Government Debt and Corporate Leverage: International Evidence

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Abstract

We empirically investigate the impact of government debt on corporate financing decisions in an international setting. We document a negative relation between government debt and corporate leverage using data on 40 countries between 1990-2014. This negative relation is stronger for government debt that is financed domestically, for firms that are larger and more profitable, and in countries with more developed equity markets. In order to address potential endogeneity concerns, we use an instrumental variable approach based on military spending and a quasi-natural experiment based on the introduction of the Euro currency. Our findings suggest that government debt crowds out corporate debt.

JEL Classification: E44, E50, G11, G38

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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 corporate sector has not been explored in as much detail. Our paper empirically investigates whether changes in government debt levels affect the financing choices of corporations in an international setting.

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 the supply of government debt might increase the expected return on government bonds and on other debt securities that are close substitutes. In response to the higher financing costs of fixed-income securities, firms might reduce debt financing, resulting in a crowding out of corporate debt by government debt.

We investigate the crowding out effect of government debt using a data set that covers 40 countries between 1990 and 2014. We find that higher levels of government debt are associated with lower corporate leverage levels. The results are robust to including country- and year-fixed effects and controlling for various time-varying macroeconomic variables. We also obtain consistent results using a panel of disaggregated firm-level data.

We further investigate whether the relation between corporate debt and government debt depends on whether the government debt is financed domestically or internationally. Since corporate debt is disproportionately held by domestic investors, we hypothesize that the crowding out effect is more pronounced for government debt purchased by domestic investors. Consistent with our hypothesis, we only find a

significant relation between domestic government debt and corporate leverage. The coefficient estimates for external government debt are insignificant.

Our international setting also allows us to study the impact of country characteristics on crowding out effects. We hypothesize that the extent of the crowding out effect depends on the institutional features of the financial markets. We capture important institutional differences across countries using the dependance on bank financing and the size and the trading volume of the equity markets. Countries that rely more on bank financing might exhibit lower crowding out effects since government debt that is mostly in the form of bond securities likely exhibits a lower substitutability with corporate bank debt than with corporate bonds. Furthermore, countries with larger and more liquid equity markets relative to their GDPs might offer their firms easier opportunities to switch from debt to equity financing if governments increase their debt levels. Our results indicate that a change in government debt has a stronger impact on corporate debt in countries where companies are less dependent on bank financing and in countries with relatively large and liquid equity markets.

The impact of government debt on the capital structure might also differ across firms within a country for several reasons. First, the debt of larger and more profitable firms might be perceived as a closer substitute for government debt. Second, larger and more profitable firms might also have more financial flexibility and incur lower costs of switching between debt and equity financing in response to shocks in the supply of government securities. Consistent with our priors, we find that the crowding out effect is stronger for firms that are larger and more profitable.

An important concern about the crowding out effect of government debt is that government debt is endogenous. Firms might adjust their capital structures in response to economic conditions, which are correlated with the supply of government

debt. We use two tests to address the endogeneity concern: an instrumental variable approach and a quasi-natural experiment. The first approach uses military expenditures as an instrument for the government budget deficit. Changes in military expenditures are less influenced by the economic environment than the overall budget deficit which consists primarily of tax revenues and transfer payments. Our results remain robust using this instrumental variable approach.

Our second approach addresses potential endogeneity issues by utilizing the introduction of the Euro currency as a quasi-natural experiment. The European Monetary Union (EMU) facilitated the integration of financial markets in member countries. After the monetary unification, companies and governments in EMU countries gained access to financing from a substantially broader market and became less dependent on domestic financing sources. We find that the sensitivity of corporate leverage to local government debt decreased significantly for companies incorporated in EMU countries after the integration, whereas the corresponding sensitivity did not change for non-EMU countries.

The crowding out of private activities by the government has been debated in the economics literature at least since Friedman (1972), Blinder and Solow (1973), and Barro (1974).[1] Friedman (1978, 1986) discusses whether government deficits crowd-out or crowd-in private debt. He argues that an increase in the supply of long-term government bonds can increase the expected return on government debt securities and on other securities that are close substitutes. In response, investors will attempt to trade out of these securities and trade into others like equity. He compares the response of spreads between debt and equity securities to changes in government debt,

[1]Elmendorf and Mankiw (1999) provide a discussion of the short- and long-term effects of government debt.

and finds that government debt financing decreases the spread between equity and debt securities. Taggart (1986) investigates several macro factors that might explain the short- and long-run time-series variation in corporate debt. Analyzing U.S. data, he concludes that business risk, tax policy, and inflation risk fail to explain the short-run variation in corporate debt, whereas corporate debt is significantly related to government debt.

More recently, Krishnamurthy and Vissing-Jorgensen (2012, 2015) argue that investors value the liquidity and safety of U.S. Treasury bonds. An increase in the supply of government securities decreases the relative value of those attributes in the market. They find that an increase in the Treasury supply reduces the yield spread between Treasury and other fixed income securities. In addition, government debt crowds out the supply of safe and liquid assets issued by other financial institutions, like bank-issued money and other short-term debt.

Greenwood, Hanson, and Stein (2010) investigate 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 until 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 (2016) argue that this gap filling is a more important determinant of very long-term corporate borrowing than shorter-term borrowing. Foley-Fisher, Ramcharan, and Yu (2014) examine the impact of the Federal Reserve's Maturity Extension Program (MEP) on firms' financial constraints. They find that firms that rely on long-term debt issued more long-term debt during the MEP's implementation.

Becker and Ivashina (2017) show that increased domestic government bond holdings during the European sovereign debt crisis generated a crowding out of corporate lending.

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 also find a robust negative relation between government leverage and corporate leverage. In a related paper, Ma (2017) finds that firms act as cross-market arbitrageurs in their own equity and debt securities, and simultaneously issue in one market and repurchase in another in response to relative valuations. Our main contribution is to investigate 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 in government debt and to take advantage of cross-country differences in institutional environments. Furthermore, our instrumental variable approach and the empirical analysis of the Euro integration help to address potential endogeneity concerns.

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, 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, peer firms' capital structures, and the economic environment that

shape firms' leverage policies.[2] A related literature has employed dynamic models to study the impact of taxes and financing frictions on capital structure, and the relation between investment, financing, and payout decisions.[3] Our study contributes to this literature by focusing on the impact of dynamic changes in government debt on firms' financing decisions in a large cross-country sample.

Finally, a growing literature uses the variation in the institutional environment across countries to explore the importance of country-specific factors. These papers provide an 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.[4]

The remainder of the paper is organized as follows: Section 2 describes the data and reports the summary statistics. Sections 3 and 4 present the results for country- and firm-level analysis, respectively. Section 5 addresses endogeneity concerns by using instrumental variable specifications and using the EMU integration as a quasi-natural experiment. Section 6 concludes.

[2]See for example, Korajczyk and Levy (2003), Welch (2004), Frank and Goyal (2007), Faulkender and Petersen (2006), Leary (2009), Sufi (2007), Chernenko and Sunderam (2012), Leary and Roberts (2014), Graham, Leary, and Roberts (2015), and Zhu (2017).

[3]See for example, Hennessy and Whited (2005), Strebulaev (2007), DeAngelo, DeAngelo, and Whited (2011), and DeAngelo and Roll (2015).

[4]See for example, Demirguc-Kunt and Maksimovic (1996, 1998, 1999), Booth, Aivazian, Demirguc-Kunt, and Maksimovic (2001), Claessens, Djankov, and Nenova (2000), Giannetti (2003), De Jong, Kabir, and Nguyen (2008), and Fan, Titman, and Twite (2012).

2 Data and Summary Statistics

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

2.1 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 government debt-to-GDP ratio, which we obtain for most countries from the World Economic Outlook (WEO) database available through the IMF.[5] Our government debt-to-GDP variable is general government gross debt as a percentage of GDP which is composed of the debt of central, state, and local government subsectors. 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 or from the World Bank.[6] For other country-level variables, we use data from the World Bank, the 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 time series.[7]

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

[5]The April 2017 Edition of the database can be downloaded from `http://www.imf.org/external/pubs/ft/weo/2017/01/weodata/index.aspx`.

[6]Those countries are Ireland, Israel, Peru, South Africa, and the U.S.

[7]Table A1 in the Internet Appendix gives the exact definitions and sources for the various variables.

varies across countries. At the country level, the main variables we include are the government debt-to-GDP ratio, the GDP per capita, the rate of inflation, the local S&P stock index level, the unemployment rate, and the nominal exchange rate.[8] At the firm level, each firm is required to have data on book leverage and lagged firm-level controls. Observations with missing or negative book value of assets are dropped from the sample. We exclude financial (6000-6999), public (9000-9999), and utility (4900-4999) firms.

The final sample consists of 35,663 firms from 40 countries with a total of 340,290 firm-year observations and 813 country-year observations. The sample includes firms from different parts of the world, mainly Europe, Asia, North America, and South America. The U.S., Japan, and the U.K. are the countries with the highest number of firm-year observations.[9]

2.2 Summary Statistics

We use three leverage measures for our firm-level analyses. First, we define the traditional leverage measures, the *Book Leverage* and the *Market Leverage*, which are defined as the total book debt over the book value of assets and the market value of assets, respectively. The third measure, *Debt-to-Capital Ratio*, proposed by Welch

[8]We exclude country-year observations with less than ten firms and 16 country-year observations with a 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, changes in external debt policy, or debt forgiveness. We obtain the data on sovereign debt defaults and restructuring episodes from Carmen M. Reinhart and Kenneth S. Rogoff's webpage at `http://www.reinhartandrogoff.com/`.

[9]Table A2 in the Internet Appendix shows the distribution of countries in our sample.

(2011), is defined as the book value of debt divided by book debt plus book equity.[10] The book value of total assets includes the value of non-financial liabilities such as trade credit, in addition to book debt and book equity. Therefore, an increase in accounts payable causes a decrease in the book leverage, even if total financial debt of the firm stays constant. The debt-to-capital ratio is immune to such changes in non-financial liabilities. The country-level variables follow firm-level definitions. The ratio variables are calculated by aggregating the values in the numerator and in the denominator separately over all firms in a given year and country. All ratio variables, including leverage measures, are winsorized at the top and bottom 1%.

Our main independent variable *Government Debt-to-GDP* is defined as a percentage of GDP using *General Government Gross Debt*, which consists of all liabilities that require payments of interest or principal by the debtor in the future where the debtor is the general government.[11] The general government sector consists of entities that implement public policy and excludes public corporations whose primary purpose is to engage in commercial activities. The general government is composed of the following subsectors: central, state and local governments, and social security funds. General government debt is calculated based on the consolidation of debt among its subsectors. Consolidation involves the elimination of all transactions that occur between two government subsectors. For example, if one general government unit owns a bond issued by a second general government unit and data for the two units are being consolidated, then the stocks of bonds held as liabilities are reported

[10]Besides these three leverage measures, we also estimated our regressions for *Net Leverage* which is defined as total debt minus cash normalized by total assets. Our results also hold for net leverage.

[11]Such liabilities include debt liabilities in the form of SDRs, currency and deposits, debt securities, loans, insurance, pensions and standardized guarantee schemes, and other accounts payable. Net debt is calculated as gross debt minus financial assets corresponding to debt instruments.

as if the bond did not exist. For instance, in the U.S. as of September 2012, around 30% of the Federal debt outstanding was held by other government sectors with the social security trust funds holding the largest fraction (57%).[12] During consolidation, the debt held by social security funds is deducted from the sum of debt outstanding for the Federal government and social security funds.

