

# An International Comparison of Capital Structure and Debt Maturity Choices

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## Abstract

This study examines how the institutional environment influences capital structure and debt maturity choices of firms in 39 developed and developing countries. We find that a country's legal and tax system, corruption, and the preferences of capital suppliers explain a significant portion of the variation in leverage and debt maturity ratios. Specifically, firms in more corrupt countries and those with weaker laws tend to use more debt, especially short-term debt; explicit bankruptcy codes and deposit insurance are associated with higher leverage and more long-term debt. More debt is used in countries where there is a greater tax gain from leverage.

## I. Introduction

Corporate financing choices are determined by a combination of factors that are related to the characteristics of the firm as well as to their institutional environment. Although most studies focus on the importance of firm characteristics by

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examining corporate financing choices within individual countries,<sup>1</sup> there is a growing literature that considers how institutional differences affect these choices. To explore the cross-sectional variation in the institutional environment, these papers examine capital structure choices across countries (Booth, Aivazian, Demirgüç-Kunt, and Maksimovic (2001), Claessens, Djankov, and Nenova (2001), Demirgüç-Kunt and Maksimovic (1996), (1998), (1999), Giannetti (2003), and De Jong, Kabir, and Nguyen (2008)).

This study builds on this recent literature in 2 important ways. First, because we consider these issues within a panel that includes industry fixed effects, together with firm-level variables, we identify the variation in capital structure across countries that cannot be explained by cross-country differences in the industrial mix and firm-level characteristics. Second, we consider a larger number of countries and a number of important institutional characteristics not previously explored in this literature.

To understand our motivation, it is useful to illustrate the importance of country-level factors relative to industry factors in determining capital structure. A regression of firm leverage, measured as the book value of debt over the market value of the firm, on firm-specific variables, industry fixed effects, and country fixed effects, has an adjusted  $R^2$  of 0.19. When the regression is estimated with all variables except for country fixed effects, the adjusted  $R^2$  is reduced to 0.15.<sup>2</sup> However, in a regression that includes all variables except for industry dummy variables the adjusted  $R^2$  is reduced by only  $\frac{1}{2}$  as much, to 0.17. When the full regression is estimated with debt maturity, measured as the book value of long-term debt to the book value of total debt, as the dependent variable, the  $R^2$  is 0.25. When the regression is estimated with all variables except for country fixed effects, the  $R^2$  is substantially reduced to 0.09. However, in the regression that includes all variables except for industry fixed effects, the  $R^2$  is only slightly reduced to 0.23.

These experiments indicate that the country in which the firm resides is a more important determinant of how it is financed than is its industry affiliation, which in turn suggests that differences in country-level institutional factors are likely to have a 1st-order effect on capital structure choices. To examine this possibility in more detail, we estimate a panel regression on a large sample of firms from 39 countries that examines the extent to which cross-country differences in capital structures can be explained by differences in tax policies, legal environment, and the importance and regulation of financial institutions.

Our evidence suggests that the explanatory power of a model that includes between 10 and 12 institutional variables explains the cross section of debt ratios and maturity structures about as well as a model with 39 country dummy variables. These regressions indicate that firms tend to use more debt in countries

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<sup>1</sup>Examples of empirical studies that examine the association between firm characteristics and capital structure within specific countries include Titman and Wessels (1988) (U.S.), Campbell and Hamao (1995) (Japan), and Gatward and Sharpe (1996) (Australia). Barclay and Smith (1995), Stohs and Mauer (1996), and Guedes and Opler (1996) examine the association between firm characteristics and debt maturity in the United States. Gatward and Sharpe undertake a similar study of debt maturity in Australia.

<sup>2</sup>This result is similar in character to a regression reported by Booth et al. (2001).

with a greater tax gain from leverage, which contrasts with Booth et al. (2001) who, in an earlier study of mostly developing economies, do not find a significant relation between debt ratios and tax policy. In addition, we find that the strength of a country's legal system and public governance importantly affect firm capital structure. Weaker laws and more government corruption are associated with higher corporate debt ratios and shorter debt maturity.<sup>3</sup> We also find that countries with deposit insurance or explicit bankruptcy codes, like the Chapter 11 and Chapter 7 rules in the United States, have higher debt ratios and longer debt maturities. These findings reinforce the prior literature on the importance of the legal system, the enforcement of investor rights, and financial distress resolution (Claessens, Djankov, and Mody (2001), Djankov, Hart, McLiesh, and Shleifer (2008), and La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997), (1998)).

We also find that the preferences of the suppliers of capital influence capital structure choices.<sup>4</sup> In particular, firms in countries with larger banking sectors have shorter maturity debt, but the association between financing choices and the size of the insurance industry is weak. In addition, firms in countries with higher levels of defined contribution pension fund assets use relatively more equity, while firms in countries with higher levels of defined benefit pension fund assets use relatively more long-term debt, which could reflect differences in how these pension assets are invested. Finally, we find that firms in countries with larger government bond markets have lower debt ratios and shorter maturity debt, indicating that government bonds tend to crowd out long-term corporate debt.

The paper is organized as follows. Section II discusses the association between country-level institutional factors and financial choices. Section III introduces the set of firm-level variables that influence capital structure choice. Section IV describes the sample. Section V presents our results, and Section VI draws some conclusions.

## II. Institutional Factors and Cross-Country Determinants of Capital Structure

This section discusses how institutional differences between countries can potentially affect how firms within these countries are financed. Specifically, we consider institutional variables that reflect i) the ability of creditors to enforce legal contracts, ii) the tax treatment of debt and equity, and iii) the importance and regulation of financial institutions that represent major suppliers of capital.

We expect that weaker legal systems and weaker public enforcement of laws should be associated with less external equity and shorter maturity debt contracts. We also expect that firms in countries with lower tax preferences for debt will be less levered. Finally, we examine whether the suppliers of capital matter. Although most of the capital structure literature focuses on the financing

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<sup>3</sup>This result is consistent with Demirgüç-Kunt and Maksimovic (1999).

<sup>4</sup>One should interpret these results with some caution, because an analysis of capital suppliers does raise endogeneity concerns. In particular, we expect financial institutions to develop in ways that satisfy the financing needs of firms. However, as discussed in Section II.C, we have selected variables that are less likely to be influenced by the capital structure preferences of corporations.

preferences of firms, at the aggregate level, firm capital structures are determined by the preferences of the suppliers of capital (i.e., investors) as well as the preferences of firms. In particular, exogenous factors that lead suppliers of capital to prefer to hold more or less equity relative to debt will also influence the capital structures of firms.

The following subsections introduce the variables that we consider and discuss how these variables are likely to influence typical debt ratios within our sample of countries.

## A. Legal System

Incentive problems (i.e., conflicts of interest between corporate insiders (managers, employees, and/or majority shareholders) and external investors) are important factors that shape corporate policy and productivity. As extensively explored by La Porta et al. (1998), the extent to which contracts can be used to mitigate these problems depends on the legal system, which consists of both the content of the laws and the quality of their enforcement. In the following discussion we will review how these legal factors influence financing choices.

In countries with weak laws and enforcement, financial instruments (e.g., short-term debt) that allow insiders less discretion and are contractually easier to interpret, are likely to dominate. La Porta et al. (1998) find significant variation in the extent of legal protection of external investors across both developed and developing countries and argue that legal systems based on common law offer outside investors (debt and equity) better protection than those based on civil law, resulting in higher security values (La Porta, Lopez-de-Silanes, Shleifer, and Vishny (2002)). All else being equal, this suggests that common law countries will use more outside equity and longer-term debt. To test whether this is the case, we define an indicator variable that takes a value of 1 if the country's legal system is based on common law, and 0 otherwise.

In addition to the content of the law, the integrity and enforceability of the law is also important, which we measure by the perceived corruption level in a country. Corruption has been identified as a key factor shaping a country's legal system (Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2003)), resource allocation and firm behavior (La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1999), Fisman (2001), and Johnson and Mitton (2003)).

We are not the first to examine the roles of legal factors in corporate financing choices. Demirgüç-Kunt and Maksimovic (1999) find that firms have longer duration debt in countries where the legal system has more "integrity." Integrity, measured by a law and order index prepared by the International Country Risk Guide, reflects the extent to which individuals are willing to rely on the legal system to make and implement laws, mediate disputes, and enforce contracts. In contrast, we focus on corruption, defined as the abuse of public office for private gain, measured as the Corruption Perception Index (Transparency International), which reflects the extent to which corruption is perceived to exist among public officials and politicians. An advantage of this index is that it provides both time-series and cross-sectional variation; most other measures of integrity, such as the law and order index, do not have comparable historical data.

We reverse the index, so that in our study, it ranges from 0 to 10, with larger values indicating more severe corruption. In the context of the firm's capital structure choices, the index proxies for the threat of all or part of investor rights being expropriated by managers or public officials. Debt is expected to be used relatively more than equity when the public sector is more corrupt, since it is easier to expropriate outside equity holders than debt holders. Similarly, one can argue that since short-term debt is more difficult to expropriate, it will be used relatively more frequently than long-term debt in more corrupt countries.

Finally, we investigate the enforcement of debt contracts. As identified by Djankov et al. (2008), the legal structure that specifies the resolution of default differs widely across countries. Indeed, in some countries, like the United States, there is an explicit bankruptcy code that specifies and limits the rights and claims of creditors and facilitates the reorganization of the ongoing business. In contrast, in other countries with no bankruptcy codes or only weakly enforced codes, creditors often have difficulty accessing collateral by liquidating distressed firms or seizing distressed firm assets (Claessens, Djankov, and Mody (2001), Claessens, Djankov, and Klapper (2003), Claessens and Klapper (2005), Davydenko and Franks (2008), and Dinç (2005)). With poorly defined bankruptcy procedures, senior lenders typically possess inferior bargaining power relative to the borrower in out-of-court renegotiations due to the weak laws and lenders' inherent information disadvantage about the collateral relative to borrowers (Degryse and Ongena (2005), Petersen and Rajan (1994)) lowering demand for long-term debt. On the borrower side, the existence of defined bankruptcy procedures for corporate reorganization and the deferral of debt payments increase the incentive for firms to issue long-term debt since a default can be less onerous.<sup>5</sup> We conjecture that the lack of explicit bankruptcy codes and enforcement discourages the use of debt, in particular long-term debt. Based on Djankov et al. (2008), we define an indicator variable that takes a value of 1 for those countries in which an insolvent firm can undergo a court-supervised reorganization proceeding.

## B. Tax Code

The tax system in general, and specifically the tax treatment of interest and dividend payments, has been recognized as an important factor influencing capital structure choices since the seminal work of Modigliani and Miller (1963).<sup>6</sup> We observe 3 main categories of tax regimes.

The first is the classical tax system in which dividend payments are taxed at both the corporate and personal levels and interest payments are tax-deductible corporate expenses. The classical tax system exists in China, Hong Kong, India, Indonesia, Ireland (post-1999), Israel, Japan, Korea (pre-2001), Netherlands,

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<sup>5</sup>The influence of the existence of a bankruptcy code on both investor demand for and corporate supply of long-term debt was pointed out to the authors by the referee.

<sup>6</sup>See Graham (2003) for a review of the literature on the influence of taxes on capital structure choice.

Pakistan, Peru, Philippines, South Africa, Switzerland, and the United States (pre-2003).<sup>7</sup>

The second is the dividend relief tax system, where dividend payments are taxed at a reduced rate at the personal level. A dividend relief tax system exists in Austria, Belgium, Brazil, Denmark, Finland (post-2005), France (post-2004), Germany (post-2001), Greece, Italy (post-2004), Korea (post-2000), Portugal, Singapore (post-2002), Sweden, Thailand, Turkey, United Kingdom (post-2001), and the United States (post-2002). In Brazil, Greece, Singapore, and Turkey dividend payments are not taxed at the personal level, that is, a full dividend relief system exists.

Third is the dividend imputation tax system, where corporations can deduct interest payments, but where the domestic shareholders of a corporation receive a tax credit for the taxes paid by the corporation. The goal of the system is to tax corporate profits only once. Dividend imputation systems are in place in Australia, Canada, Chile, Finland (pre-2006), France (pre-2005), Germany (pre-2002), Ireland (pre-2000), Italy (pre-2005), Malaysia, Mexico, New Zealand, Norway, Singapore (pre-2003), Spain, Taiwan, and United Kingdom (pre-2002).<sup>8</sup> The proportion of corporate tax available as a tax credit under these imputation systems varies from country to country. In Australia, Chile, Finland, Germany, Italy, Malaysia, New Zealand, Norway, and Singapore the full amount of the corporate tax paid is distributed as a tax credit. In other countries only part of the corporate tax credits are distributed.

