Government Debt and Capital Structure Decisions: International Evidence

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Abstract

Our paper investigates the impact of government debt on corporate financing decisions. An increase in government debt supply might reduce corporate debt if investors prefer to maintain a relatively stable proportion of debt and equity securities. Using data on 40 countries between 1990-2014, we document a negative relation between government debt and corporate leverage. This relation holds for both levels and changes of debt, and after controlling for country- and year-fixed effects as well as country-level controls. Our firm-level analysis shows that the effect is more prominent when it is easier for corporations to adjust their capital structure, for example, for larger and more profitable firms. In order to address potential endogeneity issues, we use the introduction of the Euro currency as a quasi-natural experiment that changes the demand for local government bonds in countries adopting the Euro currency. Our findings suggest that government debt crowds out corporate debt.

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1 Introduction

Increasing government budget deficits and debt levels have obtained significant attention during the recent financial crisis. However, the impact of government debt on the economy and on the corporate sector has not been explored much in the financial economics literature. Our paper investigates whether changes in government debt affect the financing choices of corporations.

Government debt can crowd out corporate debt if investors in financial markets prefer to maintain a relatively stable proportion of debt and equity securities in their portfolios. An increase in government debt will increase the overall supply of debt in the economy. Households will only be willing to absorb the additional supply if debt securities offer higher expected returns. To the extent that it is not too costly for firms to deviate from their target capital structure, they will substitute some of the debt financing using equity to reduce overall financing costs. Thus, government debt could crowd out corporate debt.

We present a simple model where households can save using equity and debt securities. Households require a higher return for equity securities, but treat government and corporate debt as substitutes. Firms finance their projects by issuing both debt and equity securities, whereas the government is constrained to issue debt securities. The model shows that an increase in government debt issuances increases the required returns on debt securities relative to equity securities, and thereby crowds out corporate debt financing. We also discuss the conditions that lead to differential crowding out effects across countries facing different institutional structures and across firms with different abilities to adjust their capital structures.

We empirically test the predictions of our theoretical model using a data set that covers 40 countries between 1990 and 2014. We find that higher levels of government debt are associated with lower leverage levels. The results are robust including country- and year-fixed effects, using alternative specifications based on changes in leverage levels, and after controlling various time-varying macroeconomic variables. We also obtain consistent results using a panel of disaggregated firm-level data.

We investigate whether the relation between corporate debt and government debt depends on whether the government debt is financed domestically or internationally. We hypothesize that the crowding out effect is more pronounced for government debt purchased by local investors. Consistent with our hypothesis, we find an insignificant relation between external government debt and local corporate debt. On the other hand, the coefficient estimates for internal government debt are about twice the estimates for the total government debt found in our baseline model.

Our international setting also allows us to study the impact of country characteristics on crowding out effects. We hypothesize that the cost of switching from debt to equity securities is smaller for firms operating in countries with more developed equity markets and in countries where bank financing accounts for a small portion of total debt financing. Our results indicate that a change in government debt only has a significant impact on corporate debt in countries with relatively large equity markets and in countries where companies are less dependent on bank financing.

The impact of government debt on capital structure might also differ across firms within a country for several reasons. First, the debt of some firms (such as large firms and profitable firms) tends to be less risky and more liquid, so that those securities might be perceived as closer substitutes for government debt. Second, firms with more financial flexibility might incur lower costs of switching between debt and equity financing. These firms might be in a better position to adjust their capital structure in response to shocks in the supply of government securities. Consistent with our priors, we find that the crowding out effect is stronger for larger firms and for more profitable firms.

An important concern about the crowding out effect of government debt is that government debt is endogenous. Firms might adjust their capital structure in response to economic conditions, which are correlated with the supply of government debt.[2] We address this endogeneity concern in multiple ways. As mentioned previously, our specifications include year-fixed effects that capture the impact of the global business cycle and additionally control for several country-level macroeconomic variables that capture

[2]The leverage dynamics of the business cycle is discussed by Hackbarth, Miao, and Morellec (2006), Bharma, Kuehn, and Strebulaev (2010), and Halling, Yu, and Zechner (2015).

the local business environment. Furthermore, we only find a crowding out effect for the portion of government debt that is financed domestically, confirming the postulated segmentation of debt markets. Finally, we use the introduction of the Euro currency as a quasi-natural experiment to address potential endogeneity concerns. The European Monetary Union (EMU) facilitated the integration of financial markets in member countries. Companies and governments in EMU countries gained access to financing from a substantially broader market and became less dependent on domestic financing sources after the monetary unification. We find that the sensitivity of corporate leverage to local government debt decreased significantly for companies incorporated in one of the EMU countries after the integration, whereas the corresponding sensitivity did not change for non-EMU countries.

In the corporate finance literature, a significant amount of research is devoted to understanding how firms make their financing decisions. Many of the empirical studies focus on the firm-specific determinants of capital structure. For instance, Titman and Wessels (1988) investigate the empirical validity of theoretical determinants of capital structure such as asset structure, non-debt tax shields, growth, uniqueness, industry classification, size, earnings volatility, and profitability. Besides these firm-specific determinants, empirical studies show that there are also factors outside the firm, such as industry average leverage (Welch, 2004 and Frank and Goyal, 2007) and peer firms' capital structure (Leary and Roberts, 2014) that shape firms' capital structure policy. There is also a growing literature using the variation in the institutional environment across countries in order to explore the importance of country-specific factors.[3] Fan, Titman and Twite (2012) provide the most extensive analysis of the impact of various institutional factors such as legal environment, tax policies, and the types of capital providers in the economy on capital structure. They find that a firm's capital structure is affected more by the country in which it is located than by its industry affiliation. Our study contributes to the literature on country-level determinants of firms' financing decisions by focusing

[3]See Booth, Aivazian, Demirguc-Kunt, and Maksimovic (2001), Claessens, Djankov, and Nenova (2001), Demirguc-Kunt and Maksimovic (1996, 1998, 1999), Giannetti (2003), and De Jong, Kabir, and Nguyen (2008).

attention on government debt.

Greenwood, Hanson, and Stein (2010) develop a model that investigates the impact of government debt maturity on corporate debt maturity. When the supply of long-term Treasuries increases relative to the supply of short-term Treasuries, the expected return on long-term Treasuries increases. Firms absorb this supply shock by issuing short-term debt to the extent that the expected return differential between long-term and short-term debt is eliminated. They test the implications of their model using U.S. data and find a negative relation between corporate debt and government debt maturity. In a related study, Badoer and James (2015) argue that this gap filling is a more important determinant of very long-term corporate borrowing than shorter-term borrowing. Using firm-level corporate debt issuance data, they find that highly rated firms' issuance of long-term bonds is inversely related to the proportion of outstanding long-term Treasury bonds. However, they find little evidence that issuances of short-term corporate bonds are related to changes in the supply of Treasury bonds. Foley-Fisher, Ramcharan, and Yu (2014) examine the impact of the Federal Reserve's Maturity Extension Program (MEP) on the firm financial constraints. The MEP was intended to put downward pressure on long-term interest rates, to lower borrowing costs, and to increase the amount of credit available to firms and households. They find that firms that rely on long-term debt issued more long-term debt during the MEP's implementation. Furthermore, such firms enjoyed increases in investment and employment during the MEP relative to other periods, suggesting that the MEP affected real economic activity.

Krishnamurthy and Vissing-Jorgensen (2012) argue that similar to money, Treasury securities also have liquidity and safety attributes, and an increase in the supply of government securities decreases the relative value of those attributes in the market. Consistent with this hypothesis, they find that a one standard deviation decrease in the Treasury supply reduces Baa-Treasury spreads by 79 basis points. Furthermore, by studying pairs of assets with similar liquidity but different safety or with similar safety but different liquidity, they show that changes in Treasury supply affect both the safety and liquidity premia.

Our paper is most related to Graham, Leary and Roberts (2014), who investigate the government crowding out of corporate debt using unique long-term U.S. data from 1920-2012. They find a robust negative relationship between government leverage and corporate leverage. Their analysis of the portfolios of different financial intermediaries, such as commercial banks, insurance companies and pension funds, suggests that financial intermediaries respond to increased government borrowing by increasing their holdings of government debt and by reducing their holdings of corporate debt. Our paper contributes to the literature by investigating the crowding out effect between government and corporate debt using a cross-country sample. Using international data allows us to benefit from a larger variation of changes in government debt and to control for year effects, country effects, and time-varying macroeconomic factors. Furthermore, our empirical analysis of the Euro integration also helps to mitigate potential endogeneity concerns.

The remainder of the paper is organized as follows: Section 2 presents a simple model that formalizes the main ideas discussed in the Introduction. Section 3 describes the data and reports the summary statistics. Section 4 presents the country-level empirical analysis and robustness tests. Section 5 analyzes the crowding out effect using firm-level data. Section 6 studies how the relation between corporate leverage and government debt changes around the formation of the EMU. We conclude in the final section.

2 The Model

We describe in this section a simple model that illustrates crowding out effects. Our model includes three economic agents: households who save, firms who require financing to fund their projects, and the government.

2.1 Household's Optimization Problem

The representative household is endowed with an initial wealth of W, and decides how much to allocate to debt and equity securities in order to maximize the utility from

next period's consumption:

$$\max_{w_D, w_G} \; U\left[(1 - w_D - w_G)(1 + r_E)W + w_D(1 + r_D)W + w_G(1 + r_G)W + v(\rho w_D + w_G)W\right],$$

where r_E, r_D, and r_G are deterministic returns on equity, corporate debt, and government debt.[4] The portfolio weights w_D and w_G denote the fractions of initial wealth invested in corporate and government debt securities, respectively. The rest of the portfolio, $1 - w_D - w_G$ is invested in corporate equity.

Similar to the model in Krishnamurthy and Vissing-Jorgensen (2015), the household obtains additional utility v from holding safer debt-like assets. We assume that $v'(\cdot) > 0$ and $v''(\cdot) < 0$. Finally, ρ captures the substitutability between corporate and government debt ($\rho \in (0, 1]$). As ρ approaches one, households treat corporate debt as a perfect substitute for government debt.[5]

The household's first order conditions imply:

$$v'(\rho w_D + w_G) = r_E - r_G, \tag{1}$$

$$\rho v'(\rho w_D + w_G) = r_E - r_D. \tag{2}$$

We do not explicitly model risk and the associated risk premium for equity in our model. The spread between the return on equity and debt securities captures in a reduced-form the preference for safer assets from investors. Combining these two equations yields the following equation for the spread between corporate debt and government debt:

$$r_D - r_G = (1 - \rho)v'(\rho w_D + w_G). \tag{3}$$

As corporate debt becomes a perfect substitute for government debt (i.e. as $\rho \to 1$), the spread between corporate debt and government debt shrinks towards zero.

[4] We ignore risk on corporate equity for simplicity, as our focus is the tradeoff between corporate and government debts.

[5] The utility v for "safer" asset is similar to the preference for "extremely safe" assets in Krishnamurthy and Vissing-Jorgensen (2015). They model the preference for bank deposits plus Treasury bonds. Our parameter ρ allows us to differentiate between investors' preferences for "extremely safe" (e.g. Treasury bonds) and "safe" assets (e.g. corporate bonds) relative to equity.

2.2 Firm's Optimization Problem

Firms have projects that require an investment of K in the first period and produce an output of $f(K)$ in the second period. The total investment K is financed by equity and debt. The target capital structure is to have λ fraction of total capital financed by debt. Firms incur quadratic costs for any deviation from this target. These costs capture the impact of various market frictions, such as taxes, agency costs, and other financing costs. Each firm takes as a given the external financing costs r_D and r_E, and chooses the leverage ratio d to maximize total output net of financing and deviation costs:

$$\max_d \quad f(K) - d(1+r_D)K - (1-d)(1+r_E)K - \frac{\theta}{2}(d-\lambda)^2 K,$$

where

$$d = \frac{D}{K}.$$

The firm's first-order condition is as follows:

$$\theta(d-\lambda) = r_E - r_D. \tag{4}$$

The firm chooses the leverage ratio d to take advantage of the rate differential $r_E - r_D$. This rate differential captures external capital market conditions that are unrelated to the firm's specific risk. The higher the cost of deviation θ, the less the firm deviates from its target capital structure λ.

2.3 Market Equilibrium

The following equilibrium condition follows from equations (2) and (4):

$$r_E^* - r_D^* = \theta(d^* - \lambda) = \rho v'(\rho w_D^* + w_G). \tag{5}$$

The equilibrium corporate debt level d^* is determined by households' preference for safer debt-like instruments and the cost for firms to deviate from their target debt levels. The target λ captures in a reduced-form way the optimal tradeoff at the firm level, before accounting for the capital market imperfection in which households have a preference for

safer assets. This preference leads to a lower cost of corporate debt relative to equity. As a result, firms increase their debt level relative to the original target level λ.[6]

In equilibrium, equity and debt markets clear such that:[7]

$$W = E + D + G = K + G.$$

Therefore, an increase in government debt is absorbed by the household sector and shrinks the corporate sector by the same amount.[8] Figure 1 depicts the debt-to-capital ratio in equilibrium for the case when $v(\cdot)$ is a logarithmic function (i.e., $v(x) = log(1+x)$). The horizontal axis shows different leverage levels d and the vertical axis shows the equity premium $r_E - r_D$. The preferences of households for debt securities are captured by the downward-sloping curve $\rho v'(\rho d(1 - w_G) + w_G)$. As debt securities become more abundant, households do not require a large equity premium to be indifferent between holding equity and debt securities. The upward-sloping line $\theta(d-\lambda)$ captures the capital structure preferences of firms. At a leverage ratio of $d = \lambda$, the frictions of debt financing would be minimized. However, due to the household's preference for debt-like securities, the return that households demand for holding equity is higher than debt at $d = \lambda$ by an amount of $\rho v'(\rho\lambda(1 - w_G) + w_G)$. Therefore, the firm increases its leverage from the target level λ to d^* where the marginal cost of debt financing equals the marginal benefit of holding debt for the household. The figure shows that the equilibrium level of debt-to-capital (d^*) corresponds to a positive equity premium.

<Figure 1 about here>

[6] An alternative way of formulating the household's problem is to assume an optimal portfolio share for debt securities and quadratic costs of deviating from this optimum. All of the implications that we derive using our current model survive as long as the optimal portfolio share of debt for the household is greater than the firm's target leverage ratio.

[7] Substituting the market clearing condition in the definitions of w_D, w_G and d, we obtain the following relationship between the household's portfolio share of debt and the firm's leverage ratio:

$$w_D^* = d^*(1 - w_G). \tag{6}$$

[8] This assumption is for simplification and our results are not driven by this assumption since we derive the optimal leverage ratio rather than optimal debt level in equilibrium. Our implications continue to hold if we assume that some or all of the increase in government debt is transferred to the households, thus corporate investment does not shrink at all or is reduced less than the increase in government debt.

2.4 Impact of Government Debt

We now consider the impact of government debt on the corporate leverage ratio. We have the following result.