Besides our main country-level debt variables, we also control for other country characteristics. Our main specification includes GDP per capita, the level of consumer prices, the level of equity prices, the exchange rate, and the unemployment rate. In order to account for 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. The 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. The unemployment rate is defined as the number of unemployed relative to the labor force.

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)). The tangibility is defined as the ratio between the value of property, plant, and equipment (PPE) and total assets. We use the book value of total 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, the 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 to convert non-ratio variables into U.S. dollars.

[12]Bureau of the Public Debt's Fiscal Years 2012 and 2011 Schedules of Federal Debt `http://www.gao.gov/assets/650/649848.pdf`.

Panels A and B of Table 1 report the summary statistics for country- and firm-level variables, respectively.[13] Panel A of Table 1 shows that the ratio between corporate debt and total book value of assets has a mean (median) of 28.3% (27.7%) and a standard deviation of 6.5%. The debt-to-capital ratio is normalized by the book value of debt plus equity, rather than by the total assets (which also includes non financial liabilities). Thus, the debt-to-capital ratio is higher than book leverage, with a mean (median) of 42.3% (42.0%). On average, the market leverage is lower than the other leverage measures with a mean of 19.5% and a median of 18.5%. The government debt-to-GDP ratio has a mean of 58.3% and an interquartile range of 37.2% and 72.5%. The median GDP per capita amounts to $23,110 and the average unemployment rate is 7.4%.[14]

<Table 1 about here>

Panel B reports the summary statistics for firm-level variables. On average, the book leverage, the debt-to-capital ratio, and the market leverage are 21.6%, 29.8% and 18.0%, 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 between 11.3% and 44.7%. Most firms in our sample are profitable, as captured by a median ROA of 8.4%. Finally, the median firm's market value exceeds the book value by 23.9%.

[13]The dependent variables capturing different measures of corporate leverage are measured at time t, whereas the independent variables capturing government debt levels and control variables are measured at time $t-1$.

[14]Table A3 in the Internet Appendix reports country averages for corporate leverage and the macroeconomic variables. 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%.

3 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.

3.1 Debt Levels in the U.S. and Japan

Before starting the formal analysis, we plot in Figure 1 the time-series relation between government debt and corporate debt for the U.S. and Japan for illustration purposes. The government debt level in the U.S. has increased from around 50% to more than 100% of GDP between 1990 and 2014. Simultaneously, the book leverage of U.S. firms has declined from 33% to 28%. Japan experienced the largest increase in government debt over our sample period from 67% to almost 250%. At the same time, corporate leverage in Japan declined from 39% to 15%. In both cases, the government debt and corporate debt exhibit a negative correlation. In the remainder of this section we analyze the relation between corporate leverage and government debt more systematically across 40 countries controlling for various macroeconomic variables, time-fixed effects, and country-fixed effects.

<Figure 1 about here>

3.2 Base-Case Specification

We test the crowding out hypothesis that relates government debt to corporate leverage in a panel regression framework with country-fixed effects. Our baseline

regression specification estimates the country-level corporate leverage as a function of government debt-to-GDP ratio and additional macro variables. More specifically, our regression equation is given by:

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

Equation (1) is estimated separately for three different definitions of $Leverage_{j,t}$, namely book leverage, market leverage, and the debt-to-capital ratio. *Government Debt-to-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, the natural logarithm of consumer prices, the natural logarithm of the equity index, the natural logarithm of the exchange rate, and the unemployment rate; $Y_{j,t-1}$ denotes the traditional determinants of leverage that are aggregated across firms within a country, namely tangibility, firm 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.

Table 2 reports the results for our baseline specification with fixed effects. The standard errors are clustered both at the country and year levels, and t-statistics are reported in parentheses. The results indicate a negative relation between government debt and aggregate corporate leverage. A 10 percentage point increase in government debt relative to GDP reduces book leverage by 0.74 percentage points. This economic magnitude might appear small. However, the standard deviation of government debt-to-GDP is 0.335. Therefore, a one-standard deviation increase in government debt

corresponds to 2.5 percentage points change in book leverage, which is a 0.38 standard deviation change for book leverage. The results are similar using the other two leverage measures: a 10 percentage point increase in government debt-to-GDP reduces market leverage (debt-to-capital ratio) by 0.55 (0.96) percentage points. Alternatively, a one standard deviation increase in government debt-to-GDP reduces market leverage (debt-to-capital ratio) by 0.23 (0.33) standard deviations. The unemployment rate, the exchange rate, and the ROA are also significant determinants of the book leverage.[15]

<Table 2 about here>

We repeat our baseline estimation for the subsample of countries that are members of the OECD.[16] Table A5 in the Appendix reports the fixed effects regression results for the 25 OECD countries. The coefficient estimates for the OECD subsample are similar to those estimated for the whole sample. In order to ensure that the results are not driven by a single country in our sample, we repeat the fixed-effects regressions in Table 2 by dropping one country at a time from our sample (Table A11). We also estimated our baseline specification for the period before the 2007 financial crisis (Table A8). Our results are robust to these subsamples.

[15]Table A4 in the Internet Appendix reports the results for country-level first-differences regressions. The economic magnitude in the first differences specification is very similar to the magnitude in the fixed effects specification. For example, a 10 percentage points increase in the government debt-to-GDP ratio is associated with a 0.68 (0.59) percentage points decrease in firm book leverage (market leverage) in the subsequent year. Whereas the coefficients on the change of government debt to GDP are statistically significant at at 5% level for the book leverage and the debt-to-capital ratio, the coefficients are borderline insignificant for the market leverage measure.

[16]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, the U.S., and the U.K. Since they became members in 2010, Chile and Israel are not included in the OECD sample.

3.3 Alternative Variable Definitions

One possible concern about using the government debt-to-GDP ratio as the independent variable is that the relation between corporate leverage and government debt could be driven by changes in GDP rather than changes in the amount of government debt outstanding. To address this concern, 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 first column in Table 3 reports the estimation results which confirm our findings in Table 2. The coefficient estimate implies that a 10% increase in government debt is estimated to reduce corporate debt by approximately 1.42%.

<Table 3 about here>

The second column of Table 3 relates the government debt-to-GDP ratio to the corporate debt-to-GDP ratio. Normalizing both variables by GDP enables a more direct estimation of the economic magnitude of the crowding out effect. Since the proportion of the corporate sector that is publicly traded varies across countries, we control in these specifications also for the ratio between the book value of assets of publicly traded firms and the GDP level. This alternative specification confirms a negative relation between corporate debt and government debt: A 10 percentage points increase in the government debt-to-GDP ratio is associated with a 0.4 percentage point decrease in the corporate debt-to-GDP ratio. The economic magnitude in this specification is smaller than in our base-case specification since we only capture corporate debt of publicly traded firms. The total corporate debt amounts on average to only 13.8% of GDP in our sample, about one-quarter of the level of government debt-to-GDP.

3.4 External versus Domestic Government Debt

Our main 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 leaving more local funds available for corporations. We should therefore expect a stronger relation between corporate leverage and domestically-held debt.

In Table 4 we repeat our baseline analysis by replacing *Government Debt-to-GDP* with *Domestic Government Debt-to-GDP* and *External Government Debt-to-GDP*.[17] Domestic government debt is calculated by subtracting external government debt from total government debt outstanding. For all three leverage definitions, the economic magnitude of the estimates for the coefficient of internal government debt is larger than the estimates for total government debt reported in Table 2.[18] Furthermore, the coefficient estimates for external debt are insignificant suggesting that the negative relation between corporate leverage and government leverage is driven by domestic public debt rather than external debt.

<Table 4 about here>

[17]The IMF defines gross external debt as, at any given time, the outstanding amount of those actual current, and not contingent, liabilities that require payment(s) of principal and/or interest by the debtor at some point(s) in the future and that are owed to nonresidents by residents of an economy (`http://www.imf.org/external/pubs/ft/eds/Eng/Guide/file2.pdf`).

[18]This result is not an artifact of the different samples in Tables 2 and 4. We continue to find the coefficient estimates for domestic government debt to be higher than those for total government debt in the smaller sample. The baseline regression results for the subsample of countries with domestic government debt data are presented in Table A9 in the Internet Appendix.

3.5 Government Sectors

To study whether the results are robust using alternative definitions of government debt, we decompose in this section government debt into its subsectors. For a subsample of the countries, we are able to observe debt raised by the central government and by local and state governments separately.[19]

The first column of Table 5 reports the results from our baseline regression estimated for the subsample of countries for which we can observe government debt by subsectors. We continue to find a negative relationship between the general government debt and book leverage in this subsample. More specifically, a 10 percentage point increase in general government debt-to-GDP ratio is associated with a 0.96 percentage points decrease in the book leverage. Column 2 reports the results with central government debt using the same subsample of countries as in column 1. The negative relationship continues after we replace general government debt with central government debt. The economic magnitude is also similar: a 0.86 percentage points decrease in the book leverage for a 10 percentage point increase in central government debt-to-GDP ratio. In the third column, we investigate whether debt issued by local and state governments is significantly related to corporate leverage.[20] Although, the coefficient on state and local government debt is more negative than the coefficient on central government debt, the coefficient is not statistically significant. Finally, in

[19]Some countries report central government debt including social security funds and others have separate accounts for them. We use central government debt including social security whenever it is available. Otherwise, we use the sum of central government debt excluding social security and social security funds' debt. Notice that central government debt including social security funds excludes central government debt held by social security funds. Therefore, the sum of the two subsectors' debt doesn't yield the same number. We don't expect our inference to be affected by this discrepancy since the average social security funds' debt amounts to only 1.5% of GDP.

[20]Although local and state government debt levels are reported as separate items, we use their sum in our analysis since many countries do not list state-level debt.

the last column of Table 5 we regress book leverage on both central government debt and local and state government debt. The coefficient on central government remains largely unaffected after controlling for state and local government debt levels.

<Table 5 about here>

3.6 Maturity of Debt

Greenwood, Hanson, and Stein (2010) document a negative relation between corporate debt and government debt maturity using U.S. data. In this section we study the related question of whether there is a differential crowding out effect between short- and long-term debt.

We decompose our main government debt variable into two measures based on the remaining maturity of debt. *Long-Term Debt-to-GDP* measures the amount of long-term debt with payments due in more than one year and *Short-Term Debt-to-GDP* measures the amount of short- and long term debt that is due in one year or less.

Our baseline specification relates the corporate debt levels in year t with the lagged government debt levels in year $t-1$. This lagged specification is potentially problematic for debt that has a remaining maturity of less than one year, since there might not be a relation between last year's short-term government debt and next year's corporate debt level. To address this potential concern we report besides the lagged specifications also contemporaneous specifications.

The first three columns of Table 6 report the results where the government debt levels are measured in the year prior to the corporate debt levels and the last three

columns report the results for contemporaneous regressions. Within each of these two specifications, we study three different dependent variables: the total, the long-term, and the short-term corporate book leverage. In the lagged specifications, we find a significant relation between the long-term debt levels. The short-term government debt does neither relate significantly to long-term nor short-term corporate leverage, possibly because the short-term corporate and government debt levels are measured during non-overlapping time periods. In contrast, our contemporaneous regression results indicate that short-term government debt is significantly related with short-term corporate leverage. The significant relationship between long-term government debt and long-term corporate leverage continues to hold in the contemporaneous regressions. Our results are consistent with the findings in Greenwood, Hanson, and Stein (2010) and suggest that corporate and government debt markets are segmented across broad maturity groups.

