A Century of Capital Structure: The Leveraging of Corporate America*

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Abstract

We examine the determinants of aggregate corporate capital structure using a novel dataset of accounting and market information that spans most publicly traded firms over the last century. We show that the stability of aggregate leverage over the last century reflects two opposing forces: a deleveraging and reduction in the relative size of railroads and a near threefold increase in aggregate industry leverage for every other nonfinancial sector. Our analysis reveals that competition for investors' funds between the public and private sectors is largely responsible for the secular increase in leverage ratios.

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, corporate capital structure has received a great deal of attention from financial economists.[1] The bulk of this attention has focused on understanding cross-sectional variation in financial policy, in part because of readily available accounting data for large cross-sections of firms. Studies focusing on time-series variation have been confined to either relatively short panels or aggregate data, such as the flow of funds. These limitations are troubling because short time series exclude important variation in capital structure determinants, such as changes to the tax, legal, and institutional environment, and lead to imprecise estimates of the dynamic properties of financial policy. Likewise, aggregate data can mask heterogeneity in the cross-sectional distribution that is critical for understanding the mechanisms behind financial policy.

The goal of this paper is to shed light on the determination of corporate financial policy by overcoming these data limitations. Specifically, we analyze a unique dataset containing accounting and market information for U.S. nonfinancial publicly traded firms over the last century. This data enable us to examine secular changes to capital structure over a long horizon at both an aggregate and micro level. This combination provides new insight into the formation of corporate capital structures.

We begin by showing that the temporal stability of aggregate leverage suggested by the flow of funds data (e.g., Frank and Goyal (2008)) is a result of two countervailing forces. First, the share of aggregate assets held by transportation and utility sectors – two of the most highly levered sectors – declined from 40% during the 1930's and 1940's to less than 20% by 1990. Further, the leverage of the railroad sector fell from 44% in 1938 to 25% by 1950 as profits from the war effort were used to pay down debt in response to declining demand. Second, the aggregate leverage of *all* other nonfinancial sectors increased nearly threefold during the period 1942 to 1970. In fact, the median firm in these other industries went from a leverage ratio of zero in 1940 to over 25% by 1970. Thus, the stability of aggregate leverage since 1945 is due in large part to the changing sectoral composition of the economy.

[1] See Hubbard (1998) and Stein (2003) for literature reviews of the link between investment and financing. See Harris and Raviv (1991), Frank and Goyal (2008), Parsons and Titman (2010), and Graham and Leary (2012) for reviews of the capital structure literature.

We then investigate the mechanisms behind capital structure formation, paying close attention to the secular increase in leverage among nonregulated industries. Building on early work by Friedman (1978, 1986) and more recent work by Greenwood and Vayanos (2008), Krishnamurthy and Vissing-Jorgenson (2010), and Hanson, Greenwood, and Stein (2010)), we examine the relation between government deficit financing and corporate financial policy.

In the aggregate, there is a statistically and economically significant negative relation between corporate leverage and the federal debt-to-GDP ratio, i.e., government leverage.[2] A one percent increase in government leverage is associated with a 9 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. Further, this relation is robust to a host of data, specification, and measurement issues. The substitution that we see in levels is also found among flows. Increases in the net flow of government debt relative to GDP is met with declines in the net flows of corporate debt but, interestingly, not in equity. Thus, increases changes in the supply of government debt is met with a differential response in the debt and equity policies of corporations.

In the cross-section, the government–private sector leverage relation varies inversely with proxies for financial constraints. For example, when government leverage increases, the leverage of small firms declines significantly while that of large firms is not affected. These leverage results reflect a differential response to government deficit financing by the two sets of firms – a consequence of segmented capital markets and slow moving capital (e.g., Faulkender and Petersen (2007)). The channel through which this relation occurs can be seen by examining the asset composition of banks and insurance companies – intermediaries responsible for much of the loan and bond financing of corporations. Asset growth for both of these institutions is driven to a large extent by a tradeoff between treasures and corporate debt that correlates strongly with fluctuations in debt-based deficit financing.

We then investigate the role of taxes in determining capital structure (Miller (1977)). During our sample period the corporate tax rate underwent 30 revisions ranging from a low of 10% in 1920 to a high of 52% in the 1950s. Combined with variation in tax rates on dividends

[2] A recent working paper by Bansal, Coleman, and Lundblad (2011) finds an inverse relation between public debt and short term privately held debt in the context of a vector autoregression. Their focus is on the role of short term public and private debt as complimentary means of providing liquidity and transaction services, in contrast to our focus on the capital structure of corporations.

and capital gains, the tax incentive to issue debt varied significantly over the last 100 years. We find that taxes have no immediate or short-run impact on leverage. However, estimates from a distributed lag model reveal a long-run effect, which an almost 10-year lag. Nonetheless, the economic relation between taxes and leverage is still small when compared to the impact of government leverage.

The scope and efficiency of transformation services provided by the financial sector – both institutions and markets – was dramatic during our sample period. The proportion of corporate debt held by institutions increased from 23% in 1940 to almost 90% by 1950, as banks and insurance purchased corporate bonds to replace retiring government bonds used to fund the war. Yet, these shifts were largely unrelated to changes in corporate financial policy. We find no relation between the share of debt or debt net of equity held by financial institutions and corporate leverage. Likewise, growth in the income share of the financial sector bears little relation to the leverage changes experienced by nonfinancial corporations.

Finally, we find that changes in managerial incentives and styles are unlikely explanations for the secular increase in leverage (Jensen and Meckling (1976), Bertrand and Schoar (2004)). As noted by Frydman and Saks (2010), both the level and performance sensitivity of executive compensation was largely constant from the 1930s to the 1980s – precisely when leverage ratios underwent their largest change. Indeed, we find no significant statistical relation between the economic incentives of CEOs and corporate leverage.

The remainder of the paper is as follows. Section I discusses our data and sample selection. We also provide a number of summary statistics. Section II examines trends in corporate financial policy. We investigate the evolution of aggregate corporate leverage and net security issuances over the last century. We also examine leverage at the industry level in order to better understand the aggregate patterns. Section III examines the economic forces behind the variation in aggregate leverage. We focus on the role of government deficit financing, tax incentives, expected distress costs, and several additional hypotheses such as managerial incentives and the growth of financial markets and intermediaries. Section IV concludes.

I. Sample Selection and Summary Statistics

Our sample frame begins with all firms listed in the Center for Research in Security Prices (CRSP) monthly stock files. This frame includes all firms listed on the New York Stock Exchange (NYSE) since 1925, all firms listed on the American Stock Exchange (AMEX) since 1962, and all firms listed on the NASDAQ since 1972. For these firms, stock market data comes from CRSP. Accounting data is obtained from two sources: Standard and Poor's (S&P) Compustat database and Moody's Industrial and Railroad manuals. We exclude from much of our analysis firms who capital structures are determined largely by regulatory requirements: financial firms, railroads, and utilities. However, we will have much to say about the latter two sectors just below. The result of this data effort is an unbalanced firm-year panel beginning in 1920 and ending in 2010.

Table 1 presents summary statistics for many of the aggregate and micro level measures used in our analysis. In addition to its descriptive value, these results provide a context for subsequent analysis.[3] Panel A presents results for our aggregate measures of firm characteristics and macroeconomic variables. Aggregate firm characteristics are computed as the ratio of sums over firms within each year. Panel B presents results for the firm-year panel. And, Panel C presents mean firm characteristics by decade.

II. Trends in Corporate Leverage

A. Aggregate Trends

Figure 1 examines the long run trends in aggregate leverage. Panel A examines book leverage, defined as the ratio of total interest bearing debt divided by the total book value of assets. Apparent from Panel A – and Panel C of Table I – is that the use of corporate debt among unregulated firms has changed dramatically over the last century. From 1920 to 1945, leverage is fairly stable and relatively low, ranging from 9% to 14% during this quarter century. From 1945 to 1970 leverage increased steadily and significantly – nearly tripling – from approximately 9% in 1945 to over 25% in 1970. Since 1970, leverage has stabilized at this higher level, varying between 23% and 30% for the last 40 years.

Panel B and C show that this pattern is not unique to our sample or definition of leverage. Specifically, Panel B examines the aggregate leverage of two alternative samples. The first

[3] Appendix A discusses the details of our data sources and variable construction.

sample uses data form the largest 500 firms each year. The composition of this sample varies less through time, thereby mitigating the impact of entry and exit. The second sample consists only of firms listed on the NYSE, which mitigates the impact of entry by firms listed on the AMEX (1962) and NASDAQ (1972). It also biases the sample towards larger, longer living firms. We see that the level and variation in both leverage series are virtually identical to that found in Panel A.

Panel C presents the results from several alternative definitions of leverage. In addition to confirming the robustness of the patterns found in Panels A and B, these plots highlight several other aspects of financing over our sample period. Preferred stock was a more important form of financing in the first half of the century. As such, some of the increase in leverage between 1920 and 1970 was due to a substitution away from preferred stock towards debt financing. Preferred stock accounted for more than 10% of assets in aggregate in 1920, but has been negligible during the last several decades. In contrast, the inclusion of operating leases, which are negligible prior to 1970, increases aggregate leverage by about 5% since the mid-1970s.[4]

Market leverage, defined as the ratio of total debt to the sum of total debt and the market capitalization of equity, experiences a delayed but steeper increase relative to our other measures of leverage. We also note a sharp decline in leverage coinciding with the bull market of the 1990s. More generally, this measure exhibits significantly more year-to-year volatility because of variation that is dominated by stock prices as opposed to financial policy. Leverage defined as the ratio of net debt (debt – cash) to assets exhibits an even sharper increase between 1940 and 1970. The pattern here is exacerbated by a peak in cash balances in the mid-1940s followed by a steady decline until 1970. Finally, leverage defined as the ratio of debt to capital (debt plus book equity) shows that the trends are not driven by large changes in non-debt liabilities entering the denominator.

Because of the similarity of results across samples and leverage definitions, we focus our analysis and discussion on book leverage for the entire sample. Doing so avoids redundancy. Nonetheless, the majority of this analysis is repeated using the alternative samples and leverage definitions just discussed. We note when result differences or similarities have a material effect on our inferences.

[4] Data on operating leases is not available in the Moody's manuals. Since operating lease usage as reported in Compustat declines as we go back in time, we make the simplifying assumption that it is zero for all firms before 1950.

B. Cross-Sectional and Sectoral Trends

Figure 2 examines the evolution of the cross-sectional leverage distribution by plotting the annual quartiles of leverage year-by-year. Evident from this figure is that the change in aggregate leverage observed in Figure 1 reflects a broad-based shift in financial policy. All three quartile breakpoints increase in tandem. Interestingly, the median firm was unlevered from the mid-1930s to the mid-1940s and at least a quarter of our sample firms were unlevered in each year from 1920 through 1950. Thus, the secular increase in leverage was associated with an increase in leverage across the entire distribution of firms. Panel B indicates that the decline in the leverage distribution since 1980 is driven by the addition of large numbers of NASDAQ firms to the CRSP/Compustat universe. When we restrict our attention to NYSE firms, all three quartile breakpoints remain fairly stable from 1970 through the end of the sample period.

In Figure 3 we examine whether this change was concentrated in certain sectors of the economy. We define sectors, or industries, using the Fama-French 12-industry classification.[5] Each panel in the figure plots the aggregate book leverage ratio for the indicated industry (solid line) and the aggregate book leverage ratio for all nonfinancial firms (dashed line) as a point of reference. Industry leverage is somewhat more volatile than aggregate leverage due in large part to smaller sample sizes, particularly in the first half of the century. What is most notable, though, is the striking similarity in the leverage time series across every industry. Each industry reveals a strong positive trend between 1945 and 1970. Further, this upward trend tends to taper off after 1970. Thus, the secular increase in leverage experienced in the middle half of the 20th century was an economy-wide phenomenon, at least among unregulated industries, affecting firms across industries.

C. Net Flows of Debt and Equity

Figure 4 isolates the effects of financial policy on leverage by presenting the aggregate time series for the net flows of debt and equity. Panel A of Figure 4 plots net debt and net equity

[5] We thank Ken French for sharing this data, which can be found on his website at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/ftp/Siccodes12.zip.

issuances scaled by lagged assets for each year.[6] To ease the interpretation of the figure, we plot a 5-year moving average. While both series exhibit a great deal of volatility, the increase in the relative use of debt financing can be seen after 1945. Equity issuance also increases, but never reaches the heights of the late 1920s. More importantly, the leverage-increasing effect of net debt issuances is greater than the leverage-decreasing effect of net equity issuances at low levels of leverages, and particularly so for the very low levels in the pre-World War II era.

Also evident in Panel A is the correlation between debt and equity issuance, which is unsurprising if demand for all types of external of capital is driven by investment activity. In Panel B, we control for investment demand by plotting the fraction of investment financed with debt. That is, for the subsample of firms with positive investment we divide aggregate net debt issuance by aggregate investment.[7] For comparison, we also plot (dashed line) the aggregate book leverage series. The figure highlights the increased use of debt financing through the first half of the sample period. External debt accounted for only 5 to 10% of investment in the 1920s and 1930s, but steadily increased to over 30% by the late 1960s. This shift toward a greater reliance on debt as a funding source appears to be at least one of the factors driving the increase in leverage.

D. Reconciling with other Leverage Aggregates

Previous studies examining aggregate leverage that use alternative data sources document a more temporally stable leverage process over the last century. (e.g., Sametz (1964), Wright (2004), and Frank and Goyal (2008)). In this subsection, we reconcile our data and findings with these earlier works.[8] As will become clear, the persistent stability of leverage found in previous studies is due to two countervailing forces at work in regulated and unregulated sectors of the economy. The analysis here highlights the importance of our micro-level data for understanding the mechanisms behind capital structure determination.

[6] Net debt issuance for each firm is defined as the change in total balance sheet debt. Net equity issuance is defined, as in Fama and French (2005), as the split-adjusted change in shares outstanding multiplied by the average of the beginning and end of year stock price.

[7] Since statement of cash flow data is not available from the Moodys manuals, we calculate investment as the change in (gross) long-term assets plus the change in inventory from the balance sheet.

[8] See Appendix A for more detail on the data sources, variable construction, and reconciliation.

Panel A of Figure 5 presents three series. The first is book leverage from our sample of firms as shown in Panel A of Figure 1. The second series represented by the dotted line combines data from the flow of funds over the period 1945 to 2010 with data from the Historical Statistics of the United States (HSUS) from 1926 to 1944 to obtain a series that is more comparable in length to ours. In appendix A, we show that these two series coincide closely during the period of overlap, 1945 to 1997. We refer to this series simply as the Flow of Funds.

The last series represented by the dots on the dashed line present the aggregate book leverage ratio computed using *all* firms in the Moody's Industrials manuals. This sample includes hundreds, sometimes thousands, of smaller firms that are not covered by CRSP because they did not trade on the NYSE, in addition to the large publicly traded firms that comprise our primary sample. Because of data collection costs, this additional data is only collected once a decade in years ending in "8," as indicated by the dots. A comparison of this more comprehensive series with our primary leverage series shows that smaller firms maintain a similar capital structure to that of large public firms, at least in the aggregate. It also shows that the exclusion of non-NYSE firms does not appear responsible for any difference between our data and the Flow of Funds data.