Implication 1: Given households' preference for debt-like instruments and financing frictions of the corporate sector, an increase in government debt leads to a lower corporate leverage ratio. Furthermore, it reduces both the spread between equity and corporate debt and the spread between corporate and government debt.

The detailed proof is in the appendix. Figure 2 shows how the introduction of government debt affects the equilibrium in financial markets. The introduction of government debt shifts the household's marginal utility curve (v') to the left, since the household now has a larger share of debt securities for a given portfolio share of corporate debt. The introduction of government debt reduces the equity premium as well as the optimal amount of corporate debt.

<Figure 2 about here>

2.5 Countries with Different Financing Frictions

Next, we investigate whether the crowding out effect differs between countries with different financing frictions. We use the cost of deviating from optimal capital structure (θ) as a measure of financing frictions. In a country with a more developed equity market and lower financing frictions, it is less costly for firms to deviate from their target capital structure.

To simplify notation we abbreviate the equity premium as: $EP = r_E - r_D$. It can be shown that the following inequality holds[9]:

$$\theta_H = \frac{EP_H^* - EP_H^{**}}{d_H^* - d_H^{**}} > \frac{EP_L^* - EP_L^{**}}{d_L^* - d_L^{**}} = \theta_L. \tag{7}$$

Implication 2: Given an increase in government debt, countries with higher financing

[9]See the appendix for the proof.

frictions experience a smaller reduction in corporate debt. However, these countries experience a larger drop in both the spread between equity and corporate debt and the spread between corporate and government debt.

Figure 3 compares the change in the equilibrium level of debt for countries with high (θ_H) and low (θ_L) financial frictions. We compare the equilibrium outcomes without a government sector (denoted with one asterisk) and with a government sector (denoted with two asterisks).

<Figure 3 about here>

When financing frictions are high, the introduction of a government sector generates stronger price responses and weaker quantity responses compared to the case with low adjustment costs. This outcome is intuitive because firms are not as flexible to adjust their leverage levels in environments with more substantial frictions. Without quantity adjustment, the price impact is larger. Since our empirical tests focus only on the quantity responses, we underestimate the impact of government debt for countries with higher frictions.

2.6 Heterogeneity in Firm Composition

We also analyze the model's implications for two firms that are incorporated in the same country, but their corporate debts have different levels of substitutability with government debt due to different credit quality or liquidity. For simplicity we assume the two firms have the same optimal target leverage ($\lambda_i = \lambda$) and the same financing frictions ($\theta_i = \theta$).[10]

[10]We solve for the case where firms have different financing frictions but the same level of substitutability in the Appendix.

The household's problem is summarized as follows

$$\begin{aligned}\max_{w_{E_L},w_{D_L},w_{D_H},w_G} \; & U[(1-w_{E_L}-w_{D_L}-w_{D_H}-w_G)(1+r_{E_H})W + w_{E_L}(1+r_{E_L})W \\ & + w_{D_L}(1+r_{D_L})W + w_{D_H}(1+r_{D_H})W + w_G(1+r_G)W \\ & + v\left(\rho_L w_{D_L} + \rho_H w_{D_H} + w_G\right)W],\end{aligned}$$

where w_{D_i} and w_{E_i} are the fractions of initial wealth invested into debt and equity of firm $i \in \{L, H\}$. The following equations are derived from the household's first order conditions

$$r_{E_i} - r_G = v'(\rho_L w_{D_L} + \rho_H w_{D_H} + w_G) \tag{8}$$

$$r_{E_i} - r_{D_i} = \rho_i v'(\rho_L w_{D_L} + \rho_H w_{D_H} + w_G). \tag{9}$$

In equilibrium, the representative investor is indifferent between investing into the equities of high-ρ and the low-ρ firm such that $r^*_{E_L} = r^*_{E_H}$. Consequently, the difference between the returns on debt securities supplied by the high-ρ and the low-ρ firm are determined by the difference between their contributions to marginal utility. Each entrepreneur $i \in \{L, H\}$ solves the following problem:

$$\max_{d_i} \; f(K_i) - d_i(1+r_{D_i})K - (1-d_i)(1+r_{E_i})K - \frac{\theta}{2}\left(d_i - \lambda_i\right)^2 K_i.$$

We derive the following first order condition for entrepreneur i's problem

$$r_{E_i} - r_{D_i} = \theta\left(d_i - \lambda_i\right). \tag{10}$$

In this case, the equilibrium condition is given by

$$\rho_i v'\left(\rho_L w_{D_L} + \rho_H w_{D_H} + w_G\right) = \theta\left(d^*_i - \lambda\right) \tag{11}$$

Implication 3: Within a country, for a given level of government debt increase, firms whose debt securities are closer substitutes for government debt decrease their leverage more than others.

Figure 4 illustrates how a positive supply of government debt affects the leverage for firms with high and low levels of substitutability.

<Figure 4 about here>

3 Data and Summary Statistics

This section describes the data sources and summarizes the main variables used in our empirical analysis.

3.1 Data

We obtain firm-level accounting data from Compustat Global and Compustat North America, and firm-level market data from Compustat Global Security Daily. The main variable of interest is the total government debt-to-GDP ratio, which we obtain from the World Economic Outlook (WEO) database available through the IMF[11]. For other country-level variables, we use data from the World Bank, IMF and the ECB. To ensure that the country-level variables are consistently defined over time, for each country and variable, we use the data source that provides us with the longest series. We obtain the data on sovereign debt defaults and restructuring episodes from Carmen M. Reinhart and Kenneth S. Rogoff's webpage.[12] The website offers the longest historical annual government debt data from as early as 1692 for the UK and 1719 for Sweden to 2010 for 70 countries.

Our sample covers the period between 1990 and 2014, and the first year of the sample is determined by the availability of the firm-level and country-level data which vary across countries. Observations with missing and/or negative book value of assets are dropped from the sample. We exclude financial (6000-6999), public (9000-9999) and utility (4900-4999) firms. Since we focus on the time-series variation in corporate and public debt, each firm is required to have data on book leverage, lagged firm-level controls, as well as lagged values of government debt, GDP per capita, inflation, S&P index level, unemployment,

[11]The WEO series are not available for the earlier periods of our sample for some countries. For those countries with short series we use government debt data from the central banks whenever available or other sources such as World Bank. Those countries are Ireland, Israel, Peru, South Africa, and the US.

[12]http://www.reinhartandrogoff.com/

and nominal exchange rate. We also exclude country-year observations with less than ten firms.

Our sample includes 16 country-year observations in which we observe a domestic or external sovereign debt default or restructuring event. These events are associated with large decreases and increases in government debt-to-GDP ratios that might result from significant devaluations of the local currency and debt forgiveness. While our exchange rate captures such devaluations, our macro controls cannot account for debt forgiveness. We exclude these 16 country-year observations from our analysis. The final sample consists of 38,740 firms from 40 countries with a total of 344,132 firm-year observations and 812 country-year observations.

Table 1 shows the distribution of countries in our sample. The sample includes firms from different parts of the world, mainly Europe, Asia, North America, and South America. Hong Kong has the shortest time series that mainly results from government debt not being available in the earlier periods of the sample. The U.S., the U.K., and Japan are the countries with the highest number of firm-year observations.

<Table 1 about here>

3.2 Summary Statistics

We use four leverage measures for our firm-level analyses. First, we define the traditional leverage measures, *Book Leverage* and *Market Leverage*, which are total debt over book value of assets and total debt over market value of assets, respectively. *Net Book Leverage* is defined as book leverage net of cash and short-term investments. The last measure, *Debt-to-Capital Ratio*, is proposed by Welch (2011), and is defined as the book value of debt divided by debt plus the book value of equity. The book value of total assets includes the value of non-financial liabilities such as trade credit. Therefore, an increase in accounts receivable causes a decrease in the book leverage, even if total debt of the firm stays constant. The last definition of leverage is not affected by changes in non-financial liabilities. The country-level variables follow firm-level definitions, and are calculated by

aggregating the values in the numerator and the denominator over all firms in a given year and country. All ratio variables, including leverage measures, are winsorized at the 1% level.

Table 2 reports country averages for corporate leverage and macroeconomic variables. While, on average, firms in Hong Kong have the lowest leverage ratio, firms in Portugal have the highest corporate leverage in our sample. Belgium, Greece, Italy, and Japan are countries with an average government debt-to-GDP ratio exceeding 100%. Chile, Hong Kong, and Russia have the lowest average government debt-to-GDP ratios that are all below 20%.

<Table 2 about here>

Besides our main country-level debt variables, we also control for other country characteristics.[13] Our main specification includes GDP per capita, the level of inflation, the level of the equity index, the unemployment rate, and the exchange rate. The natural logarithm of *GDP per Capita* is measured in current U.S. dollars, whereas *Inflation* is defined as the natural logarithm of the level of consumer price index. In order to account for the movements in the stock market, we convert each country's return on its *S&P Global Equity Index* into a variable that tracks the index level assuming that the base year is the first year in the sample, and include the natural logarithm of this index in our regressions. *Unemployment* is the number of unemployed as a percentage of the potential labor force. Although, we use year-fixed effects in all specifications, we cannot control for economic downturns specific to each country, which makes the unemployment rate an important variable to include in the analysis. Finally, *Nominal Exchange Rate* is the value of the local currency relative to one U.S. dollar calculated as an annual rate based on monthly averages, and we control for its natural logarithm in all our analysis.

We also compute additional firm-level variables that have been shown to relate to corporate leverage (Rajan and Zingales,1995, Baker and Wurgler, 2002, Frank and Goyal, 2003, and Lemmon, Roberts and Zender, 2008). *Tangibility* is defined as the ratio between

[13]See Korajczyk and Levy (2003) for the macroeconomic determinants of capital structure.

the value of property, plant, and equipment (PPE) and total assets. We use the book value of total assets (*Assets*) to account for the impact of firm size on leverage. The return on assets (*ROA*) is defined as operating income scaled by total assets. Finally, *Market-to-Book Ratio* is defined as the ratio between the market value of total assets and the book value of the firm. We use Compustat currency exchange rate data in order to convert non-ratio variables into U.S. dollars. Detailed variable definitions are given in the Appendix.

Panels A and B of Table 3 report the summary statistics for country- and firm-level variables, respectively. *Government debt-to-GDP* has a mean of 58.3% and an interquartile range of 37.2% and 72.5%. On average, the *GDP per Capita* is $16,075, and the average unemployment rate is about 7.4%. Panel A of Table 3 shows that the ratio between corporate debt and corporate total assets has a mean (median) of 28.3% (27.7%) and a standard deviation of 6.5%. On average, book leverage net of cash is 17.8% with a standard deviation of 8.1%. Since it is normalized by the book value of total capital rather than total assets, the *Debt-to-Capital Ratio* is higher than the *Book Leverage*, with a mean (median) of 42.3% (42%). Finally, the *Market Leverage* has an average of 19.5% and a median of 18.5%.

<Table 3 about here>

Panel B reports the summary statistics for firm-level variables. On average, *Book Leverage*, *Net Book Leverage*, *Debt-to-Capital* and *Market Leverage* are 21.7%, 5%, 29.7% and 18.1%, respectively. Consistent with the capital structure literature, we find a significant variation in the tangibility of firms. The mean tangibility equals 30.5% with an interquartile range of [11.3%, 44.7%]. Most firms in our sample are profitable, as captured by the 4.2% positive mean ROA. Finally, the median firm's market value exceeds the book value by 23.2%.

4 Country-Level Analysis

This section presents the results of our empirical analyses using the country panel where we aggregate firm-level variables by year and country. One potential caveat of this approach is that the composition of the aggregated sample might change as firms go public or are delisted from security exchanges. To alleviate this problem, we report the results from firm-level specifications in Section 5.

4.1 Baseline Specification

Our baseline specification relates the country-level corporate debt to government debt-to-GDP ratio and additional macro variables. More specifically, we estimate the following regression equation:

$$\begin{aligned} Leverage_{j,t} \;&=\; \beta_0 \;+\; \beta_1 \, Government\ Debt\text{-}to\text{-}GDP_{j,t-1} \\ &\quad + \beta_2 X_{j,t-1} \;+\; \beta_3 Y_{j,t-1} \;+\; u_j \;+\; \delta_t \;+\; \varepsilon_{j,t}. \end{aligned} \tag{12}$$

Equation (12) is estimated separately for four different definitions of $Leverage_{j,t}$, namely book leverage, book leverage net of cash, market leverage, and total debt divided by debt plus equity. $Government\ Debt\text{-}to\text{-}GDP_{j,t-1}$ is total government debt as a percentage of GDP in country j; $X_{j,t-1}$ denotes macro variables, including the natural logarithm of GDP per capita, inflation, the level of the equity index, the unemployment and the exchange rate; $Y_{j,t-1}$ denotes aggregated values of traditional determinants of leverage that are frequently used in capital structure studies, mainly tangibility, size, profitability, and the market-to-book ratio. Finally, u_j and δ_t denote country- and year-fixed effects, respectively. Year-fixed effects account for worldwide events such as the recent financial crisis, and country-fixed effects control for time-invariant country characteristics.

Panel A of Table 4 reports the results for the levels specification. The standard errors are clustered at the country level and t-statistics are reported in parentheses. The results indicate a negative relationship between government debt and aggregate corporate leverage. A 10 percentage point increase in government debt relative to GDP reduces

book leverage (market leverage) by about 0.75 (0.56) percentage points. Government debt is also negatively correlated with net book leverage (debt-to-capital ratio): a 10 percentage point increase in government debt-to-GDP is associated with a 0.86 (0.96) percentage point decrease in net book leverage (debt-to-capital ratio). The unemployment rate and the exchange rate are significant determinants of corporate leverage. Also, the profitability is significantly related to the aggregate leverage.

<Table 4 about here>

We repeat our analysis for the subsample of countries that are members of the OECD.[14] Panel B of Table 4 reports the fixed effects regression results for the 25 OECD countries. Results are similar to those reported for the whole sample with the relationship between government debt and corporate debt being slightly stronger for developed countries.

A second method for analyzing the time-series relationship between corporate debt and government debt is to estimate equation (12) in first differences:

$$\begin{aligned} \Delta Leverage_{j,t,t-1} \;&=\; \beta_0 \;+\; \beta_1 \Delta \textit{Government Debt-to-GDP}_{j,t-1,t-2} \\ &\quad + \beta_2 \Delta X_{j,t-1,t-2} \;+\; \beta_3 \Delta Y_{j,t-1,t-2} \;+\; \delta_t \;+ \varepsilon_{j,t}. \end{aligned} \tag{13}$$

Panel A of Table 5 reports the results for country-level first difference regressions. The coefficient estimates for the government debt-to-GDP ratio are all negative for our four different leverage measures such that corporate leverage decreases significantly following an increase in government debt. For example, a 10% increase in government debt-to-GDP is associated with a 0.68% (0.59%) decrease in firm book leverage (market leverage) in the subsequent year. Similarly, net book leverage and debt-to-capital ratio change by -0.77% and -1.08%, respectively. The economic magnitude in the first difference specification is

[14]Those countries are: Austria, Australia, Belgium, Canada, Denmark, Germany, Finland, France, Greece, Ireland, Italy, Japan, South Korea, Mexico, Netherlands, Norway, New Zealand, Poland, Portugal, Spain, Sweden, Switzerland, Turkey, US, UK. Since they became members in 2010, Chile and Israel are not included in the OECD sample. Note that only two OECD countries, Turkey and Greece, experienced a default or a restructuring in our sample. Therefore, only two observations in this subsample are dropped due to such episodes.

very similar to the magnitude in the level specification. Note that changes in GDP per capita, ROA, and the market-to-book ratio are typically significantly related to changes in corporate debt. Overall, our findings suggest that there is a negative relation between firm leverage and government debt supply.

