while strong creditor rights increase loan maturities and the likelihood of providing collateral they do not seem to matter for interest rates charged on loans. My findings complement the recent work by Qian and Strahan (2007) and Weill (2009) which are one of the few works that study the effect of contracting environments on loan contractual terms on the intensive, micro margin. Overall, the paper sheds more light on the effect of corruption obstacles on bank lending and points that fighting corruption should be a crucial policy goal to enhance loan availability.

Appendix 1: Variables and Sources

Data sources:

WDI = World Development Indicators

BEEPS = Business Environment and Enterprise Performance Survey

TI = Transparency International

Variable	Definition	Original Source
Log of GNI	Logarithm of gross national income, average 2001-2003.	Private credit in 129 countries; Djankov and Shleifer (2007)
Credit to GDP	Domestic credit provided by banking sector (percent of GDP), average 2001-2003	WDI, Private credit in 129 countries; Djankov and Shleifer (2007)
Creditor Rights	An index aggregating creditor rights. The index ranges from 0 (weak creditor rights) to 4 (strong creditor rights), average from 1996 to 2002	Private credit in 129 countries; Djankov and Shleifer (2007)
Average inflation rate	Annual percentage inflation, GDP deflator, average 1999-2003	Private credit in 129 countries; Djankov and Shleifer (2007)
CPI	Corruption Perception Index at the country level. It relates to perceptions of the degree of corruption as seen by business people and country analysts, and ranges between 0 (highly clean) and 1 (highly corrupt), 2005	TI
Interest rate	What is the loan's annual cost (i.e. rate of interest)	BEEPS
Collateral	Thinking of the most recent loan you obtained from a financial institution, did the financing require	BEEPS

	collateral?	
Loan duration	What is the duration of the loan in months	BEEPS
Access to financing	How is access to financing problematic for the operation and growth of your business: 1) no obstacle, 2) minor obstacle, 3) moderate obstacle, 4) major obstacle	BEEPS
Corruption perception	How is corruption problematic for the operation and growth of your business: 1) no obstacle, 2) minor obstacle, 3) moderate obstacle, 4) major obstacle	BEEPS
Profitability	2002 - In 2001, what was the level (expressed as a per cent) of gross profits in relation to your total sales: negative or zero/positive percent 2004/2005 - No profit in 2003	BEEPS
SizeS	Dummy = 1 for small firm (between 2 and 49 employees)	BEEPS
SizeM	Dummy = 1 for medium firm (between 50 and 249 employees)	BEEPS
SizeL	Dummy = 1 for large firm (between 250 and 10000 employees)	BEEPS
Government	Dummy = 1 if a firm's largest shareholder is government	BEEPS
Foreign	Dummy = 1 if a firm's largest shareholder is a foreign company	BEEPS
Industry	Dummy = 1 if a firm's largest percentage of sales comes from Mining and quarrying; Construction; Manufacturing	BEEPS
Services	Dummy = 1 if a firm's largest percentage of sales comes from Transport storage and communication; Wholesale, retail, repairs; Real estate, renting and business services; Hotels and restaurants and other	BEEPS
Subsidized	Dummy = 1 if a firm receives subsidies from national, regional governments, EU or other sources	BEEPS

Appendix 2: Number of firms in each country

1	Country	Number of firms
2	Albania	374
3	Armenia	522
4	Azerbaijan	520
5	Belarus	575
6	Bosnia and Herzegovina	382
7	Bulgaria	550
8	Croatia	423
9	Czech Republic	611
10	Estonia	389
11	FYROM	370
12	Georgia	374
13	Hungary	860
14	Kazakhstan	835
15	Kyrgyzstan	375
16	Latvia	381
17	Lithuania	405
18	Moldova	524
19	Poland	1475
20	Romania	855
21	Russia	1107
22	Slovakia	390
23	Slovenia	411
24	Ukraine	1057
25	Turkey	1071
26	Germany	1197
27	Portugal	505
28	Greece	546
29	South Korea	598
30	Vietnam	500
31	Spain	606
32	Ireland	501

Appendix 3: Summary Statistics

	N	Mean	Median	Maximum	Minimum	Std. Dev.
Access to finance	18078	0.41	0.33	1,00	0,00	0.37
Foreign	18078	0.07	0,00	1,00	0,00	0.25
Small	18078	0.711	1,00	1,00	0,00	0.45
Medium	18078	0.17	0,00	1,00	0,00	0.38
Large	18078	0.10	0,00	1,00	0,00	0.31
Industry	18078	0.45	0,00	1,00	0,00	0.49
Service	18078	0.54	1,00	1,00	0,00	0.49
Subsidy	18078	0.089	0,00	1,00	0,00	0.285
Government	18078	0.08	0,00	1,00	0,00	0.27
Profit	18078	0.89	1,00	1,00	0,00	0.30
Creditor rights	18078	2.04	2,00	3,00	1,00	0.75
Credit to GDP	18078	47.71	36.99	140	8.21	34.74
GNI	18078	24.56	24.37	28.32	21.10	1.88
Inflation	18078	14.73	4.63	131.47	-0,01	24.21

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