All else being equal, we expect that debt will be used less in countries with dividend imputation or tax relief systems than in countries with classical tax systems that double tax corporate profits. To test for this relationship for each country in our sample, we estimate the tax shield, using the tax gain from the leverage variable introduced in Miller (1977):

$$1 - \frac{(1 - \tau_c)(1 - \tau_e)}{(1 - \tau_i)},$$

where  $\tau_c$  is the statutory corporate tax rate,  $\tau_i$  is the highest statutory personal tax rate on interest income, and  $\tau_e$  is the highest effective personal tax rate on equity income coming from dividends.<sup>9</sup>

The tax gain from leverage can take both positive and negative values. Negative values arise under a dividend relief tax system, when the personal tax rate on interest income is greater than the corporate tax rate, and the personal tax rate on dividend income is less than the corporate tax rate. This is the case under a full dividend relief system as exists in Brazil, Greece, and Turkey. The tax gain from leverage is 0 under a full dividend imputation tax system, which is the case in Australia, Chile, Malaysia, New Zealand, and Norway. For all other countries the value of the tax gain from leverage is positive.

<sup>7</sup>Korea and the United States provided preferential tax treatment for dividends over interest payments from 2001 and 2003, respectively.

<sup>8</sup>Finland, France, Germany, Ireland, Italy, Singapore, and the United Kingdom abandoned their dividend imputation tax systems in 2005, 2004, 2001, 1999, 2004, 2002, and 2001, respectively.

<sup>9</sup>We also consider a dividend tax indicator variable that takes a value of 1 for countries with either a full dividend relief tax system or a full dividend imputation tax system, and 0 otherwise.

### C. Suppliers of Capital

Financial economists have typically viewed the capital structure problem from the perspective of firms that face competitive and complete financial markets, where debt and equity capital are offered at equivalent risk-adjusted rates. However, when this is not the case, the preferences of investors to hold debt versus equity instruments will have an influence on how firms are financed. For example, in the Miller (1977) model, the aggregate debt ratio in the economy is determined by aggregate investor preferences for holding debt versus equity securities. While these preferences are determined by taxes in Miller's model, one can more generally consider how investor preferences for holding various debt and equity instruments affect the capital structure choice of firms.<sup>10</sup>

We will specifically consider the preferences of banks, pension funds, and insurance companies. Banks tend to have short-term liabilities and thus may have a comparative advantage holding short-term debt. In contrast, pension funds have long-term liabilities, and thus have a preference for holding long-term assets. Likewise, insurance companies tend to hold longer-term assets. Hence, we might expect firms in countries with a larger banking sector to use more short-term financing and firms in countries with larger pension funds and insurance sectors to use more long-term financing.

The analysis of supply effects raise endogeneity concerns, since we expect financial intermediaries to develop in ways that satisfy the financing needs of firms as well as the preferences of investors. Existing studies (e.g., Demirgüç-Kunt and Maksimovic (1999), De Jong et al. (2008)) examine the effects of stock/bond market size, turnover, and bank total assets on capital structure choices. These variables, however, are likely to be influenced by the capital structure preferences of corporations. For example, in countries with industries (like high tech) that require considerable amounts of external capital, the stock market is likely to be larger.<sup>11</sup> With this in mind, we depart from the existing literature and select proxies that are not likely to be directly influenced by the capital structure preferences of corporations. In particular, we select measures of the supply of funds available to these financial intermediaries.

To proxy for the supply of funds to banks, we use deposits/gross domestic product (GDP) to measure the amount of funds that are available to the banking sector.<sup>12</sup> In addition, deposit insurance is used in many countries to protect bank

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<sup>10</sup>See Titman (2002) for a discussion of the effect of investor preferences on capital structure choices.

<sup>11</sup>Demirgüç-Kunt and Maksimovic (1999) recognize this endogeneity issue and address it by using a 2-stage instrumental variable regression. They chose as instruments measures of the size of the economy and the flow of funds, plus proxies for the content, strength, and integrity of the legal system. However, one can argue that these variables either directly influence the capital structure choice or are potentially influenced by the types of firms in the economy and are thus indirectly related to the capital structure choice.

<sup>12</sup>It is possible that there are unobserved factors that affect both the willingness of investors to deposit funds with banks and the willingness of banks to provide long-term funding to firms, creating a spurious relation between deposits and capital structure. For example, one can argue that the financing needs of corporations affect the funds that are available to the different investor sectors. Suppose, for example, that the need for monitoring declines, making bank loans somewhat less attractive relative to long-term bonds. On the margin, this would increase the interest rate on long-term bonds, making

depositors, in full or in part, from losses caused by a bank's inability to pay its debts when due. This lowers the risk of bank runs, reducing the bank's need to hedge and seek more liquid short-term debt. We conjecture that the existence of deposit insurance will influence the lending and maturity choices of banks. In particular, banks provide more credit to firms and lend longer-term debt when deposits are protected. Hence, one might expect that firms in countries with deposit insurance have higher leverage and more long-term debt. To test this relationship, we utilize a deposit insurance indicator variable that takes a value of 1 if bank deposits are at least partially explicitly insured by government, and 0 otherwise (Demirgüç-Kunt, Karacaovali, and Laeven (2005)).

We use insurance penetration (value of total insurance premiums (life and nonlife)/GDP) to measure the amount of funds that are available to insurance companies. Different insurance companies, however, may have very different liability structures and may thus have different preferences for the assets that they hold. For example, life insurance companies that offer contracts with a substantial savings component, such as whole life contracts, might have a preference for long-term debt. In contrast, insurance companies that offer term life and property and casualty insurance tend to have shorter-term obligations and thus are expected to hold shorter-term debt. Unfortunately, we do not have data that allow us to distinguish between the different sectors of the insurance industry.

We measure pension fund penetration separately as the value of defined benefit pension fund assets over GDP and the value of defined contribution pension fund assets over GDP. This distinction may be important because in firms with defined benefit plans, the asset allocation is determined by the plan sponsors, while with defined contribution plans, the asset allocation is made by individuals. It should also be noted that defined benefit pension plans are often underfunded, creating a liability that we do not observe in our data set.

In addition, since it is possible that cross-country differences in pension fund regulations influence the investment choices of pension funds, we also examine restrictions on debt and equity holdings of pension funds. We conjecture that the relative restrictions on debt and equity holdings will influence the choice between debt and equity. In particular, pension funds will hold more equity when restrictions on bond holdings are tighter relative to those on equity holdings. Hence, one might expect firms in countries with tighter restriction on bond holdings to issue more equity. To investigate this possibility we estimate an index of relative restrictions on debt and equity holdings measured as the ratio of the proportional limit on equity holdings over the proportional limit on debt holdings taken from the Survey of Investment Regulation of Pension Funds, Organisation for Economic Co-Operation and Development (OECD). For each year we ranked countries by their pension fund regulation index, assigning countries into quartiles. We assigned a score of 1–4 to the quartiles, with larger values indicating tighter restriction on bond holdings.

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it more attractive for households to invest in fixed-income mutual funds rather than bank deposits. While this creates a potential endogeneity problem, it is mitigated by the inclusion of our institutional variables and probably has a minor influence on our estimates.



An alternative measure of the supply of funds available to financial intermediaries is the level of domestic savings, which we measure as gross domestic saving over GDP. In addition, we examine the size of the government bond market in each country by including domestically denominated government bonds/GDP as an independent variable. Government bonds can influence the supply of debt capital that is available to the corporate market for 2 reasons. The 1st possibility is a simple crowding out argument. If there is a fixed supply of debt capital, then government debt can compete for that fixed supply and leave less available for corporate borrowers. The 2nd possibility is that the supply is not fixed, and that the presence of government borrowers can help the debt market develop, increasing the demand for corporate debt.

### III. Firm-Level Characteristics and Capital Structure Choice

Consistent with the existing literature (Titman and Wessels (1988), Guedes and Opler (1996), and Rajan and Zingales (1995)), we include a set of firm-level variables that capture factors that are known to affect leverage and maturity structure. These variables include asset tangibility (fixed assets over total assets), profitability (net income over total assets), firm size (natural logarithm of total assets), and the market-to-book ratio (market value of equity over book value of equity). Due to data limitations in some of the countries included in our study, we do not include variables that measure the effective tax rate, operating risk, research and development expenditure, capital expenditure, and selling expenses as per Titman and Wessels. In place of these variables we include the market-to-book ratio, which can proxy for growth as well as the collateral value of assets, and industry indicator variables based on 2-digit Standard Industrial Classification (SIC) codes.<sup>13</sup>

### IV. Data and Sample

This section describes the sample and presents the country and industry patterns of capital and debt maturity structures. It then introduces the empirical procedure employed in this study.

#### A. Sample Selection

The primary source of our firm-level data is Worldscope, which contains financial data on companies from a wide range of industries in over 50 countries. We restrict the sample to those firms listed on the stock market of the country in which it is domiciled.

Our analysis covers the period of 1991–2006. We exclude firm-year observations with missing financial data that are required for the firm-level analysis. The final sample consists of 36,767 firms from 39 countries, totaling 272,092 firm-years. Table 1 provides a description of the sample, which covers a broad cross section of developed and developing countries, with every continent represented. Most of the countries have observations in each of the 16 years.

<sup>13</sup>See MacKay and Phillips (2005) for evidence on the importance of industry fixed effects.

TABLE 1  
The Sample

Table 1 provides a description of the sample: the number of years that data are available for each country, the mean number of firms per year for each country, and the median value of the proportion of firms represented in the sample for each country, by number of firms and market capitalization.

Country	Number of Years of Data Used	Number of Firms in the Sample	Firm-Years	Time-Series Median Value	
				Number of Firms in the Sample/Total Number of Listed Firms	Market Capitalization of Firms in the Sample/Stock Market Capitalization
Australia	16	1,554	8,308	0.50	0.79
Austria	16	139	1,144	0.75	0.61
Belgium	16	169	1,485	0.59	0.49
Brazil	16	351	2,591	0.46	0.87
Canada	16	1,865	10,988	0.34	0.79
Switzerland	16	274	2,656	0.72	0.77
Chile	16	158	1,424	0.41	0.58
China	13	1,530	6,827	0.57	0.44
Germany	16	1,011	9,209	0.90	0.69
Denmark	16	208	2,123	0.64	0.88
Spain	16	223	2,315	0.17	0.48
Finland	16	175	1,684	0.95	0.83
France	16	1,205	9,664	0.87	0.73
United Kingdom	16	2,861	21,785	0.67	0.62
Greece	16	321	2,511	0.64	0.53
Hong Kong	16	939	7,108	0.62	0.85
Indonesia	16	295	2,573	0.62	0.70
India	15	637	4,388	0.07	0.39
Ireland	16	109	880	0.89	0.49
Israel	13	181	949	0.15	0.36
Italy	16	343	2,810	0.73	0.55
Japan	16	4,088	42,611	0.97	0.86
Korea	16	970	6,741	0.40	0.72
Mexico	16	151	1,230	0.51	0.92
Malaysia	16	1,011	7,586	0.71	0.86
Netherlands	16	280	2,612	0.73	0.88
Norway	16	266	1,826	0.77	0.92
New Zealand	16	134	954	0.49	0.94
Pakistan	16	114	1,061	0.11	0.42
Peru	14	74	491	0.20	0.55
Philippines	16	188	1,648	0.53	0.81
Portugal	16	110	867	0.67	0.61
Singapore	16	628	4,111	0.76	0.82
Sweden	16	447	3,394	0.86	0.91
Thailand	16	481	3,457	0.60	0.73
Turkey	15	201	1,422	0.40	0.74
Taiwan	16	1,399	7,051	0.68	0.74
United States	16	11,119	77,909	0.81	0.81
South Africa	16	558	3,699	0.53	0.78

As can be seen from the last 2 columns of Table 1, the coverage of the sample firms varies across countries in terms of number and/or market capitalization, reflecting that Worldscope has uneven coverage of firms across the countries. For most of the economies we have more than 60% of sample coverage in terms of market capitalization and 50% in terms of number of listed firms. The economies with lower data coverage tend to be developing economies.

