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Does money buy credit?
Firm-level evidence on bribery
and bank debt



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Contents

Abstract.....	4
1 Introduction	5
2 Literature review	8
3 Data and methodology.....	10
3.1 Data and variables	10
3.2 Bribery measure	12
3.3 Empirical methodology	14
4 Results	16
4.1 Main results	16
4.2 Interactions with country-level variables	18
4.3 Robustness checks.....	21
5 Conclusion.....	22
References	25
Tables	27
Appendix A Data cleaning	37
Appendix B Definitions and sources of variables.....	38
Appendix C Regressions without firm fixed effects	39

Zuzana Fungáčová, Anna Kochanova and Laurent Weill

Does money buy credit? Firm-level evidence on bribery and bank debt

Abstract

This study examines how bribery influences bank debt ratios for a large sample of firms from 14 transition countries. We combine information on bribery practices from the BEEPS survey with firm-level accounting data from the Amadeus database. Bribery is measured by the frequency of extra unofficial payments to officials to “get things done”. We find that bribery is positively related to firms’ bank debt ratios, which provides evidence that bribing bank officials facilitates firms’ access to bank loans. This impact differs with the maturity of bank debt, as bribery contributes to higher short-term bank debt ratios but lower long-term bank debt ratios. Finally, we find that the institutional characteristics of the banking industry influence the relation between bribery and firms’ bank debt ratios. Higher levels of financial development constrain the positive effects of bribery whereas larger market shares of state-owned banks have the opposite effect. Foreign bank presence also affects the impact of bribery, albeit this effect depends on the maturity of firms’ bank-debt.

JEL Codes: G32, K4, P2

Keywords: bank lending, bribery, corruption, Eastern Europe.

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1 Introduction

Corruption is a major concern in emerging and developing countries because it influences growth, productivity, and foreign direct investment (Mauro, 1995; Wei, 2000; Méon and Weill, 2010). Since bank credit has been shown to be a driving force for growth (e.g. Levine, Loayza and Beck, 2000), a further question is whether corruption affects economic development via the micro channel of bank credit provided to firms.

In the literature we are confronted with ambiguity as regards the effects of corruption on bank credit. Based on the law and finance theory pioneered by La Porta et al. (1997), we would expect corruption to reduce bank credit. Namely, because more corruption would indicate a poorer quality of the legal institutions that protect banks and enforce contracts, corruption is likely to discourage banks from granting loans. Much empirical research supports the finding that poor law enforcement reduces bank credit; some studies relying on rule of law measures (Bae and Goyal, 2011) and others on corruption measures (Weill, 2011a).

However, in looking at the impact of corruption on firms' bank credit, one should not limit universe to judicial corruption. Corruption can also be present within the lending process, through bribing bank officials to obtain loans, as observed by Beck, Demirgüç-Kunt and Levine (2006).¹ Corruption in lending can contribute to a reduction in firms' bank debt due to the increasing cost of the loan for the borrower. In this case a bribe amounts to a tax on borrowers and so constitutes an obstacle to credit. Nevertheless, it can also contribute to an increase in firms' bank debt if the borrower takes the initiative of proposing a bribe to a bank official in order to enhance his chances of getting a loan. Weill (2011a) employs bank-level data from all over the world to show that corruption can enhance bank lending when levels of bank risk aversion associated with greater reluctance of banks to grant loans are particularly high. Chen, Liu and Su (2013) find evidence in favor of such a positive impact of corruption on access to bank credit in China as they observe a positive link between a proxy for the amount of bribes provided by the firm and the importance of firms' bank credit.

Surprisingly this single-country study is to our knowledge the only work which investigates the effect of corruption on bank credit at the firm level. Hence the literature

¹ Two cross-country studies dealing with the causes of corruption in bank lending find links between bank competition and information sharing (Barth et al., 2009), and between media ownership and concentration (Houston, Lin and Ma, 2011).

does not provide firm-level evidence to clarify the relation between bribery and bank credit. A couple of studies examine the impact of corruption on bank credit ratios at the aggregate level (e.g. Wei, 2000; Weill, 2011a), but the evidence remains absent at the firm level, which is key to examining the channels of access to bank credit.

Our investigation aims to fill this gap by analyzing the effect of bribery on firms' ratios of bank debt in transition countries. Transition countries provide an excellent opportunity to investigate the effect of bribery since corruption is still a big concern in these countries. They have thus been analyzed in many studies of corruption (e.g. Javorcik and Wei, 2009). To answer our research question, we test the impact of bribery measures on bank debt ratios computed at the firm-level for a very large sample of companies from 14 transition countries, including former communist countries of Central and Eastern Europe, but also Russia and Ukraine. This group of countries is characterized by substantial variation in terms of corruption, financial and economic development.

A major concern in analyzing the impact of bribery on bank debt ratios is to have firm-level information on both the balance sheet items and on bribery practice. As corruption is by nature a hidden phenomenon, information on bribery is generally collected on an anonymous basis in order to guarantee a better quality of responses. In such surveys, firms are nonetheless reluctant to provide accounting data that would jeopardize anonymity.

To solve this issue, we combine firm-level accounting data from the Amadeus database with firm-level data on bribery practices from the BEEPS (Business Environment and Enterprise Performance Survey) database.² Relying on the latter database, we measure bribery by the frequency of making extra unofficial payments to officials to “get things done”. We cannot directly match firms from both databases, as BEEPS information is anonymous. Therefore we proceed by computing the mean of the bribery measure for each cell defined at the intersection of five characteristics: country, survey wave of the BEEPS (three waves covering 1999–2001, 2002–2004, 2005–2007), industry (2-digit ISIC code), firm size (micro, small, medium and large firms), and location size (capital, city with population over 1 million, and others). We then assign this bribery measure to each firm-level observation from the Amadeus database belonging to the same cell.

As a consequence, we assume that all firms in the same cell face the same level of bribery. Such hypothesis is in accordance with the literature on corruption. On the one

² Kochanová (2012) adopts the same approach in her work on the impact of bribery on firm performance in transition countries.

hand, Svensson (2003) and Fisman and Svensson (2007) and others stress that bribery practices are industry- and region-specific. On the other hand, size of firms has been shown to impact bribery (e.g. Safavian, Graham and Gonzalez-Vega, 2001; Beck, Demirgüç-Kunt and Levine, 2006). Moreover, the use of the merged dataset presents the advantage of reducing endogeneity issues between bank debt and involvement in bribery of firms.

We contribute to the literature in four important respects. First, we provide the first cross-country analysis on the impact of bribery on firms' bank debt that uses micro-level data. We hence contribute to the understanding of institutional factors that influence the level of firms' bank indebtedness. While many works analyze the effect of institutional determinants on financial structure (e.g. Fan, Titman and Twite, 2012), they all use country-level variables, which suffer from aggregation when linked to firm-level financial variables.

Second, we contribute to the literature on the effects of corruption in transition countries. A large set of studies confirms the persistence and economic consequences of corruption in these countries even though cross-country differences can be observed (e.g. Shleifer and Treisman, 2004, and Weill, 2011b, on Russia). In her study dealing with the determinants of capital structure in transition countries, Jõeveer (2013) examines the impact of corruption on debt ratios. Our analysis goes a step further, as we employ a disaggregated measure of bribery and consider a broader sample of countries including Russia and Ukraine, two countries characterized by much greater corruption than CEE countries; and we use more recent data.

