Financial Crowding Out*

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Abstract:

We show that government deficit financing crowds out private sector financing. Using a novel dataset of accounting and market information that spans most publicly traded firms over the last century, we begin by showing that corporate leverage ratios increased nearly threefold during the 100 years. This increase is systemic in that all three quartiles of the leverage distribution increased, and the increase was experienced in virtually every industry. We then find robust negative relations between both the stocks and flows of government and corporate debt. Cross-sectional analysis reveals that these relations are found among each of the quartiles of the leverage distribution and in virtually every sector of the economy.

Corporate financial policy plays a significant role in a number of real economic decisions including fixed business investment, inventory investment, research and development expenditures, product market strategy, and employment decisions. As such, capital structure determination has received a great deal of attention from financial economists.[1] Despite significant progress, the mechanisms that drive corporate financial policies remain unclear. The goal of this study is to shed light on corporate capital structure choices using a unique dataset containing accounting and market information for U.S. nonfinancial publicly traded firms over the last century.

We begin by showing that the distribution of private sector leverage prior to 1970 – the approximate starting point for most empirical studies – was significantly different from the last 40 years. Both book and market leverage ratios increased nearly threefold from the middle of the 20th century.[2] Closer examination of this distributional shift reveals that it is pervasive and robust. The shift occurred within most every industry and can be seen in a variety of different measures of corporate leverage. Further, this shift is found even among the subsample of the largest 500 firms in the economy for which entry and exit concerns are mitigated.

The flow of funds for each firm reveals that this leveraging process was driven by an increase in debt financing that outstripped asset growth and a moderate increase in equity financing. Firms relied significantly more heavily on long-term debt, and to a lesser extent short-term debt, than during the pre-war years. Emphasizing this change is our finding that the fraction of firms with no debt in their capital structures fell from over 50% in 1944 to less than 10% by 1970.

To investigate this systemic change in financing behavior, we examine the hypothesis that government deficit financing displaces, or "crowds out," private sector financing. Motivation for this hypothesis can be found in early work by Friedman (1978, 1986) and Taggart (1981), which show that changes in government debt have differential effects on the market rates of return to competing securities, such as corporate debt and equity. More recently, studies have found evidence linking government deficit financing to corporate bond returns (Greenwood and Vayanos (2008) and Krishnamurthy and Vissing-Jorgenson (2010)) and corporate debt maturity structure (Hanson, Greenwood, and Stein (2010)).

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[1] See the literature reviews by Hubbard (1998) and Stein (2003) for references and details.

[2] Book leverage is the ratio of the book value of debt to the book value of assets. Market leverage is the ratio of the book value debt to the sum of the book value of debt and the market value of equity.

In the aggregate, there is a significant negative relation between corporate leverage (Debt-to-Asset ratio) and government leverage (Federal debt-to-income ratio). A one percent increase in the government leverage is associated with (i.e., "crowds out") a 7 to 13 basis point decrease in corporate leverage. Equivalently, a one standard deviation increase in government leverage is associated with a one quarter standard deviation decrease in aggregate corporate leverage. This marginal effect on capital structure is significantly larger than that of other macroeconomic factors, such as GDP growth, inflation, and the BAA – AAA corporate bond credit spread. It is also significantly larger than many aggregate firm characteristics, such as profit margins, asset growth, and the market-to-book equity ratio.

This relation is robust. Our findings occur in both levels and first differences. Our results are largely insensitive to the choice of corporate leverage measure – debt-to-assets, debt-to-market capitalization, debt net of cash-to-assets. Nonlinear specifications and additional control variables accounting for variation in taxes, security market conditions, international holdings of U.S. debt, and general economic conditions have little effect on the negative relation between government and corporate leverage. The crowding out relation is found among different sub-periods of the last century, including a specification that eliminates all recessionary periods.

In addition to the level of leverage as described above, this crowding out relation is also found between the net flows of debt capital. A one percent increase in the net flow of government debt relative to GDP is associated with a 9.3 basis point decrease in the net flow of corporate debt relative to total assets. We also find a decline in net equity issuances by corporations in response to increases in government net debt issuances. However, this latter result is economically smaller and statistically insignificant.

Our analysis of the cross-section of firms over the last 100 years reinforces our aggregate findings and sheds new light on the potential mechanisms behind this relation. First, the secular increase in leverage is a distribution-wide phenomenon. We see a similar time-series pattern for all three quartiles of the leverage distribution, as well as the mean. Second, the secular increase in leverage is an industry-wide phenomenon. We find time-series patterns of industry aggregate leverage ratios across all industries that mimic that found in the aggregate. Further, industry level time-series regressions reveal statistically and economically significant negative relations between industry aggregate leverage and government leverage. Finally, we document robust cross-sectional crowding-out effects in firm-year panel regressions, which further corroborates

the negative associations between the stocks and flows of government and corporate debt. In sum, government financing plays a significant role in shaping corporate financing through a crowding out effect.

Our work is related to a large and diverse literature attempting to understand variation in corporate capital structures.[3] More specifically, our study is related to previous work examining the link between public sector and private sector financing decisions. Friedman (1986) shows that government deficit financing via debt influences the returns to corporate debt and equity relative to the yields on long- and short-term treasuries. In order to induce portfolio rebalancing toward government securities, yields on substitute securities must fall. Yields on securities that are closer substitutes to government debt are expected to be affected less. This implies that following an increase (decrease) in government debt financing, market rates on corporate equity should fall (rise) relative to corporate debt, while both rates are expected to fall (rise) relative to Treasuries.

Recent work by Greenwood and Vayanos (2008) and Krishnamurthy and Vissing-Jorgenson (2010) build on these findings. The former study shows that the maturity structure of government deficit financing is positively related to bond yield spreads and excess returns. The latter shows that public sector leverage is strongly negatively related to the interest rate spread of corporate bonds over US treasuries. Our study compliments these findings by showing that the price effects influence quantities.

A recent study by Hanson, Greenwood, and Stein (2010) shows that the debt maturity choice of firms is governed in part by a desire to fill "gaps" in the yield curve created by a relatively weak supply of treasuries at specific maturities. Beyond this adjustment to the maturity structure of their debt liabilities, we show that firms also alter the relative mix of debt and equity – internal and external. Relative to all of these studies, our cross-sectional analysis exploits firm-level variation over the last century in order to further aid identification.

The remainder of the paper is as follows. In Section 1 we discuss the data and sample construction. We also reconcile our data with earlier studies, though most of the details are left to Appendix A. In Section 3 we examine the aggregate link between public sector and private sector financing. In Section 4 we examine cross-sectional variation in corporate behavior at the

[3] For reviews of the capital structure literature see Graham and Leary (2011), Baker (2009), Parsons and Titman (2009), Frank and Goyal (2008), Myers (2003), and Harris and Raviv (1991).

firm-level. This analysis provides for more refined tests of the financial crowding-out hypothesis aimed at addressing identification challenges faced by the aggregate analysis. In Section 5 we conclude.

1. Data and Summary Statistics

Our primary data comes from three sources. The first is Standard and Poor's (S&P) Compustat database, which contains accounting data for publicly held U.S. firms from 1965 to 2010. We supplement this sample with historical accounting data beginning in 1918 that is culled from Moody's Industrial manuals. In combination, these two sources provide accounting data for every U.S. firm listed on the New York Stock Exchange (NYSE) between 1918 and 2010, the American Stock Exchange (AMEX) between 1962 and 2010, and the National Association Security Dealers Automated Quotations (NASDAQ) between 1972 and 2010. We obtain stock market information over the period 1925 to 2010 from the Center for Research in Security Prices (CRSP) monthly stock files.

We exclude from this sample all financial firms as defined by a standard industrial classification (SIC) code between 6000 and 6999, and all utilities defined by SIC codes between 4900 and 4940. The capital structures of these firms are largely determined by regulatory requirements. This exclusion also ensures consistency with the existing capital structure literature (Rajan and Zingales (1995), Frank and Goyal (2003)).

We also gather data on a number of macroeconomic time-series. Together, the corporate data and macroeconomic data form two samples. The first is an annual time-series sample containing aggregate corporate measures and macroeconomic factors. The aggregate corporate measures are constructed by summing across firms each year. For example, corporate book leverage for each year is constructed as the sum of total debt divided by the sum of the total book value of assets. The second sample is a firm-year panel also containing corporate measures and macroeconomic factors. Specific details regarding data sources and variable construction are described in Appendix A.

Table I presents summary statistics for these samples. Panel A examines the aggregate time-series, Panel B the panel data. We present summary statistics for both the levels and first-differences of each variable as indicated at the top of each panel. Focusing on panel A we see that most corporate series are highly persistent, with the exception of asset growth. Aggregate

corporate leverage is approximately 21% and varies significantly over the last 90 years. On average, firms are net security issuers, the majority of which are debt securities.

Government leverage, defined as the ratio of federal debt help by the public to GDP, is on average 40% and highly volatile.[4] We focus on federal debt because it comprises the majority of total government debt, and is responsible for most of its variation over time. As such, replacing federal debt with the sum of federal, state, and local debt has little impact on our findings below. The relative importance of federal debt can be clearly seen in Figure 1, which presents a stacked area chart of government debt divided by GDP. In fact, the estimates of state and local debt are somewhat misleading. A significant fraction of state and local assets consists of U.S. treasuries (on average $0.5 trillion between 2000 and 2010). Thus, state and local governments can act as a pass through for federal debt by issuing their own debt claims against these assets.

Panel B presents similar statistics for the firm-year panel sample. We winsorize each ratio at the upper and lower one percentiles to address possible data-coding errors and mitigate the influence of outliers on our results. These statistics provide a useful benchmark for comparison with more recent studies of capital structure (e.g., Frank and Goyal (2005), Lemmon, Roberts, and Zender (2008)). They are also useful for quantifying the economic significance of several our findings below. As such, we refer back to these estimates later.

2. Aggregate Analysis

2.a Graphical Analysis

Figure 2 illustrates the relation between government and corporate leverage. We focus on corporate leverage defined as the ratio of total debt to total book value of assets for two reasons. First, book leverage is one of the most common measures of leverage used in the empirical capital structure literature. Second, the focus of most corporate financial managers, such as CFOs and Treasurers, and bankers is on book value based measures of leverage (Taylor and Sansome (2007)). Nonetheless, in our formal statistical analysis below, we examine several alternative measures of corporate leverage.