Rather, the difference between our leverage series and the Flow of Funds is due to the exclusion of regulated industries, railroads and utilities in particular. Panel B of Figure 5 plots the leverage series for the transportation and utilities sector from HSUS and the leverage series for railroads as gathered from the Moody's Transportation manuals. The sector as a whole displays a remarkably stable capital structure that varies between approximately 40% and 50% for 70 years. However, this stability masks a large decline in leverage experienced by the railroads during the 1940s and 1950s.

During this periods, railroads incurred large profits during World War II due to increased operating efficiency and their role as the primary mode of transportation to support the war effort. Railroads also faced a bleak economic outlook. Demand for rail services declined significantly in the face of increased competition for passengers from cars and airplanes, and for freight from trucking. These forces lead railroads to reduce their debt burden with their profits and shrink their companies in tandem with their shrinking market shares.

Panel C of Figure 5 presents the distribution of total assets across sectors from the HSUS. Unfortunately, the HSUS combines the transportation and utilities sector but the plot is still

informative. The share of assets for this sector declines from a peak of 43% in 1934 to 26% by 1950, despite significant growth in utilities and other forms of transportation. When we exclude the transportation and utilities sector, the aggregate leverage from the HSUS closely matches our data from Moody's. In fact, for each sector that HSUS collects data – e.g., Manufacturing, Wholesale & Retail Trade, Services – each of the HSUS sector level leverage series closely match the Moody's sector level leverage series. (See Appendix A for details.)

While enlightening, this analysis raises several questions. First, why is the capital structure of regulated industries as a whole both high and temporally stable? As we show below, the theoretical determinants underwent significant and frequent changes during the 20th century. This stability is counterfactual to a number of theories. Second, why did unregulated industries increase their leverage so dramatically? These questions are not independent and the answer to each will almost surely be insightful for the other. Data and space constraints dictate that we focus on the latter. However, we hope that our discussion here inspires further research on the former.

III. The Economic Forces Behind Leverage

A. The Role of Government

The link between public and private sector financing has focused primarily on asset prices. Early work by Friedman (1978, 1986) showed that government deficit financing via debt influences the returns to corporate debt and equity relative to the yields on long- and short-term treasuries. These price changes occur in order to induce portfolio rebalancing in response to changes in the supply of government securities. 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 government leverage, i.e., the debt-to-GDP ratio, is strongly negatively related to the interest rate spread of corporate bonds over US treasuries.

A potential implication of these price changes are corresponding quantity changes. In this vein, 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. A contemporaneous paper by Bansal, Coleman, and Lundblad (2011) shows in a vector autoregression a negative relation between short-term public and private sector debt. However, it remains to be seen whether there is an effect of government financing on the relative flows and stock of debt and equity in the private sector. In particular, does government financing impact the financing decisions and balance sheets of the corporate sector and, if so, what is the mechanism by which this occurs? We examine these questions here.

A.1. The Leverage Relation

Panel A of Figure 6 plots corporate and government leverage over our sample period, where the latter is defined as the ratio of federal debt held by the public to gross domestic product (GDP). We focus on federal debt because it comprises the majority of total government debt and is responsible for most of its variation over time (see Figure X in Appendix A). Focusing on the amount held by the public avoids the double counting of debt that arises from treasury holdings by government entities, such as the social security administration.

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 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 significant increase in response to the most recent recession and financial crisis.

A negative relation between the two series 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.

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

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

and

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

Corporate leverage is denoted *CL*, government leverage *GL*, and control variables *X*. 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 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 in Panel A 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 leverage is associated with a 8.8 basis point decrease in corporate leverage. 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 1.6% decline in corporate leverage. Relative to the annual standard deviation of corporate leverage (6.9%), this marginal effect is economically large.

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 (Krishnamurty and Vissing-Jorgensen (2012)).

Finally, firm characteristics have a mixed role in determining corporate leverage, but largely follow the results found in previous panel data studies (e.g., Frank and Goyal (2007)).

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)).

Panel B of Table II presents the results of a host of additional robustness tests. The baseline model for this analysis includes all of the macroeconomic factors and firm characteristics found in Panel A. We also include a time trend in all of the level specifications. 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. 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 three rows show that the relation is robust to alternative measures of corporate leverage. To address the changing sample composition from entry and exit, 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. The next row defines corporate leverage as the ratio of "net debt" (debt – cash holdings) to assets. The third row looks at a market based measure of leverage by dividing debt by the sum of debt and the equity market capitalization of the firm.

Rows four through eight show that the relation is robust to changes in the control variables. Lagging all right hand side variables has no effect on the levels specification, but the first difference specification is no longer significant – statistically or economically. Given the persistence in the levels of both leverage series, this finding is unsurprising as the differenced series are near white noise. Including measures of the corporate tax rate and a debt tax incentive variable has little effect on the leverage relation, though we will have more to say about taxes in the following section. [9]

Additional macroeconomic factors such as the unemployment rate have little impact on the leverage relation. We also add a measure of foreign holdings of U.S. debt. As figure X in

[9] The debt tax incentive variable is defined as $1 - (1-\tau_c)/(1-\tau_p)$, as in Miller (1977), where τ_c is the corporate tax rate and τ_p is the lowest statutory tax rate on personal income.

Appendix A 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.

In sum, the negative relation between corporate and government leverage is large 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.

A.2. The Security Issuance Relation

Table III presents the estimation results from the following two flow regressions:

$$(3)\ \Delta CD_t = \alpha + \beta \Delta GD_t + \Gamma X_t + \mathrm{H}\Delta X_t + \eta_t \text{, and}$$

$$(4),\ \Delta CE_t = \alpha + \beta \Delta GD_t + \Gamma X_t + \mathrm{H}\Delta X_t + \eta_t$$

where ΔCD_t is the change in corporate debt from *t-1* to *t* divided by total assets at *t-1*, ΔCE_t is dollar value of corporate net equity issuances 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 examine both the level and first difference in our control variables, X_t and ΔX_t. These controls consist of both macroeconomic factors and firm characteristics found in Table II. 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 III 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.

The final three columns rescale net debt issuances by investment. Doing so helps rule out the possibility that the link between government and corporate leverage is based on the choice between internal and external finance, as opposed to the choice between debt and equity financing. Columns (7) through (9) show that this is not the case. When funding investment, the proportion of external financing is decreasing in the amount of government deficit financing.

These findings reinforce the leverage results above. Government financing has a strong negative effect on the net flow of corporate debt. 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.

A.3. Why is Government Leverage Related to Corporate Leverage?

To better understand why corporate financing is so closely tied to government financing, we investigate cross-sectional heterogeneity in the relation. In essence, we ask which firms capital structures are most sensitive to changes in the governments debt position. To capture this heterogeneity, we estimate regression models of the form

$$(6)\ CL_{it} = \alpha + \left(\beta + \delta Z_{it}\right) GL_t + \psi Z_{it} + \Gamma X_{it} + \phi t + \mu_i + \varepsilon_{it},$$

where Z corresponds to a firm-specific characteristic and μ_i is a firm fixed effect. All other variables are as defined earlier. The errors are assumed to be heteroskastic and correlated within firms. As such, all standard errors and test-statistics are robust with respect to these departures from spherical errors (Petersen (2009)).

For the interaction variable, Z, we focus attention on measures of financial constraints to distinguish firms on the markets for their securities (e.g., public versus private debt, commercial paper versus long term bonds). Motivation for this distinction comes from Friedman's (1987) notion of substitutability of securities in investors' portfolios. Government financing should have less impact on the securities of firms that are more easily substituted for treasuries. Practically speaking, this encompasses larger, investment grade firms with access to public debt markets, i.e., financially unconstrained.

We examine several measures of financial constraints to help ensure the robustness of our inferences. Our proxies include firm size as measured by total assets, estimated default probability (see appendix for a definition), Kaplan and Zingales (KZ) index, Whited and Wu (WW) index, Hadlock and Pierce (HP) index, and an indicator for non-dividend paying firms. For all of the measures but the last, we rank firms on the basis of the constraint measure into three groups. We then define an indicator variable equal to one if the observation falls in the most constrained of the three groups. This indicator variable forms the interaction variable, Z_{it}.

The results are presented in Table IV. Column 1 presents a baseline result without any interactions to show the economic and statistical strength of the relation in our panel. The remaining columns examine the impact of different proxies for financial constraints on this relation. For virtually every measure of financial constraints, the interaction with government leverage is negative. The results with the HP index and non-dividend payer indicator are insignificant. However, all other proxies indicate the leverage of financially constrained firms is particularly sensitive to the financial policy of the government.

In sum, an increase (decrease) in the supply of treasuries is associated with a decline (increase) in corporate debt relative to equity. Further, this response to government deficit financing is larger among smaller, financially constrained firms that are more likely bank-dependent.

Our results are consistent with the portfolio rebalancing hypothesis of Friedman (1986) and the presence of segmented capital markets. When the government issues debt, the expected return on treasuries increases relative to that of other assets in order to induce investors to hold the increased supply of government debt. Equivalently, the expected return on other assets decreases relative to that on government debt. Corporate debt is more similar to, or a closer substitute for, government debt in terms of its risk-return profile. Consequently, the expected return differential of corporate debt over treasuries narrows but by less than the differential of equities over treasuries. This is the price effect shown by Friedman (1986).

Figure 7 provides further evidence by examining the allocation of government and corporate debt within the economy. Panel A shows the distribution of treasury holdings across investors. Though declining since the 1940s, banks and households held the majority of treasury securities prior to 1970. Since 1970, banks share of treasuries continued to decline as the Fed, insurance companies, pension funds, and GSEs increased their relative holdings of treasuries.

Panels B and C show the asset growth of insurance companies and banks that is due to government debt versus corporate debt. We isolate insurance companies and banks for their significant roles as lenders to the corporate sector: the former through bond markets (reference ??), the later through loans. Insurance company asset growth was dominated by treasuries during the war but quickly reversed immediately following the war as government debt was retired. As a substitute, insurance companies lent to corporations, a practice responsible for almost 40% of the annual asset growth since 1945. Panel C shows a similar pattern for banks.

The heterogeneity of the effect that we find (Table III) is consistent with a significant amount of work showing that capital markets are segmented (e.g., Fauklender and Petersen (2007), Leary (2009), Baker (2009), and Lemmon and Roberts (2010)). Financially constrained firms for which the effect is largest had no cost-effective alternative sources of financing. Most financially constrained firms are smaller and have access only to intermediated debt. In fact, fewer than 30% of publicly traded firms have publicly placed debt, which is dominated by larger firms. Equity is a feasible alternative for bank-dependent firms but not necessarily a an economically attractive one given its information sensitivity (Myers (1984)). Thus, segmented capital markets creates slow moving capital that generates a differential effect on small and large firms.

B. Tax Incentives

The tax deductibility of interest creates an incentive for firms to issue debt rather than equity, all else equal. While this incentive is mitigated by taxation at the personal level, the prevailing rates during the last century have typically been such that the after tax cost of debt is less than equity on a certainty-equivalent basis (Graham (2003)). However, a challenge in identifying the effect of taxes on capital structure is finding observable, exogenous variation in corporate marginal tax rates. This challenge has forced studies to either estimate tax rates via simulation (e.g., Graham (1996)), or focus on relative differences in debt useage created by tax law changes (e.g. Givoly et al., 1992, Heider and Ljungqvist, 2012, Perez-Gonzalez (2012)). In this section, we exploit the numerous and significant tax rate changes over our sample period to better understand the relation between debt and taxes.

B.1. Leverage and Taxes

Panel A of Figure 8 displays the time series of (top) corporate tax rates along with our aggregate book leverage series, as well as a measure of the debt tax incentive net of personal taxes.[10] The statutory corporate tax rate underwent 30 changes during the last century. Rates were quite low at the start of our sample period, staying below 15% from 1920 until the late 1930s. By the mid-1950s, however, the corporate tax rate exceeded 50%. Tax rates remained near 50% until the mid-1980s, and have been steady near 35% since.

Casual inspection of the figure suggests a positive relation between corporate taxes (or the net tax incentive) and leverage, particularly in the mid-20th century. Indeed, several past authors have interpreted this visual association as a casual one (Hickman (1953) and Sametz (1963)). Further suggestive evidence of this relation can be found in Panel B of Figure 7. This panel plots the corporate tax rate series with the ratio of debt to total fixed-charge finance, defined as debt plus preferred stock. As noted earlier, preferred stock's popularity declined significantly from the start of the 20th century, quite possibly as a consequence of the changing tax environment, as argued by Sametz (1963). Indeed, the debt-to-fixed charge finance ratio shows an even more dramatic rise than debt-to-assets, rising from 50 – 55% in the pre-war period to more than 90% by 1970. Further, the unconditional correlation between the tax rate and the debt-to-fixed charge finance series, 0.68, is even stronger than that between leverage and the tax rate, 0.39.

In Table 5 we examine this relation more carefully by adding measures of the corporate tax rate to our aggregate leverage regressions from Table 2. As before, we estimate the regressions both in levels, controlling for a time trend, and in first differences. To ease the presentation, we report only the coefficient estimates on the tax variables and government leverage. We report the latter to emphasize the robustness of our previous findings to these alternative specifications. The macroeconomic control variables include the real rate of return on AAA-rated corporate bonds, the BAA-AAA yield spread, the rate of inflation, the return on the

[10] Following Taggart (1981), we define the net debt tax incentive as $1 - (1-t_c)/(1-t_p)$, where t_c is the corporate tax rate and t_p the lowest personal tax rate. This formula derives from Miller (1977), with the simplifying assumption that the effective tax rate on income to equity holders is zero. We use the lowest personal tax rate because the highest reached levels during the middle of the century that few if any investors actually paid. (The top personal rate exceeded 90% for 16 out of the 20 years from 1944 through 1963).

aggregate stock market, and real GDP growth. The firm characteristic control variables include the return on assets, the ratio of tangible assets to total assets, and the market-to-book ratio. We use both debt to assets (Panel A) and debt to total fixed-charge finance (Panel B) as dependent variables.

Column (1) of Panel A indicates, as expected, a significant positive relationship between tax rates and aggregate leverage when we do not control for a time trend. However, the coefficient becomes insignificant once we include any controls (column 2) or convert all variables to first differences (column 5). Thus, we cannot reject the hypothesis that the series are correlated because they share a common trend as opposed to a causal relationship.

In columns 3 and 6, we account for the possibility of a delayed reaction to the tax law change using a distributed lag model. That is, if recapitalization is costly, firms' leverage may not respond immediately to an increase in tax rates, but may still affect their choice of security the next time they raise external capital. In both the level and first-difference regressions, we find a positive long-run effect, but it is not statistically different from zero. Columns 4 and 7 present results from a distributed lag model using a measure of net tax incentives to issue debt. The results with are very similar to those obtained with the corporate tax rate.

In Panel B, we show stronger evidence of a relationship between corporate tax rates and the choice between debt and preferred stock financing. The coefficient on the tax rate remains significant after controlling for a time trend, macroeconomic variables (including government borrowing), and firm characteristics. While the results in first differences are somewhat weaker than for levels, the long run effect is highly significant even in first differences. Economically, a one percentage point increase in tax rate is associated with an increase of 30 basis points in the ratio of debt to fixed charge finance. The total increase in tax rates between the late 1930s and early 1950s was about 37%. This would translate into an increase of about 11% in the D/(D+P) ratio, almost a third of the total increase in the ratio over that time span.

