INFLUENCE OF BANK CONCENTRATION AND INSTITUTIONS ON CAPITAL STRUCTURE: NEW INTERNATIONAL EVIDENCE

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Influence of bank concentration and institutions on capital structure: New international evidence

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Abstract

This paper uses a panel database of 12,049 firms in 39 countries to analyze how bank market concentration and institutions affect capital structure. Our results show that firm leverage increases with bank concentration and the protection of creditor rights, but decreases with the protection of property rights. Results also indicate that higher bank concentration substitutes for creditor protection and asset tangibility to reduce the agency cost of debt between shareholders and debtholders. Weak protection of property rights increases the agency cost of external funds, leading to the preferential use of internal funds proposed by the Pecking Order Theory. The validity of the Trade-Off Theory, however, increases in countries with better protection of property rights.

JEL classification: G18, G32.
Keywords: capital structure, property rights, creditor rights, institutions, panel data.

I. Introduction

The empirical literature on corporate finance has shown that financial decisions depend on firm attributes that proxy for the extent of agency problems and asymmetric information, such as the availability of collateral and profitability (Rajan and Zingales, 1995). These studies have generally focused on samples of US companies, comparing the Trade-Off Theory (TOT) with the Pecking Order Theory (POT) as explanations of firms' capital structure. Recent papers argue that determinants of capital structure come not only from firm-level variables but also from country-level variables, including legal and institutional factors.[1] Our paper forms part of this growing literature and its main contribution is to analyze how firm leverage varies across countries not only with institutions but also with bank market concentration. Our paper also investigates the influence of institutions and bank concentration on the determinants of firm leverage and therefore explains how the validity of the TOT and POT may vary across countries.

Financial literature suggests that an effective legal system favors the use of external funds while companies in poor contracting environments are more dependent on internal funds (Demirgüc-Kunt and Maksimovic, 1999). Development of the legal system affects not only the percentage of external funding but also its characteristics in two ways: 1) favoring the use of equity rather than debt (Giannetti, 2003), and 2) increasing the proportion of long-term debt (Demirgüc-Kunt and Maksimovic, 1999).

Most of the international studies use country-level data. To our knowledge, cross-country comparisons of capital structure with firm-level data are only made by Rajan

[1] Recent papers show that secure property rights are associated with higher stock market values and a higher number of listed firms (La Porta et al., 1997), higher valuation of listed firms relative to their assets (Classens et al, 2002; La Porta et al., 2002), greater use of external finance (La Porta et al., 1997,

and Zingales (1995), Booth *et al.* (2001), Giannetti (2003) and Bae and Goyal (2004). These papers offer mixed evidence on the influence of institutions on firms' capital structure and none of them cover the potential influence of bank concentration.

Rajan and Zingales (1995) analyze large listed companies from G7 countries and find that factors identified by previous studies as correlated in the cross-section with firm leverage in the United States, are similarly correlated in other countries as well. Booth *et al*. (2001) suggest that the same determinants of capital structure prevail in developing countries. The two papers therefore suggest that institutional differences seem unimportant in both developed and developing countries. However, they both run separate regressions for each country and do not use explicit variables for the institutional environment as regressors in estimations with data from all the countries.

Giannetti (2003) explicitly introduces creditor right protection in the analysis of a sample of unlisted companies in eight European countries. Her results suggest that the relevance of institutional variables depends on firm size. Larger listed companies have easier access to international financial markets so their corporate finance decisions are less subject to the institutional constraints imposed by domestic markets. Institutional characteristics do, however, have a greater impact in unlisted companies. She shows for unlisted companies that creditor protection helps them obtain loans for investing in intangible assets and guarantees access to long-term debt for firms operating in sectors with highly volatile returns. Bae and Goyal (2004) also show the relevance of institutional characteristics on capital structure, analyzing data from 36 countries to show that lenders charge lower spreads on loans in countries with better property rights protection.

1998, 2000), and greater investments from external funds (Rajan and Zingales, 1998; Demirgüç-Kunt and Maksimovic, 1998).

In the context of this literature, our paper is relevant in at least four ways. First, we include the influence of bank market concentration. This variable has been omitted in previous studies using international databases to analyze capital structure even though there is evidence that bank concentration may influence banks' lending decisions. Cetorelli and Gambera (2001) show that bank market concentration has a general depressing effect on growth although bank concentration promotes the growth of industrial sectors that are more in need of external finance by facilitating credit access to younger firms. This result suggests that bank concentration may influence the availability of external funds for firms.

Second, we analyze not only the influence of bank concentration and institutional characteristics on firm leverage but also on the determinants of leverage for firms. This analysis shows that the prevalence of the POT vs. the TOT may vary across countries depending on institutions and bank concentration.

Third, we analyze more countries than previous studies: 39 countries as opposed to 7 in Rajan and Zingales (1995), 8 in Giannetti (2003) and 10 in Booth *et al.* (2001). The inclusion of more countries increases cross-country variability and provides a greater range of institutional differences, resulting in a deeper understanding of how capital structure depends on institutions and on bank concentration.

Finally, we account for dynamic processes in firm leverage by using the generalized-method-of-moments (GMM) estimators developed by Arellano and Bond (1991) for dynamic panel data. GMM models are specifically designed to handle autoregressive properties in the dependent variable (firm leverage) when lagged values are introduced as explanatory variables, and endogeneity in the explanatory variables (other firm-specific characteristics) must be controlled for. Although this method has been used in

studies on capital structure focusing on a single country, it has not yet been applied in studies using international data.[2] The empirical analysis is carried out on a sample of 12,049 firms in 39 countries over the period 1995-2004.

Our results indicate that firm leverage increases with bank concentration and the protection of creditor rights, while it decreases with the protection of property rights. Results also indicate that higher bank concentration can substitute creditor protection and asset tangibility to reduce the agency cost of debt between shareholders and debtholders. Moreover, weak protection of property rights increases the agency cost of external funds, leading to the preferential use of internal funds proposed by the POT. However, the validity of the TOT increases in countries with better protection of property rights.

The rest of the paper is organized as follows. Section 2 discusses the influence of bank concentration and institutions in capital structure and the hypotheses tested in the paper. Section 3 describes the characteristics of the database and the methodology, while Section 4 discusses the empirical results. Section 5 checks the robustness of our basic results. Finally, Section 6 presents some conclusions.

II. Theoretical background and hypotheses

The finance literature offers two competing but not mutually exclusive models based on firm variables to explain financing decisions: the TOT and the POT. The TOT posits that firms maximize their value when the benefits that stem from debt (the tax shield, the disciplinary role of debt or the reduction of free cash-flow problems, and the fact

[2] Results consistent with a partial adjustment to the target leverage are obtained for US firms (Marcus, 1983; Jalilvand and Harris, 1984; Auerbach, 1985; Fischer *et al*., 1989; Shyam-Sunder and Myers, 1999; Fama and French, 2002; Flannery and Rangan, 2006), for French and German firms (Kremp *et al*., 1999),

that debt suffers less from informational costs than outside equity) equal the marginal cost of debt (bankruptcy costs, and agency costs between shareholders and bondholders).

The POT, developed by Myers and Majluf (1984) and Myers (1984), focuses on the information asymmetries existing between firm insiders and outsiders. In these models, managers use private information to issue risky securities when they are overpriced. Investors are aware of this asymmetric information problem, and they discount the firm's new and existing risky securities when new issues are announced. Managers anticipate these price discounts, and may forego profitable investments if these must be financed with new risky securities. To avoid this distortion of investment decisions, managers prefer to finance projects with retained earnings, which do not involve the asymmetric information problem involved in risky debt. So, as far as possible, the firm will fund all projects using retained earnings. If there is an inadequate amount of retained earnings, then debt financing will be used and an equity issue would be the least favored option. This means that changes in a firm's leverage are driven not by the costs and benefits of debt according to the trade-off model, but rather by the firm's net cash flows (cash earnings minus investment outlays) and the intensity of information asymmetry. The POT suggests that a firm's debt decreases with profitability but increases with growth opportunities and intangible assets. The TOT, on the other hand, suggests that a firm's debt increases with profitability and diminishes with growth opportunities and intangible assets. Table 1 summarizes the traditional arguments given in the literature for estimating the effects of these firm characteristics using the POT and the TOT (Myers, 1977; Jensen, 1986; Stulz, 1990; Rajan and Zingales, 1995; Flannery and Rangan, 2006).