<Table 5 about here>

We repeat our first difference analysis for the OECD countries as we did for the levels specification in Table 4. Table 5 Panel B reports the results. Consistent with the fixed effects regression results, the coefficient estimates for the OECD subsample are similar to those estimated for the whole sample.

4.2 External Debt

Our government debt variable includes both external and domestic government debt. Consequently, there can be cases where an increase in the supply of government debt is absorbed by foreign investors or international financial institutions such as the IMF. In the latter case, we do not expect the change in government debt to have any impact on corporate leverage as long as the stock of local government debt stays constant. There are two potential channels through which corporate debt can be affected from changes in foreign demand for government bonds. First, holding the change in total government debt constant, a larger fraction of a debt issue is absorbed by foreign investors, leaving more local funds available for corporations. Second, the increase in foreign demand for government debt can crowd out foreign investment into corporations. The latter effect would be more prominent in those countries where external private debt is a more important source of debt financing than domestic private debt. According to the IMF (2015), over the period between 2003 and 2014, foreign bank lending to the private sector in emerging markets stayed below 8% of total debt, whereas domestic bank lending was above 78%. Although, bond financing has doubled from 8% to 16% since 2008, domestic bank lending is still the main source of debt financing in emerging markets.

In Table 6, we repeat our baseline analysis by replacing *Government debt-to-GDP* with *Domestic Government Debt* and *External Government Debt* measured in percent of GDP. *Domestic Government Debt* is calculated by subtracting external government debt from total government debt outstanding. The results are reported for both fixed effects and first difference specifications. The economic magnitude of the estimate for the coefficient of internal government debt is twice the estimate for total government debt reported in Table 4. Furthermore, the coefficient estimate for external debt is insignificant suggesting that the negative relationship between corporate leverage and government leverage is driven by domestic public debt rather than external debt.[15]

<Table 6 about here>

4.3 An Alternative Specification

One possible concern about using the government debt-to-GDP ratio as the independent variable is that the relationship between corporate leverage and government debt could be driven by changes in GDP rather than changes in the amount of government debt outstanding. In order to eliminate this concern, we estimate an alternative specification. More specifically, we regress the natural logarithm of the dollar value of corporate debt on the natural logarithm of the dollar value of lagged government debt. The coefficients in this specification can be interpreted as the elasticities of corporate debt in response to changes in government debt.

Table 7 reports the estimation results which confirm our findings in Table 4 and Table 5. Results are consistent with our previous findings. For instance, in the fixed effects regressions a one standard deviation (1.590) increase in the natural logarithm of government debt is associated with a 0.144 standard deviation decrease in the natural logarithm

[15]The correlation between the levels (first differences) of external and internal government debt is 0.214 (0.376). Although, they are statistically significant, correlation coefficients are not large enough to raise multicollinearity concerns. Furthermore, the variance inflation factors associated with the changes in external and internal government debt are both close to one.

of corporate debt. We obtain similar results for the first difference specification.[16]

<Table 7 about here>

4.4 Country Characteristics and Crowding Out

We also investigate the cross-country variation in the crowding out effect. We hypothesize that in countries where financial markets are more developed, it is less costly for firms to adjust their capital structure. Consequently, we expect firms in such countries to find it easier to change their capital structure when government debt changes.

To investigate the cross-country variation in crowding out, we use three proxies, namely, size of the equity market, bank dependence of the private sector and stock turnover ratio. *Market Capitalization* is total market value of pubic firms as a percent of GDP. *Bank Dependence* is the amount of bank credit extended to the private sector (% total credit) which proxies for the dependence of corporations on banks. *Stock Turnover Ratio* is the value of domestic shares traded divided by their market capitalization which captures the liquidity of an equity market. In each year, we split the sample into three equally-sized groups based on previous year's *Market Capitalization*, *Bank Dependence* and *Stock Turnover Ratio*.

Panel A of Table 8 reports the first difference estimation results for the three subsamples based on the size of the equity market. While the coefficient estimates for change in government debt-to-GDP are in general negative, they are only statistically significant and are the largest in magnitude for countries with a large equity market. Panels B and C report the results for the subsamples based on the fraction of bank credit and the stock turnover ratio. The results show that the crowding out effect is more prominent in countries with a less bank-dependent private sector and a high stock turnover ratio.

<Table 8 about here>

[16] In order to ensure that the results are not driven by a single country in our sample, we repeat the fixed effects and first difference regressions in Table 4 and Table 5 by dropping one country at a time from our sample. Our results are robust to these subsamples.

5 Firm-Level Analysis

In this section, we estimate our baseline model at the firm level. Table 9 reports the estimation results for firm fixed effects and the first difference specification. The results show that the coefficient estimates for the firm-level controls have the signs consistent with the literature. While tangibility and size have a positive impact on leverage, profitable firms and those with high market-to-book ratios have lower leverage. We obtain a negative relation between the level of government debt and firm leverage levels for all four leverage measures. The coefficient estimates imply that a 10 percentage point increase in government debt relative to GDP reduces firm leverage by 0.48-0.77 percentage points. Similarly, the coefficient estimates from the first difference specification are consistent with our previous findings. A 10 percentage point change in government debt relative to GDP reduces firm leverage by 0.73-0.99 percentage points.

<Table 9 about here>

We conduct several robustness checks for our firm-level analysis which we report in the Appendix. First, as an alternative to our baseline specification, we repeat our firm-level analysis using the natural logarithms of government debt and corporate debt in dollars. Table A2 shows that the results are robust to this alternative definition.

We also differentiate between domestic and external government debt at the firm level. Results are reported in Table A3, which confirm the findings from country-level analysis such that external debt is not significantly related to corporate leverage and there is a negative relationship between domestic debt and leverage.

We also investigate whether the negative impact of government debt on corporate leverage is specific to long-term or short-term corporate debt. In Table A4, we repeat our main analysis for *Long-Term Debt* defined as long-term debt that matures in more than one year divided by total assets, and for *Short-term Debt* defined as the ratio of debt in current liabilities to total assets. Results indicate that the negative relationship holds for both long-term and short-term corporate debt.

One advantage of our firm-level analysis is that it allows us to investigate the impact of firm characteristics on the crowding out effect, as discussed in our theoretical model. The impact of government debt on capital structure might differ across firms for two reasons. First, some types of corporate debt are closer substitutes to government debt than others. For example, bonds issued by larger firms might be more liquidly traded. Similarly, more profitable firms tend to have lower default risk, which makes their debt a better substitute for government debt. Thus, the crowding out effect should be stronger for large and profitable firms. Second, firms with more financial flexibility incur lower costs of switching between debt and other sources of financing. These firms are in a better position to adjust their capital structure in response to shifts in demand. For example, larger firms are more flexible in their choices between debt and equity financing, since they are potentially less subject to asymmetric information problems. In contrast, high equity issuance costs or borrowing costs might prevent small firms from drastically changing their method of financing. Similarly, more profitable firms face lower costs in adjusting their capital structure because they have the flexibility of first drawing down their internal funds before tapping the external capital market. Moreover, they may face a lower cost of switching between debt and equity financing. Therefore, both the substitution effect and the adjustment cost effect suggest that larger and more profitable firms should respond more to government debt changes.

In columns (1)-(4) of Table 10 we interact government debt-to-GDP ratio with indicator variables for firm size. More specifically, we split firms into three terciles in each year and each country by total book value of assets. Consistent with our prior, we find that the crowding out effect is significantly higher for large firms than for small firms.

<Table 10 about here>

Similarly, we expect profitable firms to respond more to changes in government debt. Such firms are more likely to have high retained earnings that they can use towards investment without any need for external financing. Columns (5)-(8) of Table 10 report the results for profitability interactions, where the dummy variable *ROA Tercile 3* indicates

that the firm's lagged ROA is in the highest tercile of its country distribution in a given year. The results show that the crowding out effect is more significant for profitable firms. Overall, we find consistent evidence with our model's implications such that government crowding out is more prominent for firms that are financially less constrained.

6 Euro-Area Integration

Although we control in our baseline analysis for time-invariant country characteristics, various macroeconomic controls, and year-fixed effects that account for worldwide events such as the financial crisis, endogeneity concerns might remain. In this section, we address this concern by using the integration of the bond market in the European Monetary Union (EMU) as a quasi-natural experiment. Since the second half of the 1990s, the degree of integration in various European financial markets has significantly increased (ECB, 2006). The effect has especially been prominent in government and corporate bond markets (Pagano and Von Thadden, 2004 and ECB, 2006).

Coeurdacier and Martin (2007) argue that in theory, the monetary integration can have opposing effects on the holdings of Euro assets by countries in the Euro zone. For instance, by reducing currency risk, integration can decrease transaction costs of trading across different financial markets in the Euro zone. On the other hand, a single currency may increase the substitutability between assets issued by member countries which in turn decreases the Euro asset holdings of the member countries. The results of Coeurdacier and Martin (2007) suggest that the single currency decreased transaction costs for a cross border purchase of a Euro bond or equity for both Euro and non-Euro countries. Although, they also find evidence for the negative impact of substitution effect on the holdings of Euro assets, the results indicate that the positive impact of lower transaction costs dominates the substitution effect. More specifically, consistent with Lane (2006), they show that there is an "Euro bias" in bilateral bond holdings between two Euro countries.

We hypothesize that after the EMU integration the sensitivity of corporate leverage to

local government debt decreases for companies incorporated in one of the EMU countries. The integration can weaken the crowding out effect through increased demand by foreign investors for government debt and/or corporate debt securities. While the former helps local investors in absorbing government debt supply, and increases funds available to the corporate sector, the latter decreases firms' dependence on local investors, especially on financial institutions.

Figure 5 depicts the relation between changes in corporate leverage and changes in the government debt-to-GDP ratio for EMU and non-EMU countries before (1990-1998) and after the introduction of the Euro (1999-2006). While we do not observe a significant change in the relation for non-EMU countries after the integration, for EMU countries the direction of the relation changes from negative to positive. Corporate leverage is not any longer negatively related with local government debt for EMU countries after the formation of the EMU.

<Figure 5 about here>

Next, we verify the finding in Figure 5 in a regression framework. We define an *After 1999* indicator variable that equals one for 1999 and years following that. Panel A of Table 11 reports the results for the subsample comprised of EMU member countries. We report the estimation results for all four leverage variables. The sample period is between 1990 and 2006. All regressions include the same control variables as our baseline specification but their coefficient estimates are not reported to save space. Consistent with our priors, in all specifications, the interaction between government debt-to-GDP ratio and *After 1999* dummy is estimated to be positive.

We also extend the analysis to all countries in our sample. The indicator variable *EMU* takes the value one for EMU countries. The coefficient of interest is the coefficient of the triple interaction between the change in *Government Debt-to-GDP ratio*, *After 1999*, and *EMU* dummy. Consistent with our prior,

Panel B of Table 11 reports the estimation results for the period between 1990 and 2006. All regressions include the same control variables as our baseline specification but

their coefficient estimates are not reported to save space. The negative coefficient estimate for the change in government debt-to-GDP represents the impact of government debt on leverage before 1999 for non-EMU countries. Consistent with our findings in Panel A, the positive coefficient estimate for the triple interaction suggests that corporate leverage becomes less sensitive to local government debt in EMU countries after the integration. The coefficient estimate for the triple interaction is statistically significant for the specifications *Book Leverage* and *Net Book Leverage* 5% or 10% levels. These results are robust to inclusion of year-fixed effects. Note that the relation between corporate leverage and government debt does not change to a significant degree for non-EMU countries suggested by the insignificant coefficient estimate for the interaction between the change in government debt-to-GDP ratio and *After 1999* dummy. On average, there is a decrease in the magnitude of the changes in corporate debt after the integration. EMU countries do not differ from others in terms of book leverage ratios, but the change in market leverage ratios are smaller in magnitude for countries incorporated in EMU countries.

<Table 11 about here>

The next table investigates the impact of integration for firms with different size and profitability levels and are incorporated in member countries. For this analysis, we use firm-level data. As we did in Table 10, we split firms into terciles based on their lagged assets and ROA in each year and country. Then, we estimate our first difference specification for each size and profitability tercile with an interaction term between change in government debt-to-GDP ratio and *After 1999* dummy. Table 12 reports the results for the change in book leverage. While all coefficient estimates for the change in government debt-to-GDP ratio are negative, they are only statistically significant for the largest and the most profitable firms which is consistent with our fixed effects regression results in Table 10. The coefficient estimate for the interaction term is negative for all terciles indicating that the impact of government debt on leverage was reduced after the integration regardless of size and profitability. However, the estimate

is only statistically significant for the largest and the most profitable firms. Overall, our results suggest that the crowding out effect was more prominent for unconstrained firms before the integration, and the effect disappeared after the integration.

<Table 12 about here>

Conclusions

In this paper, we investigate the impact of government debt on firms' capital structure decisions using data on 40 countries between 1990-2014. We argue that an increase in government debt supply might reduce investors' demand for corporate debt relative to equity since government debt is a better substitute for corporate debt than for equity. As a result, corporations might adjust their capital structure and reduce their leverage. Our results support these hypotheses: we document a negative relation between government debt and corporate leverage both in levels and changes of debt after controlling for country- and year-fixed effects as well as country-level controls. Our firm-level analysis shows that the effect is more pronounced for large firms, which have more flexibility in substituting between different sources of financing. In order to address potential endogeneity problems, we use the integration of the European Monetary Union as a quasi-natural experiment. Overall, our results are consistent with government debt crowding out corporate debt.