## B. Country Financing Patterns

Our measures of capital structure are

i) leverage, measured as the proportion of total debt to market value of the firm (total debt/market value), where total debt is defined as the book value of

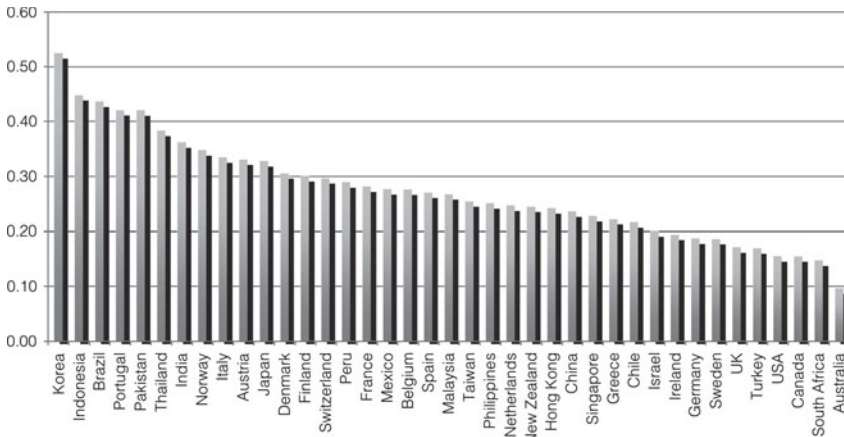
short-term and long-term interest-bearing debt, and market value of the firm is defined as the market value of common equity plus the book value of preferred stock plus total debt, or

ii) debt maturity, measured as the proportion of the book value of long-term debt to total debt (long-term debt/total debt).<sup>14</sup>

To gain a basic idea about how capital and maturity structures differ across countries, we compute the median leverage and maturity structure by country for the period from 1991 to 2006. As can be seen in Figure 1, developing economies occupy both ends of the leverage spectrum. The highest 5 leverage ratios are observed in South Korea, Indonesia, Brazil, Portugal, and Pakistan, while the lowest 5 are observed in Australia, South Africa, Canada, United States, and Turkey. Developing economies seem to dominate the higher range, while developed economies tend to be at the lower range. The median leverage ratio for the developing economies in the sample is 0.26,<sup>15</sup> while for the developed economies

FIGURE 1  
Median Leverage Ratio of Sample Firms (1991–2006)

Figure 1 plots the median leverage ratio across 39 countries. The leverage ratio is measured as total debt over the market value of the firm. Total debt is defined to be the book value of current and long-term interest-bearing debt. Market value of the firm is defined to be the market value of common equity plus book value of preferred stock plus total debt.



the median leverage ratio is 0.20. The middle range of the leverage spectrum is mixed, with both developing and developed economies.

Figure 2 presents the median maturity structure by country. It is clear from the figure that debt obligations have longer maturities in more developed economies. The 5 countries with the highest long-term debt ratios are New Zealand,

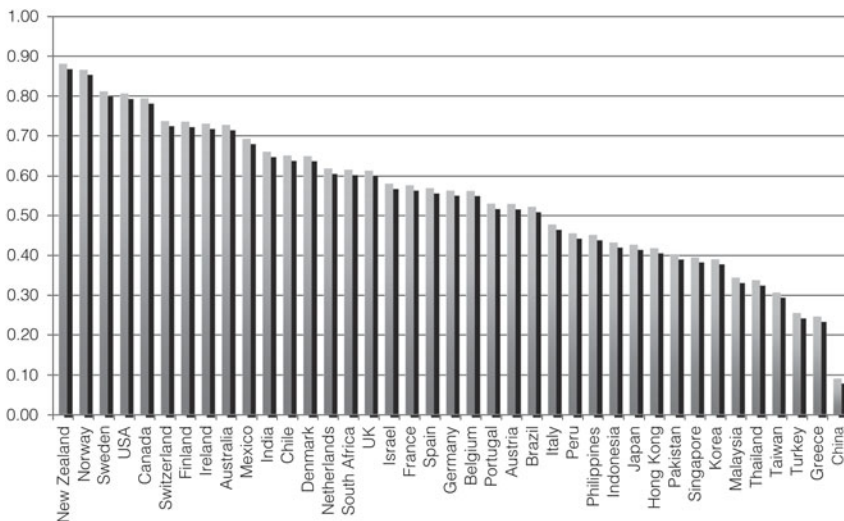
<sup>14</sup>Trade credit is an important source of financing in economies with underdeveloped financial institutions (Demirgüç-Kunt and Maksimovic (2001), Fisman and Love (2003)). Our results are robust to include trade credit (measured as accounts payable) in our measure of short-term debt.

<sup>15</sup>Economies within the sample classified as developing, according to the World Bank, are Brazil, Chile, China, India, Indonesia, Malaysia, Mexico, Pakistan, Peru, Philippines, Taiwan, Thailand, Turkey, and South Africa.

Norway, Sweden, United States, and Canada. The lowest 5 median long-term debt ratios are observed in China, Greece, Turkey, Taiwan, and Thailand.<sup>16</sup> The median long-term debt ratio for the developing economies in the sample is 0.36, while for the developed economies the median long-term debt ratio is 0.61.

FIGURE 2  
Median Long-Term Debt Ratio of Sample Firms (1991–2006)

Figure 2 plots the median debt maturity ratio across 39 countries. The debt maturity ratio is measured as long-term interest-bearing debt over total debt. Total debt is defined to be the book value of current and long-term interest-bearing debt.



In addition to the set of firm- and country-level variables described in Section II, we include inflation, inflation volatility (measured as the standard deviation of inflation rates over the preceding 4 years), and a developed economy indicator variable that takes a value of 1 if the country is classified as a developed economy according to the World Bank classification that is based on the countries' gross national income levels.<sup>17</sup> Inflation is included because debt contracts are generally nominal contracts, and high inflation, which is generally associated with high uncertainty about future inflation, may tilt lenders away from long-term debt. Likewise, higher inflation volatility reflects higher uncertainty about future inflation, tilting lenders away from long-term debt. A developed economy indicator variable is included because it may pick up an element of economic development that is not already captured by our other variables. Both firm- and country-level variables are lagged 1 period to allow for the noncontemporaneous nature of the interaction between firm-/country-level characteristics and financing choices.

Table 2, which presents the summary statistics, shows cross-sectional variation in the country-level variables. The country-level variables are defined in

<sup>16</sup>This parallels the findings of Demirgüç-Kunt and Maksimovic (1999) for an early sample period (1980–1991).

<sup>17</sup>The set of country-level independent variables is defined in Table A1 in Appendix A, along with their data sources.

Table A1, along with their data sources. Except for the common law, developed economy, bankruptcy code, and deposit insurance variables that are constant across time, all remaining variables exhibit time-series variation.<sup>18</sup> Table A2 in Appendix A reports the country-by-country median values of the country-level explanatory variables.

TABLE 2  
Summary Statistics

Table 2 provides the mean, standard deviation, median, minimum, and maximum values of each variable. *Leverage ratio* is the ratio of total debt to market value of the firm. Total debt is defined to be the book value of short-term and long-term interest-bearing debt. Market value of the firm is defined to be the market value of common equity plus book value of preferred stock plus total debt. *Maturity structure ratio* is the ratio of long-term debt to total debt. *Tangible assets/total assets* is the ratio of fixed assets to total assets, operating risk is measured as the absolute value of the annual change in ROA, ROA is the ratio of net income to total assets, firm size is measured as the natural logarithm of total assets, and the *market-to-book ratio* is the ratio of market value of equity plus book value of total debt over total assets. *Developed economy* is a dummy variable equal to 1 when the country is classified as developed according to the World Bank classification based on countries' gross national income levels. *Inflation rate* is the annual rate of change in a country's consumer price index (CPI). *Inflation rate volatility* is the standard deviation of inflation rates from period  $t - 4$  to  $t$ . *Corruption index* is an index ranging from 0 to 10, with larger value indicating more severe corruption. *Common law* is a dummy variable equal to 1 when a country adopts the common law system. *Bankruptcy code* is a dummy variable equal to 1 if an insolvent firm is most likely to undergo a reorganization proceeding. *Tax* is an estimate of the Miller (1977) tax ratio calculated using statutory tax rates. *Deposits* is the ratio of a country's bank deposits to GDP. *Deposit insurance* is a dummy variable equal to 1 if bank deposits are insured by government. *Domestic savings* is the ratio of gross domestic saving to GDP. *Insurance penetration* is the value of a country's total insurance premiums to GDP. *Pension fund regulation index* is an index of relative restrictions on debt and equity holdings of pension funds ranging from 1 to 4. *Defined benefit pensions* is the value of the country's defined benefit pension fund assets to GDP. *Defined contribution pensions* is the value of the country's defined contribution pension fund assets to GDP. *Government bonds* is the ratio of the value of domestically denominated government bonds to GDP.

Variables	N	Mean	Standard Deviation	Median	Minimum	Maximum
Leverage ratio	264,236	0.29	0.26	0.22	0.00	1.00
Maturity structure ratio	235,874	0.53	0.34	0.57	0.00	1.00
Tangible assets/total assets	264,236	0.33	0.24	0.29	0.00	0.97
ROA	264,236	-0.13	0.98	0.02	-12.25	0.43
Log total assets	264,236	19.76	4.21	19.82	-10.93	31.94
Market-to-book ratio	264,236	2.50	6.87	1.51	-35.15	63.26
Developed economy	624	0.86	0.35	1.00	0.00	1.00
Inflation rate	624	0.03	0.05	0.02	-0.04	0.54
Inflation rate volatility	624	0.02	0.39	0.01	0.00	32.88
Corruption index	624	3.01	1.74	2.50	0.00	9.43
Common law	624	0.59	0.49	1.00	0.00	1.00
Bankruptcy code	624	0.68	0.47	1.00	0.00	1.00
Tax	624	0.14	0.17	0.13	-0.30	0.51
Deposits	624	0.93	0.57	0.67	0.13	2.46
Deposit insurance	624	0.87	0.34	1.00	0.00	1.00
Domestic savings	624	0.23	0.09	0.22	0.09	0.52
Insurance penetration	624	0.08	0.03	0.09	0.01	0.18
Pension fund regulation index	457	3.18	1.06	4.00	1.00	4.00
Defined benefit pensions	72	37.55	19.07	48.10	0.08	71.33
Defined contribution pensions	72	24.72	18.41	29.86	0.03	119.97
Government bonds	624	0.36	0.25	0.30	0.00	1.19

To gain a basic understanding of how debt ratios and maturity structures are influenced by these variables, we compute the Pearson correlation coefficients for pairs of the dependent and independent variables. The results, reported in Table 3, suggest that the legal system, the tax system, and the suppliers of funds potentially influence the capital structure choice. In particular,

- firms in more developed economies have lower debt ratios and more long-term debt;
- common law is associated with lower leverage and more long-term debt;

<sup>18</sup>The corruption index prior to 1995 is taken as the 1988–1992 composite level, because compatible annual data are not available prior to 1995.