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for Spanish firms (Miguel and Pindado, 2001), for Swiss firms (Gaud *et al*., 2005), and for UK firms

However, the predominance of the TOT and POT arguments may vary across countries as the relevance of the information asymmetries and agency cost depends on the market structure, quality of institutions and legal system of the country. When we include the influence of country variables on capital structure, there are two potential effects to consider: 1) on the level and maturity of debt, and 2) on the firm-level determinants of debt. As possible country determinants we include the influence of bank concentration alongside the more traditional determinants of the protection of property rights and the protection of creditor rights.

a) Bank market concentration

The banking literature has suggested two potential opposing effects of bank concentration on firm leverage. In a market in which perfect information exists and the agents know perfectly the quality of the goods being exchanged, the existence of market power implies that a price is set above that of equilibrium (equal to the marginal cost) and that the quantity of goods or services traded is less than competitive equilibrium. Consequently, greater competition in the banking market will imply a lower price for credit and greater credit availability. Following this argument, a negative relationship would be expected between market concentration and firm leverage.

However, higher bank market concentration may increase banks' incentives to invest in the acquisition of soft information by establishing close relationships with borrowers over time (*relationship banking*), facilitating the availability of credit and consequently reducing firms' financial constraints (Boot, 2000; Dell' Ariccia and Marquez, 2004). Following this argument, a positive relationship would be expected between bank market concentration and firm leverage.

(Ozkan, 2001).

Empirical evidence on the influence of bank concentration on debt availability is mixed. Petersen and Rajan (1994) and Berlin and Mester (1999) show in the US market that firms in less concentrated markets are subject to greater financial constraints. However, D'Auria *et al.* (1999) for Italian firms and Degryse and Ongena (2005) for Belgian firms find that an increase in bank market concentration increases the cost of financing provided by banks.

Unlike previous studies that have focused on a single country, this paper is the first to provide empirical evidence on the influence of bank concentration on firm leverage using an international database of banks. The existence of arguments and of opposing empirical evidence means that the influence of bank market concentration on firm leverage is basically an empirical question and we do not establish any a priori hypothesis.

As for the influence of bank concentration on the determinants of firm leverage, we would expect higher bank concentration to reduce the importance of the POT arguments by reducing the information asymmetry between firms and bank lenders. This would make it easier for less profitable firms with fewer tangible assets (we expect lower negative coefficients for these variables) to use debt. However, higher bank concentration and a long-term relationship between banks and debtholders would also decrease the validity of the TOT by reducing agency costs between them. This would make firms' profitability and tangibility less useful in facilitating access to debt (we expect lower positive coefficients for these variables). As we expect higher concentration to reduce the validity of both the POT and TOT, we cannot make a clear forecast for the influence of bank concentration on the traditional determinants of firms' debt and therefore analyze it as an empirical question.

Following Demirgüc-Kunt *et al*. (2004) and Beck *et al.* (2006), bank concentration is measured as the fraction of bank assets held by the three largest commercial banks in the country (CONC). Figures are obtained from the World Bank Database, whose base source is the Fitch IBCA's Bankscope Database.

b) Property rights

La Porta *et al.* (1997, 1998) and Rajan and Zingales (1998) have shown that well-functioning markets rely on contracts and their legal enforceability. Rajan and Zingales (1998) use country-level data to conclude that the development of a financial system basically helps the firms that are most dependent on funding to reduce the cost of obtaining it and, therefore, makes it easier for them to invest, fostering economic growth. As La Porta *et al.* (1997, 1998) find that markets develop better in countries where the rights of the minority shareholders are well protected, we would expect firms in these countries to have not only better access to external funds but also more equity and less debt. Giannetti (2003) provides evidence to support this argument. She shows that stock market development favors the use of equity as opposed to debt as the most widely-used type of external fund and that unlisted companies show higher levels of debt than listed companies even after controlling for firm characteristics such as profitability, size, and the ability to provide collateral.

Since the quality of the institutional environment promotes development of the stock market, we would expect this variable to have a negative effect on firm leverage. We therefore establish the following hypothesis:

H.1.: *Better protection of property rights favors the issue of equity and is negatively related to firm leverage.*

The protection of property rights may also affect the determinants of a firm's capital structure. Weak protection of property rights diminishes the capacity of investors to privately contract and may, therefore, increase the relevance of information asymmetry, increasing the problems of adverse selection and of moral hazard. This would make it more difficult for countries with a poor contracting environment to use external funds and would lead firms to favor internal funds. We would therefore expect the POT arguments to prevail in such countries. However, in countries with a better contracting environment, the enforceability of contracts would allow parties to privately resolve conflicts stemming from information asymmetry. But there would always be unresolved conflicts within the incomplete contracts framework, the intensity of which would depend on the characteristics of the firms involved. Companies with more tangible assets could offer greater guarantees to reduce the cost of debt and would have greater leverage than firms with less protection of tangible assets. In countries with a better contracting environment or a higher degree of institutional development, we would expect the TOT predictions to prevail. Following this argument, we establish a new hypothesis:

H.2. *The validity of the TOT (POT) to explain the determinants of firm leverage increases (decreases) with the protection of property rights.*

In the empirical analysis, we measure the protection of property rights by the Index of private property rights published by the Heritage Foundation and used by La Porta *et al.* (1998). This is an annual indicator of the degree to which private property rights are protected and the degree to which the government enforces laws that protect private property. It also accounts for the possibility that private property may be expropriated. In addition, it analyzes the independence of the judiciary, the existence of corruption

within the judiciary, and the ability of individuals and businesses to enforce contracts. This index ranges from 1 to 5, with a high score indicating greater legal protection of property (calculated at 6 minus the property rights index of the Heritage Foundation).

c) Creditor rights

We include a creditor rights index to check if differences in firm leverage are associated with differences in the protection of creditors. Empirical evidence suggests a positive relationship between the protection of creditors and firm debt. Levine (1998, 1999) uses country-level data to find that banks develop better in countries where the rights of the secured creditors are well protected. Giannetti (2003) finds that in countries with good creditor protection, it is easier for unlisted firms investing in intangible assets to obtain loans. Demirgüc-Kunt and Maksimovic (1999) and Giannetti (2003) show that institutions that favor creditor rights and ensure stricter enforcement are associated not only with higher leverage but also with greater availability of long-term debt. These arguments lead to our third hypothesis:

H.3.: *Better protection of creditor rights is positively related to firm leverage.*

In addition to the level of firm debt, the protection of creditor rights may also affect firms' determinants of capital structure. Debt agency costs are lower in countries with better creditor protection, making it easier to obtain loans for firms investing in intangible assets, which cannot be provided as collateral, and for firms with growth opportunities. Such firms have stronger incentives to under-invest and greater possibilities of risk-shifting substitution (Myers, 1977, Smith and Warner, 1979) as well as higher costs of financial distress (Myers, 1984; Harris and Raviv, 1991). Better creditor protection may reduce these costs and facilitate access to debt. Therefore, the

TOT can be expected to be less valid in countries with better protection of creditor rights. These arguments lead to our fourth hypothesis:

H.4. *The validity of the TOT to explain the determinants of firm leverage decreases with the protection of creditor rights.*

We use the index developed in La Porta *et al.* (1998) to measure a borrower country's overall creditor rights (CREDITORS). This index is equal to the sum of the scores (0 to 1) for five categories: no automatic stay on assets, secured creditors paid first, restrictions for going into reorganization, management does not stay in control during reorganization, and legal reserve required as percent of capital. This index thus ranges from 0 to 5, with a higher value indicating stronger creditor rights or stronger protection against borrower expropriation.