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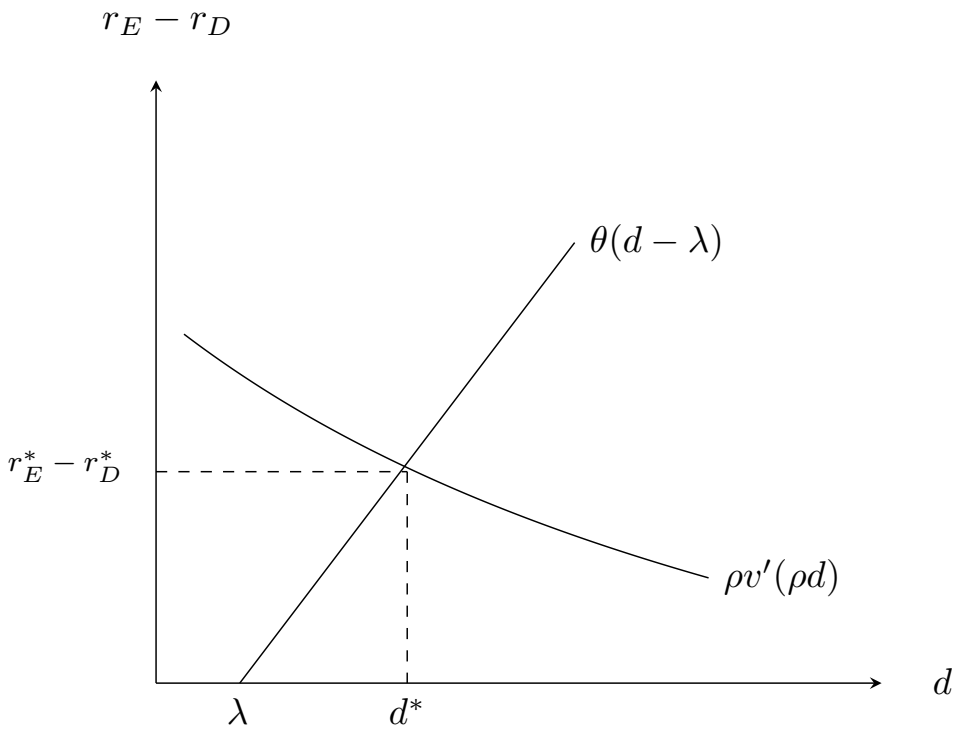

Figure 1: Baseline model This figure shows the equilibrium level of debt-to-capital ratio (d^*) for the baseline case without government sector assuming that $v(.)$ is a logarithmic function.

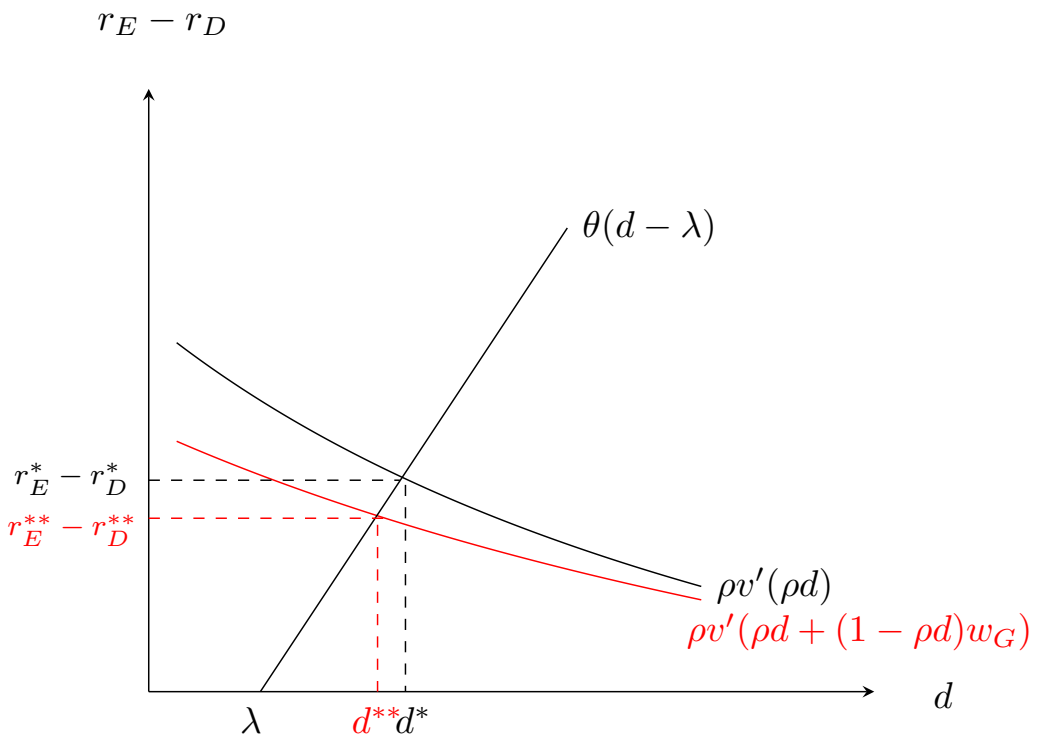

Figure 2: Government sector This figure shows the impact of the introduction of government sector on the equilibrium level of debt-to-capital ratio (d^{**}) for the case when $v(.)$ is a logarithmic function.

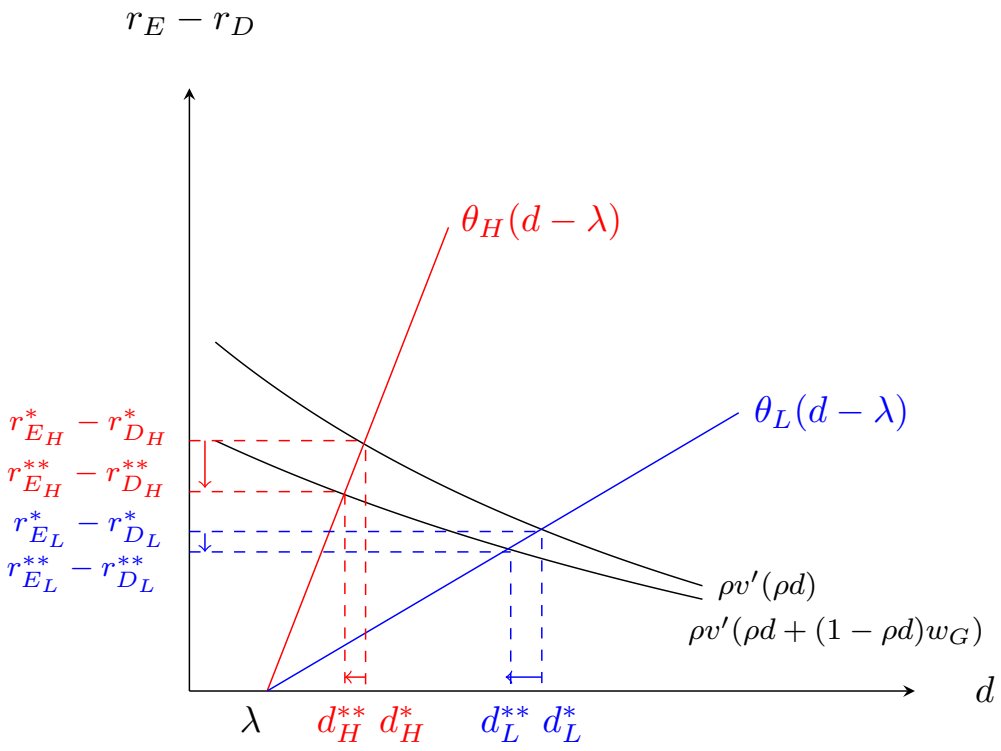

Figure 3: Two firms in different countries This figure shows the impact of the introduction of government sector on the equilibrium level of debt-to-capital ratio for two firms in countries with different adjustment costs (θ).

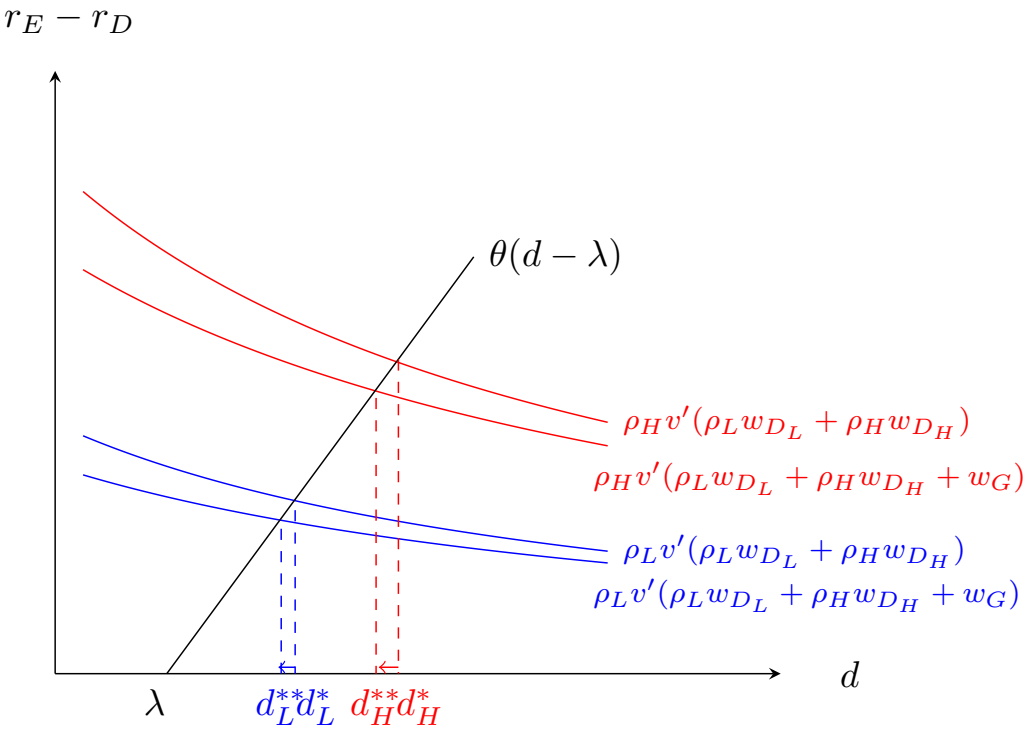

Figure 4: Two firms in the same economy This figure shows the impact of the introduction of government sector on the equilibrium level of debt-to-capital ratio for two firms with different substitutability of debt (ρ) incorporated in the same country.

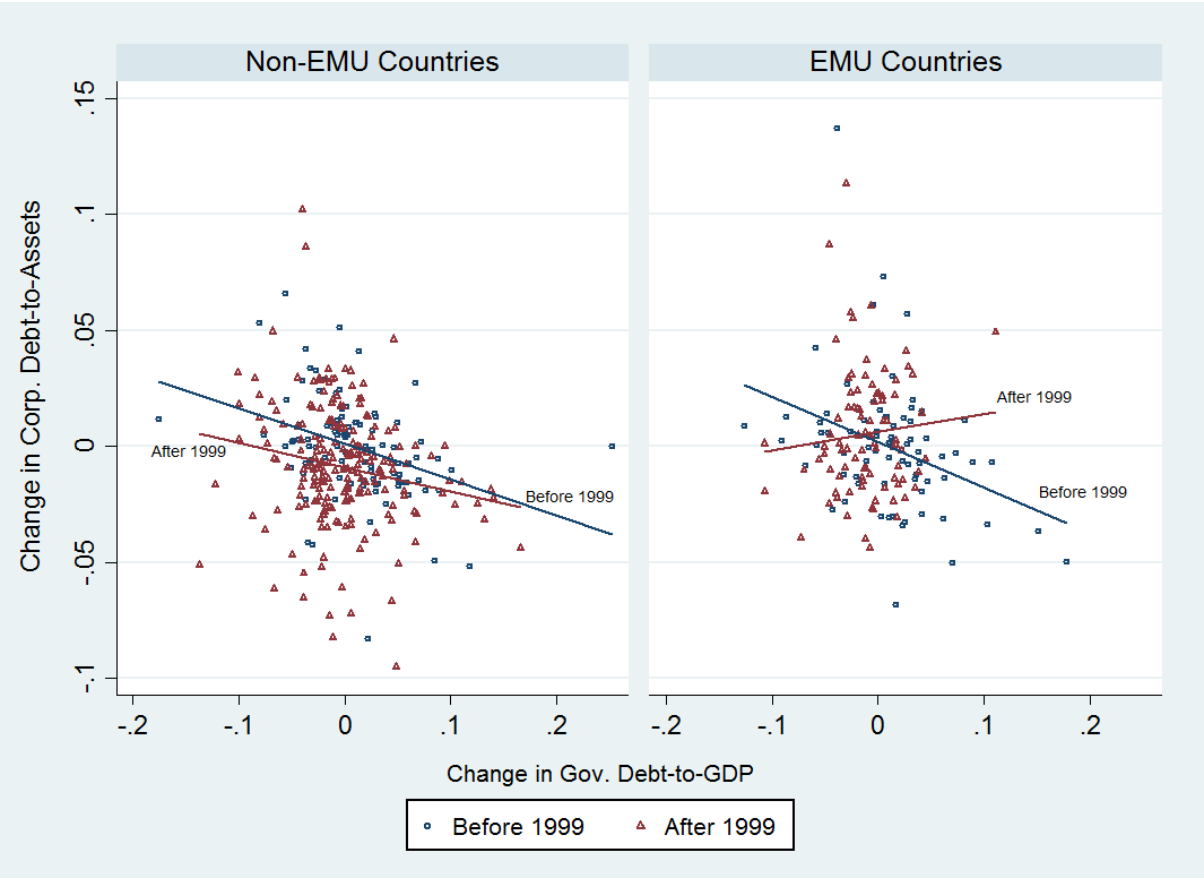

Figure 5: EMU Integration This figure scatter plot the ΔGovernment Debt-to-GDP$_{t-1,t-2}$ to ΔBook Leverage$_{t,t-1}$ in countries that are members of the EMU and all other countries over the 17-year period around the integration (1990-2006). The lines represent the linear regression fits before and after (and including) 1999.

Table 1: Sample Distribution

This table reports the frequency distribution of countries in our sample. Observations with missing and/or negative book value of assets and total debt are dropped from the sample. We also exclude firms operating in financial (6000-6999), public (9000-9999) and utility (4900-4999) sectors. Each firm is required to have data on book leverage, firm-level controls as well as government debt-to-GDP, GDP per capita, inflation, S&P index, unemployment and exchange rate. We also exclude country-year observations with less than 10 firms in a given year.