<Table 6 about here>

3.7 Country Characteristics

In this section, we investigate the cross-country variation in the crowding out effect. We capture institutional differences across countries using three proxies, namely, the bank dependence of the private sector, the size of the equity market, and the equity trading volume. *Bank Dependence* is measured by the outstanding amount of bank credit extended to the private sector as a fraction of total credit. Carlin and Mayer (2003) use the ratio of bank loans to physical investment and to gross external financing as proxies for industry bank dependence. *Equity Capitalization* is defined

as the total market value of public firms as a percent of GDP. This variable is used to measure stock market development by Levine and Zervos (1998) and to measure the ease of access to stock market by Beck, Lundberg, and Majnoni (2006). *Equity Trading* is defined as the total volume of stocks traded as a percentage of GDP. In each year, we split the sample into three equally-sized groups based on previous year's bank dependence, equity capitalization, and equity trading. The indicator variables *Low*, *Medium*, and *High* capture country-year observations that are in the corresponding terciles of their respective variables.

Table 7 reports the estimation results using the country panel. All regressions include year- and country-fixed effects as well as the interactions of the tercile dummies with the control variables which are not reported to save space. Column 1 reports the results for interactions with bank dependence. The coefficient estimate of the government debt-to-GDP ratio for countries in the highest bank dependence tercile is not statistically significant whereas the relation is significant for those in the lowest and the medium bank dependence terciles. More specifically, a 10 percentage point increase in general government debt-to-GDP ratio is associated with a 1.34 and 0.92 percentage points decrease in the book leverage for the lowest and the medium bank dependence terciles, respectively.

<Table 7 about here>

Columns 2 and 3 of Table 7 report the estimation results for the interaction terms between measures of equity market development and government debt-to-GDP ratios. Column 2 uses market capitalization and Column 3 uses equity trading volume as proxies of equity market development. In both cases, we find a significant crowding

out effect for the medium and the high market capitalization terciles, but the effect is not statistically significant at the 10% level for the countries in the low tercile.

Our cross-country results indicate that the crowding-out results are more pronounced in countries that are less bank-dependent and in countries with larger and more liquid equity markets.

4 Firm-Level Analysis

We estimate in this section our model using firm-level data. Using firm-level data allows us to control for firm-specific determinants of leverage and mitigates concerns about the composition of firms changing in the country sample. Furthermore, the firm-level analysis weighs more heavily towards countries with a larger number of firm observations.

4.1 Base-Case Results

Table 8 reports the estimation results for firm-fixed effects regressions. All independent variables are lagged by one year relative to leverage. Standard errors are clustered at both the country and year level. We obtain a negative relation between the level of government debt and firm leverage levels for all three leverage measures. The coefficient estimates imply that a 10 percentage point increase in government debt relative to GDP reduces firm leverage by between 0.46 and 0.74 percentage points. Consistent with the capital structure literature, we find that book leverage variables increase with tangibility of assets and firm size, and decrease with the ROA and the market-to-book ratio.

<Table 8 about here>

We conduct several robustness tests for our firm-level analysis which we report in the Online Appendix. As we did for the country panel, in the firm panel, we restrict the sample to the OECD member countries. Fixed effects estimation results for this subsample are reported in Table A6, which are similar to those for the baseline specification in Table 8.

4.2 Firm Characteristics

We also investigate the impact of firm characteristics on the crowding out effect. The impact of government debt on capital structure might differ across firms for two reasons. First, 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 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. Second, 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. Therefore, larger and more profitable firms should respond more to government debt changes.

In the first three columns of Table 9 we interact the government debt-to-GDP ratio with an indicator variable for firm size. More specifically, we split firms into two groups depending on whether their lagged total book value of assets is in the top 20th percentile of their country-year distribution. On average, these firms constitute 80% of the total market value of equity in their countries. Consistent with our prior, we find that the crowding out effect is significantly higher for large firms than for small firms.

<Table 9 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. The last three columns of Table 9 report the results for profitability interactions, where the dummy variable *Profitable* indicates that the firm's lagged ROA is above its country's median 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.

5 Endogeneity Concerns

An important concern about the crowding out effect of government debt is that government debt is endogenous.[21] Firms might adjust their capital structure in response to economic conditions, which are correlated with the supply of government debt. 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 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. In this section we present further evidence to address potential endogeneity concerns. We first present the results from an instrumental variable specification and then we discuss results that use the EMU integration as a quasi-natural experiment.

5.1 Instrumental Variable Approach

Although we control for time-invariant country characteristics, various macroeconomic controls, and year-fixed effects in our baseline analysis, endogeneity concerns might remain. For example, government budget deficits tend to be large when the economy is performing poorly. In these periods the government receives lower tax revenues and has higher transfer expenditures from various social programs (e.g., unemployment benefits, welfare). Such episodes might also coincide with time periods

[21] 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 (2016).

where corporations are more financially constrained and adjust their financing strategies. We address this issue by employing an instrumental variable approach where we use military expenditures as an instrument for government debt.[22] While military expenditures are not completely exogenous, they are less affected by the macroeconomic environment than other government revenues and expenditures, such as taxes and transfer payments.

Panel A of Table 10 reports the estimation results where the government debt-to-GDP ratio is instrumented with the lagged military expenditures relative to GDP. In order to ensure that our results are not driven by firms operating in defense related industries, we drop firms in industries that are at least 40 percent defense dependent, as determined by the U.S. Bureau of Labor Statistics.[23]

We use the lagged value of military expenditures to mitigate the possibility of reverse causality. The first stage estimation results indicate that there is a positive and statistically significant relation between military expenditures and government debt. Panel A also reports the statistics for underidentification and weak identification tests. The Kleibergen-Paap LM statistic is 3.74 with a p-value of 0.053, which rejects the null of underidentification at the 10% level. The Kleibergen-Paap F statistic amounts to 4.81. The second stage regressions indicate a significant relation between corporate leverage and instrumented government debt. The results for the government debt-to-GDP are broadly consistent with those in Table 2.

[22]Ramey and Shapiro (1998) use large military buildups and increases in total purchases as exogenous changes in government spending. Berndt, Lustig, and Yeltekin (2012) identify fiscal shocks as innovations to current and future defense spending growth.

[23]These industries are explosives, ordnance and accessories, radio and TV communications equipment, communications equipment, aircraft and parts, shipbuilding and repairing, guided missiles and space vehicles, tanks and tank components, search and navigation equipment, commercial physical research, commercial nonphysical research, and testing laboratories.

<Table 10 about here>

Panel B reports the results for domestic government debt, which are based on a smaller sample due to data availability. We continue to find a statistically significant negative relation between our leverage measures and domestic government debt in the second stage. Both the first stage and the second stage coefficient estimates increase in statistical significance relative to Panel A. Furthermore, the Kleibergen-Paap LM and the Kleibergen-Paap F statistics increase to 6.07 ($p = 0.014$) and to 13.64, which strengthens our confidence in the relevance of the instrumental variable.

5.2 Euro-Area Integration

In this section we use the integration of the bond markets in the European Monetary Union (EMU) as a quasi-natural experiment to address the endogeneity concerns. 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)).

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 monetary integration can weaken the crowding out effect through increased demand by non-local investors for government debt and 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 2 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). Whereas the relation between corporate leverage and government debt is negative for non-EMU countries both before and after the integration, the negative relation for EMU countries completely disappears after the Euro integration.

<Figure 2 about here>

Next, we verify the finding in Figure 2 using a regression specification. Table 11 analyzes the impact of the EMU integration on the sensitivity of corporate leverage to government debt. *After 1998* is an indicator variable for the years following 1998. The sample period ranges from 1990 to 2006. *EMU* is an indicator variable that captures whether the country is a member of the European Monetary Union. All regressions include macroeconomic and firm-level controls as well as their interactions with the *EMU*, *After 1998*, and *EMU x After 1998*. All regressions include the direct effects of *EMU*, *After 1998*, and *EMU x After 1998*. In order to save space, we only report the coefficient estimates for government debt and its interactions.

Table 11 reports the fixed effects regression results for book leverage, debt-to-capital, and market leverage. All regressions include country-fixed effects. Consistent with our baseline specification, the coefficient estimates of government debt before 1999 for non-EMU countries are negative, and they are statistically significant at the 1% level. The positive coefficient estimates for the triple interactions suggest that corporate leverage becomes less sensitive to local government debt in EMU countries after the integration. The results are statistically significant for the book and the

market leverage regressions. The results also indicate that there is no significant change in the government debt sensitivity of corporate debt after 1998 for non-EMU countries.

<Table 11 about here>

6 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. 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. We find that the crowding out effect is stronger for firms and countries facing smaller financing frictions, for example for larger and more profitable firms or for firms in countries with more developed equity markets and less bank-dependent private sectors. These firms tend to have more flexibility in substituting between different sources of financing. In order to address potential endogeneity problems, we use an instrumental variable approach and a quasi-natural experiment based on the EMU integration. Overall, our results are consistent with government debt crowding out corporate debt.

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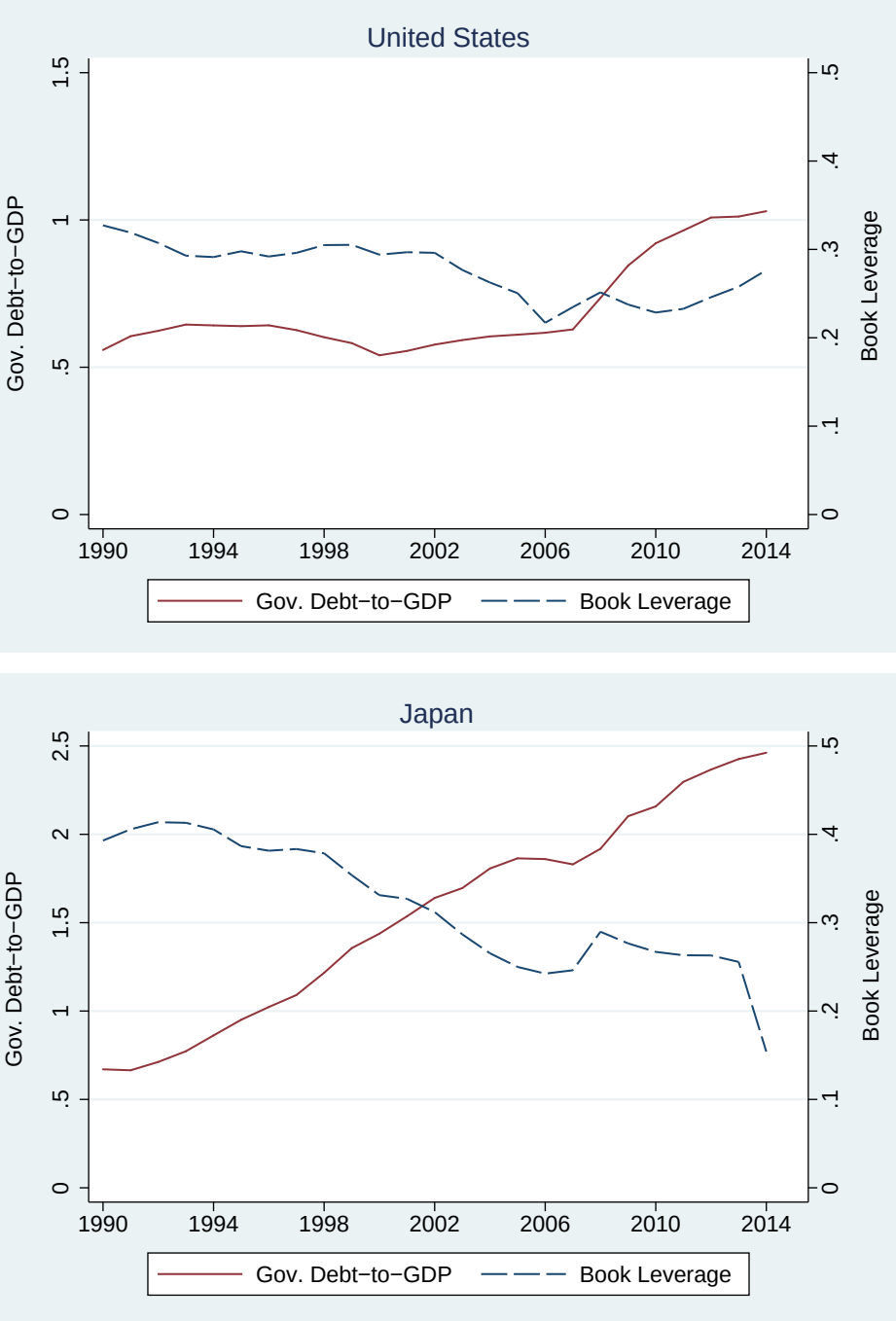

Figure 1: This figure depicts the time-series relationship between Government Debt-to-GDP and Book Leverage for the U.S. and Japan.

