



Contents lists available at ScienceDirect

## The Quarterly Review of Economics and Finance

journal homepage: [www.elsevier.com/locate/qref](http://www.elsevier.com/locate/qref)



# The impact of institutional environment on the capital structure of firms during recent financial crises<sup>☆</sup>

Paulo Alves<sup>a,\*</sup>, Paulo Francisco<sup>b</sup>

<sup>a</sup> Portuguese Securities Market Commission (CMVM) and Lisbon Accounting and Management Institute (ISCAL), Rua Laura Alves, n° 4 Apartado 14258, 1064-003 Lisbon, Portugal

<sup>b</sup> Portuguese Securities Market Commission (CMVM) and School of Economics and Management (ISEG), Rua Laura Alves, n° 4 Apartado 14258, 1064-003 Lisbon, Portugal

### ARTICLE INFO

#### Article history:

Received 10 October 2013

Received in revised form

10 November 2014

Accepted 2 December 2014

Available online xxx

#### JEL classification:

G01

G30

G32

#### Keywords:

Capital structure

Financial crisis

Institutional environment

### ABSTRACT

This paper reviews the impact of institutional variables on the capital structure of firms during the recent financial crises (dot.com bubble, subprime crisis, and European sovereign debt crisis). For the first time, the general government gross debt and current account balance are included in the debate, revealing evidence that the irrational exuberance of sovereign debt has been mimicked by firms. The approach proposed reveals two important trends, broadly consistent throughout those episodes of disturbance. Under stress, firms increase leverage and then rely, or are forced to rely, on short-term borrowing, heightening rollover risks. Altogether, the outbreak of those crises sowed the seeds of a new one. Regarding the European sovereign debt crisis, the presence of an asymmetric shock has been noted, with the periphery and the center of the European Union being targeted to different extents. Lastly, it is clear that institutional variables are key to this topic and deserve a more careful analysis if we are to improve our understanding of the financing options available to firms, especially in times of financial crisis.

© 2014 The Board of Trustees of the University of Illinois. Published by Elsevier B.V. All rights reserved.

## 1. Introduction

There have been three financial crises since the beginning of the century – the dot.com bubble, the subprime crisis, and the European sovereign debt crisis. The dot.com bubble, a crisis apparently confined to the United States, was the result of irrational behavior by investors. The subprime crisis, the most troublesome of the three on a global scale, revealed a wide combination of weaknesses: the deregulation of financial markets, the explosion of financial innovation, the deficiency of supervisory systems, the monetary policies that stimulated financial speculation, and poorly designed management compensation schemes. The European sovereign debt crisis was a result of expansionary fiscal policies pursued during the first decade of the twenty-first century, particularly by southern European countries, in response to low rates of economic growth and the low competitiveness of these economies in the context of the

European Union. The three crises had different dimensions and dissimilar outcomes for the world economy, and probably created new challenges for corporate financing choices.

The aim of this research paper is to (i) evaluate the impact of recent financial crises on corporate financing decisions, *i.e.* whether firms changed their financial structure during such periods and how those changes occurred, (ii) evaluate whether the impact of the three crises on corporate financing choices was similar in developed and developing capital markets, in capital market-based and banking-based countries, and in countries with different levels of development, (iii) understand how institutional variables influenced financing choices during recent financial crises, for example, whether the impact on capital structure was similar in countries with different levels of corruption, and (iv) evaluate how such institutional variables influenced corporate financing choices during each crisis. This approach, and the aim of this research paper, is novel, as we shall see below. Until the 1990s the capital structure topic focused on different theoretical points of view. In the 1970s and 1980s, it focused on the development of the trade-off theory, which compares the benefits of using debt and other tax-shield substitutes (DeAngelo & Masulis, 1980) with its costs, namely in terms of financial distress (Kim, 1978; Kraus & Litztenberger, 1973)

<sup>☆</sup> The views stated are those of the authors.

\* Corresponding author. Tel.: +351 917308049; fax: +351 917308049.

E-mail addresses: [pauloalves@cmvm.pt](mailto:pauloalves@cmvm.pt) (P. Alves), [paulofrancisco@iseg.utl.pt](mailto:paulofrancisco@iseg.utl.pt) (P. Francisco).

and agency costs (Jensen & Meckling, 1976). In the 1980s the pecking order theory emerged – a new theory related to information asymmetries, advocating the use of internal rather than external resources, and secured rather than unsecured securities (Myers, 1984; Myers & Majluf, 1984). In 1990s the capital structure topic evolved again: the role of institutional setting assumed an important relevance. For example, in their study of the impact of stock market development on corporate financing choices Demirgüç-Kunt and Maksimovic (1996) concluded that the size of the capital market has a positive influence on the use of long-term debt. Booth, Aivazian, Demirgüç-Kunt, and Maksimovic (2001) examined capital structures in ten developing countries, concluding that there was a need to study the influence of countries' infrastructures on financing choices in cases where the firm-level determinants of capital structure are similar in developed and developing countries. Considering a sample of unlisted firms, Giannetti (2003) evaluated the impact of firm and country characteristics on capital structure and concluded that firms' indebtedness is greater in underdeveloped stock markets. Palacín-Sánchez, Ramírez-Herrera, and di Pietro (2013) studied the financing choices of small and medium enterprises, concluding that the determinants of leverage at the level of the firm differ across a country's regions, and that the role of the institutional environment plays an important role. Based on a sample of 42 countries, De Jong, Kabir, and Nguyen (2008) concluded that the impact of firm-specific determinants is highly influenced by country-specific determinants. Comparing the capital structure determinants of firms in two capital market-oriented countries (the United Kingdom and the United States) with those in three banking-focused countries (France, Germany, and Japan), Antoniou, Guney, and Paudyal (2008) showed the importance of the economic environment, corporate governance practices, the level of investor protection, and other institutional variables in explaining corporate financing decisions. Using a panel of 31 countries Alves and Ferreira (2011) studied the impact of legislation on capital structure and concluded that the interaction between shareholder rights and profitability had a negative impact on market leverage, suggesting that the more shareholders there are, the fewer asymmetric information problems there are. Fan, Titman, and Twite (2012) debated the impact of institutional variables such as corruption, taxes, and legal systems on capital structure and debt maturity choices, concluding that such variables explain a significant part of the variation in leverage and debt maturity ratios. Öztekin (forthcoming) also studied the impact of institutional setting on the capital structure of firms and concluded that leverage and the speed of adjustment toward target leverage is affected by the quality of a country's institutions. However, despite the various studies presented, the present study is the first to relate simultaneously the impact of financial crises and the institutional environment in determining corporate financing choices.

In this research paper, we examine the impact of institutional setting on corporate financing choices, and our analysis of the effects of financial crises on corporate capital structure is one of the main contributions of this paper. Some macroeconomic variables are introduced, for the first time, into the capital structure debate, namely general gross debt as a percentage of GDP and the current account balance as a percentage of GDP. Both variables reflect different indicators. In the case of general gross debt as a percentage of GDP, increasing the state's capacity to obtain funds means the markets are also open to firms, and consequently they can obtain more debt, mimicking the states in terms of issuing debt. As regards the current account balance as a percentage of GDP, a chronic deficit means loss of competitiveness, implying a lower equity value and increasing a firm's leverage, even if the level of debt has begun to stabilize. The results found in this research paper are more conclusive for general gross debt as a percentage of GDP. Our results also

indicate that the financial crises had different impacts on corporate financing choices. However, in general, leverage and the level of corporate short-term debt increased during a financial crisis. These findings indicate that cumulative financial crises created conditions of stress for firms, increasing, firstly, leverage and, secondly, forcing them to resort to short-term borrowing, since lenders are more distrustful concerning the risk posed by borrowers. This is worrying when companies want to make long-term investments and states, namely the supervisory authorities, are forced to monitor corporate debt levels in light of potential financial crises.

The paper is organized as follows. Section 2 outlines the hypotheses we will be testing. Section 3 describes the data and methodology, and Section 4 details the main results. Section 5 presents our conclusion.

## 2. Hypotheses

This section analyzes the role of financial crises, institutional, and firm-level variables on financing choices. The proposed hypotheses relate financial crises and institutional variables such as economic environment, financial development, capital-market developments, business confidence, and financial systems in a given country to the capital structure of firms. Firm-level variables are also used in this research, in line *inter alia* with Hall, Hutchinson, and Michaelas (2000), Bhaird and Lucey (2010), Degryse, De Goeij, and Kappert (2012), and Mateev, Poutziouris, and Ivanov (2013).

### 2.1. Financial crises

Three financial crises have occurred since the beginning of the century: the dot.com bubble, the subprime crisis, and the European sovereign debt crisis. More than simply a result of financial deregulation, the dot.com bubble of 2001 was a consequence of supervisory deficiencies. The problems began in the US capital market, but went on to affect capital markets around the world. In fact, by the end of the 1990s retail investors particularly, rather than institutional ones, had begun buying Internet stocks at unrealistic values, culminating in the dot.com bubble. In all probability, the supervisory authorities could have done more to avert such a collapse. We expect that collapse to have had a particularly significant impact on the US capital market, and less of an impact on other markets. The equity devaluation is likely to have increased the leverage of US firms. In contrast, the subprime crisis was a global crisis and the impact of financial deregulation could not be neglected. In fact, the repeal of the Glass–Steagall Act in the US in 1999, which put an end to the separation between commercial banks and investment banks, created conditions for industrial corporations to increase their leverage. As a result, new financial products emerged, namely asset-backed securities, credit default swaps, and structured financial products, to name a few, but financial institutions had a hard time monitoring such products. In Europe, during the first decade of the twenty-first century, the experience of shadow banking was tolerated, sometimes promoted, and risk management was weakened, creating a situation in which the banking supervisory authorities had little idea about what was going on. In the meantime, the leverage of firms and banks increased without risk levels being adequately taken into account. The subprime crisis was bound to happen. On September 15, 2008, Lehman Brothers filed for Chapter 11 bankruptcy protection, sending shockwaves around the world. We believe that although the subprime crisis created the conditions for the credit shocks and liquidity problems observed, it also had a positive impact on leverage, in all economies, but through the issuance of short-term debt rather than

long-term debt (Custódio, Ferreira, & Laureano, 2013; González, 2014; Vermoesen, Deloof, & Laveren, 2013).

During this financial market turmoil investors and financial intermediaries became more risk averse, leading to a significant decline in the syndicated loans and corporate bond markets. As a consequence, the long-term cost of issuing capital increased significantly, leaving firms with no other option than to issue short-term debt (Ivashina & Scharfstein, 2010; Santos, 2011). In this sense, the increase in information asymmetries during the recent financial crises affected capital markets, leading companies to replace long-term debt by short-term debt. The bond market suffered from the financial crisis as a result, for example, of investors' risk aversion and the increase in agency costs between shareholders and long-term bondholders (asset substitution). The long-term capital supply consequently decreased; it was probably only large firms that had access to the long-term debt markets.

The European sovereign debt crisis affected mainly southern Europe and resulted from the loss of confidence in the creditworthiness of peripheral countries, namely Greece and Portugal, forcing the governments of these countries to seek bailouts from the international community. For those peripheral countries, debt markets were closed and we expect the long-term debt of firms to have decreased.

Given this line of reasoning we propose the following hypotheses:

- H1.** Firms use more debt than equity in times of financial crisis.
- H2.** Firms use more short-term debt than long-term debt in times of financial crisis.

## 2.2. Economic environment

Booth et al. (2001) concluded that, unlike institutional variables, firm-level determinants are similar in developed and in developing countries, and even more so during a financial crisis. Like other institutional variables, economic environment (or related variables) has a different impact on the financing choices of firms in countries that have a different institutional setting. In this research paper we explore two new variables related to economic environment: current account balance and general government gross debt (see Table A1). Fan et al. (2012) used a variable similar to general gross debt, namely government bonds, measured by the value of domestically denominated government bonds/GDP. They found, in general, a negative impact of this variable on leverage, and in their opinion one plausible reason was the fact that debt capital supply was fixed. And thus, government and corporate borrowers had to compete to obtain these limited financial resources. In our opinion, the first decade of the present century cannot be characterized by a fixed supply of debt capital. On the contrary, financial innovation, for example through securitization activity, and economic conditions (low interest rates) created, on the one hand, conditions for financial institutions systematically to restructure their balance sheets, and, on the other, for bank customers to replace deposits by government and corporate bonds. We expected that in some countries the impact of an increase in general government gross debt would have had a positive impact on corporate leverage, namely in EMU countries, where the level of corporate and government debt increased simultaneously between 2000 and 2010. In fact, we observed a simultaneous trend in the evolution of government debt and private credit. For example, in the case of Portugal, according to the World Bank, the level of domestic credit provided by the financial sector increased from 177% of GDP in 2008 to 203% in 2011. According to the European Central Bank, the corresponding level of general government debt also increased, from 71.7% in 2008 to 108.2% in 2011. Greece showed the same pattern: the level

of domestic credit provided by the financial sector increased from 115% of GDP in 2008 to 153% in 2011 and the level of general government debt rose from 112.9% to 170.3% over the same period. For these reasons we believe that in periods of credit expansion the use of this type of financing extends to all economic agents, including firms and the public sector.

The current account balance relates directly to the level of competitiveness of an economy. A systematic current account surplus signifies a wealthy and competitive economy: an economy with firms capable of selling tradable assets, of creating value, and of financing their investments by allocating their own resources. We expect the current account balance deficit to have a positive impact on corporate leverage in certain countries, namely in some developing countries, which have become more competitive during the past 20 years. The third economic variable we explore in this paper is GDP growth (see Table A1). For ten developing countries Booth et al. (2001) found that GDP growth had a positive impact on corporate leverage, although without statistical significance. They concluded that real economic growth in a country will positively influence book leverage, as firms tend to borrow more in periods when there is a prospect of real growth and less during periods driven by an inflationary process. The increase in the monetary value of assets is not compensated by the higher interest rates and concomitant risk. De Jong et al. (2008) showed that economic growth impacts levels of debt and some firm-level variables, namely growth opportunities. In line with these results, we expect GDP growth to be positively associated with corporate leverage.

- H3.** General government gross debt is positively associated with corporate leverage.

- H4.** Current account balance deficit is positively associated with corporate leverage.

- H5.** GDP growth is positively associated with corporate leverage.

## 2.3. Financial development, capital-market development, and business environment

La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997, 1998) studied the role of the legal environment in several variables, namely shareholders' rights and creditors' rights. Their results indicated that countries with poor investor protection, particularly civil law systems, do indeed have significantly smaller debt and equity markets. In line with those authors, Demirgüç-Kunt and Levine (1999) also concluded that countries with civil law regimes, poor protection of shareholder and creditor rights, poor accounting standards, and restrictive banking regulations tend to have underdeveloped financial systems, typically banking-based. In fact, countries with a common law tradition, strong shareholder protection, and good accounting regulations tend to be more market-based.