Third, we examine whether bribery affects differently firms' bank debt depending on its maturity. When bank credit is analyzed as a whole, the differences between short-term and long-term bank credit are not taken into account even though this may be an importance consideration. First, short-term and long-term bank credit are not subject to the same requirements by banks; more careful screening of firms occurs as regards the latter. As a consequence, the mechanisms through which corruption affects firms' bank debt can work in a different way for these two types of credit. Second, short-term bank credit is much more common than long-term bank credit for firms in transition countries (De Haas and Peeters, 2006). However long-term bank credit plays a more significant role in supporting economic growth, as it finances investment. The literature on the impacts of financial development on growth in particular refers to long-term bank credit when analyzing the role of banks as a coordinating device that allocates capital to efficient uses (Beck,

2013). Hence, it is of major interest to determine whether bribery influences short-term bank credit and long-term bank credit differently because the respective macroeconomic implications differ.

Fourth, we investigate the potential effect of bribery by looking at the interaction with institutional factors of the banking industry. Financial development can influence the impact of bribery on firms' bank debt, by easing or tightening such indebtedness. Moreover, ownership of banks can influence this relation since corruption in lending might be more or less prevalent depending on bank ownership. As a consequence, the influence of bribery on firms' bank debt may be conditional on the institutional environment of banks and hence can differ across countries.

The remainder of the paper is organized as follows. Section II reviews the literature and section III the data and the methodology. Section IV discusses the results and section V concludes.

2 Literature review

This research is related to several strands of the literature. The first broad category that relates to our analysis is the literature that investigates the connection between corruption and bank lending. These papers tend to confirm the fact that corruption influences bank lending. The empirical study by Beck, Demirgüç-Kunt and Levine (2006) employs firm-level data from 37 countries in an investigation of the relationship between bank supervisory power and the degree to which lending corruption hampers firms' ability to raise external finance. The existence of corruption in lending is confirmed by a measure provided by the World Business Environment Survey (WBES) that is used to assess the degree of corruption in lending. In a similar vein, Wei (2000) shows that corruption affects the volume and composition of capital flows to capital-importing countries. The structure of capital flows to the more corrupt countries is dominated by bank borrowing and includes relatively less FDI. Further evidence of the effects of corruption at the macro level is provided by Weill (2011a). He uses the data from over 130 countries to confirm the negative impact of corruption on bank lending, although the detrimental effect of corruption is found to be reduced when bank risk aversion increases. Goel and Hasan (2011) find that there exists a relation between corruption and bad loans at the country level.

Our study is also related to the papers that study how institutional characteristics affect firms' capital structure. Giannetti (2003) analyses data on unlisted companies from eight European countries and shows that the leverage of an individual firms is significantly and positively influenced by institutional variables such as protection of creditor rights or law enforcement. Using a dataset covering 42 countries, De Jong, Kabir and Thu Nguyen (2008) show that country-specific factors can affect corporate leverage directly as well as indirectly through their influence on firm-specific factors. They confirm a significant positive impact for institutional variables such as legal environment and protection of creditor rights. Li, Yue, Zhao (2009) study capital structure determinants of Chinese companies and find that state ownership is positively related to leverage whereas there is a negative relationship for foreign ownership. Even though many papers include in the analysis not only firm-level factors but also institutional variables, not all of them account for corruption. Fan, Titman and Twite (2012) investigate how institutional factors influence capital structure and debt maturity choices of listed firms in 39 countries. They use the Corruption Perception Index (CPI) provided by Transparency International to measure country-level corruption and find a positive relation between corruption and firms' debt, especially short-term debt. Jõeveer (2013) studies the determinants of leverage in nine Eastern European transition countries by taking into account firm-specific, institutional and macroeconomic factors. She finds some evidence that higher corruption levels (measured by CPI) boost firms' leverage ratios. Depending on the definition of leverage, she observes that the influence of corruption is either beneficial or non-significant for leverage. Nevertheless, all of these papers measure corruption at the country level and employ only broad measures of leverage i.e. they do not consider firms' bank debt ratios.

In their recent study Chen, Liu and Su (2013) analyze how corruption influences access to bank credit and the size of a bank loan for a sample of Chinese firms. They measure bribery at the firm level by the amount of entertainment and travel costs scaled by sales. They motivate this proxy variable by the fact that these costs are commonly used to reimburse all expenses used to bribe officials. Their results show that bribery is positively related to both loan size and access to bank loans, thus supporting the view that corruption contributes to bank lending.

3 Data and methodology

3.1 Data and variables

Our sample includes companies from 14 Central and Eastern European countries which are covered widely by both databases used here: Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, and Ukraine. This selection of countries is of particular interest for our research question as they have somewhat similar histories of transition to market economy, but are at the same time heterogeneous in institutional and economic development.

The primary source of firm-level data is the Amadeus database from Bureau Van Dijk, which contains financial data on companies from all European countries. It has standardized income statement and balance sheet data, and includes virtually all registered firms.³ We use three variables to measure bank debt: the ratio of short-term bank debt to total assets (*Short-Term Bank Debt*), the ratio of long-term bank debt to total assets (*Long-Term Bank Debt*), and their sum (*Total Bank Debt*). By considering these three variables, we are able to analyze the overall effect of bribery not only on firms' bank debt but also on the different maturities of that debt.

To select firm-level control variables, we follow the earlier literature on the determinants of capital structure (Li, Yue and Zhao, 2009; Fan, Titman and Twite, 2012; Jõeveer, 2013). Size is measured by the logarithm of real sales (*Size*).⁴ We expect a positive relation with firms' bank debt, as greater size is associated with lower bankruptcy risk from the bank's perspective. The ratio of tangible fixed assets to total assets indicates the tangibility of assets (*Tangibility*). A positive relation is also expected with firms' bank debt, as tangibility of assets is associated with higher collateral value, which facilitates access to bank loans. Nevertheless, the results can differ between short-term bank debt and long-term bank debt. Tangible assets are generally financed by long-term means – equity or long-term bank debt. As a consequence, firms with greater shares of tangible assets in total assets should have lower levels of short-term bank debt in their balance sheet, as they are less dependent on such debt for financing.

³ To preserve the longest available data series, we use several editions of Amadeus. Appendix A reports on some features of assembling Amadeus and on the data cleaning procedure for merging this data with the BEEPS and regression analysis.

⁴ The results, however, hardly change if we use total assets instead of sales.

Profitability is measured by the ratio of profit before tax to total assets (*Profitability*).⁵ The expected effect of profitability on bank debt is ambiguous. On the one hand, greater profitability is valued by banks in credit decisions, as it reduces bankruptcy risk and should thus be associated with higher levels of firms' bank debt. The pecking-order theory however suggests that firms prefer internal funding to bank debt for financing their activities. As a result, more profitable firms should ask for less bank debt than others. Finally we consider growth opportunities defined by the industry-level median of real sales growth (*Growth Opportunities*).⁶ We expect a negative relation for this variable, in line with the view that managers of firms with better growth opportunities aim at minimizing agency conflicts between stockholders and bondholders. Hence firms with better growth opportunities are expected to rely less on bank debt.

Macroeconomic conditions are related to the ratio of bank loans to total assets; thus, following the previous studies (e.g. Jõeveer, 2013), we include the annual growth rate of GDP per capita (*GDP Growth*) as one of the control variables in our estimations.

In addition to GDP growth, we also use three other country-level variables to examine whether the institutional environment of a country influences the relation between bribery and firms' bank debt. Financial development is measured by the ratio of private credit granted by deposit money banks and other financial institutions to GDP, from World Bank data (*Private Credit*).⁷ This variable is commonly used in cross-country studies on financial development to represent the development of financial intermediaries (e.g. Djankov, McLiesh and Shleifer, 2007). Foreign ownership of banks is measured by the asset share of foreign-owned banks, from EBRD (*Foreign Ownership*). State ownership of banks is measured by the asset share of state-owned banks, from EBRD (*State ownership*). Appendix B provides exact definitions of all the variables.

⁵ Our results are robust to other measures of profit such as operational profit/loss or net income.

