

FIRM AND COUNTRY DETERMINANTS OF DEBT MATURITY. NEW INTERNATIONAL EVIDENCE

This paper shows the influence of firm- and country-level determinants on debt maturity structure for 39 countries during the period 1995-2012. Efficiency of the legal system, protection of creditors' rights and bank concentration show a positive relationship with debt maturity, while the weight of banks in the economy has a negative effect on firm debt maturity. The positive influence of bank concentration on corporate debt maturity reveals that creditors are more likely to extend debt maturity when the bank credit market is concentrated. This positive effect of bank concentration is reduced in high quality institutional environments. Moreover, the effects of bank concentration and the weight of banks in the economy on corporate debt maturity are higher in smaller firms.

1. INTRODUCTION

Studies on firm capital structure have recently focused on the influences of institutional and legal features on the amount of debt financing. The literature on capital structure has analysed the influence of investor protection and institutions and has revealed that institutional factors play an important role in the choice of capital structure. Empirical studies show, for instance, that better protection of creditors increases the availability of debt by reducing adverse selection and the moral hazard problems of debt (Giannetti, 2003; Qian and Strahan, 2007), while stronger protection of property rights favours increased use of equity over debt (González and González, 2008).

Previous studies show the existence of differences in debt maturity among countries. Barclay and Smith (1995) report a percentage of total long-term debt of around 70% for their sample of US listed firms, while Antoniou *et al.* (2006) show that the long-term debt ratio of French, German and UK listed firms is around 59%, 53% and 46%, respectively. Demirgüç-Kunt and Maksimovic (1999) and Fan *et al.* (2012) reveal that firms in developing countries use less long-term debt as a proportion of total debt and that this difference cannot be explained by the maturity of assets. Figure 1 represents the average ratio of long-term debt to total debt among the countries included in our sample. Debt maturity can be seen to vary widely among countries, as the average percentage of long-term debt for firms in the USA or Norway is more than twice the percentage for firms in Thailand, South Korea, Taiwan or Turkey. These differences in financing patterns across countries may be addressed by differences in the legal and institutional environment across countries.

FIGURE 1 ABOUT HERE

Despite these differences in debt maturity among countries, the financial literature has focused less on the institutional determinants of debt maturity and the differences in firm-

specific determinants among countries. Demirgüç-Kunt and Maksimovic (1999) and Fan *et al.* (2012) examine how the institutional environment influences the capital structure and debt maturity choices of firms. They find that corruption, the efficiency of the legal system, the level of the activity of the stock market and the size of the banking sector explain a significant portion of the variation in debt maturity ratios.

Within this context, the present paper examines how institutional and banking environments affect the choice of debt maturity made by firms in a sample of 39 countries in the period 1995-2012. Our paper makes several important contributions to the literature. First, we analyse the firm-level determinants of debt maturity and the way in which observed differences in institutional and legal environments and banking structures across countries affect the debt maturity choice of firms within an international context. The influence of legal and institutional environments has also been analysed by Demirgüç-Kunt and Maksimovic (1999) and Fan *et al.* (2012). However, we not only exploit the variation over time of the firm and country variables¹, but also consider another aspect, bank concentration, not considered in the aforementioned papers. Petersen and Rajan (1995) reveal that creditors are more likely to finance credit-constrained firms when credit markets are concentrated because it is easier for these creditors to internalize the benefits of assisting the firms. Similarly, González and González (2008) show that leverage increases with increasing bank concentration. The existence of a positive relationship between bank concentration and credit is in line with the idea that relationship banking is useful to reduce information asymmetries. Bank concentration can also affect debt maturity, as the effect on leverage could be stronger in long-term debt. Our results suggest that bank concentration lengthens the maturity of firm debt. This finding is consistent with the evidence of greater financial constraints for US small firms in less concentrated credit markets (Petersen and Rajan, 1995).

¹ Demirgüç-Kunt and Maksimovic (1999) rely on cross-sectional analysis across countries, taking the time-series country means of each variable as observations.

Second, we also study the complementary or substitutive role of bank concentration and the quality of the institutional environment. La Porta *et al.* (1997, 1998) state that long-term relationships may be promoted between banks and debtors in markets with low levels of legal protection of property and creditors' rights. Both institutional quality and bank concentration are mechanisms for reducing agency costs and information asymmetries. Bank concentration in countries with a low protection of rights may favour long-term relationships between lenders and debtors and have a positive effect on corporate debt maturity, substituting good legal protection of rights.

Finally, we consider how results vary depending on firm size, as evidence has highlighted the importance of this variable. For instance, Giannetti (2003) has shown that the effect of institutional variables on the use of debt depends on firm size in a sample of listed and unlisted companies in eight European countries. Figure 2 shows the average ratio of long-term debt to total debt for our sample during the period 1995-2012, considering large and small firms separately for each country. Large firms can be seen to report higher ratios of long-term debt to total liabilities than small firms. Consequently, we analyse whether the differences in financing patterns according to firm size may reflect differences in access to financial markets and institutions even within the same economy. Specifically, we focus our analysis on the role played by the banking structure according to firm size, as bank preferences and bank concentration may have a greater effect on smaller firms, because these firms are more dependent on bank financing.