Demirgüç-Kunt and Maksimovic (1996) found a positive relationship between leverage and banking-oriented systems and an inconclusive result for the relationship between leverage and market-based systems. Alves and Ferreira (2011) also found an unexpected result, namely that leverage is positively influenced by stock market development and negatively by banking development. Muradoglu, Onay, and Phylaktis (2013) also found that stock market development had a positive impact on leverage, though the relationship between banking development and leverage was inconclusive. On the other hand, the positive impact of banking development on corporate short-term debt has been empirically verified more often (see, for example, Alves & Ferreira, 2011; Demirgüç-Kunt & Maksimovic, 1996; Fan et al., 2012), the reason being that it is cheaper to monitor short-term debt than long-term



debt, particularly when creditors are not well protected. In the face of these conflicting results concerning leverage, we expect banking development to have a positive impact on corporate short-term debt, particularly in countries with less favorable legal provisions. As noted earlier, the structure of a financial system, whether banking-based or capital-market based, is an important aspect to consider when analyzing corporate financing choices. Demircüç-Kunt and Maksimovic (1996, 1999) and Alves and Ferreira (2011) identified a positive relationship between an active stock market and the use of long-term debt, and concluded that equity is replaced by long-term debt after stock market development. We expect capital-market development to have a positive impact on corporate long-term debt. In our research, the level of domestic credit provided by the banking sector is used as an indicator of banking development (see Table A1) and the total value of shares traded during the period is used as an indicator of capital-market development (see Table A1), both scaled by GDP.

To evaluate the business environment, one relevant variable is the country's level of corruption, generally measured by a corruption perception index (ranging from 0 to 10, where the lower values indicate more severe corruption (see Table A1)) compiled by Transparency International. Recently, Alves and Ferreira (2011) and Fan et al. (2012) showed that firms from countries with higher levels of corruption had larger levels of debt. In fact, firms in countries with more corruption and less legal enforcement tend to use more debt and less equity because there is more asymmetric information among investors, damaging the issuances of riskier assets. Another variable that can be used to assess business environment is foreign direct investment. Drawing on a sample of 77 countries, Claessens, Klingebiel, and Schmukler (2002) concluded, on the one hand, that foreign direct investment is a complement to and not a substitute for domestic stock market development, and, on the other, that foreign direct investment is positively related to stock market capitalization and value traded. Considering the European integration process, Muradoglu et al. (2013) showed that corporate debt maturities increase as foreign direct investment flows rise. In our research, foreign direct investment contains information on foreign direct investment inflows and outflows by individual country (see Table A1). Given these potentially conflicting outcomes we cannot formulate an *a priori* hypothesis for the relationship between foreign direct investment and corporate leverage. As such, we present it as an empirical issue.

**H6.** Stock market development is positively associated with corporate long-term debt.

**H7.** Banking-based development is positively associated with corporate short-term debt.

**H8.** Firms in countries that are viewed as more corrupt tend to be more leveraged.

#### 2.4. Firm-level variables

Consistent with the existing literature (Alves & Ferreira, 2011; Baker & Wurgler, 2002; Fan et al., 2012; Guedes & Opler, 1996; Rajan & Zingales, 1995; Titman & Wessels, 1988, among others), we chose consensual firm-level variables related to various capital structure theories, namely the trade-off and the pecking order theories that are commonly used as determinants of leverage and debt maturity. Henceforth, we define tangibility as property, plant, and equipment divided by total assets; profitability is defined as earnings before interest, taxes, depreciation, and amortization divided by total assets; size is defined as the logarithm of sales; and market-to-book is defined as total liabilities plus market capitalization divided by total assets. Other firm-level variables also influence the

capital structure of firms, namely firm volatility (Bathala, Moon, & Rao, 1994; Bradley, Jarrell, & Kim, 1984), non-debt tax shields (Bathala et al., 1994; Bradley et al., 1984; Michaelas, Chittenden, & Poutziouris, 1999; Noulas & Genimakis, 2011), R&D and advertising (Bathala et al., 1994; Bradley et al., 1984), a firm's age (Michaelas et al., 1999; Noulas & Genimakis, 2011), past growth (Bradley et al., 1984), effective tax rate (Michaelas et al., 1999), net debtors (Michaelas et al., 1999), profit volatility (Noulas & Genimakis, 2011), institutional holdings (Bathala et al., 1994), and credit rating (Noulas & Genimakis, 2011). Owing to the limited availability of data, in our research we will consider R&D expenditure and date of incorporation.<sup>1</sup>

### 3. Data and methodology

#### 3.1. Data

The data extracted from Worldscope include firms from 43 countries, with different features: Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Denmark, Egypt, Finland, France, Germany, Greece, Hong Kong, Indonesia, Israel, Italy, Japan, Malaysia, Mexico, the Netherlands, New Zealand, Norway, Pakistan, Peru, Philippines, Poland, Portugal, Russia, Singapore, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Taiwan, Thailand, Turkey, the UK, and the US.

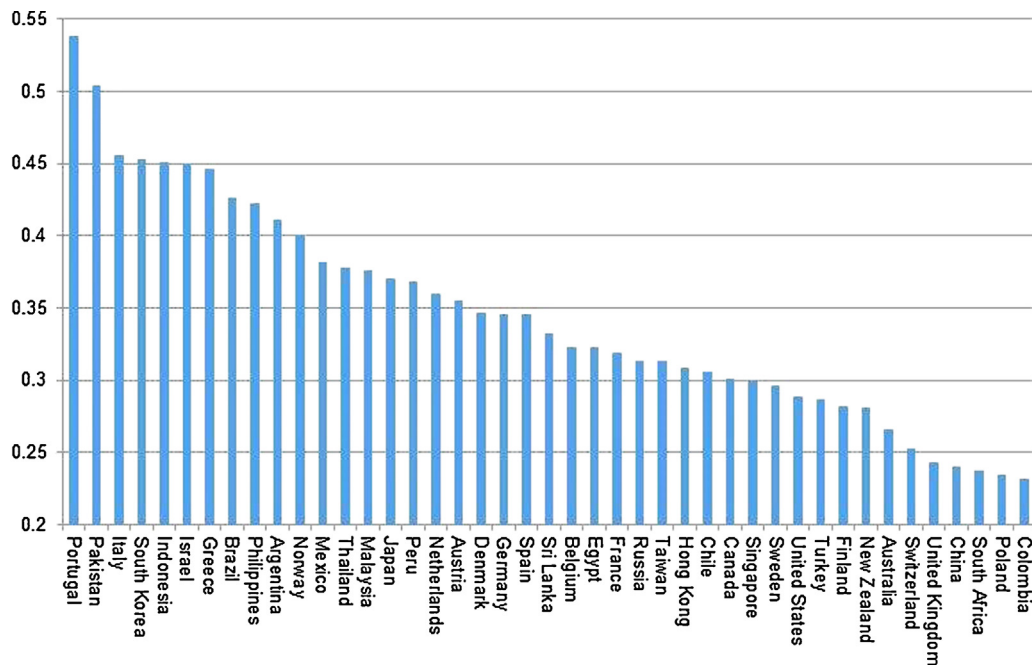
The sample is diversified, containing developing capital markets, namely the largest ones, such as Mexico and Brazil; several developed capital markets, such as the UK and the US; diverse banking-oriented countries, including France and Germany; countries with differing levels of investor protection, such as Indonesia and Australia; countries with different degrees of financial liberalization, such as China and Canada; and countries whose economies show different levels of growth and financial robustness, such as Hong Kong and Portugal.

We have analyzed the period 2000–2011. The inclusion of a firm in this research supposes the availability of financial information covering at least an eight-year period. We censorize all firm-level variables, excluding the bottom and the top 1% of the own variable distribution. We also exclude financial institutions, because they are subject to specific regulations that influence their leverage.

Dependent variables are defined as follows: book leverage is total debt (WC 03255) divided by total assets (WC 02999); market leverage is total debt divided by the sum of total debt and market capitalization (WC 08001); short-term debt to total debt (STDD) is defined as short-term debt (WC 03051) divided by total debt; long-term debt to total debt (LTDD) is defined as long-term debt (WC 03251) divided by total debt. Tangibility is defined as property, plant, and equipment (WC 02501) divided by total assets. Profitability is defined as earnings before interest, taxes, depreciation, and amortization (WC 18198) divided by total assets. Size is defined as the logarithm of sales (WC 07240). Market-to-book is defined as total liabilities (WC 03351) plus market capitalization divided by total assets. We also include date of incorporation (WC 18273) and investment in R&D, defined as R&D expenditure (WC 01201) divided by net sales or revenues (WC 01001). However, including these variables reduces our sample to 1312 firms and 14,389 observations. We present the results of our analysis, including these additional firm-specific control variables, in the robustness section.

Figs. 1–3 show the means for market leverage, book leverage, LTDD, and STDD. The most surprising result for leverage levels (see

<sup>1</sup> We could have used other variables, such as profit volatility or non-debt tax shields, but this would have substantially reduced the size of the initial sample. Using R&D advertising and date of incorporation, the sample is reduced by 90%.



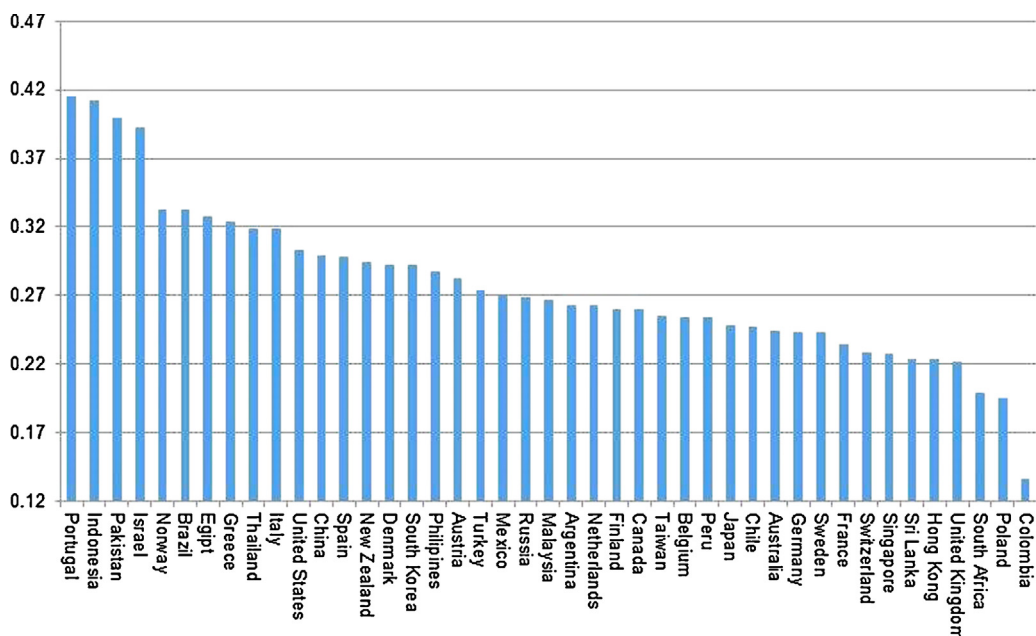
**Fig. 1.** Mean market leverage of firms in sample (2000–2011). Figure gives mean market leverage across 43 countries. Market leverage is total debt divided by the sum of total debt and market capitalization.

Figs. 1 and 2) relates to the differences found among developing countries. While Colombia, Poland, and South Africa present low levels of leverage, Pakistan, Indonesia, and Brazil show the opposite. This finding is important because, unlike what mainstream thinking would lead us to expect, it indicates that not all developing countries will have the same result in terms of future economic growth.

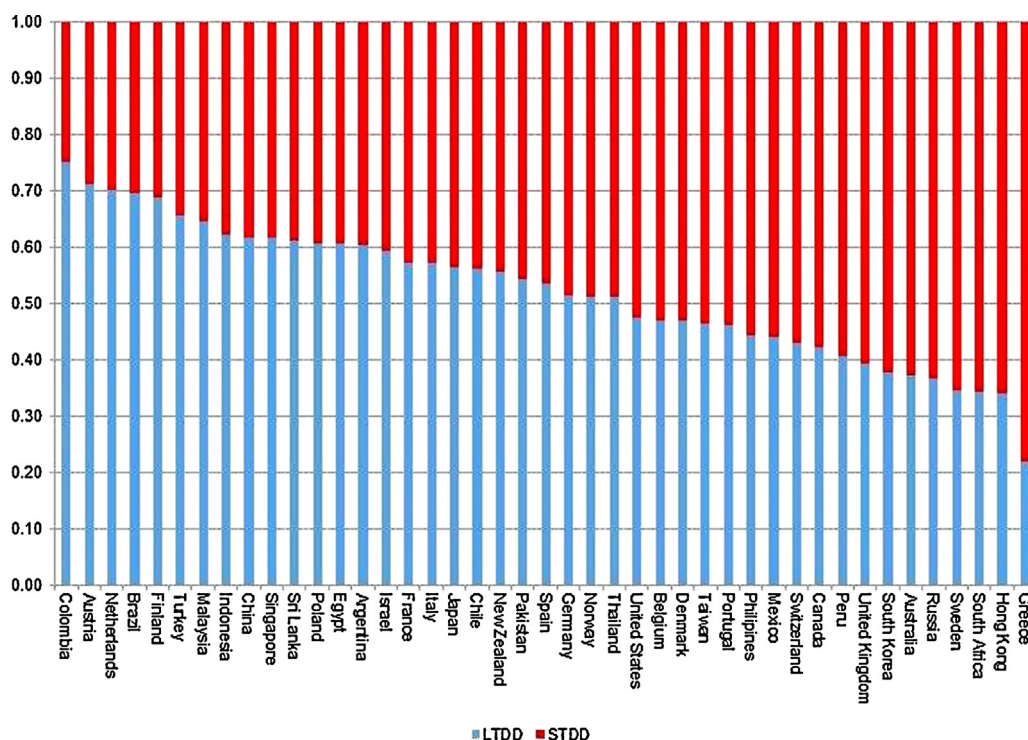
In relation to LTDD, we would like to highlight our findings for developing countries. Despite what we might expect, firms from such countries show the greatest long-term debt levels (see Fig. 3, particularly the cases of Colombia, Brazil, Turkey, Malaysia,

Indonesia, Sri Lanka, Poland, Egypt, and Argentina). The idea that long-term debt is commonly used in developed countries as a consequence of their higher levels of credit monitoring and investor protection is rejected, and perhaps explains why they were more affected by recent financial crises.

Table 1 presents the summary statistics for firm-level variables. The sample is composed of 11,209 firms and 119,589 observations. The countries most represented in the sample are China, Japan, and the US, the least represented being Colombia and Egypt. The results for firm-level variables are diverse. The most notable case is profitability, where Italy has a mean of 0.44 and South Korea 0.01.



**Fig. 2.** Mean book leverage of firms in sample (2000–2011). Figure gives mean book leverage across 43 countries. Book leverage is total debt divided by total assets.



**Fig. 3.** Mean long- and short-term debt to total debt of firms in sample (2000–2011). Figure gives mean book leverage across 43 countries. Short-term debt to total debt is defined as short-term debt divided by total debt; long-term debt to total debt is defined as long-term debt divided by total debt.

The higher outcome for Italy resulted from the characteristics of the sample of Italian firms, which contained a small number of large firms.