B.2. Security Issuance Decisions and Taxes

In Table 6, we investigate the extent to which corporate tax rates influence aggregate debt and equity issuance decisions. We estimate models similar to those in Table III, with the addition of a measure of the corporate tax rate. The results are not substantially supportive of a

role for taxes in influencing issuance decisions in aggregate. Without controlling for aggregate firm characteristics or macroeconomic factors (other than government borrowing), we do find a significant positive association between tax rates and debt issuance (column 1) and between tax rates and the use of debt to fund investment (debt issuance scaled by investment for those firms with positive investment, column 7). However, when the macro and firm characteristic controls are added, both relationships become insignificant. In columns 3 and 9, we allow for a delayed response of financing activity to tax rate changes with a distributed lag model, but again find no significant effect. We do find some evidence that firms issue less external equity when tax rates are high (columns 5-6). On the whole, though, tax rates do not appear to be a significant driver of aggregate debt issuance activity.

B.3. Micro-Level Analysis of Tax Law Changes

An advantage of our data set, relative to previously available firm-level data, is that it allows us to investigate the cross-sectional impact of the large increases in tax rates that occurred between the late 1930s and early 1950s. The objective of this exercise is twofold. First, it allows us to potentially reconcile our weak results with regard to the relationship between tax rates and aggregate leverage with prior studies that find a significant link between tax incentives and capital structure decisions. That is, a disadvantage of the aggregate data is that it may include many firms whose marginal tax rates remain low despite an increase in the top normal rate. By exploring the cross-section, we can determine if the large historical increases in tax rates affected capital structure decisions for those firms with the greatest tax incentives. Second, while imperfect as quasi-experiments, the shocks to the tax rate associated with the tax acts of 1940-42 and 1950-51 may provide stronger identification of the causal effect of tax rates on the debt-to-preferred ratio than do our aggregate regressions alone.

In Table 7, we study the leverage effect of two tax-increasing events. The first is based on the Revenue Acts of 1940 and 1941, which more than doubled the corporate tax rate between 1939 and 1942, from 19% to 40%. In addition, it imposed a tax of 25% - 50% on excess profits (relative to a benchmark level of earnings). Both acts were motivated by an effort to fund increased defense spending in early years of WW II. The second "event" is based on the Revenue Acts of 1950 and 1951, which were motived to fund defense spending related to the

Korean War. These acts collectively increased the top corporate tax rate from 38% in 1949 to 52% by 1952. In addition, the Excess Profits Tax Act of 1950 added a 2% surtax and 30% tax on excess profits. While a portion of these increases were initially deemed to be temporary, they were ultimately extended and remained in effect long after the war (see Figure 7).

Partially offsetting the increase in corporate tax rates was a concurrent rise in personal tax rates during these periods. Between 1938 and 1942, the lowest bracket personal tax rate increased from 4% to 19%, while the highest rate increased from 79% to 88%. Despite these changes, the net tax incentive for financing increased as a result of the tax law changes, even under the aggressive assumption that equity income is shielded from taxes. For example, the net tax incentive using the lowest personal tax rate increased from 0.16 in 1938 to 0.26 by 1942 (see Figure 8). The personal rate increased again as a result of the Revenue Acts of 1950-51, but more modestly (lowest rate increased from 16.6% to 22.2%, highest rate from 82% to 92%).

Table 7 examines the effect of the tax acts of 1940-42 (Panel A) and 1950-51 (Panel B) on corporate leverage using panel data. We use three measures of leverage – debt-to-assets, debt to debt plus preferred, and the debt share of investment – to isolate the potentially different effects of the tax change. The sample period extends from 2 years prior to the start of each tax rate increase to 2 years after the end. *Post* is an indicator equal to 1 in the period after each tax increase (1942-44 in Panel A, 1952-54 in Panel B). To proxy for variation in tax incentives for debt financing, we sort firms based on their average pre-event (1938-40 or 1948-50) level of pre-tax earnings (defined as EBIT scaled by assets). *Profit* is an indicator equal to 1 for firms in the upper third of the distribution and 0 for those in the bottom third. We regress leverage on *post, profit*, the interaction between the two, and our set of firm-specific and macroeconomic control variables.

If the increase in tax rates associated with the tax acts leads to an increase in the average leverage ratio, we would expect the coefficient on *post* in columns 1, 4, and 7 to be positive. The results in Panel A suggest that while the ratio of debt to preferred increased on average following the 1940-42 tax increase, the overall leverage ratio and the use of debt to finance investment did not increase. From Panel B, both leverage and the debt to preferred mix increased following the 1950-52 rate increase, although the debt to investment ratio was lower, on average, in the post-event period.

While these results are consistent with the weak relationship between tax rates and aggregate leverage documented above, and the stronger relationship between tax rates and the debt to fixed charge financing ratio, they may hide important cross-sectional differences. That is, the overall average (or aggregate) leverage may appear less responsive to tax rates because many firms have low tax incentives, even when the normal rate increases. The interaction *post x profit* captures the increase in leverage following the tax increase for highly profitable firms relative to the leverage change over the same period for less profitable firms. Here we see stronger evidence of a role for taxes in capital structure decisions. In Panel A, we find a positive and significant coefficient across all specifications, suggesting that those firms with the highest tax incentives increase their leverage, relative to other firms, following the tax rate hikes of 1940-42. The results in Panel B are more mixed, but we do continue to find significantly positive interactions for the debt to preferred and debt share of investment measures. The coefficients on the firm characteristics are in line with those found in prior capital structure studies (e.g. Rajan and Zingales, 1995).

Overall, our analysis of the two tax rate increasing events allows us to draw two conclusions. First, it enables us to confirm the relationship between tax incentives and the choice between debt and preferred stock using firm-level data. While the tax rate hikes certainly have shortcomings as quasi-experiments, they arguably provide sharper identification than the aggregate time-series regressions alone.[11] Secondly, they help us understand more deeply the weaker results relating aggregate leverage to tax rates. Taxes do seem to be relevant for capital structure decisions among firms with the greatest tax incentives. However, there seem to be enough firms in the sample with weak tax incentives to dampen the relationship in the aggregate.

C. Expected Default Costs and Economic Uncertainty

TBD…

D. Alternative Mechanisms

D.1. Financial Institution and Market Development

[11] The two events were clearly correlated with other macroeconomic shocks associated with WWII and the Korean War. Further, our proxy for tax incentives (past profitability) may be correlated with future leverage changes.

Financial intermediaries play an important role in facilitating access to capital by mitigating information asymmetry and agency costs ((Diamond 1984, Leland and Pyle 1977). As a result, differences in the levels of development of financial markets across countries have been linked to differences in how firms finance their activities (Demirguc-Kunt and Maksimovic, 1996). Meanwhile, the size and complexity of the financial services sector in the U.S. has grown dramatically over the past century (Phillipon, 2008, 2012). In this section, we explore the extent to which development of U.S. capital markets, and growth in financial intermediation in particular, is associated with changes in our sample firms' corporate capital structures over time.

Panel A of Figure 9 plots the share of corporate bonds and equity held through intermediaries over time. The series combine data from Goldsmith (1958) from 1920 through 1944 with US flow-of-funds data from 1945 through 2010. The share of equities held through intermediaries (largely investment companies and pension funds) has steadily increased over the latter half of the century, from 5% in 1945 to almost 60% by 2010. By contrast, the share of bonds held by intermediaries changed dramatically over a short period, between the late 1930s and early 1950s. In 1939, only 24% of bonds were held through intermediaries.[12] However, this fraction ballooned to over 80% by 1950 and over 90% by 1955. Thus, the share of bonds held by intermediaries increased sharply relative to that of equity in the 1940s. To the extent that intermediaries perform valuable information gathering and monitoring roles, this may have altered the relative costs of raising debt and equity capital for firms.

Panels B and C of Figure 9 plot our aggregate leverage series along with two measures of the size of the financial sector from Phillipon (2012): the income share of the finance sector and his estimate of the level of output of the financial sector from business credit and equity issuance.[13] Both measures of the size of the financial sector appear to follow a similar time-series pattern as that of aggregate leverage, declining through the depression years and steadily rising post-WW II. However, the financial sector (particularly the income share) continues to grow in the last two decades even as aggregate leverage has leveled off. This is potentially consistent with the findings of Demirguc-Kunt and Maksimovic (1996) who conclude that

[12] Goldsmith (1958) includes the following classes of intermediaries: Commercial Banks, Mutual Savings Banks, Insurance companies, Pension & Retirement Funds and Investment Companies.

[13] We thank Thomas Phillipon for sharing this data, which can be found on his website at website: http://pages.stern.nyu.edu/~tphilipp/research.htm

"initial improvements in the functioning of a developing stock market produce a higher debt-equity ratio for firms and thus more business for banks. In stock markets that are already developed, further development leads to a substitution of equity for debt financing." We investigate this relationship more formally below.

Table 8 repeats the aggregate leverage regressions of Tables 2 and 5 with the addition of our measures of the intermediary shares of bonds and equity (Panel A) and Phillipon's financial sector size measures (Panel B). Consistent with Figure 9, the intermediary share of debt (column 1 of Panel A) and both measures of financial sector size (columns 1 and 4 of Panel B) are positively correlated with aggregate leverage. However, the intermediary share relationships are not robust to controlling for a time trend or taking first differences. Thus, it is difficult at this point to say more beyond noting that these series share common trends. On the other hand, aggregate leverage continues to be positively correlated with Phillipon's measure of the output of the finance sector (based on business credit and equity issuance activity), after controlling for the time trend as well as macro and firm level variables.

Table 9 investigates the link between security issuance activity and financial market development proxies. From Panel A, we see some evidence that firms issue more debt (column 1) and finance a greater proportion of their investments with debt (column 5) as the share of bonds held by intermediaries grows. However, in both cases, the coefficient becomes insignificant when we control for our full set of firm level and macroeconomic controls. In Panels B and C, the results suggest that firms issue more equity relative to assets, but not more debt, as the financial sector grows, consistent with the findings of Demirguc-Kunt and Maksimovic (1996). While our initial evidence is suggestive of an association between corporate financing choices and growth of the financial sector, and of financial intermediation, further research is needed to understand this relationship more fully.

D.2. Changing managerial incentives

TBD…

IV. Conclusions

TBD…

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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

Intangible Assets = [Total Assets – (Net PP&E + cash and marketable securities + accounts receivable + inventories)] / Total Assets

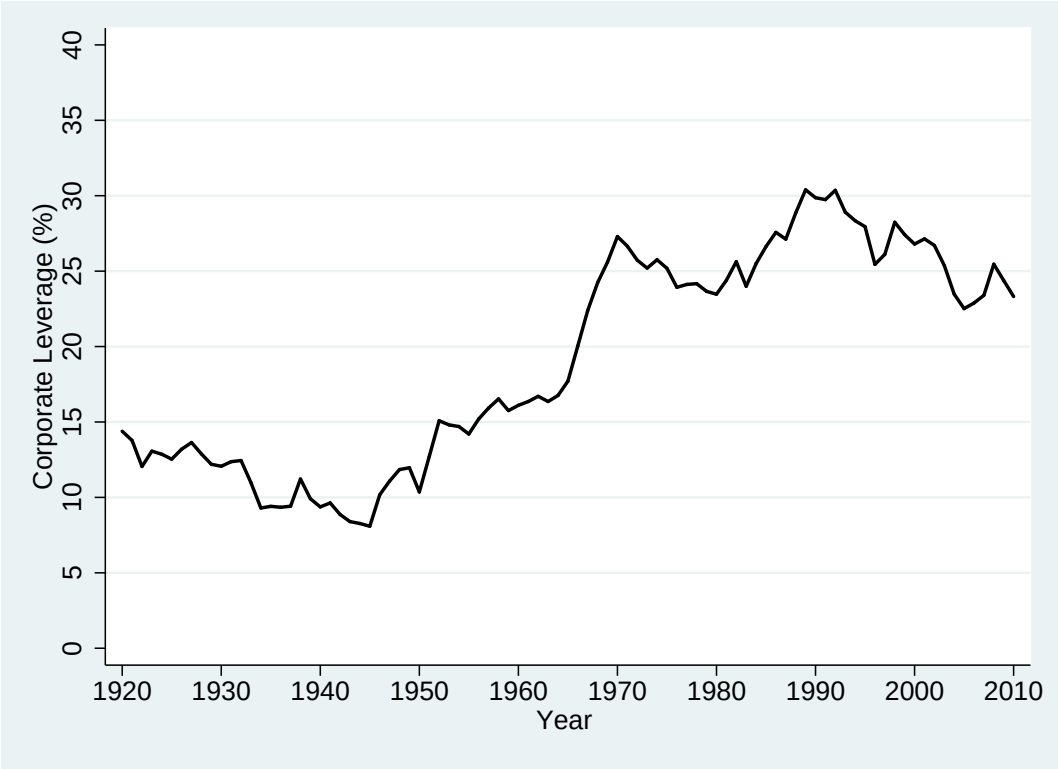
Asset growth = [Total book value of assets(t) - Total book value of assets(t-1)] / Total book value of assets(t)

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

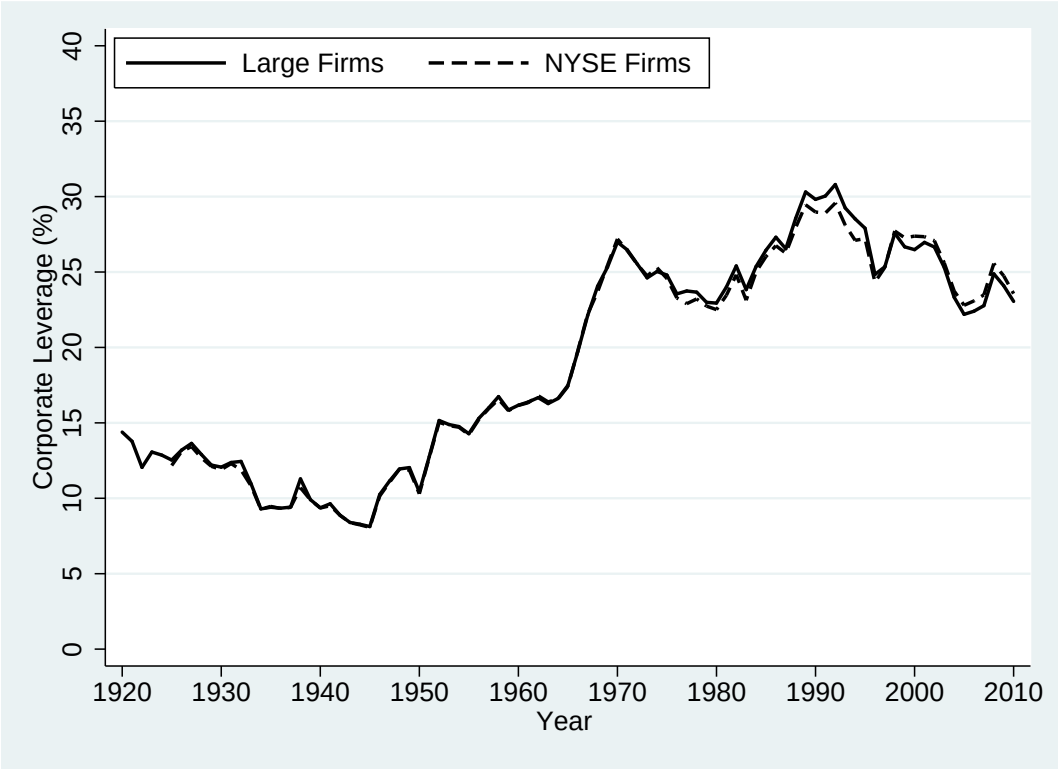
Figure 1
Aggregate Corporate Leverage Through Time

Panel A: Total Debt to Assets

The figure presents the annual ratio of aggregate total debt (short term plus long term) to aggregate book value assets. The sample includes all firms in the CRSP data base that are also covered either in Compustat or the Moody's Industrial Manuals. Financial firms, utilities and railroads are excluded.