TABLE 3  
Correlation Matrix

Table 3 provides a correlation matrix for our sample. Pearson correlation coefficients for all independent variables, leverage, and debt maturity, together with each pairing of independent variables, are presented. Variables are as defined in Table 2.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	
Leverage ratio	(1)	1.000																		
Maturity structure ratio	(2)	0.062	1.000																	
ROA	(3)	0.033	0.096	1.000																
Log total assets	(4)	0.182	-0.030	0.253	1.000															
Market-to-book ratio	(5)	-0.136	0.012	0.082	-0.042	1.000														
Developed economy	(6)	-0.075	0.139	-0.058	-0.122	0.025	1.000													
Inflation rate	(7)	0.021	0.001	0.013	-0.060	-0.001	-0.374	1.000												
Inflation rate volatility	(8)	0.014	-0.011	0.005	-0.028	-0.006	-0.091	0.340	1.000											
Corruption index	(9)	0.165	-0.210	0.066	0.313	-0.041	-0.757	0.328	0.073	1.000										
Common law	(10)	-0.157	0.173	-0.112	-0.414	0.035	0.054	-0.013	-0.041	-0.293	1.000									
Bankruptcy code	(11)	0.071	0.095	-0.060	0.163	-0.003	0.283	-0.045	-0.039	0.089	-0.072	1.000								
Tax	(12)	0.061	0.036	0.014	0.213	0.014	-0.041	-0.118	0.019	0.080	0.014	0.344	1.000							
Deposits	(13)	0.070	-0.135	0.045	0.337	-0.027	0.234	-0.325	-0.044	-0.147	-0.315	0.088	0.297	1.000						
Deposit insurance	(14)	0.037	0.107	-0.027	0.014	0.009	0.298	-0.042	-0.067	-0.130	-0.126	0.521	0.117	0.053	1.000					
Domestic savings	(15)	0.109	-0.229	0.114	0.337	-0.039	-0.401	-0.117	-0.003	0.323	-0.349	-0.256	0.113	0.296	-0.406	1.000				
Insurance penetration	(16)	0.003	-0.066	0.021	0.183	-0.010	0.317	-0.257	-0.046	-0.206	-0.066	0.061	0.143	0.465	0.102	0.013	1.000			
Pension fund regulation index	(17)	-0.034	0.071	-0.068	0.000	0.029	0.431	-0.160	-0.080	-0.192	0.159	0.549	0.441	0.269	0.337	-0.396	0.033	1.000		
Defined benefit pensions	(18)	0.148	0.254	-0.108	-0.463	0.065	0.158	0.385	-0.185	-0.473	0.821	0.391	0.209	-0.622	0.323	-0.686	-0.176	0.225	1.000	
Defined contribution pensions	(19)	-0.088	-0.089	-0.082	-0.343	0.046	0.075	0.272	-0.108	-0.295	0.395	0.081	0.060	-0.555	0.141	-0.430	0.128	-0.039	0.730	1.000
Government bonds	(20)	0.061	-0.107	0.072	0.272	-0.025	0.158	-0.195	-0.043	0.015	-0.467	0.160	0.136	0.532	0.234	0.011	0.281	0.266	-0.591	-0.603

- low levels of corruption are associated with lower debt ratios and a greater use of long-term rather than short-term debt;
- the existence of an explicit bankruptcy code is associated with higher debt ratios and a greater use of long-term debt;
- firms in countries that have a higher tax preference for debt have higher debt ratios;
- firms in countries with more bank deposits and larger domestic savings tend to have higher leverage and more short-term debt;
- the existence of explicit deposit insurance is associated with more long-term debt;
- the level of defined contribution pension fund assets is associated with lower leverage; and
- the level of defined benefit pension fund assets is associated with the use of long-term debt.<sup>19</sup>

To investigate whether these variables are likely to be subject to collinearity problems in our later regression analysis, we examine the correlations between the independent variables that are used in our analysis. From Table 3, we see that most variables are not highly correlated with each other, with some notable exceptions. In particular, the correlation between the economic development indicator variable and the corruption index is  $-76\%$ .

## V. Regression Analysis

This section presents regressions that estimate the influence of country-level explanatory variables on capital structure choices, controlling for firm- and industry-level characteristics. Our regressions are estimated with a generalized method of moments (GMM) approach that accounts for the fact that the regression residuals are heteroskedastic and serially correlated across both firm- and country-level observations.<sup>20</sup>

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<sup>19</sup>In unreported analysis, we examined these correlations in a number of subsamples. Specifically, we separately examine developed and developing economies, and we divide the sample between 2 time periods (1991–1998 and 1999–2006). There are some differences between the subsamples. For example, we find that the correlation between leverage and common law is strong only in developed economies, and taxes and deposit insurance are strongly correlated with leverage in only the initial subperiod. In addition, the size of the government bond market is negative and highly correlated with leverage in developing economies, but only in the initial subperiod. Deposit insurance is positively correlated with debt maturity in only the later subperiod, while insurance penetration is positively correlated with debt maturity in both subperiods, but only in developing economies. Finally, the size of the government bond market is negative and strongly correlated with debt maturity in the later subperiod, but only in developed economies.

<sup>20</sup>The regressions are performed on panel data where the residuals may be correlated across firms and/or across country, and ordinary least squares (OLS) standard errors can be biased. We use the OLS method with heteroskedastic and autocorrelation corrected (HAC) errors (Andrew (1991)) and clustered at the country level (Petersen (2009)). The HAC procedure accounts for the potential heteroskedasticity and autocorrelation at the firm level by deriving the  $t$ -statistics of estimated OLS coefficients from GMM standard errors corrected for heteroskedasticity and autocorrelation.

## A. The Determinants of Leverage

Table 4 presents the results of the leverage regressions.<sup>21</sup> Column (1) reports the regression for the full sample, column (2) provides evidence for the subsample of developed economies only, and column (3) the subsample of developing economies only. Columns (4)–(5) provide evidence for the subperiods 1991–1998 and 1999–2006, respectively, and column (6) provides evidence for a subsample representing OECD countries for which pension fund bond/equity holding restriction information is available. Column (7) provides evidence for a select subsample of OECD countries for which pension fund asset information is available.

### 1. Firm Effects

The top half of Table 4 reports the coefficient estimates of our firm-specific variables. These coefficient estimates indicate that leverage is positively related to asset tangibility and firm size and negatively related to profitability and the market-to-book ratio. These results, which hold in the full sample as well as the subsamples, are consistent with evidence on U.S. firms (Bradley, Jarrell, and Kim (1984), Titman and Wessels (1988)) and more recent international evidence (Rajan and Zingales (1995), Booth et al. (2001), and De Jong et al. (2008)). These results are also generally consistent with individual country leverage regressions that we report in Appendix B in Table B1. The coefficients for the market-to-book ratio have the same sign in all country regressions. Asset tangibility and size are positively related to leverage in 38 and 34 out of 39 countries, respectively. Finally, profitability is negatively related to leverage in 36 out of 39 countries.

### 2. Country Effects

The lower half of Table 4 reports coefficient estimates for country variables. The regression for the full sample (column (1)) has an adjusted  $R^2$  of 0.1798, which is the same order of magnitude as the preliminary result reported previously, regressing leverage on firm-specific variables and industry- and country-fixed effects.

These coefficient estimates indicate that leverage is positively related to economic development, but unrelated to both inflation and inflation volatility. Consistent with better investor protection leading to a greater use of equity financing, we find that corruption is associated with higher debt ratios, common law systems are associated with lower debt ratios, and the existence of an explicit bankruptcy code is associated with higher debt ratios.<sup>22</sup> In addition, we find that leverage is higher

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<sup>21</sup>The results are robust to the use of alternative proxies for the country's legal system, corruption, taxation, and financial market development. Alternative proxies leave other estimated coefficients unaffected. In addition, results are substantially unchanged when we winsorize all variables at the 1% level.

<sup>22</sup>We also considered the possibility that in some countries regulatory barriers to entry might decrease the risk of incumbent firms and thereby increase their debt capacities. To examine this in more detail, we considered regulatory variables introduced in Djankov, La Porta, Lopez de Silanes, and Shleifer (2002). However, because these variables are highly correlated with corruption and our common law indicator variable, we did not include them in the regression reported in Table 4. The high



TABLE 4  
Leverage on Firm- and Country-Level Determinants

Table 4 presents regressions of leverage on both firm- and country-level variables, as defined in Table 2. All regressions include dummy variables for industry (2-digit SIC codes). The sample is divided between developed and developing economies as defined by the developed economy indicator variable, a sample of OECD member countries for which pension fund bond/equity holding restriction information is available and a select sample of OECD countries for which pension fund asset information is available. The sample is split into 2 subsamples (1991–1998 and 1999–2006). This table also reports the adjusted  $R^2$  and number of firm-year observations. Standard errors are robust to clustering within country over time.  $t$ -statistics are given in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable: Total Debt/Market Value of the Firm

Sample	Full Sample	Developed Economies	Developing Economies	1991–1998	1999–2006	OECD	Select OECD
Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Firm Factors</i>							
Tangible assets/total assets	0.2178 (28.68)***	0.2274 (25.93)***	0.1171 (11.39)***	0.1738 (19.32)***	0.2359 (25.76)***	0.2176 (25.65)***	0.2221 (15.28)***
ROA	-0.0201 (-3.77)***	-0.0144 (-3.04)***	-0.2268 (-8.44)***	-0.1737 (-3.63)***	-0.0117 (-2.41)***	-0.0159 (-3.12)***	-0.0074 (-1.76)***
Log total assets	0.0065 (7.97)***	0.0057 (7.09)***	0.0109 (7.82)***	0.0070 (4.51)***	0.0060 (7.11)***	0.0056 (7.05)***	0.0029 (5.20)***
Market-to-book ratio	-0.0081 (-18.04)***	-0.0075 (-16.98)***	-0.0096 (-10.45)***	-0.0110 (-12.69)***	-0.0071 (-18.62)***	-0.0076 (-16.97)***	-0.0068 (-13.89)***
<i>Country Factors</i>							
Developed economy	0.1006 (6.20)***			0.1075 (4.42)***	0.1071 (5.80)***	0.1069 (4.53)***	0.1361 (2.28)***
Inflation rate	-0.0363 (-0.66)	-0.2222 (-0.92)	0.0917 (1.75)*	-0.0674 (-0.58)	0.0650 (1.17)	-0.0958 (-1.35)	-0.6182 (-1.47)
Inflation rate volatility	0.0043 (0.74)	1.1850 (2.04)**	0.0033 (0.57)	0.0029 (0.41)	0.3570 (2.29)***	0.0093 (1.51)	1.2617 (2.84)***
Corruption index	0.0222 (6.89)***	0.0232 (6.28)***	0.0261 (5.12)***	0.0255 (5.69)***	0.0183 (4.71)***	0.0240 (6.60)***	0.0092 (1.98)**
Common law	-0.0330 (-3.91)***	-0.0477 (-5.43)***	0.0430 (0.98)	-0.0537 (-4.46)***	-0.0266 (-2.61)***	-0.0410 (-4.52)***	-0.2615 (-7.23)***
Bankruptcy code	0.0113 (3.51)***	0.0097 (2.87)***	-0.0136 (-1.51)	0.0197 (4.16)***	0.0068 (2.13)**	0.0123 (2.66)***	0.0378 (2.32)**
Tax	0.0654 (2.22)**	0.1005 (3.05)***	-0.0778 (-1.01)	-0.0268 (-0.78)	0.1790 (5.03)***	0.1176 (3.55)***	0.1295 (1.70)*
Deposits/GDP	0.0004 (0.05)	-0.0198 (-2.25)**	-0.0057 (-0.08)	-0.0178 (-1.13)	0.0060 (0.72)	-0.0060 (-0.55)	-0.0298 (-1.48)
Deposit insurance	0.0069 (2.36)***	-0.0066 (-2.15)**	0.0400 (4.81)***	-0.0016 (-0.29)	0.0116 (3.31)***	0.0082 (1.85)***	-0.0067 (-0.59)
Domestic savings	0.0044 (1.25)	0.0008 (0.19)	-0.0102 (-1.34)	0.0178 (2.85)***	0.0007 (0.22)	0.0002 (0.04)	-0.0181 (-2.23)***
Insurance penetration	-0.0007 (-0.01)	0.0930 (0.71)	0.1373 (0.42)	0.2201 (1.14)	-0.0645 (-0.49)	0.0007 (0.01)	1.6296 (2.13)**
Government bonds	-0.0350 (-1.60)	-0.0238 (-1.07)	-0.1942 (-3.37)***	-0.1212 (-4.19)***	-0.0345 (-1.18)	-0.0389 (-1.72)***	-0.2254 (-5.37)***
Pension fund regulation index						-0.0068 (-1.78)***	
Defined benefit pensions							0.0032 (3.35)***
Defined contribution pensions							-0.0024 (-2.20)**
No. of obs.	250,668	218,847	31,821	87,515	163,153	232,656	112,722
Adjusted $R^2$	0.1798	0.1959	0.1689	0.1958	0.1932	0.1862	0.1891

in countries where the tax gain from leverage is positive. This evidence contrasts with Booth et al. (2001), who do not find a significant relation between debt ratios and tax policy. This difference in results arises because of differences in both the sample countries and sample periods. The Booth et al. sample is mainly developing economies over the period from 1980 to 1991. As we show, our evidence in favor of a tax effect comes from developed economies in a later time period.

We find some support for the idea that suppliers of capital influence firm debt ratio choices. In particular, we find that leverage is higher in countries with deposit insurance, suggesting that the banking industry is important, but we do not find a significant relation between the size of the banking sector and debt ratios. In addition, we do not find a significant relation between leverage and the size of the insurance industry, the level of domestic savings, or the size of the government bond market.<sup>23</sup> However, in a select sample of OECD countries that report the level of pension fund assets, we find that firms in countries with larger defined benefit pension funds have higher debt ratios, and those with larger defined contribution pension funds have lower debt ratios.

There are some significant differences between the subsamples. In particular, common law and the bankruptcy code are significant in the sample of developed economies, but not in the sample of developing economies, while deposit insurance and the size of the government bond market are important in developing economies, but not in developed economies.