FIGURE 2 ABOUT HERE

Our results indicate that legal enforcement, protection of creditors' rights and bank concentration lengthen the maturity of corporate debt, while the size of the banking system favours the use of short-term debt. The effect of bank concentration is particularly evident in countries with low institutional quality, in line with the substitutive role of institutional quality

and bank concentration in reducing agency costs and information asymmetries. The results also reveal that bank concentration and the weight of banks in the financing of the private sector have a greater effect on debt maturity in smaller firms.

The remainder of this paper is organized as follows. Section 2 discusses the influence of the legal and institutional environment and the structure of the banking system over firm debt maturity. Section 3 describes the data sources and variables used in the study. Section 4 presents the empirical results. Finally, Section 5 provides the conclusions.

2. THEORETICAL BACKGROUND AND HYPOTHESES

Access to external financing will depend partly on the legal and institutional features of the country, seeing as these provide the mechanisms for monitoring and enforcing financial contracts. Empirical papers including legal and institutional variables in the analysis provide clear evidence regarding the relevance of these country variables with respect to the use of debt (Giannetti, 2003; Qian and Strahan, 2007; González and González, 2008; Bae and Goyal, 2009; Fan *et al.*, 2012). We know less, however, about the effect of legal and institutional features on debt maturity, although important differences can be observed in debt maturity among countries. Legal and institutional features influence debt structure because lenders need to assess not only the credit quality of borrowers, but also the inherent risks of the legal and institutional system.

Debt maturity may influence the possibility for firms to defraud creditors. Shorter maturities reduce the period during which an opportunistic firm can exploit its creditors without falling in default (Diamond, 1991, 1993; Rajan, 1992). The use of financial instruments that allow insiders less discretion will be more common in poor contracting environments. In this context, a positive relationship can be expected between the efficiency of the legal system and the protection of property rights and the percentage of long-term debt. Using a proxy of the

country's corruption, Fan *et al.* (2012) show that weaker legal systems are associated with shorter maturity debt contracts, as short-term debt allows insiders less discretion.

Several papers have shown that the protection of creditors' rights has a significant influence on the amount and the cost of debt (Giannetti, 2003; Qian and Strahan, 2007). When creditors' rights are better protected, they will be more likely to force repayment and gain control in the event of bankruptcy. This consequently reduces risk and will exert an *ex ante* influence on the terms of the credit. It may additionally reduce moral hazard problems, as it entails reductions in the incentives for borrowers to engage in excessive risk taking and asset substitution. Consequently, we would expect a direct relation between the protection of creditor rights and corporate debt maturity. Fan *et al.* (2012) reveal that the existence of an explicit bankruptcy code is related to greater use of long-term debt.

Financial intermediaries directly influence corporate financial structure. Demirgüç-Kunt and Maksimovic (1999) also stress that short-term debt allows banks to use their advantages in monitoring borrowers. Short-term debt forces lenders to monitor corporate performance more frequently and enables the bank to change the terms of contract or not to renew the loan (Diamond, 1991; Rajan, 1992). In this context, Fan *et al.* (2012) report a negative effect of the weight of banks in the economy on debt maturity as a consequence of bank preferences for short-term debt. We posit that this effect will be greater in smaller firms, as large firms have better access to domestic and international markets and are therefore usually less dependent on domestic bank credit. Smaller firms will be more affected by bank preferences as they have more financing constraints. Consequently, our first hypothesis is stated as follows:

H1. The weight of banks in the financing of the private sector will have a higher negative relationship with corporate debt maturity in smaller firms than in larger firms.

The banking literature suggests two potential effects of bank concentration on firm leverage. In a market without asymmetric information, there will be a negative relationship between bank concentration and a firm's leverage, as higher bank market power results in a higher price for debt and less credit availability. However, in markets with asymmetric information, higher bank market concentration may increase the incentives of banks to invest in the acquisition of soft information by establishing close relationships with borrowers over time. This will lead to a higher availability of credit, thus reducing corporate financial constraints (Boot, 2000; Dell'Ariccia and Marquez, 2004). The importance of bank concentration has been argued by Petersen and Rajan (1995). These authors show that US firms in less concentrated credit markets are subject to greater financial constraints. The existence of a positive relationship between bank concentration and credit availability is in line with the fact that relationship banking serves to mitigate information asymmetries and agency costs between creditors and debtors. La Porta *et al.* (1997, 1998) argue that long-term relationships between banks and debtors may be promoted in countries where the protection of rights is low. Bank concentration and institutional quality allow agency costs and information asymmetries to be reduced. Given that information asymmetries are greater in long-term debt and in small firms (Fama and French, 2002; Frank and Goyal, 2003), the positive effect of bank concentration on leverage could be concentrated in long-term debt, in small firms and in countries with low levels of institutional quality. Our second hypothesis is thus threefold:

H2a. Bank concentration will have a positive relationship with corporate debt maturity.