The results for the country variables presented in Table 2 are even more diverse than those obtained for the firm-level variables, justifying their inclusion in any analysis of capital structure and financing choices. This can be seen, for example, in the case of capital-market development, the mean of which varies from 0.03 (Peru) to 3.72 (Hong Kong), but also for GDP growth, which fluctuates between 0.01 (for Portugal) and 0.11 (China), for foreign direct investment, ranging from 0.00 (Japan) to 0.22 (Hong Kong), and also for the current account balance, ranging from –0.10 for Portugal to 0.19 for Singapore.

Summing up, the period between 2000 and 2011 was characterized by significant changes, namely market volatility and financial crises, causing diverse effects on leverage ratios and on the relationships between such ratios and independent variables.

In Table 3 we present Pearson correlation coefficients in order to understand the relationship between dependent and independent variables. The most relevant results are: (i) the Pearson correlation coefficient for book and market leverage is relatively small. The significant changes in corporate market capitalization during 2000–2011 were responsible for this result; (ii) financial crises are positively associated with leverage and the use of long-term debt rather than short-term debt, although that was more evident during the dot.com bubble; (iii) unlike long-term debt, leverage is negatively related to standards of corruption; (iv) unlike long-term debt, market (book) leverage is negatively (positively) related to common law systems; (v) unlike long-term debt, leverage is negatively related to the level of economic development; (vi) unlike long-term debt, leverage is negatively related to capital-market development and banking development; (vii) unlike short-term debt, leverage is negatively influenced by foreign direct investment; (viii) unlike long-term debt, market (book) leverage is

positively (negatively) related to a country's current account balance; (ix) unlike short-term debt, market (book) leverage is positively (negatively) related to a country's general government gross debt; (x) unlike short-term debt, market (book) leverage is negatively (positively) related to a country's GDP growth; (xi) unlike short-term debt, market (book) leverage is positively (negatively) related to the degree of financial liberalization in a country.

### 3.2. Methodology

In order to test the proposed hypotheses, we have estimated a panel regression of leverage and debt maturity choices, which includes firm-fixed effects:

$$LEV_{it} = \alpha + \beta_{it}X_{it} + v_i + \varepsilon_{it}$$

$$DMC_{it} = \alpha + \beta_{it}X_{it} + v_i + \varepsilon_{it}$$

where  $LEV_{it}$  (leverage) is market and book leverage for firm  $i$  in period  $t$  and  $DMC_{it}$  (debt maturity choices) is LTDD and STDD for firm  $i$  during period  $t$ ;  $X_{it}$  is a set of firm- and country-level variables. CPI (corruption perception index), CMD (capital-market development), BD (banking development), GGGD (general government gross debt), GDPG (GDP growth), FDI (foreign direct investment flows), CAB (current account balance), CRISIS1 (dummy variable equal to 1 for 2000 and 2001, when the dot.com bubble burst), CRISIS2 (dummy variable equal to 1 for 2007 and 2008, when the subprime crisis arose), CRISIS3 (dummy variable equal to 1 for 2010 and 2011, when the European sovereign debt crisis broke), and CRISIS4 (dummy variable equal to 1 if a financial crisis occurred) are country-level variables (see definitions in Table A1). TANG (tangibility), PROF (profitability), SIZE (the natural logarithm of sales), and MtB (market-to-book) are firm-level variables. Further,  $v_i$  is a firm-fixed effect and  $\varepsilon_{it}$  is the error term.

**Table 1**  
Summary statistics for firm-level variables.

Country	ML	BL	LTDD	STDD	Tangibility	Profitability	Size	MtB	No. of obs	Firms
Argentina	0.41	0.26	0.46	0.54	0.51	0.13	11.93	1.02	525	49
Australia	0.27	0.24	0.62	0.38	0.32	0.09	11.52	1.54	3571	344
Austria	0.36	0.28	0.54	0.46	0.36	0.11	12.92	1.24	548	49
Belgium	0.32	0.25	0.59	0.41	0.31	0.12	12.58	1.41	806	72
Brazil	0.43	0.33	0.51	0.49	0.40	0.15	12.71	1.34	2042	189
Canada	0.30	0.26	0.70	0.30	0.45	0.10	12.40	1.53	3260	306
Chile	0.31	0.25	0.61	0.39	0.51	0.12	11.98	1.27	1165	105
China	0.24	0.30	0.22	0.78	0.37	0.08	12.10	1.96	11,055	1113
Colombia	0.23	0.14	0.51	0.49	0.48	0.11	12.48	1.11	121	11
Denmark	0.35	0.29	0.57	0.43	0.35	0.10	12.28	1.52	999	89
Egypt	0.32	0.33	0.47	0.53	0.53	0.16	12.62	1.37	145	14
Finland	0.28	0.26	0.62	0.38	0.29	0.12	12.60	1.55	1058	94
France	0.32	0.23	0.54	0.46	0.19	0.09	12.51	1.42	4956	450
Germany	0.35	0.24	0.56	0.44	0.27	0.10	12.70	1.36	4551	417
Greece	0.45	0.32	0.47	0.53	0.40	0.08	11.98	1.21	685	66
Hong Kong	0.31	0.22	0.38	0.62	0.28	0.07	11.10	1.23	2065	206
Indonesia	0.45	0.41	0.44	0.56	0.43	0.06	11.29	1.31	1746	163
Israel	0.45	0.39	0.71	0.29	0.39	0.33	13.70	1.43	252	24
Italy	0.46	0.32	0.66	0.34	0.32	0.44	14.83	1.18	403	38
Japan	0.37	0.25	0.44	0.56	0.34	0.16	13.53	1.09	12,716	1188
Malaysia	0.38	0.27	0.37	0.63	0.40	0.08	10.91	1.04	6065	573
Mexico	0.38	0.27	0.64	0.36	0.47	0.12	13.37	1.17	759	68
Netherlands	0.36	0.26	0.60	0.40	0.26	0.11	13.72	1.36	1099	101
New Zealand	0.28	0.29	0.70	0.30	0.49	0.14	11.83	1.48	562	53
Norway	0.40	0.33	0.69	0.31	0.35	0.09	12.48	1.32	792	75
Pakistan	0.50	0.40	0.42	0.58	0.51	0.13	10.87	1.24	929	82
Peru	0.37	0.25	0.46	0.54	0.52	0.17	11.37	1.27	503	46
Philippines	0.42	0.29	0.47	0.53	0.44	0.11	11.20	1.20	744	68
Poland	0.23	0.20	0.41	0.59	0.35	0.12	11.99	1.51	683	71
Portugal	0.54	0.42	0.56	0.44	0.34	0.08	12.72	1.19	445	39
Russia	0.31	0.27	0.56	0.44	0.62	0.18	14.54	1.39	325	34
Singapore	0.30	0.23	0.37	0.63	0.32	0.08	11.33	1.21	3691	349
South Africa	0.24	0.20	0.51	0.49	0.32	0.16	12.31	1.44	1613	146
South Korea	0.45	0.29	0.35	0.65	0.37	0.01	12.13	1.00	4861	475
Spain	0.35	0.30	0.57	0.43	0.36	0.10	13.35	1.46	1041	92
Sri Lanka	0.33	0.22	0.43	0.57	0.53	0.14	11.80	1.21	292	28
Sweden	0.30	0.24	0.62	0.38	0.24	0.07	12.41	1.55	1591	149
Switzerland	0.25	0.23	0.61	0.39	0.32	0.11	13.22	1.60	1567	141
Taiwan	0.31	0.25	0.34	0.66	0.35	0.08	11.76	1.22	9323	899
Thailand	0.38	0.32	0.39	0.61	0.43	0.11	11.31	1.18	2737	256
Turkey	0.29	0.27	0.34	0.66	0.37	0.14	11.87	1.39	1631	151
United Kingdom	0.24	0.22	0.61	0.39	0.28	0.09	12.53	1.59	4986	453
United States	0.29	0.30	0.75	0.25	0.31	0.09	13.03	1.77	20,681	1873
Mean	0.35	0.28	0.52	0.48	0.38	0.12	12.37	1.35		
Median	0.33	0.27	0.54	0.46	0.36	0.11	12.40	1.34		
Standard deviation	0.08	0.06	0.12	0.12	0.09	0.07	0.90	0.20		
Maximum	0.54	0.42	0.75	0.78	0.62	0.44	14.83	1.96		
Minimum	0.23	0.14	0.22	0.25	0.19	0.01	10.87	1.00		

Market leverage (ML) is defined as total debt divided by the result of market capitalization and total debt. Book leverage (BL) is defined as total debt divided by total assets. The ratio of long-term debt to total debt (LTDD) is defined as long-term debt divided by total debt. The ratio of short-term debt to total debt (STDD) is defined as short-term debt divided by total debt. Tangibility is defined as property, plant, and equipment divided by total assets. Profitability is defined as earnings before interest, taxes, depreciation, and amortization divided by total assets. Size is defined as the logarithm of sales. Market-to-book (MtB) is defined as the result of total assets minus book equity plus market capitalization divided by total assets. *N* and firms are the number of observations and firms respectively. The sample period is from 2000 to 2011.

The commonly used OLS models assume that the observable covariates capture all relevant heterogeneity within individual firms, *i.e.* that no individual-specific unobserved effect (fixed-effect) is present. Although the present study employs a large set of firm-specific variables, some firm unobserved heterogeneity may still be present and therefore estimates of the model parameters could be biased (in other words, the model could suffer from endogeneity problems). In order to overcome this econometric issue we use the fixed-effects model, where each variable has its individual average (*i.e.* within each firm) subtracted from it, eliminating the unobservable time-invariant fixed effects. An alternative method that also addresses endogeneity problems is the instrumental variables regression (2SLS). However, 2SLS requires searching for valid instruments for each independent variable considered to be endogenously related to the dependent variable. For

that reason we have chosen the fixed-effects model. Nevertheless, for robustness purposes we also use the [Arellano and Bond \(1991\)](#) linear dynamic panel data estimation procedure, which allows the first lag of the dependent variable as a covariate and also the unobserved fixed effects (as in the fixed-effects model). Also, to provide further robustness checks we re-estimated the models including two additional firm-specific control variables, namely date of incorporation (age) and investment in R&D.

#### 4. Empirical results

The results presented in [Table 4](#) show how (i) leverage (market leverage and book leverage) and debt maturity choices (LTDD and STDD) react to institutional variables during the financial crises presented (CRISIS1, CRISIS2, and CRISIS3), and how (ii) the



**Table 2**  
Summary statistics for country-level variables.

Country	Financial liberalization	Developed economy	CPI	Capital market development	Banking development	General government gross debt (% GDP)	GDP (Growth)	Foreign direct investment (% GDP)	Current account balance (% GDP)	No. of obs
Argentina	12	0	2.91	0.03	0.36	0.81	0.05	0.02	0.02	12
Australia	18	1	8.69	0.93	1.22	0.15	0.03	0.03	−0.04	12
Austria	18	1	8.10	0.13	1.29	0.66	0.02	0.03	0.02	12
Belgium	18	1	7.15	0.28	1.13	0.96	0.02	0.20	0.02	12
Brazil	10	0	3.74	0.26	0.84	0.69	0.04	0.03	−0.01	12
Canada	18	1	8.72	0.84	1.84	0.77	0.02	0.03	0.00	12
Chile	9	0	7.23	0.16	0.79	0.09	0.04	0.07	0.01	12
China	0	0	3.42	0.93	1.38	0.20	0.11	0.03	0.05	12
Colombia	10	0	3.68	0.04	0.50	0.38	0.04	0.03	−0.02	12
Denmark	18	1	9.46	0.50	1.84	0.48	0.01	0.03	0.03	12
Egypt	9	0	3.11	0.22	0.88	0.86	0.05	0.04	0.01	12
Finland	18	1	9.40	1.25	0.79	0.42	0.02	0.03	0.04	12
France	18	1	6.97	0.80	1.16	0.67	0.01	0.03	0.00	12
Germany	18	1	7.84	0.64	1.35	0.68	0.01	0.02	0.04	12
Greece	14	1	4.19	0.25	1.13	1.15	0.01	0.01	−0.10	12
Hong Kong	18	1	8.18	3.72	1.49	0.31	0.04	0.22	0.09	12
Indonesia	12	0	2.31	0.14	0.45	0.48	0.05	0.01	0.02	12
Israel	8	1	6.36	0.48	0.83	0.85	0.04	0.04	0.02	12
Italy	18	1	4.76	0.50	1.21	1.09	0.01	0.01	−0.02	12
Japan	18	1	7.35	0.88	3.13	1.87	0.01	0.00	0.03	12
Malaysia	13	0	4.88	0.43	1.27	0.45	0.05	0.03	0.13	12
Mexico	12	0	3.43	0.08	0.37	0.42	0.02	0.03	−0.01	12
Netherlands	18	1	8.84	1.39	1.80	0.54	0.02	0.06	0.06	12
New Zealand	14	1	9.46	0.16	1.35	0.26	0.02	0.02	−0.05	12
Norway	18	1	8.69	0.60	0.82	0.48	0.02	0.02	0.14	12
Pakistan	9	0	2.37	0.52	0.44	0.68	0.04	0.02	−0.01	12
Peru	9	0	3.68	0.03	0.19	0.35	0.06	0.04	−0.01	12
Philippines	10	0	2.54	0.09	0.51	0.54	0.05	0.01	0.02	12
Poland	0	1	4.29	0.12	0.49	0.48	0.04	0.04	−0.04	12
Portugal	15	1	6.29	0.27	1.61	0.68	0.01	0.03	−0.10	12
Russia	0	0	2.39	0.38	0.28	0.18	0.05	0.03	0.08	12
Singapore	18	1	9.28	1.19	0.78	0.95	0.06	0.18	0.19	12
South Africa	5	0	4.67	0.95	1.76	0.35	0.04	0.02	−0.03	12
South Korea	9	1	4.94	1.51	0.95	0.28	0.04	0.01	0.02	12
Spain	16	1	6.73	1.37	1.72	0.50	0.02	0.03	−0.06	12
Sri Lanka	10	0	3.35	0.03	0.43	0.61	0.06	0.01	−0.04	12
Sweden	18	1	9.24	1.25	1.19	0.46	0.02	0.04	0.07	12
Switzerland	18	1	8.84	2.22	1.73	0.59	0.02	0.04	0.11	12
Taiwan	0	1	5.76	1.01	1.91	0.35	0.05	0.01	0.08	12
Thailand	14	0	3.43	0.50	1.31	0.47	0.04	0.03	0.03	12
Turkey	12	0	3.84	0.43	1.90	0.53	0.05	0.02	−0.04	12
United Kingdom	18	1	8.27	1.72	1.77	0.50	0.02	0.03	−0.02	12
United States	18	1	7.41	2.56	2.23	0.72	0.02	0.01	−0.04	12
Mean	12.93	0.60	5.96	0.74	1.17	0.58	0.03	0.04	0.02	
Median	14.00	1.00	6.29	0.50	1.19	0.50	0.04	0.03	0.02	
Standard deviation	5.67	0.49	2.44	0.76	0.62	0.32	0.02	0.05	0.06	
Maximum	18.00	1.00	9.46	3.72	3.13	1.87	0.11	0.22	0.19	
Minimum	0.00	0.00	2.31	0.03	0.19	0.09	0.01	0.00	−0.10	

Financial liberalization corresponds to the number of years between the formal regulatory date change after which foreign investors officially have the opportunity to invest in domestic equity securities and the beginning of our sample, 2000. Developed economy is a dummy variable equal to 1 when the country is classified as developed. The corruption perception index is an index that ranges from 0 to 10, where lower values indicate more severe corruption. Capital market development refers to the total value of shares traded during the period (% of GDP). Banking development is domestic credit provided by the banking sector (% of GDP). General government gross debt (% of GDP): gross debt consists of all liabilities that require payment or payments of interest and/or principal by the debtor to the creditor at a date or dates in the future; this includes debt liabilities in the form of SDRs, currency and deposits, debt securities, loans, insurance, pensions and standardized guarantee schemes, and other accounts payable. GDP (Growth) means the annual percentage growth rate of GDP at market prices based on constant local currency. Foreign direct investment flows (% of GDP) contains information on foreign direct investment (FDI) inflows and outflows by individual country. Current account balance (% of GDP) includes all transactions other than those in financial and capital items. The sample period is from 2000 to 2011.