In addition, we find that the level of domestic savings and the size of the government bond market are significant in the 1991–1998 subperiod, but not in the 1999–2006 subperiod, while taxes and deposit insurance are important in the later time period, but not in the former period. The negative association between leverage and the size of the government bond market in the 1991–1998 subperiod suggests that there may be a fixed demand for fixed-income securities, so that government bonds crowd out corporate bond issues.

The subsample analysis reveals that corruption is consistently associated with higher debt ratios in all subsamples. However, the common versus civil law distinction is less important in developing economies. On the other hand, deposit insurance is significant in the latter time period, reflecting, perhaps, an increase in the number of countries adopting explicit deposit insurance from 23 to 33.

Taxes are significant in the sample of developed economies, but not in the sample of developing economies, and only in the later time period. This may be due to the observation that the influence of corporate taxes is likely to be weaker in

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correlation between these entry barrier variables and common law and corruption, however, may partially explain why common law and corruption have such a strong effect on the capital structure choice.

<sup>23</sup>The weak result with respect to insurance penetration may be due to the lack of a clear prediction as to the association between leverage and insurance penetration. Recognizing that life insurance incorporates both a savings (whole life and annuities) and an insurance (term life) product, we follow Beck and Webb (2003) and the suggestion of the referee, and proxy for the size of the insurance sector as a savings vehicle using insurance premiums/domestic savings. However, as with insurance penetration, we do not find a significant relation between leverage and insurance premiums/domestic savings.

countries where they are easier to evade.<sup>24</sup> In unreported regressions, we find that taxes are significant in a sample of below-median tax evasion countries, but not in a sample of above-median tax evasion countries.<sup>25</sup> With this index, our entire sample of developing economies is characterized as high tax evasion countries.

In addition, we consider an alternative tax measure that considers only the tax treatment of dividends. As discussed in footnote 9, we estimate a dividend tax indicator variable that takes a value of 1 for countries with either a full dividend relief tax system or a full dividend imputation tax system, and 0 otherwise. With this measure we find that leverage is lower in countries that tax dividends less, and this result holds strongly in all subsamples and subperiods.

Finally, we find that the coefficients of inflation volatility, which are insignificant in about ½ the regressions, is significantly positive in the developed country subsample, the subsample of OECD countries for which pension fund asset information is available, and in the total sample of countries in the 1999–2006 subperiod. We also find negative associations between leverage, the size of the banking sector, and the existence of deposit insurance in the developed economy subsample. These latter 2 findings are inconsistent with our expectations but appear to be driven by outliers.<sup>26</sup>

## B. Determinants of Maturity Structure

### 1. Firm Effects

Table 5 reports the results of the debt maturity structure regressions.<sup>27</sup> These regressions are estimated on the full sample and the subsamples as previously discussed. Column (1) reports the regression for the full sample, column (2) provides evidence for the subsample of developed economies only, and column (3) the subsample of developing economies only. Columns (4)–(5) provide evidence for the subperiods 1991–1998 and 1999–2006, respectively. Column (6) provides evidence for subsample representing OECD countries for which pension fund asset information is available.

The coefficients of the firm-specific variables are largely consistent with prior research (Barclay and Smith (1995), Stohs and Mauer (1996), Guedes and Opler (1996), and Demirgüç-Kunt and Maksimovic (1999)) in the full sample and all subsamples and subperiods. Long-term debt is used more by firms with greater asset tangibility, larger size, and higher profits. However, in contrast to the

<sup>24</sup>The likelihood that the potential to avoid paying taxes influences the strength of the relationship between taxes and leverage was pointed out by the referee.

<sup>25</sup>Based on the World Bank tax evasion index, World Economic Forum, Global Competitiveness Report 2001/2002.

<sup>26</sup>In particular, the high leverage ratios of South Korean firms generate the relation between leverage and inflation volatility, deposits and deposit insurances in both the developed economies subsample and the 1999–2006 subperiod. South Korea is characterized by high inflation volatility, a relatively small banking sector, the existence of deposit insurance, and a relatively high level of domestic savings. After dropping South Korea, inflation volatility, the size of the banking sector, and deposit insurance are all insignificantly related to leverage.

<sup>27</sup>The results are robust to the use of alternative proxies for the country's legal system, corruption, taxation, and financial market development. In addition, results are substantially unchanged when we winsorize all variables at the 1% level.

TABLE 5  
Debt Maturity Structure, Firm- and Country-Level Determinants

Table 5 presents regressions of debt maturity on both firm- and country-level variables, as defined in Table 2. All regressions include dummy variables for industry (2-digit SIC codes). The sample is divided between developed and developing economies as defined by the developed economy indicator variable, a sample of OECD member countries for which pension fund bond/equity holding restriction information is available and a select sample of OECD countries for which pension fund asset information is available. This table also reports the adjusted  $R^2$  and number of firm-year observations. Standard errors are robust to clustering within country over time. *t*-statistics are given in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable: *Long-Term Debt/Total Debt*

Sample	Full Sample	Developed Economy	Developing Economy	1991–1998	1999–2006	Select OECD Sample
Independent Variable	(1)	(2)	(3)	(4)	(5)	(6)
<i>Firm Factors</i>						
Tangible assets/total assets	0.2648 (46.94)***	0.2707 (44.70)***	0.2990 (23.77)***	0.2704 (37.8)***	0.2659 (37.34)***	0.2699 (39.22)***
ROA	0.0765 (24.22)***	0.0800 (26.65)***	0.0650 (4.30)***	0.0701 (7.12)***	0.0733 (22.36)***	0.0811 (46.43)***
Log total assets	0.0139 (23.32)***	0.0152 (26.44)***	0.0157 (12.12)***	0.0106 (16.58)***	0.0149 (20.74)***	0.0168 (24.57)***
Market-to-book ratio	0.0005 (1.61)	0.0001 (0.44)	0.0034 (3.67)***	0.0004 (0.83)	0.0003 (1.23)	-0.0038 (-1.55)
<i>Country Factors</i>						
Developed economy	0.1422 (8.94)***			0.1434 (5.23)***	0.1296 (7.12)***	0.0796 (2.09)**
Inflation rate	0.0883 (1.31)	0.2335 (0.97)	0.1641 (3.17)***	0.2414 (2.09)**	0.0047 (0.09)	0.9699 (2.54)***
Inflation rate volatility	0.0046 (0.70)	-3.0938 (-5.00)***	0.0054 (0.90)	0.0002 (0.04)	-0.2641 (-1.73)*	-1.6375 (-4.65)***
Corruption index	-0.0352 (-11.71)***	-0.0335 (-9.57)***	-0.0145 (-4.03)***	-0.0321 (-8.45)***	-0.0386 (-9.81)***	-0.0043 (-1.81)*
Common law	0.0749 (8.08)***	0.0742 (7.54)***	0.1821 (7.55)***	0.0977 (6.85)***	0.0736 (7.23)***	0.1424 (5.12)***
Bankruptcy code	0.0460 (15.68)***	0.0489 (14.50)***	0.0096 (2.19)***	0.0599 (9.90)***	0.0425 (14.92)***	0.0258 (2.84)***
Deposits/GDP	-0.1245 (-16.33)***	-0.1176 (-13.43)***	-0.2805 (-5.73)***	-0.0968 (-7.81)***	-0.1320 (-15.32)***	-0.1414 (-8.35)***
Deposit insurance	0.0147 (4.33)***	0.0147 (3.87)***	0.0433 (8.98)***	-0.0089 (-1.61)	0.0283 (8.73)***	0.0110 (1.36)
Domestic savings	-0.0335 (-11.76)***	-0.0419 (-12.75)***	-0.0201 (-4.25)***	-0.0332 (-6.02)***	-0.0353 (-11.75)***	-0.0116 (-1.69)*
Insurance penetration	0.1272 (1.06)	-0.1039 (-0.79)	0.6509 (3.40)***	0.1880 (0.88)	0.1398 (0.91)	0.6295 (1.09)
Government bonds	-0.0814 (-4.74)***	-0.1301 (-8.11)***	0.0205 (0.64)	0.0143 (0.53)	-0.0840 (-4.78)***	-0.0399 (-1.19)
Defined benefit pensions						0.0009 (1.73)*
Defined contribution pensions						-0.0006 (-0.91)
No. of obs.	224,527	194,976	29,551	81,539	142,988	97,635
Adjusted $R^2$	0.2189	0.2041	0.2301	0.2068	0.2222	0.2405

findings in the United States, we find that the market-to-book ratio is only weakly associated with debt maturity in the full sample and is unrelated to debt maturity in the developed economy subsample.

Table B2 in Appendix B reports the results of the country-by-country debt maturity regressions. The most robust cross-sectional determinant of debt maturity is asset tangibility. With one exception, asset tangibility is significantly

and positively related to debt maturity structure. On the other hand, we find cross-country variation in the signs of the estimated coefficients for profitability, firm size, and the market-to-book ratio. Profitability is positively related to debt maturity structure in 25 (statistically significant in 15) out of 39 countries. Firm size is positively related to debt maturity structure in 33 (statistically significant in 21) out of 39 countries, and the market-to-book ratio is positively related to debt maturity structure in 28 out of 39 countries and is statistically insignificant in most countries. Indeed, this relation is significantly negative only in the United States.<sup>28</sup>

## 2. Country Effects

The estimates of the country-level coefficients reveal that debt maturity is negatively related to the level of corruption, but positively related to the common law indicator variable, consistent with lower corruption and stronger investor protection encouraging the use of long-term debt financing. Also, the existence of an explicit bankruptcy code is associated with greater use of long-term debt. We find that debt maturity is positively related to the level of economic development. Overall our results with respect to the relation between maturity structure and country-level characteristics are more robust than those reported for leverage.

Consistent with the preferences of the suppliers of capital having an influence on the firms' maturity structures, we find that debt maturity is strongly and negatively related to the amount of deposits in the country's banking sector. This is in contrast to the negative, but insignificant banking sector result reported by Demirgüç-Kunt and Maksimovic (1999). Further, we find that the level of domestic savings, measured as gross domestic saving over GDP, is negatively related to debt maturity. We also find that debt maturity is longer in countries with explicit deposit insurance, reflecting the willingness of banks to lend longer-term debt when deposits are protected. In addition, debt maturity is shorter, the larger the government bond market. However, we find no reliable relation between maturity structure and the degree of insurance penetration. The weak result with respect to insurance penetration may be due to the lack of a clear prediction as to the association between maturity and insurance penetration.<sup>29</sup>

In general, although the results in all subsamples and subperiods are similar, there are several exceptions. Inflation rate volatility is associated with shorter maturity in developed economies, but unrelated to maturity in developing economies. The size of the insurance industry is positively related to maturity in developing economies, but unrelated to maturity in developed economies. In addition,

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<sup>28</sup>Prior literature also reports mixed results. For example, Guedes and Opler (1996) report negative relations for U.S. firms, while Stohs and Mauer (1996) find only mixed support for an inverse relationship for U.S. firms. Ozkan (2000) reports a positive relationship for U.K. firms. Outside the United States and the United Kingdom, international evidence generally does not find significant relation between the 2 variables (Antoniou, Guney, and Paudyal (2006), Terra (2011)).

<sup>29</sup>As noted previously, we include a proxy for the size of the insurance sector as a savings vehicle using insurance premiums/domestic savings. However, as with insurance penetration, we do not find a significant relation between maturity and insurance premiums/domestic savings.

deposit insurance is associated with longer debt maturity only in the latter time period, possibly due to an increase in the number of countries adopting explicit deposit insurance from 23 to 33 over the full sample period. The size of the government bond market is negatively related to maturity only in developed economies, and the relation is significant only in the latter time period. In addition, for a subsample of OECD countries we find that the level of defined benefit pension fund assets is associated with greater use of long-term debt, while the level of defined contributions pension fund assets is unrelated to debt maturity. Finally, we find a significant positive relation between debt maturity and inflation in the developing economy subsample, in the earlier time period, and in the OECD subsample.<sup>30</sup>

### C. Fixed Effects and Cross-Sectional Estimates

This section examines the extent to which the cross-sectional and time-series variation in our explanatory variables drive our results. Up to this point our emphasis has been on the cross-sectional variation in capital structures. However, the debt ratios in individual countries also vary from year to year, and some of that year-to-year variation may be explained by the year-to-year changes in our explanatory variables.