H2b. The positive effect of bank concentration on corporate debt maturity will be greater in countries with poor protection of rights.

H2c. The positive effect of bank concentration on corporate debt maturity will be greater in smaller firms than in larger firms.

3. DATABASES AND VARIABLES

Our source for firm data is the Worldscope database, from which financial firms (SIC codes 6000 - 6999) were excluded. Our sample considers 30,727 firms and 171,892 firm-year observations for 39 countries in the period 1995-2012. The sample includes countries with different institutional environments. We use the following baseline model to investigate the determinants of the debt maturity structure of firms:

$$\begin{aligned} DEBTMAT_{it} = & a_0 + a_1 ASSET_MAT_{it-1} + a_2 GROWHT_{it-1} + a_3 SIZE_{it-1} + \\ & a_4 FIRM_QUALITY_{it-1} + a_5 VOL_EBIT_{it-1} + a_6 LEV_{it-1} + b_1 RULE_OF_LAW_{kt} \\ & + b_2 C_RIGHTS_{kt} + b_3 BANK_CONC_{kt} + b_4 BANK_CREDIT_{kt} + \\ & \sum_{kt} \lambda_{kt} + \sum_{jt} \mu_{jt} + v_i + \varepsilon_{it} \end{aligned} \quad [1]$$

The dependent variable is debt maturity (DEBTMAT), defined as the percentage of the firm's total debt that has a maturity of more than one year². The observed differences in debt maturities among countries depend partly on the characteristics of the firms in each economy. We accordingly introduce firm-level variables suggested by theory which have been used in previous studies analysing firm debt maturity (Myers, 1977; Barnea *et al.*, 1980; Barclay and Smith, 1995; Stohs and Mauer, 1996; González, 2013; Guedes and Opler, 1996; Antoniou *et al.*, 2006).

Firms have an interest in matching their debt maturities to their asset maturities to avoid risks. If the maturity of debt is shorter than that of assets, the firm may not have sufficient cash available to pay its financial obligations when they are due. However, if debt has a longer maturity, debt payments remain due when cash flows from assets cease. We have considered

² This is the amount of long-term debt identified by standard accounting convention and traditionally used (Antoniou *et al.*, 2006; Demirgüç-Kunt and Maksimovic, 1999; Fan *et al.*, 2012). Other authors have used alternative definitions. Barclay and Smith (1995) define debt maturity as long-term if it is payable after three years. Stohs and Mauer (1996) use a weighted average of the maturity of liabilities. The papers using alternative measures have reported results that are not significantly different from those obtained when the standard definition is used. Our choice is also driven by data availability.

the ratio between net fixed assets and total assets (ASSET_MAT) as a measure of the maturity of assets.

The agency costs of debt may influence corporate debt maturity given that outstanding debt may create incentive problems for shareholders. Myers (1977) argues that shareholders of a firm with risky fixed claims in its capital structure will potentially forgo positive NPV investments if project benefits accrue to the firm's existing bondholders. A firm may control this underinvestment incentive by reducing the amount of debt in the firm's capital structure, by including restrictive covenants in the debt contracts, or by shortening the maturity of the firm's debt obligations. The variable used as a proxy for the firm's investment opportunity set is the market-to-book ratio (GROWTH).

Agency problems between shareholders and debtholders may be particularly severe for small firms as a consequence of underinvestment incentives and risk shifting. Barnea *et al.* (1980) suggest that these problems may be reduced by issuing shorter-term debt. This argument thus suggests that debt maturity varies directly with firm size. We have measured firm size as the natural logarithm of sales (SIZE).

The liquidity risk hypothesis implies that incentives to lengthen the maturity of debt increase with the risk of not being able to refund debt. In this context, high-quality firms will prefer to issue short-term debt. Following Antoniou *et al.* (2006), we use the ratio of net income plus depreciation to net debt as a proxy for firm quality (FIRM_QUALITY).

Companies with a high volatility in their firm value have to change their capital structure frequently to reduce bankruptcy costs and hence these firms will use more short-term debt (Kane *et al.*, 1985). In this context, the maturity of debt should rise if the volatility of firm value decreases. The firm's level of volatility is proxied by the absolute value of change in earnings before interest and taxes (VOL_EBIT).

Diamond (1991) shows that liquidity risk increases with leverage and hence that highly leveraged firms may be expected to use more long-term debt. However, Barclay *et al.* (2003) argue that the relationship between leverage and maturity should be negative due to the fact that leverage and maturity are substitutes in mitigating under- and overinvestment problems. The opposing arguments and mixed empirical evidence mean that the influence of leverage has on debt maturity is basically an empirical question. Leverage has been proxied in this paper as the ratio between total debt and firm market value (LEV)³. The market value of assets is defined as total assets minus the book value of equity plus the market value of equity.