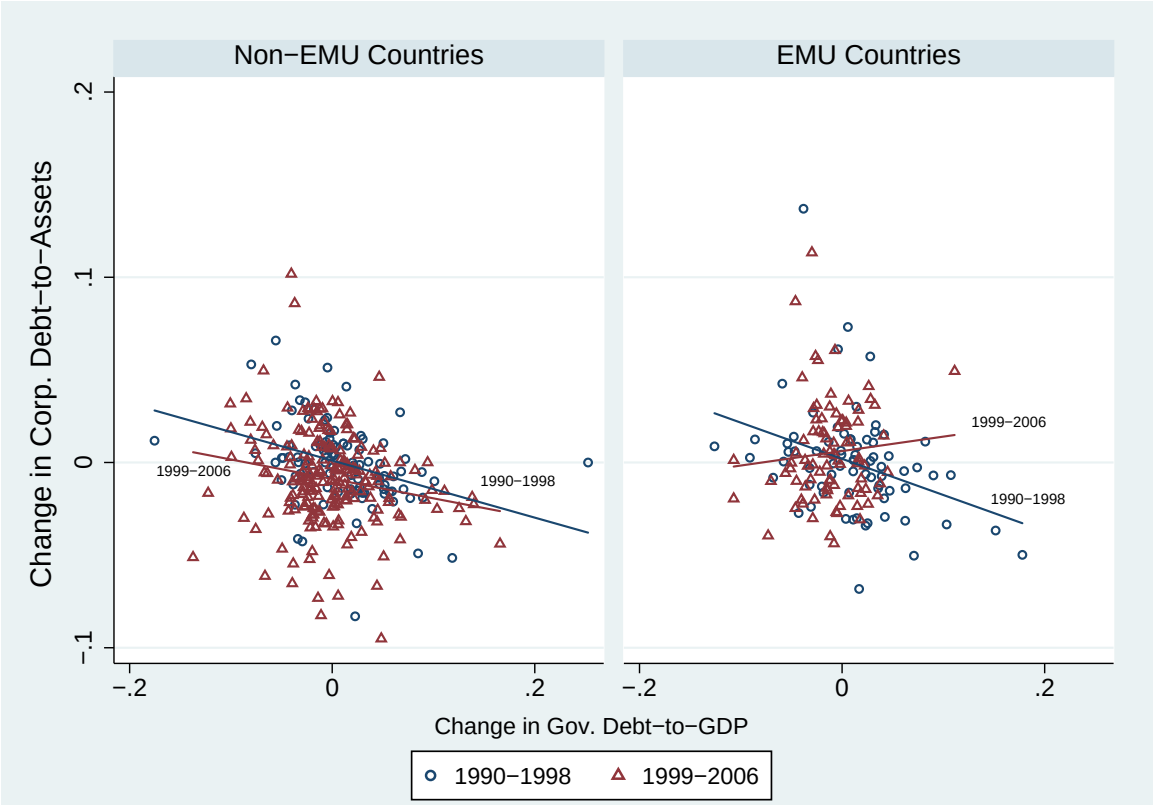

Figure 2: EMU Integration This figure depicts scatter plots of ΔGovernment Debt-to-GDP$_{t-1,t-2}$ and ΔBook Leverage$_{t,t-1}$ in countries that are members of the EMU and all other countries over the 17-year period around the integration (1990-2006). The lines represent the linear regression fits before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

Table 1: Summary Statistics

This table shows the summary statistics for all country-level (Panel A) and firm-level (Panel B) variables. *Book Leverage* is defined as the ratio of total book debt of all firms in a country to total book assets. *Debt-to-Capital* is the ratio of total book debt to total capital (book debt plus book equity) in each country. *Market Leverage* is defined as the ratio of total book debt to total market value of assets. *Gov. Debt-to-GDP* is gross government debt divided by GDP, *Long-Term Debt-to-GDP* is the ratio of total government debt with a remaining maturity of more than one year to GDP, *Short-Term Debt-to-GDP* is the ratio of total government debt with less than one year remaining maturity to GDP. *GDP Per Capita* is measured in current U.S. dollars, *Unemployment* is measured as a proportion of the labor force. *Ln(S&P Index)*, *Ln(CPI Level)*, and *Ln(Exchange Rate)* are calculated by taking the natural logarithm of the level of S&P Global Equity Index, the level of CPI, and the level of exchange rate, which is denoted in local currency units per U.S. dollar.

Panel A: Country Characteristics

	Mean	St. Dev.	p25	Median	p75	N
Book Leverage$_{t}$	0.283	0.065	0.239	0.277	0.318	813
Debt-to-Capital$_{t}$	0.423	0.098	0.359	0.420	0.481	813
Market Leverage$_{t}$	0.195	0.079	0.140	0.185	0.237	813
Long-Term Leverage$_{t}$	0.197	0.058	0.155	0.194	0.232	813
Short-Term Leverage$_{t}$	0.086	0.036	0.061	0.082	0.104	813
Corporate Debt-to-GDP$_{t}$	0.138	0.082	0.073	0.130	0.187	813
Ln(Corp. Debt$_{t}$)	24.701	1.581	23.615	24.545	25.744	813
Gov. Debt-to-GDP$_{t-1}$	0.583	0.335	0.372	0.527	0.725	813
Ln(Gov. Debt$_{t-1}$)	26.108	1.589	25.069	25.958	27.013	813
Domestic Gov. Debt-to-GDP$_{t-1}$	0.380	0.301	0.190	0.307	0.513	671
External Gov. Debt-to-GDP$_{t-1}$	0.204	0.169	0.080	0.167	0.292	671
General Gov. Debt-to-GDP$_{t-1}$	0.787	0.365	0.514	0.668	1.041	263
Local and State Gov. Debt-to-GDP$_{t-1}$	0.133	0.086	0.080	0.114	0.160	263
Central Gov. Debt-to-GDP$_{t-1}$	0.691	0.345	0.446	0.588	0.902	263
Long-Term Gov. Debt-to-GDP$_{t-1}$	0.483	0.329	0.278	0.379	0.725	141
Short-Term Gov. Debt-to-GDP$_{t-1}$	0.161	0.095	0.102	0.144	0.225	141
Ln(GDP Per Capita$_{t-1}$)	9.684	1.118	9.145	10.048	10.477	813
Ln(CPI Index Level$_{t-1}$)	6.019	2.900	4.881	5.094	5.633	813
Ln(S&P Index Level$_{t-1}$)	5.146	0.795	4.605	5.183	5.714	813
Unemployment Rate$_{t-1}$	0.074	0.045	0.043	0.068	0.091	813
Ln(Exchange Rate$_{t-1}$)	1.680	2.162	0.030	1.118	2.311	813
Tangibility$_{t-1}$	0.405	0.108	0.329	0.403	0.477	813
Ln(Assets$_{t-1}$)	12.092	1.595	10.936	11.983	13.134	813
ROA$_{t-1}$	0.126	0.033	0.103	0.121	0.146	813
Market-to-Book$_{t-1}$	1.780	2.071	1.232	1.470	1.795	813
Book Value of Assets-to-GDP$_{t-1}$	0.489	0.299	0.240	0.461	0.662	813

Panel B: Firm Characteristics

	Mean	St. Dev.	p25	Median	p75	N
Book Leverage$_{t}$	0.216	0.203	0.034	0.184	0.339	340290
Debt-to-Capital$_{t}$	0.298	0.253	0.049	0.270	0.483	333922
Market Leverage$_{t}$	0.180	0.179	0.019	0.132	0.290	327837
Tangibility$_{t-1}$	0.305	0.232	0.113	0.261	0.447	340290
Ln(Assets$_{t-1}$)	5.115	2.082	3.741	5.083	6.435	340290
ROA$_{t-1}$	0.043	0.249	0.026	0.084	0.141	340290
Market-to-Book$_{t-1}$	1.768	1.645	0.949	1.239	1.876	340290

Table 2: Baseline Specification (Country Panel)

This table reports the estimation results for the fixed effects specification using the country panel. *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; *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 1. All regressions include country- and year-fixed effects. The standard errors are clustered at both the country and year level. The statistical significance at the 10%, 5% and 1% levels is denoted by "*", "**" and "***", respectively.

	Book Leverage_t	Debt-to-Capital_t	Market Leverage_t
$\text{Gov. Debt-to-GDP}_{t-1}$	-0.074***	-0.096***	-0.055**
	(-3.694)	(-3.140)	(-2.371)
$\text{Ln(GDP Per Capita}_{t-1})$	0.014	0.048**	0.029
	(0.706)	(2.096)	(1.067)
$\text{Ln(CPI Index Level}_{t-1})$	0.017	0.030	-0.020
	(0.721)	(1.009)	(-0.573)
$\text{Ln(S\&P Index Level}_{t-1})$	-0.016	-0.032*	-0.049***
	(-1.363)	(-1.980)	(-3.405)
$\text{Unemployment Rate}_{t-1}$	0.266***	0.322***	0.130
	(3.367)	(2.991)	(1.099)
$\text{Ln(Exchange Rate}_{t-1})$	-0.014***	-0.014*	-0.013***
	(-3.533)	(-2.020)	(-3.066)
Tangibility_{t-1}	0.048	-0.062	0.139*
	(0.679)	(-0.619)	(1.716)
$\text{Ln(Assets}_{t-1})$	-0.001	0.006	-0.010
	(-0.162)	(0.675)	(-1.108)
ROA_{t-1}	-0.812***	-1.171***	-1.055***
	(-5.661)	(-5.570)	(-4.403)
$\text{Market-to-Book}_{t-1}$	-0.000	0.003**	-0.007***
	(-0.128)	(2.188)	(-3.008)
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	813	813	813
R-squared	0.697	0.747	0.711

Table 3: Alternative Variable Definitions (Country Panel)

This table reports the estimation results for the fixed effects specification using alternative variable definitions. *Corporate Debt* is calculated by summing the dollar values of debt over all firms in a country and year. *Ln(Government Debt)* is the natural logarithm of the dollar value of government debt outstanding. *Corporate Debt-to-GDP* is the ratio of *Corporate Debt* to GDP. All regressions include country- and year-fixed effects. The standard errors are clustered at both the country and year level. The statistical significance at the 10%, 5% and 1% levels is denoted by "*", "**" and "***", respectively.