**Table 3**  
Correlation matrix.

	ML	BL	LTDD	STDD	TANG	PROF	SIZE	MtB	FL	DE	CRISIS1	CRISIS2	CRISIS3	CRISIS4	CPI	CMD	BD	GGGD	GDPG	FDI	CAB
BL	0.63	1.00																			
LTDD	0.07	0.14	1.00																		
STDD	−0.07	−0.14	−1.00	1.00																	
TANG	0.21	0.20	0.17	−0.17	1.00																
PROF	−0.11	−0.09	0.06	−0.06	0.07	1.00															
SIZE	0.04	−0.01	0.28	−0.28	0.00	0.17	1.00														
MtB	−0.41	0.06	0.02	−0.02	−0.11	0.04	−0.05	1.00													
FL	0.03	−0.03	0.34	−0.34	−0.11	0.04	0.15	−0.03	1.00												
DE	−0.01	−0.06	0.25	−0.25	−0.17	−0.01	0.17	−0.02	0.52	1.00											
CRISIS1	0.05	0.03	0.03	−0.03	0.03	0.00	−0.05	0.01	0.08	0.04	1.00										
CRISIS2	0.00	0.00	−0.01	0.01	−0.03	0.00	0.04	0.00	−0.01	−0.01	−0.18	1.00									
CRISIS3	−0.01	−0.02	0.01	−0.01	−0.04	0.01	0.08	−0.02	−0.02	−0.01	−0.17	−0.21	1.00								
CRISIS4	0.03	0.00	0.01	−0.01	−0.03	0.01	0.07	−0.01	0.02	0.01	0.40	0.49	0.47	1.00							
CPI	−0.07	−0.08	0.29	−0.29	−0.15	0.01	0.13	0.01	0.71	0.80	0.04	−0.01	−0.01	0.01	1.00						
CMD	−0.08	0.00	0.19	−0.19	−0.12	−0.05	0.12	0.13	0.26	0.39	−0.01	0.28	−0.03	0.19	0.35	1.00					
BD	−0.03	−0.03	0.11	−0.11	−0.08	0.07	0.24	0.00	0.27	0.43	−0.06	0.00	0.09	0.02	0.34	0.31	1.00				
GGGD	0.08	−0.03	0.07	−0.07	−0.04	0.12	0.23	−0.12	0.49	0.35	−0.04	−0.03	0.12	0.04	0.31	−0.01	0.68	1.00			
GDPG	−0.10	0.01	−0.26	0.26	0.07	−0.03	−0.16	0.12	−0.58	−0.50	−0.06	0.05	0.11	0.08	−0.47	−0.15	−0.36	−0.44	1.00		
FDI	−0.04	−0.04	−0.05	0.05	−0.03	−0.02	−0.12	−0.01	0.14	0.03	0.09	0.05	−0.01	0.09	0.23	0.19	−0.31	−0.11	0.19	1.00	
CAB	0.02	−0.04	−0.28	0.28	0.02	−0.02	−0.16	−0.11	−0.26	−0.18	−0.08	0.04	0.00	−0.02	−0.05	−0.20	−0.22	−0.02	0.30	0.38	1.00

ML (market leverage) is defined as total debt divided by the result of market capitalization and total debt. BL (book leverage) is defined as total debt divided by total assets. LTDD (long-term debt to total debt) is defined as long-term debt divided by total debt. STDD (short-term debt to total debt) is defined as short-term debt divided by total debt. Tang (tangibility) is defined as property, plant, and equipment divided by total assets. Prof (profitability) is defined as earnings before interest, taxes, depreciation, and amortization divided by total assets. SIZE is defined as the logarithm of sales. MtB (market-to-book) is defined as the result of total assets minus book equity plus market capitalization divided by total assets. FL (financial liberalization) corresponds to the number of years between the formal regulatory date change after which foreign investors officially have the opportunity to invest in domestic equity securities and the beginning of out sample, 2000. Developed economy (DE) is a dummy variable equal to 1 when the country is classified as developed. CRISIS1 is a dummy variable equal to 1 for 2000 and 2001 when the dot.com bubble occurred. CRISIS2 is a dummy variable equal to 1 for 2007 and 2008 when the subprime crisis occurred. CRISIS3 is a dummy variable equal to 1 for 2010 and 2011 when the European sovereign debt crisis occurred. CRISIS4 is a dummy variable equal to 1 if a financial crisis occurred. CPI (corruption perception index) is an index that ranges from 0 to 10, where lower values indicate more severe corruption. CMD (capital market development) refers to the total value of shares traded during the period (% of GDP). BD (banking development) is domestic credit provided by the banking sector (% of GDP). GGGD (general government gross debt (% of GDP)): gross debt consists of all liabilities that require payment or payments of interest and/or principal by the debtor to the creditor at a date or dates in the future; this includes debt liabilities in the form of SDRs, currency and deposits, debt securities, loans, insurance, pensions and standardized guarantee schemes, and other accounts payable. GDPG (GDP (Growth)) means the annual percentage growth rate of GDP at market prices based on constant local currency. FDI (foreign direct investment flows (% of GDP)) contains information on foreign direct investment (FDI) inflows and outflows by individual country. CAB (current account balance (% of GDP)) includes all transactions other than those in financial and capital items. The sample period is from 2000 to 2011.

**Table 4**  
Panel regression of leverage and debt maturity choices.

Variables	Market leverage			Book leverage			LTDD			STDD		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CPI	−0.030*** (−21.302)	−0.033*** (−23.614)	−0.031*** (−21.918)	−0.017*** (−11.657)	−0.019*** (−13.399)	−0.018*** (−12.639)	−0.012*** (−5.281)	−0.011*** (−4.733)	−0.012*** (−5.053)	0.012*** (5.287)	0.011*** (4.740)	0.012*** (5.059)
CMD	−0.004*** (−4.600)	−0.005*** (−6.442)	−0.015*** (−13.748)	0.002*** (2.118)	0.002*** (2.067)	−0.002*** (−1.968)	0.006*** (4.798)	0.005*** (3.718)	0.008*** (4.376)	−0.006*** (−4.795)	−0.005*** (−3.713)	−0.008*** (−4.375)
BD	−0.043*** (−12.679)	−0.065*** (−20.360)	−0.067*** (−20.108)	0.005*** (1.385)	−0.012*** (−3.677)	−0.013*** (−3.938)	−0.008*** (−1.392)	0.001*** (0.260)	0.004*** (0.715)	0.008*** (1.392)	−0.001*** (−0.257)	−0.004*** (−0.710)
GGGD	0.040*** (9.585)	0.018*** (4.665)	0.026*** (6.191)	0.026*** (6.057)	0.007*** (1.683)	0.013*** (3.017)	0.022*** (3.211)	0.038*** (6.130)	0.025*** (3.657)	−0.022*** (−3.220)	−0.038*** (−6.137)	−0.025*** (−3.667)
GDPG	−0.471*** (−25.845)	−0.584*** (−34.198)	−0.623*** (−30.309)	−0.070*** (−3.773)	−0.157*** (−9.105)	−0.159*** (−7.639)	−0.031*** (−1.065)	0.020*** (0.723)	0.015*** (0.455)	0.032*** (1.074)	−0.020*** (−0.710)	−0.015*** (−0.449)
FDI	−0.073*** (−4.017)	−0.014*** (−0.780)	0.026*** (0.992)	−0.075*** (−4.108)	−0.034*** (−1.902)	−0.010*** (−0.388)	−0.066*** (−2.240)	−0.078*** (−2.686)	−0.086*** (−1.984)	0.066*** (2.235)	0.077*** (2.679)	0.086*** (1.985)
CAB	−0.002*** (−0.114)	−0.050*** (−2.594)	−0.070*** (−3.290)	0.079*** (3.963)	0.047*** (2.387)	0.035*** (1.614)	−0.084*** (−2.634)	−0.080*** (−2.530)	−0.067*** (−1.951)	0.083*** (2.624)	0.079*** (2.521)	0.067*** (1.943)
CRISIS1	0.043*** (31.046)			0.020*** (14.235)			−0.013*** (−5.936)			0.013*** (5.924)		
CRISIS2	0.015*** (11.905)			0.001*** (1.075)			−0.011*** (−5.519)			0.011*** (5.519)		
CRISIS3	0.006*** (4.532)			−0.008*** (−5.724)			0.003*** (1.104)			−0.003*** (−1.104)		
CRISIS4		0.022*** (25.928)			0.005*** (5.766)			−0.008*** (−5.439)			0.008*** (5.432)	
CRISIS4*CPI			0.001*** (3.539)			0.000*** (0.139)			−0.002*** (−2.882)			0.002*** (2.881)
CRISIS4*CMD			0.012*** (10.674)			0.004*** (3.977)			−0.003*** (−1.670)			0.003*** (1.674)
CRISIS4*BD			0.005*** (2.812)			0.003*** (1.496)			−0.003*** (−0.971)			0.003*** (0.965)
CRISIS4*GGGD			−0.014*** (−5.133)			−0.008*** (−3.041)			−0.017*** (−3.843)			0.017*** (3.836)
CRISIS4*GDPG			0.034*** (1.434)			−0.010*** (−0.407)			0.020*** (0.514)			−0.019*** (−0.506)
CRISIS4*FDI			−0.037*** (−1.529)			−0.019*** (−0.770)			0.013*** (0.338)			−0.014*** (−0.345)
CRISIS4*CAB			0.008*** (0.521)			0.009*** (0.563)			−0.011*** (−0.440)			0.011*** (0.437)
TANG	0.220*** (46.482)	0.229*** (48.573)	0.225*** (47.821)	0.198*** (41.348)	0.204*** (42.978)	0.203*** (42.592)	0.180*** (23.459)	0.176*** (23.103)	0.178*** (23.249)	−0.180*** (−23.455)	−0.176*** (−23.100)	−0.177*** (−23.245)
PROF	−0.179*** (−54.071)	−0.175*** (−52.921)	−0.176*** (−53.157)	−0.151*** (−45.097)	−0.148*** (−44.275)	−0.149*** (−44.341)	0.045*** (8.404)	0.044*** (8.137)	0.044*** (8.164)	−0.045*** (−8.403)	−0.044*** (−8.137)	−0.044*** (−8.163)
SIZE	0.015*** (20.300)	0.011*** (14.797)	0.012*** (15.971)	0.003*** (4.011)	−0.000*** (−0.614)	−0.000*** (−0.038)	0.015*** (12.075)	0.017*** (14.146)	0.016*** (13.662)	−0.015*** (−12.068)	−0.017*** (−14.136)	−0.016*** (−13.653)
MtB	−0.067*** (−110.824)	−0.067*** (−110.177)	−0.066*** (−108.858)	0.010*** (17.163)	0.011*** (17.491)	0.011*** (17.650)	−0.003*** (−3.440)	−0.003*** (−3.464)	−0.004*** (−3.650)	0.003*** (3.443)	0.003*** (3.467)	0.004*** (3.653)
Constant	0.424*** (28.160)	0.554*** (41.645)	0.541*** (39.898)	0.249*** (16.346)	0.348*** (25.835)	0.340*** (24.767)	0.333*** (13.645)	0.282*** (13.070)	0.293*** (13.329)	0.667*** (27.294)	0.718*** (33.304)	0.707*** (32.159)
Observations	11,589	119,589	119,589	119,589	119,589	119,589	119,589	119,589	119,589	119,589	119,589	119,589
Number of firms	11,209	11,209	11,209	11,209	11,209	11,209	11,209	11,209	11,209	11,209	11,209	11,209
R-squared	0.184	0.181	0.183	0.042	0.040	0.040	0.039	0.038	0.021	0.032	0.031	0.021
Hausman test	698.39	937.26	983.61	233.94	225.33	224.56	195.49	194.74	145.21	174.25	174.22	144.62
(p-Value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

This table reports the fixed-effects regression results. Market leverage, book leverage, short-term debt (STDD), and long-term debt to debt (LTDD) are dependent variables. Market leverage is defined as total debt divided by the result of market capitalization and total debt. Book leverage is defined as total debt divided by total assets. LTDD (long-term debt to total debt) is defined as long-term debt divided by total debt. STDD (short-term debt to total debt) is defined as short-term debt divided by total debt. CPI (corruption perception index) is an index that ranges from 0 to 10, where lower values indicate more severe corruption. CMD (capital market development) refers to the total value of shares traded during the period (% of GDP). BD (banking development) is domestic credit provided by the banking sector (% of GDP). GGGD (general government gross debt (% of GDP)): gross debt consists of all liabilities that require payment or payments of interest and/or principal by the debtor to the creditor at a date or dates in the future; this includes debt liabilities in the form of SDRs, currency and deposits, debt securities, loans, insurance, pensions and standardized guarantee schemes, and other accounts payable. GDPG (GDP (Growth)) means the annual percentage growth rate of GDP at market prices based on constant local currency. FDI (foreign direct investment flows (% of GDP)) contains information on foreign direct investment (FDI) inflows and outflows by individual country. CAB (current account balance (% of GDP)) includes all transactions other than those in financial and capital items. CRISIS1 is a dummy variable equal to 1 for 2000 and 2001 when the dot.com bubble occurred. CRISIS2 is a dummy variable equal to 1 for 2007 and 2008 when the subprime crisis occurred. CRISIS3 is a dummy variable equal to 1 for 2010 and 2011 when the European sovereign debt crisis occurred. CRISIS4 is a dummy variable equal to 1 if a financial crisis occurred. TANG (tangibility) is defined as property, plant, and equipment divided by total assets. PROF (profitability) is defined as earnings before interest, taxes, depreciation, and amortization divided by total assets. SIZE is defined as the logarithm of sales. MtB (market-to-book) is defined as the result of total assets minus book equity plus market capitalization divided by total assets. The panel data regressions are estimated using firm effects. T-statistics are computed with heteroscedasticity-consistent standard errors (Huber/White) and reported in parentheses.

\*  $p < 0.10$ .\*\*  $p < 0.05$ .\*\*\*  $p < 0.01$ .

**Table 5**

Panel regression of leverage and debt maturity choices including additional controls.