During the last century, government debt experienced several notable transitions beginning with a dramatic expansion after the Great Depression to fund World War II. From its

[4] We focus on federal debt help by the public to avoid "double counting" of debt because a significant amount of U.S. treasuries are held by other government entities, such as the social security administration.

peak of 109% of GDP in 1946, government debt as a share of income fell steadily until 1972 when it leveled off at approximately 25% of GDP. The 1980s saw a renewed increase in public sector leverage that persisted until the mid-1990s. In 2008, public debt-to-GDP began another dramatic increase in response to the most recent recession and financial crisis.

Turning to corporate leverage, a negative relation with government leverage is apparent. As government leverage increased sharply from 1917 to 1945, corporate leverage experienced a less severe but nonetheless significant decline from 14% to 8% over this same period. From 1945 to 1970, as government debt fell, corporate leverage increased more than threefold to 27.6%. After little change during the 1970s, corporate leverage increased sharply in the mid-1980s in conjunction with the leveraged buyout boom (Kaplan and Stromberg (2009)) before trending downward over the next thirty years.

Figure 3 examines alternative measures of corporate leverage to emphasize the robustness of the patterns just discussed. We investigate whether changing sample composition could explain the aggregate time series relation. To mitigate this possibility, we examine an alternate sample limited to the largest 500 firms (based on book value of assets) in each year. We also examine corporate market leverage defined by the ratio of total debt to total market value (i.e., total book debt value plus equity market capitalization). The first series is virtually identical to that found in Figure 2. The market leverage series is more volatile, a consequence of equity market capitalization in the denominator, but also exhibits a broadly similar pattern in terms of changing trends. Finally, we examine the ratio of debt net of cash holdings to total assets. This last series shows an even more pronounced negative relation to government leverage.

Importantly, the crowding out relation is not only present in the level of debt but also in the flow of debt. Panel A of Figure 4 plots corporate net debt issuances scaled by lagged assets against government net debt issuances scaled by lagged GDP. The large spike in government debt to finance World War II expenditures makes the relation more difficult to detect. However, close inspection reveals a fairly clear negative association between the flows of corporate and government debt. Panel B of Figure 4 presents a similar plot replacing corporate net debt issuances with corporate net equity issuances scaled by l

agged assets. There appears to be a similar negative relation, though somewhat less clear.

The graphical relations between corporate and government financial policies are consistent with financial crowding out. The next subsection examines this hypothesis more formally.

2.b Econometric Analysis

2.b.1 Corporate Leverage

Table II presents ordinary least squares (OLS) regression results for several models of corporate leverage. More precisely, we estimate the following regressions

$$(1)\ CL_t = \alpha + \beta GL_t + \Gamma X_t + \phi t + \varepsilon_t,$$

and

$$(2)\ \Delta CL_t = \alpha + \beta \Delta GL_t + \Gamma \Delta X_t + \eta_t.$$

Corporate leverage is denoted *CL*, government leverage *GL*. We include a time trend, *t*, in the level specification to absorb any finite sample time trends. We use Δ to denote the first difference operator ($\Delta CL = CL_t - CL_{t-1}$). We focus on corporate book leverage, measured as the ratio of total debt to total assets. In our robustness tests below, we consider alternative measures of corporate leverage. Serial correlation in the error term of both equations is addressed with Newey-West standard errors assuming a two-period lag structure.

The estimates reveal the following inferences. First, government leverage and corporate leverage are strongly negatively related. This relation is robust to the inclusion of both macroeconomic and firm characteristic control variables. This relation is also found in both levels and first differences. Looking at column (3) of Table II, we see that a one percentage point increase in government debt financing is associated with a 6.5 basis point decrease in corporate debt financing. Combined with the summary information found in Panel A of Table I, these estimates imply that a one standard deviation increase in government leverage (17.7%) leads to a 1.2% decline in corporate leverage. Relative to the annual standard deviation of corporate leverage (7.8%), this marginal effect is economically significant.

The estimates also indicate that macroeconomic conditions play an important role in shaping corporate leverage. Corporate leverage is counter-cyclical: high and increasing during economic slowdowns. Inflation is positively associated with corporate leverage, consistent with the findings of Frank and Goyal (2009), though two of the four point estimates are statistically insignificant. Changes in the credit spread (BAA – AAA yield spread) have a strong negative

impact on corporate leverage, while the rate of change in the credit spread has precisely the opposite effect. In other words, corporate leverage is lower when the spread is large and tends to increase when the spread widens. A wide spread implies that credit for (most) corporations is relatively expensive. Spreads increase precisely when firms take advantage of relatively inexpensive debt financing. Likewise, the rate of change in the AAA-treasury yield spread is positively associated with corporate leverage changes, suggesting that bond market liquidity plays a role in shaping leverage.

Finally, firm characteristics have a mixed role in determining corporate leverage. Profit margins and asset growth are statistically negligible in both the level and first difference specifications. The level of tangible assets is strongly positively related to corporate leverage. This result is consistent with the importance of collateral for securing debt (Stulz (1985)). The change in the market-to-book equity ratio is negatively related to changes in corporate leverage. Improving investment opportunities coincide with declining leverage ratios, consistent with the implications from theories of debt overhang (Myers (1977)).

The importance of government leverage is consistent with the notion that, in the aggregate, the willingness of investors to hold certain securities is an important determinant of corporate leverage (Baker (2009)). This view adds a new dimension to traditional capital structure theories which emphasize firms' demand for various securities as a means to mitigate market imperfections, such as taxes and bankruptcy costs (e.g., Scott (1976), Leland (1994)). Our findings highlight the importance on firm-specific debt ratios of a less than perfectly elastic supply of funds from investors.

Table III presents the results of a host of additional robustness tests. The baseline model for this analysis includes the following covariates: government leverage, GDP growth, inflation, BAA-AAA corporate bond yield spread, and the AAA-10-year Treasury bond yield spread. The dependent variable is corporate leverage, measured contemporaneously with the covariates unless otherwise specified. We modify this baseline specification in a variety of ways, as indicated by each row in Table III. The figures in each row correspond to the coefficient estimates (and t-statistics in parentheses) on the government leverage variable. The first row corresponds to specifications in levels of all of the variables, the second row first differences.

The first four rows of Table III explore alternative measures of corporate leverage. The first row examines the ratio of debt-to-assets computed using the data from only the 500 largest

(by asset value) firms in our sample each year. This change is motivated by concerns over firm entry and exit into our sample over time. As discussed above, a changing sample composition is significantly mitigated by focusing on the largest firms in the economy. The next row defines corporate leverage as the ratio of "net debt" (debt – cash holdings) to assets. The first change has little effect on our estimates, when compared to columns (2) and (5) in Table II. The marginal effect of government leverage on net debt leverage is significantly larger in magnitude. Thus, firms appear to stockpile cash holdings when government leverage increases, perhaps because of corporate concerns that debt markets may not provide necessary corporate funding when government debt is high.

The third row normalizes debt by sales. While unconventional, this measure is motivated by the definition of government leverage, which is a ratio of a stock (Debt) to a flow (GDP). Other than a statistically weak estimate in the difference specification, the results are qualitatively similar. Finally, we normalize total debt by the market value of the company in the fourth row. The market value of the company is defined as the sum of the book value of debt and the equity market capitalization of the company.[5] Again, the results are similar to previous estimates.

The next five rows alter the independent variables, *X*. We first lag all of the covariates, including government leverage. The levels estimate is largely unaffected, but the difference estimate in the differences specification is no longer significant. Given the persistence in the levels of both leverage series, these results are unsurprising. Lagged levels contain similar information to contemporaneous levels. However, differencing produces a series that is close to white noise and contains little information about future (or past) periods.

The following rows return to a contemporaneous relation between left- and right-hand-side variables and incorporate additional macroeconomic controls. We first include measures of the corporate tax rate and a debt tax incentive variable. The latter variable is defined as:

$$(3)\ \text{Debt Tax Incentive} = \frac{tax_{Corporate} - tax_{Personal}}{\left(1 - tax_{Personal}\right)}$$

[5] Practically speaking, it is extremely costly, if not impossible, to get the total market value of debt for most firms. The majority of debt securities do not have a publicly available price (bank loans) or even an informative price (illiquid bonds). As such, we follow the convention in the capital structure literature of proxying for the market value of debt with the book value. For financially healthy companies, this is a reasonable approximation since most debt issued at par.

This measure incorporates the countervailing effect of personal taxes on firms' incentives to use debt. Neither variable has a significant effect on the government leverage coefficient.

Similarly, including the stock market return and the unemployment rate does little to alter the estimated relation between corporate and government leverage. Because GDP growth and inflation are also included in each regression, this makes it more difficult to argue that unmeasured aggregate demand shocks are driving the relation between the leverage variables. However, we pursue this alternative more deeply in our firm-level analysis below. We also add a measure of foreign holdings of U.S. debt. As figure 5 shows, foreign holdings of U.S. debt has increased dramatically over the last 40 years. This increase represents an opening of global credit markets and expansion of the potential investor base. We do find that foreign holdings are negatively associated with the level of corporate leverage (unreported), but this association has no impact on the relation between corporate and government leverage.

The next two rows attempt to address functional form concerns. We include second- and third-order polynomials of every control variable, except for government leverage. There is a slight attenuation in the estimated coefficients, but both are still economically and statistically large. We next examine leverage in a fractional response model (Papke and Wooldridge (1996)). Intuitively, this model is akin to a logit but allows for y-values that lie on the boundaries of the unit interval, [0,1]. This model recognizes that our dependent variable is a fraction. Because this functional form is only defined on the unit interval, we can only estimate the model in level form. The resulting coefficient estimate is highly statistically significant.

Our final robustness tests split the sample in half – pre-1965 and post-1964. In the early period, the estimates are similar to those found in the whole sample. In the latter period, the estimate in the difference specification is negative, economically large in magnitude (-0.118 compared to -0.051 from column (5) of Table II), and statistically significant at the 5% level. However, the estimate in the level specification is slightly positive but statistically insignificant. These results suggest that a different dynamic may be at work in the latter half of our sample. We investigate this possibility more carefully below.