⁶ We do not include the market to book value ratio, which is tested as a potential determinant in many studies of capital structure of firms, as our sample includes mainly unlisted firms.

⁷ We also use an alternative measure of financial development, the ratio of domestic credit granted to the private sector to GDP, from EBRD, which provides similar results, not reported.

3.2 Bribery measure

To measure bribery, we use the BEEPS database, compiled from a survey by the European Bank for Reconstruction and Development (EBRD) jointly with the World Bank.⁸ This database consists of a stratified random sample of anonymous firms from Central and Eastern Europe and the former Soviet Union countries. We use three waves completed in 2002, 2005 and 2008. The questionnaires are designed so that each wave covers the three preceding years. The BEEPS contains questions regarding different aspects of business environment, firms' activity, market orientation, etc. The major criticism of BEEPS is the relatively high rate of non-responses to particular questions and likelihood of perception bias in responses. To mitigate these limitations, we use the most neutral question to measure bribery, consistently formulated across the three survey waves: *"Thinking about officials, would you say the following statement is always, usually, frequently, sometimes, seldom or never true: "It is common for firms in my line of business to have to pay some irregular "additional payments/gifts" to get things done with regard to customs, taxes, licenses, regulations, services etc."* Firms' responses result in the categorical variable varying from 1 to 6. This variable we rescale to a [0, 1] measure, where higher values correspond to more frequent involvement in bribery. Although this question seems to measure bureaucratic corruption in a broad sense, we consider that it captures well bribery practices between firms and banks. This conjecture is supported by the fact that in the 2005 wave the frequency of bribing to "get things done" is positively and significantly correlated with the responses "It is necessary to make informal payments to get bank loans" to the question "If your firm did not apply for a loan, what were the main reasons". Unfortunately, the 2002 and 2008 waves do not contain similar questions.

In spite of the richness and uniqueness of the BEEPS dataset, it cannot be used alone in our research, since it does not include questions on firms' financial structures consistently formulated over waves.⁹ Therefore we use only information on bribery from the BEEPS.

⁸ The data, questionnaire, and other documentation are available at <http://www.ebrd.com/pages/research/economics/data/beeps.shtml>. Another source of these data is WBES (World Bank Enterprise Survey), available at <https://www.enterprisesurveys.org>.

⁹ The BEEPS contains a few questions related to loans. For example, the 2008 wave includes questions "At this time, does this establishment have a line of credit or a loan from a financial institution?" and "Referring only to this most recent loan or line of credit, what was its value at the time of approval?" While about 52% of firms respond positively on the first question, only 77% of them report the size of the loan. For the 2002 and 2005 waves, however, no question on the size of loans is included. Moreover, in responses for 2002 it is

To link bribery measures from the BEEPS and financial firm-level information from Amadeus, we borrow the merging approach from Kochanova (2012).¹⁰ We define cells on the intersection of the following characteristics:

1. Country.
2. Time period, corresponding to the three waves of the BEEPS: 1999–2001, 2002–2004, 2005–2007.
3. Industry: two digit ISIC rev. 3.1 industry classification.
4. Firm size: micro (1–10 workers), small (11–49 workers), medium and large (more than 50 workers) firms.
5. Location size: capital, city with population above 1 million, and all others.

We require that each cell include at least 4 observations, and we get a median cell of 6 observations, and an average cell of 8.9 observations, and the standard deviation is 7.95. For each cell we compute the mean bribery from the BEEPS and assign it to every firm-observation from Amadeus within the same cell. We thus assume that all firms from the same cell face the same local bribery level. The existing research on bureaucratic corruption justifies the use of such a merging criterion. For instance, Svensson (2003) and Fisman and Svensson (2007) argue that the levels of bribery are industry and region-specific. In our case, however, we cannot identify regions from the BEEPS and so we use the size of location in the merging criterion.¹¹ Firm size can also impact the level of bribery that affects firms. Safavian, Graham and Gonzalez-Vega (2001) show that large firms can be more vulnerable to rent-extracting officials in Russia. Beck, Demirgüç-Kunt and Levine (2006) observe a negative relation between firm size and the degree to which corruption of bank officials is considered an obstacle to the operation and growth of the business.

The final dataset consists of an unbalanced panel data for 9 years, 1999–2007, where bribery level remains constant over three time periods: 1999–2001, 2002–2004 and 2005–2007.

The use of the merged dataset for our analysis has several advantages. First, it contains rich data linking bribery and firm-level characteristics. Second, the panel structure of the data allows us to control for firm-specific unobservable characteristics and to reduce time-invariant endogeneity between firms' financial structure and bribery. Third, the brib-

not possible to separate loans obtained from private individuals and financial institutions. These changes in the questionnaire limit the analysis of the three waves together.

¹⁰ Among other papers attempting to merge the two databases see, for example, Anos-Casero and Udomsaph (2009) and Commander and Svejnar (2011).

¹¹ This criterion essentially separates capital cities from other cities and towns, since cities with population more than 1 million exist only in Russia and Ukraine.

ery measure - the averages over cells from the BEEPS - should contain less perception bias and measurement error, as they averaged out. The disadvantage of our approach is that we do not observe firm-specific bribery practices.

Descriptive statistics for all the variables are reported in Table 1. The mean values of firms' short-term and long-term bank-debt ratios are respectively 5.01% and 2.41%. As expected, long-term bank debt is lower than short-term bank debt for transition countries owing to the reluctance of banks to grant loans for long periods in these countries. As observed by Jõeveer (2013), debt ratios as a whole are much smaller in European transition countries than in developed countries, which can be largely explained by the fact that the ratios of domestic credit to GDP are substantially lower in the former countries.

Table 2 displays the frequency of observations and the mean values of bribery by country, survey wave, and firm size. Based on these statistics, a couple of insightful observations can be made regarding bribery. First, bribery varies considerably across transition countries. The mean values of bribery range from 0.06 in Slovenia to 0.38 in Russia. Second, bribery has evolved somewhat over the survey waves: mean values are respectively 0.33, 0.30, and 0.28 for the successive waves. Third, bribery is higher on average for larger firms. The mean values of bribery are 0.28 for firms with 1 to 10 employees, 0.32 for those with 11 to 49 employees, and 0.34 for those with more than 50 employees. This observation accords with the general view that bribery concerns larger more than smaller firms (e.g. Safavian, Graham and Gonzalez-Vega, 2001).

3.3 Empirical methodology

To analyze the relation between bribery and bank debt, we run panel regressions of bank debt ratios on bribery measure and the set of control variables.

$$Y_{it} = \beta \text{Bribery}_{ct-1} + \gamma X_{it-1} + \alpha_i + \mu_t + \varepsilon_{it}, \quad (1)$$

where Y_{it} is one of three types of bank debt ratios of firm i at time t : short-term debt, long-term debt or the sum of both; Bribery_{ct-1} is the average bribery level in cell c ; and X_{it-1} is the vector of control variables which in some specifications includes country-level variables and their interactions with the bribery metric. Both bribery level and control variables

are lagged by one period to reduce potential endogeneity between them and dependent variables. The term α_i captures unobserved time-invariant firm-specific characteristics potentially responsible for cross-time correlations of the residuals for a firm (e.g. management skills, type of corporate governance, etc.); it also removes all cross-country and cross-industry differences in bribery measure and accounting data. The term μ_t removes time fixed effects such as aggregate shocks or business cycles. Finally, ε_{it} is the i.i.d. random error term, satisfying the usual assumptions. Specification (1) is estimated using robust standard errors clustered at the firm level (Petersen, 2009). The main coefficient of interest is β ; a positive sign would suggest that bribery helps firms obtain external financing from banks.