Variables	Market leverage			Book leverage			LTDD			STDD		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
CPI	−0.040*** (−5.010)	−0.034*** (−3.599)	−0.034*** (−4.596)	−0.007*** (−2.915)	−0.010*** (−3.263)	−0.009*** (−3.136)	−0.004** (−2.329)	−0.005** (−2.442)	−0.006** (−2.344)	0.004** (2.331)	0.005** (2.447)	0.006** (2.343)
CMD	−0.017*** (−7.527)	−0.013*** (−6.566)	−0.018*** (−6.621)	0.004 (1.605)	0.004 (1.454)	−0.002 (−0.620)	0.006** (2.088)	0.007** (2.002)	0.019*** (3.322)	−0.006** (−2.090)	−0.007** (−2.002)	−0.019*** (−3.323)
BD	−0.012*** (−3.078)	−0.029*** (−2.770)	−0.038*** (−3.675)	0.012 (0.883)	0.005 (0.344)	0.002 (0.125)	0.058*** (2.870)	0.052*** (2.629)	0.057*** (2.524)	−0.058*** (−2.870)	−0.052*** (−2.630)	−0.057*** (−2.527)
GGGD	0.038*** (3.205)	0.026*** (3.679)	0.039*** (3.096)	0.019*** (2.869)	0.019*** (2.990)	0.019*** (3.065)	0.018*** (3.545)	0.011*** (3.392)	0.006** (2.364)	−0.018*** (−3.547)	−0.011*** (−3.393)	−0.006** (−2.366)
GDPG	−0.878*** (−11.097)	−0.541*** (−8.052)	−0.670*** (−7.904)	−0.384*** (−3.853)	−0.223*** (−2.642)	−0.218** (−2.043)	−0.031 (−0.213)	0.086 (0.687)	−0.117 (−0.740)	0.031 (0.209)	−0.086 (−0.690)	0.117 (0.740)
FDI	−0.022 (−0.305)	−0.123* (−1.733)	−0.041 (−0.413)	0.032 (0.349)	−0.045 (−0.501)	0.045 (0.355)	−0.165 (−1.210)	−0.215 (−1.635)	0.008 (0.042)	0.165 (1.205)	0.215 (1.629)	−0.008 (−0.043)
CAB	−0.104 (−0.513)	−0.193** (−2.341)	0.265 (1.442)	0.151 (1.454)	0.138 (1.335)	0.097 (0.827)	0.511*** (3.329)	0.507*** (3.308)	0.429*** (2.471)	−0.512*** (−3.335)	−0.508*** (−3.314)	−0.430*** (−2.477)
CRISIS1	0.034*** (3.780)			0.018** (2.425)			−0.015** (−2.008)			0.015*** (2.005)		
CRISIS2	0.18*** (7.051)			0.010** (2.283)			−0.013** (−1.882)			0.013*** (1.883)		
CRISIS3	0.009** (2.457)			0.001 (0.232)			0.001 (0.755)			−0.001 (−0.752)		
CRISIS4		0.021*** (7.889)			0.009* (1.887)			−0.007* (−1.835)			0.007* (1.835)	
CRISIS4* CPI			0.003** (2.321)			0.001 (0.809)			−0.002 (−0.739)			0.002 (0.737)
CRISIS4* CMD			0.021*** (6.624)			0.008* (1.902)			−0.016*** (−2.767)			0.016*** (2.769)
CRISIS4* BD			0.036*** (4.267)			−0.002 (−0.144)			−0.014 (−0.912)			0.014 (0.917)
CRISIS4* GGGD			−0.017*** (−3.312)			−0.012 (−0.657)			−0.009 (−0.343)			0.009 (0.347)
CRISIS4* GDPG			−0.060 (−0.553)			−0.190 (−1.383)			0.244 (1.202)			−0.245 (−1.207)
CRISIS4* FDI			−0.083 (−0.840)			−0.104 (−0.840)			−0.283 (−1.543)			0.283 (1.540)
CRISIS4* CAB			0.053 (0.675)			0.140 (1.411)			0.152 (1.038)			−0.153 (−1.041)
TANG	0.187*** (11.470)	0.190*** (11.635)	0.189*** (11.569)	0.292*** (14.224)	0.294*** (14.299)	0.294*** (14.289)	0.152*** (5.007)	0.153*** (5.043)	0.154*** (5.051)	−0.152*** (−5.006)	−0.153*** (−5.043)	−0.154*** (−5.051)
PROF	−0.203*** (−22.909)	−0.205*** (−23.033)	−0.205*** (−23.103)	−0.174*** (−15.610)	−0.175*** (−15.669)	−0.175*** (−15.651)	0.020*** (3.181)	0.019*** (3.149)	0.019*** (3.138)	−0.020*** (−3.185)	−0.019*** (−3.153)	−0.019*** (−3.142)
SIZE	0.016*** (6.387)	0.015*** (6.050)	0.015*** (5.932)	0.004*** (3.120)	0.003*** (3.234)	0.004*** (3.317)	0.018*** (3.772)	0.017*** (3.713)	0.017*** (3.673)	−0.018*** (−3.768)	−0.017*** (−3.710)	−0.017*** (−3.670)
MtB	−0.043*** (−34.722)	−0.044*** (−35.536)	−0.044*** (−35.269)	0.009*** (5.739)	0.009*** (5.474)	0.009*** (5.571)	−0.008*** (−3.270)	−0.008*** (−3.424)	−0.008*** (−3.391)	0.008*** (3.272)	0.008*** (3.425)	0.008*** (3.392)
Age	−0.013*** (−11.457)	−0.006*** (−8.434)	−0.006*** (−8.257)	−0.005*** (−3.168)	−0.003*** (−2.397)	−0.004*** (−2.214)	−0.002 (−0.835)	0.001 (0.406)	0.000 (0.223)	0.002 (0.832)	−0.001 (−0.406)	−0.000 (−0.222)
R&D	0.000 (1.063)	0.000 (0.866)	0.000 (0.886)	−0.000 (−0.141)	−0.000 (−0.205)	−0.000 (−0.217)	−0.001*** (−3.831)	−0.001*** (−3.796)	−0.001*** (−3.807)	0.001*** (3.830)	0.001*** (3.795)	0.001*** (3.807)
Constant	0.532*** (7.895)	0.355*** (5.560)	0.361*** (5.639)	0.436*** (5.138)	0.352*** (4.384)	0.349*** (4.318)	0.448*** (3.564)	0.386*** (3.253)	0.412*** (3.445)	0.552*** (4.394)	0.614*** (5.169)	0.588*** (4.917)
Observations	14,389	14,389	14,389	14,389	14,389	14,389	14,389	14,389	14,389	14,389	14,389	14,389
Number of firms	1312	1312	1312	1312	1312	1312	1312	1312	1312	1312	1312	1312
R-squared	0.196	0.192	0.196	0.045	0.044	0.045	0.043	0.042	0.023	0.038	0.037	0.023
Hausman test	865.23	1025.92	1055.77	524.35	522.22	602.85	623.25	524.99	586.54	401.79	458.81	498.71
(p-Value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

This table reports the fixed-effects regression results including additional control variables. Market leverage, book leverage, short-term debt (STDD), and long-term debt to debt (LTDD) are dependent variables. Market leverage is defined as total debt divided by the result of market capitalization and total debt. Book leverage is defined as total debt divided by total assets. LTDD (long-term debt to total debt) is defined as long-term debt divided by total debt. STDD (short-term debt to total debt) is defined as short-term debt divided by total debt. CPI (corruption perception index) is an index that ranges from 0 to 10, where lower values indicate more severe corruption. CMD (capital market development) refers to the total value of shares traded during the period (% of GDP). BD (banking development) is domestic credit provided by the banking sector (% of GDP). GGGD (general government gross debt (% of GDP)): gross debt consists of all liabilities that require payment or payments of interest and/or principal by the debtor to the creditor at a date or dates in the future; this includes debt liabilities in the form of SDRs, currency and deposits, debt securities, loans, insurance, pensions and standardized guarantee schemes, and other accounts payable. GDPG (GDP (Growth)) means the annual percentage growth rate of GDP at market prices based on constant local currency. FDI (foreign direct investment flows (% of GDP)) contains information on foreign direct investment (FDI) inflows and outflows by individual country. CAB (current account balance (% of GDP)) includes all transactions other than those in financial and capital items. CRISIS1 is a dummy variable equal to 1 for 2000 and 2001 when the dot.com bubble occurred. CRISIS2 is a dummy variable equal to 1 for 2007 and 2008 when the subprime crisis occurred. CRISIS3 is a dummy variable equal to 1 for 2010 and 2011 when the European sovereign debt crisis occurred. CRISIS4 is a dummy variable equal to 1 if a financial crisis occurred. TANG (tangibility) is defined as property, plant, and equipment divided by total assets. PROF (profitability) is defined as earnings before interest, taxes, depreciation, and amortization divided by total assets. SIZE is defined as the logarithm of sales. MtB (market-to-book) is defined as the result of total assets minus book equity plus market capitalization divided by total assets. Age is date of incorporation. R&D is defined as R&D expenditure divided by net sales or revenues. The panel data regressions are estimated using firm effects. T-statistics are computed with heteroscedasticity-consistent standard errors (Huber/White) and reported in parentheses.

\*  $p < 0.10$ .\*\*  $p < 0.05$ .\*\*\*  $p < 0.01$ .

variables resulting from the interaction between all financial crises (CRISIS4) and institutional variables influence such dependent variables. To explain the two dependencies we estimate twelve models. In Table 5 we use the regressions calculated in Table 4, but include two new firm-level variables: date of incorporation and investment in R&D. In Table 6 we present a dynamic panel analysis of the impact of firm-level variables, institutional variables, and financial crises on leverage and financing choices.

Models (1), (4), (7), and (10) presented in Tables 4 and 5 show that the first financial crisis, the dot.com bubble, had the most significant overall impact on leverage and debt maturity choices. The CRISIS1 parameter yields a larger value than those obtained in other crises, and its positive sign means that debt levels rose during this period. However, in general, the impact of a financial crisis on leverage is positive. CRISIS4 has a positive impact on leverage (see Table 4 (models 2 and 5)). This provides strong support for H1. The aggregate behavior of debt maturity choices on the three financial crises, as measured by CRISIS4, produced two divergent tendencies. In the presence of a crisis, short-term borrowing followed an upward drift while long-term issuances followed a downward trend. This can be observed particularly in CRISIS1 and CRISIS2 (see models 7 and 10 in Tables 4 and 5). As a consequence of asymmetric information increases and credit collapse, firms issued short-term debt instead of long-term debt and refused to issue shares, in accordance with the pecking order theory. The signal of CRISIS4 in Tables 4 (models 8 and 11) and 5 (models 6 and 8) also confirm that long-term debt was being substituted by short-term debt. That is consistent with H2 because, in general, firms have greater exposure to rollover risk in periods of recession, and those firms exposed to such risk have a lower credit rating, higher yield spreads, and find it more difficult to convince bond market investors to roll over their debt (see, for example, Gopalan, Song, & Yerramilli, in press). This finding is also consistent with Custódio et al. (2013), who found that corporate debt maturity for US firms decreased. They attributed such a result to information asymmetries.

With regard to institutional variables, the negative impact of corruption on leverage should be noted (see models 1–6 in Tables 4 and 5 and models 1 and 2 in Table 6). In fact, our findings suggest that the greater a country's efforts to combat corruption, the higher the impact of corruption on leverage. Firms reduce their leverage when countries adopt measures to counter corruption. This result is in line with Alves and Ferreira (2011) and Fan et al. (2012), providing strong support for H8.

Concerning capital-market development and banking development, we found different signs in the connection between those variables and the level of leverage (Tables 4–6). In the case of capital-market development a negative result is produced when market leverage is considered (see model 1 in Table 4) and a positive result when book leverage is considered (see model 4 in Table 4). When we analyze the impact of capital-market development on debt maturity choices, we conclude, after observing models 7, 8, and 9 in Tables 4 and 5 and model 3 in Table 6, that this variable has a positive impact on LTDD, in line with Demirgüç-Kunt and Maksimovic (1999). In the presence of an active stock market, firms replace equity by long-term debt. This provides strong support for H6. However, it must be noted that the impact decreases during a financial crisis (see model 9 in Tables 4 and 5), particularly the interaction CRISIS4\*CMD. Once more, credit collapse and information asymmetry between lenders and borrowers might be plausible explanations for this result. On the other hand, a mixed result was obtained for the impact of banking development on LTDD. In model 8 in Table 4 we find a relationship between banking development and long-term debt which is not statistically different from zero, whereas in model 7 in Table 5 and model 3 in Table 6 the relationship is positive and statistically significant. In

**Table 6**

Dynamic panel regression of leverage and debt maturity choices.

Variables	(1) Market leverage	(2) Book leverage	(3) LTDD	(4) STDD
$ML_{t-1}$	0.257*** (28.049)			
$BL_{t-1}$		0.632*** (25.893)		
$LTDD_{t-1}$			0.427*** (8.537)	
$STDD_{t-1}$				0.427*** (8.531)
CPI	−0.020*** (−7.186)	−0.007*** (−2.824)	−0.052*** (−8.463)	0.052*** (8.470)
CMD	0.013*** (5.116)	−0.002 (−0.746)	0.012*** (2.596)	−0.012*** (−2.595)
BD	−0.260*** (−24.019)	−0.035*** (−3.496)	0.051*** (2.853)	−0.051*** (−2.848)
GGGD	0.186*** (12.357)	0.014* (1.842)	0.043* (1.866)	−0.043* (−1.883)
GDPG	−0.591*** (−16.358)	−0.147*** (−4.036)	0.094 (1.383)	−0.094 (−1.374)
FDI	−0.048 (−0.632)	0.274*** (3.286)	−0.458*** (−3.052)	0.457*** (3.042)
CAB	−1.505*** (−23.922)	−0.536*** (−9.541)	−0.156 (−1.498)	0.156 (1.501)
TANG	0.243*** (14.154)	0.166*** (11.653)	0.119*** (5.409)	−0.119*** (−5.420)
PROF	−0.082** (−2.340)	−0.175*** (−4.399)	0.068** (2.132)	−0.069** (−2.142)
SIZE	0.014*** (3.828)	0.012*** (3.637)	0.009*** (2.723)	−0.009*** (−2.734)
MtB	−0.091*** (−51.711)	−0.004*** (−2.948)	−0.004* (−1.953)	0.004* (1.956)
Constant	0.941*** (20.302)	0.151*** (3.499)	−0.037 (−0.524)	0.610*** (6.804)
Observations	106,322	106,322	106,322	106,322
Number of firms	11,209	11,209	11,209	11,209
Chi <sup>2</sup>	9062.541	2546.593	2515.164	2516.219
p-Value	0.000	0.000	0.000	0.000
AR.1	43.196	13.746	6.411	6.415
p-Value	0.000	0.000	0.000	0.000
Sargan	72.006	139.149	43.302	43.283
p-Value	0.191	0.100	0.310	0.310

This table reports the dynamic panel regression results. Developed and developing countries are defined according to the World Bank. Countries with a low degree of financial liberalization had capital markets in 2000 that had been liberalized for less than 18 years. Market leverage, book leverage, short-term debt (STDD), and long-term to debt (LTDD) are dependent variables. Market leverage (ML) is defined as total debt divided by the result of market capitalization and total debt. Book leverage (BL) is defined as total debt divided by total assets. LTDD (long-term debt to total debt) is defined as long-term debt divided by total debt. STDD (short-term debt to total debt) is defined as short-term debt divided by total debt. CPI (corruption perception index) is an index that ranges from 0 to 10, where lower values indicate more severe corruption. CMD (capital market development) refers to the total value of shares traded during the period (% of GDP). BD (banking development) is domestic credit provided by the banking sector (% of GDP). GGGD (general government gross debt (% of GDP)): gross debt consists of all liabilities that require payment or payments of interest and/or principal by the debtor to the creditor at a date or dates in the future; this includes debt liabilities in the form of SDRs, currency and deposits, debt securities, loans, insurance, pensions and standardized guarantee schemes, and other accounts payable. GDPG (GDP(Growth)) means the annual percentage growth rate of GDP at market prices based on constant local currency. FDI (foreign direct investment flows (% of GDP)) contains information on foreign direct investment (FDI) inflows and outflows by individual country. CAB (current account balance (% of GDP)) includes all transactions other than those in financial and capital items. TANG (tangibility) is defined as property, plant, and equipment divided by total assets. PROF (profitability) is defined as earnings before interest, taxes, depreciation, and amortization divided by total assets. SIZE is defined as the logarithm of sales. MtB (market-to-book) is defined as the result of total assets minus book equity plus market capitalization divided by total assets. Robust z-statistics are reported in parentheses.