The last two rows examine subsamples removing certain subsets of observations. We first remove observations from 1945 to 1965 to ensure that the 20 year decline in government leverage is not solely responsible for our findings. The level regression is largely unaffected by this change. The first difference specification produces an estimate that is significant only at the

10% level, but still economically significant. The decline in statistical power is unsurprising given the removal of the period containing the largest change in the independent variable. The last specification removes all years in which more than one quarter was deemed a recession by the National Bureau of Economic Research. The results are again unaffected, despite reducing the number of observations by over 30%.

In sum, the negative relation between corporate and government leverage is strong and robust. In order to move closer to understanding the mechanism behind this relation, we next examine the link between corporate and government security issuances.

2.b.2 Corporate Security Issuances

While the first difference specifications examined above are suggestive of a link in financing decisions, they are confounded by contemporaneous changes in the denominator – assets and GDP. This section focuses on the flows of corporate debt and equity and how they relate to the flows of government debt.

Figure 4 plots net debt issuances of the corporate sector and federal government. As with the relative level of debt, the flows of debt capital are clearly negatively related. We formally investigate this relation with the following regression:

$$(4)\ \Delta CD_t = \alpha + \beta \Delta GD_t + \Gamma X_t + \eta_t ,$$

where ΔCD_t is the change in corporate debt from *t-1* to *t* divided by total assets at *t-1* and ΔGD_t is the change in federal debt from *t-1* to *t* divided by GDP at *t-1*. We also estimate the following regression linking net equity issuances by corporations to government net debt issuances

$$(5)\ \Delta CE_t = \alpha + \beta \Delta GD_t + \Gamma X_t + \eta_t ,$$

where ΔCE_t is dollar value of corporate net equity issuances from *t-1* to *t* divided by total assets at *t-1*. The control variables in both equations (4) and (5) are denoted by X_t. These controls consist of both macroeconomic factors and firm characteristics found in Table II. We incorporate both levels and first differences of the control variables. Serial correlation in the error term of equations (4) and (5) is addressed by Newey-West standard errors assuming a two-period lag structure.

Table IV presents the coefficient estimates for the government debt issuance term and model information for equations (4) and (5). Focusing first on net debt issuances, we see a significant negative relation between corporate and government net debt issuing activity. A one

percent increase in the relative flow of government debt is associated with a 7 to 9 basis point reduction in the flow of corporate debt relative to assets. Net equity issues also show a negative relation with government debt issues. However, this relation becomes statistically insignificant once we control for firm characteristics. Economically speaking, the magnitude of the coefficient is less than half that in the net debt issuance specification. Closer inspection reveals that the market-to-book equity ratio is largely responsible for the attenuation of the government issuance coefficient in the net equity issuance model. This suggests the stronger coefficients in columns (4) and (5) are driven in part by correlation between government debt issuance and the aggregate market-to-book ratio.

These findings reinforce the leverage results above. Government financing has a strong negative effect on the net flow of corporate debt and, to a lesser extent, corporate equity. This relation between security issuances is behind the similar relation between corporate and government leverage. Together these results suggest that government debt crowds out corporate debt, and to a lesser extent equity, which leads to a significant impact on corporate capital structure.

3. Firm-Level Analysis

3.a Leverage Quartile Responses to Federal Debt

Figure 6 plots breakpoints of the quartiles of the leverage distribution for each year between 1918 and 2010. The figure shows that the increase in aggregate leverage observed in Figure 2 is not confined to a specific region of the distribution. Rather, the entire leverage distribution experiences a "rightward" shift between 1946 and 1970. After 1970, we see a gradual increase in interquartile spread. The lowest quartile and median experience 40 year downward trends, though the median trend is slightly less steep. The 75th percentile remains relatively flat between 1970 and 2010.

Table V compliments Figure 6 by showing that the relation between government and corporate debt is also found within each leverage quartile. Specifically, we compute the quartiles of the leverage distribution each year. This produces three time-series consisting of the 25th, 50th, and 75th percentiles of the leverage distribution. We then regress each time-series on government leverage and macroeconomic control variables. We estimate the regressions in level and first-

difference form. For the level regressions, we include a time trend. Standard errors are computed using Newey-West standard errors assuming a two-period lag structure.

The results highlight the pervasiveness of the link between government and corporate leverage. The first row reveals a statistically and economically significant coefficient on government leverage for each of the regressions. The one exception is the 25th percentile of leverage in the first difference specification, where the coefficient is significant only at the 10% level. The results also reveal a heterogeneous relation between government debt usage and the different quartiles of the leverage distribution. In particular, the 25th percentile of leverage is less sensitive to changes in government debt than the other quartiles. From Figure 6, the 25th percentile is often zero, indicating that financial crowding out is less relevant for firms not relying on debt.

3.b Industry Leverage

Figure 7 presents plots of industry aggregate leverage (solid line) for each of the 12 Fama and French industry classifications (excluding financials and utilities). To ease comparisons, we also plot government leverage (dashed line) in each panel. Industry leverage is more volatile than aggregate leverage. This is due in large part to smaller sample sizes, particularly in the first half of the century.[6] Industry leverage also reveals some of the heterogeneity present in the cross-section. However, the general trends observed in aggregate leverage appear in each industry. In particular, each industry reveals a strong positive trend between 1945 and 1970. Further, this upward trend tends to taper off after 1970.[7]

Table VI examines the relation between industry corporate leverage and government leverage in a regression setting. We begin with an industry fixed effects panel regression estimated in levels,

$$(6)\quad CL_{jt} = \alpha + \beta GL_t + \Gamma X_{jt} + \phi t + \mu_j + \varepsilon_{jt},$$

and differences,

[6] The large spike in 1988 in the Consumer Durables industry is due largely to the passage of FASB No. 94 which required consolidation of all majority-owned subsidiaries. This rule change most noticeably impacted a number of large, manufacturing firms (e.g., Ford, General Motors, Chrysler, General Electric, etc.) with significantly levered financing subsidiaries. We have addressed this issue by deducting the financial subsidiary data from the consolidated accounts when this information is available.

[7] The large spike in consumer durables occurring in 1988 is due in large part to large leverage increases by four of the largest companies in this sector: Ford Motor Co. (41.04%), General Electric Co. (40.71%), Chrysler Corp. (37.75%), and General Motors (29.68%).

$$(7)\ \Delta CL_{jt} = \alpha + \beta \Delta GL_t + \Gamma \Delta X_{jt} + \eta_{jt}.$$

The unit of observation is an industry-year. The data is constructed from the firm-year level panel by aggregating up to the industry level. All variables are as defined above in equations (1) and (2) above. Industry fixed effects are denoted μ_j and all standard errors are constructed using the Newey-West approach with a two-period lag structure. For the control variables, we incorporate macroeconomic controls – GDP growth, inflation, the BAA – AAA corporate bond credit spread, and the AAA-treasury yield spread – and firm characteristic controls – profit margin, asset tangibility, market-to-book equity ratio, and asset growth.

Both the levels and first differences specifications reveal highly statistically significant coefficients on the government leverage coefficient. This is true of both functional forms and both sets of control variables. Indeed, the magnitudes of the estimates are similar to those found in the aggregate regressions of Table II.

The remaining rows present the results of individual time-series regressions run at the industry level. Specifically, we estimate equations (1) and (2) using industry aggregate leverage as the dependent variable. For these regressions, we include only macroeconomic control variables to ensure a complete time-series and avoid small sample sizes in the construction of the industry aggregates. (Firm characteristics are missing more often in the pre-war era.) The results reveal statistically and economically significant findings for every industry in the levels specification. The results for the first difference specifications are statistically noisier, though every industry reveals a negative relation and most magnitudes similar to that found in the aggregate.

The industry results also reveal interesting heterogeneity in the sensitivity of corporate debt policy to government debt policy. We discuss the level results because of their statistical precision. The most sensitive industries are "Manufacturing," "Wholesale, Retails & Some Services," and "Everything Else." These are also the three most highly levered industries with average leverage ratios of 20.0%, 24.8%, and 25.1%, respectively. Consistent with the leverage quartile regression results, the crowding out effect is greatest among the industries that are most reliant on debt financing.

3.c Firm Leverage

Table VII presents the results from firm-year panel regressions. Panel A examines corporate leverage ratios – both book and market leverage ratios. Panel B examines net debt and net equity issuances scaled by lagged assets. All standard errors are corrected for clustering at the firm level and are robust to heteroskedasticity (Petersen (2009)).

Focusing first on Panel A, we see that government leverage is strongly negatively correlated with corporate leverage across all models. The first and fourth columns present the pooled OLS estimates that ignore any firm-level heterogeneity. The second and fifth columns employ firm fixed effects, estimating the model via OLS after a within-firm transformation of the data. The third and sixth columns estimate a first-differenced version of the model.

Across all estimations, the negative coefficient on government leverage is negative and statistically significant. The magnitude of the coefficient is uniformly larger for market leverage relative to book leverage. This difference is due in part to the greater variation in market leverage (see Panel B of Table I). The coefficients on the control variables are similar to those found in previous studies of capital structure (e.g., Frank and Goyal (2009)).

Panel B of Table VII presents similar results for the net debt and net equity issuances. Government leverage is strongly negatively related net debt and net equity issuances across all the estimations methods, despite including levels and first differences of all macroeconomic and firm control variables.

4. Conclusions

We show that corporate leverage experienced a significant secular increase over the last century that affected firms across industries. More broadly, we find that government deficit financing crowds out corporate financing. As the government increases (decreases) its usage of debt, corporations respond in precisely the opposite manner.

In addition to uncovering a new and important mechanism behind capital structure variation, our results move closer to providing evidence consistent with the importance of government policy for real outcomes. Given the importance of financing for investment, R&D expenditures, inventory accumulation, and labor policy, our analysis highlights the distinct possibility that government activity crowds out these real outcomes via their impact on financing.

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Appendix A: Data Sources, Sample Construction and Variable Definitions

This appendix provides details on the data sources, sample construction, and variable construction. We use the acronym GFD for Global Financial Database, a source for many macroeconomic series.