The relationship between bribery practices and bank debt ratios of firms may not be straightforward to determine, since the causality between them can run in both directions. If bribery greases the wheels of obtaining external finance, then, on the one hand, more involvement in bribery can facilitate the receiving of loans from banks. On the other hand, greater availability of financing can increase firms' profits and thus enhance the ability and willingness to pay bribes. In this case one expects the coefficient β to be positive and biased upward. If bribery retards the obtaining of loans from banks due to, for example, banks' reluctance to participate in illegal activities, large scale of screening procedures or high risks to finance bad loans, then more extensive involvement in bribery decreases the loan ratios. Firms that were still able to obtain loans from banks can start to comply with rules and regulations and thus reduce their bribing activities. In this case the coefficient β should be negative and biased downward.

To overcome this endogeneity issue, we should ideally use instruments for our bribery measure. Finding the instruments, however, is not an easy task given the nature of our dataset, the extensive coverage of countries and lack of guidance from the existing literature. Nevertheless, we argue that in our settings for the empirical analysis, the endogeneity problem is greatly reduced. First, we do not observe bribing behavior of individual firms; therefore, individual willingness to bribe is unlikely to affect the results. Second, information on bribery and firm characteristics comes from different data sources. Third, we control for firm fixed effects in the regression analysis and thereby remove all unobservable time-invariant variables that can potentially contribute to reverse causality be-

tween bribery and bank debt ratios.^{12, 13} Finally, we lag the observations by one year for all the independent variables in our empirical specification, to reduce the contemporaneous reverse causality.

4 Results

This section presents the results for the impact of bribery on firms' bank debt ratios. We begin with the main estimation results and then turn to robustness checks.

4.1 Main results

Table 3 reports the estimates for our baseline models regarding the effect of bribery on firms' bank debt ratios – short-term, long-term bank debt and total. Bank debt ratios are the dependent variables. This breakdown enables us to account for the fact that bribery can have different effects on bank debt depending on the maturity.

We observe that bribery has a positive and statistically significant¹⁴ impact on the short-term bank debt ratio but a negative one on long-term bank debt ratio. If bribery level increases by 0.3 (sample average value) over time, short-term bank debt increases by 0.54%, i.e. by 11% of its sample average value (5.01%). As regards long-term debt, a similar increase in bribery level is associated with a decrease of 0.08%, which is just 3% of its sample average (2.41%). Thus the change in the short-term bank debt ratio, therefore, appears to be economically significant.

These contrasting results for short-term and long-term bank debt can be reconciled. Banks are reluctant to grant long-term loans in the context of a weak institutional framework, which can explain why long-term loans are much less common than short-term loans in emerging and developing countries. Consequently, in the presence of abundant

¹² Random effects regression analysis seems to be implausible, since it is unlikely that the α_i do not correlate with regressors. Moreover, the Hausman test rejects RE regression in favor of FE regression (results not reported here).

¹³ Appendix C presents the results for specifications that do not include firm fixed effects, but we include only country and time fixed effects (first three columns), and only country, time, industry, firm size and city size fixed effects (last three columns). This table is useful for comparison of the results from the regression with firm and time fixed effects. In the latter case, the coefficients on the bribery measure decrease in absolute value indicating the reduction in endogeneity bias.

¹⁴ In all our reported estimations the standard errors are robust to heteroskedasticity and clusters at the firm-level. We also estimate the specification (1) using bootstrapped standard errors, but they remain virtually undistinguishable from the clustered ones.

corruption, banks restrict the supply of long-term loans. Long-term loans require more careful screening of firms than do short-term loans. This difference in screening results from the fact that these types of loans are not used for the same purpose and are not associated with collateral in the same way. Long-term loans contribute to the financing of tangible assets while short-term loans are used to satisfy working capital requirements. As observed by Nguyen and Qian (2012), short-term loans are less often associated with collateral. Hence the provision of the two types of loans does not follow the same process; there is much more control and screening associated with long-term loans. As a consequence, bribing bank officials tends to increase only those bank loans that are used for short-term purposes.

It is of particular interest to observe that bribery has opposing effects on short-versus long-term firms' bank debt. This finding supports the view that the effects of bribery on firms' bank debt cannot be analyzed without taking maturity of debt into account.

Furthermore, we find a positive and significant coefficient for *Bribery* when explaining the total bank debt ratio. All in all, this result suggests that the positive effect of bribery on short-term bank debt is stronger than the negative effect on long-term bank debt. This result stems from the fact that the short-term bank debt ratio is on average much higher than the long-term bank debt ratio as confirmed by the descriptive statistics.

Thus, our main finding is the absence of an overall adverse effect of bribery on firms' bank debt. We even find that bribery can boost bank debt, which we interpret as being due to bribes given to bank officials that ease the access to short-term bank loans. Our main finding is in line with the literature, even if other studies consider different debt ratios or geographic areas. For China, Chen, Liu and Su (2013) also find that bribery at the firm-level contributes to a higher bank credit ratio (bank loans to sales). This result also supports the beneficial effect of bribery on firms' bank credit. Fan, Titman and Twite (2012) find that corruption measured at the country level is positively related to the ratio of total debt to total assets but reduces the ratio of long-term debt to total assets. As a consequence, their study suggests that corruption is particularly detrimental to long-term bank debt, in line with our results for debt maturity. Finally, Jõeveer (2013) also finds some evidence in favor of a positive impact of corruption measured at the country level on leverage ratios in transition countries. Thus the finding that bribery is not detrimental to bank debt ratio as a whole is not at odds with former empirical literature.

We now turn to the analysis of control variables. Overall we find the expected results for these variables. *Size* has a significant and positive coefficient in all the estimations, which is in accordance with the view that larger firms have easier access to bank loans. *Profitability* is significantly negative in all estimations, in line with the pecking-order theory according to which more profitable firms require less bank debt as they prefer to rely first on internal funds to satisfy their financing needs. *Growth Opportunities* is significantly negative when explaining long-term bank debt, but is positively related to short-term bank debt and total bank debt. While the result for short-term bank debt is quite unusual, the finding for long-term bank debt accords with the view that firms with better growth prospects rely less on bank debt. The estimated coefficient for *GDP Growth* is negative and significant, which is at odds with the theory. But such a result has already been found in the case of transition countries (Jõeveer, 2013).

As expected, *Tangibility* does not have the same relation with short-term and long-term bank debt. The coefficient is significantly positive for explaining the long-term bank debt ratio and total bank debt ratio. This result reflects the fact that a larger share of tangible assets in total assets enhances the collateralization value of firms and hence facilitates their access to bank loans.

The coefficient is significantly negative for the short-term bank debt ratio, which can be explained by the fact that firms with larger shares of tangible assets in their balance sheet use less short-term bank debt to finance their assets. Indeed, tangible assets are financed with equity and long-term loans. Similarly, Li, Yue and Zhao (2009) find for China a negative impact of tangibility of assets on the short-term debt ratio defined as short-term debt to total assets.

4.2 Interactions with country-level variables

Our baseline estimations indicate that bribery is positively related to short-term bank debt but negatively related to long-term bank debt. It is however not clear whether the influence of bribery depends on the institutional characteristics of the banking industry. Thus we consider three factors which are of particular interest for transition and developing countries: level of financial development, foreign bank ownership, and state bank ownership.

Financial development can influence the relation between bribery and firms' bank debt. The bribery behavior of borrowers is directly related to the ease of access to bank

debt. As a consequence, one would expect that a high level of financial development (a high ratio of bank credit to GDP), because it enables better access to financial services, would weaken the negative link between bribery and firms' bank debt. To test this hypothesis, we redo the estimations, now including a variable for financial development and its interaction with bribery. Table 4 reports the results.