	Ln(Corporate Debt$_t$)	Corporate Debt-to-GDP$_t$
Ln(Gov. Debt$_{t-1}$)	-0.142**	
	(-2.505)	
Gov. Debt-to-GDP$_{t-1}$		-0.040***
		(-3.459)
Ln(GDP Per Capita$_{t-1}$)	0.074	-0.010
	(0.683)	(-0.702)
Ln(CPI Index Level$_{t-1}$)	0.084	0.013
	(0.986)	(1.038)
Ln(S&P Index Level$_{t-1}$)	0.046	-0.006
	(0.997)	(-1.129)
Unemployment Rate$_{t-1}$	1.074***	0.077
	(3.237)	(1.358)
Ln(Exchange Rate$_{t-1}$)	-0.038**	-0.005***
	(-2.500)	(-2.963)
Tangibility$_{t-1}$	0.076	-0.046
	(0.292)	(-1.257)
Ln(Assets$_{t-1}$)	1.048***	0.018***
	(19.944)	(3.374)
ROA$_{t-1}$	-2.128***	-0.210***
	(-3.840)	(-4.116)
Market-to-Book$_{t-1}$	0.002	0.001
	(0.491)	(1.454)
Book Value of Assets-to-GDP$_{t-1}$	-0.216	0.215***
	(-1.182)	(8.503)
Country FE	Yes	Yes
Year FE	Yes	Yes
Observations	813	813
R-squared	0.990	0.919

Table 4: Domestic vs. External Debt (Country Panel)

This table investigates the impact of external government debt on corporate leverage by estimating the baseline fixed effects specification after decomposing *Government Debt-to-GDP* as *Domestic Government Debt-to-GDP* and *External Government Debt-to-GDP* measured in percent of GDP. *External Government Debt-to-GDP* is government debt owed to nonresidents. *Domestic Government Debt-to-GDP* is *Government Debt-to-GDP* net of external debt. All regressions include country- and year-fixed effects. The standard errors are clustered at both the country and year level. The statistical significance at the 10%, 5% and 1% levels is denoted by "*", "**" and "***", respectively.

	Book Leverage_{t}	$\text{Debt-to-Capital}_{t}$	$\text{Market Leverage}_{t}$
$\text{Domestic Gov. Debt-to-GDP}_{t-1}$	-0.128***	-0.180***	-0.130***
	(-3.338)	(-2.836)	(-3.303)
$\text{External Gov. Debt-to-GDP}_{t-1}$	0.017	-0.009	0.042
	(0.446)	(-0.191)	(1.042)
$\text{Ln(GDP Per Capita}_{t-1})$	0.027	0.065***	0.038
	(1.458)	(2.885)	(1.316)
$\text{Ln(CPI Index Level}_{t-1})$	0.022	0.013	-0.043
	(0.576)	(0.254)	(-0.765)
$\text{Ln(S\&P Index Level}_{t-1})$	-0.015	-0.036*	-0.045**
	(-1.071)	(-1.870)	(-2.638)
$\text{Unemployment Rate}_{t-1}$	0.222*	0.312*	0.025
	(1.827)	(1.945)	(0.141)
$\text{Ln(Exchange Rate}_{t-1})$	-0.004	-0.001	-0.003
	(-1.303)	(-0.091)	(-1.044)
Tangibility_{t-1}	0.087	-0.026	0.182**
	(1.309)	(-0.265)	(2.255)
$\text{Ln(Assets}_{t-1})$	0.000	0.011	-0.007
	(0.033)	(1.154)	(-0.747)
ROA_{t-1}	-0.690***	-0.980***	-1.033***
	(-5.153)	(-5.119)	(-4.221)
$\text{Market-to-Book}_{t-1}$	0.001	0.003***	-0.006*
	(1.334)	(3.458)	(-2.051)
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	671	671	671
R-squared	0.723	0.772	0.731

Table 5: Government Sectors (Country Panel)

This table investigates the crowding out effect for different sectors of government debt separately by estimating the baseline specification after decomposing *Government Debt-to-GDP* as *Central Government Debt-to-GDP* and *Local and State Government Debt-to-GDP*. All regressions include country- and year-fixed effects. The standard errors are clustered at both the country and year level. The statistical significance at the 10%, 5% and 1% levels is denoted by "*", "**" and "***", respectively.

	Book Leverage$_t$	Book Leverage$_t$	Book Leverage$_t$	Book Leverage$_t$
General Gov. Debt-to-GDP$_{t-1}$	-0.096***			
	(-3.369)			
Central Gov. Debt-to-GDP$_{t-1}$		-0.086***		-0.083***
		(-3.149)		(-3.077)
Local and State Gov. Debt-to-GDP$_{t-1}$			-0.149	-0.090
			(-1.113)	(-0.929)
Ln(GDP Per Capita$_{t-1}$)	-0.009	-0.008	-0.011	-0.010
	(-0.437)	(-0.394)	(-0.578)	(-0.513)
Ln(CPI Index Level$_{t-1}$)	0.083	0.084	0.192**	0.085
	(0.786)	(0.776)	(2.616)	(0.799)
Ln(S&P Index Level$_{t-1}$)	-0.008	-0.007	0.010	-0.006
	(-0.525)	(-0.474)	(0.724)	(-0.452)
Unemployment Rate$_{t-1}$	0.285**	0.255**	0.126	0.278**
	(2.456)	(2.159)	(0.800)	(2.430)
Ln(Exchange Rate$_{t-1}$)	-0.009**	-0.009**	-0.010**	-0.009**
	(-2.774)	(-2.615)	(-2.770)	(-2.921)
Tangibility$_{t-1}$	0.047	0.051	0.036	0.044
	(0.488)	(0.528)	(0.307)	(0.459)
Ln(Assets$_{t-1}$)	0.002	0.003	0.003	0.003
	(0.217)	(0.334)	(0.168)	(0.299)
ROA$_{t-1}$	-0.750***	-0.767***	-0.808***	-0.746***
	(-3.791)	(-3.835)	(-4.007)	(-3.636)
Market-to-Book$_{t-1}$	0.014***	0.016**	0.009	0.015***
	(2.956)	(2.944)	(1.457)	(2.994)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	263	263	263	263
R-squared	0.792	0.788	0.761	0.788

Table 6: Maturity by Remaining Years (Country Panel)

This table investigates the crowding out effect for different maturities of government debt and corporate debt. *Long-Term Gov. Debt-to-GDP* is the ratio of total government debt with a remaining maturity of more than one year to GDP. *Short-Term Gov. Debt-to-GDP* is the ratio of total government debt with less than one year remaining maturity to GDP. The first three columns report the results using lagged values of independent variables whereas the last three columns report the results from contemporaneous regressions. All regressions include country- and year-fixed effects. The standard errors are clustered at both the country and year level. The statistical significance at the 10%, 5% and 1% levels is denoted by "*", "**" and "***", respectively.

	Lagged Independent Variables			Contemporaneous Independent Variables		
	Book Leverage$_{t+1}$	Long-Term Leverage$_{t+1}$	Short-Term Leverage$_{t+1}$	Book Leverage$_{t}$	Long-Term Leverage$_{t}$	Short-Term Leverage$_{t}$
Long-Term Gov. Debt-to-GDP$_{t}$	-0.072**	-0.089***	0.021	-0.058***	-0.046**	-0.012
	(-2.813)	(-4.502)	(1.095)	(-4.678)	(-2.659)	(-0.758)
Short-Term Gov. Debt-to-GDP$_{t}$	0.003	-0.016	0.015	-0.092*	0.026	-0.116**
	(0.074)	(-0.270)	(0.350)	(-1.980)	(0.259)	(-2.672)
Ln(GDP Per Capita)$_{t}$	-0.024	-0.060	0.037	-0.071***	-0.079***	0.007
	(-0.611)	(-1.776)	(0.961)	(-3.168)	(-3.241)	(0.338)
Ln(CPI Index Level)$_{t}$	0.276***	0.244**	0.022	0.270***	0.260**	0.010
	(3.939)	(2.750)	(0.285)	(4.715)	(2.789)	(0.115)
Ln(S&P Index Level)$_{t}$	-0.011	0.009	-0.022	-0.005	0.015	-0.021
	(-0.689)	(0.620)	(-1.605)	(-0.316)	(1.393)	(-1.524)
Unemployment Rate$_{t}$	-0.127	0.108	-0.264	0.154	-0.048	0.183
	(-0.703)	(0.811)	(-1.724)	(0.684)	(-0.306)	(1.244)
Ln(Exchange Rate)$_{t}$	-0.011***	-0.013***	0.002	-0.014**	-0.015**	0.002
	(-3.235)	(-4.139)	(0.630)	(-2.795)	(-2.206)	(0.337)
Tangibility$_{t}$	-0.169	-0.034	-0.146	0.012	-0.012	0.024
	(-1.751)	(-0.356)	(-1.437)	(0.709)	(-0.678)	(1.029)
Ln(Assets)$_{t}$	-0.006	0.001	-0.006	0.080	0.058	0.015
	(-0.222)	(0.072)	(-0.225)	(1.231)	(0.697)	(0.411)
ROA$_{t}$	-0.577***	-0.376**	-0.185	-0.567***	-0.417**	-0.134
	(-3.666)	(-2.573)	(-1.661)	(-3.840)	(-2.614)	(-1.183)
Market-to-Book$_{t}$	0.002	0.001	0.001	0.009***	0.001	0.008**
	(0.466)	(0.214)	(0.311)	(3.196)	(0.382)	(2.545)
Country FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	141	141	141	149	149	149
R-squared	0.879	0.866	0.809	0.871	0.844	0.802

Table 7: Country Characteristics (Country Panel)

This table reports the results from fixed effects regressions with government debt-to-GDP ratio interacted with proxies for the availability of alternative means of external financing. Each year, we split the sample into three equally-sized terciles based on lagged *Bank Dependence*, *Equity Capitalization* and *Equity Trading*. *Bank Dependence* is measured by bank credit to private sector as a fraction of total credit. *Equity Capitalization* is total market value of public firms as a percent of GDP. *Equity Trading* is defined as the total volume of stocks traded as a percentage of GDP. All regressions include the control variables from the baseline specification, country and year-fixed effects as well as the interactions of the dummy variables with the control variables (including year-fixed effects) which are not reported to save space. The standard errors are clustered at both the country and year level. The statistical significance at the 10%, 5% and 1% levels is denoted by "*", "**" and "***", respectively.

	Dependent Variable: Book Leverage$_t$		
	Bank Dependence	Equity Capitalization	Equity Trading
Gov. Debt-to-GDP$_{t-1}$ x Low	-0.134***	-0.045	-0.040
	(-4.018)	(-1.334)	(-1.550)
Gov. Debt-to-GDP$_{t-1}$ x Medium	-0.092***	-0.077***	-0.098***
	(-4.394)	(-3.408)	(-3.339)
Gov. Debt-to-GDP$_{t-1}$ x High	-0.028	-0.070**	-0.093***
	(-0.553)	(-2.635)	(-3.460)
Medium	-0.404*	0.118	0.035
	(-1.885)	(1.626)	(0.306)
High	-0.578**	-0.312	-0.160
	(-2.625)	(-1.306)	(-0.642)
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	761	767	773
R-squared	0.740	0.719	0.736
High-Low Interactions	0.106**	-0.025	-0.053*
t-stat	(2.066)	(-0.779)	(-1.836)

Table 8: Baseline Specification (Firm Panel)

This table reports the estimation results from firm-fixed effects regressions. All regressions include firm- and year-fixed effects. The standard errors are clustered at both the country and year level. The statistical significance at the 10%, 5% and 1% levels is denoted by "*", "**" and "***", respectively.