Gross Domestic Product Implicit Price Deflator: Source = GFD, Series = USGDPD, Annual data from 1947 to 2010.

United States Annualized Exports of Goods and Services: Source = GFD, Series = USEXPGSQ, Annual data from 1947 to 2010.

United States Annualized Exports of Goods and Services: Source = GFD, Series = USIMPGSQ, Annual data from 1947 to 2010.

United States Gross Federal Debt Held by the Public (Bil. of $, NA), Source = GFD, Series = USFYGFDPUBA, Annual data from 1938 to 2010. This series is extended back in time by assuming that total federal debt is equal to federal debt held by the public. Pre-1938 federal debt data is obtained from, http://www.usgovernmentspending.com/federal_state_local_debt_chart.html.

Corporate Income Tax Rate: This rate corresponds to the top corporate income tax rate. Source = "Corporation Income Tax Brackets and Rates, 1909-2002", http://www.irs.gov/pub/irs-soi/02corate.pdf. Annual data from 1909 to 2010.

United States M1 Money Stock: Source = GFD, Series = USM1W, Year-end monthly data from 1929 to 2010.

United States M2 Money Stock: Source = GFD, Series = USM2W, Year-end monthly data from 1947 to 2010.

United States State and Local Debt: Source = US government spending (http://www.usgovernmentspending.com/federal_state_local_debt_chart.html), Annual data from 1902 to 2010.

United States Nominal GDP: Source = GFD, Series = GDPUSA, Year-end annual data from 1790 to 2010.

United States Unemployment Rate: Source = GFD, Series = UNUSAM, Year-end annual data from 1890 to 1928. Year-end monthly data from 1929 to 2010

International Holdings of US Debt: Source = Flow of Funds, Series = Foreign Holdings of U.S. Treasuries. Annual data from 1945 to 2010. Prior to 1945 we assume that there are no foreign holdings of US treasuries.

USA Government 90-day T-Bills Secondary Market: Source = GDP, Series = ITUSA3D, Year-end monthly data from 1920 to 2010.

USA 10-year Bond Constant Maturity Yield: Source GFD, Series, IGUSA10D, Year-end monthly data from 1790 to 2010.

United States BLS Consumer Price Index NSA: Source GFD, Series, IGUSA10D, Annual data from 1820 to 1874. Monthly data from 1875 to 2010 collapsed to an annual series by averaging within years.

Moody's Corporate AAA Yield: Source GFD, Series, MOCAAAD, Year-end monthly data from 1857 to 2010.

Moody's Corporate BAA Yield: Source GFD, Series, MOCBAAD, Year-end monthly data from 1919 to 2010.

Variable Construction

Inflation = [CPI(t) – CPI(t-1)] / CPI(t) where CPI(t) is the consumer price index in year t computed as the average monthly CPI for the year.

US Net exports = [US exports – US imports] / US GDP

GDP growth = [GDP(t) – GDP(t-1)] / GDP(t-1) where GDP(t) is US gross domestic product in year t.

Government Leverage = US public debt held by the public in year t / GDP(t)

Net Debt Issuances by the US Governement = Change in US public debt held by the public from year t-1 to t / GDP(t-1)

Book Leverage = Total Debt / Total book value of assets

Market leverage = Total Debt / (Total Debt + Equity Market Capitalization)

Net Debt leverage = (Total Debt – Cash) / Total book value of assets

Net Debt Issuance = [Total Debt(t) – Total Debt(t-1)] / Total book value of assets(t-1)

Net Equity Issuance = [Equity issues(t) – Equity repurchases(t)] / Total book value of assets(t-1)

Market-to-Book Equity Ratio = Equity Market Capitalization / Book Equity

Profitability = operating income before depreciation / total book value of assets

Tangibility = net plant property and equipment / total book value of assets

Asset growth = [Total book value of assets(t) - Total book value of assets(t-1)] / Total book value of assets(t)

Altman's Z-Score = [3.3 x Pretax income + Total sales + 1.4 x Retained Earnings + 1.2 x (Current Assets – Current Liablities)] / Total book value of assets

Figure 1
Government Leverage

The figure presents a stacked area chart of government debt at the federal, state, and local levels. We normalize these levels by GDP.

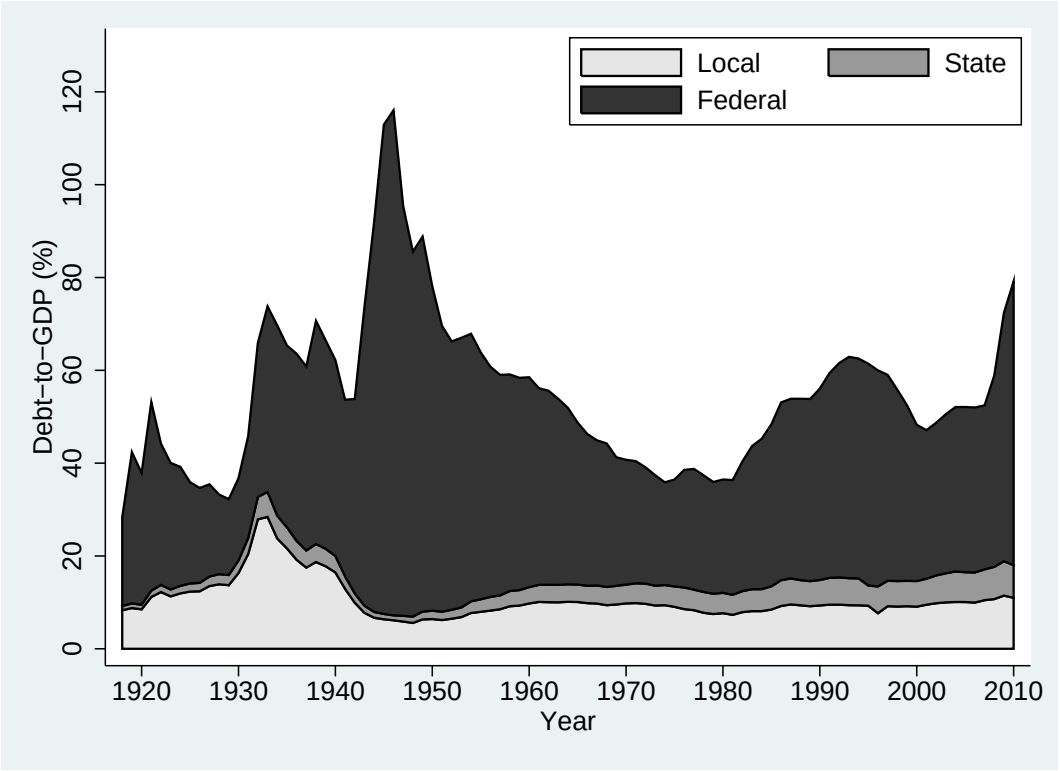


Figure 2
Corporate and Government Leverage

Corporate leverage is the ratio of total debt to total assets. Government leverage is the ratio of total public sector debt to GDP.

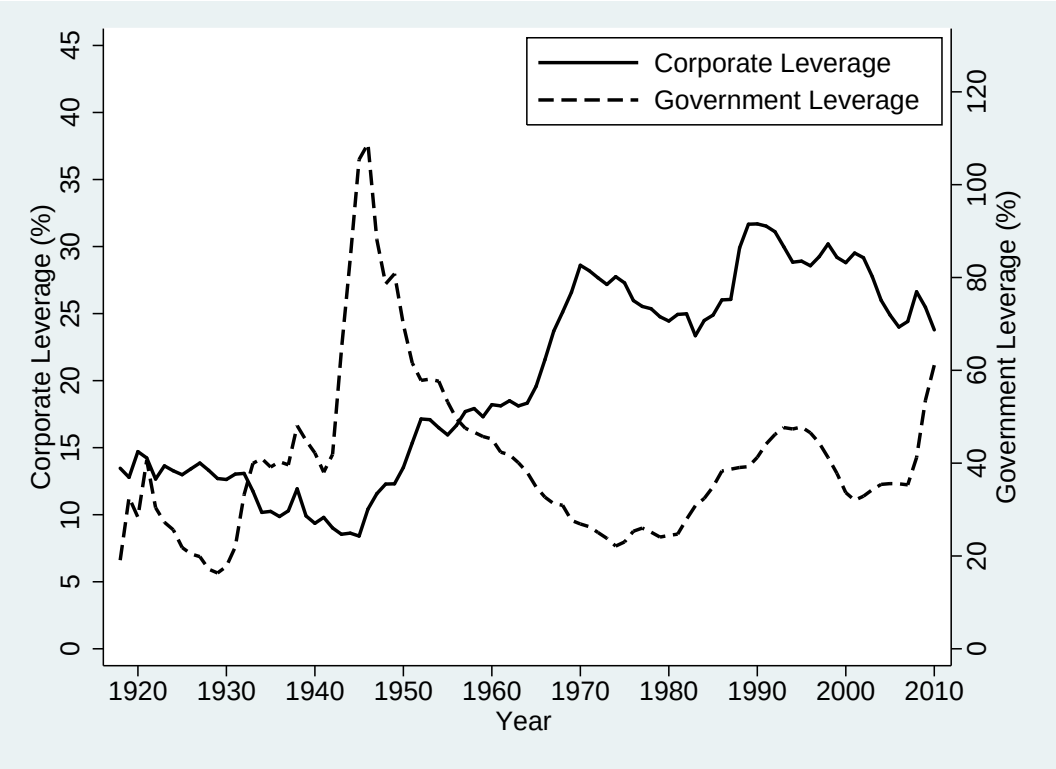


Figure 3
Alternative Measures of Corporate Leverage

The figure presents time-series for three alternative corporate leverage measures. Corporate leverage of big firms is the ratio of total debt to total assets for the 500 largest firms in the sample each year. Corporate market leverage is the ratio of total debt to the sum of total debt and equity market capitalization. Corporate leverage net of cash is the ratio of total debt minus cash and short term investments to total assets.