The coefficient of *Private Credit* is significantly positive for all three model specifications, in line with the intuitive view that greater financial development in a country improves access to bank debt. However, the main finding is the significantly negative coefficient for the interaction term between *Private Credit* and *Bribery* in all three estimations. This result indicates that greater financial development reduces the positive influence of bribery on firms' bank debt. It is in line with the view that bribery facilitates access to bank credit when such credit is scarce.

This finding is of particular importance, as it suggests that the positive relation between bribery and firms' bank debt should not be taken for granted whatever the level of financial development. In this connection, it is of interest to compute the overall effect of bribery on firms' bank debt ratios. The overall coefficient of the bribery variable is the sum of the coefficient for *Bribery* and the coefficient for the interaction term between *Bribery* and *Private Credit* multiplied by the value of *Private Credit*. We can thus compute the thresholds of financial development measure above which the overall impact of bribery is no longer positive for the short-term bank debt and total bank debt ratios. We find that the thresholds are respectively 47.2% and 49%. The descriptive analysis of our sample shows that the mean value of the financial development variable is 41.9%, with values ranging from 2.8% to 153.1%. In other words, even if financial development is not extensive enough on average to reverse the positive relation between bribery and bank credit for our sample of countries, it can reach such levels for some countries and some time periods. This is especially important when considering the trend of increasing financial development in transition countries over time, so that one might wonder whether the positive influence of bribery on bank debt will last.

Foreign ownership of banks is a key characteristic of banking industries in transition countries. Following privatization policies in many of these countries, the market share of foreign banks is high in most of these countries, sometimes nearly 100%, as in the Czech Republic. A couple of papers show that foreign ownership could influence the access to bank debt (e.g. Clarke et al., 2006; Beck and Martinez-Peria, 2010). Therefore it is

important to take this factor into account when examining the relation between bribery and firms' bank debt. However the literature provides opposing hypotheses concerning this influence. On the one hand, a higher share for foreign banks can weaken the link between bribery and firms' bank debt. Stronger control of employees inside foreign banks and the presence of foreign managers less involved in domestic networks can weaken the impact of corruption on lending in countries with a larger foreign bank presence.¹⁵ On the other hand, foreign banks may prefer "cherry-picking behavior", which would reduce the access to bank credit for a vast number of companies, in particular the SMEs. As a consequence, such weaker access to bank credit could provide greater incentives for firm managers to bribe bank officials to get loans. Hence a greater foreign bank presence would strengthen the link between bribery and firms' bank debt.

To examine the influence of foreign ownership of banks, we add a variable for foreign ownership and an interaction term between foreign ownership and bribery in the estimations. Table 5 reports the results.

We observe that the estimated coefficient for *Foreign Ownership* is significant and positive. This finding accords with the view that foreign banks do not hamper access to bank credit but rather promote it, as shown by Clarke et al. (2006). Nevertheless, the major result in this set of estimations concerns the interaction term between *Foreign Ownership* and *Bribery*. We find that this term is not significant when explaining the short-term bank debt ratio but significantly negative for the long-term bank debt ratio and total bank debt ratio. The fact that greater foreign ownership of banks enhances the negative influence of bribery on long-term bank debt ratio is in line with the view that foreign banks would be more reluctant than domestic banks to grant long-term loans in a corrupt institutional framework. This result accords with the observation of particular care for granting long-term loans by foreign banks in transition countries. The absence of any significant influence of foreign ownership on the relation between bribery and short-term bank debt ratio can be explained by the fact that foreign banks are not influenced the same way by the institutional framework when it comes to granting short-term loans. The shorter maturity is associated with lower perceived credit risk and is thus less sensitive to a flawed legal environment.

¹⁵ Corruption scandals can also affect foreign banks in transition countries. A recent example deals with the CEO of Société Générale's Russian subsidiary Rosbank which was charged with bribery in May 2013.

State ownership is still present at various levels in transition countries. As these were all formerly communist countries, it is worth noting that they all had a fully-state-owned banking industry two decades ago. The banking industry has then gradually been handed over to private investors at different degrees depending on the country. As corruption is generally observed in public administration, state-owned banks could be more affected by bribery than other banks. Hence, having more state ownership of banks may influence the relation between bribery and firms' bank debt by strengthening the role of corruption in lending.

We test this hypothesis by adding a variable for state ownership and an interaction term between state ownership and bribery in the estimations. The results are displayed in Table 6. We find that the interaction term between *State ownership* and *Bribery* is significantly positive in all estimations. In other words, a greater presence of the state in the ownership of banks strengthens the positive impact of bribery on firms' bank debt. This result is understandable in light of the fact that greater state ownership of banks strengthens the impact of bribery on bank debt in a positive way, i.e. by fostering the bribing bank officials to get loans. We can compute the thresholds for the state ownership metric, above which the sign of the overall impact of bribery changes. The overall impact of bribery is significantly positive if the value of state ownership is respectively higher than 8.2% and 27.7% for the short-term and long-term bank debt ratio. For comparison, the mean value of state ownership variable in our sample is 15.8%.

For the rest, it is of interest to observe that the coefficient of *State ownership* is significantly negative in all estimations, which suggests that a larger share of state-owned banks reduces firms' bank debt in transition countries. This result is in line with the finding of La Porta et al. (2002) that state ownership of banks is associated with lower levels of financial development.

4.3 Robustness checks

We implement several robustness checks by varying the bribery measure and control variables.

First, we explore two alternative measures of bribery constructed as dummy variables from the original frequency of paying bribes. The first measure (*Bribery1*) is equal to one if firms report that they bribe public officials sometimes, frequently, usually, or always

to “get things done”, and zero otherwise, as in De Rosa, Gooroochurn and Gorg (2010). The second measure (*Bribery2*) is based on a wider definition of bribery: it takes the value one if firms report that they bribe public officials seldom, sometimes, frequently, usually, or always to “get things done”, and zero if never. Both of these variables only indicate the existence of bribery, not its intensity as our main measure of bribery does. The results are displayed in Table 7. We observe that the results are similar to our main results with positive coefficients when explaining short-term bank debt and total bank debt but negative coefficients when explaining long-term bank debt. Hence, these results corroborate those obtained using our main measure of bribery.

Second, we examine whether our results are robust over bribery metric. We initially computed bribery measure for cells on the intersection of different characteristics by requiring cells to contain at least 4 observations. We now redo the estimations by requiring cells to have at least 5 observations, which results in fewer observations, but greater precision in the measurement of bribery. Table 8 reports these new results. We again find that the coefficient of bribery is significantly negative for short-term and total bank debt. The only change is the lack of significance for the coefficient when explaining long-term debt, which is, however, again negative.

Third, we also run regressions with alternative control variables. We measure size by logarithm of total assets instead of logarithm of total sales and profitability by operational profit rather than the ratio of profit before taxes to assets. The results of these estimations, shown in Table 9, confirm the negative influence of bribery on the short-term and total bank debt ratio, but also the positive link with long-term bank debt.

Fourth, we redo estimations by excluding from the sample two highly corrupt countries, Russian and Ukraine. As Table 10 demonstrates, the coefficients on bribery remain significant and with the same sign. Our selection for countries, therefore, does not drive the main results.

5 Conclusion

This paper examines the impact of bribery on firms’ bank debt ratios. To this end, we combine financial firm-level data with responses on bribery practices from a survey on a large sample of firms from transition countries. Our analysis yields three important results.

First, we find that bribery contributes to an increase in firms' bank debt ratios. A higher degree of bribery would hence on average not be detrimental but rather beneficial for firms' bank debt in transition countries. Bribery would encourage bank lending through bribes given to bank officials and would favor access to bank debt.