	# of years	# of firms	# of firm-year observations	Min	Max
Argentina	7	55	590	1999	2014
Australia	25	1,986	16,390	1990	2014
Austria	25	116	1,173	1990	2014
Belgium	25	140	1,525	1990	2014
Brazil	13	230	1,533	2001	2014
Canada	25	2,913	20,097	1990	2014
Chile	18	136	1,292	1997	2014
China	19	2,343	17,209	1996	2014
Denmark	22	186	1,878	1993	2014
Finland	25	152	1,881	1990	2014
France	25	939	9,247	1990	2014
Germany	23	884	8,805	1992	2014
Greece	17	231	2,373	1997	2014
Hong Kong	13	127	1,243	2002	2014
India	19	2,451	14,743	1996	2014
Indonesia	12	364	2,865	2002	2014
Ireland	25	93	911	1990	2014
Israel	17	344	2,145	1998	2014
Italy	25	303	2,941	1990	2014
Japan	25	3,821	53,437	1990	2014
Malaysia	19	978	10,659	1996	2014
Mexico	18	116	1,153	1997	2014
Netherlands	25	240	2,676	1990	2014
New Zealand	23	145	1,300	1992	2014
Norway	25	291	2,300	1990	2014
Peru	15	72	609	2000	2014
Philippines	19	155	1,526	1996	2014
Poland	18	433	2,883	1997	2014
Portugal	20	77	703	1995	2014
Russia	13	157	990	2002	2014
Singapore	24	700	6,951	1991	2014
South Africa	19	344	3,243	1996	2014
South Korea	19	1,478	9,432	1996	2014
Spain	23	171	1,858	1992	2014
Sweden	21	568	4,427	1994	2014
Switzerland	25	243	3,084	1990	2014
Thailand	18	507	5,223	1997	2014
Turkey	13	237	1,899	2001	2014
United Kingdom	25	2,522	22,421	1990	2014
United States	25	11,492	98,517	1990	2014
Total	812	38,740	344,132		

Table 2: Summary Statistics by Country

This table shows the summary statistics for the country-level variables. *Book Leverage* is defined as the ratio of total book debt of all firms in a country to their total assets. *Net Book Leverage* is total debt net of cash and short-term investments divided by total assets. *Debt-to-Capital* is the ratio of total corporate debt to total corporate capital (book value of debt plus equity) in each country. *Market Leverage* is defined as the ratio of total book debt of all firms in a country to their market value of assets. *Government Debt* is gross government debt divided by GDP, *GDP Per Capita* is measured in current U.S. dollars, *Unemployment* is measured as a percentage of the labor force, and *Exchange Rate* is denoted in local currency units per US dollar. *Ln(S&P Index)* and *Ln(CPI Level)* are calculated by taking the natural logarithm of the level of S&P Global Equity Index and the level of CPI.

Country	Book Leverage	Net Book Leverage	Debt-to Capital	Market Leverage	Gov. Debt (% GDP)	Ln(GDP Per Capita)	Ln(CPI Level)	Ln(S&P Index)	Unemployment	Ln(Exchange Rate)
Argentina	0.259	0.197	0.351	0.171	0.402	9.213	5.153	5.104	0.103	1.241
Australia	0.271	0.203	0.379	0.179	0.207	10.242	5.016	5.251	0.067	0.852
Austria	0.246	0.143	0.434	0.211	0.673	10.375	4.882	4.802	0.049	1.376
Belgium	0.282	0.207	0.450	0.207	1.122	10.318	4.892	5.210	0.080	1.785
Brazil	0.314	0.194	0.440	0.059	0.657	8.796	22.205	5.811	0.081	1.143
Canada	0.271	0.211	0.387	0.196	0.837	10.272	4.926	5.172	0.081	0.811
Chile	0.283	0.218	0.367	0.222	0.106	8.943	6.026	4.834	0.076	6.275
China	0.258	0.138	0.365	0.216	0.336	7.497	5.587	4.955	0.037	2.158
Denmark	0.271	0.164	0.386	0.172	0.514	10.639	4.941	5.638	0.066	1.975
Finland	0.288	0.177	0.438	0.184	0.425	10.364	4.924	5.727	0.095	1.059
France	0.270	0.172	0.483	0.199	0.613	10.284	4.880	5.148	0.091	1.118
Germany	0.260	0.153	0.495	0.200	0.615	10.378	4.921	5.541	0.081	0.730
Greece	0.313	0.210	0.446	0.242	1.106	9.856	5.932	5.347	0.117	2.092
Hong Kong	0.172	-0.008	0.233	0.092	0.014	10.295	5.330	6.283	0.050	2.172
India	0.331	0.242	0.457	0.236	0.733	6.576	5.810	5.268	0.040	3.812
Indonesia	0.323	0.206	0.431	0.192	0.370	7.569	6.616	4.251	0.084	9.153
Ireland	0.329	0.153	0.457	0.178	0.677	10.300	4.959	5.340	0.098	0.564
Israel	0.343	0.221	0.513	0.234	0.799	10.067	5.956	5.400	0.081	1.616
Italy	0.304	0.211	0.529	0.258	1.079	10.168	5.096	4.788	0.092	3.282
Japan	0.318	0.182	0.486	0.259	1.477	10.469	4.717	3.927	0.039	4.713
Malaysia	0.281	0.139	0.375	0.214	0.418	8.645	5.087	4.159	0.033	1.479
Mexico	0.297	0.203	0.433	0.208	0.426	8.893	6.867	5.698	0.038	2.451
Netherlands	0.251	0.150	0.442	0.146	0.633	10.400	4.882	5.467	0.055	0.783
New Zealand	0.322	0.260	0.410	0.173	0.298	9.958	4.965	4.667	0.064	0.966
Norway	0.296	0.199	0.460	0.225	0.366	10.796	4.929	5.119	0.040	2.042
Peru	0.235	0.145	0.306	0.185	0.356	8.095	15.848	5.658	0.083	1.422
Philippines	0.349	0.241	0.474	0.276	0.528	7.244	5.830	3.866	0.090	3.785
Poland	0.224	0.145	0.314	0.178	0.460	8.923	10.190	5.320	0.133	1.466
Portugal	0.390	0.308	0.594	0.289	0.698	9.688	5.407	5.225	0.087	1.734
Russia	0.196	0.121	0.244	0.159	0.188	8.816	11.816	5.372	0.072	3.406
Singapore	0.221	0.052	0.320	0.132	0.854	10.219	4.861	5.138	0.027	0.938
South Africa	0.197	0.093	0.301	0.108	0.390	8.442	5.957	4.847	0.240	2.059
South Korea	0.330	0.219	0.510	0.305	0.226	9.681	5.363	4.740	0.036	6.993
Spain	0.354	0.274	0.562	0.230	0.564	9.941	5.186	5.350	0.160	2.081
Sweden	0.246	0.132	0.384	0.132	0.513	10.554	5.022	5.779	0.076	2.151
Switzerland	0.252	0.086	0.382	0.146	0.520	10.821	4.874	5.746	0.031	0.832
Thailand	0.372	0.288	0.495	0.248	0.437	8.015	5.267	3.420	0.018	3.603
Turkey	0.248	0.102	0.354	0.184	0.486	8.922	12.510	6.012	0.097	0.888
United Kingdom	0.223	0.134	0.346	0.127	0.485	10.271	5.004	5.250	0.069	0.476
United States	0.275	0.186	0.424	0.158	0.676	10.500	5.000	5.540	0.061	0.693
Total	0.283	0.178	0.423	0.195	0.583	9.685	6.021	5.146	0.074	2.066

Table 3: Summary Statistics for Country- and Firm-Level Variables

This table shows the summary statistics for the country-level (Panel A) and firm-level (Panel B) variables. We use four leverage measures for our firm-level analyses. *Book Leverage* and *Market Leverage* are total debt over book value of assets and total debt over market value of assets, respectively. *Net Book Leverage* is total debt net of cash and short-term investments divided by total assets. *Debt-to-Capital* is the ratio of total corporate debt to total corporate capital (book value of debt plus equity) in each country. *Tangibility* is defined as the ratio between the value of property, plant, and equipment (PPE) and total assets. We use the natural logarithm of book value of total assets (*Ln(Assets)*) in order to account for the impact of firm size on leverage. Return on assets (*ROA*) is defined as operating income scaled by total assets. Finally, *Market-to-Book* is defined as the ratio between the market value and the book value of total assets. Country-level corporate variables are calculated by aggregating the numerator and the denominator over all firms with non-missing dependent and control variables in a given year and country. *Domestic Government Debt* is total debt net of debt held by foreigners. All country-level ratio variables, and all firm-level ratio variables are winsorized at 1% on both ends of the distribution. We use Compustat currency exchange rate data in order to convert non-ratio variables into U.S. dollars.

Panel A: Country-Level Variables

	Mean	St. Dev.	p25	Median	p75	N
Book Leverage	0.283	0.065	0.239	0.277	0.318	812
Net Book Leverage	0.178	0.081	0.126	0.173	0.226	812
Debt-to-Capital	0.423	0.098	0.359	0.420	0.481	812
Market Leverage	0.195	0.079	0.141	0.185	0.237	812
Gov. Debt-to-GDP	0.583	0.335	0.372	0.527	0.725	812
Ln(GDP Per Capita)	9.685	1.118	9.156	10.049	10.478	812
Ln(CPI Index Level)	6.021	2.901	4.881	5.095	5.640	812
Ln(S&P Index Level)	5.146	0.796	4.605	5.186	5.715	812
Unemployment Rate	0.074	0.045	0.043	0.068	0.091	812
Ln(Exchange Rate)	2.066	1.909	0.710	1.403	2.416	812
Tangibility	0.405	0.107	0.329	0.403	0.477	812
Ln(Assets)	12.093	1.595	10.937	11.983	13.138	812
ROA	0.126	0.033	0.102	0.121	0.146	812
Market-to-Book	1.780	2.072	1.232	1.470	1.797	812
Domestic Gov. Debt	0.375	0.302	0.190	0.305	0.497	638
External Gov. Debt	0.214	0.175	0.094	0.175	0.302	638

Summary Statistics for Country- and Firm-Level Variables (Cont.)

Panel B: Firm-Level Variables

	Mean	St. Dev.	p25	Median	p75	N
Book Leverage	0.217	0.205	0.034	0.184	0.340	344132
Net Book Leverage	0.050	0.324	-0.136	0.078	0.265	344117
Debt-to-Capital	0.297	0.253	0.049	0.270	0.483	337205
Market Leverage	0.181	0.179	0.019	0.132	0.290	330893
Tangibility	0.305	0.232	0.113	0.261	0.447	344132
Ln(Assets)	5.099	2.086	3.724	5.069	6.422	344132
ROA	0.042	0.252	0.025	0.084	0.141	344132
Market-to-Book	1.744	1.590	0.946	1.232	1.858	344132

Table 4: Leverage Regressions (Fixed Effects)

This table reports the coefficient estimates from the following fixed effects regression: Leverage$_{j,t}$ = β_0 + β_1Government Debt-to-GDP$_{j,t-1}$ + β_2Corporate controls$_{j,t-1}$ + β_3Macro controls$_{j,t-1}$ + u_j + δ_t + $\varepsilon_{j,t}$, where j and t denote the country and year, respectively. *Leverage* denotes one of the following debt measures: *Book Leverage* is defined as the ratio of total book debt of all firms in a country to their total assets; *Net Book Leverage* is total debt net of cash and short-term investments divided by total assets; *Debt-to-Capital* is the ratio of total corporate debt to total corporate capital (book value of debt plus equity) in each country; and *Market Leverage* is defined as the ratio of total book debt of all firms in a country to their market value of assets. All other variables are explained in Table 2 and Table 3. All regressions include country-fixed effects (u_j) and year-fixed effects (δ_t). Standard errors are clustered at the country level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	Panel A: All countries				Panel B: OECD countries only			
	Book Leverage	Net Book Leverage	Debt-to Capital	Market Leverage	Book Leverage	Net Book Leverage	Debt-to Capital	Market Leverage
Gov. Debt-to-GDP$_{t-1}$	-0.075***	-0.086***	-0.096***	-0.056**	-0.080***	-0.096***	-0.099**	-0.048*
	(-3.455)	(-3.413)	(-2.993)	(-2.269)	(-3.281)	(-2.943)	(-2.469)	(-2.003)
Ln(GDP Per Capita$_{t-1}$)	0.013	0.021	0.047*	0.028	-0.031	-0.045	0.017	0.019
	(0.585)	(0.720)	(1.874)	(0.964)	(-0.953)	(-1.265)	(0.451)	(0.495)
Ln(CPI Index Level$_{t-1}$)	0.015	-0.020	0.028	-0.022	0.027	-0.014	0.059	-0.002
	(0.579)	(-0.498)	(0.813)	(-0.558)	(0.845)	(-0.280)	(0.998)	(-0.049)
Ln(S&P Index Level$_{t-1}$)	-0.016	-0.020	-0.032*	-0.049***	-0.024	-0.038*	-0.044*	-0.049**
	(-1.354)	(-1.254)	(-2.020)	(-3.660)	(-1.348)	(-1.748)	(-1.969)	(-2.449)
Unemployment Rate$_{t-1}$	0.267***	0.106	0.324**	0.133	0.134	-0.066	0.206	0.146*
	(2.919)	(0.834)	(2.423)	(1.160)	(1.139)	(-0.420)	(1.180)	(1.886)
Ln(Exchange Rate$_{t-1}$)	-0.016***	-0.017***	-0.015*	-0.014***	-0.013***	-0.012**	-0.013	-0.009**
	(-3.377)	(-3.555)	(-1.864)	(-3.345)	(-3.045)	(-2.647)	(-1.647)	(-2.660)
Tangibility$_{t-1}$	0.044	0.218**	-0.065	0.135	0.026	0.170	-0.025	0.071
	(0.586)	(2.084)	(-0.624)	(1.552)	(0.301)	(1.548)	(-0.183)	(0.950)
Ln(Assets$_{t-1}$)	-0.001	-0.004	0.007	-0.010	0.028**	0.047***	0.030*	0.018
	(-0.141)	(-0.325)	(0.614)	(-1.082)	(2.341)	(3.414)	(1.885)	(1.492)
ROA$_{t-1}$	-0.820***	-0.897***	-1.179***	-1.062***	-0.849***	-0.777***	-1.318***	-0.858***
	(-5.492)	(-4.577)	(-5.619)	(-4.237)	(-4.732)	(-4.145)	(-5.034)	(-3.888)
Market-to-Book$_{t-1}$	-0.000	-0.001	0.003*	-0.007***	0.007	0.012	0.015	-0.022
	(-0.062)	(-0.588)	(1.955)	(-2.780)	(1.042)	(1.535)	(1.421)	(-1.695)
Observations	812	812	812	812	567	567	567	567
Adj. R-squared	0.694	0.689	0.747	0.710	0.661	0.653	0.704	0.751
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES

Table 5: Leverage Regressions (First Differences)