III. Econometric specification and database

A. Methodology

We adopt the traditional dynamic model of capital structure, as used in prior studies taking data on a single country (among others, Shyam-Sunder and Myers, 1999; Fama and French, 2002, and Flannery and Rangan, 2006). The model tests whether there is a leverage target and, if so, what the adjustment speed is with which a firm moves toward its target. The form of the target adjustment model states that changes in the debt ratio ($D_{it} - D_{it-1}$) partially absorb the difference between target leverage (D_{it}*) and lagged leverage (D_{it-1}):

$$\left(D_{it} - D_{it-1}\right) = \alpha\left(D_{it}^{*} - D_{it-1}\right) \qquad [1]$$

where the transaction costs that impede complete adjustment to the target leverage are measured by the coefficient α, which varies between 0 and 1 and is inversely related to adjustment costs. So firm leverage is:

$$D_{it} = \alpha D_{it}^{*} + (1-\alpha) D_{it-1} \qquad [2]$$

On the one hand, if transaction costs are zero, i.e. $\alpha=1$, $D_{it}=D_{it}^*$ and firms automatically adjust their debt level to the target level. On the other hand, if $\alpha=0$, $D_{it}=D_{it-1}$, this implies that transaction costs are so high that firms do not adjust their debt level. The adjustment process is a trade-off between the adjustment costs towards a target ratio and the costs of being in disequilibrium.

As the target debt is unobservable, we model it as a linear function of the traditional firm's determinants of capital structure as indicated by Rajan and Zingales (1995) (profitability, growth opportunities, tangible assets and size), obtaining:[3]

$$D_{it}^{*} = a_0 + a_1 PROF_{it} + a_2 GROWTH_{it} + a_3 PPE_{it} + a_4 SIZE_{it} + \mu_{it} \qquad [3]$$

where D^*_{it} is the target leverage of firm i in year t. We use a market measure of the leverage.[4] As information asymmetry and moral hazard problems basically affect the availability of long-term debt, we proxy leverage as the ratio between long-term debt and market value of assets. Market value of assets is defined as total assets minus book value of equity plus market value of equity. Long-term debt is the debt that is most sensitive to the problems of adverse selection and moral hazard. Therefore, by using it

[3] The same framework has been used in prior studies such as Miguel and Pindado (2001), Ozkan (2001), Gaud *et al*. (2005) and Flannery and Rangan (2006).

[4] Welch (2004) argues that we should use market leverage ratios since our theories of target ratios are implicitly about market leverage ratios. Many previous researchers have analyzed market-value debt ratios, for example, Hovakimian et al. (2001), Fama and French (2002), Leary and Roberts (2005) and Flannery and Rangan (2006).

as a dependent variable, we hope to better understand the effect of bank concentration and institutions on the resolution of such problems between firms and debtholders. Basic results do not change when we consider total debt instead of long-term debt.

Profitability (PROF) is measured as earnings before interest and taxes plus depreciation expenses and provisions (non-cash deductions from earnings) divided by total assets (Ozkan, 2001; Miguel and Pindado, 2001; Gaud *et al*., 2005). Following Rajan and Zingales (1995), Gaud *et al*. (2005), Flannery and Rangan (2006), growth opportunities (GROWTH) are measured as the market-to-book ratio. We proxy the tangibility of assets by the percentage of the property, plant and equipment in total assets (PPE). This variable was used by Titman and Wessels (1988) as an indicator that is positively related to the collateral value.

Larger firms tend to be more diversified and size may be an inverse proxy for the probability of bankruptcy. In line with these arguments, a large number of papers have suggested that firm size is positively related to leverage ratio (Rajan and Zingales, 1995; Booth *et al*., 2001; Frank and Goyal, 2003; Gaud *et al*., 2005). However, informational asymmetries between insiders in a firm and capital markets are lower for larger firms. So, large firms should be more capable of issuing informationally sensitive securities like equity, and should have lower debt. We measure size by the natural logarithm of total sales (Titman and Wessels, 1988; Rajan and Zingales, 1995; Gaud et al., 2005).

Incorporating Eq. (3) into Eq. (2) and considering that estimations are carried out with panel data, we get:

$$D_{it} = \alpha a_0 + (1-\alpha) D_{it-1} + \alpha\, a_1 PROF_{it} + \alpha\, a_2 GROWTH_{it} + \alpha\alpha_{\,3} PPE_{it} + \alpha\, a_4 SIZE_{it} + \\ + b_5\, CONC_{kt} + b_6\, RIGHTS_{kt} + b_7\, CREDITORS_k + \sum_{k=1}^{m} C_k + \sum_{t=1995}^{2004} Y_t + \sum_{j=1}^{n} I_j + \gamma_i + \mu_{it} \qquad [4]$$

In addition to firms' variables, we also include bank market concentration (CONC), protection of property rights (RIGHTS), and protection of creditor rights (CREDITORS) in each country. $\sum_{k=1}^{m} C_k$ is the set of country dummy variables controlling for other legal and institutional aspects apart from those that are explicitly included in RIGHTS and in CREDITORS. $\sum_{t=1995}^{2004} Y_t$ is a set of dummy time variables for each year capturing any unobserved firm-invariant time effect not included in the regression. We also include industry dummy variables according to SIC codes ($\sum_{j=1}^{n} I_j$) to capture any industry effect not included in the explanatory variables. γ_i is the firm effect, which is assumed to be constant for firm i over t; and μ_{it} is the error term.

We apply the generalized-method-of-moments (GMM) estimators developed for dynamic models of panel data by Arellano and Bond (1991). This methodology is specifically designed to address three econometric issues relevant to the present paper: (i) the presence of unobserved individual effects (in the present case, firm-specific effects), which are eliminated by taking first differences of all variables; (ii) the autoregressive process in the data regarding the behavior of the leverage ratio (i.e. the need to use a lagged-dependent-variables model to capture the dynamic nature of the capital structure decisions); and (iii) the likely endogeneity of the explanatory variables. We control for the potential endogeneity of PROF, GROWTH, PPE and SIZE in the GMM estimations using the two to four period lags of the same variables as instruments. The country and the dummy variables were the variables initially considered to be exogenous. We check subsequently that results do not change when we consider the potential endogeneity of the institutional variables.

One-step estimation has been used specifying the robust estimator of the variance-covariance matrix of the parameters. We also examine the hypothesis of lack of second-order serial correlation in the first-difference residuals (m_2). In our models, this hypothesis of second-order serial correlation is always rejected. Although there is first-order serial correlation (m_1) in the differentiated residuals, it is due to the first difference of models.

B. Database

We obtain firm balance-sheet and income-statement annual data (in euros and in real prices) from Worldscope for 1995-2004. We initially selected the 49 countries considered by La Porta et al. (1998), but then eliminated 10 of these because the lack of data: Colombia, Ecuador, Egypt, Jordan, Kenya, Nigeria, Sri Lanka, Uruguay, Venezuela and Zimbabwe. The final number of countries considered was therefore 39, including both developed and developing countries.

Following previous studies, we exclude firms whose capital decisions may reflect special factors: financial (SIC 6000 – 6999) and regulated (SIC 4000 – 4999) enterprises (Flannery and Rangan, 2006). Since we apply the GMM first-difference estimator with one lag of the dependent variable in the empirical analysis, firms with fewer than two consecutive years of data must be excluded. Finally, the number of firms included in the sample was 12,049 and the final sample comprised 59,577 firm-year observations.