As regards country-level variables, we have used the rule of law component from the Worldwide Governance Indicators (WGI) compiled by Kaufmann *et al.* (2009) to proxy the efficiency of a country's legal system and the protection of property rights. Rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, as well as the likelihood of crime and violence (RULE_OF_LAW). The index ranges from -2.5 to 2.5, low levels denoting less efficiency in the legal system and protection of property rights. We use the index developed in Djankov *et al.* (2007) to measure the legal rights of creditors against defaulting debtors (C_RIGHTS). This index measures four powers of secured lenders in bankruptcy, with high values indicating higher protection of creditor rights.

We also use two variables to proxy the banking structure in the country. First, the weight of banks in the economy, measured as the ratio of private credit by deposit money banks to GDP (BANK_CREDIT). The data are obtained from the Financial Structure and Economic Database

³ We resolve the potential problem of endogeneity of leverage using instrumental variable estimation, considering as instrument the initial industry average leverage, jointly with other determinants of leverage: profitability, growth, tangibility and size (Rajan and Zingales, 1995). The initial average leverage in a firm's industry is a reasonable instrument for the firm's leverage, due to the fact that an individual firm's leverage is correlated with its industry average but it is unlikely that an individual corporate debt maturity is directly driven by the historical industry average leverage other than through its effect on the firm's leverage. Subsequently, we perform a Durbin-Wu-Hausman (DWH) test of overidentifying restrictions for each of the regressions (reported in the bottom row of each table). This test verifies the null hypothesis that the introduction of instrumental variables has no influence on the coefficients of the estimations. When the p value of the F test falls below 10%, the null hypothesis is rejected and the instrumental variable estimations are reported. Otherwise, the estimations with the observed values of leverage are provided.

(Beck *et al.*, 2006). Second, we also use a measure of bank concentration in a country. Following Demirgüç-Kunt *et al.* (2004) and Beck *et al.* (2006), we measure bank concentration as the proportion of bank assets held by the three largest commercial banks in the country (BANK_CONC). Figures are obtained from the World Bank Database, whose main source is Fitch IBCA's Bankscope Database.

We include three specific effects: country-year ($\sum_{kt} \lambda_{kt}$), industry-year ($\sum_{jt} \mu_{jt}$) and firm-specific (ν_i) effects. These specific effects try to control for most shocks affecting debt maturity. This approach has the advantage of being less likely to suffer from omitted variable bias or model specification than traditional regressions (Dell'Ariccia *et al.*, 2008).

Table 1 provides descriptive statistics on the firm- and country-level variables used in this paper. Panel A describes all the firms included in the sample. Panels B and C show the descriptive statistics according to firm size. We split our sample into quartiles according to the amount of total assets. We define "large firms" as those in the highest quartile and "small firms" as those belonging to the lowest quartile. The mean (median) debt maturity of the sample is 47.19 (48.19)%. Large firms present higher average maturity of debt (63.15 %) than small firms (35.75 %). Large firms also show higher maturity of assets, growth opportunities and leverage than small firms. However, small firms have higher firm quality and a higher value of volatility of earnings.

TABLE 1 ABOUT HERE

Table 2 shows the correlation matrix. DEBT_MAT shows a positive correlation with asset maturity, size and leverage, but correlates negatively with the quality of the firm.

TABLE 2 ABOUT HERE

4. RESULTS

4.1 DETERMINANTS OF FIRM DEBT MATURITY

The estimations are carried out using panel data. We use the Breusch-Pagan test (Breusch and Pagan, 1980) to identify the existence of individual effects. As the null hypothesis of no unobserved heterogeneity is rejected, the panel data methodology is appropriate. The panel data estimation was calculated using fixed effects, as the Hausman test (Hausman, 1978) rejects the null hypothesis of the lack of correlation between individual effects and observable variables in all regressions. All independent firm-level variables are lagged by one year to control for potential endogeneity problems.

Column (1) in Table 3 shows the results when only firm-level variables are considered. The relationship between asset and debt maturities is positive. This is consistent with the matching hypothesis, according to which firms match assets and liabilities to reduce risk. The effect of size on debt maturity is positive, indicating that large firms have larger debt maturities. This positive relationship is in line with the idea that firms with more agency problems –small firms– may use shorter-term debt to reduce underinvestment and risk-shifting problems. FIRM_QUALITY has a negative influence on debt maturity, indicating that high-quality firms tend to issue short-term debt. The coefficient of VOL_EBIT shows that the results are not in line with the tax hypothesis. Leverage (LEV) has a positive relationship to debt maturity in a way that is consistent with the arguments put forward by Diamond (1991), as liquidity risk increases with leverage and hence highly leveraged firms can be expected to use more long-term debt. The variable GROWTH has a positive and significant coefficient inconsistent with the agency cost hypothesis. The positive relationship could be a consequence of the liquidity risk argument, according to which firms with long-term investment opportunities prefer to hedge against liquidity risk by issuing long-term debt (Antoniou *et al.*, 2006; Guedes and Opler, 1996).