	Book Leverage$_t$	Debt-to-Capital$_t$	Market Leverage$_t$
Gov. Debt-to-GDP$_{t-1}$	-0.066***	-0.074***	-0.046***
	(-5.114)	(-4.227)	(-2.873)
Ln(GDP Per Capita$_{t-1}$)	-0.027***	-0.024**	-0.010
	(-3.143)	(-2.443)	(-0.663)
Ln(CPI Index Level$_{t-1}$)	0.015	0.039	0.022
	(0.662)	(1.205)	(0.784)
Ln(S&P Index Level$_{t-1}$)	-0.015**	-0.017*	-0.046***
	(-2.363)	(-1.992)	(-5.145)
Unemployment Rate$_{t-1}$	0.016	0.054	-0.121
	(0.206)	(0.460)	(-1.124)
Ln(Exchange Rate$_{t-1}$)	-0.010***	-0.010**	-0.012**
	(-3.391)	(-2.251)	(-2.733)
Tangibility$_{t-1}$	0.126***	0.147***	0.103***
	(7.953)	(6.537)	(6.525)
Ln(Assets$_{t-1}$)	0.037***	0.048***	0.042***
	(8.412)	(7.975)	(10.702)
ROA$_{t-1}$	-0.105***	-0.102***	-0.075***
	(-8.560)	(-5.926)	(-5.655)
Market-to-Book$_{t-1}$	-0.004***	-0.005***	-0.010***
	(-3.882)	(-2.893)	(-11.587)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	340290	333373	326965
R-squared	0.632	0.706	0.726

Table 9: Company Characteristics (Firm Panel)

This table reports the results from firm-fixed effects regressions with firm size and profitability interactions. *Large* equals one if a firm's lagged book assets is in the top 20 percentile of its country distribution and zero otherwise. *Profitable* indicates whether a firm's lagged ROA is above its country median in a given year. All regressions include firm- and year-fixed effects. The standard errors are clustered at both the country and year level. The statistical significance at the 10%, 5% and 1% levels is denoted by "*", "**" and "***", respectively.

	Book Leverage$_t$	Debt-to Capital$_t$	Market Leverage$_t$	Book Leverage$_t$	Debt-to Capital$_t$	Market Leverage$_t$
Gov. Debt-to-GDP$_{t-1}$	-0.063***	-0.071***	-0.044**	-0.060***	-0.069***	-0.042**
	(-4.862)	(-4.002)	(-2.753)	(-4.887)	(-4.070)	(-2.670)
x Large	-0.012***	-0.014*	-0.010**			
	(-2.802)	(-1.978)	(-2.373)			
x Profitable				-0.017***	-0.021***	-0.017***
				(-6.302)	(-6.828)	(-6.868)
Large	0.016***	0.018**	0.016***			
	(2.890)	(2.151)	(3.069)			
Profitable				-0.005	-0.014***	-0.013***
				(-1.400)	(-3.275)	(-4.169)
Ln(GDP Per Capita$_{t-1}$)	-0.028***	-0.025**	-0.011	-0.027***	-0.024**	-0.010
	(-3.123)	(-2.495)	(-0.689)	(-3.014)	(-2.523)	(-0.626)
Ln(CPI Index Level$_{t-1}$)	0.015	0.039	0.023	0.014	0.037	0.021
	(0.674)	(1.215)	(0.795)	(0.612)	(1.150)	(0.741)
Ln(S&P Index Level$_{t-1}$)	-0.015**	-0.017*	-0.046***	-0.016**	-0.018*	-0.047***
	(-2.331)	(-1.968)	(-5.081)	(-2.405)	(-2.062)	(-5.110)
Unemployment Rate$_{t-1}$	0.021	0.061	-0.115	0.017	0.053	-0.123
	(0.278)	(0.522)	(-1.074)	(0.219)	(0.449)	(-1.092)
Ln(Exchange Rate$_{t-1}$)	-0.010***	-0.010**	-0.012**	-0.010***	-0.010**	-0.012**
	(-3.379)	(-2.242)	(-2.726)	(-3.377)	(-2.247)	(-2.701)
Tangibility$_{t-1}$	0.126***	0.147***	0.103***	0.126***	0.148***	0.104***
	(7.966)	(6.549)	(6.555)	(7.869)	(6.443)	(6.543)
Ln(Assets$_{t-1}$)	0.036***	0.047***	0.041***	0.037***	0.048***	0.042***
	(8.179)	(7.853)	(10.297)	(8.330)	(7.912)	(10.808)
ROA$_{t-1}$	-0.104***	-0.101***	-0.074***	-0.093***	-0.080***	-0.055***
	(-8.425)	(-5.856)	(-5.586)	(-9.780)	(-6.067)	(-5.789)
Market-to-Book$_{t-1}$	-0.004***	-0.005***	-0.010***	-0.003***	-0.004**	-0.009***
	(-3.946)	(-2.899)	(-11.888)	(-2.956)	(-2.286)	(-11.326)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	340290	333373	326965	340290	333373	326965
R-squared	0.632	0.706	0.726	0.633	0.708	0.729

Table 10: Instrumental Variables (Country Panel)

This table reports the first and second stage estimation results from instrumental variables regressions where *Government Debt-to-GDP* (Panel A) and *Domestic Government Debt-to-GDP* (Panel B) are instrumented by lagged *Military Expenditures-to-GDP*. All regressions include country- and year-fixed effects. The standard errors are clustered at both the country and year level. The statistical significance at the 10%, 5% and 1% levels is denoted by "*", "**" and "***", respectively.

Panel A: Government Debt-to-GDP

	Gov. Debt-to-GDP$_{t-1}$	Book Leverage$_{t}$	Debt-to-Capital$_{t}$	Market Leverage$_{t}$
Military Expenditures$_{t-2}$	11.923**			
	(2.192)			
Gov. Debt-to-GDP$_{t-1}$	.	-0.142**	-0.174*	-0.188**
		(-2.344)	(-1.874)	(-2.093)
Ln(GDP Per Capita$_{t-1}$)	-0.210***	0.001	0.036	-0.001
	(-2.851)	(0.049)	(1.259)	(-0.029)
Ln(CPI Index Level$_{t-1}$)	-0.260*	-0.004	0.007	-0.057
	(-2.027)	(-0.112)	(0.156)	(-1.319)
Ln(S&P Index Level$_{t-1}$)	-0.115***	-0.024	-0.040*	-0.062***
	(-2.919)	(-1.639)	(-1.847)	(-3.352)
Unemployment Rate$_{t-1}$	2.445***	0.436**	0.540*	0.508*
	(3.883)	(2.375)	(2.023)	(1.800)
Ln(Exchange Rate$_{t-1}$)	0.009	-0.014***	-0.014*	-0.012**
	(0.728)	(-2.928)	(-1.834)	(-2.345)
Tangibility$_{t-1}$	0.089	0.051	-0.054	0.158*
	(0.382)	(0.680)	(-0.543)	(1.811)
Ln(Assets$_{t-1}$)	0.024	-0.001	0.006	-0.007
	(0.794)	(-0.080)	(0.613)	(-0.746)
ROA$_{t-1}$	0.115	-0.802***	-1.112***	-1.011***
	(0.257)	(-5.157)	(-5.156)	(-3.695)
Market-to-Book$_{t-1}$	-0.003	-0.000	0.003**	-0.008***
	(-0.742)	(-0.268)	(2.426)	(-3.612)
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	800	800	800	800
R-squared	0.891	0.660	0.720	0.652
Kleibergen-Paap LM statistic	3.74			
P-value	0.053			
Kleibergen-Paap F statistic	4.81			

Panel B: Domestic Government Debt

	Domestic Gov. Debt-to-GDP$_{t-1}$	Book Leverage$_t$	Debt-to-Capital$_t$	Market Leverage$_t$
Military Expenditures$_{t-2}$	6.401***			
	(3.693)			
Domestic Gov. Debt-to-GDP$_{t-1}$		-0.295**	-0.464***	-0.345**
		(-2.651)	(-3.056)	(-2.733)
Ln(GDP Per Capita$_{t-1}$)	0.003	0.027	0.069**	0.031
	(0.061)	(1.276)	(2.807)	(1.012)
Ln(CPI Index Level$_{t-1}$)	-0.219**	-0.020	-0.052	-0.092
	(-2.472)	(-0.344)	(-0.657)	(-1.493)
Ln(S&P Index Level$_{t-1}$)	-0.031	-0.020	-0.042*	-0.050**
	(-1.361)	(-1.366)	(-2.020)	(-2.792)
Unemployment Rate$_{t-1}$	1.139***	0.451**	0.669**	0.398
	(3.539)	(2.354)	(2.290)	(1.651)
Ln(Exchange Rate$_{t-1}$)	0.046***	0.003	0.012	0.005
	(4.371)	(0.398)	(1.086)	(0.570)
Tangibility$_{t-1}$	-0.142	0.066	-0.065	0.163*
	(-0.892)	(0.894)	(-0.584)	(1.792)
Ln(Assets$_{t-1}$)	0.045*	0.007	0.023*	0.003
	(1.899)	(0.621)	(1.876)	(0.296)
ROA$_{t-1}$	0.478*	-0.631***	-0.792***	-0.937***
	(1.956)	(-4.090)	(-3.809)	(-3.454)
Market-to-Book$_{t-1}$	-0.004***	0.001	0.002*	-0.006**
	(-3.188)	(0.818)	(1.860)	(-2.130)
Country FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	659	659	659	659
R-squared	0.942	0.672	0.702	0.667
Kleibergen-Paap LM statistic	6.07			
P-value	0.014			
Kleibergen-Paap F statistic	13.64			

Table 11: EMU Results (Country Panel)

This table analyzes the impact of the EMU integration on the sensitivity of corporate leverage to government debt. *EMU* is a variable that indicates whether the country is a member of the European Monetary Union. *After 1998* is an indicator for the period between 1999 and 2006. All regressions include macroeconomic and firm-level controls as well as their interactions with *EMU*, *After 1998*, and *EMU X After 1998*. The sample period is from 1990 to 2006. The standard errors are clustered at both the country and year level. The statistical significance at the 10%, 5% and 1% levels is denoted by "*", "**" and "***", respectively.