Second, the effects of bribery on firms' bank debt ratios differ with the maturity. While bribery contributes to increased short-term bank debt, it hampers long-term bank debt. We interpret this latter result as indicative of banks being more reluctant to grant long-term loans in the presence of a very corrupt environment. Long-term bank loans are less common and more tightly monitored inside banks than are short-term bank loans. The decision to provide such loans can thus be more strongly influenced by the institutional framework through the protection of creditors and the enforcement of loan contracts.

Third, institutional factors of the banking industry turn out to play a significant role in determining the impact of bribery on firms' bank debt ratios. A higher level of financial development reduces the positive impact of bribery on firms' bank debt ratios. This result accords with the view that bribery facilitates easier access to bank credit when the latter is a rare resource. In contrast, a higher market share of state-owned banks strengthens the positive relation between bribery and firms' bank debt ratios. This finding is consistent with the view that state-owned banks are expected to be more readily affected by bribery than other banks, and as a consequence the positive impact of bribery on the ease of access to bank credit would be strengthened in the presence of greater state ownership of banks. Finally, the presence of foreign banks reinforces the negative effect of bribery on long-term bank debt. Thus, greater foreign bank ownership is not univocal in its influence on the link between bribery and bank debt.

Our main conclusion of a positive relation between bribery and firms' bank debt may at first glance appear inconsistent with the literature on corruption, as this strand of literature generally finds a detrimental economic role for corruption. However, the impact of corruption on firms' bank debt has been largely ignored in the literature, and hence our conclusion is not at odds with the few studies that are related to ours. Chen, Liu and Su (2013) also find a positive influence of bribery on the bank credit ratio in China. Studies on the determinants of capital structure considering corruption do not find a negative influence on leverage ratios in which debt is considered as a whole (Fan, Titman and Twite, 2012; Jõeveer, 2013).

In terms of policy implications, we contribute to a better understanding of how bribery shapes firms' bank debt ratios. We argue that fighting corruption will not contribute to better access to bank credit in all situations. However we do not support the view that countries may benefit from letting corruption grow in order to boost bank debt ratios. Even though the average effect of bribery is positive, the impact of bribery is negative for long-term bank debt, which is the major source of the kind of bank finance that contributes to growth, as it finances investments. Moreover, the effect of bribery on firms' bank debt ratios is conditional on the institutional factors of the banking industry. A high level of financial development can clearly reverse the positive impact of bribery on firms' bank debt. As a consequence, any policy targeting greater bank debt ratios by reducing corruption should be informed by the targeted type of debt and the institutional framework of the banking industry.

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Tables

Table 1 Descriptive statistics

This table presents means and standard deviations of the main variables used in the estimations. Definitions of the variables are given in Appendix B.

Variable	Mean	Std Dev.
Short-Term Bank Debt	5.01	13.49
Long-Term Bank Debt	2.41	9.93
Total Bank Debt	7.42	16.90
Bribery	0.30	0.14
Size	4.42	2.17
Profitability	7.98	33.56
Tangibility	26.71	27.43
Growth opportunities	2.97	15.02
Private credit	41.92	30.67
Foreign ownership	58.82	31.17
State ownership	15.95	18.93
GDP growth	5.50	3.19

Table 2 Frequencies and mean values of bribery levels

This table reports frequency of observations, mean and standard deviation of bribery measure, short-term and long-term bank debts by country, survey wave, and firm size.

	Frequency (%)	Bribery		Short-Term Bank Debt (%)		Long-Term Bank Debt (%)	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Country							
Bulgaria	4.61	0.30	0.15	4.12	11.91	8.25	18.97
Croatia	3.86	0.22	0.10	9.07	15.76	8.61	15.74
Czech Republic	3.36	0.17	0.10	4.55	10.77	5.44	15.04
Estonia	2.53	0.15	0.08	7.35	14.60	7.14	15.44
Hungary	0.10	0.13	0.11	10.29	14.48	3.91	7.96
Latvia	0.65	0.17	0.10	11.27	15.22	13.50	19.17
Lithuania	0.34	0.22	0.16	5.68	10.42	10.49	16.91
Poland	2.29	0.14	0.09	7.56	10.71	4.82	9.84
Romania	28.56	0.27	0.13	0.78	4.71	0.27	2.93
Russia	22.34	0.38	0.12	8.80	18.26	2.89	11.63
Serbia	5.41	0.35	0.16	10.85	17.55	2.46	8.55
Slovakia	0.42	0.23	0.11	5.10	9.53	5.63	11.35
Slovenia	0.30	0.06	0.06	11.07	14.31	10.88	15.47
Ukraine	25.25	0.30	0.11	4.07	12.84	0.73	5.64
Years							
1999–2001	12.21	0.33	0.15	3.93	10.63	2.24	9.37
2002–2004	39.87	0.30	0.15	4.34	12.82	1.82	8.85
2005–2007	47.92	0.28	0.11	5.84	14.59	2.94	10.86
Firm size							
1–10 empl	60.08	0.28	0.13	3.75	12.36	1.77	9.00
11–49 empl	26.46	0.32	0.13	5.93	14.35	2.88	10.69
50+ empl	13.46	0.34	0.15	8.84	15.54	4.32	11.88

Table 3 Main estimations

Panel estimations with firm fixed effects and time fixed effects. Dependent variable is firms' bank debt ratio reported at the top of each column. Definitions of the variables are given in Appendix B. Explanatory variables are lagged one period. Standard errors (in parentheses) are robust to heteroskedasticity and clustered at firm level. *, **, *** denote significant difference from 0 at 10%, 5% or 1% level.

	Short-Term Bank Debt	Long-Term Bank Debt	Total Bank Debt
Bribery	1.813*** (0.106)	-0.272*** (0.079)	1.738*** (0.130)
Size	0.217*** (0.019)	0.207*** (0.012)	0.415*** (0.022)
Profitability	-0.004*** (0.000)	-0.001*** (0.000)	-0.006*** (0.000)
Tangibility	-0.006*** (0.001)	0.011*** (0.001)	0.007*** (0.001)
Growth Opportunities	0.002*** (0.001)	-0.001*** (0.000)	0.002*** (0.001)
GDP Growth	-0.187*** (0.005)	-0.069*** (0.003)	-0.261*** (0.005)
No. of observations	1 756 393	1 782 913	1 712 626
No. of firms	660 053	665 427	650 100
R2 overall	0.024	0.032	0.054

Table 4 The impact of financial development

Panel estimations with firm fixed effects and time fixed effects. Dependent variable is firms' bank debt ratio reported at the top of each column. The data on Private Credit is not available for Serbia. Definitions of the variables are given in Appendix B. Explanatory variables are lagged one period. Standard errors (reported in parentheses) are robust to heteroskedasticity and clustered at firm level. *, **, *** denote significant difference from 0 at the 10%, 5% or 1% level.

	Short-Term Bank Debt	Long-Term Bank Debt	Total Bank Debt
Bribery	2.643*** (0.154)	0.168 (0.109)	2.207*** (0.189)
Bribery×Private Credit	-0.056*** (0.005)	-0.031*** (0.004)	-0.045*** (0.007)
Private Credit	0.051*** (0.002)	0.024*** (0.002)	0.084*** (0.003)
Size	0.234*** (0.019)	0.171*** (0.012)	0.396*** (0.023)
Profitability	-0.004*** (0.000)	-0.001*** (0.000)	-0.005*** (0.000)
Tangibility	-0.007*** (0.001)	0.010*** (0.001)	0.004*** (0.001)
Growth Opportunities	-0.028*** (0.001)	-0.012*** (0.001)	-0.039*** (0.001)
GDP Growth	-0.192*** (0.005)	-0.077*** (0.003)	-0.277*** (0.006)
No. of observations	1 685 018	1 711 538	1 641 251
No. of firms	651 530	656 904	641 577
R2 overall	0.012	0.050	0.050

Table 5 The impact of foreign ownership

Panel estimations with firm fixed effects and time fixed effects. Dependent variable is firms' bank debt ratio reported at the top of each column. Definitions of the variables are given in Appendix B. Explanatory variables are lagged one period. Standard errors (in parentheses) are robust to heteroskedasticity and clustered at firm level. *, **, *** denote significant difference from 0 at the 10%, 5% or 1% level.