\*  $p < 0.10$ .\*\*  $p < 0.05$ .\*\*\*  $p < 0.01$ .



this case, LTDD is positively influenced by banking development. This increase in the robustness of the sign must be due to the fact that in the fixed-effects model (Table 4) the relationship between these two variables suffers from time-varying endogeneity problems; these problems are solved by the dynamic models or by including additional control variables. This type of inconsistent result in relation to LTDD can also be extended to STDD. In fact, considering the initial sample (see model 10 in Table 4), banking development influences STDD positively, diverging from the results shown in model 10 in Table 5 and model 4 in Table 6. Overall, these results do not provide strong support for H6.

The substantial increase in government general gross debt around the world since 2000 also had a positive impact on corporate leverage, but not on short-term debt (see, for example, models 3–6 in Tables 4 and 5). This result is also confirmed by our dynamic panel analysis (see models 1 and 2 in Table 6) and provides strong support for H3. It seems that in recent years firms have been mimicking governments with regard to debt issuance. The results obtained for the current account balance are less clear-cut than those obtained for government general gross debt. In fact, only the results observed in Table 6 (models 1 and 2) support H4, in contrast with those in Tables 4 and 5, which suggest that the current account balance had a mixed impact on market and book leverage. However, there is some evidence that an increase in the deficit on the current account balance decreases a country's competitiveness, and consequently the value of firms, increasing leverage.

Market leverage and book leverage were negatively influenced by the GDP growth rate (see models 1–6 in Tables 4 and 5), a finding inconsistent with the results of Booth et al. (2001) and De Jong et al. (2008). This result does not support H5. Our result can be explained as follows. A higher GDP growth rate means a higher dividend (free cash flow to equity) growth rate, increasing the value of equity and decreasing book leverage and particularly market leverage. In fact, when an economy is expanding, stock prices may rise, and investors will buy more stocks in expectation of greater profit, and consequently dividends.

Foreign direct investment presents mixed effects in terms of impact on corporate leverage. However, it influences LTDD negatively and STDD positively (Tables 4–6). In fact, analyzing these results, foreign direct investment would not appear to encourage capital markets to increase long-term issues and corporate leverage. One plausible explanation for this is that foreign direct investment flowed directly to firms from countries whose financial sectors had only recently been liberalized and whose financial markets are undeveloped.

Concerning firm-level variables, the results are similar regardless of whether we consider a panel of fixed effects or a dynamic panel. The results obtained for market leverage are in line with recent research (Baker & Wurgler, 2002; Fan et al., 2012; Rajan & Zingales, 1995). Firms with high ratios of fixed assets to total assets have higher debt ratios. Lower debt ratios are associated with profitable firms; large firms tend to have higher debt ratios. Firms with higher ratios of market-to-book value have lower debt ratios. Book leverage also presents the same signs as those for market leverage, except for market-to-book. These results do not demonstrate that pecking order is better than trade-off theory, or vice versa (Frank & Goyal, 2008, chap. 12). In fact, the positive impact of tangibility on leverage is expected by pecking order theory and trade-off theory. The more tangibles a firm has, the more debt the firm can obtain, as a result of mitigating agency costs and asymmetric information. But, at the same time, the positive impact of tangibility on leverage means more tax shield, in line with trade-off theory. On the other hand, firms with lower debt ratios are more profitable, meaning they prefer internal rather than external finance, in line with pecking order theory. According to trade-off theory, there is

a positive relationship between size and debt, because large firms are usually more diversified, face less bankruptcy risk, and support a greater proportion of debt. On the other hand, pecking order also predicts a positive relationship between firm size and leverage, since greater diversification and less change in earnings mitigate problems related to information asymmetry.

In Table 5 we introduce two new variables: date of incorporation and investment in R&D. The results show that leverage is negatively influenced by date of incorporation. This result is fairly consistent with the findings of Michaelas et al. (1999) and in line with Palacin-Sánchez et al. (2013), who concluded that leverage and financing options are negatively influenced by the age of a firm. A possible explanation for this result is that young firms tend to be externally financed, while older firms tend to accumulate retained earnings. On the other hand, investment in R&D does not have any impact on corporate leverage (see models 1–6). It does, though, impact LTDD and STDD; in fact, LTDD (STDD) is negatively (positively) influenced by expenditure on R&D. This is because firms are unable to borrow money to finance long-term projects based on intangible assets because their agency costs are higher than those associated with tangible assets (Myers, 1977).

Regarding long-term debt to debt and short-term debt to debt, the results are also in line with what was expected, unlike with market-to-book. Long-term debt to debt is positively influenced by tangibility, profitability, and size. The opposite pattern can be seen for short-term debt to debt (see Tables 4–6).

Long-term debt to debt is positively influenced by tangibility, as it avoids companies having to exchange lower-risk investments for higher-risk investments, in line with the asset substitution problem defined by Jensen and Meckling (1976). Moreover, borrowing can be easily collateralized by tangible assets. Analyzing an alternative point of view, Ortiz-Molina and Penas (2008) concluded that shorter-term maturities serve to mitigate agency problems associated with asymmetric information and borrower risk. Profitability contributes positively to long-term debt to total debt. This result is in line with the free cash flow hypothesis of Jensen (1986), which sees shareholders incentivized to issue long-term debt in the face of corporate wealth creation in order to prevent eventual conflicts of interest between managers and shareholders. There are other logical reasons that can explain this result, though, namely that firms characterized by information opacity find it much more difficult to resort to borrowing and long-term debt issues (Ortiz-Molina & Penas, 2008). In the same direction, we find that size influences long-term debt to debt. The explanation for this is straightforward: larger firms have lower bankruptcy costs (Rajan & Zingales, 1995), fewer conflicting interests between lenders and borrowers (Stohs & Mauer, 1996), and less information opacity (Ortiz-Molina & Penas, 2008). Conversely, we find a negative relationship between market-to-book and long-term debt to debt as a consequence of the underinvestment problem identified by Myers (1977): equity holders might not accept positive net-present-value projects because they assume the full costs of the projects while the benefits are shared with debt holders.

Concerning the interaction between institutional variables and financial variables, the results are not completely consistent. Except for the interaction CRISIS4\*CMD, where the impact is positive for leverage (see models 3 and 6 in Tables 4 and 5) but negative for LTDD, the other interactions present non-definitive results (see Tables 4 and 5).

In panels A–D of Table 7 we present the results for leverage and financing options based on different samples. First, developed versus developing economies. Second, countries with a high degree of financial liberalization versus countries with a low degree of financial liberalization, where a country is assumed to be highly liberalized financially if it had been liberalized financially

Table 7

Panel regression of leverage and debt maturity choices by country category.

Variables	(1) Developed countries	(2) Developing countries	(3) High financial liberalization	(4) Low financial liberalization	(5) High CMD	(6) Low CMD	(7) High BD	(8) Low BD	(9) EMU	(10) PIGS
<b>Panel A: Market leverage</b>										
CPI	−0.035*** (−21.478)	0.023*** (6.405)	−0.024*** (−12.299)	−0.020*** (−8.874)	−0.047*** (−17.768)	−0.027*** (−13.708)	−0.030*** (−14.621)	−0.030*** (−14.123)	−0.060*** (−15.233)	−0.034*** (−2.647)
CMD	−0.001 (−0.578)	−0.038*** (−14.631)	0.001 (0.661)	−0.034*** (−15.728)	0.004*** (4.047)	−0.091*** (−19.424)	0.000 (0.242)	−0.012*** (−8.020)	−0.006 (−1.145)	−0.096*** (−5.588)
BD	−0.040*** (−10.516)	−0.131*** (−13.306)	−0.040*** (−9.748)	−0.080*** (−12.414)	−0.067*** (−14.509)	−0.046*** (−8.143)	−0.045*** (−9.464)	−0.047*** (−7.150)	−0.040*** (−4.508)	−0.088*** (−4.453)
GGGD	−0.027*** (−5.207)	0.247*** (24.187)	−0.062*** (−10.792)	0.215*** (25.162)	−0.053*** (−6.402)	0.092*** (16.891)	0.013*** (2.236)	0.127*** (15.312)	0.132*** (6.367)	0.074*** (1.854)
GDPG	−0.554*** (−24.530)	−0.273*** (−7.823)	−0.858*** (−30.464)	−0.168*** (−6.492)	−0.498*** (−18.110)	−0.334*** (−13.093)	−0.467*** (−18.202)	−0.540*** (−19.455)	−0.770*** (−10.622)	−1.242*** (−6.567)
FDI	−0.014 (−0.718)	−0.438*** (−4.797)	0.013 (0.683)	−0.622*** (−8.649)	−0.096*** (−3.732)	−0.071*** (−2.644)	−0.161*** (−3.885)	−0.046*** (−2.070)	−0.037 (−1.039)	1.050*** (4.125)
CAB	−0.272*** (−10.735)	0.156*** (4.111)	−0.057** (−2.013)	−0.014 (−0.488)	−0.214*** (−6.657)	0.135*** (5.069)	−0.474*** (−12.804)	0.127*** (4.809)	−0.251*** (−4.522)	−0.050 (−0.335)
CRISIS1	0.031*** (18.876)	0.046*** (16.588)	0.029*** (16.434)	0.051*** (22.696)	0.039*** (16.901)	0.033*** (18.917)	0.051*** (24.020)	0.038*** (19.082)	0.011*** (2.907)	−0.017*** (−1.761)
CRISIS2	0.013*** (8.751)	0.018*** (6.856)	0.007*** (4.143)	0.034*** (17.170)	0.025*** (15.991)	0.023*** (10.235)	0.013*** (6.903)	0.018*** (10.096)	0.022*** (5.880)	0.060*** (5.988)
CRISIS3	0.026*** (13.833)	−0.004*** (−1.693)	0.034*** (15.978)	−0.001 (−0.338)	0.030*** (12.960)	−0.008*** (−4.110)	0.019*** (8.410)	−0.004*** (−1.758)	0.002 (0.445)	0.084*** (5.063)
TANG	0.236*** (40.408)	0.183*** (22.991)	0.228*** (34.401)	0.205*** (30.569)	0.209*** (28.600)	0.214*** (31.507)	0.206*** (26.462)	0.233*** (36.892)	0.192*** (12.602)	0.102*** (3.578)
PROF	−0.150*** (−42.404)	−0.354*** (−40.292)	−0.132*** (−36.009)	−0.331*** (−47.049)	−0.194*** (−39.550)	−0.166*** (−35.837)	−0.137*** (−33.904)	−0.249*** (−43.776)	−0.179*** (−20.025)	−0.033*** (−2.390)
SIZE	0.015*** (16.285)	0.025*** (17.754)	0.014*** (13.420)	0.024*** (20.559)	0.017*** (14.244)	0.016*** (14.466)	0.005*** (4.340)	0.022*** (20.414)	0.022*** (9.002)	0.043*** (6.832)
MtB	−0.067*** (−93.147)	−0.060*** (−50.011)	−0.060*** (−80.605)	−0.070*** (−67.212)	−0.056*** (−72.286)	−0.077*** (−73.947)	−0.067*** (−79.378)	−0.066*** (−73.768)	−0.060*** (−33.453)	−0.070*** (−12.936)
Constant	0.526*** (28.078)	0.090*** (3.221)	0.496*** (22.298)	0.245*** (11.664)	0.610*** (21.338)	0.403*** (20.094)	0.592*** (24.047)	0.295*** (15.331)	0.540*** (12.631)	0.219*** (1.783)
Observations	87,192	32,397	69,340	50,249	59,694	59,895	59,791	59,798	15,592	2574
R-squared	0.181	0.233	0.180	0.221	0.194	0.182	0.183	0.201	0.211	0.387
Number of firms	8113	3096	6394	4815	8980	8407	7766	6553	1418	235
Hausman test	141.04	250.85	156.34	235.32	195.85	145.29	165.57	213.85	265.74	329.75
(p-Value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
<b>Panel B: Book leverage</b>										
CPI	−0.015*** (−9.692)	0.001 (0.338)	−0.016*** (−7.896)	−0.013*** (−5.513)	−0.016*** (−5.677)	−0.024*** (−12.205)	−0.025*** (−11.751)	−0.013*** (−6.349)	−0.020*** (−5.404)	−0.005 (−0.378)
CMD	0.002*** (2.188)	−0.015*** (−5.276)	0.002*** (2.391)	−0.010*** (−4.784)	0.004*** (3.525)	−0.025*** (−5.586)	0.006*** (4.543)	0.000 (0.153)	0.001 (0.280)	−0.036*** (−2.259)
BD	0.002 (0.480)	0.006 (0.535)	−0.007 (−1.594)	0.008 (1.276)	−0.002 (−0.306)	−0.003 (−0.568)	−0.016*** (−3.230)	0.027*** (4.189)	0.024*** (2.922)	0.083*** (4.451)
GGGD	−0.035*** (−6.905)	0.201*** (18.047)	−0.044*** (−7.467)	0.168*** (19.799)	−0.034*** (−3.754)	0.071*** (13.382)	−0.014*** (−2.325)	0.132*** (16.085)	0.057*** (3.012)	0.158*** (4.206)
GDPG	−0.162*** (−7.325)	0.085*** (2.238)	−0.260*** (−8.956)	0.093*** (3.617)	−0.147*** (−4.961)	0.010 (0.398)	−0.190*** (−7.153)	0.008 (0.307)	−0.228*** (−3.439)	0.178 (1.003)
FDI	−0.001 (−0.074)	−0.255*** (−2.559)	0.018 (0.914)	−0.470*** (−6.589)	−0.020 (−0.714)	−0.132*** (−5.012)	−0.074*** (−1.727)	−0.041*** (−1.834)	0.008 (0.232)	0.223 (0.931)
CAB	−0.055*** (−2.201)	0.155*** (3.756)	0.048 (1.629)	0.034 (1.157)	−0.045 (−1.288)	0.164*** (6.319)	−0.217*** (−5.656)	0.123*** (4.708)	0.038 (0.752)	−0.015 (−0.107)
CRISIS1	0.007*** (4.142)	0.033*** (10.806)	0.004*** (2.324)	0.032*** (14.148)	0.010*** (3.893)	0.020*** (11.533)	0.015*** (6.746)	0.019*** (9.756)	−0.004 (−1.085)	−0.033*** (−3.649)
CRISIS2	0.003*** (2.000)	0.006*** (2.081)	0.000 (0.235)	0.009*** (4.612)	0.007*** (3.882)	0.005*** (2.421)	−0.004*** (−1.978)	0.005*** (2.791)	0.010*** (2.857)	0.012 (1.214)
CRISIS3	0.007*** (3.867)	−0.020*** (−7.306)	0.009*** (3.907)	−0.017*** (−8.297)	0.010*** (4.036)	−0.020*** (−10.321)	0.010*** (4.293)	−0.021*** (−10.419)	−0.009 (−1.849)	0.033*** (2.121)
TANG	0.217*** (37.713)	0.153*** (17.574)	0.225*** (32.913)	0.163*** (24.381)	0.214*** (27.138)	0.186*** (28.100)	0.188*** (23.302)	0.198*** (31.693)	0.227*** (16.300)	0.189*** (7.058)
PROF	−0.112*** (−32.334)	−0.379*** (−39.525)	−0.096*** (−25.440)	−0.328*** (−47.032)	−0.138*** (−26.098)	−0.154*** (−34.032)	−0.101*** (−24.210)	−0.232*** (−41.177)	−0.143*** (−17.432)	−0.073*** (−5.587)
SIZE	0.001 (0.557)	0.016*** (10.097)	0.001 (0.838)	0.011*** (8.955)	−0.002 (−1.285)	0.005*** (4.942)	−0.010*** (−7.794)	0.011*** (10.750)	0.005*** (2.430)	−0.008 (−1.264)
MtB	0.009*** (12.449)	0.018*** (13.921)	0.010*** (13.559)	0.014*** (13.241)	0.012*** (13.891)	0.017*** (16.296)	0.008*** (9.540)	0.012*** (14.029)	0.008*** (5.104)	0.017*** (3.356)
Constant	0.325*** (17.675)	−0.026 (−0.859)	0.351*** (15.299)	0.100*** (4.811)	0.351*** (11.384)	0.545*** (12.210)	0.545*** (21.370)	0.211*** (2.815)	0.211*** (5.393)	0.153 (1.319)
Observations	87,192	32,397	69,340	50,249	59,694	59,895	59,791	59,798	15,592	2574
R-squared	0.037	0.085	0.035	0.079	0.034	0.054	0.035	0.062	0.055	0.127
Number of firms	8113	3096	6394	4815	8980	8407	7766	6553	1418	235