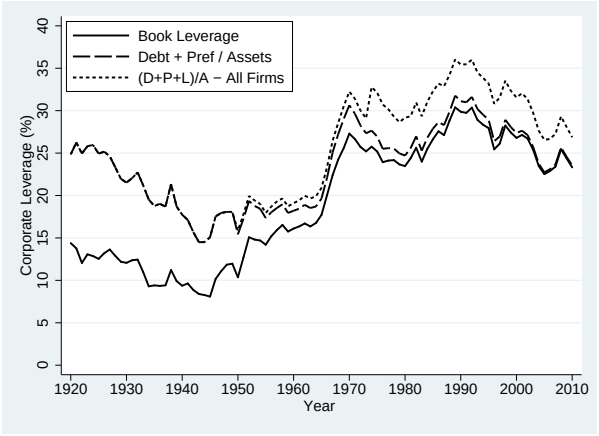


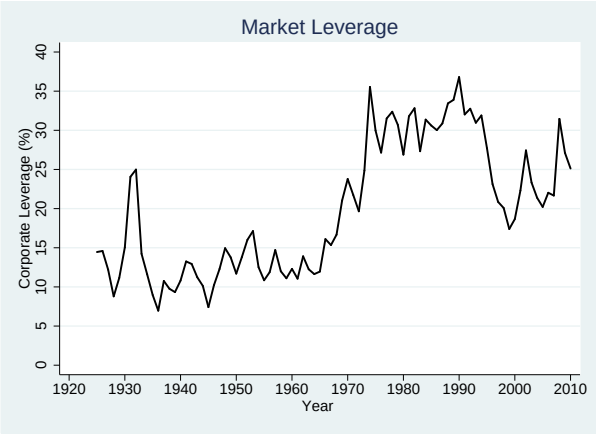
Panel B: Alternative Samples

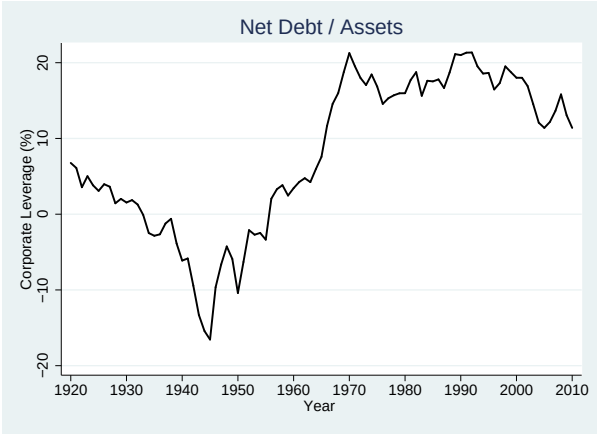


Panel C: Alternative Leverage Measures

The figure shows aggregate book (solid line) and market (dashed line) leverage ratios for all NYSE-listed firms, excluding financial firms, utilites and railroads. Aggregate book leverage is defined each year as the cross-sectional sum of total debt (short-term plus long-term) divided by the sum of total assets. Aggregate book leverage is defined each year as the cross-sectional sum of total debt (short-term plus long-term) divided by the sum of market capitalization, where market capitalization is the book value of debt plus the market value of equity.







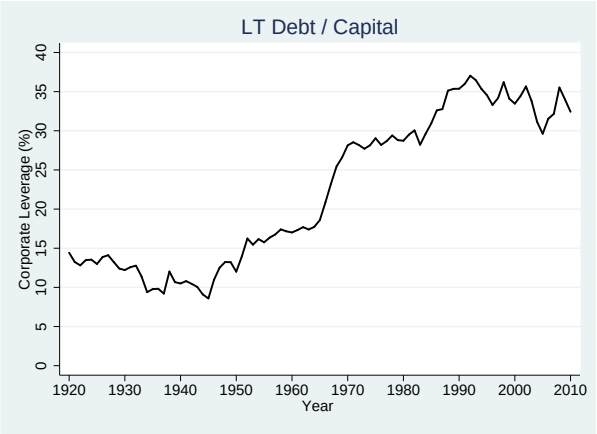
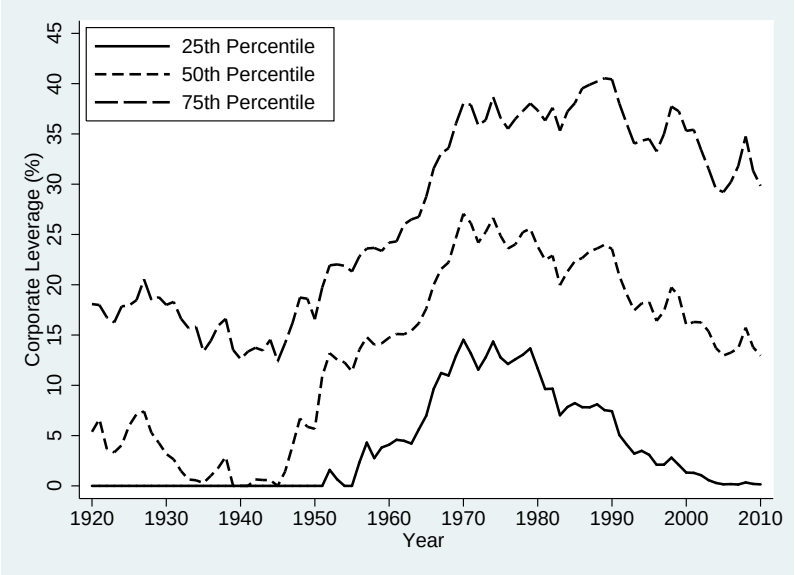


Figure 2
Corporate Leverage: Cross-sectional Distribution

The figure presents, for each year from 1920 to 2010, the cross-sectional median and first and third quartiles of the ratio of total debt (short term plus long term) to book value assets. The sample includes all firms in the CRSP data base that are also covered either in Compustat or the Moody's Industrial Manuals. Financial firms, utilities and railroads are excluded.

Panel A: Full Sample



Panel B: NYSE Firms

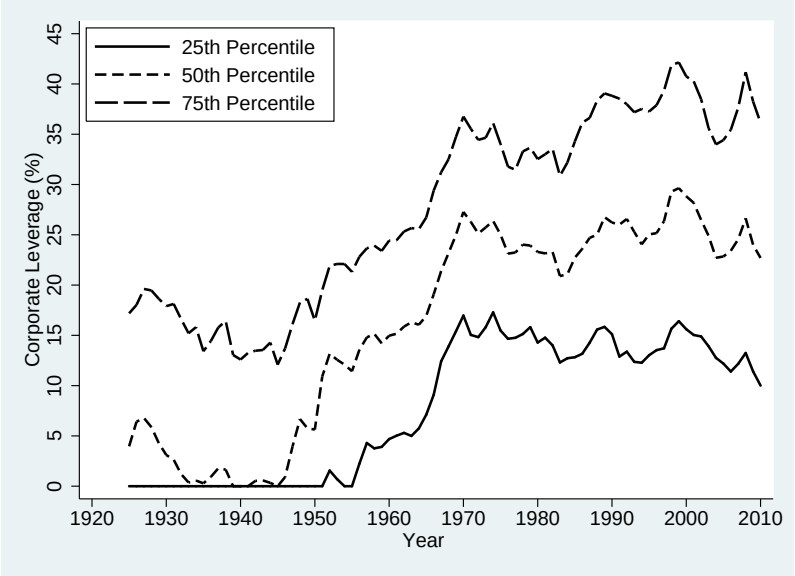
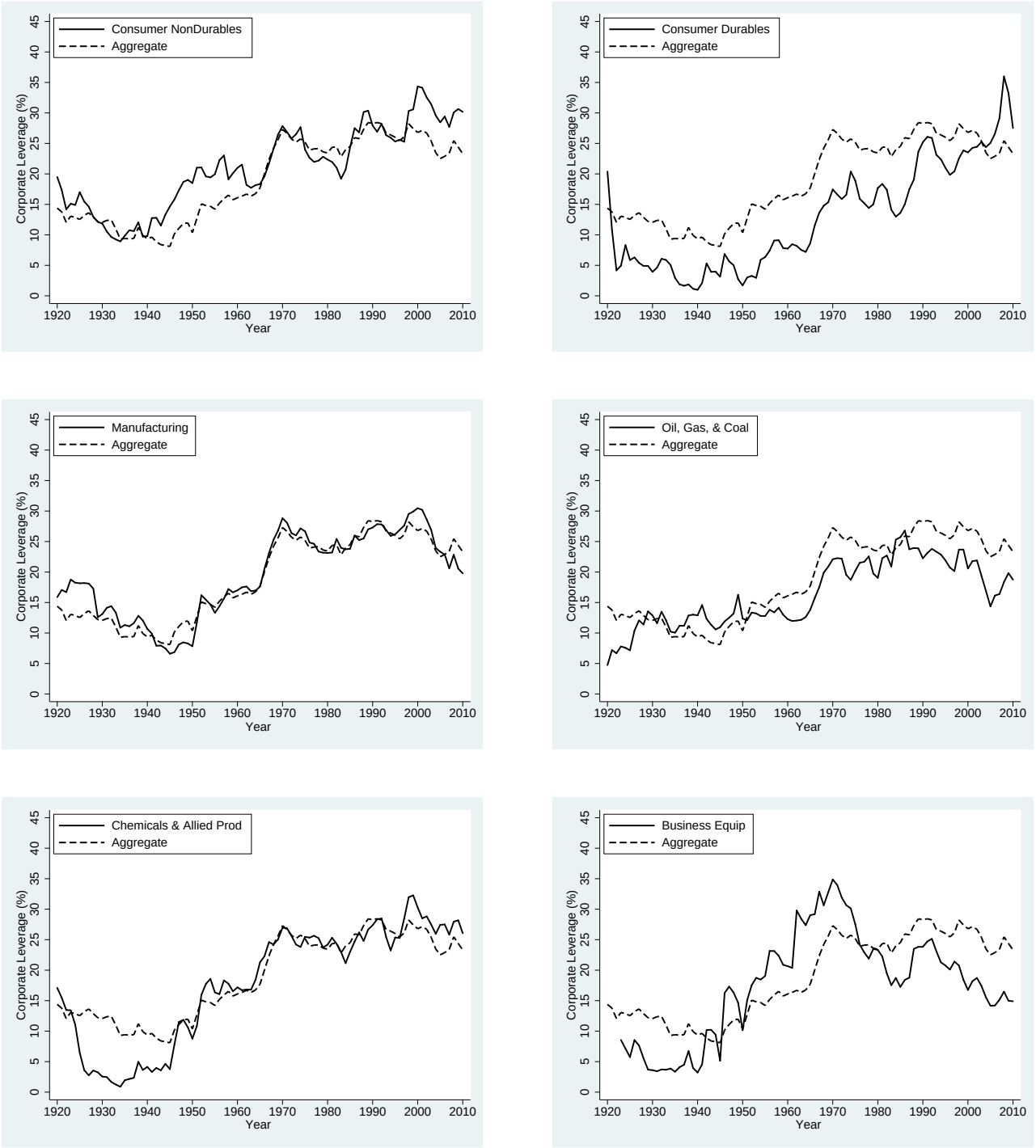
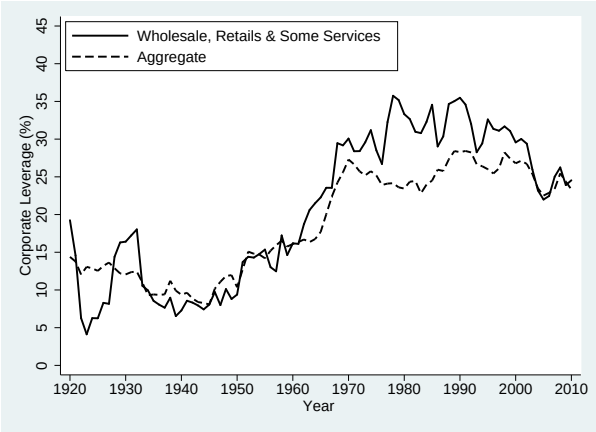
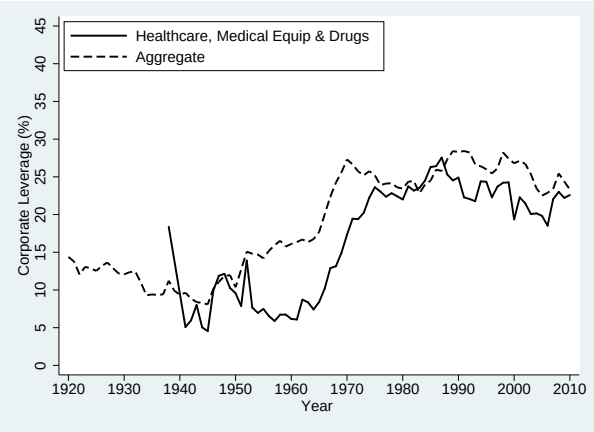


Figure 3
Industry Leverage

The solid line presents the asset value-weighted average leverage ratio for each of the 12 Fama and French industry classifications. The dashed line presents the value-weighted average leverage ratio for all NYSE-listed industrial firms. Industry-years with fewer than 10 firms are excluded.