Table 2 shows that for the total sample the mean leverage ratio is 15.33% with an average profitability of 8.48% and a mean for growth opportunities of 2.67. The companies in the sample have a 32.63% ratio of property, plant and equipment to total assets. The market leverage ratio varies greatly among countries. This ratio is 26.15% in

India, whereas in Turkey the average over the whole period is 7.62%. This table also presents the mean values of the CONC, RIGHTS and CREDITORS variables. Bank concentration varies greatly among countries. In Finland or South Africa, almost all bank assets were held by three banks during the period. However, in countries such as US or Taiwan, the percentage of bank assets held by the three largest commercial banks was less than 30%.

Table 3 reports the correlation matrix. The correlation between long-term leverage and total leverage is high. According to most of the previous empirical evidence, debt ratio correlates positively with firm size. The positive correlation of market long-term leverage with profitability and tangible assets and the negative correlation with growth opportunities are consistent with the predictions of the TOT. Moreover, country variables (CONC, RIGHTS, CREDITORS) are negatively correlated with the long-term debt ratio.

IV. Results

We initially compare our results with those obtained by Rajan and Zingales (1995) to evaluate differences stemming from the use of our different methodology and our different database. Table 4 shows the results obtained by Rajan and Zingales (1995) in the seven major industrialized countries and the results obtained for these countries with our database replicating their methodology and applying GMM.

The results of using our database tally with those reported by Rajan and Zingales (1995), except in the cases of Germany, France and Italy, for which Rajan and Zingales (1995) had a smaller number of observations. Estimations using OLS show that profitability has a negative influence on leverage in all countries, while tangibility and

size have a positive effect on leverage according to our results.[5] Market-to-book has a negative coefficient in all countries, except US and France. Rajan and Zingales (1995) also showed a negative influence on borrowing in these two countries.

The greatest differences result from applying GMM instead of OLS. Although profitability continues to have a negative influence on debt, with the exception of Italy, the other variables determining debt, size, tangibility and growth tend not to have a significant influence on the level of borrowing in the seven countries. These results point to the differences with the model estimated by Rajan and Zingales (1995) and the use of a partial-adjustment model in which part of the variation in the dependent variable is absorbed by the lagged dependent variable.

We also estimate equation [4] separately for each country to analyze the stability of firms' determinants across countries. Results in Table 5 indicate the existence of differences in the signs and significance of firm determinants of leverage among countries. This difference across countries in the determinants of capital structure is consistent with the relevance that country variables, such as bank concentration and the institutional environment, may have on the level and determinants of debt. This possible relevance is analyzed in the following tables.

Table 6 shows the results of the partial-adjustment model [4] for the whole sample of firms. The coefficients of time, country and industry dummies are not reported to save space. The positive and statistically significant coefficients of $DEBT_{t-1}$ suggest that

[5] Rajan and Zingales (1995) revealed a negative influence of size on leverage in Germany.

firms have a target leverage to which they partially adjust in each period. Coefficients of $DEBT_{t-1}$ take values of around 0.66, which implies values of α of approximately 0.34. [6]

The relationship between leverage and profitability of the firm is negative for all estimations in Table 6. This is the result most frequently found in previous studies analyzing determinants of firms' debt (Harris and Raviv, 1991; Rajan and Zingales, 1995; and Boot *et al*., 2001). This negative relation tallies with the POT because higher profitability increases the possibility of retaining earnings and reduces, all else being equal, the need for debt.

SIZE has a positive impact on firms' debt, which is consistent with size being an inverse proxy for the probability of bankruptcy. This result is similar to the one shown in Rajan and Zingales (1995), Fama and French (2002), Frank and Goyal (2003), Flannery and Rangan (2006), and Gaud *et al*. (2005).

Growth opportunities and PPE do not have statistically significant coefficients at the standard levels although their coefficients are consistent with the traditional arguments of the TOT. The negative coefficients for growth opportunities reflect the higher agency cost between shareholders and bondholders and the higher costs of financial distress. The positive coefficients of PPE in all the estimations seem to be consistent with the greater value of these assets as collateral.

In line with many previous studies that have tested TOT and POT, in this international sample we do not find results that validate the predominance of one theory over the other.[7]

[6] Previous evidence has shown values of α ranging between 0.79 for Spain and 0.14 for the Swiss market. Miguel and Pindado (2001) find an α of 0.79 for a panel data set for 133 Spain companies, Shyam-Sunder and Myers (1999), Jalivand and Harris (1984) and Auerbach (1985) a value of 0.59-0.70 for the US, Kremp *et al*. (1999) a value of 0.53 for German firms and a value of 0.28 for France, Ozkan (2001) a

The influence of bank concentration on debt ratio is positive. This is consistent with the theory that bank concentration favors close bank-firm relations and, therefore, reduces the agency cost and adverse selection problems associated with leverage.

The variable proxy for the protection of property rights (RIGHTS) has negative coefficients in all estimations. This result is consistent with our hypothesis H.1 and with the lower agency costs associated with equity issues in countries with better protection of property rights.

The protection of creditor rights (CREDITORS) has a positive effect on debt ratio in columns (5) to (6). This result is consistent with our hypothesis H.2 that better protection of creditors reduces the agency cost of debt and increases firm leverage. Giannetti (2003) finds a similar result in unlisted firms in eight European countries.

To analyze whether bank concentration complements or substitutes the effect caused by legal protection of creditor and property rights, we interact CONC with RIGHTS and CREDITORS in Table 7. Columns (3) and (4) show negative coefficients for the interaction term CONC*CREDITORS. It means that the higher the bank concentration, the lower the positive effect of creditor protection on firm leverage. This result suggests that bank concentration and protection of creditor rights are substitutes to reduce conflicts of interest between shareholders and debtholders, i.e. bank concentration is an alternative to favor the use of debt in countries with weak protection of creditor rights. Coefficients of CONC*RIGHTS in columns (1) and (2) are not statistically significant,

value of 0.52-0.57 for a panel data set for 390 UK companies and Gaud *et al*. (2005) a value of 0.14-0.29 for the Swiss market.

[7] Whereas Shyam-Sunder and Myers (1999) and Fama and French (2002) obtain results that are consistent with the predominance of the POT in the US, Flannery and Rangan (2006) suggest a greater validity of the TOT. However, Frank and Goyal (2003) and Leary and Roberts (2005) obtain evidence that is favorable to both theories without highlighting the predominance of either.

suggesting that the positive influence of protection of property rights on equity issues is independent of bank concentration.

A. Variation across countries of firms' determinants of leverage

We analyze whether bank market concentration and institutional characteristics in a country affect firms' determinants of leverage. This could explain differences across countries in the predominance of the TOT and POT. We analyze this possibility by including interaction terms between each country variable (bank concentration, property and creditor rights) and all firms' determinants. The extensive number of interaction terms indicates that it is best to include the interaction terms separately by country variable. Results are reported in Table 8.

The positive coefficients of PPE in columns (1) and (2) are consistent with using asset tangibility to reduce agency cost of debt, as suggested by the TOT. However, the negative coefficients for CONC*PPE indicate that higher market concentration reduces the importance of asset tangibility for gaining access to debt. That is, close relationships between banks and borrowers resulting from high bank concentration may facilitate the availability of debt to firms with intangible assets by reducing the agency costs associated with the use of debt. This result suggests that asset tangibility and bank market concentration are substitutes for reducing the agency cost of debt and that bank concentration reduces the validity of the TOT.