This table estimates the following first difference specification: $\Delta\text{Leverage}_{j,t,t-1} = \beta_0 + \beta_1\Delta\text{Government Debt-to-GDP}_{j,t-1,t-2} + \beta_2\Delta\text{Corporate controls}_{j,t-1,t-2} + \beta_3\Delta\text{Macro controls}_{j,t-1,t-2} + \delta_t + \varepsilon_{j,t}$, where j and t denote the country and year, respectively. *Leverage* denotes one of the following debt measures: *Book Leverage* is defined as the ratio of total book debt of all firms in a country to their total assets; *Net Book Leverage* is total debt net of cash and short-term investments divided by total assets; *Debt-to-Capital* is the ratio of total corporate debt to total corporate capital (book value of debt plus equity) in each country; and *Market Leverage* is defined as the ratio of total book debt of all firms in a country to their market value of assets. All other variables are explained in Table 2 and Table 3. All regressions include year-fixed effects (δ_t). Standard errors are clustered at the country level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	Panel A: All countries				Panel B: OECD countries only			
	Δ Book Leverage	Δ Net Book Leverage	Δ Debt-to Capital	Δ Market Leverage	Δ Book Leverage	Δ Net Book Leverage	Δ Debt-to Capital	Δ Market Leverage
Δ Gov. Debt-to-GDP$_{t-1,t-2}$	-0.068***	-0.077***	-0.108***	-0.059*	-0.064**	-0.067**	-0.083**	-0.026
	(-3.194)	(-3.511)	(-3.586)	(-1.836)	(-2.669)	(-2.644)	(-2.446)	(-0.927)
Δ Ln(GDP Per Capita$_{t-1,t-2}$)	0.031**	0.040**	0.046**	0.041*	0.061***	0.078***	0.096***	0.082***
	(2.180)	(2.219)	(2.261)	(1.953)	(3.915)	(4.220)	(4.272)	(4.752)
Δ Ln(CPI Index Level$_{t-1,t-2}$)	-0.034	-0.031	-0.048	-0.022	-0.066	-0.061	-0.083	-0.037
	(-1.027)	(-0.692)	(-0.835)	(-0.356)	(-1.524)	(-0.925)	(-0.973)	(-0.529)
Δ Ln(S&P Index Level$_{t-1,t-2}$)	-0.005	-0.006	-0.003	-0.011	-0.003	-0.006	-0.003	0.001
	(-0.880)	(-1.000)	(-0.453)	(-1.353)	(-0.372)	(-0.671)	(-0.318)	(0.140)
Δ Unemployment Rate$_{t-1,t-2}$	-0.109	-0.293**	-0.083	-0.102	-0.052	-0.259*	-0.063	-0.046
	(-1.267)	(-2.362)	(-0.664)	(-0.757)	(-0.645)	(-2.044)	(-0.465)	(-0.427)
Δ Ln(Exchange Rate$_{t-1,t-2}$)	-0.001	0.001	-0.000	-0.003	-0.001	0.002	0.001	-0.002
	(-0.764)	(0.402)	(-0.081)	(-1.068)	(-0.351)	(0.654)	(0.325)	(-0.775)
Δ Tangibility$_{t-1,t-2}$	0.005	0.039	-0.077	-0.029	0.054	0.029	0.011	-0.002
	(0.101)	(0.554)	(-0.992)	(-0.458)	(0.656)	(0.251)	(0.098)	(-0.031)
Δ Ln(Assets)$_{t-1,t-2}$	-0.000	0.003	0.005	0.013**	0.008	0.009	0.013	0.016**
	(-0.058)	(0.339)	(0.653)	(2.184)	(1.078)	(0.723)	(1.130)	(2.225)
Δ ROA$_{t-1,t-2}$	-0.148**	-0.122	-0.187*	-0.143	-0.230**	-0.150	-0.273*	-0.283**
	(-2.181)	(-1.267)	(-1.942)	(-1.224)	(-2.532)	(-1.263)	(-1.898)	(-2.718)
Δ Martket-to-Book$_{t-1,t-2}$	-0.001**	-0.001*	-0.001***	-0.003**	0.001	0.000	0.001	-0.007**
	(-2.536)	(-1.739)	(-2.904)	(-2.065)	(0.396)	(0.100)	(0.349)	(-2.452)
Observations	779	779	779	779	546	546	546	546
Adj. R-squared	0.188	0.203	0.192	0.389	0.231	0.254	0.237	0.469
Year FE	YES	YES	YES	YES	YES	YES	YES	YES

Table 6: External Debt (Country-Level)

This table investigates the impact of external government debt on corporate leverage by repeating both the fixed effects and the first difference specifications in Table 4 and Table 5 after decomposing *Government Debt-to-GDP* as *Domestic Government Debt* and *External Government Debt* measured in percent of GDP. *External Government Debt* is government debt held by foreigners. *Domestic Government Debt* is *Government Debt-to-GDP* net of external debt. Standard errors are clustered at the country level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	Fixed Effects				First Difference			
	Book Leverage	Net Book Leverage	Debt-to Capital	Market Leverage	Δ Book Leverage	Δ Net Book Leverage	Δ Debt-to Capital	Δ Market Leverage
Domestic Gov. Debt$_{t-1}$	-0.166***	-0.227***	-0.218***	-0.167***	-0.129***	-0.150***	-0.155***	-0.140***
	(-5.076)	(-6.071)	(-3.377)	(-4.209)	(-4.993)	(-3.923)	(-4.577)	(-3.013)
External Gov. Debt$_{t-1}$	0.028	0.004	0.003	0.043	-0.000	-0.002	-0.027	-0.003
	(0.705)	(0.078)	(0.058)	(0.961)	(-0.006)	(-0.067)	(-0.644)	(-0.070)
Ln(GDP Per Capita$_{t-1}$)	0.017	0.011	0.055***	0.023	0.030**	0.032*	0.037**	0.033
	(1.174)	(0.513)	(2.716)	(0.806)	(2.239)	(1.773)	(2.226)	(1.252)
Ln(CPI Index Level$_{t-1}$)	0.040	-0.012	0.035	-0.034	-0.016	-0.034	0.017	-0.044
	(1.259)	(-0.250)	(0.746)	(-0.641)	(-0.430)	(-0.725)	(0.341)	(-0.535)
Ln(S&P Index Level$_{t-1}$)	-0.006	-0.004	-0.025*	-0.038***	-0.005	-0.007	-0.004	-0.014
	(-0.637)	(-0.303)	(-1.758)	(-2.802)	(-0.846)	(-1.028)	(-0.449)	(-1.424)
Unemployment Rate$_{t-1}$	0.289**	0.265	0.393**	0.107	-0.019	-0.142	-0.043	0.016
	(2.088)	(1.434)	(2.106)	(0.630)	(-0.201)	(-1.281)	(-0.352)	(0.097)
Ln(Exchange Rate$_{t-1}$)	-0.005	-0.006	-0.001	-0.005**	0.000	0.004	0.001	-0.001
	(-1.411)	(-1.487)	(-0.139)	(-2.067)	(0.050)	(0.977)	(0.349)	(-0.331)
Tangibility$_{t-1}$	0.089	0.274***	-0.022	0.180**	-0.005	0.043	-0.070	0.009
	(1.331)	(2.963)	(-0.213)	(2.043)	(-0.093)	(0.774)	(-0.965)	(0.112)
Ln(Assets$_{t-1}$)	-0.000	-0.002	0.009	-0.005	0.000	0.008	0.009	0.017*
	(-0.069)	(-0.240)	(1.084)	(-0.953)	(0.057)	(0.799)	(0.809)	(1.971)
ROA$_{t-1}$	-0.689***	-0.751***	-0.986***	-1.047***	-0.047	-0.040	-0.094	-0.069
	(-5.082)	(-3.759)	(-4.935)	(-4.378)	(-0.610)	(-0.374)	(-0.837)	(-0.481)
Market-to-Book$_{t-1}$	0.001	-0.000	0.003**	-0.006**	-0.001	-0.001	-0.000	-0.004
	(1.475)	(-0.543)	(2.625)	(-2.375)	(-1.144)	(-1.146)	(-0.523)	(-1.181)
Observations	633	633	633	633	592	592	592	592
Adj. R-squared	0.752	0.765	0.785	0.751	0.195	0.234	0.197	0.418
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	NO	NO	NO	NO

Table 7: Alternative Specification (Country-Level)

Corporate Debt is calculated by summing dollar value of debt over all firms in a country and year. *Net Corporate Debt* is the sum of total debt net of cash and short-term investments over all firms in a country and year. *Ln(Government Debt)* is the natural logarithm of the dollar value of government debt outstanding. Standard errors are clustered at the country level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	Fixed Effects		First Difference	
	Ln(Corp. Debt)	Ln(Net Corp. Debt)	Δ Ln(Corp. Debt)	Δ Ln(Net Corp. Debt)
Ln(Gov. Debt$_{t-1}$)	-0.143**	-0.370**	-0.199***	-0.306**
	(-2.237)	(-2.472)	(-2.926)	(-2.345)
Ln(GDP Per Capita$_{t-1}$)	0.145	0.222	-0.043	0.324
	(1.626)	(0.998)	(-0.371)	(1.462)
Ln(CPI Index Level$_{t-1}$)	0.111	0.125	0.236	-0.480
	(1.094)	(0.472)	(0.696)	(-0.895)
Ln(S&P Index Level$_{t-1}$)	0.033	-0.032	0.160***	0.195**
	(0.790)	(-0.308)	(3.768)	(2.308)
Unemployment Rate$_{t-1}$	1.109***	1.298	-0.544	1.115
	(2.813)	(1.417)	(-0.652)	(0.803)
Ln(Exchange Rate$_{t-1}$)	-0.045***	-0.066*	0.031	0.043
	(-2.708)	(-1.741)	(1.634)	(1.377)
Tangibility$_{t-1}$	0.084	0.908*	0.182	-0.572
	(0.304)	(1.720)	(0.488)	(-0.591)
Ln(Assets$_{t-1}$)	1.006***	1.135***	0.897***	1.124***
	(25.605)	(5.849)	(11.850)	(2.756)
ROA$_{t-1}$	-2.051***	-4.669***	0.509	-1.094
	(-3.954)	(-3.134)	(1.218)	(-0.775)
Market-to-Book$_{t-1}$	0.002	0.001	0.003	-0.001
	(0.887)	(0.062)	(0.447)	(-0.232)
Observations	812	797	778	762
Adj. R-squared	0.990	0.935	0.681	0.360
Year FE	YES	YES	YES	YES
Country FE	YES	YES	NO	NO

Table 8: Country Characteristics and Crowding Out

This table reports the results from our first difference specification with change in government debt-to-GDP interacted with various country characteristics. Every year we split countries into terciles by their lagged *Market Capitalization*, *Bank Dependence* and *Stock Turnover Ratio*. *Market Capitalization* is total market value of public firms as a percent of GDP. *Bank Dependence* is measured by total bank credit to private sector as a fraction of total credit. *Stock Turnover Ratio* is the value of domestic shares traded divided by their market capitalization. Standard errors are clustered at the country level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

Panel A	Small Equity Market				Medium Equity Market				Large Equity Market			
	Δ Book Leverage	Δ Net Book Leverage	Δ Debt-to Capital	Δ Market Leverage	Δ Book Leverage	Δ Net Book Leverage	Δ Debt-to Capital	Δ Market Leverage	Δ Book Leverage	Δ Net Book Leverage	Δ Debt-to Capital	Δ Market Leverage
Δ Gov. Debt-to-GDP$_{t-1,t-2}$	-0.040	-0.040	-0.079*	0.008	-0.047	-0.039	-0.070	-0.048	-0.087**	-0.111**	-0.148**	-0.100
	(-1.379)	(-1.195)	(-1.731)	(0.186)	(-1.025)	(-0.826)	(-1.114)	(-0.999)	(-2.611)	(-2.599)	(-2.597)	(-1.605)
Observations	251	251	251	251	245	245	245	245	238	238	238	238
Adj. R-squared	0.219	0.248	0.230	0.424	0.236	0.240	0.208	0.514	0.182	0.159	0.222	0.430
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Panel B	Low Bank Credit				Medium Bank Credit				High Bank Credit			
	Δ Book Leverage	Δ Net Book Leverage	Δ Debt-to Capital	Δ Market Leverage	Δ Book Leverage	Δ Net Book Leverage	Δ Debt-to Capital	Δ Market Leverage	Δ Book Leverage	Δ Net Book Leverage	Δ Debt-to Capital	Δ Market Leverage
Δ Gov. Debt-to-GDP$_{t-1,t-2}$	-0.103***	-0.118***	-0.135***	-0.098***	-0.018	-0.011	-0.046	0.117*	-0.047	-0.078	-0.066	-0.112
	(-4.733)	(-5.165)	(-4.143)	(-4.036)	(-0.334)	(-0.190)	(-0.668)	(1.850)	(-1.131)	(-1.405)	(-1.186)	(-1.445)
Observations	250	250	250	250	244	244	244	244	235	235	235	235
Adj. R-squared	0.332	0.341	0.330	0.605	0.206	0.235	0.197	0.399	0.131	0.119	0.151	0.240
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Country Characteristics and Crowding Out

Panel C	Low Stock Turnover				Medium Stock Turnover				High Stock Turnover			
	Δ Book Leverage	Δ Net Book Leverage	Δ Debt-to Capital	Δ Market Leverage	Δ Book Leverage	Δ Net Book Leverage	Δ Debt-to Capital	Δ Market Leverage	Δ Book Leverage	Δ Net Book Leverage	Δ Debt-to Capital	Δ Market Leverage
Δ Gov. Debt-to-GDP$_{t-1,t-2}$	0.001	-0.017	-0.000	0.016	-0.083*	-0.116**	-0.107*	-0.077	-0.104***	-0.112**	-0.192***	-0.096*
	(0.028)	(-0.502)	(-0.012)	(0.352)	(-1.929)	(-2.091)	(-1.800)	(-1.568)	(-2.850)	(-2.451)	(-5.526)	(-1.984)
Observations	240	240	240	240	234	234	234	234	225	225	225	225
Adj. R-squared	0.215	0.212	0.279	0.494	0.155	0.222	0.161	0.453	0.207	0.268	0.289	0.382
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Table 9: Firm-Level Analysis