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

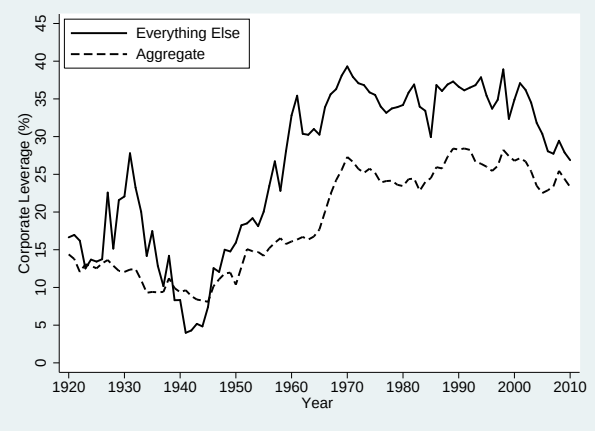
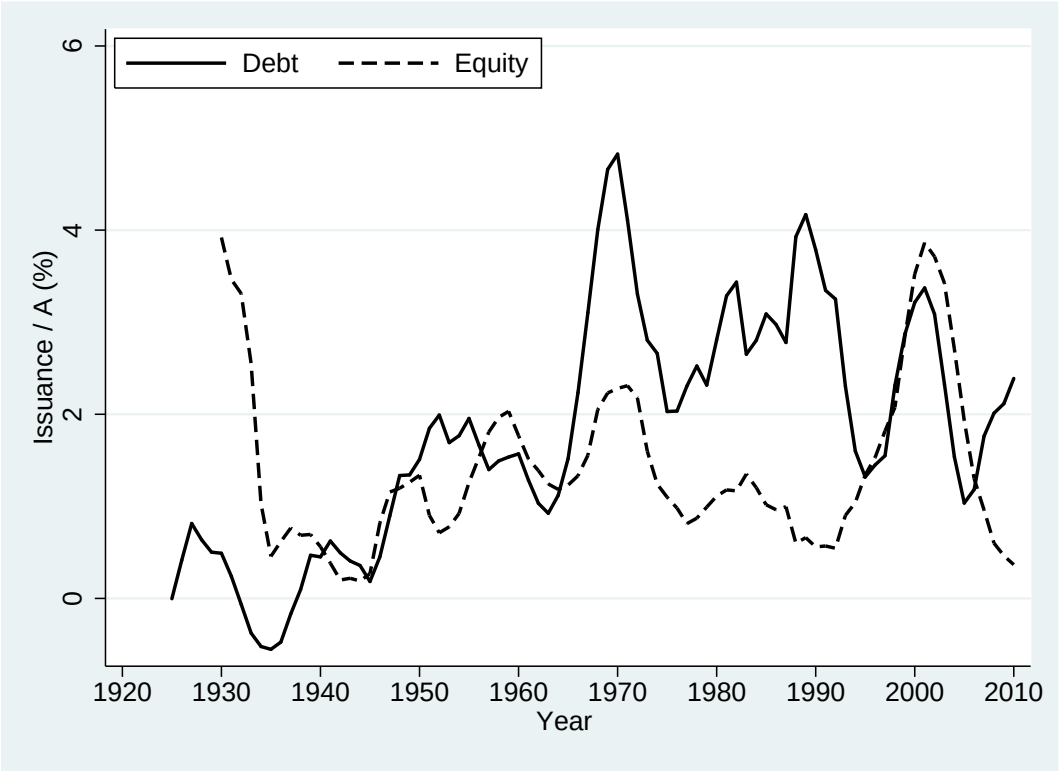

Everything Else
Aggregate
Corporate Leverage (%)
0
5
10
15
20
25
30
35
40
45
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
Year

Figure 4
Aggregate Security Issuance

Panel A: Net Debt and Equity Issuance (% of Assets) – 5 yr MA



Panel B: Debt Issuance / Investment (5 yr MA)

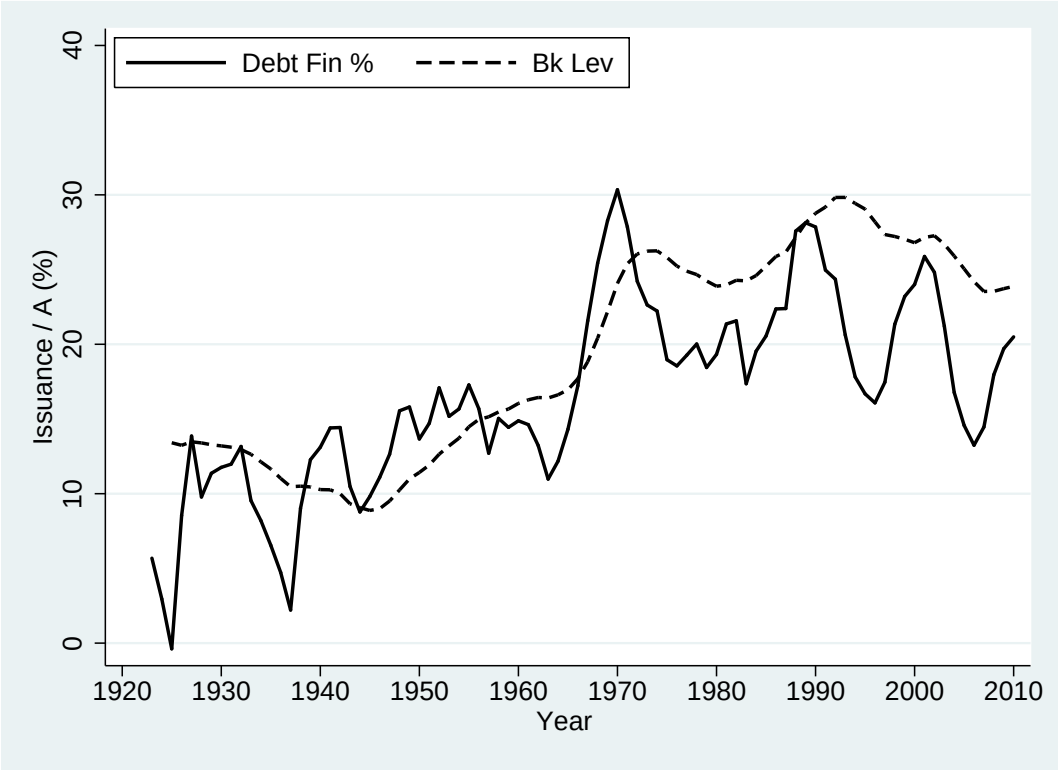
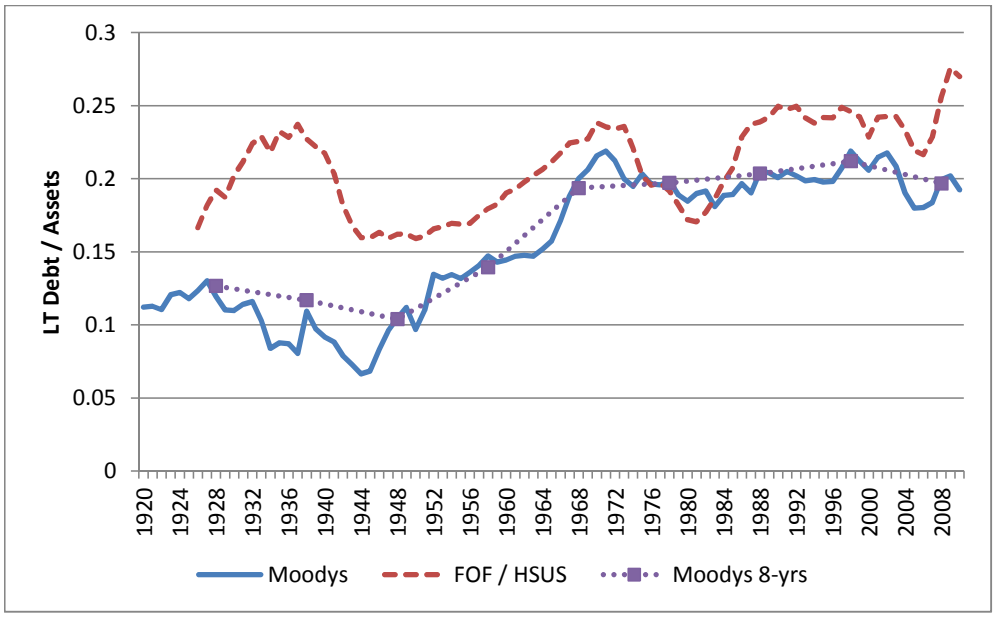
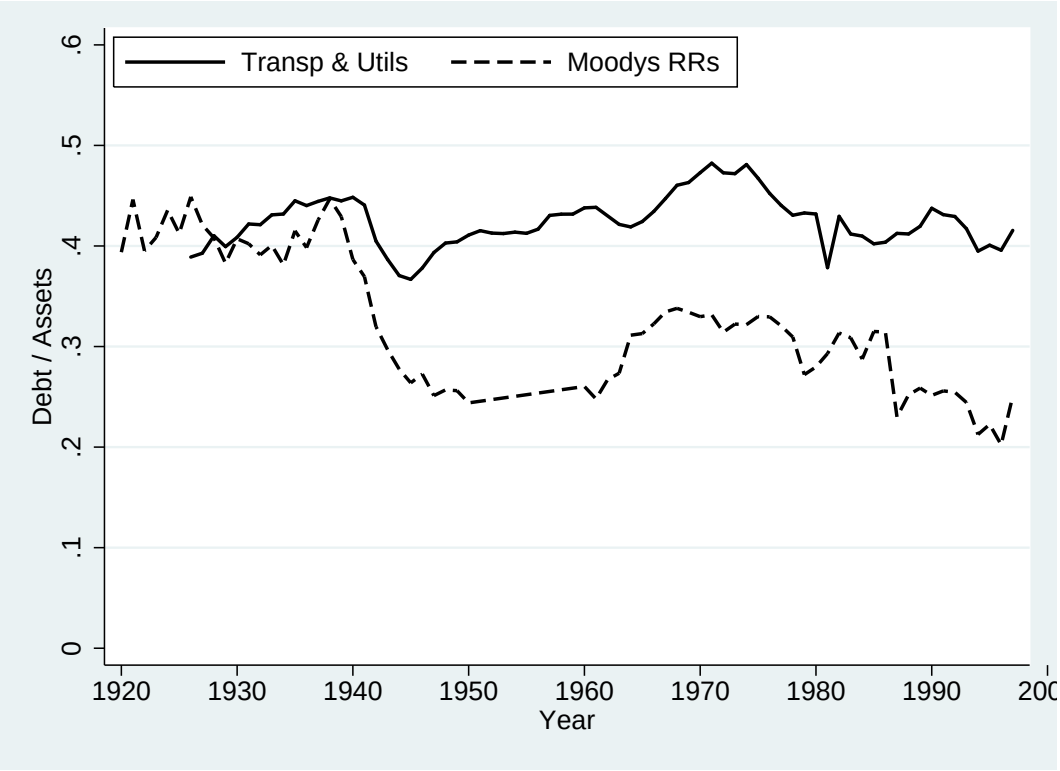


Figure 5
Comparing Aggregate Leverage Series

Panel A: Moodys vs. Flow-of-Funds



Panel B: Leverage of Regulated Industries



Panel C: Asset-weighted Industry Composition (HSUS data)