Columns (3) and (4) report the results of interactions between RIGHTS and firms' determinants of leverage. Coefficients of interaction terms suggest that the validity of the TOT increases with the quality of the institutional environment. The positive coefficients of RIGHTS*PROFIT and RIGHTS*PPE indicate that greater institutional

development increases the reduction of the agency costs stemming from higher profitability and a greater proportion of tangible assets. This result is consistent with increased difficulty for resolving agency costs and information asymmetries through private transactions in poor institutional environments. This means that it is more difficult for firms to obtain external funds and that the POT propositions may be more valid in such environments. However, improving the quality of the institutional environment helps to partially resolve conflicts of interest and allows debt contracts to take into account the characteristics of profitability or asset tangibility that determine the intensity of agency costs. In such a scenario, higher profitability and asset tangibility favor the use of debt and the TOT propositions are more valid.

The coefficients of the interaction of CREDITORS with PROFIT, GROWTH, and PPE are not statistically significant. As CREDITORS maintains the positive coefficient observed in all the previous estimates, our results suggest that creditor protection has a positive effect on the level of debt but does not affect firms' determinants of leverage nor the relative importance of the TOT and POT for explaining capital structure.

V. Robustness

Additional tests were carried out to check the robustness of our results. First, we control for the potential endogeneity of bank concentration and institutional country variables. Instead of using the observed values of each country variable we use instruments for them to identify their exogenous component and control for potential simultaneity bias. The instruments used, following Barth *et al.* (2004), are: legal origin dummy variables (English, French, German and Scandinavian), latitudinal distance from the equator, and religious composition dummy variables. Religious composition is measured as the

percentage of population in each country that is Roman Catholic, Protestant, Muslim, or "other". Results do not change.

Second, we also replicate estimations using an alternative definition of firm leverage. Using the total market leverage, defined as the ratio between long and short-term debt and market value of assets, results are similar to those shown in Tables 6, 7 and 8.

Third, as an alternative to the measure of property rights used by La Porta *et al.* (1998), we also use the Index of Economic Freedom published by the Heritage Foundation to measure the protection of property rights. This index measures the degree to which private property rights are protected, the independence of the judiciary, the existence of corruption within the judiciary, and the ability of individuals and businesses to enforce contracts. Results are not significantly different to those reported using the property rights index of La Porta *et al.* (1998).

VI. Conclusions

This paper analyzes how bank concentration and institutions affect capital structure using a panel database of 12,049 firms in 39 countries over the 1995-2004 period. The paper shows the relevance of bank market concentration for reducing information asymmetries and agency costs between banks and firms. The consequence is a positive influence of bank concentration on firms' long-term debt in line with the use of relationship banking to mitigate conflicts of interest between banks and debtors.

Our results also show that the protection of creditor rights also facilitates the use of long-term debt by firms whereas better protection of property rights promotes the issue of equity. Bank concentration substitutes the legal protection of creditor rights and the tangibility of firms' assets to reduce the agency cost of debt. So, the lower the

protection of creditors in the country and the lower the tangibility of firms' assets, the higher the positive marginal effects of bank concentration on firms' debt. This result implies that bank concentration, the protection of creditor rights, and asset tangibility are alternative mechanisms for facilitating access to debt for firms.

Finally, our paper provides arguments to explain the variation across countries of the predominance of the TOT and POT. As bank concentration and institutional country characteristics modify the agency costs and information asymmetries between firms and banks, the determinants of firm leverage also vary across countries. Results indicate that weak protection of property rights increases the agency cost of external funds leading to the preferential use of internal funds as proposed by the POT, whereas the validity of TOT propositions increases in countries with better protection of property rights.

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Table 1
Summary of predictions of the Trade-Off and Pecking Order theories

	Predictions on firm leverage	
Variable	TOT	POT
Profitability (PROF)	+	-
	a) Higher tax benefits b) Greater reduction of free cash flow conflict c) Lower bankruptcy costs	a) Higher possibilities of retaining earnings
Growth opportunities (GROWTH)	-	+
	a) Greater reduction of free cash-flow conflict b) Higher conflicts between bondholders and shareholders c) Higher costs of financial distress	a) Higher information asymmetries b) Higher financing needs
Tangible assets (TANG)	+	-
	a) Lower costs of financial distress b) Lower conflicts between bondholders and shareholders	a) Lower information asymmetries

Table 2
Descriptive Statistics

The table presents for each country the summary statistics of the dependent and independent variables. DEBT is the ratio between the book value of long-term debt and the market value of total assets; PROFIT is estimated as EBIT plus depreciation expenses and provisions (non-cash deductions from earnings) divided by total assets; GROWTH is growth opportunities and is measured by Tobin's Q; PPE is the ratio between the tangible assets (property, plant and equipment) and total assets; SIZE is the firm's sales (in millions of euros); CONC is the fraction of assets held by the three largest commercial banks in each country; RIGHTS measures the protection of property rights; CREDITORS measures creditor rights.

	# Obs	DEBT (%)	PROFIT (%)	GROWTH	PPE (%)	SIZE	CONC (%)	RIGHTS	CREDITORS
Germany	2,642	13.69	6.70	3.17	19.05	10665.23	63.34	1	3
Argentina	129	19.64	10.72	2.97	44.82	434.51	41.41	3.09	1
Australia	1,749	11.95	-0.29	3.06	33.02	378.48	63.85	1	1
Austria	243	15.45	10.65	1.71	34.37	645.35	70.71	1	3
Belgium	442	14.67	12.09	2.60	44.38	662.99	87.86	1	2
Brazil	752	19.27	15.88	1.78	37.83	734.31	42.20	3	1
Canada	2,292	15.57	4.23	2.92	41.93	707.59	53.92	1	1
Chile	425	14.91	10.69	1.53	50.00	253.47	55.94	1	2
South Korea	2,328	20.57	11.08	0.94	40.68	1018.28	45.72	1.37	3
Denmark	583	16.49	8.57	2.57	34.35	382.89	77.89	1	3
Philippines	333	17.85	6.81	1.09	46.10	186.44	45.76	2.80	0
Finland	545	18.07	12.86	2.39	30.91	1249.26	98.35	1	1
France	2,414	14.25	10.78	3.25	18.81	2030.46	55.51	2	0
Greece	902	8.46	11.56	3.93	31.24	183.45	67.97	2.52	1
Hong Kong	2,009	10.19	2.96	2.75	32.73	248.60	68.01	1	4
India	1,506	26.15	15.61	2.41	41.20	473.80	35.49	3	4
Indonesia	798	20.57	11.51	3.08	42.01	160.14	57.86	3.70	4
Ireland	188	16.48	8.82	2.67	28.90	931.67	58.00	1	1
Israel	184	17.49	6.20	2.26	27.89	477.67	74.88	2	4
Italy	711	15.45	8.71	2.58	21.90	1678.95	35.82	2	2
Japan	8,132	15.72	6.52	1.50	31.05	2461.29	36.80	1.50	2
Malaysia	2,375	11.07	7.65	1.47	42.71	133.63	43.21	2.73	4
Mexico	401	24.23	11.22	1.02	49.30	1031.86	65.77	3	0
Netherlands	629	14.52	12.21	4.61	26.10	2796.25	69.00	1	2
Norway	385	19.24	2.67	3.42	26.40	768.06	90.32	1	2
New Zealand	209	14.99	-14.71	2.46	37.58	184.68	74.15	1	3
Pakistan	443	16.44	16.49	1.49	45.15	117.99	57.60	3.86	4
Peru	188	16.82	13.42	1.10	46.27	89.02	70.90	3.45	0
Portugal	242	20.30	27.44	1.39	35.04	283.83	86.05	2	1
Singapore	1,294	12.35	6.54	1.68	38.10	160.61	92.35	1	4
Spain	482	14.23	11.76	3.14	35.74	1494.03	62.31	2	2
Sri Lanka	776	10.85	13.99	2.39	30.88	450.45	73.85	3	3
South Africa	1,023	12.91	1.14	2.96	20.57	955.50	97.22	1.33	2
Switzerland	746	18.55	10.09	2.58	34.96	636.74	88.24	1	1
Thailand	1,255	15.22	12.56	1.52	43.77	155.86	51.74	2.19	3
Taiwan	2,699	11.23	7.85	1.43	34.18	296.14	29.59	1.71	2
Turkey	546	7.62	20.87	2.82	35.32	259.91	60.55	2.56	2
UK	4,015	14.59	10.37	3.28	33.16	2543.69	45.60	1	4
US	12,562	17.01	9.43	4.15	27.08	2464.32	28.40	1	1
Mean		15.33	8.48	2.67	32.63	1438.74	48.74	1.52	2.11
Standard Dev.		17.51	31.50	31.81	35.54	7330.84	19.09	0.77	1.24
First quartile		0.32	4.78	0.75	15.30	50.09	33.73	1	1
Median		9.47	10.24	1.33	29.48	180.36	44.49	1	2
Third quartile		24.35	16.00	2.42	46.13	663.52	62.22	2	3