TABLE 3 ABOUT HERE

All the results for firm-level variables discussed above are maintained when we include the country-level determinants of debt maturity in the estimations (columns (2) to (6)). The *RULE_OF_LAW* variable has a positive and significant influence on debt maturity, indicating that firms in countries with strong legal enforcement and stronger protection of property rights have higher maturity of debt. This result is similar to that obtained by Demirgüç-Kunt and Maksimovic (1999) and means that the higher the quality of legal institutions, the greater the proportion of long-term financing. This finding is also consistent with the shorter debt maturity found by Fan *et al.* (2012) in countries with high levels of corruption. The coefficient of the protection of creditors' rights is positive. Firms in countries with strong protection of creditors' rights tend to issue debt with a longer maturity. This result suggests that creditors lend on more favourable terms when their rights are strongly protected.

Bank concentration has a positive effect on firm debt maturity. The maturity of debt increases in countries in which bank concentration is high. This result suggests that higher bank concentration increases bank incentives to establish close relationships with borrowers over time and thus reduces the financial constraints on firms.

The weight of banks in the economy is seen to have a negative influence on debt maturity. This result is in line with the evidence provided by Fan *et al.* (2012), which is consistent with the preferences of suppliers of capital having an influence on debt maturity structures. These results for country-level determinants of debt maturity are maintained when all the variables are included jointly in column (6).

The impact of the country-level variables is economically significant. Using the coefficients in column (6), a one-standard deviation increase in *RULE_OF_LAW*, *C_RIGHTS*, *BANK_CONC* and *BANK_CREDIT* would cause a variation in debt maturity of 6.89 per cent, 2.12 per cent, 2.74 per cent and -2.97 per cent, respectively.

Seeing as both institutional quality and bank concentration are mechanisms to reduce agency costs and information asymmetries, we wish to know whether these mechanisms act in an alternative or complementary way. To do so, we create new variables as an interaction between the legal and institutional environment variables `RULE_OF_LAW` and `C_RIGHTS` and the banking concentration (`BANK_CONC`) and the weight of banks in the economy (`BANK_CREDIT`). For instance, the variable `RULE_OF_LAW*BANK_CONC` measures the differential effect of bank concentration when the level of legal enforcement is high. The estimations are presented in column (7) of Table 3.

The results reveal similar relationships for firm-level determinants with debt maturity to those highlighted previously. As for the country-level determinants, we can see that `RULE_OF_LAW`, `BANK_CONC` and `BANK_CREDIT` maintain the already mentioned effect. However, protection of creditors' rights has a negative effect on debt maturity. `C_RIGHTS` only maintains a positive relationship with debt maturity when it co-exists with a high level of bank concentration in a country or with a large role of banks in the economy.

The negative coefficient of `RULE_OF_LAW*BANK_CONC` shows that the higher the efficiency of the legal system, the lower the positive effect of bank concentration on debt maturity. Thus, in countries where the efficiency of the legal system is strong, bank concentration reduces its positive influence on debt maturity. This result is consistent with bank concentration and legal enforcement as alternatives for extending corporate debt maturity and offers support to our hypothesis H2b.

The negative coefficient of `BANK_CREDIT` suggests that suppliers of debt (banks) have a preference for shorter-term debt. However, the positive sign of the interaction term of this variable with `RULE_OF_LAW` reveals that this preference is relaxed in high quality institutional environments.

4.2. FIRM- AND COUNTRY-LEVEL DETERMINANTS OF DEBT MATURITY ACROSS FIRM SIZE

Table 4 analyses whether the influence of the firm- and country-level determinants of debt maturity is different depending on firm size, dividing the overall sample into quartiles according to the amount of total assets. Column (1) shows the results for small firms, which are those belonging to the lowest quartile. Large firms are those belonging to the highest quartile and their results are shown in column (3). The results for medium-sized firms, those belonging to quartiles two and three, are reported in Column (2).

TABLE 4 ABOUT HERE

The results shown in Table 4 reveal that the effect of firm- and country-level determinants on debt maturity is size-dependent. Asset maturity has a positive and significant coefficient for smaller firms, while the coefficient is not significant in the case of large firms. This reveals that the asset maturity hypothesis has greater weight in explaining corporate debt maturity in smaller firms.

The coefficient for the variable FIRM_QUALITY is negative and significant for medium-sized and large firms. The effect of the FIRM_QUALITY variable is consistent with liquidity risk argument better explaining the corporate debt maturity of larger firms.

Table 4 also reveals that there are differences between large and small firms according to the country-level variables. The main interest lies in testing whether the weight of the country's banking structure on corporate debt maturity is different according to firm size. In line with our hypothesis H1, the weight of banks in the financing of the private sector has a negative relationship with corporate debt maturity for smaller firms, while this variable is not significant in the case of large firms. These results are consistent with the existence of a negative relationship between the weight of banks in the economy and debt maturity (Fan *et al.*, 2012), only being important in the case of smaller firms.

As for the variable BANK_CONC, we obtain coefficients that are positive and significant for small and medium-sized firms, while the influence is not significant for large firms. In line with the expected result (Hypothesis H2c), bank concentration serves to mitigate information asymmetries between creditors and debtors. Furthermore, because information asymmetries are greater in small firms, these will benefit more from bank concentration. This result is in line with the evidence provided by Petersen and Rajan (1995) of greater financial constraints for US small firms in less concentrated credit markets.