This table reports the coefficient estimates from the following fixed effects regression: $\text{Leverage}_{i,t} = \beta_0 + \beta_1 \text{Government Debt-to-GDP}_{j,t-1} + \beta_2 \text{Macro controls}_{j,t-1} + \beta_3 \text{Company controls}_{i,t-1} + u_i + \delta_t + \varepsilon_{i,t}$, and the following first difference regression: $\Delta\text{Leverage}_{i,t,t-1} = \beta_0 + \beta_1 \Delta\text{Government Debt-to-GDP}_{j,t-1,t-2} + \beta_2 \Delta\text{Macro controls}_{j,t-1,t-2} + \beta_3 \Delta \text{ Company controls}_{i,t-1,t-2} + \delta_t + \varepsilon_{i,t}$ where i and j denote the firm and its country of incorporation, respectively. All regressions include firm fixed effects (u_i) and year-fixed effects (δ_t). Standard errors are clustered at the country level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	Fixed Effects				First Difference			
	Book Leverage	Net Book Leverage	Debt-to Capital	Market Leverage	Δ Book Leverage	Δ Net Book Leverage	Δ Debt-to Capital	Δ Market Leverage
Gov. Debt-to-GDP$_{t-1}$	-0.069***	-0.053***	-0.077***	-0.048***	-0.099***	-0.098***	-0.099***	-0.073***
	(-5.110)	(-3.053)	(-4.200)	(-3.143)	(-3.500)	(-3.701)	(-4.117)	(-3.826)
Ln(GDP Per Capita$_{t-1}$)	-0.027***	-0.025***	-0.025**	-0.010	0.005	0.007	0.005	-0.001
	(-3.316)	(-2.802)	(-2.611)	(-0.655)	(0.409)	(0.590)	(0.532)	(-0.038)
Ln(CPI Index Level$_{t-1}$)	0.009	0.016	0.034	0.016	-0.049	-0.062	-0.043	-0.032
	(0.378)	(0.521)	(1.010)	(0.580)	(-1.312)	(-1.080)	(-1.304)	(-0.774)
Ln(S&P Index Level$_{t-1}$)	-0.016**	-0.028***	-0.018*	-0.046***	-0.004	-0.004	-0.002	-0.008
	(-2.482)	(-3.234)	(-2.002)	(-5.672)	(-1.369)	(-1.025)	(-0.526)	(-1.255)
Unemployment Rate$_{t-1}$	0.032	-0.018	0.061	-0.102	0.007	0.032	-0.056	-0.223**
	(0.432)	(-0.169)	(0.562)	(-0.957)	(0.096)	(0.327)	(-0.606)	(-2.432)
Ln(Exchange Rate$_{t-1}$)	-0.012***	-0.014***	-0.013**	-0.014**	-0.004***	-0.003	-0.005***	-0.003
	(-3.284)	(-3.866)	(-2.351)	(-2.596)	(-3.306)	(-1.301)	(-3.666)	(-1.124)
Tangibility$_{t-1}$	0.126***	0.358***	0.147***	0.106***	0.043***	0.002	0.055***	0.038***
	(7.483)	(14.120)	(6.063)	(6.101)	(5.503)	(0.170)	(5.441)	(5.077)
Ln(Assets$_{t-1}$)	0.037***	0.060***	0.048***	0.042***	0.006***	0.032***	0.011***	0.019***
	(8.001)	(11.407)	(7.585)	(9.912)	(3.506)	(15.734)	(7.263)	(8.884)
ROA$_{t-1}$	-0.106***	-0.105***	-0.103***	-0.076***	-0.031***	-0.046***	-0.017***	-0.014***
	(-7.914)	(-6.830)	(-5.493)	(-5.345)	(-5.063)	(-7.831)	(-6.412)	(-7.998)
Market-to-Book$_{t-1}$	-0.004***	-0.009***	-0.005***	-0.011***	-0.001**	-0.002**	-0.002***	0.001***
	(-3.602)	(-6.518)	(-2.804)	(-12.137)	(-2.595)	(-2.595)	(-4.534)	(3.886)
Observations	344,132	344,117	337,205	330,893	299,540	299,524	294,217	288,621
Adj. R-squared	0.639	0.717	0.707	0.726	0.0103	0.0128	0.0112	0.0637
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	NO	NO	NO	NO

Table 10: Government Debt and Company Characteristics

Columns (1)-(3) and (4)-(6) report the results from firm fixed effects regression with firm size and profitability interactions. *Size Tercile* (*ROA Tercile*) indicates whether a firm's lagged total assets (lagged ROA) are in the second or third (highest) tercile of its country in a given year and zero otherwise. All regressions include firm and year-fixed effects. Standard errors are clustered at the country level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Book Leverage	Net Book Leverage	Debt-to Capital	Market Leverage	Book Leverage	Net Book Leverage	Debt-to Capital	Market Leverage
Gov. Debt-to-GDP$_{t-1}$	-0.059***	-0.041**	-0.064***	-0.044**	-0.061***	-0.040**	-0.070***	-0.042***
	(-4.051)	(-2.160)	(-3.316)	(-2.667)	(-4.585)	(-2.226)	(-3.984)	(-2.763)
X Size Tercile 2	-0.009**	-0.016*	-0.012*	-0.006				
	(-2.378)	(-2.005)	(-1.995)	(-0.904)				
X Size Tercile 3	-0.016***	-0.018	-0.020**	-0.009				
	(-3.599)	(-1.280)	(-2.442)	(-1.245)				
X ROA Tercile 2					-0.013***	-0.020***	-0.015***	-0.013***
					(-3.990)	(-2.857)	(-5.249)	(-4.867)
X ROA Tercile 3					-0.024***	-0.035***	-0.029***	-0.024***
					(-5.509)	(-4.323)	(-5.667)	(-6.552)
Size Tercile 2	0.010**	0.020***	0.008	0.011*				
	(2.305)	(4.113)	(1.255)	(1.724)				
Size Tercile 3	0.028***	0.040***	0.028***	0.029***				
	(4.251)	(3.112)	(3.826)	(3.524)				
ROA Tercile 2					-0.001	0.006	-0.009*	-0.001
					(-0.206)	(0.598)	(-1.876)	(-0.236)
ROA Tercile 3					-0.013**	-0.012	-0.029***	-0.025***
					(-2.247)	(-1.037)	(-4.149)	(-5.051)
Ln(GDP Per Capita$_{t-1}$)	-0.028***	-0.027***	-0.026**	-0.011	-0.027***	-0.025**	-0.024***	-0.009
	(-3.215)	(-2.859)	(-2.621)	(-0.742)	(-3.014)	(-2.592)	(-2.752)	(-0.543)
Ln(CPI Index Level$_{t-1}$)	0.009	0.016	0.034	0.017	0.007	0.015	0.032	0.016
	(0.370)	(0.512)	(1.014)	(0.591)	(0.324)	(0.480)	(0.948)	(0.540)
Ln(S&P Index Level$_{t-1}$)	-0.016**	-0.027***	-0.018*	-0.045***	-0.017**	-0.029***	-0.020**	-0.048***
	(-2.268)	(-3.075)	(-1.900)	(-5.525)	(-2.565)	(-3.291)	(-2.122)	(-5.648)
Unemployment Rate$_{t-1}$	0.050	0.011	0.073	-0.077	0.033	-0.014	0.060	-0.102
	(0.636)	(0.098)	(0.647)	(-0.734)	(0.437)	(-0.125)	(0.543)	(-0.916)
Ln(Exchange Rate$_{t-1}$)	-0.012***	-0.014***	-0.013**	-0.013**	-0.012***	-0.015***	-0.013**	-0.014**
	(-3.222)	(-3.840)	(-2.351)	(-2.542)	(-3.234)	(-3.809)	(-2.324)	(-2.538)
Tangibility$_{t-1}$	0.126***	0.357***	0.147***	0.105***	0.127***	0.358***	0.148***	0.107***
	(7.467)	(14.114)	(6.056)	(6.099)	(7.294)	(13.962)	(5.889)	(6.012)
Ln(Assets$_{t-1}$)	0.034***	0.056***	0.046***	0.038***	0.037***	0.060***	0.048***	0.041***
	(6.574)	(9.208)	(6.890)	(9.529)	(7.880)	(10.994)	(7.438)	(9.770)
ROA$_{t-1}$	-0.105***	-0.104***	-0.102***	-0.075***	-0.086***	-0.083***	-0.066***	-0.046***
	(-7.763)	(-6.767)	(-5.344)	(-5.244)	(-9.939)	(-9.648)	(-5.435)	(-5.220)
Market-to-Book$_{t-1}$	-0.004***	-0.009***	-0.005***	-0.011***	-0.002**	-0.008***	-0.003*	-0.009***
	(-3.580)	(-6.375)	(-2.795)	(-12.586)	(-2.342)	(-5.136)	(-1.819)	(-11.299)
Observations	344,132	344,117	337,205	330,893	344,132	344,117	337,205	330,893
Adj. R-squared	0.639	0.717	0.707	0.727	0.641	0.718	0.710	0.731
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES	YES	YES	YES	YES

Table 11: EMU Integration

Panel A investigates the impact of EMU integration on the sensitivity of corporate leverage to government debt for the EMU countries. Panel B reports the results for all countries. *EMU* is a dummy variable that indicates whether the country is a member of the European Monetary Union. All regressions are estimated for the first difference specification. All regressions include macro and firm controls used in the baseline specification (Table 5). Sample period is from 1990 to 2006. Standard errors are clustered at the country level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

Panel A: EMU countries	Δ Book Leverage	Δ Net Book Leverage	Δ Debt-to Capital	Δ Market Leverage	Δ Book Leverage	Δ Net Book Leverage	Δ Debt-to Capital	Δ Market Leverage
Δ Gov. Debt-to-GDP$_{t-1,t-2}$	-0.164**	-0.160	-0.259**	-0.106	-0.091*	-0.078	-0.148**	-0.030
	(-2.541)	(-1.658)	(-2.509)	(-1.417)	(-1.937)	(-1.015)	(-2.372)	(-0.403)
X After 1999	0.322**	0.360*	0.394**	0.262**	0.261*	0.290	0.317*	0.159
	(3.020)	(1.986)	(2.733)	(2.904)	(2.134)	(1.671)	(2.010)	(1.475)
After 1999	0.005	-0.000	0.004	0.014*				
	(1.122)	(-0.002)	(0.569)	(2.148)				
Observations	162	162	162	162	162	162	162	162
Adj. R-squared	0.130	0.0713	0.151	0.226	0.191	0.202	0.170	0.430
Year FE	NO	NO	NO	NO	YES	YES	YES	YES

Panel B: All countries	Δ Book Leverage		Δ Net Book Leverage		Δ Debt-to-Capital		Δ Market Leverage	
Δ Gov. Debt-to-GDP$_{t-1,t-2}$	-0.154***	-0.110***	-0.147***	-0.111**	-0.290***	-0.245***	-0.249***	-0.209**
	(-3.982)	(-3.250)	(-3.412)	(-2.295)	(-4.482)	(-3.671)	(-3.017)	(-2.642)
X After 1999 X EMU	0.222**	0.215**	0.289*	0.251*	0.144	0.147	0.110	-0.023
	(2.049)	(2.158)	(1.706)	(1.846)	(0.884)	(1.000)	(0.804)	(-0.216)
X After 1999	0.042	0.026	0.023	0.029	0.170	0.162	0.103	0.135
	(0.715)	(0.469)	(0.316)	(0.403)	(1.663)	(1.638)	(0.953)	(1.389)
X EMU	0.008	0.028	0.019	0.057	0.074	0.091	0.186*	0.197**
	(0.133)	(0.461)	(0.222)	(0.656)	(0.691)	(0.941)	(1.996)	(2.453)
After 1999 X EMU	0.011**	0.011**	0.014**	0.015**	0.014**	0.015**	0.026***	0.028***
	(2.211)	(2.255)	(2.568)	(2.676)	(2.043)	(2.150)	(3.124)	(3.276)
After 1999	-0.008***		-0.013***		-0.011**		-0.015**	
	(-2.939)		(-4.217)		(-2.601)		(-2.684)	
EMU	0.002	0.002	0.002	0.002	0.001	0.001	-0.012*	-0.011*
	(0.447)	(0.613)	(0.398)	(0.455)	(0.119)	(0.201)	(-1.843)	(-1.739)
Observations	464	464	464	464	464	464	464	464
Adj. R-squared	0.110	0.210	0.0952	0.191	0.108	0.175	0.108	0.291
Year FE	NO	YES	NO	YES	NO	YES	NO	YES

Table 12: EMU Integration and Firm Characteristics

This table investigates the impact of EMU integration on the sensitivity of corporate leverage to government debt for companies with different sizes and levels of profitability. The sample period is between 1990 and 2006 and is restricted to companies incorporated in an EMU member country. *After 1999* is one (zero) for the years between 1999 and 2006 (1990 and 1998). All regressions are estimated for the first difference specification. Standard errors are clustered at the country level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	Δ Book Leverage					
	Size (Book Assets)			Profitability		
	Low	Medium	High	Low	Medium	High
After 1999	0.003	0.004	0.001	0.006**	0.004	-0.003
	(0.912)	(1.710)	(0.368)	(2.321)	(1.776)	(-1.000)
Δ Gov. Debt-to-GDP$_{t-1,t-2}$	-0.070	-0.092	-0.098**	-0.086	-0.069	-0.120**
	(-1.333)	(-1.655)	(-2.515)	(-1.756)	(-1.158)	(-2.931)
X After 1999	0.045	0.070	0.138*	0.044	0.045	0.171**
	(0.477)	(0.593)	(2.089)	(0.437)	(0.760)	(2.256)
Δ Ln(GDP Per Capita$_{t-1,t-2}$)	-0.037*	-0.042**	-0.034***	-0.021	-0.032*	-0.068***
	(-1.870)	(-3.062)	(-3.629)	(-1.577)	(-2.039)	(-5.542)
Δ Ln(CPI Index Level$_{t-1,t-2}$)	-0.019	-0.023	-0.010	-0.088	0.005	0.050
	(-0.131)	(-0.116)	(-0.104)	(-0.606)	(0.039)	(0.353)
Δ Ln(S&P Index Level$_{t-1,t-2}$)	-0.016***	-0.007	-0.003	-0.023***	-0.005	0.003
	(-3.564)	(-1.585)	(-0.611)	(-4.388)	(-0.760)	(1.520)
Δ Unemployment Rate$_{t-1,t-2}$	-0.422*	-0.114	-0.683***	-0.220*	-0.345**	-0.667***
	(-2.154)	(-0.919)	(-4.107)	(-1.911)	(-2.551)	(-8.089)
Δ Ln(Exchange Rate$_{t-1,t-2}$)	-0.005*	-0.004**	-0.000	-0.002	-0.002*	-0.003*
	(-2.085)	(-2.810)	(-0.112)	(-1.602)	(-1.841)	(-1.851)
Δ Tangibility$_{t-1,t-2}$	0.011	0.047	0.078***	0.040	0.073***	0.018
	(0.362)	(1.437)	(4.685)	(1.446)	(3.630)	(0.385)
Δ Ln(Assets)$_{t-1,t-2}$	0.010	0.019***	0.004	0.003	0.016**	0.027***
	(1.107)	(4.300)	(0.603)	(0.241)	(2.439)	(5.617)
Δ ROA$_{t-1,t-2}$	-0.025**	-0.011	-0.052**	-0.012	-0.067***	-0.012
	(-2.492)	(-0.529)	(-2.657)	(-0.780)	(-4.095)	(-0.945)
Δ Martket-to-Book$_{t-1,t-2}$	0.003	-0.001	0.000	0.002	-0.002	0.001
	(1.503)	(-0.831)	(0.108)	(0.790)	(-0.748)	(0.523)
Observations	4,905	5,571	5,986	5,373	5,625	5,464
Adj. R-squared	0.008	0.010	0.013	0.007	0.015	0.016

Appendix

A.1 Proof of Implication 1

In order to investigate the impact of government debt on the equilibrium leverage ratio, we first substitute equation (6) into (5) to obtain

$$\theta(d^* - \lambda) = \rho v'(\rho d^*(1 - w_G) + w_G). \tag{14}$$

Then, we take the derivative of both sides in equation (14) with respect to w_G, and solve for $\partial d^*/\partial w_G$.

$$\left[\theta - \rho^2(1 - w_G)v''(\rho d^*(1 - w_G) + w_G)\right] \frac{\partial d^*}{\partial w_G} = \rho\,(1 - \rho d^*)\, v''(\rho d^*(1 - w_G) + w_G). \tag{15}$$

Given that $v''(.) < 0$, $\rho \leq 1$, and $d^* < 1$, equation (15) implies that

$$\frac{\partial d^*}{\partial w_G} < 0.$$

Similarly, taking the partial derivative of both sides in equation (6) yields

$$\frac{\partial w_D^*}{\partial w_G} = \frac{\partial d^*}{\partial w_G}(1 - w_G) - d^*,$$

which implies that

$$\frac{\partial w_D^*}{\partial w_G} < 0.$$

Thus, as government debt increases, both d^* and w_D^* decrease relative to the previous equilibrium. When government debt increases, households absorb the increase by increasing their allocation w_G. We will prove by contradiction that both d^* and w_D^* should decrease. Assume counterfactually that d^* increases. Then the second equality in (5) implies that v' increases. Since $v'' < 0$, v'' increases only if $\rho w_D^* + w_G$ decreases. Given the increase in w_G, ρw_D^* has to decrease more than the increase in w_G. Note that in equilibrium, $\rho w_D^* = \rho d^*(1 - w_G)$ which implies that every percent increase in w_G decreases ρw_D^* by less than one percent. Thus, an increase in d^* is not feasible. The only feasible equilibrium response is for both d^* and w_D^* to decrease when government debt increases.