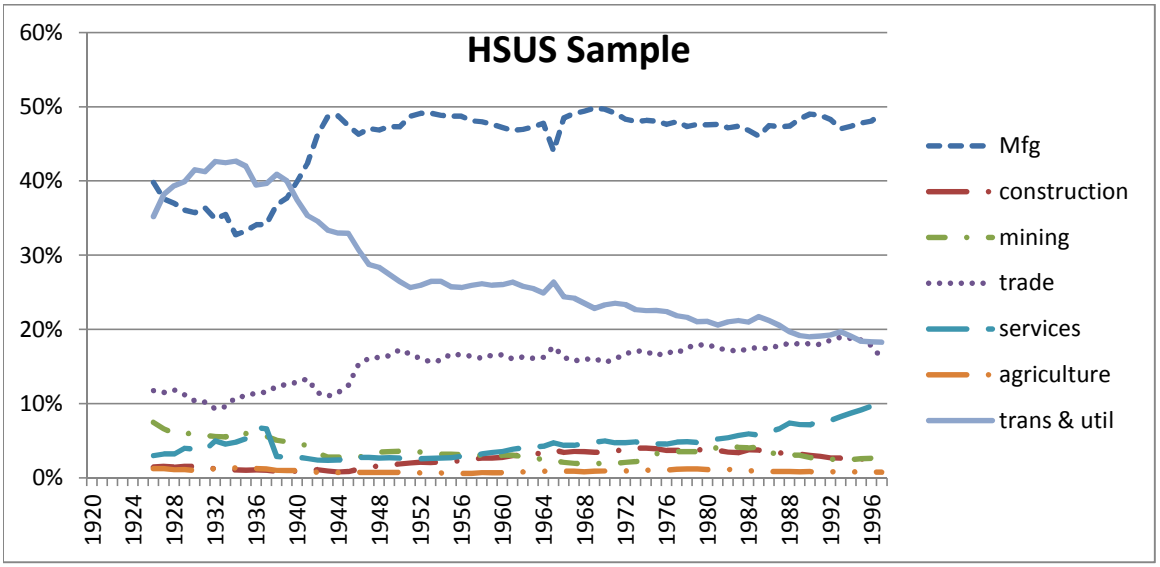


Figure 6

Corporate Leverage and Government Borrowing

Panel A: Corporate D/A Ratio

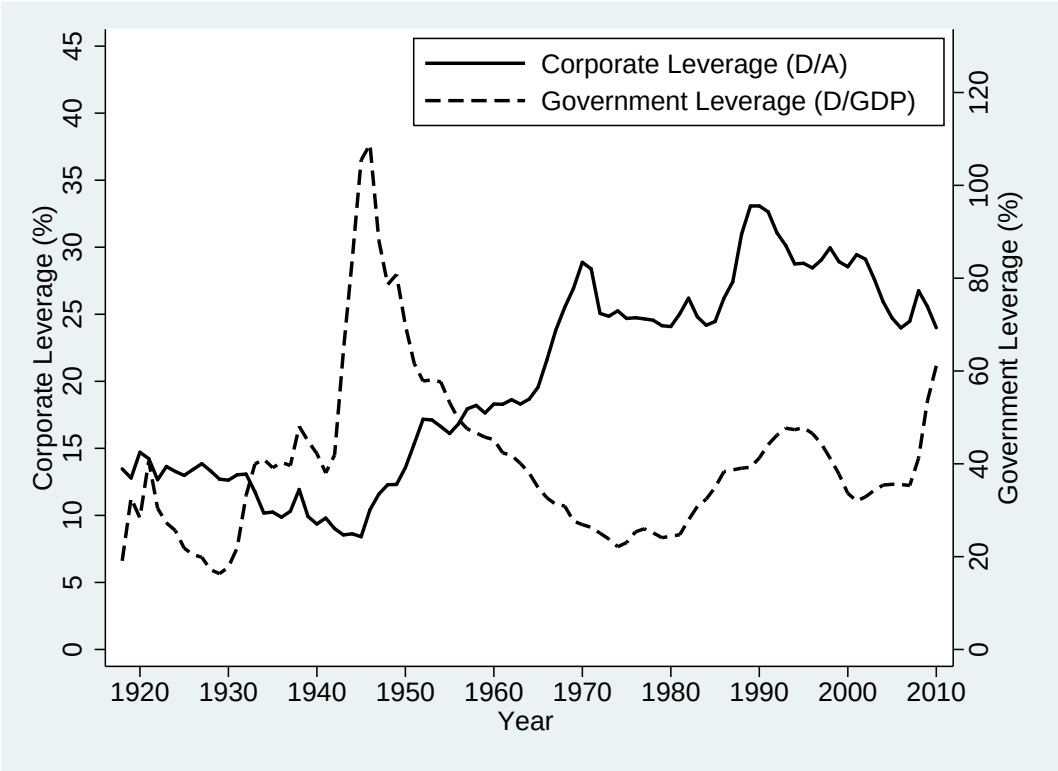
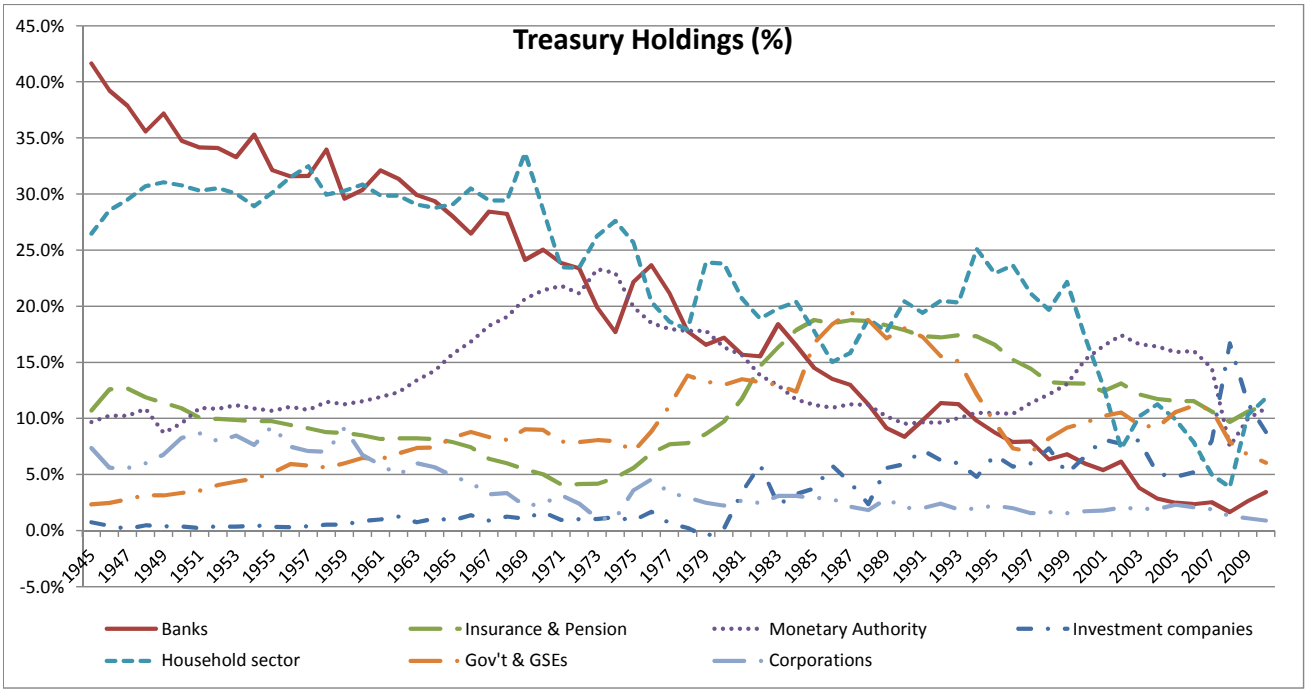
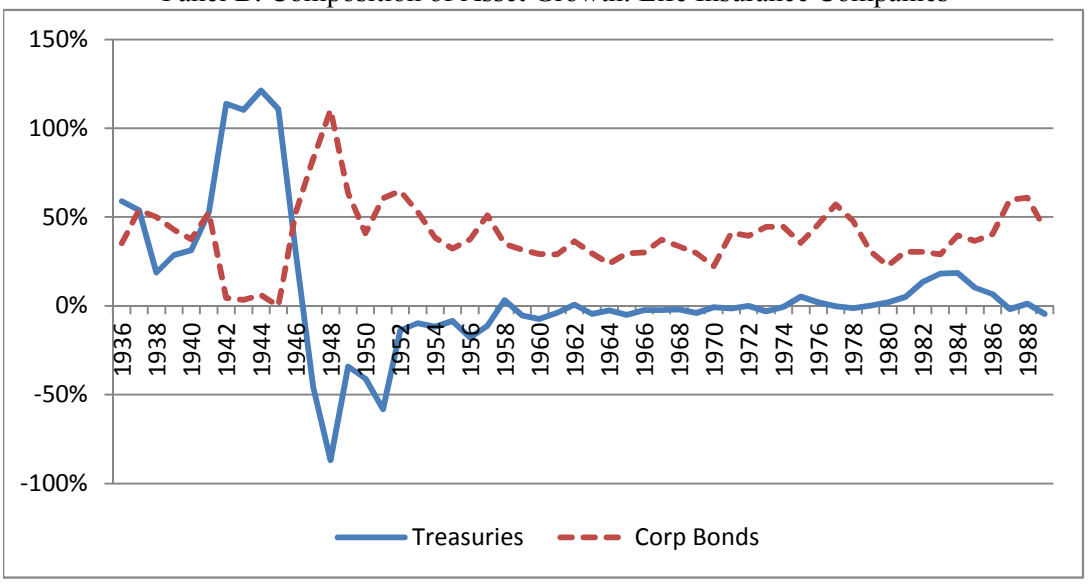


Figure 7
Allocation of Government and Corporate Debt

Panel A: Holdings of US Treasury Securities



Panel B: Composition of Asset Growth: Life Insurance Companies



Panel C: Composition of Asset Growth: Commercial Banks

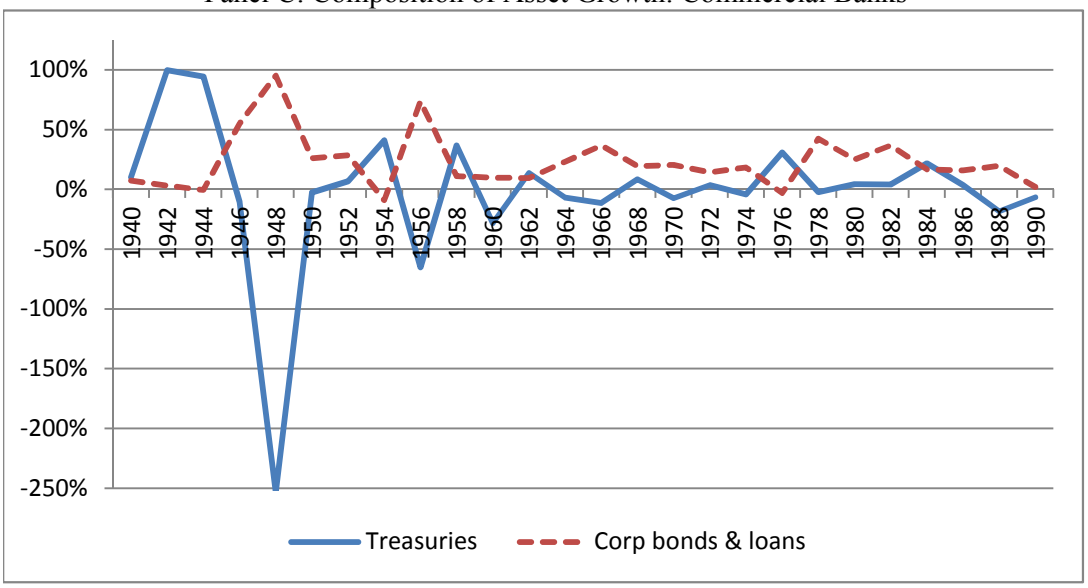
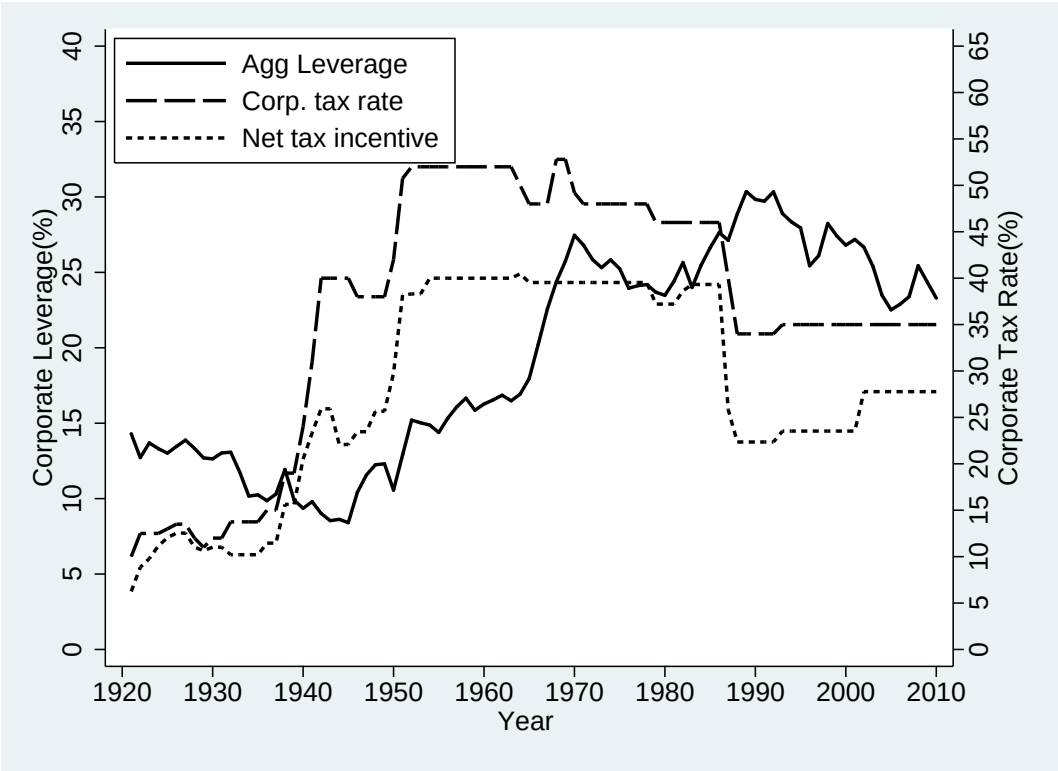


Figure 8
Leverage and Corporate Tax Rates

Panel A: Aggregate D/A Ratio



Panel B: Debt to Total Fixed Charge Capital

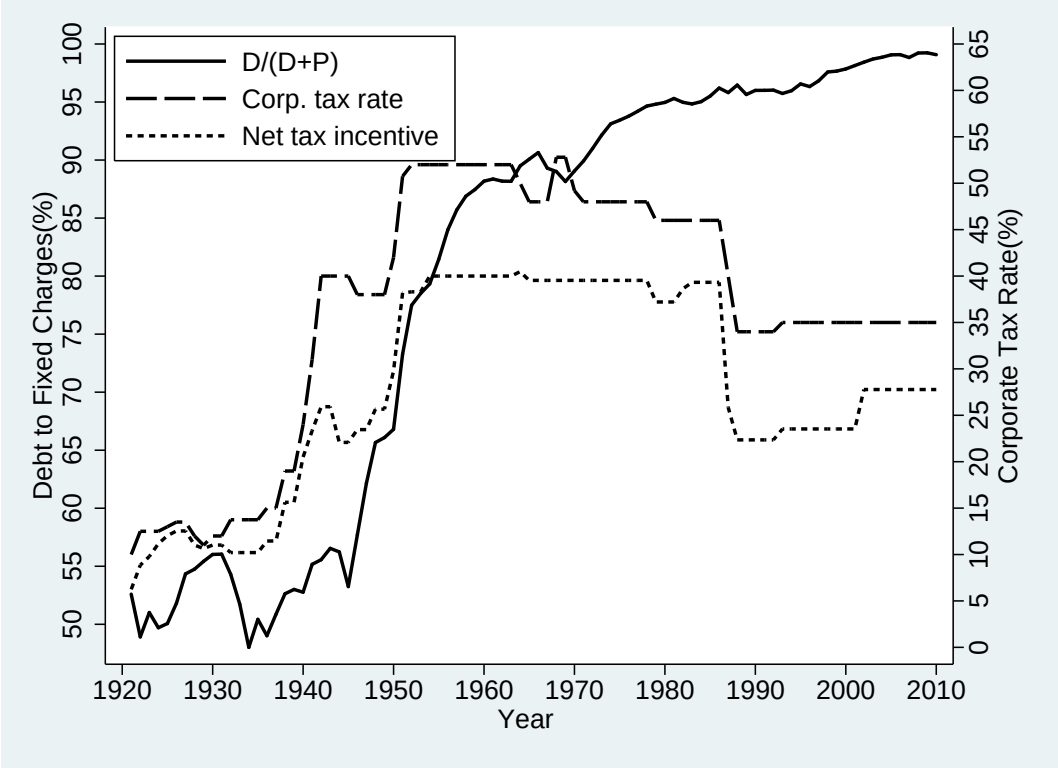
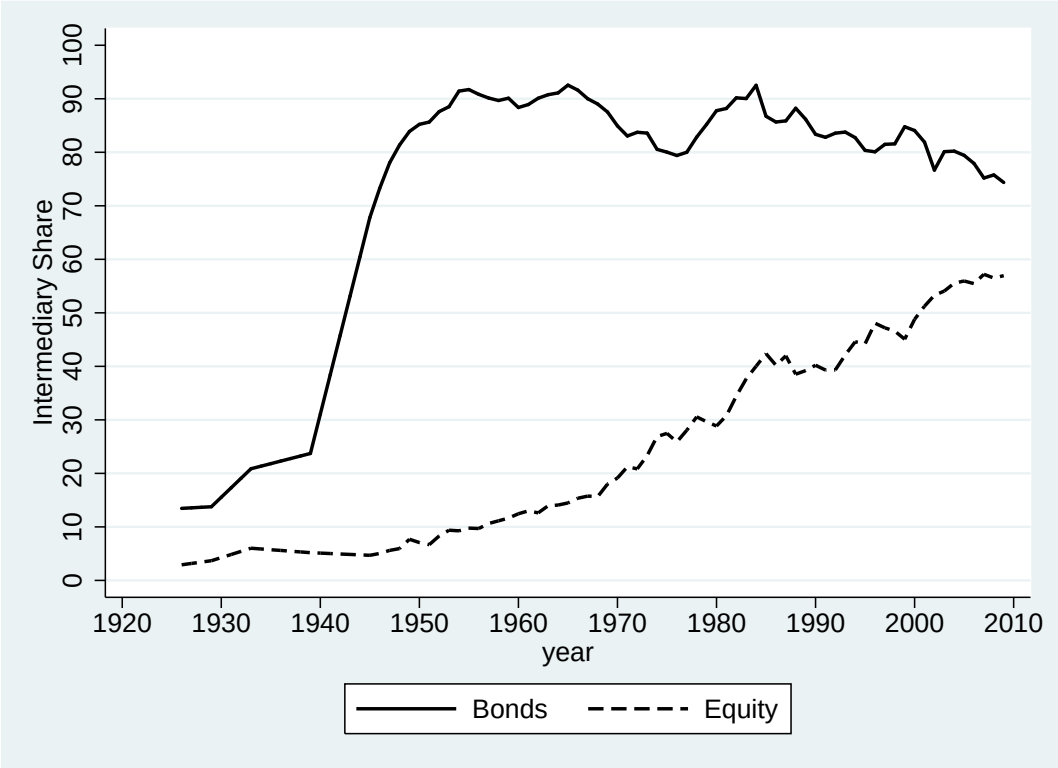