Similar to what we found in Table 3, debt maturity increases with RULE_OF_LAW regardless of firm size. As for the variable C_RIGHTS, the results show that the influence of the protection of creditors' rights varies widely across firm size. For medium-sized and large firms, the influence of the protection of creditors' rights is positive, in line with more favourable terms of credit when the rights of creditors are strongly protected, and negative in the case of small firms.

5. CONCLUSIONS

This paper analyses the effect of firm- and country-level determinants on corporate debt maturity, highlighting the relevance of the matching and liquidity risk hypotheses. As regards the role of institutional and legal and banking structure variables, the results reveal that the efficiency of the legal system, the protection of creditors' rights, and bank concentration have a positive influence on debt maturity. First, the positive effect of legal quality shows that firms use more short-term debt in countries in which the legal system does not provide proper protection. Second, creditors are willing to lend on more favourable terms when their rights are strongly protected. Third, the positive relationship between bank concentration and debt maturity provides evidence in line with the reduction of information asymmetries as a consequence of relationship banking. However, the positive effect of bank concentration on debt maturity is reduced in countries with a high quality institutional environment. Furthermore, the weight of banks in the economy shows a negative relationship to debt

maturity. The weight of banks in the economy incentivizes the use of short-term debt in a way that is consistent with the preferences of banks for short-term debt having an effect on the firms' maturity structures.

These results for firm- and country-level variables are not homogenous across firm size. Banking structure variables in particular have a greater influence on small firms. Bank concentration has a positive influence on debt maturity for small firms, whereas in the case of large firms, corporate debt maturity does not depend on bank concentration. The weight of banks in the economy has a negative influence for small firms, this influence being non-significant in the case of large firms. These results reveal the different role of banking structure depending on firm size. Relationship banking, and hence bank concentration, provides for mitigating information asymmetries in smaller firms and explains the positive relationship with debt maturity. Due to the fact that large firms have better access to financial markets, they are less dependent on domestic bank credit and are hence less affected by the preferences of banks.

The paper shows that institutional features and banking structure characteristics lead to differences in debt maturity across countries. The nature and magnitude of the effect of firm- and country-level determinants of corporate debt maturity are country dependent, revealing the influences of the institutional environment and the banking structure of the country. Furthermore, the influences of country-level determinants are not homogeneous across firm size. The banking structure of the country is a relevant determinant of corporate debt maturity in poor quality institutional environments. The country's bank concentration is found to be a useful mechanism for reducing financial constraints in countries with poor institutional quality and for small firms. Consequently, different policies would have to be implemented to provide access to long-term debt for firms in countries with different banking structures and those of different sizes.

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Table 1. Descriptive statistics

Panels A, B, C report the descriptive statistics of firm- and country-level variables for the overall sample and for the subsamples of large and small firms. DEBT_MAT is the percentage of the firm's total debt that has a maturity of more than one year. ASSET_MAT is the ratio between net fixed assets and total assets. GROWTH is the market-to-book ratio. SIZE is the natural logarithm of sales. VOL_EBIT is the absolute value of change in EBIT. FIRM_QUALITY is the ratio of net income plus depreciation to net debt. LEV is the ratio between total debt and the firm's market value. RULE OF LAW is one of the six dimensions of the Worldwide Governance Indicators compiled by Kaufmann *et al.* (2009) and is a measure of the efficiency of the legal system and the protection of property rights. C_RIGHTS measures the protection of creditor rights. BANK_CONC is the fraction of assets held by the three largest commercial banks in each country. BANK_CREDIT is the ratio of private credit by deposit money banks to GDP. We split the overall sample into quartiles according to the amount of total assets. Large firms are those in the largest quartile, while small firms are those belonging to the smallest quartile.