	Short-Term Bank Debt	Long-Term Bank Debt	Total Bank Debt
Bribery	1.907*** (0.193)	0.323** (0.137)	2.424*** (0.226)
Bribery×Foreign Ownership	0.001 (0.004)	-0.017*** (0.003)	-0.014*** (0.005)
Foreign Ownership	0.046*** (0.002)	0.013*** (0.002)	0.072*** (0.003)
Size	0.220*** (0.019)	0.205*** (0.012)	0.418*** (0.022)
Profitability	-0.004*** (0.000)	-0.001*** (0.000)	-0.005*** (0.000)
Tangibility	-0.006*** (0.001)	0.011*** (0.001)	0.007*** (0.001)
Growth Opportunities	-0.005*** (0.001)	-0.003*** (0.000)	-0.008*** (0.001)
GDP Growth	-0.169*** (0.005)	-0.070*** (0.003)	-0.237*** (0.005)
No. of observations	1 756 393	1 782 913	1 712 626
No. of firms	660 053	665 427	650 100
R2 overall	0.001	0.040	0.016

Table 6 The impact of state ownership

Panel estimations with firm fixed effects and time fixed effects. Dependent variable is firms' bank debt ratio reported at the top of each column. Data on State Ownership are not available for Russia. Definitions of the variables are given in Appendix B. Explanatory variables are lagged one period. Standard errors (in parentheses) are robust to heteroskedasticity and clustered at firm level. *, **, *** denote significant difference from 0 at the 10%, 5% or 1% level.

	Short-Term Bank Debt	Long-Term Bank Debt	Total Bank Debt
Bribery	-0.992*** (0.143)	-1.913*** (0.130)	-2.682*** (0.184)
Bribery×State Ownership	0.121*** (0.005)	0.069*** (0.004)	0.189*** (0.006)
State Ownership	-0.024*** (0.002)	-0.010*** (0.001)	-0.032*** (0.002)
Size	0.263*** (0.019)	0.245*** (0.012)	0.505*** (0.023)
Profitability	-0.003*** (0.000)	-0.001*** (0.000)	-0.004*** (0.000)
Tangibility	-0.002** (0.001)	0.012*** (0.001)	0.012*** (0.001)
Growth Opportunities	0.010*** (0.001)	0.000 (0.000)	0.011*** (0.001)
GDP Growth	-0.140*** (0.005)	-0.069*** (0.004)	-0.213*** (0.006)
No. of observations	1 371 406	1 395 451	1 330 042
No. of firms	471 930	475 909	463 306
R2 overall	0.022	0.040	0.059

Table 7 Robustness check: Other bribery measures

Panel estimations with firm fixed effects and time fixed effects. Dependent variable is firms' bank debt ratio reported at the top of each column. Definitions of the variables are given in Appendix B. Explanatory variables are lagged one period. Standard errors (in parentheses) are robust to heteroskedasticity and clustered at firm level. *, **, *** denote significant difference from 0 at the 10%, 5% or 1% level.

	Short-Term Bank Debt	Long-Term Bank Debt	Total Bank Debt	Short-Term Bank Debt	Long-Term Bank Debt	Total Bank Debt
Bribery1	0.372*** (0.063)	-0.455*** (0.050)	0.022 (0.078)			
Bribery2				0.956*** (0.068)	-0.087 (0.057)	1.024*** (0.087)
Size	0.222*** (0.019)	0.210*** (0.012)	0.423*** (0.022)	0.220*** (0.019)	0.207*** (0.012)	0.418*** (0.022)
Profitability	-0.004*** (0.000)	-0.001*** (0.000)	-0.006*** (0.000)	-0.004*** (0.000)	-0.001*** (0.000)	-0.006*** (0.000)
Tangibility	-0.006*** (0.001)	0.011*** (0.001)	0.007*** (0.001)	-0.006*** (0.001)	0.011*** (0.001)	0.007*** (0.001)
Growth Opportunities	0.002*** (0.001)	-0.002*** (0.000)	0.002** (0.001)	0.002*** (0.001)	-0.001*** (0.000)	0.002*** (0.001)
GDP Growth	-0.188*** (0.005)	-0.073*** (0.003)	-0.265*** (0.005)	-0.187*** (0.005)	-0.069*** (0.003)	-0.260*** (0.005)
No. of obs.	1 756 393	1 782 913	1 712 626	1 756 393	1 782 913	1 712 626
No. of firms	660 053	665 427	650 100	660 053	665 427	650 100
R2 overall	0.021	0.032	0.052	0.024	0.031	0.055

Table 8 Robustness check: Different number of observations in a cell for the bribery measure

Panel estimations with firm fixed effects and time fixed effects. Dependent variable is firms' bank debt ratio reported at the top of each column. Number of observations in a cell for the Bribery measure is as least 5. Definitions of the variables are given in Appendix B. Explanatory variables are lagged one period. Standard errors (in parentheses) are robust to heteroskedasticity and clustered at firm level. *, **, *** denote significant difference from 0 at the 10%, 5% or 1% level.

	Short-Term Bank Debt	Long-Term Bank Debt	Total Bank Debt
Bribery	1.741*** (0.122)	-0.108 (0.080)	1.842*** (0.143)
Size	0.233*** (0.021)	0.182*** (0.012)	0.410*** (0.023)
Profitability	-0.004*** (0.000)	-0.001*** (0.000)	-0.005*** (0.000)
Tangibility	-0.006*** (0.001)	0.009*** (0.001)	0.004*** (0.001)
Growth Opportunities	0.001 (0.001)	-0.002*** (0.000)	0.001 (0.001)
GDP Growth	-0.191*** (0.005)	-0.062*** (0.003)	-0.259*** (0.006)
No. of observations	1 514 048	1 542 830	1 474 877
No. of firms	590 441	595 674	581 358
R2 overall	0.026	0.031	0.055

Table 9 Robustness check: Alternative control variables

Panel estimations with firm fixed effects and time fixed effects. Dependent variable is firms' bank debt ratio reported at the top of each column. Definitions of the variables are given in Appendix B. Explanatory variables are lagged one period. Standard errors (in parentheses) are robust to heteroskedasticity and clustered at firm level. *, **, *** denote significant difference from 0 at the 10%, 5% or 1% level.

	Short-Term Bank Debt	Long-Term Bank Debt	Total Bank Debt	Short-Term Bank Debt	Long-Term Bank Debt	Total Bank Debt
Bribery	1.867*** (0.107)	-0.330*** (0.079)	1.744*** (0.130)	1.824*** (0.106)	-0.272*** (0.079)	1.751*** (0.130)
Size (log total assets)	-0.083*** (0.022)	0.368*** (0.014)	0.316*** (0.025)			
Size (log sales)				0.203*** (0.019)	0.202*** (0.012)	0.396*** (0.022)
Profitability (operational profit/loss)				-0.002*** (0.000)	-0.001*** (0.000)	-0.003*** (0.000)
Profitability (profit/loss before tax)	-0.003*** (0.000)	-0.001*** (0.000)	-0.005*** (0.000)			
Tangibility	-0.006*** (0.001)	0.010*** (0.001)	0.006*** (0.001)	-0.005*** (0.001)	0.011*** (0.001)	0.007*** (0.001)
Growth Opportunities	0.003*** (0.001)	-0.002*** (0.000)	0.003*** (0.001)	0.002*** (0.001)	-0.001*** (0.000)	0.002*** (0.001)
GDP Growth	-0.186*** (0.005)	-0.069*** (0.003)	-0.260*** (0.005)	-0.188*** (0.005)	-0.069*** (0.003)	-0.261*** (0.005)
No. of observations	1 756 394	1 782 914	1 712 627	1 757 202	1 783 873	1 713 149
No. of firms	660 054	665 428	650 101	660 484	665 797	650 359
R2 overall	0.001	0.044	0.056	0.022	0.031	0.052

Table 10 Robustness check: Sample restriction

Panel estimations with firm fixed effects and time fixed effects, without Russia and Ukraine. Dependent variable is firms' bank debt ratio reported at the top of each column. Definitions of the variables are given in Appendix B. Explanatory variables are lagged one period. Standard errors (in parentheses) are robust to heteroskedasticity and clustered at firm level. *, **, *** denote significant difference from 0 at the 10%, 5% or 1% level.