To estimate the extent to which our results are generated from the cross section versus the time series, we estimate both firm/country fixed effects and Fama-MacBeth (1973) regressions. Specifically, we report fixed-effects leverage and maturity structure regressions in columns (1) and (2) of Table 6, respectively. The Fama-MacBeth leverage and maturity structure regressions with the Newey-West (1987) corrected standard errors are reported in columns (3) and (4), respectively. By sweeping out individual firm and country effects, the fixed-effects regression estimates the extent to which the time-series variation of our independent variables explains the time series of capital structure choices. In contrast, the Fama-MacBeth regression estimates the regression model for each of the 16 years in the sample period and then averages the coefficients for all independent variables across the 16 years, isolating the cross-sectional determinants of capital structure. The coefficients and statistical significance of the independent variables are similar to those reported in the cross-sectional, time-series regressions (Tables 4 and 5).

The regression estimates reported in Table 6 indicate that the relationships between financing choices and firm characteristics are significant in both the time series and the cross section and are consistent with our earlier estimates. However, the results of the inflation and financial institution variables continue to be mixed. The results also show that several country variables, in particular corruption and deposit insurance, have significant effects on firm capital structure choices even though their time-serial variations are small.

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<sup>30</sup>The result that inflation is positively related to debt maturity in both developing economies and the earlier time period is generated by the low inflation/short-term maturity characteristic of China. After dropping China, inflation is insignificantly related to maturity.

TABLE 6  
Sources of Variation in Leverage and Debt Maturity

Table 6 presents regressions of both leverage and debt maturity. Column (1) reports a fixed-effects regression for leverage. Column (3) reports a Fama-MacBeth (1973) regression for leverage. Columns (2) and (4) report the corresponding results for maturity structure. All variables are as defined in Table 2. Industry dummy variables (2-digit SIC codes) are included in columns (3) and (4). This table also reports the adjusted  $R^2$  and number of firm-year observations.  $t$ -statistics are given in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent Variable	Fixed Effects		Fama-MacBeth	
	Total Debt/Market Value of the Firm	Long-Term Debt/Total Debt	Total Debt/Market Value of the Firm	Long-Term Debt/Total Debt
Independent Variable	(1)	(2)	(3)	(4)
<i>Firm Factors</i>				
Tangible assets/Total assets	0.1610 (7.23)***	0.0846 (5.03)***	0.1964 (17.83)***	0.2692 (62.65)***
ROA	-0.0260 (-8.29)***	0.0136 (5.56)***	-0.1346 (-3.06)***	0.0684 (13.49)***
Log total assets	0.0110 (4.25)***	0.0044 (3.74)***	0.0075 (14.00)***	0.0143 (21.85)***
Market-to-book ratio	-0.0032 (-5.17)***	0.0006 (2.92)***	-0.0085 (-14.16)***	0.0000 (-0.04)
<i>Country Factors</i>				
Developed economy			0.1140 (6.44)***	0.1536 (12.95)***
Inflation rate	0.1952 (2.15)**	0.0999 (2.12)**	-0.0012 (-0.02)	-0.1211 (-0.74)
Inflation rate volatility	-0.0050 (-0.93)	-0.0046 (-2.83)***	0.1039 (0.62)	-0.1100 (-0.91)
Corruption index	0.0388 (2.59)***	-0.0206 (-1.97)**	0.0206 (7.89)***	-0.0363 (-15.76)***
Common law			-0.0336 (-6.23)***	0.0954 (20.04)***
Bankruptcy code			0.0184 (4.89)***	0.0526 (16.63)***
Tax	0.1885 (1.28)		-0.0036 (-0.15)	
Deposits	0.0293 (0.61)	-0.0123 (-0.55)	-0.0243 (-2.15)**	-0.1089 (-9.40)***
Deposit insurance	0.0310 (2.78)***	-0.0051 (-1.01)	-0.0005 (-0.17)	0.0074 (1.37)
Domestic savings	-2.7265 (-1.62)	0.9638 (1.33)	1.1488 (4.14)***	-4.3573 (-13.62)***
Insurance penetration	0.0368 (0.39)	0.0081 (0.05)	0.5433 (3.36)***	-0.2434 (-2.65)***
Government bonds	-0.0240 (-1.09)	-0.0777 (-5.42)***	-0.0403 (-1.70)*	0.0002 (0.01)
No. of obs.	251,780	225,437	251,780	225,437
Adjusted $R^2$	0.0757	0.1089	0.1102	0.1923

#### D. Book Values and Financing Choices

In this section we examine how the country variables affect the levels of short-term debt, long-term debt, and total debt relative to the asset values of the firms in our sample. We measure book leverage as the proportion of total debt to total assets of the firm, decomposing this measure into short-term debt to total assets and long-term debt to total assets.

Table 7 presents the results of the book leverage regressions. Column (1) reports the regression for total book leverage, column (2) provides evidence for

TABLE 7  
Book Debt Ratios

Table 7 presents regressions for book leverage, defined as is the ratio of total debt to total assets. We further decompose the book leverage ratio into its long-term and short-term components. Column (1) reports the regression for book leverage, defined as the ratio of total debt to total assets. Column (2) reports the regression for long-term debt ratio, defined as the ratio of long-term debt to total assets. Column (3) reports the regression for short-term debt ratio, defined as the ratio of short-term to total assets. All variables are as defined in Table 2. All regressions include dummy variables for industry (2-digit SIC codes). This table also reports the adjusted  $R^2$  and number of firm-year observations.  $t$ -statistics are given in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

Dependent Variable	Total Debt/ Total Assets	Long-Term Debt/ Total Assets	Short-Term Debt/ Total Assets
Independent Variable	(1)	(2)	(3)
<i>Firm Factors</i>			
Tangible assets/Total assets	0.2016 (33.82)***	0.1887 (46.46)***	0.0110 (3.35)***
ROA	-0.1000 (-27.77)***	-0.0120 (-6.74)***	-0.0643 (-28.23)***
Log total assets	0.0037 (6.60)***	0.0063 (23.65)***	-0.0019 (-4.49)***
Market-to-book ratio	-0.0024 (-5.23)***	-0.0008 (-3.52)***	-0.0010 (-4.68)***
<i>Country Factors</i>			
Developed economy	0.0667 (6.61)***	0.0748 (9.28)***	-0.0098 (-1.78)*
Inflation rate	-0.0181 (-0.46)	-0.0141 (-0.66)	-0.0487 (-1.59)
Inflation rate volatility	-0.0073 (-3.89)***	-0.0003 (-0.15)	-0.0037 (-1.62)
Corruption index	0.0124 (5.34)***	-0.0032 (-1.90)***	0.0169 (15.17)***
Common law	-0.0200 (-5.51)***	0.0214 (5.34)***	-0.0353 (-12.79)***
Bankruptcy code	0.0124 (6.92)***	0.0194 (14.51)***	-0.0085 (-7.58)***
Tax	0.1121 (8.70)***		
Deposits/GDP	-0.0163 (-4.04)***	-0.0402 (-11.55)***	0.0281 (10.06)***
Deposit insurance	0.0004 (0.27)	0.0043 (3.31)***	-0.0053 (-4.30)***
Domestic savings	0.0054 (2.65)***	-0.0069 (-4.74)***	0.0118 (10.96)***
Insurance penetration	-0.0545 (-0.84)	0.0393 (0.77)	0.0233 (0.63)
Government bonds	-0.0337 (-3.56)***	-0.0306 (-4.01)***	-0.0011 (-0.19)
No. of obs.	224,527	224,527	224,527
Adjusted $R^2$	0.1474	0.1802	0.1676

the long-term debt ratio, and column (3) provides evidence for the short-term debt ratio. As this table indicates, the long-term debt ratio is higher in more developed economies, and in countries with common laws, lower corruption, explicit bankruptcy codes, relatively smaller banking sectors, deposit insurance, lower domestic savings, and smaller government bond issuances. By contrast, the short-term debt ratio is higher in less developed economies, in countries not under common laws, and in those with higher corruption, higher domestic savings, larger banking sectors, lack of deposit insurance, and higher domestic savings. Taken together, these results of the long- and short-term debt regressions are



consistent and complementary with the results of the debt maturity ratio regressions in Table 5.<sup>31</sup>

## VI. Summary and Conclusion

At the outset, we described regression results that indicate that a firm's capital structure is determined more by the country in which it is located than by its industry affiliation, suggesting that the institutional environment can have a profound effect on how firms are financed. Specifically, we find that a country's legal and taxation system, level of corruption, and the preferences of capital suppliers (banks and pension funds) explain a significant portion of the variation in leverage and debt maturity ratios.

The effects of taxes on capital structure choices are consistent with theory. When the tax gain from leverage is positive, firms tilt their capital structures toward more debt. However, as we note below, the tax effect is not as strong and pervasive as other influences on capital structure. The legal environment also has an important influence on capital structure choices. Our strongest finding is that firms in countries that are viewed as more corrupt tend to be more levered and use more short-term debt. We also find that common law countries have lower leverage and use more long-term debt and that firms in countries with an explicit bankruptcy code have higher leverage and use relatively more long-term debt.

We also provide evidence that suppliers of capital can influence how firms are financed. Most notably, the debt maturity structure of corporations in countries with larger banking sectors tend to be shorter, reflecting the preferences of banks to lend short term. However, controlling for the size of the banking sector, firms in countries with deposit insurance tend to have longer maturity debt, suggesting that deposit insurance in some way facilitates long-term lending by banks. In contrast, our evidence of a relation between the size of the insurance sector and capital structure is very weak. However, we find that firms in countries with higher levels of defined-contribution pension fund assets use relatively more equity, while firms in countries with higher levels of defined benefit pension fund assets use relatively more long-term debt. In addition, we find evidence that a larger government bond sector crowds out private debt capital in the developing countries, leading firms in these countries to borrow less. We do not, however, find an effect of government borrowing on debt/value ratios of firms in developed countries, but we do find that firms in these countries tend to have shorter maturity debt when the government bond market is larger.

While not all of our results hold across all subgroups and subperiods, some of the results are quite strong and pervasive. This is particularly true in the debt

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<sup>31</sup>We also find that inflation rate volatility is associated with lower total debt ratio, which is in contrast to the previous results in Table 4, where leverage is measured as total debt to market value. Note also that the size of the banking sector is associated with lower total debt ratio. However, this result is driven by the high leverage ratios of South Korean firms and the relatively small banking sector of the South Korean economy. After dropping South Korea, the size of the banking sector is insignificantly related to book leverage. Interestingly, the results presented in Table 7 indicate that the relationship between financing choices and tax is more important when leverage is defined relative to total assets rather than the market value of the firm.

maturity regressions where corruption, legal system, and the size of the banking sector are very strong in all subsamples and subperiods. Further, the bankruptcy code and domestic savings are also strongly related to debt maturity in all of the subsamples. Deposit insurance, while related to debt maturity in most subsamples, is insignificant in the 1991–1998 subperiod.

In the leverage regressions the results depend more on subgroups and subperiods. For example, while we find that for the full sample, leverage is higher in countries where the tax gain from leverage is positive, we do not find a significant relation between the tax gain to leverage and debt ratios in the developing economies subsample, and the tax effect is insignificant in the 1991–1998 subperiod. Likewise, the effect of both common law and bankruptcy code are insignificant if we restrict the sample to developing economies. However, the relationship between financial leverage and corruption is strong and significant in all subsamples.

Although our emphasis has been on the effect of cross-country differences in institutions on corporate financial choices, our analysis may have implications for the literature on how institutions can promote economic growth.<sup>32</sup> Specifically, the fact that institutions influence how firms are financed may provide an indirect channel through which a country's institutions affect economic growth. For example, there is reason to believe that if firms can raise more of their capital with equity and long-term debt, they will be better able to make longer-term investments, which may better promote economic growth. This suggests that an analysis of the relation between investment horizons and institutional structure offers an interesting avenue for future research.

## Appendix A. Country-Level Variables

In Appendix A, we consider the country-level variables described in Section II. In addition, we include inflation, inflation volatility (measured as the standard deviation of inflation rates over the preceding 4 years), and a developed economy indicator variable that takes a value of 1 if the country is classified as a developed economy. Table A1 presents variable definitions along with their data sources. With the exception of the common law, developed economy, bankruptcy code, and deposit insurance variables that are constant across time, all remaining variables exhibit time-series variation. The country-by-country median values of the country-level explanatory variables presented in Table A2 reveal cross-country variation in all variables.