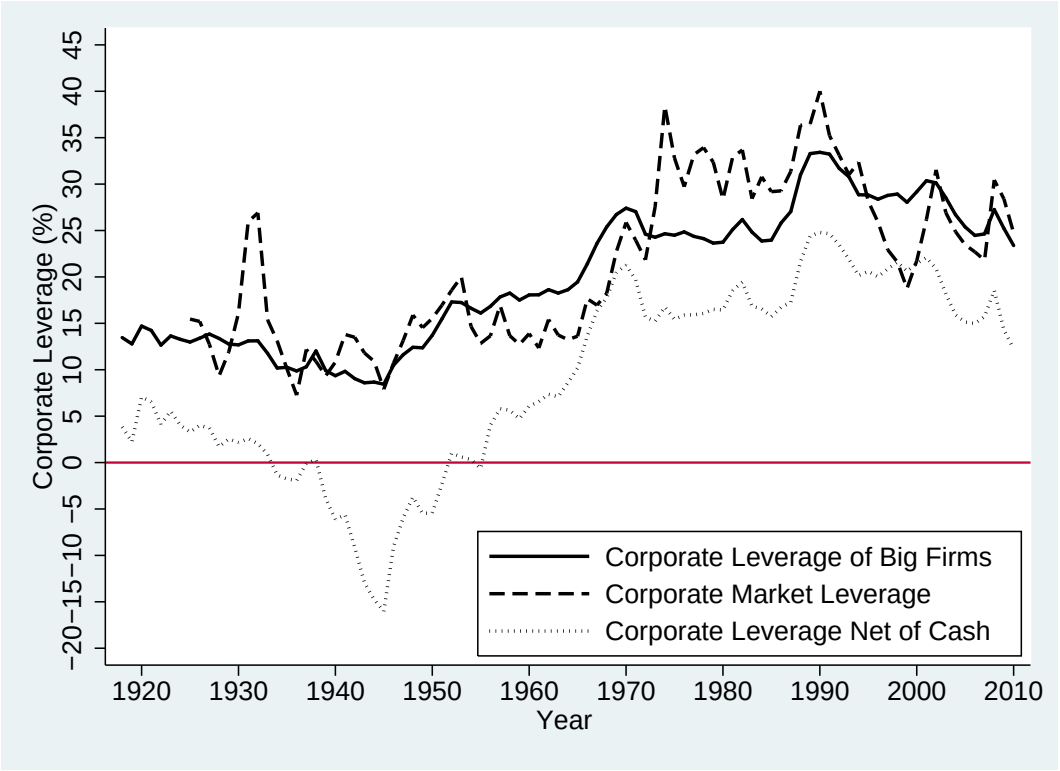
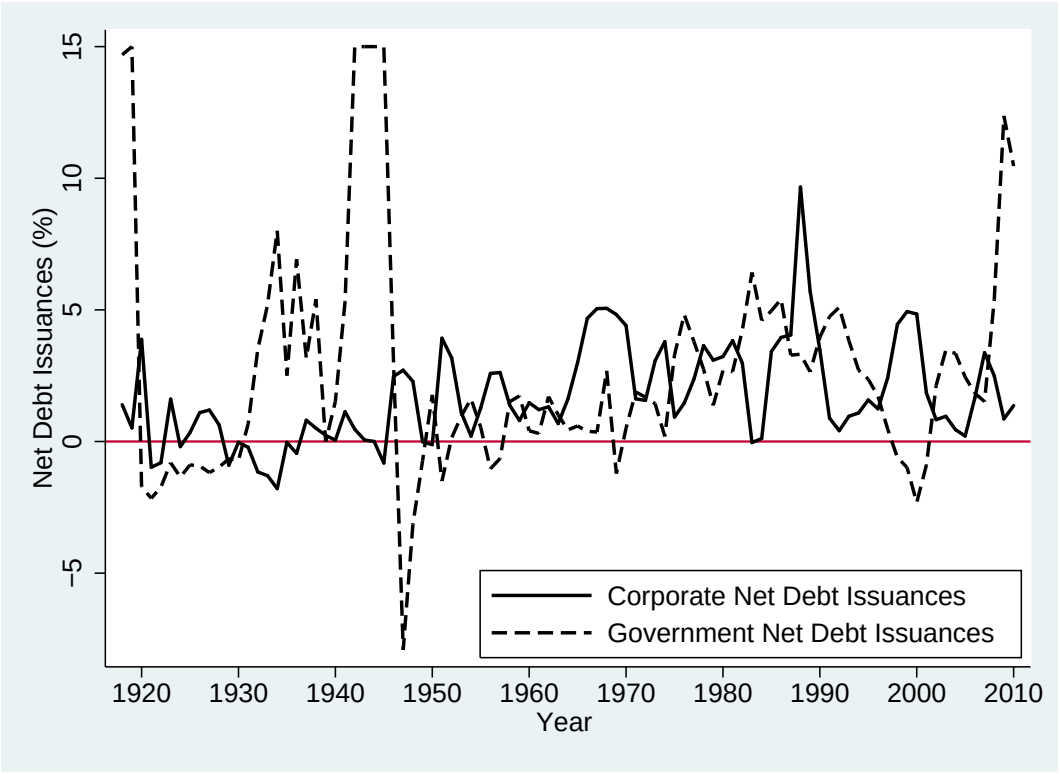


Figure 4
Corporate and Government Net Security Issuances

The figure presents corporate and government net debt issuances. Corporate net debt issuances is defined as the ratio of the change in debt dividend by lagged assets. Government net debt issuances is defined as the ratio of the change in federal debt help by the public divided by lagged GDP. To ease the presentation, we truncate the government net debt issuance series at 15% of lagged GDP.

Panel A: Corporate Net Debt Issuances



Panel B: Corporate Net Equity Issuances

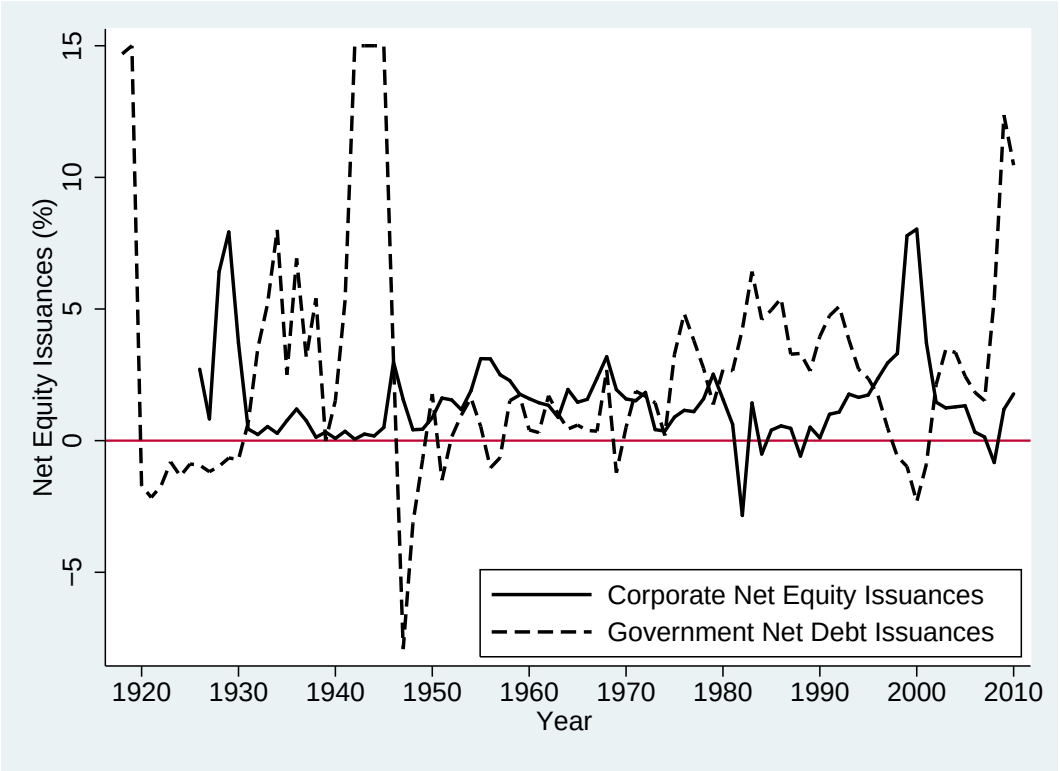


Figure 5
Foreign Holdings of U.S. Debt

The figure presents the fraction of U.S. federal debt held by foreigners.

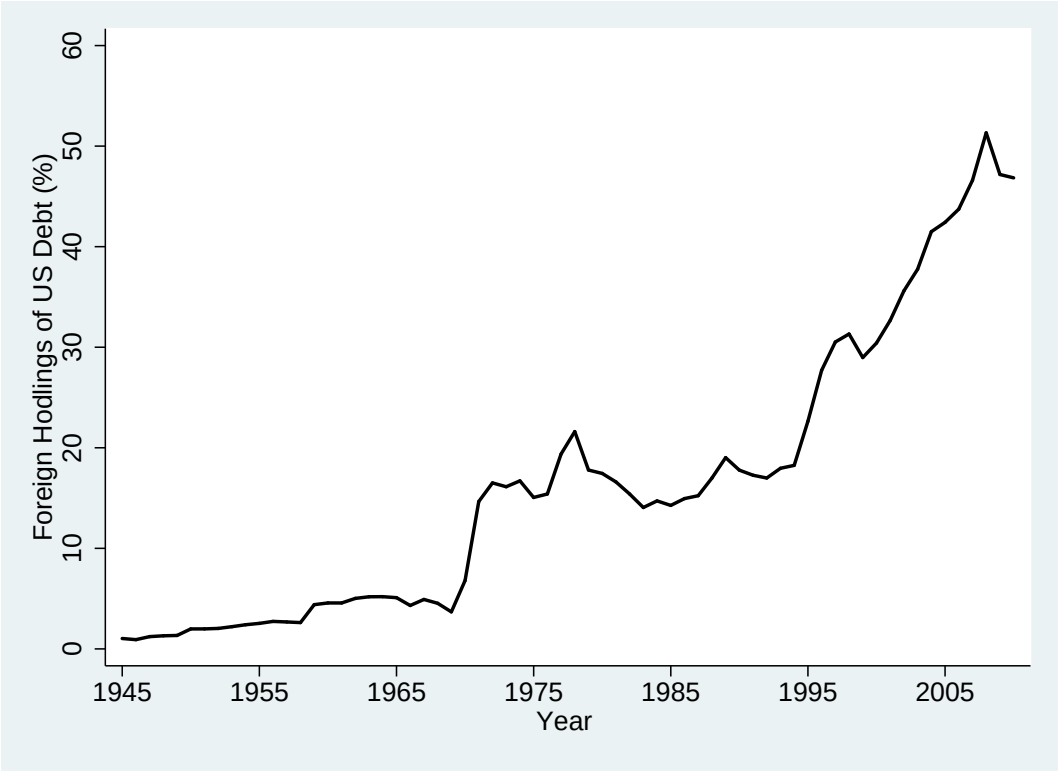


Figure 6
Corporate Leverage Quartiles

The figure presents the 25^{th},50^{th}, and 75^{th} percentiles of the cross-section distribution of corporate leverage each year. Corporate leverage is the ratio of debt to total assets.