	Number of observations	Mean	Median	Standard Deviation	First quartile	Third quartile
<i>Panel A: Overall Sample</i>						
DEBT_MAT (%)	171,892	47.19	48.19	34.01	14.23	77.35
ASSET_MAT (%)	171,892	33.22	30.36	22.19	15.58	47.49
GROWTH	171,892	1.79	1.21	2.02	0.69	2.15
SIZE	171,892	5.19	5.15	2.09	3.88	6.50
VOL_EBIT	171,892	1.28	0.48	2.77	0.20	1.14
FIRM_QUALITY	171,892	2.22	0.38	10.56	0.16	0.96
LEV (%)	171,892	33.00	28.31	25.03	11.45	50.88
RULE_OF_LAW	171,892	1.09	1.32	0.70	0.75	1.66
C_RIGHTS	171,892	2.00	2.00	1.09	1	3
BANK_CONC (%)	164,507	52.30	46.75	19.44	36.12	64.50
BANK_CREDIT (%)	154,381	91.59	98.43	40.01	54.98	109.71
<i>Panel B: Large firms</i>						
DEBT_MAT (%)	42,973	63.15	68.66	29.06	43.74	88.08
ASSET_MAT (%)	42,973	35.34	32.12	22.06	17.73	50.05
GROWTH	42,973	2.08	1.52	2.01	0.92	2.51
SIZE	42,973	7.67	7.53	1.32	6.85	8.42
VOL_EBIT	42,973	1.00	0.35	2.37	0.15	0.86
FIRM_QUALITY	42,973	1.70	0.39	7.99	0.20	0.80
LEV (%)	42,973	34.51	30.19	24.11	14.82	50.93
RULE_OF_LAW	42,973	1.24	1.43	0.63	1.04	1.67
C_RIGHTS	42,973	1.83	1.00	1.14	1.00	3.00
BANK_CONC (%)	41,723	51.53	44.96	19.10	35.66	63.65
BANK_CREDIT (%)	39,803	94.99	99.61	41.66	55.48	113.07
<i>Panel C: Small firms</i>						
DEBT_MAT (%)	42,973	35.75	28.16	34.43	0	65.09
ASSET_MAT (%)	42,973	30.55	27.19	23.31	10.41	46.10
GROWTH	42,973	1.81	1.13	2.34	0.63	2.13
SIZE	42,973	2.87	3.16	1.39	2.31	3.78
VOL_EBIT	42,973	1.59	0.64	3.15	0.26	1.42
FIRM_QUALITY	42,973	2.23	0.33	12.04	-0.01	1.06
LEV (%)	42,973	29.60	23.34	25.01	7.85	46.67
RULE_OF_LAW	42,973	0.94	1.01	0.78	0.22	1.68
C_RIGHTS	42,973	2.16	2.00	1.05	1.00	3.00
BANK_CONC (%)	41,030	54.47	53.16	19.81	38.27	66.60
BANK_CREDIT (%)	37,926	87.85	94.14	40.56	48.66	107.13

Table 2. Correlations

The table presents the correlation matrix. DEBT_MAT is the percentage of the firm's total debt that has a maturity of more than one year. ASSET_MAT is the ratio between net fixed assets and total assets. GROWTH is the market-to-book ratio. SIZE is the natural logarithm of sales. VOL_EBIT is the absolute value of change in EBIT. FIRM_QUALITY is the ratio of net income plus depreciation to net debt. LEV is the ratio between total debt and the firm's market value. RULE_OF_LAW is one of the six dimensions of the WGI and is a measure of the efficiency of the legal system and the protection of property rights. C_RIGHTS measures creditor rights. BANK_CONC is the fraction of assets held by the three largest commercial banks in each country. BANK_CREDIT is the ratio of private credit by deposit money banks to GDP.

	DEBT_MAT	ASSET_MAT	GROWTH	SIZE	FIRM_QUALITY	VOL_EBIT	LEV	RULE_OF_LAW	C_RIGHTS	BANK_CONC	BANK_CREDIT
DEBT_MAT	1.000										
ASSET_MAT	0.178	1.000									
GROWTH	0.099	-0.103	1.000								
SIZE	0.222	-0.011	0.067	1.000							
FIRM_QUALITY	-0.115	-0.067	0.069	0.018	1.000						
VOL_EBIT	-0.028	-0.004	-0.022	-0.101	-0.037	1.000					
LEV	0.071	0.219	-0.363	0.041	-0.240	0.067	1.000				
RULE_OF_LAW	0.137	-0.148	0.099	0.164	-0.018	0.024	-0.170	1.000			
C_RIGHTS	-0.092	-0.016	-0.021	-0.132	0.006	0.011	-0.020	0.068	1.000		
BANK_CONC	-0.033	-0.056	0.016	-0.075	-0.006	0.021	-0.062	0.282	0.464	1.000	
BANK_CREDIT	-0.078	-0.131	-0.037	0.059	-0.015	0.028	-0.059	0.563	0.283	0.385	1.000