## Appendix B. Firm-Level Regressions of Capital Structure Choice

In Appendix B, we report individual country regressions that estimate the influence of firm-level explanatory variables on capital structure choice. The firm-level variables that we include are asset tangibility (fixed assets over total assets), profitability (net income over total assets), firm size (natural logarithm of total assets), and the market-to-book ratio (market value of equity over book value of equity). In addition, we include industry indicator variables based on 2-digit SIC codes. Table B1 reports the results of the individual

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<sup>32</sup>Demirgüç-Kunt and Maksimovic (1998), Levine and Zervos (1998), and Rajan and Zingales (1998) find that, for a sample of developing and developed countries, the development of stock markets, bond markets, and banks facilitate economic growth.

TABLE A1  
Definitions and Data Sources of Country-Level Variables

Variable	Description	Source
Developed economy	A 0 or 1 dummy variable indicating whether the country is classified as developed according to the World Bank classification based on countries' gross national income levels.	World Development Indicators, World Bank
Inflation rate	Annual rate of change on consumer price index.	World Development Indicators, World Bank
Inflation rate volatility	Standard deviation of inflation rates from period $t - 4$ to $t$ .	World Development Indicators, World Bank
Corruption index	An index ranging from 0 to 10, with larger value indicating more severe corruption.	Corruption Perception Index, Transparency International
Common law	A 0 or 1 dummy variable indicating whether a country adopts the common law system.	Treisman (2000)
Bankruptcy code	A proxy for the existence of an explicit bankruptcy code, measured as a dummy variable equal to 1 if an insolvent firm is most likely to undergo a reorganization proceeding.	Djankov, Hart, McLiesh, and Shleifer (2008)
Tax	Estimate of the Miller (1977) tax ratio equal to $(1 - ((\text{after all tax value of } \$\text{dividends})/(\text{after all tax value of } \$\text{interest})))$ calculated using statutory tax rates.	Price Waterhouse Coopers, Doing Business
Deposits	A proxy for the degree of financial intermediation of a country, measured as the country's deposits (liquid liability) over GDP.	International Financial Statistics, International Monetary Fund
Deposit insurance	Dummy variable equal to 1 if bank deposits are insured by government.	Demirgüç-Kunt, Karacaovali, and Laeven (2005)
Domestic savings	A proxy for the level of domestic savings measure as the country's gross domestic saving over GDP.	International Financial Statistics, International Monetary Fund
Insurance penetration	Value of total insurance premiums/GDP. Total insurance premiums are the sum of life and non-life insurance premiums.	Swiss Reinsurance Company, Beck and Demirgüç-Kunt (2009)
Pension fund regulation index	An index of relative restrictions on debt and equity holdings of pension funds measured as the ratio of the proportional limit on equity holdings over the proportional limit on debt holdings, with larger values indicating tighter restriction on bond holdings. The index ranges from 1 to 4.	OECD, Survey of Investment Regulation of Pension Funds
Government bonds	Value of domestically denominated government bonds/GDP.	International Financial Statistics, International Monetary Fund
Defined benefit pensions	Value of defined benefit pension fund assets/GDP.	OECD
Defined contribution pensions	Value of defined contribution pension fund assets/GDP.	OECD

country leverage regressions. The coefficients for the market-to-book ratio have the same sign in all country regressions. Asset tangibility and size are positively related to leverage in 38 and 34 out of 39 countries, respectively. Finally, profitability is negatively related to leverage in 36 out of 39 countries. Table B2 reports the results of the country-by-country debt maturity regressions. The most robust cross-sectional determinant of debt maturity is asset tangibility. With one exception, asset tangibility is significantly and positively related to debt maturity structure. On the other hand, we find cross-country variation in the signs of the estimated coefficients for profitability, firm size, and the market-to-book ratio. Profitability is positively related to debt maturity structure in 25 (statistically significant in 15) out of 39 countries. Firm size is positively related to debt maturity structure in 33 (statistically significant in 21) out of 39 countries, and the market-to-book ratio is positively related to debt maturity structure in 28 out of 39 countries and is statistically insignificant in most countries. Indeed, this relation is significantly negative only in the United States.

TABLE A2  
Median Values of Country-Level Dependent Variables

Table A2 provides the country-by-country median value of the dependent variables. Variables are as defined in Table 2 and Table A1.

Country	Developed Economy	Inflation Rate	Inflation Rate Volatility	Corruption Index	Common Law	Bankruptcy Code	Tax	Deposits/GDP	Deposit Insurance	Domestic Savings	Insurance Penetration	Pension Fund Regulation Index	Government Bonds	Defined Benefit Pension	Defined Contribution Pension
Australia	1.00	0.03	0.01	1.40	1.00	0.00	0.00	0.60	0.00	0.23	0.04	2.00	0.09	—	—
Austria	1.00	0.02	0.01	2.35	0.00	0.00	0.03	0.82	1.00	0.25	0.02	1.00	0.47	—	—
Belgium	1.00	0.02	0.01	2.90	0.00	1.00	0.03	0.78	1.00	0.24	0.04	2.00	0.81	—	—
Brazil	0.00	0.08	0.10	6.35	0.00	0.00	-0.15	0.37	1.00	0.18	0.00	1.00	0.32	12.36	5.88
Canada	1.00	0.02	0.01	1.03	1.00	1.00	0.18	0.75	1.00	0.23	0.03	2.00	0.28	52.52	1.49
Switzerland	1.00	0.01	0.01	1.10	0.00	1.00	0.26	1.25	1.00	0.28	0.07	2.00	0.11	—	102.87
Chile	0.00	0.05	0.02	2.85	0.00	0.00	0.00	0.43	1.00	0.26	0.02	1.00	0.28	—	59.08
China	0.00	0.02	0.07	6.60	0.00	0.00	0.30	0.33	0.00	0.42	0.01	2.00	0.15	—	—
Germany	1.00	0.02	0.01	1.94	0.00	0.00	-0.01	0.70	1.00	0.22	0.03	2.00	0.28	—	—
Denmark	1.00	0.02	0.00	0.50	0.00	0.00	0.12	0.53	1.00	0.25	0.04	2.00	0.57	2.71	26.92
Spain	1.00	0.03	0.01	3.35	0.00	1.00	0.18	0.65	1.00	0.23	0.02	3.00	0.32	0.10	6.32
Finland	1.00	0.01	0.01	0.40	0.00	1.00	0.01	0.48	1.00	0.26	0.07	3.00	0.37	57.85	—
France	1.00	0.02	0.00	3.00	0.00	1.00	0.17	0.63	1.00	0.20	0.06	3.00	0.39	1.16	—
United Kingdom	1.00	0.03	0.01	1.52	1.00	0.00	0.15	0.90	1.00	0.16	0.09	3.00	0.33	—	—
Greece	1.00	0.04	0.02	5.25	0.00	0.00	-0.16	0.55	1.00	0.10	0.01	3.00	0.74	—	—
Hong Kong	1.00	0.02	0.02	2.25	1.00	0.00	0.17	1.92	0.00	0.31	0.03	—	0.09	5.71	15.07
Indonesia	0.00	0.09	0.03	8.10	0.00	1.00	0.30	0.39	1.00	0.31	0.01	—	0.21	—	—
India	0.00	0.06	0.03	7.20	1.00	0.00	0.38	0.38	1.00	0.23	0.01	—	0.20	—	—
Ireland	1.00	0.03	0.01	2.50	1.00	1.00	0.17	0.70	1.00	0.36	0.07	3.00	0.36	—	—
Israel	1.00	0.04	0.02	2.95	1.00	0.00	0.36	0.74	0.00	0.17	0.03	3.00	0.00	24.11	4.13
Italy	1.00	0.03	0.01	5.25	0.00	1.00	-0.01	0.53	1.00	0.22	0.03	4.00	0.80	0.46	2.04
Japan	1.00	0.00	0.01	2.90	0.00	1.00	0.35	1.94	1.00	0.27	0.09	4.00	0.60	10.79	0.56
Korea, Rep.	1.00	0.04	0.02	5.76	0.00	1.00	0.25	0.49	1.00	0.35	0.09	1.00	0.11	0.50	—
Mexico	0.00	0.10	0.08	6.70	0.00	1.00	0.03	0.23	1.00	0.22	0.01	1.00	0.15	3.09	6.04
Malaysia	0.00	0.03	0.01	4.90	1.00	0.00	0.00	1.12	1.00	0.43	0.02	1.00	0.34	—	—
Netherlands	1.00	0.02	0.01	1.05	0.00	0.00	0.34	0.99	1.00	0.27	0.05	4.00	0.42	—	—
Norway	1.00	0.02	0.01	1.25	0.00	1.00	0.00	0.50	1.00	0.31	0.02	4.00	0.12	6.51	—
New Zealand	1.00	0.02	0.01	0.60	1.00	0.00	0.00	0.82	0.00	0.23	0.02	4.00	0.27	3.28	8.53
Pakistan	0.00	0.08	0.02	7.80	1.00	0.00	0.44	0.30	0.00	0.16	0.00	—	0.36	—	—
Peru	0.00	0.04	0.04	5.90	0.00	1.00	0.30	0.21	1.00	0.18	0.00	—	0.02	—	10.45

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TABLE A2 (continued)  
Median Values of Country-Level Dependent Variables

Country	Developed Economy	Inflation Rate	Inflation Rate Volatility	Corruption Index	Common Law	Bankruptcy Code	Tax	Deposits/GDP	Deposit Insurance	Domestic Savings	Insurance Penetration	Pension Fund Regulation Index	Government Bonds	Defined Benefit Pension	Defined Contribution Pension
Philippines	0.00	0.07	0.02	7.40	0.00	1.00	0.33	0.47	1.00	0.15	0.01	—	0.35	—	—
Portugal	1.00	0.03	0.01	3.65	0.00	1.00	0.17	0.88	1.00	0.17	0.02	2.00	0.40	11.07	0.48
Singapore	1.00	0.02	0.01	0.82	1.00	0.00	0.00	0.98	0.00	0.47	0.03	—	0.40	—	—
Sweden	1.00	0.02	0.01	0.80	0.00	0.00	0.22	0.40	1.00	0.24	0.04	1.00	0.39	—	—
Thailand	0.00	0.04	0.01	6.80	1.00	1.00	0.00	0.94	1.00	0.34	0.01	—	0.02	—	4.72
Turkey	0.00	0.54	0.05	6.40	0.00	1.00	-0.19	0.32	1.00	0.17	0.00	4.00	0.21	0.38	0.19
Taiwan	1.00	0.01	0.01	4.45	0.00	1.00	0.03	0.24	1.00	0.14	0.04	—	0.13	—	—
United States	1.00	0.03	0.01	2.40	1.00	1.00	0.31	0.65	1.00	0.16	0.04	4.00	0.29	48.11	32.24
South Africa	0.00	0.07	0.02	5.30	1.00	0.00	0.32	0.50	0.00	0.19	0.11	2.00	0.46	—	—

TABLE B1  
Pooled Firm-Level Regressions of Leverage by Country

Table B1 presents the regression of leverage on firm-level variables as defined in Table 2. The regression equation is estimated for each country using the pooled time-series and cross-sectional sample. All regressions include dummy variables for industry (2-digit SIC codes). This table also reports the adjusted  $R^2$  and number of firm-year observations. Standard errors are robust to clustering within firm over time. *t*-statistics are given in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