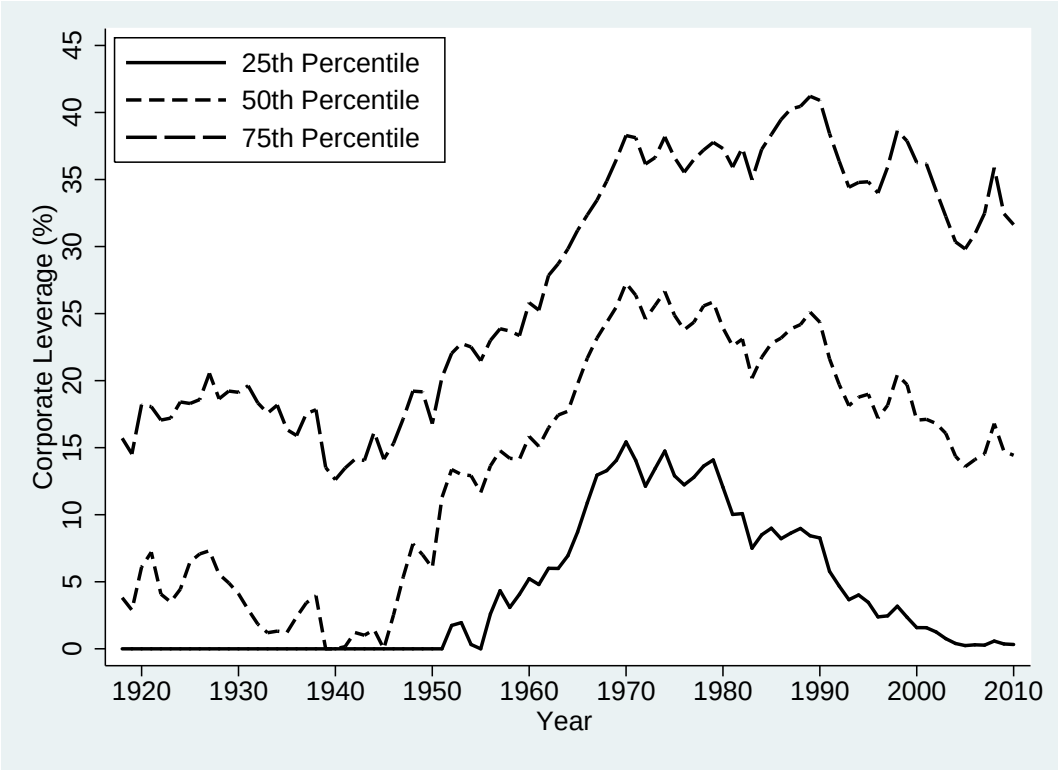
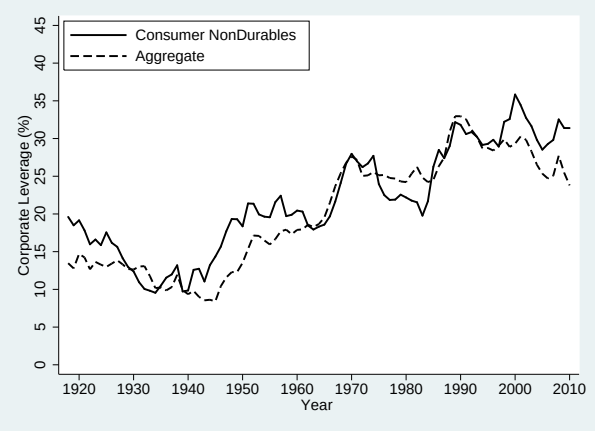
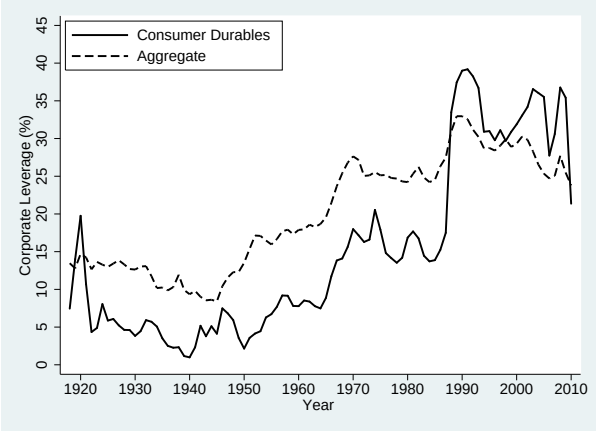
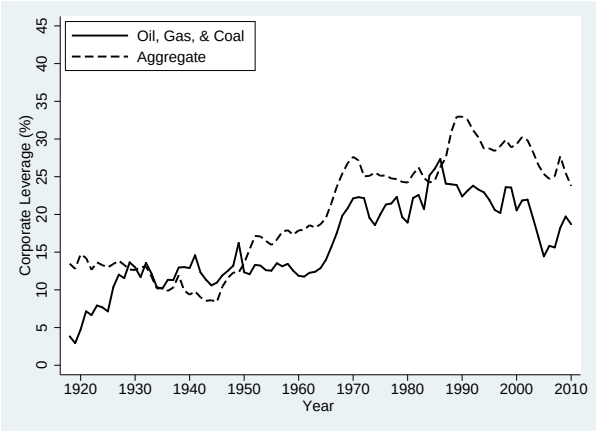


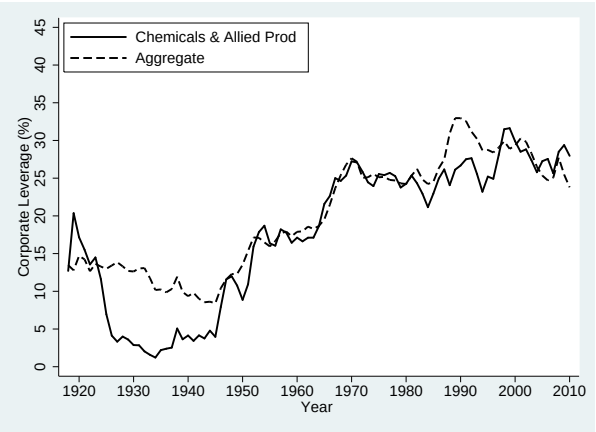
Figure 7
Industry Leverage

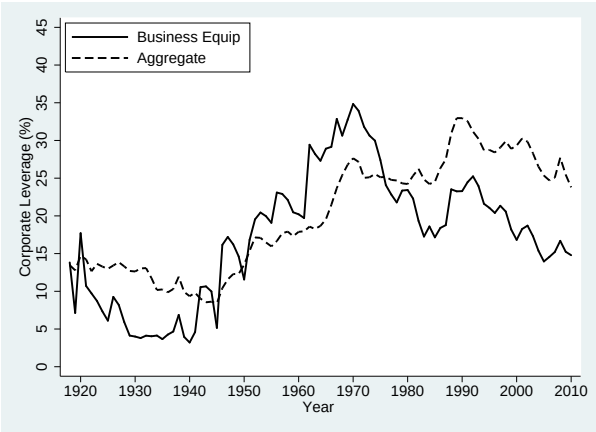
The figure presents the asset value-weighted average leverage ratio for each of the 12 Fama and French industry classifications. capital structure and government leverage defined as the ratio of federal debt help by the public divided by GDP.

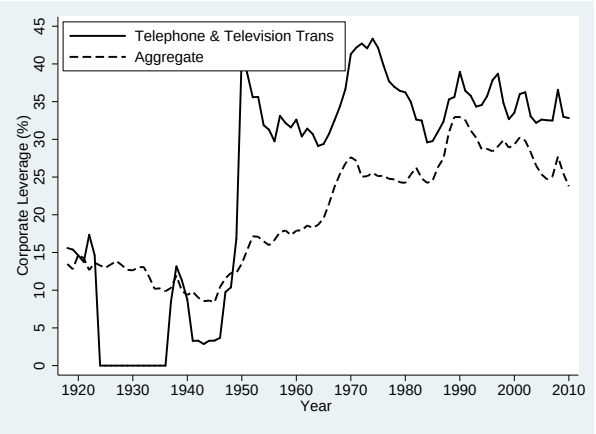


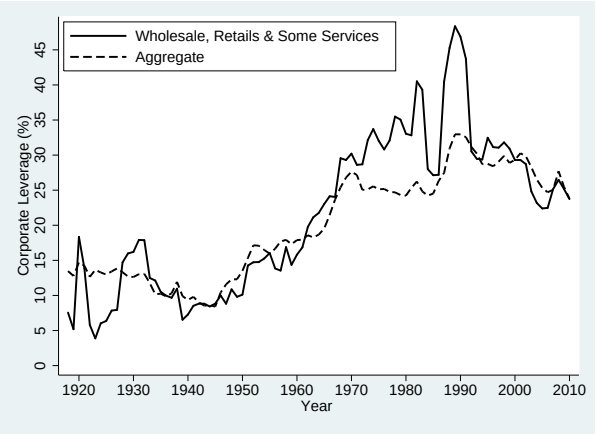


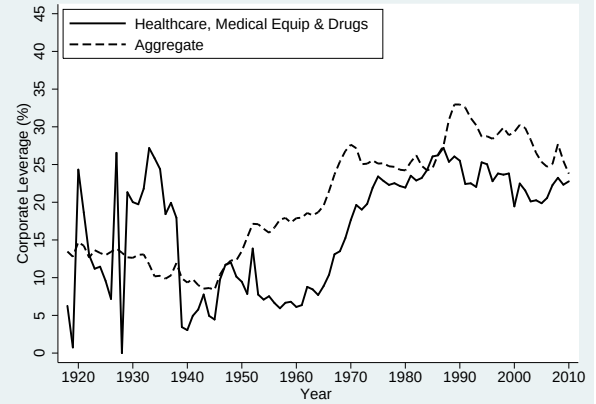







Telephone & Television Trans
Aggregate
Corporate Leverage (%)
0
5
10
15
20
25
30
35
40
45
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
Year