Table 3
Correlations

The table presents the correlation matrix. DEBT1 is the ratio between the book value of long-term debt and the market value of total assets; TDEBT is the ratio between the book value of debt (long-term and short-term debt) and the market value of total assets; PROFIT is estimated as EBIT plus depreciation expenses and provisions (non-cash deductions from earnings) divided by total assets; GROWTH is growth opportunities and is measured by Tobin's Q; PPE is the ratio between the tangible assets (property, plant and equipment) and total assets; SIZE is the natural logarithm of sales; CONC is the fraction of assets held by the three largest commercial banks in each country; RIGHTS measures the protection of property rights; CREDITORS measures creditor rights. ***, **, and * represent significance at the 1%, 5% and 10% levels, respectively.

	DEBT	TDEBT	PROFIT	GROWTH	PPE	SIZE	CONC	CREDITORS
TDEBT	0.734***							
PROFIT	0.011***	-0.009***						
GROWTH	-0.021***	-0.035***	0.057***					
PPE	0.186***	0.157***	0.009***	-0.013***				
SIZE	0.221***	0.156***	0.058***	-0.013***	0.005			
CONC	-0.064***	-0.020***	-0.010***	-0.001	0.023***	-0.247***		
CREDITORS	-0.013***	0.110***	0.014***	-0.014	0.0596***	-0.091***	0.230***	
RIGHTS	-0.023***	-0.146***	-0.025***	0.016***	-0.053***	0.155***	-0.025***	-0.161***

Table 4. Results compared with Rajan and Zingales (1995)

The table presents the results obtained by Rajan and Zingales (1995) and compares them with our database, carrying out estimation using both OLS and GMM according to the model [4].

		Intercept	PROFIT	GROWTH	PPE	SIZE	D_{t-1}	# Obs
US	RZ (1995)		-0.60***	-0.08***	0.33***	0.03***		2207
	OLS	0.0469***	-0.0976***	-0.0000	0.2295***	0.0208***		18202
	GMM	0.0352***	-0.0824***	-0.0002	0.1293*	0.0140	0.6093***	12562
Japan	RZ (1995)		-2.25***	-0.07***	0.58***	0.07***		313
	OLS	-0.2108***	-0.5794***	-0.0007***	0.3865***	0.0269***		11512
	GMM	0.0143**	-0.2991***	-0.0013*	0.0626	0.0063	0.4731***	8132
Germany	RZ (1995)		0.17	-0.21***	0.28*	-0.06***		176
	OLS	-0.1057***	-0.0163***	-0.0003***	0.3435***	0.0103***		3954
	GMM	-0.0361***	-0.0983**	-0.0001	-0.0223	-0.0034	0.5477***	2642
France	RZ (1995)		-0.22	-0.15**	0.18	-0.00		126
	OLS	0.0489**	-0.1931***	-0.0002	0.2643***	0.0175***		3563
	GMM	0.0037	-0.1343**	-0.0005	0.1811	0.0772***	0.4615***	2414
Italy	RZ (1995)		-0.95	-0.18*	0.48**	0.04		98
	OLS	-0.1250***	-0.1887***	-0.0014*	0.1671***	0.0352***		1006
	GMM	-0.0237	-0.0303	0.0001	-0.2776*	0.0245	0.2794***	711
UK	RZ (1995)		-0.47**	-0.06**	0.27***	0.01		544
	OLS	-0.0849***	-0.1486***	-0.0002*	0.1541***	0.0210***		5640
	GMM	0.0162	-0.0907**	0.0002	0.0163	0.0075	0.6172***	4015
Canada	RZ (1995)		-0.48***	-0.13***	0.11	0.05***		275
	OLS	0.0263	-0.0633***	-0.0006**	0.2220***	0.0243***		3585
	GMM	0.0145	-0.1305***	0.0003	0.1087	0.0267***	0.5734***	2292

Table 5. GMM estimates by country

Regressions are estimated using the Arellano and Bond (1991) one-step GMM difference estimator for panel data with lagged dependent variables. The dependent variable is the ratio between the book value of long-term debt and the market value of total assets. As explanatory variables, we include one lag of the dependent variable ($DEBT_{t-1}$). PROFIT is estimated as EBIT plus depreciation expenses and provisions (non-cash deductions from earnings) divided by total assets. GROWTH is growth opportunities and is measured by Tobin's Q. PPE is the ratio between the tangible assets (property, plant and equipment) and total assets. SIZE is the natural logarithm of sales. T-statistics are between brackets. ***, ** and * represent the significance at the 1%, 5% and 10% levels, respectively.