	Book Leverage$_t$	Debt-to-Capital$_t$	Market Leverage$_t$
Gov. Debt-to-GDP$_{t-1}$	-0.147***	-0.203***	-0.140***
	(-4.601)	(-3.820)	(-4.265)
X After 1998 X EMU	0.116**	0.087	0.151***
	(2.182)	(1.010)	(2.984)
X EMU	0.069	0.032	0.081
	(1.018)	(0.295)	(1.632)
X After 1998	0.010	0.039	-0.009
	(0.455)	(0.997)	(-0.436)
After 1998	-0.026	-0.158	-0.233
	(-0.229)	(-0.980)	(-1.444)
After 1998 X EMU	-0.918***	-0.735*	-1.719***
	(-3.580)	(-1.912)	(-5.725)
Country FE	Yes	Yes	Yes
Observations	498	498	498
R-squared	0.831	0.822	0.814

Internet Appendix: Government Debt and Corporate Leverage: International Evidence

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 italics. 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	Definition and Compustat Item Name
Ln(Assets)	Ln(Total Book Assets) = Ln(**at**)
ROA	Operating Income (Before Depreciation) / Assets = **oibdp / at**
Tangibility	Net PPE / Assets = **ppent / at**
Market Value of Equity	MVE = **prcc** $\times$ **cshoc**
Market Value of Assets	MVA = **at - ceq + MVE**
Market-to-Book	MVA / Total Book Assets
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 / MVA

Panel B: Macro Variables

Variable	Data Source	Definition
Government Debt-to-GDP	IMF, Central Banks, World Bank	Gross government debt (% GDP)
GDP Per Capita	World Bank	GDP per capita (current US$)
Inflation	World Bank and IMF	Inflation, consumer prices (annual %)
S&P Global Equity Indices	World Bank	US$ price change in the stock markets
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 Dependence	BIS (Total Credit)	Private nonfinancial sector, Banks, Market value (% Total)
Market Capitalization	World Bank (World Federation of Exchanges)	Market capitalization of listed domestic companies (% GDP)
Equity Trading	World Bank (World Federation of Exchanges)	Stocks traded, total value (% GDP)
Central, State and Local Gov. Debt	IMF (Government Finance Statistics)	Gross debt (D4) at market value (% GDP)
Long- and Short-term Gov. Debt	World Bank (Public Debt Statistics)	General Gov., All instruments, Nominal Value (% GDP)

Table A2: Country Distribution (Country Panel)

This table reports the frequency distribution of countries in our sample.

	N	Min.	Max.
Argentina	8	1998	2014
Australia	25	1990	2014
Austria	25	1990	2014
Belgium	25	1990	2014
Brazil	13	2001	2014
Canada	25	1990	2014
Chile	18	1997	2014
China	19	1996	2014
Denmark	22	1993	2014
Finland	25	1990	2014
France	25	1990	2014
Germany	23	1992	2014
Greece	17	1997	2014
Hong Kong	13	2002	2014
India	19	1996	2014
Indonesia	12	2002	2014
Ireland	25	1990	2014
Israel	17	1998	2014
Italy	25	1990	2014
Japan	25	1990	2014
Korea, Rep.	19	1996	2014
Malaysia	19	1996	2014
Mexico	18	1997	2014
Netherlands	25	1990	2014
New Zealand	23	1992	2014
Norway	25	1990	2014
Peru	15	2000	2014
Philippines	19	1996	2014
Poland	18	1997	2014
Portugal	20	1995	2014
Russian Federation	13	2002	2014
Singapore	24	1991	2014
South Africa	19	1996	2014
Spain	23	1992	2014
Sweden	21	1994	2014
Switzerland	25	1990	2014
Thailand	18	1997	2014
Turkey	13	2001	2014
United Kingdom	25	1990	2014
United States	25	1990	2014
Total	813	1990	2014

Table A3: Summary Statistics by Country (Country Panel)

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 sum of their 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 proportion of the labor force, and *Exchange Rate* is denoted in local currency units per U.S. 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.

	Book Leverage	Debt-to-Capital	Market Leverage	Gov. Debt-to-GDP	Ln(GDP Per Capita	Ln(CPI Level)	S&P Index	Unemployment	Exchange Rate
Argentina	0.270	0.361	0.187	0.389	9.188	5.085	5.083	0.107	0.717
Australia	0.271	0.379	0.179	0.207	10.242	5.016	5.251	0.067	0.290
Austria	0.246	0.434	0.211	0.673	10.375	4.882	4.802	0.049	0.866
Belgium	0.282	0.450	0.207	1.122	10.318	4.892	5.210	0.080	1.297
Brazil	0.314	0.440	0.059	0.657	8.796	22.205	5.811	0.081	0.754
Canada	0.272	0.388	0.196	0.837	10.272	4.926	5.172	0.081	0.219
Chile	0.283	0.367	0.222	0.106	8.943	6.026	4.834	0.076	6.273
China	0.258	0.365	0.216	0.336	7.497	5.587	4.955	0.037	2.035
Denmark	0.271	0.386	0.172	0.514	10.639	4.941	5.638	0.066	1.825
Finland	0.288	0.438	0.184	0.425	10.364	4.924	5.727	0.095	0.505
France	0.270	0.483	0.199	0.613	10.284	4.880	5.148	0.091	0.575
Germany	0.260	0.495	0.200	0.615	10.378	4.921	5.541	0.081	0.045
Greece	0.313	0.446	0.242	1.106	9.856	5.932	5.347	0.117	1.521
Hong Kong	0.172	0.233	0.092	0.014	10.295	5.330	6.283	0.050	2.051
India	0.331	0.457	0.236	0.733	6.576	5.810	5.268	0.040	3.790
Indonesia	0.323	0.431	0.192	0.370	7.569	6.616	4.251	0.084	9.153
Ireland	0.329	0.457	0.178	0.677	10.300	4.959	5.340	0.098	-0.286
Israel	0.343	0.513	0.234	0.799	10.067	5.956	5.400	0.081	1.394
Italy	0.304	0.529	0.258	1.079	10.168	5.096	4.788	0.092	2.806
Japan	0.318	0.486	0.259	1.477	10.469	4.717	3.927	0.039	4.704
Korea, Rep.	0.330	0.510	0.305	0.226	9.681	5.363	4.740	0.036	6.992
Malaysia	0.281	0.375	0.214	0.418	8.645	5.087	4.159	0.033	1.218
Mexico	0.297	0.433	0.208	0.426	8.893	6.867	5.698	0.038	2.360
Netherlands	0.251	0.442	0.146	0.633	10.400	4.882	5.467	0.055	0.133
New Zealand	0.322	0.410	0.173	0.298	9.958	4.965	4.667	0.064	0.480
Norway	0.296	0.460	0.225	0.366	10.796	4.929	5.119	0.040	1.902
Peru	0.235	0.306	0.185	0.356	8.095	15.848	5.658	0.083	1.144
Philippines	0.349	0.474	0.276	0.528	7.244	5.830	3.866	0.090	3.761
Poland	0.224	0.314	0.178	0.460	8.923	10.190	5.320	0.133	1.200
Portugal	0.390	0.594	0.289	0.698	9.688	5.407	5.225	0.087	1.137
Russian Federation	0.196	0.244	0.159	0.188	8.816	11.816	5.372	0.072	3.373
Singapore	0.221	0.320	0.132	0.854	10.219	4.861	5.138	0.027	0.439
South Africa	0.197	0.301	0.108	0.390	8.442	5.957	4.847	0.240	1.918
Spain	0.354	0.562	0.230	0.564	9.941	5.186	5.350	0.160	1.560
Sweden	0.246	0.384	0.132	0.513	10.554	5.022	5.779	0.076	2.027
Switzerland	0.252	0.382	0.146	0.520	10.821	4.874	5.746	0.031	0.254
Thailand	0.372	0.495	0.248	0.437	8.015	5.267	3.420	0.018	3.575
Turkey	0.248	0.354	0.184	0.486	8.922	12.510	6.012	0.097	0.344
United Kingdom	0.223	0.346	0.127	0.485	10.271	5.004	5.250	0.069	-0.498
United States	0.276	0.425	0.158	0.676	10.500	5.000	5.540	0.061	0.000
Total	0.283	0.423	0.195	0.583	9.684	6.019	5.146	0.074	1.680

Table A4: First Differences (Country Panel)

This table reports the first-differences estimation results for our baseline specification. All regressions include year-fixed effects. Standard errors are clustered at both the country and year level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	Δ Book Leverage$_t$	Δ Debt-to-Capital$_t$	Δ Market Leverage$_t$
Δ Gov. Debt-to-GDP$_{t-1,t-2}$	-0.068**	-0.109***	-0.059
	(-2.632)	(-3.235)	(-1.681)
Δ Ln(GDP Per Capita$_{t-1,t-2}$)	0.031**	0.046**	0.042*
	(2.538)	(2.438)	(1.848)
Δ Ln(CPI Index Level$_{t-1,t-2}$)	-0.034	-0.047	-0.021
	(-1.228)	(-0.907)	(-0.375)
Δ Ln(S&P Index Level$_{t-1,t-2}$)	-0.004	-0.003	-0.011
	(-0.562)	(-0.288)	(-1.130)
Δ Unemployment Rate$_{t-1,t-2}$	-0.104	-0.074	-0.099
	(-1.437)	(-0.932)	(-0.959)
Δ Ln(Exchange Rate$_{t-1,t-2}$)	-0.002	-0.001	-0.003
	(-1.662)	(-0.253)	(-0.955)
Δ Tangibility$_{t-1,t-2}$	0.005	-0.077	-0.030
	(0.090)	(-1.064)	(-0.432)
Δ Ln(Assets$_{t-1,t-2}$)	-0.000	0.005	0.013**
	(-0.073)	(0.643)	(2.403)
Δ ROA$_{t-1,t-2}$	-0.148**	-0.187*	-0.142
	(-2.183)	(-1.749)	(-1.439)
Δ Martket-to-Book$_{t-1,t-2}$	-0.001*	-0.001	-0.003
	(-1.877)	(-0.956)	(-0.753)
Year FE	Yes	Yes	Yes
Observations	780	780	780
R-squared	0.188	0.191	0.389

Table A5: OECD Sample (Country Panel)

This table reports our baseline estimation results for the subsample of OECD countries using the country panel. All regressions include country- and year-fixed effects. Standard errors are clustered at both the country and year level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	Book Leverage_t	Debt-to-Capital_t	Market Leverage_t
$\text{Gov. Debt-to-GDP}_{t-1}$	-0.079***	-0.098**	-0.048*
	(-3.416)	(-2.585)	(-2.059)
$\text{Ln(GDP Per Capita}_{t-1})$	-0.028	0.020	0.020
	(-1.001)	(0.619)	(0.606)
$\text{Ln(CPI Index Level}_{t-1})$	0.032	0.064	0.002
	(1.064)	(1.156)	(0.054)
$\text{Ln(S\&P Index Level}_{t-1})$	-0.024	-0.044**	-0.049**
	(-1.420)	(-2.092)	(-2.573)
$\text{Unemployment Rate}_{t-1}$	0.128	0.200	0.140*
	(1.165)	(1.325)	(1.743)
$\text{Ln(Exchange Rate}_{t-1})$	-0.012***	-0.012*	-0.008**
	(-3.314)	(-1.912)	(-2.627)
Tangibility_{t-1}	0.033	-0.017	0.077
	(0.420)	(-0.135)	(1.101)
$\text{Ln(Assets}_{t-1})$	0.027**	0.028*	0.017*
	(2.560)	(1.931)	(1.829)
ROA_{t-1}	-0.844***	-1.313***	-0.855***
	(-4.898)	(-5.036)	(-4.120)
$\text{Market-to-Book}_{t-1}$	0.007	0.015	-0.022
	(1.042)	(1.515)	(-1.695)
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	567	567	567
R-squared	0.665	0.705	0.753

Table A6: OECD Sample (Firm Panel)