Wholesale, Retails & Some Services
Aggregate
Corporate Leverage (%)
0
5
10
15
20
25
30
35
40
45
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
Year


Healthcare, Medical Equip & Drugs
Aggregate
Corporate Leverage (%)
0
5
10
15
20
25
30
35
40
45
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
Year

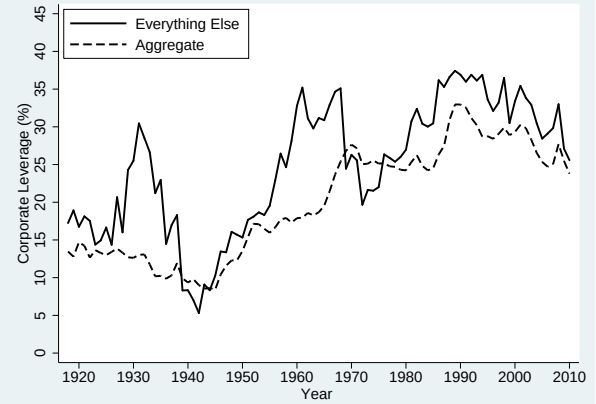

Everything Else
Aggregate
Corporate Leverage (%)
0
5
10
15
20
25
30
35
40
45
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
Year

Table I

Summary Statistics

Panel A presents summary statistics — mean, standard deviation (SD), and first order autoregressive coefficient (AR(1)) — for annual aggregate measures in levels and first differences. All variables are formally defined in Appendix A.

Panel A: Annual Aggregate Data

		Levels			First Difference		
	N	Mean	SD	AR(1)	Mean	SD	AR(1)
Nonfinancial Corporate Sector							
Book Leverage (Debt-to-Assets, %)	93	20.068	7.381	0.985	0.112	1.124	0.347**
Market Leverage (Debt-to-Market Value, %)	86	21.356	8.612	0.913	0.109	3.581	0.073**
Net Debt Issuance (Δ Debt / Assets, %)	93	1.739	1.908	0.648**	-0.000	1.610	-0.084**
Net Equity Issuance (Net Equity Iss. / Assets, %)	85	1.515	1.722	0.636**	-0.011	1.473	-0.034**
Investment (Δ Net PP&E / Net PP&E, %)	93	6.927	5.518	0.641**	0.088	4.680	-0.125**
Profitability (Earnings / Assets, %)	93	14.007	3.178	0.743	0.070	2.214	-0.315**
Tangibility (Capital / Assets, %)	93	42.762	6.332	0.973	-0.094	1.678	0.541**
Market-to-Book Equity	86	3.777	2.514	0.945	0.174	1.480	-0.072**
Asset Growth (%)	93	7.574	5.536	0.463*	-0.126	5.563	-0.200**
Government Sector							
Government Leverage (Debt / GDP, %)	93	40.473	17.678	0.941	0.457	6.049	0.442**
Net Debt Issuance (Δ Debt / GDP, %)	93	3.148	6.231	0.720**	-0.046	4.554	0.172**
Fraction US Debt held by Foreigners (%)	66	16.406	13.985	1.019	0.705	1.962	0.288**
Macroeconomic Factors							
GDP Growth (%)	93	6.489	8.784	0.215**	-0.236	10.863	-0.400**
Inflation (%)	93	3.204	4.804	0.589*	-0.170	4.123	-0.006**
BAA - AAA Yield Spread (%)	92	1.198	0.689	0.837**	-0.007	0.391	0.202**
AAA - Treasury Yield Spread (%)	93	0.832	0.444	0.819	0.003	0.271	-0.039**
Stock Market Return (%)	85	11.690	20.503	0.010**	0.100	29.010	-0.411**

Panel B: Firm-Year Panel Data

		Levels			First Difference	
	N	Mean	SD	AR(1)	Mean	SD	AR(1)
Book Leverage (Debt-to-Assets, %)	223,346	22.405	20.727	0.880	0.710	10.917	-0.109
Market Leverage (Debt-to-Market Value, %)	207,223	25.535	25.670	0.896	1.167	12.633	-0.075
Net Debt Issuance (Δ Debt / Assets, %)	200,351	3.641	16.378	0.063	-0.500	21.695	-0.467
Net Equity Issuance (Net Equity Iss. / Assets, %)	186,959	9.827	35.046	0.331	-0.983	38.354	-0.415
Investment (Δ Net PP&E / Net PP&E, %)	196,750	0.173	0.557	0.143	-0.038	0.681	-0.400
Profitability (Earnings / Assets, %)	205,141	7.318	21.980	0.833	-0.693	13.537	-0.263
Tangibility (Capital / Assets, %)	221,010	30.895	21.975	0.949	0.135	7.120	-0.082
Market-to-Book Equity	184,759	59.795	389.408	0.948	23.839	274.460	-0.044
Asset Growth (%)	200,269	13.259	38.518	0.157	-1.923	47.969	-0.417

Table II

Aggregate Leverage Regressions

The table presents results of OLS regressions of aggregate corporate book leverage (Debt-to-Assets) on governement leverage (Debt-to-GDP). The regressions are run in both levels and first differences. Newey-West standard errors assuming two non-zero lags are used to compute all t-statistics (in parentheses). Statistical significance at the 5% and 1% levels are indicated by "*" and "**", respectively. All variables are formally defined in Appendix A.

	Levels			First Differences		
	(1)	(2)	(3)	(4)	(5)	(6)
Government Leverage	-0.114**	-0.129**	-0.065*	-0.038*	-0.055**	-0.050**
	(-8.010)	(-8.195)	(-2.367)	(-2.293)	(-2.940)	(-2.759)
Macroeconomic Factors						
GDP Growth		-0.142*	-0.140*		-0.040**	-0.052**
		(-2.443)	(-2.395)		(-4.703)	(-3.121)
Inflation		0.177*	0.281*		0.064**	0.057
		(2.058)	(2.486)		(2.632)	(1.592)
BAA - AAA Yield Spread		-1.230*	-1.773**		0.623**	0.342
		(-2.350)	(-3.123)		(2.623)	(1.699)
AAA - Treasury Yield Spread		0.135	0.612		1.172**	1.272**
		(0.189)	(0.474)		(3.404)	(3.608)
Firm Characteristics						
Profitability			-0.307			0.066
			(-1.531)			(1.819)
Tangibility			0.273*			0.066
			(2.009)			(0.637)
Market-to-Book Equity			-0.113			-0.094*
			(-0.436)			(-2.026)
Asset Growth			0.080			0.004
			(0.945)			(0.148)
Trend	Yes	Yes	Yes	No	No	No
R^2	0.860	0.882	0.907	0.043	0.344	0.375
Obs	93	92	86	92	91	85

Table III

Aggregate Leverage Results Robustness Tests

The table presents results of OLS regressions of aggregate corporate leverage on contemporaneous government leverage plus contemporaneous control variables: GDP growth, Stock Market Return, BAA-AAA corporate bond yield spread, and the AAA-10-Year Treasury yield spread. The figures in the table are coefficient estimates on government leverage (t-statistic in parentheses). Each row corresponds to a modification of this baseline specification. The regressions are run in both levels and first differences. Newey-West standard errors assuming two non-zero lags are used to compute all t-statistics (in parentheses). Statistical significance at the 5% and 1% levels are indicated by "*" and "**", respectively.

	Levels	Differences
Alternative Measure of Corporate Leverage		
Debt-to-Assets (500 Largest Firms)	-0.124**	-0.055**
	(-7.707)	(-2.701)
Net Debt-to-Assets	-0.293**	-0.151**
	(-10.197)	(-5.246)
Debt-to-Sales	-0.187**	-0.022
	(-5.539)	(-0.678)
Debt-to-Market Value	-0.113**	-0.131*
	(-3.931)	(-2.537)
Changes to the X-Variables		
One-year Lags	-0.122**	-0.008
	(-7.684)	(-0.430)
Real Oil Price	-0.139**	-0.055**
	(-12.562)	(-2.871)
Debt Tax Incentive	-0.112**	-0.048*
	(-5.854)	(-2.458)
Stock Market Return	-0.127**	-0.059**
	(-7.769)	(-3.387)
Unemployment Rate	-0.124**	-0.053**
	(-7.386)	(-2.764)
Foreign Holdings of US Debt	-0.140**	-0.056**
	(-10.734)	(-2.723)
Nonlinear Specifications		
2^{nd} & 3^{rd}-Order Polynomials	-0.119**	-0.058**
	(-8.303)	(-2.943)
Fractional Response Model	-0.010**	
	(-11.172)	
Subsamples		
First Half	-0.090**	-0.043*
	(-6.917)	(-2.345)
Second Half	0.080	-0.118*
	(0.604)	(-2.533)
No 1945 to 1965 Years	-0.129**	-0.039
	(-4.696)	(-1.661)
No Recession Years	-0.144**	-0.051*
	(-8.108)	(-2.237)

Table IV

Aggregate Net Debt & Equity Issuance Regressions

The table presents results of OLS regressions of aggregate corporate net debt and net equity issuances scaled by lagged assets on contemporaneous covariates. Macreconomic factors include GDP growth, stock market return, BAA-AAA corporate bond yield spread, the AAA-to-year treasury yield spread, and inflation. Firm characteristics include profitabilty, tangiblity, and the market-to-book equity ratio. Newey-West standard errors assuming two non-zero lags are used to compute all t-statistics (in parentheses). Statistical significance at the 5% and 1% levels are indicated by "*" and "**", respectively.