A.2 Proof of Implication 2

First, solve for d^* and d^{**} using equation (4), respectively

$$EP_i^* = \theta\,(d_i^* - \lambda) \quad \text{and} \quad EP_i^{**} = \theta(d_i^{**} - \lambda).$$

Taking the differences between the equity premiums yields

$$EP_i^* - EP_i^{**} = \theta_i(d_i^* - d_i^{**}).$$

Finally, by solving for θ_i we obtain

$$\theta_i = \frac{EP_i^* - EP_i^{**}}{d_i^* - d_i^{**}}.$$

which implies

$$\theta_H = \frac{EP_H^* - EP_H^{**}}{d_H^* - d_H^{**}} > \frac{EP_L^* - EP_L^{**}}{d_L^* - d_L^{**}} = \theta_L. \tag{16}$$

A.3 Proof of Implication 3

Equation (11) implies that

$$v'\left(\rho_L w_{D_L} + \rho_H w_{D_H} + w_G\right) = \theta\frac{(d_L^* - \lambda)}{\rho_L} = \theta\frac{(d_H^* - t)}{\rho_H}. \tag{17}$$

We obtain the following expression by taking the derivative of both sides with respect to share of government debt (w_G)

$$\frac{1}{\rho_L}\frac{\partial d_L^*}{\partial w_G} = \frac{1}{\rho_H}\frac{\partial d_H^*}{\partial w_G}. \tag{18}$$

Given that $\rho_H > \rho_L$, it follows from equation (18) that the absolute value of the derivative of the leverage ratio with respect to government debt for the high-theta firm exceeds that for the low-theta firm such that

$$\left|\frac{\partial d_H^*}{\partial w_G}\right| > \left|\frac{\partial d_L^*}{\partial w_G}\right|$$

A.4 Proof of Implication 3 for θ

We also analyze the model's implications for two firms that are incorporated in the same country but are subject to different levels of financing frictions proxied by θ assuming that their debt securities contribute to the household's marginal utility by the same amount ($\rho_L = \rho_H = \rho$). It follows from equation (9) that in equilibrium $r_{E_H} - r_{D_H} = r_{E_L} - r_{D_L}$. By combining equations (9) and (10) we obtain the following equilibrium condition

$$r_E^* - r_D^* = \rho v'(\rho w_{D_L}^* + \rho w_{D_H}^* + w_G) = \theta_L \left(d_L^* - \lambda\right) = \theta_H \left(d_H^* - \lambda\right) \tag{19}$$

Debt and equity markets clear in equilibrium, and the household's budget constraint is satisfied

$$K_i = E_i + D_i \quad \text{and} \quad W = E_L + E_H + D_L + D_H + G.$$

In order to understand the impact of government debt on leverage ratios, we take the derivative of both sides of equation (19) with respect to the government ratio w_G:

$$\rho v''(\rho w_{D_L}^* + \rho w_{D_H}^* + w_G)\left(1 + \rho\frac{\partial w_L^*}{\partial w_G} + \rho\frac{\partial w_H^*}{\partial w_G}\right) = \theta_L \frac{\partial d_L^*}{\partial w_G} = \theta_H \frac{\partial d_H^*}{\partial w_G}. \tag{20}$$

Given that $\theta_H > \theta_L$, equation (20) suggests that the absolute value of the marginal change in the leverage ratio of the high-θ firm is less than that of the low-θ firm such that

$$\left|\frac{\partial d_H^*}{\partial w_G}\right| < \left|\frac{\partial d_L^*}{\partial w_G}\right|.$$

Implication 3 (for θ): Within a country, for a given level of government debt increase, firms that are subject to more financing frictions choose a smaller reduction in leverage than firms with lower adjustment costs.

Table A1: Variable Definitions

This table details the variable construction for the analysis of the sample. Panel A lists the definitions of Compustat variables. The variable Xpressfeed pneumonics are given in italic. The country-level variables follow firm-level definitions and are calculated by aggregating the numerator and denominator values over all firms in a given year and country. Panel B lists the data source for and the definitions of macro variables. If a variable is available through two different sources for a country, we use the data source that provides us with the longest series.

Panel A: Compustat Variables

Variable	Compustat Item Name
Ln(Assets)	Ln(Total Book Assets)
ROA	Income / Assets = **oibdp / at**
Tangibility	Net PPE / Assets = **ppent / at**
Market-to-Book	MVA / Total Book Assets
Market Value of Assets	= **at - ceq + prcc** $\times$ **cshoc**
Total Debt	Short-Term Debt + Long-Term Debt = **dltt + dlc**
Book Leverage	Total Debt / Total Book Assets = **(dltt + dlc) / at**
Debt-to-Capital	Total Debt / Total Capital = **(dltt+dlc) / (ceq+dltt+dlc)**
Market Leverage	Total Debt / Market Value of Assets

Panel B: Macro Variables

Variable	Data Source	Definition
Gov. Debt-to-GDP	WEO data on IMF	Gross government debt (%GDP)
GDP Per Capita	World Bank	GDP per capita (current US$)
Inflation	World Bank and IMF	Inflation, consumer prices (annual %)
S&P Return	World Bank	S&P global equity indices (annual % change)
Unemployment Rate	World Bank and IMF	Unemployment, total (% of total labor force)
Nominal Exchange Rate	World Bank and ECB	Official exchange rate (LCU per US$, period avr.)
External Government Debt	IMF, World Bank and ECB	Gross external debt (%GDP)
Bank credit to private sector	BIS	Bank credit (% GDP)
Stock Turnover Ratio	World Bank	Value of shares traded (% market capitalization)

Table A2: Alternative Specification (Firm-Level)

Corporate Debt is the sum of dollar value of long-term debt and debt in current liabilities. *Ln(Government Debt)* is the natural logarithm of the dollar value of government debt outstanding. Standard errors are clustered at the country level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	Ln(Corporate Debt)	
	Fixed Effects	First Difference
Ln(Gov. Debt$_{t-1}$)	-0.258***	-0.251***
	(-3.056)	(-3.939)
Ln(GDP Per Capita$_{t-1}$)	0.080	0.320***
	(0.678)	(2.869)
Ln(CPI Index Level$_{t-1}$)	0.442	0.423
	(1.564)	(0.863)
Ln(S&P Index Level$_{t-1}$)	0.067	0.108***
	(1.598)	(3.284)
Unemployment Rate$_{t-1}$	0.018	-1.272**
	(0.025)	(-2.293)
Ln(Exchange Rate$_{t-1}$)	-0.092***	-0.027***
	(-3.308)	(-4.223)
Tangibility$_{t-1}$	0.732***	0.342***
	(4.933)	(5.913)
Ln(Assets$_{t-1}$)	0.788***	0.167***
	(17.442)	(15.303)
ROA$_{t-1}$	-0.621***	-0.069***
	(-9.686)	(-6.688)
Market-to-Book$_{t-1}$	0.011	0.015***
	(1.095)	(7.349)
Observations	339,532	295,281
Adj. R-squared	0.880	0.0161
Year FE	YES	YES
Firm FE	YES	NO

Table A3: External Debt (Firm-Level)

This table investigates the impact of external government debt on corporate leverage by repeating both the fixed effects and the first difference specifications in Table 9 after decomposing *Government Debt-to-GDP* as *Domestic Government Debt* and *External Government Debt* measured in percent of GDP. *External Government Debt* is government debt held by foreigners. *Domestic Government Debt* is *Government Debt-to-GDP* net of external debt. Standard errors are clustered at the country level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	Fixed Effects				First Difference			
	Book Leverage	Net Book Leverage	Debt-to Capital	Market Leverage	Δ Book Leverage	Δ Net Book Leverage	Δ Debt-to Capital	Δ Market Leverage
Domestic Gov. Debt$_{t-1}$	-0.039**	-0.095**	-0.038	-0.051**	-0.071***	-0.096***	-0.087***	-0.042***
	(-2.047)	(-2.599)	(-1.382)	(-2.061)	(-2.777)	(-2.839)	(-3.682)	(-2.817)
External Gov. Debt$_{t-1}$	0.028	0.011	0.013	0.057	-0.012	-0.026	-0.035	-0.022
	(0.688)	(0.215)	(0.250)	(1.285)	(-0.338)	(-0.642)	(-0.980)	(-0.471)
Ln(GDP Per Capita$_{t-1}$)	-0.031***	-0.047***	-0.028**	-0.026**	0.006	0.003	0.004	-0.007
	(-3.813)	(-3.959)	(-2.187)	(-2.378)	(0.347)	(0.188)	(0.344)	(-0.253)
Ln(CPI Index Level$_{t-1}$)	0.036	0.025	0.055	0.035	-0.018	-0.031	-0.013	0.035
	(1.443)	(0.553)	(1.514)	(1.293)	(-0.330)	(-0.318)	(-0.269)	(0.877)
Ln(S&P Index Level$_{t-1}$)	-0.015***	-0.023***	-0.018**	-0.035***	-0.008***	-0.012**	-0.006	-0.001
	(-3.179)	(-2.912)	(-2.485)	(-5.697)	(-2.887)	(-2.120)	(-1.564)	(-0.081)
Unemployment Rate$_{t-1}$	0.020	0.158	0.081	-0.175	0.046	0.074	0.004	-0.166
	(0.261)	(1.150)	(0.744)	(-1.234)	(0.441)	(0.551)	(0.037)	(-1.338)
Ln(Exchange Rate$_{t-1}$)	-0.008**	-0.007*	-0.010**	-0.009**	-0.002**	-0.002	-0.003**	-0.002
	(-2.671)	(-1.980)	(-2.086)	(-2.217)	(-2.259)	(-0.675)	(-2.589)	(-0.720)
Tangibility$_{t-1}$	0.122***	0.334***	0.141***	0.096***	0.041***	0.002	0.050***	0.033***
	(6.909)	(21.003)	(5.780)	(5.264)	(5.462)	(0.100)	(4.835)	(6.076)
Ln(Assets$_{t-1}$)	0.037***	0.065***	0.049***	0.043***	0.004**	0.031***	0.010***	0.017***
	(6.576)	(13.426)	(6.405)	(7.503)	(2.103)	(9.933)	(5.563)	(5.704)
ROA$_{t-1}$	-0.098***	-0.107***	-0.099***	-0.074***	-0.029***	-0.046***	-0.016***	-0.014***
	(-5.871)	(-5.034)	(-4.312)	(-4.598)	(-5.214)	(-7.812)	(-4.968)	(-5.620)
Market-to-Book$_{t-1}$	-0.002**	-0.007***	-0.002*	-0.008***	-0.001	-0.001	-0.001***	0.001
	(-2.388)	(-6.715)	(-2.006)	(-7.796)	(-1.418)	(-1.406)	(-5.366)	(1.517)
Observations	231,440	231,434	227,453	222,072	196,245	196,237	193,219	188,358
Adj. R-squared	0.679	0.751	0.744	0.759	0.00929	0.0124	0.0112	0.0760
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	NO	NO	NO	NO

Table A4: Debt Maturity

This table reports the results from fixed effects and first difference regression of *Long-Term Debt* and *Short-Term Debt* as well as their ratio. *Long-Term Debt* is total debt due in more than one year. *Short-Term Debt* is debt in current liabilities. Standard errors are clustered at the country level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	Fixed Effects			First Differences		
	LT Debt/ Assets	ST Debt/ Assets	LT Debt/ ST Debt	Δ LT Debt/ Assets	Δ ST Debt/ Assets	Δ LT Debt/ ST Debt
Gov. Debt-to-GDP$_{t-1}$	-0.032**	-0.036***	-0.029	-0.044***	-0.051***	-0.000
	(-2.082)	(-3.810)	(-0.644)	(-3.574)	(-2.942)	(-0.002)
Ln(GDP Per Capita$_{t-1}$)	-0.017	-0.010	-0.023	-0.004	0.008	-0.013
	(-1.267)	(-0.633)	(-0.556)	(-1.187)	(0.828)	(-0.528)
Ln(CPI Index Level$_{t-1}$)	-0.031	0.039	-0.130	-0.044	-0.007	-0.074
	(-0.743)	(1.301)	(-1.008)	(-1.471)	(-0.291)	(-0.974)
Ln(S&P Index Level$_{t-1}$)	-0.001	-0.015***	0.016	0.001	-0.005*	-0.000
	(-0.240)	(-4.322)	(1.221)	(0.327)	(-1.930)	(-0.056)
Unemployment Rate$_{t-1}$	-0.012	0.042	0.083	-0.081	0.074	-0.045
	(-0.151)	(0.591)	(0.341)	(-1.420)	(1.198)	(-0.249)
Ln(Exchange Rate$_{t-1}$)	-0.009***	-0.003*	-0.012**	-0.004***	-0.001	-0.005**
	(-3.332)	(-2.014)	(-2.576)	(-3.423)	(-0.706)	(-2.033)
Tangibility$_{t-1}$	0.078***	0.046***	0.067***	0.014**	0.029***	-0.029***
	(5.064)	(11.883)	(3.836)	(2.296)	(9.091)	(-3.096)
Ln(Assets$_{t-1}$)	0.027***	0.010**	0.037***	0.005***	0.002	0.007***
	(14.740)	(2.575)	(22.888)	(5.181)	(1.523)	(2.903)
ROA$_{t-1}$	-0.045***	-0.051***	0.020*	-0.012***	-0.014***	-0.006
	(-8.079)	(-6.043)	(1.875)	(-7.017)	(-3.928)	(-0.972)
Market-to-Book$_{t-1}$	-0.001	-0.002***	0.004***	-0.000*	-0.001***	0.001
	(-1.157)	(-6.773)	(3.819)	(-1.800)	(-2.789)	(0.999)
Observations	344,132	344,132	295,988	299,561	299,643	250,352
Adj. R-squared	0.628	0.555	0.541	0.00368	0.00528	0.00117
Year FE	YES	YES	YES	YES	YES	YES
Firm FE	YES	YES	YES	NO	NO	NO