	Short-Term Bank Debt	Long-Term Bank Debt	Total Bank Debt
Bribery	2.041*** (0.132)	-0.591*** (0.112)	1.873*** (0.177)
Size	0.019 (0.027)	0.257*** (0.021)	0.280*** (0.034)
Profitability	-0.002*** (0.000)	-0.001*** (0.000)	-0.003*** (0.000)
Tangibility	-0.002*** (0.001)	0.015*** (0.001)	0.014*** (0.001)
Growth Opportunities	0.016*** (0.001)	0.003*** (0.000)	0.018*** (0.001)
GDP Growth	-0.290*** (0.009)	-0.176*** (0.007)	-0.463*** (0.012)
No of observations	914 140	961 080	897 629
No of firms	325 880	334 493	322 252
R2 overall	0.014	0.038	0.050

Appendix A Data cleaning

The Amadeus database treats exit of “shut down” firms in a specific way. If a firm exits or stops reporting data, this firm is kept in the database for four years (with empty values of variables) and is excluded from the database afterwards. In 2010 edition of Amadeus, for example, firms that exited in 2006 or before are not included. To preserve the longest available data series, we therefore use several editions of Amadeus: November 2010, May 2010 and June 2007 downloaded from the WRDS, and August 2003 DVD update from Bureau of van Dijk.

In order to reduce potential selection bias and measurement errors, to deal with severe outliers, and to provide a better comparison of firms across CEE countries, we proceed with the following data cleaning:¹⁶

1. remove firms with data from consolidated statements, to avoid double counting of firms or subsidiaries and duplicates; include observations for which financial information is reported for a 12 month period;
2. transform all industry codes to ISIC rev. 3.1, to align the BEEPS and Amadeus, and remove firms that do not report industry codes;
3. convert firm size measure (operational revenue) into US dollars using period average exchange rates from the IMF, and deflate to 2000 constant prices using countries' GDP deflators;
4. remove observations where three types of leverage or tangibility are either negative or greater than 100;
5. remove severe outliers: 1st and 99th percentiles of distribution of yearly changes in real operational revenue, total assets and number of employees for each country and 2–digit industry code. If an outlier is at the start or end of the time span for a firm, then only the first or last observation is removed. If the outlier is in the middle of the time period, the whole firm is removed.
6. remove severe outliers: 1st and 99th percentiles of distribution of return on assets for each country, 2–digit industry code, and year. If an outlier is at the start or end of the time span for a firm, then only the first or last observation is removed. If the outlier is in the middle of the time period, the whole firm is removed.

¹⁶ Data cleaning follows other research that uses the Amadeus database (e.g. Klapper, Laeven and Rajan, 2006; Anos-Casero and Udomsaph, 2009).

Appendix B Definitions and sources of variables

Name	Definition and source
Short-Term Bank Debt	Short-term loans (i.e. bank debt obligations remain outstanding up to one year) divided by total assets and multiplied by 100. Source: Amadeus.
Long-Term Bank Debt	Long-term loans (i.e. bank debt obligations remain outstanding more than one year) divided by total assets and multiplied by 100. Source: Amadeus.
Total Bank Debt	The sum of the Short-Term and Long-Term Bank Debt. Source: Amadeus.
Bribery	Bribery level, computed as the average frequency to bribe to “get things done” within country – time period – industry – firm size – location size cells. Rescaled to [0, 1] variable. Higher values stand for higher bribery. Source: BEEPS.
Bribery 1	Dummy variable equal to one if firms report that they bribe public officials sometimes, frequently, usually, or always to “get things done”, and zero otherwise. Source: BEEPS.
Bribery 2	Dummy variable equal to one if firms report that they bribe public officials seldom, sometimes, frequently, usually, or always to “get things done”, and zero if never. Source: BEEPS.
Size	Firm size is the logarithm of real (in US dollars 2000) sales (operational revenue). Source: Amadeus.
Profitability	Profit/loss before taxes divided by total assets (return on assets) and multiplied by 100. Source: Amadeus.
Tangibility	Tangible fixed assets divided by total assets and multiplied by 100. Source: Amadeus.
Growth Opportunities	Industry-level median of real sales growth. Source: Amadeus.
Private Credit	Private credit by deposit money banks and other financial institutions in percent to GDP. Source: World Development Indicators, World Bank.
Foreign Ownership	Asset share of foreign owned banks in percent is the foreign ownership defined as banks with assets of foreign ownership > 50%. Source: Structural change indicators, EBRD Banking Survey.
State Ownership	Asset share of state owned banks in percent. The state includes the federal, regional and municipal levels, as well as the state property fund and the state pension fund. State-owned banks are defined as banks with state ownership exceeding 50%. Source: Structural change indicators, EBRD Banking Survey.
GDP Growth	GDP per capita growth (annual %). Source: World Development Indicators, World Bank.

Appendix C Regressions without firm fixed effects

This table reports the results from estimation of specification (1) without firm fixed effects. In columns (I)–(III) only country and time fixed effects are included, in columns (IV–VI) country, industry, firm size, city size and time fixed effects are included. Dependent variable is firms' bank debt ratio reported at the top of each column. Definitions of the variables are given in Appendix B. Explanatory variables are lagged one period. Standard errors (in parentheses) are robust to heteroskedasticity and clustered at firm level. *, **, *** denote significant difference from 0 at the 10%, 5% or 1% level.

	Short-Term Bank Debt	Long-Term Bank Debt	Total Bank Debt	Short-Term Bank Debt	Long-Term Bank Debt	Total Bank Debt
	Country and Time FE			Country, Time, Industry and City FE		
Bribery	1.154*** (0.100)	-0.564*** (0.069)	0.760*** (0.123)	2.142*** (0.109)	-0.359*** (0.076)	1.921*** (0.135)
Size	0.797*** (0.008)	0.386*** (0.006)	1.173*** (0.010)	0.713*** (0.009)	0.370*** (0.006)	1.075*** (0.011)
Profitability	-0.025*** (0.000)	-0.009*** (0.000)	-0.035*** (0.000)	-0.024*** (0.000)	-0.009*** (0.000)	-0.032*** (0.000)
Tangibility	-0.006*** (0.000)	0.035*** (0.000)	0.030*** (0.001)	-0.005*** (0.001)	0.033*** (0.000)	0.029*** (0.001)
Growth Opportunities	-0.009*** (0.001)	-0.002*** (0.000)	-0.008*** (0.001)	0.002** (0.001)	0.003*** (0.000)	0.006*** (0.001)
GDP Growth	-0.165*** (0.005)	-0.115*** (0.004)	-0.282*** (0.007)	-0.197*** (0.005)	-0.122*** (0.004)	-0.322*** (0.007)
N observations	1 756 393	1 782 913	1 712 626	1 756 393	1 782 913	1 712 626
R2 adjusted	0.081	0.095	0.131	0.094	0.097	0.144

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