Table 7 (Continued)

Variables	(1) Developed countries	(2) Developing countries	(3) High financial liberalization	(4) Low financial liberalization	(5) High CMD	(6) Low CMD	(7) High BD	(8) Low BD	(9) EMU	(10) PIGS
Hausman test (p-Value)	95.02 (0.000)	98.52 (0.000)	95.37 (0.000)	101.02 (0.000)	85.96 (0.000)	125.23 (0.000)	95.62 (0.000)	109.73 (0.000)	98.36 (0.000)	129.23 (0.000)
<b>Panel C: LTDD</b>										
CPI	−0.016*** (−6.064)	0.003 (0.607)	0.000 (0.084)	−0.031*** (−8.711)	−0.050*** (−10.980)	−0.000 (−0.022)	−0.001 (−0.234)	−0.016*** (−4.778)	0.033*** (4.808)	−0.022 (−1.011)
CMD	0.003*** (1.768)	0.034*** (8.446)	0.002 (1.477)	0.021*** (6.359)	0.007*** (4.646)	0.014* (1.861)	−0.002 (−0.835)	0.018*** (7.996)	−0.007 (−0.695)	−0.015 (−0.536)
BD	0.002 (0.342)	−0.005 (−0.334)	0.017** (2.453)	−0.048*** (−4.829)	0.000 (0.020)	−0.024*** (−2.669)	0.018** (2.221)	−0.086*** (−8.317)	0.069*** (4.621)	0.078** (2.341)
GGGD	0.041*** (4.781)	0.042*** (2.696)	0.032*** (3.247)	−0.031** (−2.301)	−0.003 (−0.229)	0.020 (2.254)	0.004 (0.392)	0.073*** (5.537)	−0.035 (−0.974)	0.042 (0.632)
GDPG	0.058 (1.524)	−0.227*** (−4.241)	0.094** (1.976)	−0.198*** (−4.897)	0.163*** (3.502)	−0.114*** (−2.810)	−0.081* (−1.891)	−0.105** (−2.381)	−0.141 (−1.141)	0.751** (2.366)
FDI	−0.053* (−1.675)	0.348** (2.491)	−0.054* (−1.662)	−0.420*** (−3.753)	−0.003 (−0.066)	−0.051 (−1.182)	−0.267*** (−3.847)	0.004 (0.110)	0.050 (0.829)	0.003 (0.006)
CAB	−0.071* (−1.671)	−0.072 (−1.236)	0.028 (0.587)	−0.265*** (−5.761)	−0.179*** (−3.271)	0.024 (0.577)	−0.296*** (−4.755)	−0.187*** (−4.471)	0.371*** (3.913)	−0.794*** (−3.172)
CRISIS1	−0.010*** (−3.736)	−0.022*** (−5.060)	−0.011*** (−3.503)	−0.013*** (−3.546)	−0.014*** (−3.596)	−0.015*** (−5.181)	−0.004 (−1.127)	−0.020*** (−6.127)	−0.022*** (−3.416)	−0.068*** (−4.265)
CRISIS2	−0.010*** (−4.085)	−0.020*** (−4.987)	−0.002 (−0.852)	−0.019*** (−6.082)	−0.024*** (−8.956)	−0.006 (−1.548)	−0.010*** (−3.278)	−0.011*** (−4.006)	0.017*** (2.652)	−0.007 (−0.417)
CRISIS3	−0.008** (−2.566)	0.012*** (3.047)	−0.003 (−0.742)	0.004 (1.366)	−0.012*** (−3.046)	0.013*** (4.210)	0.001 (0.309)	0.006* (1.753)	0.022*** (2.348)	−0.038** (−2.367)
TANG	0.179*** (18.292)	0.189*** (15.485)	0.183*** (16.310)	0.182*** (17.389)	0.160*** (12.926)	0.187*** (17.311)	0.137*** (10.473)	0.211*** (21.153)	0.132*** (5.070)	0.091*** (1.915)
PROF	0.038*** (6.408)	0.098*** (7.245)	0.032*** (5.212)	0.079*** (7.175)	0.047*** (5.660)	0.034*** (4.584)	0.025*** (3.636)	0.076*** (8.446)	0.040*** (2.601)	−0.013 (−0.575)
SIZE	0.013*** (8.200)	0.013*** (6.114)	0.013*** (7.314)	0.015*** (8.220)	0.014*** (6.698)	0.013*** (7.180)	0.014*** (7.199)	0.015*** (8.818)	0.008* (1.939)	−0.018* (−1.710)
MtB	−0.004*** (−3.590)	−0.008*** (−4.473)	−0.006*** (−4.766)	−0.002 (−1.165)	−0.007*** (−5.580)	−0.004** (−2.106)	−0.008*** (−5.358)	−0.001 (−0.979)	−0.002 (−0.617)	−0.026*** (−2.847)
Constant	0.427*** (13.647)	0.104*** (2.427)	0.322*** (8.526)	0.348*** (10.652)	0.676*** (13.951)	0.253*** (7.918)	0.318*** (7.700)	0.335*** (10.981)	0.115 (1.571)	0.736*** (3.566)
Observations	87,192	32,397	69,340	50,249	59,694	59,895	59,791	59,798	15,592	2574
R-squared	0.037	0.085	0.035	0.079	0.034	0.054	0.035	0.062	0.055	0.127
Number of firms	8113	3096	6394	4815	8980	8407	7766	6553	1418	235
Hausman test (p-Value)	110.01 (0.000)	265.89 (0.000)	112.85 (0.000)	145.52 (0.000)	101.98 (0.000)	139.16 (0.000)	108.95 (0.000)	142.03 (0.000)	140.01 (0.000)	162.36 (0.000)
<b>Panel D: STDD</b>										
CPI	0.016*** (6.069)	−0.003 (−0.602)	−0.000 (−0.077)	0.031*** (8.712)	0.050*** (10.983)	0.000 (0.033)	0.001 (0.242)	0.016*** (4.781)	−0.032*** (−4.801)	0.022 (1.013)
CMD	−0.003* (−1.766)	−0.034*** (−8.462)	−0.002 (−1.475)	−0.021*** (−6.368)	−0.007*** (−4.643)	−0.014* (−1.871)	0.002 (0.843)	−0.018*** (−7.999)	0.007 (0.695)	0.015 (0.538)
BD	−0.002 (−0.344)	0.005 (0.336)	−0.017* (−2.456)	0.048*** (4.834)	−0.000 (−0.022)	0.024*** (2.674)	−0.018** (−2.219)	0.086*** (8.317)	−0.069*** (−4.620)	−0.078** (−2.338)
GGGD	−0.041*** (−4.787)	−0.042*** (−2.699)	−0.032*** (−3.254)	0.030*** (2.293)	0.003 (0.224)	−0.020* (−2.257)	−0.004 (−0.409)	−0.073*** (−5.533)	0.034 (0.973)	−0.042 (−0.633)
GDPG	−0.058 (−1.527)	0.228*** (4.268)	−0.095** (−1.979)	0.199*** (4.914)	−0.163*** (−3.506)	0.115*** (2.831)	0.082* (1.898)	0.105*** (2.382)	0.141 (1.139)	−0.751** (−2.367)
FDI	0.053* (1.671)	−0.350** (−2.505)	0.054* (1.659)	0.420*** (3.747)	0.003 (0.065)	0.051 (1.179)	0.267*** (3.846)	−0.004 (−0.114)	−0.050 (−0.829)	−0.003 (−0.007)
CAB	0.071* (1.670)	0.071 (1.223)	−0.028 (−0.588)	0.265*** (5.752)	0.178*** (3.269)	−0.025 (−0.589)	0.295*** (4.742)	0.187*** (4.471)	−0.371*** (−3.915)	0.793*** (3.170)
CRISIS1	0.010*** (3.731)	0.021*** (5.048)	0.011*** (3.498)	0.012*** (3.536)	0.014*** (3.591)	0.015*** (5.170)	0.004 (1.109)	0.020*** (6.125)	0.022*** (3.416)	0.068*** (4.265)
CRISIS2	0.010*** (4.088)	0.020*** (4.990)	0.002 (0.855)	0.019*** (6.081)	0.024*** (8.962)	0.006 (1.548)	0.010*** (3.275)	0.011*** (4.006)	−0.017*** (−2.655)	0.007 (0.415)
CRISIS3	0.008** (2.569)	−0.012*** (−3.058)	0.003 (0.747)	−0.004 (−1.372)	0.012*** (3.047)	−0.013*** (−4.218)	−0.001 (−0.303)	−0.006* (−1.753)	−0.022*** (−2.346)	0.038* (2.368)
TANG	−0.179*** (−18.289)	−0.189*** (−15.485)	−0.183*** (−16.305)	−0.182*** (−17.390)	−0.160*** (−12.912)	−0.187*** (−17.318)	−0.136*** (−10.453)	−0.212*** (−21.162)	−0.132*** (−5.080)	−0.092* (−1.919)
PROF	−0.038*** (−6.398)	−0.098*** (−7.268)	−0.032*** (−5.202)	−0.079*** (−7.193)	−0.047*** (−5.654)	−0.034*** (−4.592)	−0.025*** (−3.637)	−0.076*** (−8.441)	−0.040*** (−2.600)	0.013 (0.574)
SIZE	−0.013*** (−8.201)	−0.013*** (−6.096)	−0.013*** (−7.315)	−0.015*** (−8.207)	−0.014*** (−6.695)	−0.013*** (−7.167)	−0.014*** (−7.189)	−0.015*** (−8.818)	−0.008* (−1.933)	0.018* (1.708)
MtB	0.004*** (3.584)	0.008*** (4.494)	0.006*** (4.760)	0.002 (1.183)	0.007*** (5.572)	0.004*** (2.128)	0.008*** (5.358)	0.001 (0.983)	0.002 (0.622)	0.026*** (2.846)
Constant	0.573*** (18.298)	0.896*** (20.923)	0.678*** (17.952)	0.652*** (19.946)	0.323*** (6.670)	0.747*** (23.405)	0.682*** (16.503)	0.665*** (21.761)	0.885*** (12.124)	0.264 (1.276)

Table 7 (Continued)

Variables	(1) Developed countries	(2) Developing countries	(3) High financial liberalization	(4) Low financial liberalization	(5) High CMD	(6) Low CMD	(7) High BD	(8) Low BD	(9) EMU	(10) PIGS
Observations	87,192	32,397	69,340	50,249	59,694	59,895	59,791	59,798	15,592	2574
R-squared	0.037	0.085	0.035	0.079	0.034	0.054	0.035	0.062	0.055	0.127
Number of firms	8113	3096	6394	4815	8980	8407	7766	6553	1418	235
Hausman test	110.25	259.98	152.45	200.65	165.87	185.09	109.25	212.32	196.87	315.22
(p-Value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

This table reports the fixed-effects regression results. Developed and developing countries are defined according to the World Bank. Countries with a low degree of financial liberalization had capital markets in 2000 that had been liberalized for less than 18 years. Market leverage, book leverage, short-term debt (STDD), and long-term to debt (LTDD) are dependent variables. Market leverage is defined as total debt divided by the result of market capitalization and total debt. Book leverage is defined as total debt divided by total assets. LTDD (long-term debt to total debt) is defined as long-term debt divided by total debt. STDD (short-term debt to total debt) is defined as short-term debt divided by total debt. CPI (corruption perception index) is an index that ranges from 0 to 10, where lower values indicate more severe corruption. CMD (capital market development) refers to the total value of shares traded during the period (% of GDP). BD (banking development) is domestic credit provided by the banking sector (% of GDP). GGGD (general government gross debt (% of GDP)): gross debt consists of all liabilities that require payment or payments of interest and/or principal by the debtor to the creditor at a date or dates in the future; this includes debt liabilities in the form of SDRs, currency and deposits, debt securities, loans, insurance, pensions and standardized guarantee schemes, and other accounts payable. GDPG (GDP (Growth)) means the annual percentage growth rate of GDP at market prices based on constant local currency. FDI (foreign direct investment flows (% of GDP)) contains information on foreign direct investment (FDI) inflows and outflows by individual country. CAB (current account balance (% of GDP)) includes all transactions other than those in financial and capital items. CRISIS4 is a dummy variable equal to 1 if a financial crisis occurred. TANG (tangibility) is defined as property, plant, and equipment divided by total assets. PROF (profitability) is defined as earnings before interest, taxes, depreciation, and amortization divided by total assets. SIZE is defined as the logarithm of sales. MtB (market-to-book) is defined as the result of total assets minus book equity plus market capitalization divided by total assets. The panel data regressions are estimated using firm effects. T-statistics are computed with heteroscedasticity-consistent standard errors (Huber/White) and are reported in parentheses.