Country Code	Tangible Assets/ Total Assets	ROA	Log Total Assets	Market-to-Book Ratio	No. of Obs./ Adjusted $R^2$
Australia	0.0343 (2.11)**	-0.0061 (-1.02)	0.0264 (9.49)***	-0.0072 (-9.11)***	8,221 0.1224
Austria	0.2481 (2.86)***	-0.0735 (-1.74)*	0.0133 (2.78)***	-0.0128 (-3.59)***	1,093 0.1129
Belgium	0.1931 (3.61)***	-0.5328 (-4.34)***	0.016 (5.31)***	-0.0132 (-3.73)***	1,406 0.1824
Brazil	0.1930 (3.09)***	-0.1741 (-2.81)***	-0.0010 (-0.31)	-0.0103 (-3.33)***	2,579 0.0814
Canada	0.0924 (5.13)***	0.0070 (0.78)	0.0165 (4.05)***	-0.0102 (-13.46)***	10,806 0.1003
Switzerland	0.3178 (7.63)***	-0.1171 (-2.14)**	0.0036 (0.83)	-0.0186 (-5.97)***	2,583 0.1926
Chile	0.0817 (1.56)	-0.1870 (-1.01)	0.0181 (1.87)*	-0.0091 (-2.91)**	1,413 0.0840
China	0.0490 (2.10)**	-0.1378 (-5.87)***	0.0423 (5.26)***	-0.0073 (-6.85)***	6,815 0.1221
Germany	0.3018 (9.41)***	-0.0520 (-3.02)	0.0056 (3.73)	-0.0111 (-9.43)	8,497 0.1106
Denmark	0.2503 (4.27)***	-0.0762 (-1.74)*	0.0003 (0.08)	-0.0193 (-6.15)***	2,006 0.1368
Spain	0.0767 (1.76)*	-0.8292 (-6.83)***	0.0019 (0.85)	-0.0127 (-3.57)***	2,025 0.1600
Finland	0.4595 (7.57)***	-0.2516 (-2.68)***	0.0055 (1.78)*	-0.0149 (-4.19)***	1,591 0.2493
France	0.3408 (10.19)***	-0.1791 (-3.48)***	0.0081 (4.35)***	-0.0134 (-13.25)***	9,063 0.1624
United Kingdom	0.2412 (18.10)***	-0.0126 (-1.93)*	-0.0035 (-2.81)***	-0.0070 (-16.15)***	20,741 0.1289
Greece	0.0335 (0.72)	-1.2120 (-8.47)***	0.0239 (3.30)***	-0.0076 (-7.50)***	2,471 0.2250
Hong Kong	0.2220 (7.69)***	-0.0512 (-4.03)***	0.0035 (1.84)*	-0.0130 (-10.85)***	6,493 0.0982
Indonesia	0.2525 (4.55)***	-0.5076 (-5.01)***	0.0034 (0.70)	-0.0145 (-5.10)***	2,452 0.1586
India	0.4351 (11.03)***	-1.3180 (-13.25)***	-0.0052 (-1.16)	-0.0192 (-8.95)***	4,381 0.4328
Ireland	0.2047 (3.49)***	0.0234 (1.67)*	0.0065 (1.09)	-0.0091 (-3.74)***	854 0.1095
Israel	0.5941 (7.69)***	-0.0212 (-0.54)	0.0221 (1.76)*	-0.0081 (-3.06)**	934 0.3667
Italy	0.1041 (1.80)*	-0.5515 (-2.89)***	0.0117 (2.81)***	-0.0213 (-6.68)***	2,644 0.1169
Japan	0.3655 (18.55)***	-0.6499 (-6.60)***	0.0096 (4.70)***	-0.0055 (-6.05)***	41,763 0.1116
Korea	0.1765 (4.46)***	-0.1977 (-4.92)***	0.0595 (7.65)***	-0.0201 (-6.03)***	6,734 0.1764
Mexico	0.0821 (1.03)	-0.8375 (-4.14)***	0.0143 (1.31)	-0.0392 (-3.27)***	1,224 0.2132
Malaysia	0.1179 (3.77)***	-0.3592 (-6.27)***	0.0079 (3.76)***	-0.0123 (-7.05)***	7,072 0.1093
Netherlands	0.2754 (6.05)***	-0.0994 (-4.19)***	0.0049 (1.55)	-0.0108 (-6.52)***	2,482 0.1594

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TABLE B1 (continued)  
Pooled Firm-Level Regressions of Leverage by Country

Country Code	Tangible Assets/ Total Assets	ROA	Log Total Assets	Market-to-Book Ratio	No. of Obs./ Adjusted $R^2$
Norway	0.5780 (19.03)***	-0.0231 (-0.90)	0.0049 (1.61)	-0.0145 (-5.47)***	1,757 0.4568
New Zealand	0.1006 (1.68)*	0.0022 (0.11)	0.0033 (0.38)	-0.0150 (-2.29)**	917 0.1574
Pakistan	0.3415 (5.13)***	-1.5769 (-9.76)***	-0.0064 (-0.67)	-0.0197 (-3.67)***	1,045 0.4428
Peru	0.0169 (0.15)	-1.3765 (-8.23)***	0.0157 (1.17)	-0.0167 (-1.50)	491 0.2523
Philippines	0.1738 (2.46)**	-0.1420 (-2.92)***	0.0217 (5.16)***	-0.0201 (-4.46)***	1,523 0.1484
Portugal	-0.2483 (-3.15)***	-0.7286 (-2.66)***	0.0113 (1.67)*	-0.0301 (-4.99)***	840 0.1775
Singapore	0.2632 (8.63)***	-0.0783 (-2.32)**	0.0080 (2.39)**	-0.0186 (-6.50)***	3,973 0.1290
Sweden	0.4990 (13.16)***	0.0115 (0.79)	-0.0016 (-0.43)	-0.0161 (-8.47)***	3,189 0.3777
Thailand	0.0853 (2.09)**	-0.5986 (-3.77)***	0.0290 (3.80)***	-0.0128 (-3.28)***	3,403 0.1505
Turkey	-0.0963 (-1.54)	-0.5521 (-5.16)***	0.0114 (1.98)**	-0.0063 (-3.02)**	1,422 0.1925
Taiwan	0.0505 (1.90)*	-0.8067 (-10.40)***	0.0395 (10.21)***	-0.0411 (-9.31)***	7,051 0.3186
United States	0.2774 (33.04)***	0.0052 (2.66)***	0.0020 (3.19)***	-0.0072 (-38.41)***	77,132 0.1076
South Africa	0.0780 (2.39)**	-0.0442 (-1.65)*	-0.0110 (-4.35)***	-0.0073 (-4.18)***	3,483 0.0622

TABLE B2  
Pooled Firm-Level Regressions of Debt Maturity Structure by Country

Table B2 presents the regression of debt maturity on firm-level variables as defined in Table 2. The regression equation is estimated for each country using the pooled time-series and cross-sectional sample. All regressions include dummy variables for industry (2-digit SIC codes). This table also reports the adjusted  $R^2$  and number of firm-year observations. Standard errors are robust to clustering within firm over time.  $t$ -statistics are given in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

Country Code	Tangible Assets/ Total Assets	ROA	Log Total Assets	Market-to-Book Ratio	No. of Obs./ Adjusted $R^2$
Australia	0.1720 (6.15)***	0.0487 (3.15)***	0.0344 (6.54)***	-0.0011 (-0.72)	6,292 0.0991
Austria	0.3808 (3.72)***	-0.1207 (-1.65)	-0.0006 (-0.09)	0.0005 (0.10)	1,025 0.0674
Belgium	0.4061 (5.63)***	0.0641 (0.50)	0.0167 (3.84)***	0.0028 (1.14)	1,370 0.1333
Brazil	0.3386 (6.98)***	0.1300 (4.17)***	0.0217 (5.58)***	0.0045 (1.99)**	2,551 0.1304
Canada	0.2135 (8.97)***	0.0469 (3.05)***	0.0282 (5.70)***	-0.0018 (-1.49)	8,672 0.1144
Switzerland	0.3620 (7.95)***	0.0296 (0.43)	-0.0016 (-0.33)	-0.0055 (-1.58)	2,500 0.1005
Chile	0.3038 (3.32)***	-0.1973 (-1.23)	0.0440 (1.87)*	0.0086 (1.47)	1,301 0.1269

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TABLE B2 (continued)  
Pooled Firm-Level Regressions of Debt Maturity Structure by Country

Country Code	Tangible Assets/ Total Assets	ROA	Log Total Assets	Market-to-Book Ratio	No. of Obs./ Adjusted R <sup>2</sup>
China	0.3953 (8.65)***	0.0590 (2.43)**	0.0422 (2.35)**	0.0006 (0.37)	6,499 0.1570
Germany	0.4253 (12.06)***	0.0480 (1.76)*	-0.0019 (-1.06)	0.0021 (1.52)	7,523 0.0846
Denmark	0.4435 (7.00)***	-0.0095 (-0.30)**	-0.0046 (-1.07)	0.0031 (0.85)	1,931 0.1098
Spain	0.3516 (6.46)***	-0.1312 (-1.00)	-0.0036 (-1.25)	0.0059 (1.36)	1,967 0.0726
Finland	0.2129 (4.04)	-0.1358 (-2.27)**	0.0024 (0.61)	-0.0040 (-1.22)	1,551 0.0512
France	0.3438 (11.21)***	-0.0037 (-0.11)	0.0062 (2.93)***	0.0008 (0.65)	8,972 0.0612
United Kingdom	0.3790 (20.40)***	0.0243 (2.14)**	0.0077 (4.55)***	0.0003 (0.41)	18,605 0.0897
Greece	0.4844 (7.06)***	0.4544 (3.14)***	0.0157 (1.20)	-0.0012 (-0.71)	2,262 0.1062
Hong Kong	0.3965 (10.76)***	0.0127 (0.75)	0.0012 (0.45)	0.0019 (1.22)	5,862 0.0786
Indonesia	0.3888 (6.15)***	0.2320 (4.72)***	0.0088 (1.51)	0.0028 (1.00)	2,280 0.0841
India	0.4336 (10.01)***	0.0711 (0.87)	0.0208 (3.00)***	0.0012 (0.57)	4,286 0.1092
Ireland	0.3475 (4.67)***	0.0875 (2.26)**	0.0210 (2.67)**	0.0033 (0.95)	766 0.1232
Israel	0.3784 (5.21)**	-0.0453 (-0.65)	0.0283 (2.42)**	-0.0008 (-0.21)	750 0.1572
Italy	0.2976 (5.44)***	0.2107 (2.78)***	0.0088 (1.87)*	-0.0002 (-0.08)	2,589 0.0650
Japan	0.4001 (22.97)***	0.1380 (3.91)***	0.0118 (6.72)***	0.0038 (4.97)***	38,813 0.0754
Korea	0.1406 (4.07)***	-0.0917 (-3.18)**	0.0223 (3.62)***	0.0049 (2.14)**	6,303 0.0353
Mexico	0.3308 (3.98)***	0.3566 (3.97)***	0.0531 (3.09)**	0.0033 (0.38)	1,159 0.1765
Malaysia	0.2271 (6.02)***	0.1534 (6.13)***	0.0017 (0.60)	0.0010 (0.50)	6,471 0.0362
Netherlands	0.4106 (7.21)***	-0.1163 (-3.13)	0.0181 (3.99)***	0.0058 (2.37)**	2,270 0.1063
Norway	0.3817 (9.03)***	0.1571 (4.89)***	0.0082 (2.71)**	-0.0025 (-0.79)	1,626 0.1974
New Zealand	0.3828 (5.11)***	0.0444 (1.57)	0.0022 (0.43)	0.0021 (0.33)	829 0.1088
Pakistan	0.6196 (7.57)***	-0.2254 (-1.54)	0.0107 (0.93)	0.0055 (1.57)	1,007 0.2628
Peru	0.3047 (3.86)***	-0.5953 (-3.26)***	0.0709 (4.71)***	0.0170 (2.69)***	467 0.2179
Philippines	0.1777 (1.96)*	0.0992 (1.61)	0.0188 (2.94)***	0.0048 (0.89)	1,257 0.0577
Portugal	0.2685 (2.66)***	0.1624 (1.10)	0.0195 (2.03)**	-0.0041 (-0.54)	824 0.0658
Singapore	0.4891 (12.33)***	0.0633 (2.61)***	0.0093 (1.58)	0.0003 (0.11)	3,712 0.1357
Sweden	0.1782 (3.92)***	0.0159 (0.64)	-0.0071 (-2.46)**	-0.0018 (-0.60)	2,777 0.0347
Thailand	0.3126 (6.73)***	-0.0663 (-1.49)	0.0413 (3.61)***	0.0119 (4.63)***	3,271 0.1136

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TABLE B2 (continued)  
Pooled Firm-Level Regressions of Debt Maturity Structure by Country

Country Code	Tangible Assets/ Total Assets	ROA	Log Total Assets	Market-to-Book Ratio	No. of Obs./ Adjusted $R^2$
Turkey	0.2459 (3.12)***	-0.0509 (-0.73)	0.0206 (2.83)***	0.0088 (2.79)***	1,286 0.0505
Taiwan	0.3771 (11.08)***	0.1934 (3.19)***	0.0452 (9.26)***	0.0191 (4.19)***	6,564 0.1224
United States	0.3169 (35.85)***	0.0878 (32.97)***	0.0176 (24.42)***	-0.0010 (-3.38)***	66,323 0.1801
South Africa	0.3702 (9.45)***	-0.0239 (-0.75)	-0.0070 (-2.97)***	0.0063 (3.36)***	3,065 0.1025

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