	Intercept	D_{t-1}	PROFIT	GROWTH	PPE	SIZE	# Obs	m1	m2
Germany	-0.0361***	0.5477***	-0.0983**	-0.0001	-0.0223	-0.0034	2,642	-6.99***	0.92
	(-4.35)	(7.59)	(-2.13)	(-1.02)	(-0.20)	(-0.16)			
Argentina	0.0552	0.0672	-0.3579**	-0.0020***	0.1454*	-0.0051	129	-2.62***	1.57
	(0.76)	(0.37)	(-2.24)	(-5.12)	(1.76)	(-0.12)			
Australia	0.0556***	0.4928***	-0.0157	0.0011	0.0085	0.0047	1,749	-6.70***	-0.69
	(3.34)	(8.13)	(-1.08)	(0.60)	(0.09)	(0.87)			
Austria	-0.0319***	0.2873***	-0.2837***	-0.0027	0.0297	0.0382***	243	-2.25**	-1.23
	(-3.02)	(3.49)	(-7.09)	(-0.75)	(0.24)	(2.79)			
Belgium	0.0080	0.3710***	-0.0736	-0.0039	-0.0048***	-0.0132	442	-4.39***	0.27
	(0.64)	(6.38)	(-1.10)	(-1.28)	(-6.84)	(-0.96)			
Brazil	0.0363*	0.3276***	-0.1853	-0.0034	0.0488	0.0052	752	-5.65***	0.03
	(1.70)	(6.13)	(-1.64)	(-1.20)	(0.28)	(0.23)			
Canada	0.0145	0.5734***	-0.1305***	0.0003	0.1087	0.0267***	2,292	-8.01***	-0.40
	(1.02)	(10.97)	(-3.03)	(0.39)	(1.44)	(2.80)			
Chile	0.1476	0.2725***	-0.4201***	0.0003	0.0589	0.0526***	425	-5.10***	1.10
	(1.30)	(3.20)	(-3.61)	(0.33)	(0.55)	(3.18)			
South Korea	0.0035	0.3607***	-0.2255***	-0.0000	0.3389**	0.0000	2,328	-8.37***	-1.78*
	(0.14)	(7.66)	(-2.63)	(-0.02)	(2.52)	(0.00)			
Denmark	0.0031	0.4672***	-0.0044	-0.0006	0.1478	0.0233	583	-4.31***	-0.16
	(0.25)	(8.13)	(-0.22)	(-0.95)	(2.03)	(1.49)			
Philippines	-0.0095	0.3446***	0.0388	0.0144	-0.0191	0.0036	333	-2.94***	-0.61
	(-0.21)	(4.49)	(0.36)	(1.16)	(-0.20)	(0.24)			
Finland	0.0278***	0.4991***	-0.2457***	-0.0016	-0.0284	0.0057	545	-5.19***	-0.92
	(2.86)	(8.01)	(-2.68)	(-1.36)	(-0.33)	(0.21)			
France	0.0037	0.4615***	-0.1343**	-0.0005	0.1811	0.0772***	2,414	-8.56***	-0.05
	(0.35)	(8.13)	(-2.19)	(-0.73)	(1.41)	(3.72)			
Greece	-0.0472***	0.2006**	-0.3288***	0.0009	0.0749	0.0151	902	-4.39***	0.14
	(-2.72)	(2.19)	(-2.90)	(1.13)	(0.80)	(0.78)			
Hong Kong	-0.0028	0.3556***	-0.0210	0.0003	0.2565***	0.0224	2,009	-7.37***	-0.40
	(-0.26)	(8.15)	(-0.53)	(1.39)	(3.80)	(1.44)			
India	0.0174*	0.4041***	-0.3264***	-0.0003	0.1491*	-0.0099	1,506	-7.87***	0.75
	(1.73)	(5.82)	(-3.27)	(-0.71)	(1.85)	(-0.56)			
Indonesia	-0.0492	0.3315***	-0.0105	-0.0008	0.0297	0.0311	798	-5.45***	-0.87
	(-1.50)	(4.70)	(-0.10)	(-0.70)	(0.25)	(1.00)			
Ireland	0.0081	0.2694***	-0.0669	-0.0081	0.2510*	0.0763	188	-2.73***	1.03
	(0.50)	(3.90)	(-0.78)	(-1.63)	(1.74)	(1.40)			
Israel	-0.0223**	0.3962***	0.0275	0.0019	0.3446**	0.0400	184	-2.72***	-1.62
	(-2.00)	(3.72)	(0.56)	(1.48)	(2.18)	(1.59)			
Italy	-0.0237	0.2794***	-0.0303	0.0001	-0.2776*	0.0245	711	-4.99***	1.68*
	(-1.46)	(2.57)	(-0.68)	(0.56)	(-1.73)	(1.26)			
Japan	0.0143**	0.4731***	-0.2991***	-0.0013*	0.0626	0.0063	8,132	-14.92***	1.45
	(2.22)	(12.74)	(-4.24)	(-1.82)	(0.78)	(0.26)			
Malaysia	0.0046	0.4731***	-0.0750	-0.0016	0.0321	0.0011	2,375	-7.23***	0.21
	(0.34)	(7.80)	(-1.10)	(-0.89)	(0.43)	(0.09)			
Mexico	0.0359	0.2586***	-0.020	-0.0510***	-0.3008*	0.0534**	401	-3.99***	-1.59
	(1.07)	(4.74)	(-0.12)	(-2.69)	(-1.85)	(2.49)			
Netherlands	0.0159	0.1631	0.0729	-0.0004	0.5160**	-0.0212	629	-2.63***	-0.62
	(1.31)	(1.02)	(1.15)	(-0.45)	(2.38)	(-0.82)			
Norway	0.0513**	-0.0198	0.0170	0.0004	0.2866**	0.0103	385	-2.39**	0.67
	(2.27)	(-0.12)	(1.10)	(1.29)	(2.38)	(0.62)			
New Zealand	0.0507	0.3115***	-0.0070**	-0.0060	0.0388	0.0235	209	-3.34***	1.31
	(1.53)	(5.79)	(-2.49)	(-1.30)	(0.72)	(1.35)			
Pakistan	-0.0183	0.5025***	-0.1365	-0.0119***	0.2029**	0.0177	443	-4.12***	-1.91*
	(-1.29)	(8.43)	(-1.51)	(-4.24)	(2.39)	(0.76)			
Peru	0.0292	0.2741***	0.0098	-0.0067	0.0003	-0.0426	188	-3.47***	-1.86*
	(0.78)	(2.85)	(0.22)	(-0.66)	(0.00)	(-0.86)			
Portugal	0.0244	0.5479***	-0.0006	-0.0078***	0.1021	0.0239	242	-3.81***	0.20
	(1.12)	(9.11)	(-0.45)	(-3.20)	(0.87)	(0.63)			
Singapore	-0.0143	0.4130***	0.0161	-0.0008	0.2717***	-0.0065	1,294	-5.67***	0.41
	(-0.57)	(6.21)	(0.26)	(-0.44)	(2.70)	(-0.33)			
Spain	-0.0082	0.4643***	-0.1811	-0.0008	0.0881	0.0130	482	-3.63***	-0.76
	(-0.60)	(8.22)	(-1.31)	(-0.73)	(0.86)	(0.51)			
Sri Lanka	0.0022	0.4333***	0.0275	-0.0010**	0.1451*	-0.0154	776	-4.83***	-0.83
	(0.17)	(5.27)	(1.27)	(-2.15)	(1.85)	(-1.20)			

South Africa	-0.0077 (-0.54)	0.3279*** (4.10)	-0.0008 (-0.04)	-0.0013 (-1.43)	0.2358*** (2.71)	0.0110 (1.37)	1,023	-4.88***	1.25
Switzerland	-0.0093 (-0.76)	0.5964*** (9.58)	-0.0339 (-0.56)	0.0002 (0.98)	0.2616** (2.42)	0.0592*** (2.96)	746	-3.87***	0.22
Thailand	-0.0604*** (-2.59)	0.5018*** (9.80)	-0.2858** (-2.23)	-0.0004 (-0.16)	0.0085 (0.08)	0.0788** (1.99)	1,255	-6.42***	1.14
Taiwan	-0.0079 (-1.28)	0.4102*** (8.35)	-0.1238** (-2.06)	-0.0057* (1.79)	0.2202*** (2.62)	-0.0172 (-1.34)	2,699	-9.66***	-1.15
Turkey	0.0396 (0.74)	0.1877*** (2.86)	-0.1387** (-2.32)	-0.0012 (-1.29)	0.0781 (1.05)	-0.0514 (-1.41)	546	-4.46***	-0.40
UK	0.0162 (1.61)	0.6172*** (11.28)	-0.0907** (-2.26)	0.0002 (0.47)	0.0163 (0.16)	0.0075 (0.39)	4,015	-9.85***	-0.66
US	0.0352*** (5.37)	0.6093*** (20.90)	-0.0824*** (-3.36)	-0.002 (-0.98)	0.1293* (1.73)	0.0140 (1.34)	12,562	-18.52***	0.49