\*  $p < 0.10$ .

\*\*  $p < 0.05$ .

\*\*\*  $p < 0.01$ .

for 18 years prior to the start of the period being investigated here. Third, advanced versus immature capital market-based systems, divided by country-years above and below the proxy for capital-market development (see Table A1). Fourth, advanced versus immature banking-based systems, divided by country-years above and below the proxy for banking-based development (see Table A1). Fifth, EMU countries (Austria, Belgium, Finland, France, Germany, Greece, Italy, the Netherlands, Portugal, and Spain) and PIGS (Portugal, Italy, Greece, and Spain).

In general, for almost all samples a financial crisis has a positive impact on leverage and on short-term debt to debt; the same result cannot be found for long-term debt to debt (see panels A–D). However, this trend was less pronounced during the European sovereign debt crisis. In fact, developing countries and immature capital-market- and banking-based systems experienced a negative impact on leverage as a result of the European sovereign debt crisis, in contrast to developed countries, countries with a high degree of financial liberalization, advanced capital-market- and banking-based systems, and especially PIGS (see panels A and B). It seems that firms from countries where shareholders and credit holders are well-protected saw a positive impact on their leverage during the European sovereign debt crisis, although after analyzing corporate long-term debt to debt we concluded that, in general, for all crises, the impact was negative. Long-term debt was being replaced by short-term debt, namely in PIGS, as a result of the credit collapse (see panels C and D). However, one should note that EMU countries saw a different trend. While in the main economies corporate long-term debt to debt had a positive impact as a result of the sovereign debt crisis, the opposite was true in the peripheral economies (see panel C).

In relation to institutional variables, one should note the similar impact of the corruption perception index on leverage. For almost all categories of country, the corruption perception index had a negative impact on leverage (see panels A and B). As noted earlier, the impact of capital-market development and banking development on leverage depends on whether we are considering market or book leverage. In the case of market leverage, there are many categories of country for which the impact of capital-market development and banking development is negative, but the same is not true when book leverage is considered. In general, the impact of

capital-market development on corporate long-term debt to debt is positive. This is in line with our previous results, for example for developed and developing countries, and for the samples with advanced and immature capital markets. On the other hand, the impact of banking development on corporate long-term debt to debt is not monotonic as it is in the case of capital-market development. For example, the impact of banking development is positive for countries with a high degree of financial liberalization but negative for countries with a low degree of financial liberalization (see panel C). The same can be observed for the samples drawn from advanced and immature banking-based systems.

The impact of general government gross debt on leverage is also non-monotonic. In the case of developed countries and the sample of highly developed capital markets the impact is negative, but the opposite occurs in the case of developing countries and a sample of less developed capital markets. However, when corporate long-term debt to debt is considered there is some evidence that this dependent variable is positively influenced by general government gross debt. This can be observed for developed and developing countries, for example, but not for all the other categories of country. There is some evidence that firms were mimicking government debt, but, strangely, that was not the case in PIGS, perhaps because the central effect on those countries occurred in CRISIS3. In fact, during CRISIS3 it was in PIGS that LTDD decreased most. Debt markets and banking constraints are the most plausible explanations for this observation. Regarding GDP growth, in general it had a negative impact on leverage. We suspect that equity growth exceeded corporate debt issues in periods of economic growth. On the other hand, although the results are not completely conclusive, it seems that leverage and long-term debt to debt are negatively influenced by foreign direct investment (see panels A and D), particularly in countries with a low degree of financial liberalization. The positive impact on STDD was not sufficient to compensate for the decreases in LTDD and equity valuations after a country became liberalized. Regarding the impact of the current account balance on leverage and financing options, the results are non-monotonic. While the impact on corporate market leverage from developed countries is negative, the opposite is true for firms from developing countries. And the same result was obtained for samples of countries with advanced or immature banking-based systems (see panel A). While



the results concerning the impact of institutional variables are not similar around the world, a finding consistent with the previous literature, firm-level variables present analogous results.

## 5. Conclusion

This article has reviewed the impact of institutional variables on corporate capital structure during the recent financial crises (dot.com bubble, subprime crisis, and the European sovereign debt crisis). Introduced for the first time in the debate, general government gross debt and the current account balance have proven to be pertinent, particularly the first variable. The level of debt issued by firms seems to have followed the irrational exuberance of sovereign debt issues in many parts of the globe. Generally, however, in contrast to firm-level variables the impact of institutional variables on leverage and financing choices is not conclusive, in line with the previous literature. The results are even more inconclusive when the interaction between some of the institutional variables – such as the corruption perception index, market development, and banking development – and the observed financial crises produces an impact on leverage and financing options. The impact of those variables varies across the functional forms of leverage and across the countries, even more so in the event of financial turmoil.

The most important conclusion of this research is that corporate leverage increases during periods of financial crisis, when long-term debt is replaced by short-term debt. Ordinarily, a maturity debt profile significantly based on short-term issuances implies greater financial distress at the firm level, as the firm faces greater exposure to rollover risk in periods of financial crisis (lower credit rating and higher yield spreads). Another key finding is that, in periods of economic distress, corporate short-term borrowing followed an upward drift while long-term issuances showed the opposite trend. In this respect we would like to highlight the impact of the European sovereign debt crisis within the eurozone. The same two effects were felt unambiguously in the aftermath of the subprime crisis and the European sovereign debt crisis. However, we are able to detect significant heterogeneity in the magnitude of maturity profiles, with some EMU countries being less affected than others. This points to an asymmetric shock in which the financial distress was felt differently in the periphery and in the center of the European Union. However, we must note a limitation of this research, namely the fact that financial crises were ubiquitous during the first decade of the century, and that it is difficult to define a specific moment of crisis.

Summing up, there are many puzzles to be studied in relation to institutional variables, but the same cannot be said in relation to firm-level variables. Unfortunately, our research yielded only limited data for some firm-level variables and had to omit others. Three important messages from this research must be considered by governments. First, during a financial crisis firms are likely to increase their leverage. Secondly, during a financial crisis it is difficult to roll over long-term debt. Financial regulators must consider corporate debt because the problem plays a role even where creditors have a high degree of protection. Thirdly, the increase in government debt will be mimicked by private debt, creating problems of solvency for the corporate sector. However, further research is needed to corroborate the present results.

## Acknowledgements

We would like to thank the journal's editor Narjess Boubakri and the two anonymous reviewers for their helpful comments on an earlier version of this article.

## Appendix A.

**Table A1**

Definitions and data sources for country-level variables.

Variable	Description	Source
Financial liberalization	Number of years between the formal regulatory date change after which foreign investors officially have the opportunity to invest in domestic equity securities and the beginning of out sample, 2000	Bekaert et al. (2005)
Developed country	Developed economy is a dummy variable equal to 1 when the country is classified as developed	World Bank
Corruption perception index	Index that ranges from 0 to 10, where lower values indicate more severe corruption	Transparency International
Capital market development	A proxy for capital market development measured by the total value of shares traded during the period (% of GDP)	World Bank
Banking development	A proxy for banking development measured by domestic credit provided by banking sector (% of GDP)	World Bank
General government gross debt (% of GDP)	Gross debt consists of all liabilities that require payment or payments of interest and/or principal by the debtor to the creditor at a date or dates in the future; This includes debt liabilities in the form of SDRs, currency and deposits, debt securities, loans, insurance, pensions and standardized guarantee schemes, and other accounts payable	International Monetary Fund
GDP (Growth)	Annual percentage growth rate of GDP at market prices based on constant local currency	World Bank
Foreign direct investment flows (% of GDP)	Contains information on foreign direct investment (FDI) inflows and outflows by individual country	UNCTAD
Current account balance (% of GDP)	Includes all transactions other than those in financial and capital items	International Monetary Fund

## References

- Alves, P., & Ferreira, M. (2011). Capital structure and law around the world. *Journal of Multinational Financial Management*, 21, 119–150.
- Antoniou, A., Guney, Y., & Paudyal, K. (2008). The determinants of capital structure: Capital market-oriented versus bank-oriented institutions. *Journal of Financial and Quantitative Analysis*, 43, 59–92.
- Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies*, 58, 277–297.
- Baker, M., & Wurgler, J. (2002). Market timing and capital structure. *Journal of Finance*, 57, 1–32.
- Bathala, C., Moon, K., & Rao, R. (1994). Managerial ownership, debt policy, and the impact of institutional holdings: An agency perspective. *Financial Management*, 23(3), 38–50.
- Bhaird, C., & Lucey, B. (2010). Determinants of capital structure in Irish SMEs. *Small Business Economics*, 35, 357–375.

- Booth, L., Aivazian, V., Demirgüç-Kunt, A., & Maksimovic, V. (2001). Capital structures in developing countries. *Journal of Finance*, 56, 87–130.
- Bradley, M., Jarrell, G., & Kim, E. (1984). On the existence of an optimal capital structure: Theory and evidence. *Journal of Finance*, 39, 857–878.
- Claessens, S., Klingebiel, D., & Schmukler, S. (2002). *FDI and stock market development: Complements or substitutes? Paper presented at joint conference of the World Bank and the IDB on The FDI Race: Who gets the prize? Is it worth the effort?* October 3–4, 2002, Washington, DC.
- Custódio, C., Ferreira, M., & Laureano, L. (2013). Why are US firms using more short-term debt? *Journal of Financial Economics*, 108, 182–212.
- DeAngelo, H., & Masulis, R. (1980). Optimal capital structure under corporate and personal taxation. *Journal of Financial Economics*, 8, 3–29.
- Degryse, H., De Goeij, P., & Kappert, P. (2012). The impact of firm and industry characteristics on small firms' capital structure. *Small Business Economics*, 38, 431–447.
- De Jong, A., Kabir, R., & Nguyen, T. (2008). Capital structure around the world: The roles of firm- and country-specific determinants. *Journal of Banking and Finance*, 32, 1954–1969.
- Demirgüç-Kunt, A., & Levine, R. (1999). *Bank-based and market-based financial systems: Cross-country comparisons. Working Paper. World Bank Policy Research.*
- Demirgüç-Kunt, A., & Maksimovic, V. (1996). Stock market development and financing choices of firms. *World Bank Economic Review*, 10, 341–369.
- Demirgüç-Kunt, A., & Maksimovic, V. (1999). Institutions, financial markets, and firm debt maturity. *Journal of Financial Economics*, 54, 295–336.
- Fan, J., Titman, S., & Twite, G. (2012). An international comparison of capital structure and debt maturity choices. *Journal of Financial and Quantitative Analysis*, 47, 23–56.
- Frank, M., & Goyal, V. (2008). Trade-off and pecking order theories of debt. In E. Eckbo (Ed.), *Handbook of corporate finance: Empirical corporate finance* (Vol. 2) (pp. 135–197). Elsevier Science.
- Giannetti, M. (2003). Do better institutions mitigate agency problems? Evidence from corporate finance choices. *Journal of Financial and Quantitative Analysis*, 38, 185–212.
- González, M. (2014). *The financial crisis and corporate debt maturity*. <http://dx.doi.org/10.2139/ssrn.2502798>. Available at SSRN: <http://ssrn.com/abstract=2502798>
- Gopalan, R., Song, F., & Yerramilli, V. (2014). Debt maturity structure and credit quality. *Journal of Financial and Quantitative Analysis*, <http://dx.doi.org/10.1017/S0022109014000520> (available on CJO2014)
- Guedes, C., & Opler, T. (1996). The determinants of the maturity of corporate debt issues. *Journal of Finance*, 51, 1809–1833.
- Hall, G., Hutchinson, P., & Michaelas, N. (2000). Industry effects on the determinants of unquoted SMEs' capital structure. *International Journal of the Economics of Business*, 7(3), 297–312.
- Ivashina, V., & Scharfstein, D. (2010). Bank lending during the financial crisis of 2008. *Journal of Financial Economics*, 97, 319–338.
- Jensen, M. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review*, 76, 323–329.
- Jensen, M., & Meckling, W. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3, 305–360.
- Kim, E. (1978). A mean-variance theory of optimal capital structure and corporate debt capacity. *Journal of Finance*, 33, 45–63.
- Kraus, A., & Litztenberger, R. (1973). A state-preference model of optimal financial leverage. *Journal of Finance*, 28, 911–922.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (1997). Legal determinants of external finance. *Journal of Finance*, 52, 1131–1150.
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (1998). Law and finance. *Journal of Political Economy*, 106, 1113–1155.
- Mateev, M., Poutziouris, P., & Ivanov, K. (2013). On the determinant of SME capital structure in Central and Eastern Europe: A dynamic panel analysis. *Research in International Business and Finance*, 27, 28–51.
- Michaelas, N., Chittenden, F., & Poutziouris, P. (1999). Financial policy and capital structure choice in U.K. SMEs: Empirical evidence from company panel data. *Small Business Economics*, 12, 113–130.
- Muradoglu, Y., Onay, C., & Phylaktis, K. (2013). *European integration and corporate financing*. <http://dx.doi.org/10.2139/ssrn.1157868>. Available at SSRN: <http://ssrn.com/abstract=157868>
- Myers, S. (1977). Determinants of corporate borrowing. *Journal of Financial Economics*, 5, 147–175.
- Myers, S. (1984). The capital structure puzzle. *Journal of Finance*, 39, 574–592.
- Myers, S., & Majluf, N. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13, 187–221.
- Noulas, A., & Genimakis, G. (2011). The determinants of capital structure choice: Evidence from Greek listed companies. *Applied Financial Economics*, 21, 379–387.
- Ortiz-Molina, H., & Penas, M. (2008). Lending to small businesses: The role of loan maturity in addressing information problems. *Small Business Economics*, 30(4), 361–383.
- Öztekin, Ö. (2015). Capital structure decisions around the world: Which factors are reliably important? *Journal of Financial and Quantitative Analysis* (forthcoming)
- Palacín-Sánchez, M., Ramírez-Herrera, L., & di Pietro, F. (2013). Capital structure of SMEs in Spanish regions. *Small Business Economics*, 41, 503–519.
- Rajan, R., & Zingales, L. (1995). What do we know about capital structure? Some evidence from international data. *Journal of Finance*, 50, 1421–1460.
- Santos, J. (2011). Bank corporate loan pricing following the subprime crisis. *The Review of Financial Studies*, 24(6), 1916–1943.
- Stohs, M., & Mauer, D. (1996). The determinants of corporate debt maturity structure. *Journal of Business*, 69, 279–312.
- Titman, S., & Wessels, R. (1988). The determinants of capital structure choice. *Journal of Finance*, 43, 1–19.
- Vermoesen, V., Deloof, M., & Laveren, E. (2013). Long-term debt maturity and financing constraints of SMEs during the global financial crisis. *Small Business Economics*, 41, 433–448.