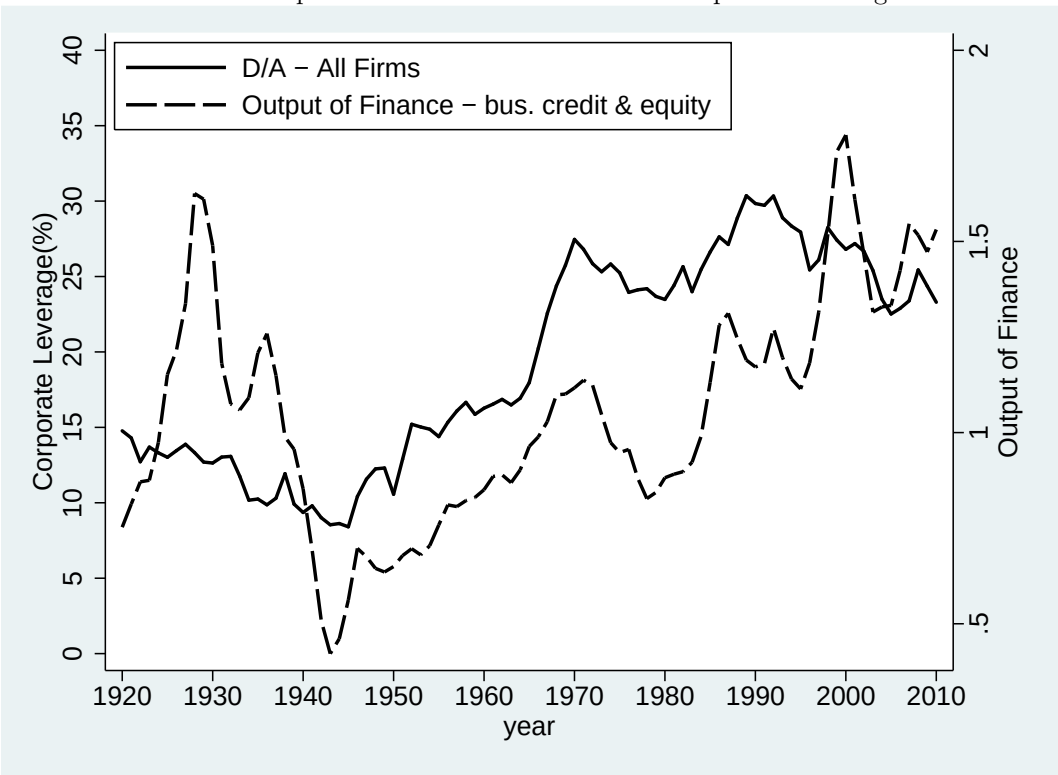
Figure 9

Intermediation, Financial Market Development and Corporate Leverage

Panel A:Proportion of Bonds and Equity Held through Intermediaries



Panel B: Output of the Financial Sector and Corporate Leverage



Panel C: Income Share of the Financial Sector and Corporate Leverage

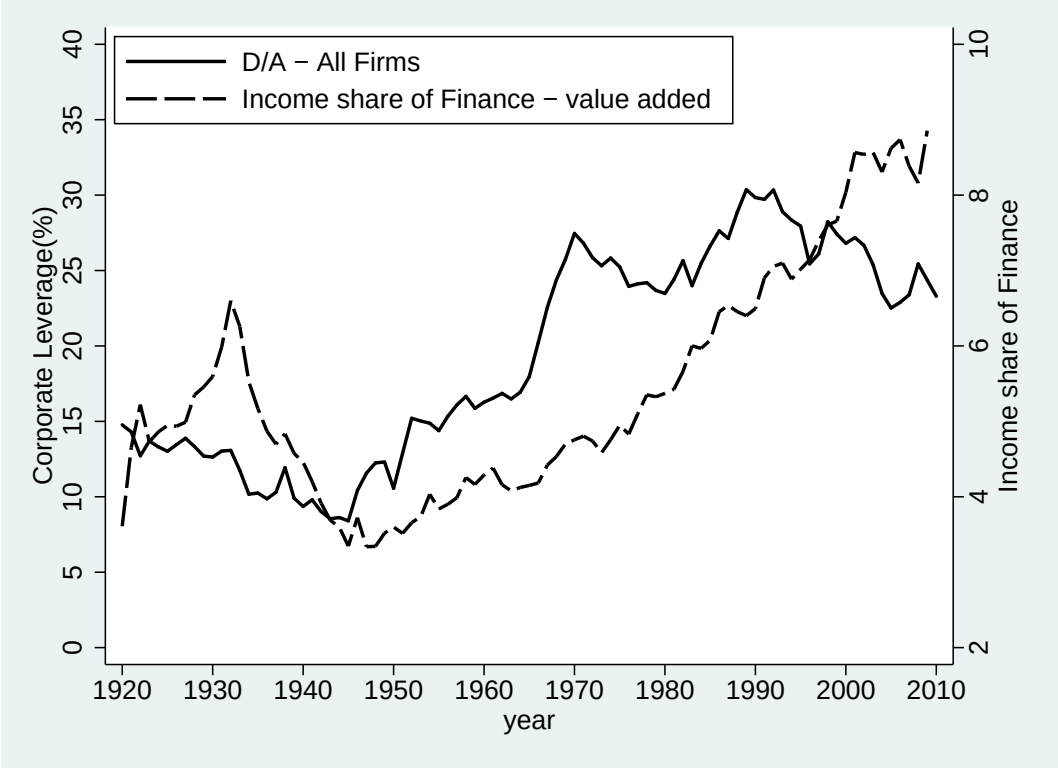


Table 1

Summary Statistics

Panel A: Annual Aggregate Summary Statistics

The sample includes all firms in the CRSP data base that are also covered either in Compustat or the Moody's Industrial Manuals. Financial firms, utilities and railroads are excluded.

	mean	sd	min	max
Firm Characteristics				
D/A	19.33	6.92	8.41	30.36
D/(D+ME)	20.20	8.19	7.59	36.69
(D-C)/A	8.07	9.93	-16.03	21.47
EBIT / A	9.96	2.99	1.83	17.54
Intangible Assets	15.80	9.85	5.88	38.37
MA / BA	1.26	0.25	0.57	1.90
Avg. Book Assets ($mm)	698.96	1117.86	42.23	5229.41
Investment / A	7.29	5.61	-6.42	19.64
Macroeconomic Factors				
Real AAA rate	2.99	4.38	-11.77	16.90
BAA - AAA Yield Spread	1.19	0.69	0.37	4.26
Inflation	2.92	4.44	-10.94	15.63
Mkt Return	0.12	0.21	-0.44	0.58
GDP growth	3.40	5.41	-13.00	18.52
Corp. Tax Rate	36.18	13.86	10.00	52.80
Govt Debt / GDP	40.79	17.71	16.34	108.82

Panel B: Panel Data Summary Statistics

The sample includes all firms in the CRSP data base that are also covered either in Compustat or the Moody's Industrial Manuals. Financial firms, utilities and railroads are excluded.

	count	mean	sd	min	max
D/A	216,705	21.84	20.17	0.00	89.20
D/(D+ME)	208,436	25.20	25.57	0.00	95.61
(D-C)/A	214,328	6.55	31.82	-77.52	82.96
EBIT / A	209,486	4.07	17.64	-76.51	31.27
Intangible Assets	208,749	16.95	17.67	-193.37	100.00
MA / BA	202,667	1.69	1.34	0.36	10.76
Book Assets ($mm)	216,784	1201.39	10552.24	0.00	1943112.68
Investment / A	191,098	0.18	0.56	-0.72	3.64

Panel C: Averages by Decade – Full Sample

	# obs	D/A	(D-C)/A	D/(D+ME)	EBIT / A	Intang. / A	MA / BA	Bk Asset	Invest/A
1921 - 1930	1,402	10.90	20.14	0.67	7.68	15.36	1.20	63	0.10
1931 - 1940	3,569	10.06	19.60	-3.98	6.99	12.10	1.13	57	0.00
1941 - 1950	5,929	9.30	14.81	-10.86	13.46	6.59	1.06	81	0.12
1951 - 1960	6,087	14.69	19.72	-0.38	11.71	5.92	1.17	177	0.11
1961 - 1970	12,216	21.78	22.65	11.55	10.54	9.32	1.61	236	0.19
1971 - 1980	27,673	26.33	35.54	17.18	10.37	10.40	1.26	343	0.16
1981 - 1990	35,572	25.81	27.40	11.79	1.97	14.00	1.70	643	0.21
1991 - 2000	44,519	22.41	23.70	5.42	0.42	20.99	1.99	1,232	0.25
2001 - 2010	35,951	19.84	21.71	-1.28	-0.00	27.80	1.90	3,437	0.11
Total		21.84	25.20	6.55	4.07	16.95	1.69	1,201	0.18

Table 2

Aggregate Corporate Leverage and Government Debt

The table presents results of OLS regressions of aggregate corporate book leverage (Debt-to-Assets) on government leverage (Debt-to-GDP). The regressions are run in both levels and first differences. Reported coefficients are standardized. 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.

Panel A: Main Specifications

	Levels			First Differences		
	(1)	(2)	(3)	(4)	(5)	(6)
Government Leverage	-0.118***	-0.067***	-0.088***	-0.026*	-0.056***	-0.064***
	(-6.73)	(-2.69)	(-3.60)	(-1.78)	(-3.74)	(-3.37)
Macroeconomic Factors						
Real AAA rate		0.958***	0.515**		0.029	0.059
		(3.36)	(1.99)		(0.15)	(0.31)
BAA - AAA Yield Spread		-1.800***	-2.936***		0.516**	0.226
		(-4.10)	(-4.05)		(2.12)	(0.63)
Inflation		0.852***	0.535**		0.028	0.088
		(3.17)	(2.21)		(0.14)	(0.46)
Market Return		0.117	0.337		0.132	-0.164
		(0.15)	(0.35)		(0.44)	(-0.33)
Real GDP Growth		-0.144***	-0.108**		-0.099***	-0.078***
		(-3.01)	(-2.23)		(-4.36)	(-3.30)
Firm Characteristics						
Profitability			-0.731***			-0.207**
			(-3.37)			(-2.19)
Intangible Assets			-0.207**			-0.001
			(-2.63)			(-0.01)
Market-to-Book Assets			-2.190			0.179
			(-1.26)			(0.21)
Trend	Yes	Yes	Yes	No	No	No
Observations	91	85	85	85	84	84

Panel B: Robustness Tests

	Levels	Differences
Alternate measures of corporate leverage		
Debt-to-Assets (500 Largest Firms)	-0.084***	-0.063***
	(-3.39)	(-3.29)
Net Debt-to-Assets	-0.228***	-0.161***
	(-5.56)	(-4.59)
Debt-to-Market Value	-0.083***	-0.067**
	(-3.54)	(-2.26)
Changes to the X-Variables		
One-year Lags	-0.065***	-0.006
	(-3.18)	(-0.51)
Corporate Tax Rate	-0.091***	-0.064***
	(-3.74)	(-3.35)
Debt Tax Incentive	-0.112***	-0.063***
	(-4.41)	(-3.28)
Unemployment Rate	-0.088***	-0.061***
	(-3.61)	(-3.48)
Foreign Holdings of US Debt	-0.130***	-0.107***
	(-3.41)	(-3.57)

Table 3

Aggregate Debt and Equity Issuance Regressions: Government Debt

The sample includes all firms in the CRSP data base that are also covered either in Compustat or the Moody's Industrial Manuals. Financial firms, utilities and railroads are excluded. The dependent variable in columns 1 - 3 (4 - 6) is the aggregate debt (equity) issuances scaled by lagged aggregate book assets. The table presents results of OLS regressions of the issuance variables on aggregate firm characteristics and macroeconomic variables. Reported coefficients are standardized. Newey-West standard errors assuming two non-zero lags are used to compute all t-statistics (in parentheses). Statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and **, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Debt Iss.	Debt Iss.	Debt Iss.	Eq. Iss.	Eq. Iss.	Eq. Iss.	DI/Invest	DI/Invest	DI/Invest
Government Net Debt Iss.	-0.072***	-0.068***	-0.055**	-0.074***	-0.016	-0.033	-0.268**	-0.262*	-0.245*
	(-3.66)	(-3.18)	(-2.12)	(-2.77)	(-0.90)	(-1.56)	(-2.01)	(-1.96)	(-1.71)
Macro vars (level)	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Firm controls (level)	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Macro vars (1st diff)	No	No	Yes	No	No	Yes	No	No	Yes
Firm controls (1st diff)	No	No	Yes	No	No	Yes	No	No	Yes
Observations	91	84	84	85	84	84	91	84	84

Table 4

Corporate Leverage and Government Debt: Cross-sectional interactions

The sample includes all firms in the CRSP data base that are also covered either in Compustat or the Moody's Industrial Manuals. Financial firms, utilities and railroads are excluded. The dependent variable is total debt divided by book assets. The table presents results from panel regressions including firm fixed-effects. Reported coefficients are standardized. Standard errors are adjusted for firm-level clustering. Statistical significance at the 5% and 1% levels are indicated by ** and ***, respectively.

	(1)	Small Firms	Default Prob	KZ Index	WW Index	HP Index	Non-Div Payers
Government Leverage	-0.823***	-0.522***	-0.764***	-0.577***	-0.673***	-0.965***	-0.750***
	(-10.61)	(-6.18)	(-9.68)	(-6.40)	(-6.46)	(-9.21)	(-9.28)
Govt lev x Fin. Constr.		-1.409***	-0.269***	-1.089***	-0.558**	-0.012	-0.141
		(-11.89)	(-4.77)	(-5.37)	(-2.48)	(-0.05)	(-0.54)
Firm Characteristics							
Firm Size	2.711***	1.893***	2.644***	2.411***	2.515***	2.070***	2.908***
	(8.09)	(5.73)	(7.91)	(7.27)	(6.97)	(6.05)	(8.69)
Profitability	-2.891***	-2.962***	-2.917***	-2.074***	-3.030***	-2.961***	-2.775***
	(-26.55)	(-27.22)	(-26.80)	(-17.35)	(-24.82)	(-26.92)	(-25.61)
Tangibility	3.764***	3.736***	3.771***	2.240***	3.660***	3.749***	3.780***
	(19.01)	(18.90)	(19.04)	(10.65)	(16.69)	(18.68)	(19.26)
Market-to-Book Assets	-1.172***	-1.189***	-1.206***	-1.057***	-1.154***	-1.127***	-1.158***
	(-12.74)	(-12.94)	(-12.95)	(-10.25)	(-10.79)	(-12.15)	(-12.64)
Modified Default Prob.	-0.954***	-0.935***	-0.919***	-0.933***	-0.987***	-0.945***	-0.957***
	(-13.98)	(-13.70)	(-13.47)	(-12.22)	(-12.64)	(-13.62)	(-14.04)
Fin const. group				8.242***	0.961**	-1.501***	3.083***
				(19.86)	(2.07)	(-3.01)	(5.81)
Macroeconomic Factors							
Corp. Tax Rate	0.425***	0.535***	0.444***	0.167	0.303**	0.380***	0.489***
	(3.59)	(4.50)	(3.75)	(1.40)	(2.31)	(3.16)	(4.19)
Real AAA rate	1.966***	1.538***	1.923***	2.592***	2.053***	1.778***	2.007***
	(11.50)	(9.03)	(11.26)	(15.21)	(11.41)	(10.29)	(11.86)
BAA - AAA Yield Spread	-1.367***	-1.234***	-1.354***	-1.473***	-1.455***	-1.426***	-1.383***
	(-16.28)	(-14.79)	(-16.14)	(-17.36)	(-15.94)	(-16.32)	(-16.32)
Inflation	2.024***	1.568***	1.990***	2.528***	2.173***	1.837***	2.123***
	(11.52)	(8.94)	(11.34)	(14.48)	(11.52)	(10.25)	(12.13)
Market Return	-0.076***	-0.092***	-0.072**	-0.049	-0.078***	-0.115***	-0.069**
	(-2.70)	(-3.25)	(-2.52)	(-1.68)	(-2.59)	(-3.94)	(-2.45)
Real GDP Growth	-0.169***	-0.153***	-0.166***	-0.232***	-0.139***	-0.172***	-0.168***
	(-4.27)	(-3.84)	(-4.22)	(-5.60)	(-3.15)	(-4.29)	(-4.28)
Constant	2.457	5.683***	2.865**	-0.083	2.992**	7.518***	0.167
	(1.95)	(4.44)	(2.27)	(-0.06)	(2.01)	(5.08)	(0.13)
Trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	174878	174878	174878	154116	153195	170806	174878
Adjusted R^2	0.628	0.629	0.628	0.645	0.633	0.628	0.629

Table 5

Aggregate Leverage Regressions: Tax incentives

The sample includes all firms in the CRSP data base that are also covered either in Compustat or the Moody's Industrial Manuals. Financial firms, utilities and railroads are excluded. The table presents results of OLS regressions of aggregate corporate book and market leverage on aggregate firm characteristics and macroeconomic variables. 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). Reported coefficients are standardized. Statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and **, respectively.