Table 3. Determinants of firm debt maturity

Regressions are estimated using panel data. The dependent variable (DEBT_MAT) is the percentage of the firm's total debt that has a maturity of more than one year. ASSET_MAT is the ratio between net fixed assets and total assets. GROWTH is the market-to-book ratio. SIZE is the natural logarithm of sales. VOL_EBIT is the absolute value of change in EBIT. FIRM_QUALITY is the ratio of net income plus depreciation to net debt. LEV is the ratio between total debt and the firm's market value. RULE_OF_LAW is one of the six dimensions of the WGI and is a measure of the efficiency of the legal system and the protection of property rights. C_RIGHTS measures creditor rights. BANK_CONC is the fraction of assets held by the three largest commercial banks in each country. BANK_CREDIT is the ratio of private credit by deposit money banks to GDP. T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Intercept	0.4493*** (52.51)	0.4071*** (30.47)	0.4292*** (40.40)	0.4223*** (37.96)	0.4828*** (45.92)	0.3754*** (21.28)	0.4194*** (15.19)
ASSET_MAT	0.0576*** (6.61)	0.0577*** (6.62)	0.0589*** (6.75)	0.0549*** (6.10)	0.0523*** (5.69)	0.0538*** (5.72)	0.0539*** (5.73)
GROWTH	0.0035*** (6.85)	0.0035*** (6.81)	0.0035*** (6.90)	0.0035*** (6.63)	0.0033*** (6.15)	0.0034*** (6.22)	0.0034*** (6.31)
SIZE	0.0032** (2.11)	0.0034** (2.25)	0.0031** (2.06)	0.0037** (2.37)	0.0024 (1.48)	0.0030* (1.82)	0.0036** (2.20)
FIRM_QUALITY	-0.0009*** (-9.76)	-0.0009*** (-9.72)	-0.0009*** (-9.72)	-0.0009*** (-9.17)	-0.0009*** (-9.23)	-0.0008*** (-8.59)	-0.0008*** (-8.56)
VOL_EBIT	-0.0002 (-0.85)	-0.0002 (-0.82)	-0.0002 (-0.75)	-0.0001 (-0.53)	-0.0001 (-0.56)	-0.0001 (-0.32)	-0.0001 (-0.28)
LEV	0.0482*** (9.32)	0.0488*** (9.42)	0.0484*** (9.35)	0.0541*** (10.11)	0.0570*** (10.39)	0.0629*** (11.21)	0.0632*** (11.26)
RULE_OF_LAW		0.0364*** (4.12)				0.0466*** (4.28)	0.0747*** (4.39)
C_RIGHTS			0.0089*** (3.19)			0.0092*** (3.16)	-0.0171* (-1.91)
BANK_CONC				0.0584*** (4.69)		0.0665*** (5.30)	0.1371*** (3.33)
BANK_CREDIT					-0.0255*** (-3.31)	-0.0350*** (-4.39)	-0.1573*** (-7.16)
RULE_OF_LAW*BANK_CONC							-0.1250*** (-5.99)
RULE_OF_LAW*BANK_CREDIT							0.0524*** (4.49)
C_RIGHTS*BANK_CONC							0.0227* (1.76)
C_RIGHTS*BANK_CREDIT							0.0161** (2.56)
Hausman test	1,437.30***	1,418.08***	1,497.41***	1,402.40***	1,302.83***	1,433.73***	1,549.05***
F test	48.23***	44.76***	44.00***	42.46***	44.88***	36.74***	31.87***
# observations	135,621	135,621	135,621	129,281	121,676	118,434	118,434
# firms	27,881	27,881	27,881	25,221	25,365	25,221	25,221
Durbin-Wu-Hausman test	1.11	1.11	1.09	1.14	1.16	1.17	1.15

Table 4. Firm- and country-level determinants of debt maturity according to firm size

Regressions are estimated using panel data. The dependent variable (DEBT_MAT) is the percentage of the firm's total debt that has a maturity of more than one year. ASSET_MAT is the ratio between net fixed assets and total assets. GROWTH is the market-to-book ratio. SIZE is the natural logarithm of sales. VOL_EBIT is the absolute value of change in EBIT. FIRM_QUALITY is the ratio of net income plus depreciation to net debt. LEV is the ratio between total debt and the firm's market value. RULE_OF_LAW is one of the six dimensions of the WGI and is a measure of the efficiency of the legal system and the protection of property rights. C_RIGHTS measures creditor rights. BANK_CONC is the fraction of assets held by the three largest commercial banks in each country. BANK_CREDIT is the ratio of private credit by deposit money banks to GDP. Columns (1), (2) and (3) report the results for small, medium and large firms, respectively. T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Intercept	0.5671*** (8.41)	0.4620*** (16.39)	0.5480*** (13.95)
ASSET_MAT	0.0637*** (2.87)	0.0832*** (5.46)	-0.0114 (-0.62)
GROWTH	0.0003 (0.22)	0.0050*** (5.37)	0.0002 (0.25)
SIZE	-0.0022 (-0.58)	-0.0093*** (-3.07)	-0.0121*** (3.17)
FIRM_QUALITY	-0.0003 (-1.54)	-0.0006*** (-4.04)	-0.0017*** (-8.01)
VOL_EBIT	0.0005 (0.83)	-0.0003 (-0.78)	-0.0004 (-0.79)
LEV	0.0476*** (3.55)	0.0719*** (8.48)	0.0515* (1.95)
RULE_OF_LAW	0.0528* (1.83)	0.0277* (1.67)	0.0753*** (3.96)
C_RIGHTS	-0.0964*** (-3.66)	0.0147*** (3.39)	0.0093** (2.50)
BANK_CONC	0.1073** (2.42)	0.0435** (2.45)	0.0170 (0.77)
BANK CREDIT	-0.0516** (-2.40)	-0.0605*** (-4.86)	0.0016 (0.12)
Hausman test	185.36***	539.95***	615.95***
F test	10.40***	27.22***	16.88***
# observations	24,249	55,785	30,980
# firms	7,849	13,677	6,306
Durbin-Wu-Hausman test	0.50	1.40	6.84***