Table 6. Determinants of leverage

Regressions are estimated using the Arellano and Bond (1991) one-step GMM difference estimator for panel data with lagged dependent variables. The dependent variable is the ratio between the book value of long-term debt and the market value of total assets. As explanatory variables, we include one lag of the dependent variable ($DEBT_{t-1}$). PROFIT is estimated as EBIT plus depreciation expenses and provisions (non-cash deductions from earnings) divided by total assets. GROWTH is growth opportunities and is measured by Tobin's Q. PPE is the ratio between the tangible assets (property, plant and equipment) and total assets. SIZE is the natural logarithm of sales. RIGHTS measures the protection of property rights. CREDITORS measures creditor rights, and CONC is the fraction of assets held by the three largest commercial banks in each country. T-statistics are between brackets. ***, ** and * represent the significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.0056*	-0.0130	0.0516***	-0.0017	0.0219***	-0.0133
	(1.67)	(-1.40)	(6.98)	(-0.25)	(3.02)	(-1.12)
$DEBT_{t-1}$	0.6644***	0.6643***	0.6658***	0.6644***	0.6658***	0.6656***
	(42.10)	(42.05)	(42.21)	(42.10)	(42.21)	(42.16)
PROFIT	-0.0642***	-0.0631***	-0.0582**	-0.0642***	-0.0582**	-0.0570**
	(-2.72)	(-2.69)	(-2.47)	(-2.72)	(-2.47)	(-2.44)
GROWTH	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008	-0.0008
	(-1.52)	(-1.53)	(-1.52)	(-1.52)	(-1.52)	(-1.52)
PPE	0.0688	0.0668	0.0796	0.0191	0.0796	0.0778
	(1.50)	(1.48)	(1.59)	(1.50)	(1.59)	(1.57)
SIZE	0.0191***	0.0182***	0.0181***	0.0191***	0.0181***	0.0171***
	(2.88)	(2.75)	(2.77)	(2.88)	(2.77)	(2.64)
CONC		0.0281***				0.0373***
		(2.75)				(2.79)
RIGHTS			-0.0091***		-0.0091***	-0.0096***
			(-5.70)		(-5.70)	(-5.93)
CREDITORS				0.0024	0.0099***	0.0113***
				(1.17)	(3.94)	(4.37)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
m_1	-20.36***	-20.48***	-21.09***	-20.36***	-21.09***	-21.30***
m_2	0.98	0.96	1.03	0.98	1.03	1.00
# observations	59,577	59.411	59,577	59,577	59,577	59,411
# firms	12,049	12.049	12,049	12,049	12,049	12,049

Table 7. Influence of bank concentration and institutions on firms' debt

Regressions are estimated using the Arellano and Bond (1991) one-step GMM difference estimator for panel data with lagged dependent variables. The dependent variable is the ratio between the book value of long-term debt and the market value of total assets. As explanatory variables, we include one lag of the dependent variable ($DEBT_{t-1}$). PROFIT is estimated as EBIT plus depreciation expenses and provisions (non-cash deductions from earnings) divided by total assets. GROWTH is growth opportunities and is measured by Tobin's Q. PPE is the ratio between the tangible assets (property, plant and equipment) and total assets. SIZE is the natural logarithm of sales. RIGHTS measures the protection of property rights. CREDITORS measures creditor rights, and CONC is the fraction of assets held by the three largest commercial banks in each country. T-statistics are between brackets. ***, ** and * represent the significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Intercept	0.0173 (1.04)	-0.0179 (-0.79)	-0.1000*** (-5.09)	-0.0821*** (-4.10)
$DEBT_{t-1}$	0.6657*** (42.16)	0.6657*** (42.16)	0.6637*** (42.04)	0.6650*** (42.14)
PROFIT	-0.0571** (-2.44)	-0.0571** (-2.44)	-0.0633*** (-2.69)	-0.0578** (-2.47)
GROWTH	-0.0008 (-1.52)	-0.0008 (-1.52)	-0.0008 (-1.52)	-0.0008 (-1.52)
PPE	0.0780 (1.57)	0.0780 (1.57)	0.0677 (1.49)	0.0776 (1.57)
SIZE	0.0170** (2.63)	0.0170** (2.63)	0.0167*** (2.57)	0.0160** (2.49)
CONC	0.0447 (1.33)	0.0447 (1.33)	0.1383*** (5.33)	0.1331*** (5.12)
RIGHTS	-0.0086** (-2.19)	-0.0086** (-2.19)		-0.0087*** (-5.32)
CREDITORS		0.0117*** (3.52)	0.0405*** (4.50)	0.0433*** (4.81)
CONC*RIGHTS	-0.0021 (-0.25)	-0.0021 (-0.25)		
CONC*CREDITORS			-0.0543*** (-4.22)	-0.0476*** (-3.66)
Country dummies	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
m_1	-21.27***	-21.27***	-20.73***	-21.44***
m_2	1.00	1.00	0.96	1.00
# observations	59,411	59,411	59,411	59,411
# firms	12,049	12,049	12,049	12,049

Table 8. Influence of bank concentration and institutions on determinants of firms' debt

Regressions are estimated using the Arellano and Bond (1991) one-step GMM difference estimator for panel data with lagged dependent variables. The dependent variable is the ratio between the book value of long-term debt and the market value of total assets. As explanatory variables, we include one lag of the dependent variable ($DEBT_{t-1}$). PROFIT is estimated as EBIT plus depreciation expenses and provisions (non-cash deductions from earnings) divided by total assets. GROWTH is growth opportunities and is measured by Tobin's Q. PPE is the ratio between the tangible assets (property, plant and equipment) and total assets. SIZE is the natural logarithm of sales. RIGHTS measures the protection of property rights. CREDITORS measures creditor rights, and CONC is the fraction of assets held by the three largest commercial banks in each country. T-statistics are between brackets. ***, ** and * represent the significance at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-0.0178* (-1.73)	-0.0284** (-2.19)	0.0308*** (3.30)	0.0019 (0.15)	0.0058 (0.84)	-0.0048 (-0.40)
$DEBT_{t-1}$	0.6533*** (43.13)	0.6554*** (43.23)	0.6405*** (41.20)	0.6409*** (41.18)	0.6529*** (42.46)	0.6549*** (42.58)
PROFIT	-0.0195 (-0.51)	-0.0184 (-0.49)	-0.5023*** (-3.50)	-0.5024*** (-3.52)	-0.0532* (-1.69)	-0.0481 (-1.55)
GROWTH	-0.0004 (-0.47)	-0.0004 (-0.49)	-0.0043* (-1.81)	-0.0042* (-1.79)	-0.0003 (-0.53)	-0.0004 (-0.58)
PPE	0.22292*** (3.47)	0.2665*** (4.00)	-0.1342 (-1.54)	-0.1305 (-1.51)	0.0794 (1.01)	0.0783 (0.94)
SIZE	0.0101 (1.48)	0.0076 (1.11)	0.0452*** (4.86)	0.0423*** (4.62)	0.0393*** (5.22)	0.0335*** (4.64)
CONC	0.0474*** (3.24)	0.0593*** (4.02)		0.0305** (2.23)		0.0370*** (2.83)
RIGHTS		-0.0101*** (-6.45)	-0.0065*** (-3.07)	-0.0075*** (-3.39)		-0.0099*** (-6.21)
CREDITORS		0.0121*** (4.73)		0.0079*** (2.78)	0.0028 (1.32)	0.0118*** (4.60)
CONC * PROFIT	-0.0559 (-0.83)	-0.0504 (-0.79)				
CONC* GROWTH	-0.0004 (-0.29)	-0.0004 (-0.27)				
CONC* PPE	-0.2433*** (-2.57)	-0.2775*** (-2.77)				
CONC* SIZE	0.0094* (1.47)	0.0117* (1.76)				
RIGHTS * PROFIT			0.1137*** (3.16)	0.1141*** (3.19)		
RIGHTS* GROWTH			0.0009 (1.40)	0.0009 (1.38)		
RIGHTS* PPE			0.0392** (1.87)	0.0387* (1.86)		
RIGHTS* SIZE			-0.0061*** (-4.41)	-0.0058*** (-4.21)		
CREDITORS * PROFIT					-0.0018 (-0.11)	-0.0012 (-0.08)
CREDITORS * GROWTH					-0.0002 (-0.49)	-0.0001 (-0.42)
CREDITORS * PPE					-0.0055 (-0.22)	-0.0002 (-0.01)
CREDITORS * SIZE					-0.0097*** (-2.86)	-0.0084** (-2.50)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
m_1	-29.09***	-30.48***	-10.60***	-10.68***	-30.86***	-31.64***
m_2	1.05	1.10	1.20	1.17	1.02	1.03
# observations	59,250	59,250	59,577	59,411	59,577	59,411
# firms	12,049	12,049	12,049	12,049	12,049	12,049

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