Panel A: Debt / Assets

	Levels				First Differences		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Corp. Tax Rate	0.237***	-0.052	-0.051		-0.008	-0.036	
	(4.65)	(-0.85)	(-0.51)		(-0.16)	(-0.58)	
Net Tax Incentive				-0.079			0.027
				(-1.04)			(0.83)
Long-run tax effect			0.050	-0.047		0.081	0.032
			0.587	-0.459		0.793	0.283
Government Leverage	-0.175***	-0.091***	-0.055**	-0.095***	-0.064***	-0.064***	-0.067***
	(-6.37)	(-3.74)	(-2.31)	(-4.39)	(-3.35)	(-3.27)	(-3.03)
Macro vars	No	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Trend	No	Yes	Yes	Yes	No	No	No
Observations	91	85	83	83	84	82	82

Panel B: Debt / (Debt + Preferred)

	Levels				First Differences		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Corp. Tax Rate	1.012***	0.300***	0.077		0.111	0.005	
	(9.65)	(3.40)	(1.10)		(1.21)	(0.06)	
Net Tax Incentive				0.147			0.101
				(1.48)			(1.29)
Long-run tax effect			0.580	0.532		0.551	0.594
			7.426	3.555		5.377	3.302
Government Leverage	-0.343***	-0.221***	-0.171***	-0.154***	-0.164***	-0.177***	-0.145***
	(-4.34)	(-6.89)	(-7.98)	(-4.56)	(-3.76)	(-4.85)	(-4.14)
Macro vars	No	Yes	Yes	Yes	Yes	Yes	Yes
Firm controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Trend	No	Yes	Yes	Yes	No	No	No
Observations	91	85	83	83	84	82	82

Table 6

Aggregate Debt and Equity Issuance Regressions: Tax Incentives

The sample includes all firms in the CRSP data base that are also covered either in Compustat or the Moody's Industrial Manuals. Financial firms, utilities and railroads are excluded. The dependent variable in columns 1 - 3 (4 - 6) is the aggregate debt (equity) issuances scaled by lagged aggregate book assets. The table presents results of OLS regressions of the issuance variables on aggregate firm characteristics and macroeconomic variables. Reported coefficients are standardized. Newey-West standard errors assuming two non-zero lags are used to compute all t-statistics (in parentheses). Statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and **, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Debt Iss.	Debt Iss.	Debt Iss.	Eq. Iss.	Eq. Iss.	Eq. Iss.	DI/Invest	DI/Invest	DI/Invest
Net Tax Incentive	0.077***	0.004	-0.034	-0.014	-0.094*	0.083*	0.387***	0.103	0.204
	(4.67)	(0.11)	(-0.35)	(-0.65)	(-1.90)	(1.68)	(3.04)	(0.52)	(0.33)
Long-run tax effect			0.041			-0.120			0.234
			1.094			-2.890			1.119
Government Net Debt Iss.	-0.068***	-0.057*	-0.046	-0.076***	0.021	-0.000	-0.251**	-0.304*	-0.201
	(-4.38)	(-1.96)	(-1.37)	(-2.71)	(0.72)	(-0.01)	(-2.27)	(-1.77)	(-1.05)
Macro vars (level)	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Firm controls (level)	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Macro vars (1st diff)	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Firm controls (1st diff)	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Observations	90	84	82	85	84	82	90	84	82

Table 7

Panel Difference-in-Differences Regressions: Tax Law Changes

The sample period is from two years before the start of each tax law change to two years after the end (1938-44 in Panel A, 1948-53 in Panel B). The sample includes all firms with continuous leverage data from at least one year before to one year after the tax law change. The dependent variable in columns (1) - (3) is total debt to assets ratio; in columns (4) - (6) is the ratio of total debt to the sum of total debt plus preferred stock. The table presents results of OLS panel regressions. *Post* is an indicator equal to 1 for years after 1942 (Panel A) or after 1951 (Panel B). *Profit* is an indicator variable equal to 1 (0) for firms in the upper (lower) third of the distribution of EBIT (scaled by assets) over the three years preceding each tax law change (1938-40 in Panel A, 1948-50 in Panel B). Standard errors are robust to heteroscedasticity and clustered at the firm level. Statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and **, respectively.

Panel A: Revenue Acts of 1940 – 1942

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	D/A	D/A	D/A	D/(D+P)	D/(D+P)	D/(D+P)	DI/Invest	DI/Invest	DI/Invest
Post	0.05	-1.35**	-3.41***	0.03**	0.01	-0.16***	-7.52***	-15.36***	-17.66
	(0.16)	(-2.22)	(-2.70)	(2.37)	(0.27)	(-2.72)	(-3.42)	(-3.86)	(-1.24)
profit		-5.19***	-3.02**		-0.17***	-0.14*		-0.68	-0.88
		(-5.40)	(-2.26)		(-3.06)	(-1.90)		(-0.23)	(-0.19)
Profit x Post		2.95***	2.21**		0.07*	0.09**		14.40***	13.34**
		(3.42)	(2.36)		(1.97)	(2.00)		(2.67)	(2.22)
Firm Size			0.14***			-0.00			0.06
			(3.78)			(-0.92)			(0.52)
Profitability			-0.01			-0.00			0.05
			(-0.22)			(-0.78)			(0.21)
Tang. Assets			0.04			0.00**			-0.24***
			(1.52)			(2.29)			(-2.75)
MA / BA			-0.81			0.04			-3.32*
			(-1.23)			(0.77)			(-1.76)
AAA rate			-0.05			-0.19*			-7.36
			(-0.03)			(-1.80)			(-0.44)
AAA - BBB spread			-2.45*			-0.08			-19.14
			(-1.91)			(-1.15)			(-1.25)
Inflation			0.22			-0.17*			-7.23
			(0.14)			(-1.69)			(-0.44)
Mkt Return			2.63			0.13			-2.98
			(1.64)			(1.54)			(-0.16)
GDP growth			-0.16*			-0.01			-1.42
			(-1.92)			(-1.36)			(-1.45)
Constant	6.92***	9.42***	9.66*	0.55***	0.67***	1.34***	1.99	2.77	84.19
	(16.61)	(11.53)	(1.66)	(24.19)	(18.91)	(3.67)	(1.64)	(1.16)	(1.31)
Observations	3111	2057	1790	2077	1354	1181	1564	1022	934
Adjusted R^2	-0.000	0.053	0.095	0.001	0.031	0.051	0.007	0.013	0.022

Panel B: Revenue Acts of 1950 – 1951

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	D/A	D/A	D/A	D/(D+P)	D/(D+P)	D/(D+P)	DI/Invest	DI/Invest	DI/Inves
Post	2.83***	2.08***	0.78	0.09***	0.05***	-0.03	-3.06*	-8.79**	-32.07***
	(8.89)	(3.04)	(0.79)	(10.47)	(4.03)	(-1.40)	(-1.95)	(-2.32)	(-3.11)
profit		-8.97***	-3.98***		-0.14***	-0.10**		-12.69***	-13.89***
		(-8.85)	(-3.46)		(-3.59)	(-2.25)		(-4.56)	(-3.63)
Profit x Post		0.94	-1.40*		0.07***	0.05*		10.02**	9.58**
		(1.15)	(-1.78)		(2.83)	(1.90)		(2.31)	(2.10)
Firm Size			0.25***			-0.00			0.15
			(3.60)			(-1.57)			(1.00)
Profitability			-0.36***			-0.01***			0.11
			(-7.21)			(-3.05)			(0.62)
Tang. Assets			0.06**			0.00**			-0.11
			(2.06)			(2.09)			(-1.28)
MA / BA			-0.85*			0.07**			-0.97
			(-1.90)			(2.14)			(-0.94)
AAA rate			4.21			0.03			45.75
			(1.61)			(0.42)			(1.47)
AAA - BBB spread			-13.10***			-0.73***			-134.79**
			(-2.60)			(-4.30)			(-2.44)
Inflation			4.39*			0.03			47.21
			(1.65)			(0.39)			(1.49)
Mkt Return			7.87**			0.27**			144.18***
			(1.99)			(2.36)			(3.33)
GDP growth			0.15***			-0.00			-1.08*
			(2.98)			(-1.29)			(-1.86)
Constant	10.94***	15.38***	6.22	0.66***	0.73***	1.12***	9.42***	16.98***	-41.12
	(25.81)	(17.92)	(0.67)	(42.83)	(31.78)	(3.76)	(9.48)	(6.84)	(-0.39)
Observations	4508	2977	2744	3560	2280	2102	2863	1834	1708
Adjusted R^2	0.013	0.123	0.198	0.018	0.039	0.078	0.001	0.013	0.048

Table 8

Aggregate Leverage Regressions: Financial Market Development

The sample includes all firms in the CRSP data base that are also covered either in Compustat or the Moody's Industrial Manuals. Financial firms, utilities and railroads are excluded. The table presents results of OLS regressions of aggregate corporate book and market leverage on aggregate firm characteristics and macroeconomic variables. The regressions are run in both levels and first differences. *Interm. Share Debt* is the proportion of bonds outstanding held through financial intermediaries. *Interm. Share (Debt-Eq)* is the proportion of bonds outstanding held through financial intermediaries minus the proportion of corporate equity held through financial intermediaries. Reported coefficients are standardized. Newey-West standard errors assuming two non-zero lags are used to compute all t-statistics (in parentheses). Statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and **, respectively.

Panel A: Intermediary Holdings of Debt and Equity

	Levels			First Differences	
	(1)	(2)	(3)	(4)	(5)
	Book Lev	Book Lev	Book Lev	Book Lev	Book Lev
Interm. Share Debt	5.729***	-0.006	4.956	-5.367	0.796
	(2.68)	(-0.00)	(1.18)	(-1.22)	(0.14)
Interm. Share Equity	27.948***	4.438	-37.563**	-0.953	-0.862
	(6.18)	(0.18)	(-2.20)	(-1.16)	(-0.91)
Government Leverage			-0.102***		-0.064***
			(-4.43)		(-3.11)
Corp. Tax Rate			-0.141*		-0.025
			(-1.94)		(-0.42)
Macro vars	No	No	Yes	No	Yes
Firm controls	No	No	Yes	No	Yes
Trend	No	Yes	Yes	No	No
Observations	88	88	84	87	83

Panel B: Size of the Financial Sector

	Levels					
	(1)	(2)	(3)	(4)	(5)	(6)
	Book Lev	Book Lev	Book Lev	Book Lev	Book Lev	Book Lev
Income share of Finance	288.198***	18.316	-270.458**			
	(6.22)	(0.34)	(-2.48)			
Output of Finance				11.840***	3.148*	8.438***
				(3.94)	(1.82)	(2.97)
Government Leverage			-0.111***			-0.054**
			(-4.57)			(-2.44)
Corp. Tax Rate			-0.078			0.031
			(-1.26)			(0.51)
Macro vars	No	No	Yes	No	No	Yes
Firm controls	No	No	Yes	No	No	Yes
Trend	No	Yes	Yes	No	Yes	Yes
Observations	90	90	84	91	91	85

Table 9

Aggregate Debt and Equity Issuance Regressions: Financial Market Development

The sample includes all firms in the CRSP data base that are also covered either in Compustat or the Moody's Industrial Manuals. Financial firms, utilities and railroads are excluded. The dependent variable in columns 1 - 3 (4 - 6) is the aggregate debt (equity) issuances scaled by lagged aggregate book assets. The table presents results of OLS regressions of the issuance variables on aggregate firm characteristics and macroeconomic variables. Reported coefficients are standardized. Newey-West standard errors assuming two non-zero lags are used to compute all t-statistics (in parentheses). Statistical significance at the 10%, 5% and 1% levels are indicated by *, ** and **, respectively.

Panel A: Intermediary Holdings of Debt and Equity

	(1)	(2)	(3)	(4)	(5)	(6)
	Debt Iss.	Debt Iss.	Eq. Iss.	Eq. Iss.	DI/Invest	DI/Invest
Interm. Share Debt	2.993***	1.881	-0.320	-3.057	11.035**	6.904
	(3.99)	(0.77)	(-0.28)	(-1.28)	(2.57)	(0.51)
Interm. Share Equity	1.212	3.423	0.363	-8.711	10.275	40.148
	(0.93)	(0.71)	(0.30)	(-1.54)	(1.51)	(1.32)
Government Net Debt Iss.		-0.057		0.033		-0.326
		(-1.46)		(1.04)		(-1.46)
Corp. Tax Rate		-0.040		-0.009		-0.160
		(-0.73)		(-0.23)		(-0.56)
Macro vars	No	Yes	No	Yes	No	Yes
Firm controls	No	Yes	No	Yes	No	Yes
Macro vars (1st diff)	No	Yes	No	Yes	No	Yes
Firm controls (1st diff)	No	Yes	No	Yes	No	Yes
Observations	88	83	84	83	88	83

Panel B: Output of the Financial Sector (bus. credit and equity)

	(1)	(2)	(3)	(4)	(5)	(6)
	Debt Iss.	Debt Iss.	Eq. Iss.	Eq. Iss.	DI/Invest	DI/Invest
Output of Finance	0.257	0.421	0.569**	0.760**	2.163**	1.920
	(1.21)	(1.07)	(2.26)	(2.20)	(2.04)	(0.82)
Government Net Debt Iss.		-0.023		0.027		-0.076
		(-0.82)		(1.10)		(-0.52)
Corp. Tax Rate		0.188		-0.637*		1.568
		(0.50)		(-1.86)		(0.62)
Macro vars	No	Yes	No	Yes	No	Yes
Firm controls	No	Yes	No	Yes	No	Yes
Macro vars (1st diff)	No	Yes	No	Yes	No	Yes
Firm controls (1st diff)	No	Yes	No	Yes	No	Yes
Observations	91	84	85	84	91	84

Panel C: Income Share of the Financial Sector

	(1) Debt Iss.	(2) Debt Iss.	(3) Eq. Iss.	(4) Eq. Iss.	(5) DI/Invest	(6) DI/Invest
Income share of Finance	0.171	-0.422	0.163	2.732**	1.716*	-5.964
	(0.85)	(-0.37)	(0.78)	(2.65)	(1.67)	(-1.10)
Government Net Debt Iss.		-0.038		0.022		-0.170
		(-1.52)		(1.01)		(-1.24)
Corp. Tax Rate		-0.112		-1.037**		0.052
		(-0.29)		(-2.63)		(0.02)
Macro vars	No	Yes	No	Yes	No	Yes
Firm controls	No	Yes	No	Yes	No	Yes
Macro vars (1st diff)	No	Yes	No	Yes	No	Yes
Firm controls (1st diff)	No	Yes	No	Yes	No	Yes
Observations	90	83	84	83	90	83