This table reports our baseline estimation results for the subsample of OECD countries using the firm panel. All regressions include firm- and year-fixed effects. Standard errors are clustered at both the country and year level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	Book Leverage_t	Debt-to-Capital_t	Market Leverage_t
$\text{Gov. Debt-to-GDP}_{t-1}$	-0.060***	-0.061***	-0.050**
	(-3.689)	(-2.849)	(-2.282)
$\text{Ln(GDP Per Capita}_{t-1}\text{)}$	-0.005	-0.016	0.015
	(-0.411)	(-0.815)	(0.994)
$\text{Ln(CPI Index Level}_{t-1}\text{)}$	0.049	0.116**	0.016
	(1.222)	(2.147)	(0.349)
$\text{Ln(S\&P Index Level}_{t-1}\text{)}$	-0.021***	-0.023**	-0.053***
	(-3.110)	(-2.293)	(-6.328)
$\text{Unemployment Rate}_{t-1}$	-0.077	-0.130	-0.117
	(-0.892)	(-1.060)	(-1.098)
$\text{Ln(Exchange Rate}_{t-1}\text{)}$	-0.009***	-0.010**	-0.011**
	(-3.334)	(-2.255)	(-2.755)
Tangibility_{t-1}	0.121***	0.141***	0.098***
	(6.046)	(4.943)	(5.140)
$\text{Ln(Assets}_{t-1}\text{)}$	0.032***	0.041***	0.038***
	(9.435)	(8.980)	(11.508)
ROA_{t-1}	-0.095***	-0.088***	-0.063***
	(-8.334)	(-6.109)	(-5.890)
$\text{Market-to-Book}_{t-1}$	-0.004***	-0.006***	-0.009***
	(-4.608)	(-3.519)	(-9.954)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	270628	264517	260744
R-squared	0.620	0.701	0.724

Table A7: Net Leverage (Baseline Specification)

This table reports the estimation results from our baseline specification with an alternative leverage definition. The dependent variable, *Net Leverage*, is defined as total debt net of cash divided by total assets. All regressions include country- and year-fixed effects. Standard errors are clustered at both the country and year level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	(Total Debt$_t$ - Cash$_t$)/Assets$_t$
Gov. Debt-to-GDP$_{t-1}$	-0.085***
	(-3.656)
Ln(GDP Per Capita$_{t-1}$)	0.022
	(0.803)
Ln(CPI Index Level$_{t-1}$)	-0.019
	(-0.494)
Ln(S&P Index Level$_{t-1}$)	-0.020
	(-1.250)
Unemployment Rate$_{t-1}$	0.105
	(0.940)
Ln(Exchange Rate$_{t-1}$)	-0.015***
	(-3.499)
Tangibility$_{t-1}$	0.222**
	(2.338)
Ln(Assets$_{t-1}$)	-0.004
	(-0.363)
ROA$_{t-1}$	-0.888***
	(-4.786)
Market-to-Book$_{t-1}$	-0.001
	(-0.691)
Country FE	Yes
Year FE	Yes
Observations	813
R-squared	0.691

Table A8: Subperiod Analysis (1990-2007)

This table reports the estimation results from our baseline specification for the period before the 2007 financial crisis. All regressions include country- and year-fixed effects. Standard errors are clustered at both the country and year level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	Book Leverage_{t}	$\text{Debt-to-Capital}_{t}$	$\text{Market Leverage}_{t}$
$\text{Gov. Debt-to-GDP}_{t-1}$	-0.102***	-0.116**	-0.075**
	(-3.541)	(-2.717)	(-2.657)
$\text{Ln(GDP Per Capita}_{t-1}\text{)}$	0.023	0.060	0.055*
	(0.995)	(1.680)	(1.805)
$\text{Ln(CPI Index Level}_{t-1}\text{)}$	-0.007	0.028	-0.034
	(-0.199)	(0.415)	(-0.897)
$\text{Ln(S\&P Index Level}_{t-1}\text{)}$	-0.020	-0.037	-0.031
	(-1.221)	(-1.536)	(-1.417)
$\text{Unemployment Rate}_{t-1}$	0.241	0.155	0.256
	(1.609)	(0.638)	(1.429)
$\text{Ln(Exchange Rate}_{t-1}\text{)}$	-0.013***	-0.014**	-0.010***
	(-3.922)	(-2.379)	(-3.160)
Tangibility_{t-1}	0.057	-0.011	0.033
	(0.751)	(-0.099)	(0.409)
$\text{Ln(Assets}_{t-1}\text{)}$	-0.002	0.010	-0.018
	(-0.163)	(0.701)	(-1.475)
ROA_{t-1}	-0.816***	-1.187***	-0.933***
	(-5.360)	(-5.222)	(-5.137)
$\text{Market-to-Book}_{t-1}$	0.001	0.006	-0.032**
	(0.200)	(0.628)	(-2.284)
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	538	538	538
R-squared	0.744	0.756	0.766

Table A9: Domestic Debt Sample (Baseline Specification)

This table reports the results from the subsample analysis of our baseline specification (Table 2) using the sample from our domestic versus external government debt analysis (Table 4). Standard errors are clustered at the country level. All regressions include country- and year-fixed effects. Standard errors are clustered at both the country and year level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	Book Leverage_t	Debt-to-Capital_t	Market Leverage_t
$\text{Gov. Debt-to-GDP}_{t-1}$	-0.064**	-0.105**	-0.054
	(-2.124)	(-2.481)	(-1.652)
$\text{Ln(GDP Per Capita}_{t-1})$	0.016	0.053**	0.026
	(0.780)	(2.127)	(0.882)
$\text{Ln(CPI Index Level}_{t-1})$	0.033	0.026	-0.030
	(0.816)	(0.488)	(-0.528)
$\text{Ln(S\&P Index Level}_{t-1})$	-0.015	-0.037*	-0.046**
	(-1.129)	(-1.951)	(-2.691)
$\text{Unemployment Rate}_{t-1}$	0.255**	0.352**	0.065
	(2.082)	(2.312)	(0.374)
$\text{Ln(Exchange Rate}_{t-1})$	-0.011**	-0.008	-0.011**
	(-2.627)	(-1.160)	(-2.574)
Tangibility_{t-1}	0.120*	0.012	0.220**
	(1.733)	(0.132)	(2.578)
$\text{Ln(Assets}_{t-1})$	-0.004	0.006	-0.011
	(-0.453)	(0.568)	(-1.168)
ROA_{t-1}	-0.801***	-1.111***	-1.164***
	(-5.312)	(-4.928)	(-4.193)
$\text{Market-to-Book}_{t-1}$	0.001**	0.004***	-0.005*
	(2.143)	(3.363)	(-1.765)
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	671	671	671
R-squared	0.706	0.762	0.715

Table A10: Alternative Clustering (Baseline Specification)

This table reports our baseline estimation results with *Book Leverage* with different assumptions for the level at which standard errors are clustered. All regressions include country- and year-fixed effects. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	Dependent Variable: Book Leverage$_t$			
	No clustering	By year	By country	By year and country
Gov. Debt-to-GDP$_{t-1}$	-0.074***	-0.074***	-0.074***	-0.074***
	(-6.714)	(-7.758)	(-3.617)	(-3.694)
Ln(GDP Per Capita$_{t-1}$)	0.014	0.014	0.014	0.014
	(1.269)	(1.672)	(0.663)	(0.706)
Ln(CPI Index Level$_{t-1}$)	0.017	0.017*	0.017	0.017
	(1.270)	(1.811)	(0.662)	(0.721)
Ln(S&P Index Level$_{t-1}$)	-0.016***	-0.016**	-0.016	-0.016
	(-3.580)	(-2.684)	(-1.361)	(-1.363)
Unemployment Rate$_{t-1}$	0.266***	0.266***	0.266***	0.266***
	(3.494)	(3.427)	(2.992)	(3.367)
Ln(Exchange Rate$_{t-1}$)	-0.014***	-0.014***	-0.014***	-0.014***
	(-10.227)	(-6.716)	(-3.758)	(-3.533)
Tangibility$_{t-1}$	0.048	0.048	0.048	0.048
	(1.489)	(1.579)	(0.662)	(0.679)
Ln(Assets$_{t-1}$)	-0.001	-0.001	-0.001	-0.001
	(-0.330)	(-0.299)	(-0.155)	(-0.162)
ROA$_{t-1}$	-0.812***	-0.812***	-0.812***	-0.812***
	(-11.424)	(-10.311)	(-5.688)	(-5.661)
Market-to-Book$_{t-1}$	-0.000	-0.000	-0.000	-0.000
	(-0.119)	(-0.173)	(-0.110)	(-0.128)
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	813	813	813	813
R-squared	0.697	0.697	0.697	0.697

Table A11: Subsample Analysis - Dropping one country at a time

This table reports the results from the subsample analysis of our baseline specification where each of the countries in our sample are dropped one at a time. The country that is dropped is indicated in the column headings. All regressions include country- and year-fixed effects. Standard errors are clustered at both the country and year level. Statistical significance at the 10%, 5% and 1% levels are denoted by "*", "**" and "***", respectively.

	Argentina	Austria	Australia	Belgium	Brazil	Canada	Switzerland	Chile
Gov. Debt-to-GDP$_{t-1}$	-0.071***	-0.073***	-0.074***	-0.078***	-0.072***	-0.077***	-0.075***	-0.075***
	(-3.471)	(-3.669)	(-3.722)	(-3.534)	(-3.523)	(-3.923)	(-3.555)	(-3.767)
Observations	805	788	788	788	800	788	788	795
R-squared	0.696	0.702	0.700	0.699	0.699	0.698	0.696	0.699
	China	Germany	Denmark	Spain	Finland	France	UK	Greece
Gov. Debt-to-GDP$_{t-1}$	-0.072***	-0.080***	-0.073***	-0.075***	-0.068***	-0.078***	-0.076***	-0.080***
	(-3.537)	(-4.444)	(-3.570)	(-3.511)	(-3.212)	(-4.048)	(-3.869)	(-4.217)
Observations	794	790	791	790	788	788	788	796
R-squared	0.698	0.714	0.701	0.694	0.706	0.702	0.692	0.694
	Hong Kong	Indonesia	Ireland	Israel	India	Italy	Japan	Korea
Gov. Debt-to-GDP$_{t-1}$	-0.074***	-0.075***	-0.074***	-0.075***	-0.069***	-0.078***	-0.057*	-0.065***
	(-3.691)	(-3.728)	(-3.433)	(-3.650)	(-3.384)	(-3.814)	(-1.893)	(-3.235)
Observations	800	801	788	796	794	788	788	794
R-squared	0.682	0.697	0.694	0.692	0.699	0.709	0.687	0.704
	Mexico	Malaysia	Netherlands	Norway	New Zealand	Peru	Philippines	Poland
Gov. Debt-to-GDP$_{t-1}$	-0.076***	-0.075***	-0.070***	-0.075***	-0.080***	-0.075***	-0.077***	-0.070***
	(-3.758)	(-3.655)	(-3.458)	(-3.604)	(-4.235)	(-3.749)	(-3.765)	(-3.286)
Observations	795	794	788	788	790	798	794	795
R-squared	0.702	0.697	0.700	0.693	0.708	0.696	0.695	0.695
	Portugal	Russia	Sweden	Singapore	Thailand	Turkey	US	South Africa
Gov. Debt-to-GDP$_{t-1}$	-0.077***	-0.075***	-0.070***	-0.078***	-0.078***	-0.071***	-0.075***	-0.071***
	(-3.851)	(-3.740)	(-3.372)	(-4.232)	(-3.879)	(-3.456)	(-3.685)	(-3.467)
Observations	793	800	792	789	795	800	788	794
R-squared	0.677	0.691	0.696	0.711	0.688	0.700	0.699	0.692