	Net Debt Issuances			Net Equity Issuances		
Government Net Debt Issuance	-0.072**	-0.082**	-0.093*	-0.091*	-0.074*	-0.047
	(-3.129)	(-4.083)	(-2.403)	(-2.429)	(-2.093)	(-0.670)
Macroeconomic Factors (Levels)	No	Yes	Yes	No	Yes	Yes
Macroeconomic Factors (Differences)	No	Yes	Yes	No	Yes	Yes
Firm Characteristics (Levels)	No	No	Yes	No	No	Yes
Firm Characteristics (Differences)	No	No	Yes	No	No	Yes
Trend	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.241	0.486	0.586	0.103	0.375	0.444
Obs	93	91	85	85	85	85

Table V

Aggregate Investment Regressions

The table presents results of OLS regressions of aggregate corporate fixed capital investment on contemporaneous covariates. Macreconomic factors include GDP growth, stock market return, BAA-AAA corporate bond yield spread, the AAA-to-year treasury yield spread, and inflation. Firm characteristics include profitabilty, tangiblity, and the market-to-book equity ratio. Newey-West standard errors assuming two non-zero lags are used to compute all t-statistics (in parentheses). Statistical significance at the 5% and 1% levels are indicated by "*" and "**", respectively.

	Levels			First Difference		
	(1)	(2)	(3)	(4)	(5)	(6)
Government Net Debt Issuance	-0.389**	-0.380**	-0.363**	-0.407*	-0.357*	-0.374*
	(-4.580)	(-6.626)	(-4.789)	(-2.323)	(-2.347)	(-2.004)
Macroeconomic Factors						
GDP Growth		-0.111	-0.109		0.047	0.012
		(-1.551)	(-1.004)		(1.081)	(0.141)
Inflation		0.629**	0.536*		0.289**	0.492*
		(4.986)	(2.420)		(2.935)	(2.232)
BAA - AAA Yield Spread		-2.684**	-1.850*		-2.040**	-1.953*
		(-3.093)	(-2.325)		(-2.587)	(-2.005)
AAA - Treasury Yield Spread		-1.476	-1.629		-1.311	-0.957
		(-1.321)	(-1.227)		(-0.613)	(-0.404)
Treasury Yield		-0.059	-0.070		0.135	0.037
		(-0.236)	(-0.295)		(0.225)	(0.053)
Firm Characteristics						
Profitability			0.038			0.075
			(0.131)			(0.515)
Tangibility			-0.142			0.267
			(-1.242)			(1.091)
Market-to-Book Equity			0.622**			0.337
			(4.279)			(1.734)
Lag Investment			0.253*			-0.233*
			(2.109)			(-2.235)
Trend	Yes	Yes	Yes	No	No	No
R^2	0.251	0.640	0.726	0.156	0.359	0.365
Obs	93	92	86	92	91	85

Table VI
Leverage Quartile Regressions

The table presents results of OLS time-series regressions of leverage quartiles on macroeconomic factors including: federal debt dividend by GDP, GDP growth, BAA-AAA corporate bond yield spread, the AAA-to-year treasury yield spread, and inflation. The leverage quartile time-series are constructed by computing the quartiles of the cross-sectional leverage distribution each year. Newey-West standard errors assuming two non-zero lags are used to compute all t-statistics (in parentheses). Statistical significance at the 5% and 1% levels are indicated by "*" and "**", respectively.

	Levels			First Difference		
	25	50	75	25	50	75
Government Leverage	-0.117**	-0.194**	-0.183**	-0.023	-0.095**	-0.075*
	(-3.780)	(-7.335)	(-7.933)	(-1.755)	(-2.886)	(-2.180)
GDP Growth	-0.078*	-0.214**	-0.171*	-0.024	-0.084**	-0.066*
	(-2.011)	(-2.815)	(-2.328)	(-1.618)	(-3.560)	(-2.346)
Inflation	0.293*	0.357*	0.308*	0.049	0.108	0.111*
	(2.078)	(2.473)	(2.422)	(1.445)	(1.747)	(2.206)
BAA - AAA Yield Spread	-0.039	-2.314**	-0.726	0.117	-0.167	0.301
	(-0.075)	(-3.118)	(-1.160)	(0.453)	(-0.433)	(0.755)
AAA - Treasury Yield Spread	-4.956**	-5.385**	-2.352**	-0.218	0.480	1.161
	(-5.832)	(-5.723)	(-2.631)	(-0.737)	(0.885)	(1.933)
Observations	92	92	92	91	91	91

Table VII
Industry Leverage Regressions

The table presents industry level leverage regressions. The first two rows present industry-year panel regressions that differ in the control variables. Macroeconomic control variables include: GDP growth, BAA-AAA corporate bond yield spread, the AAA-to-year treasury Firm control variables include: profitability, tangibility, asset growth, and the market-to-book equity ratio. All industry time series regressions include only macroeconomic control variables. All levels specifications contain a time trend. All t-statistics (in parentheses) are computed using standard errors adjusted for within firm dependence and heteroskedasticity. Statistical significance at the 5% and 1% levels are indicated by "*" and "**", respectively.

	Level	First Difference
Industry-Year Panel Regressions		
Macroeconomic Controls	-0.117**	-0.041**
	(-7.142)	(-6.353)
Macroeconomic + Firm Controls	-0.059**	-0.031**
	(-2.765)	(-2.718)
Industry Time-Series Regressions		
Consumer Non-Durables	-0.055*	-0.039
	(-2.077)	(-1.390)
Consumer Durables	-0.071*	-0.022
	(-2.317)	(-0.482)
Manufacturing	-0.190**	-0.065**
	(-8.463)	(-2.800)
Oil, Gas, and Coal	-0.040*	-0.032
	(-1.962)	(-1.454)
Chemicals & Allied Prod	-0.126**	-0.014
	(-3.524)	(-0.369)
Business Equip	-0.123**	-0.024
	(-2.620)	(-0.567)
Telephone & Television Trans	-0.141	-0.057
	(-1.665)	(-0.657)
Wholesale, Retails & Some Services	-0.177**	-0.077
	(-5.712)	(-1.727)
Healthcare, Medical Equipment & Drugs	-0.088**	-0.041
	(-3.046)	(-0.644)
Everything Else	-0.158**	-0.035
	(-4.731)	(-0.592)

Table VIII

Firm-Year Panel Leverage Regressions

Panel A presents results of regressions of corporate leverage on government leverage and control variables. We estimate three different specifications for two different definitions of corporate leverage. The three estimation methods are pooled OLS, within firm estimation employing firm fixed effects, and a first differenced specification. Book leverage is the ratio of total debt to total book assets. Market leverage is the ratio of total debt to the sum of debt and equity market capitalization. Panel B presents results of regressions of net security issuances on government net debt issuances and control variables. All t-statistics (in parentheses) are computed using standard errors adjusted for within firm dependence and heteroskedasticity. Statistical significance at the 5% and 1% levels are indicated by "*" and "**", respectively.

Panel A: Corporate Leverage

	Book Leverage			Market Leverage		
	Pooled OLS	Firm Fixed Effects	First Difference	Pooled OLS	Firm Fixed Effets	First Difference
Government Leverage	-0.119**	-0.105**	-0.085**	-0.196**	-0.171**	-0.237**
	(-13.199)	(-12.390)	(-10.886)	(-14.726)	(-13.963)	(-23.235)
Macroeconomic Factors						
GDP Growth	-0.067**	-0.144**	-0.103**	-0.178**	-0.223**	-0.358**
	(-3.800)	(-10.180)	(-11.610)	(-5.907)	(-9.331)	(-27.952)
Inflation	0.375**	0.236**	0.130**	1.160**	1.023**	0.691**
	(15.104)	(11.217)	(10.287)	(28.857)	(29.637)	(35.399)
BAA - AAA Yield Spread	-1.078**	-1.725**	-0.229*	-1.080**	-0.817**	0.726**
	(-5.593)	(-10.538)	(-2.411)	(-4.089)	(-3.572)	(5.330)
AAA - Treasury Yield Spread	-0.711**	0.903**	0.649**	4.210**	4.571**	0.991**
	(-3.971)	(6.294)	(7.345)	(17.492)	(24.564)	(8.656)
Firm Characteristics						
Profitability	-0.075**	-0.171**	-0.169**	0.003	-0.201**	-0.185**
	(-13.222)	(-26.906)	(-34.648)	(0.558)	(-28.370)	(-38.958)
Tangibility	0.279**	0.244**	0.246**	0.298**	0.235**	0.235**
	(41.401)	(24.755)	(26.930)	(33.686)	(20.833)	(26.816)
Market-to-Book Equity	-0.001**	0.000**	-0.000*	-0.002**	0.000**	-0.000**
	(-3.432)	(3.244)	(-1.961)	(-10.433)	(2.685)	(-2.770)
Asset Growth	0.013**	0.013**	0.030**	-0.046**	-0.014**	0.033**
	(7.577)	(8.985)	(26.377)	(-23.591)	(-9.349)	(31.574)
Trend	Yes	Yes	No	Yes	Yes	No
R^2	0.093	0.070	0.074	0.098	0.091	0.084
Obs	160,329	160,329	141,834	160,329	160,329	141,834

Panel B: Net Debt and Net Equity Issuances

	Net Debt Issuances		Net Equity Issuances	
	Pooled OLS	Firm Fixed Effects	Pooled OLS	Firm Fixed Effects
Government Net Debt Issuance	-0.174**	-0.156**	-0.239**	-0.287**
	(-17.695)	(-15.333)	(-10.091)	(-12.659)
Macroeconomic Factors (Levels)	Yes	Yes	Yes	Yes
Macroeconomic Factors (Differences)	Yes	Yes	Yes	Yes
Firm Characteristics (Levels)	Yes	Yes	Yes	Yes
Firm Characteristics (Differences)	Yes	Yes	Yes	Yes
Trend	Yes	Yes	Yes	Yes
R^2	0.018	0.016	0.181	0.044
Obs	182,145	182,145	172,897	172,897