# Taxes, Investment, and Capital Structure: A Study of U.S. Firms in the Early 1900s

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**Abstract**

We analyze capital structure decisions of U.S. firms during 1905-1924, a period characterized by two relevant shocks: (i) the introduction of corporate and individual taxes, and (ii) the onset of World War I, which resulted in large, transitory increases in investment outlays by U.S. firms. Although we find little evidence that shocks to corporate and individual taxes have a meaningful influence on observed leverage ratios, we find strong evidence that changes in leverage are positively related to investment outlays and negatively related to operating cash flows. Moreover, the transitory investments made by firms during World War I are associated with transitory increases in debt, especially by firms with relatively low earnings. Our findings do not support models that emphasize taxes as a first-order determinant of leverage choices, but do provide support for models that link the dynamics of leverage with dynamics of investment opportunities.

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## 1. Introduction

We analyze the capital structure decisions of U.S. firms between 1905 and 1924, a period characterized by two shocks that provide a unique opportunity for studying the factors that influence the financing decisions of firms. The first is a set of tax law changes that are among the largest in U.S. history: the inception of the U.S. corporate income tax in 1909, the U.S. individual income tax in 1913, and an "excess profits tax" associated with the U.S. entry into World War I in 1917. Because taxes play a central role in standard tradeoff models of capital structure, this shock provides a particularly useful experimental setting for examining the role that taxes play in financing decisions.

The second shock is the onset of World War I. The outbreak of the war in 1914, followed by the U.S. declaration of war in 1917, led firms in various industries to increase productive capacity to accommodate a dramatic, but transitory, increase in demand from the U.S. and European governments. This shock thus presents an opportunity to examine how firms finance a sudden and transitory increase in investment expenditures. Because recent dynamic capital structure models emphasize the importance of investment outlays as a first-order determinant of leverage dynamics, the onset of World War I provides a unique setting for examining whether the financing decisions of firms conform to the predictions of these models.[1]

Using financial information for 57 publicly-traded U.S. industrial firms over the period 1905 through 1924, we find little evidence that taxes play a central role in capital structure decisions, despite statutory tax rates that range between 0% and 80% over the sample period. Prior to the inception of the corporate income tax, debt financing is common -- sample firms have a mean (median) debt to asset ratio of approximately 14.8% (11.4%) during 1905-1908.

[1] See, for example, studies by Hennessy and Whited (2005), Tserlukevich (2008), Dudley (2010), and DeAngelo, DeAngelo, and Whited (2011).

After the inception of corporate and individual income taxes, mean (median) leverage ratios do not change significantly. Furthermore, although the adoption of the excess profits tax in 1917 creates a strong tax bias towards equity financing, we find that debt ratios actually *increase* significantly, after controlling for other variables, during the period in which the excess profits tax is in place. Our inferences are robust to the inclusion of direct measures of tax incentives, alternative assumptions about the tax rate of the marginal investor, and possible confounding effects from variations in state taxes.

Despite finding little evidence of a link between leverage changes and tax changes, we nonetheless observe substantial *within-firm* variation in leverage ratios during the sample period. The difference between the maximum and minimum debt-to-asset ratios for individual firms over the entire sample period averages 16.6 percentage points. The wide variation in leverage ratios within our sample fits well with the variation documented by DeAngelo and Roll (2013) for a broad set of U.S. firms between 1950 and 2008. This suggests that the capital structures of firms were changing considerably over the sample period, apparently for reasons other than taxes.

Our analysis of the World War I period provides evidence that leverage ratios are linked to unexpected changes in investment outlays and cash flows. We first document that corporate investments increase substantially during the World War I period and subside afterwards, suggesting that war-related investment outlays were largely transitory. Most notably, during the World War I period, the ratio of investment outlays to assets is significantly higher for the firm years in the top quartile of leverage changes (0.098) than for the firm years in the corresponding bottom quartile (0.028), whereas the ratio of earnings to assets is significantly lower in the top (0.052) than in the bottom (0.107) quartile. This evidence is consistent with the hypothesis that

firms increase debt to finance transitory increases in investments, especially when their operating earnings and cash flows are low relative to their investment requirements.

Additionally, we find that the change in debt ratios during 1917-1920 is significantly and inversely related to the corresponding change in debt ratios during 1921-1924 (i.e., the post-War period), suggesting that the increase in debt during World War I was, like the increase in investments, transitory. Further, we find the inverse relation between the change in debt ratios across periods is due to firms with high investment during the 1917-1920 period. In fact, we show that reductions in leverage in the post-War period are confined almost exclusively to those firms that had a debt-funded expansion of investment during the war. Thus, our findings do not appear to be driven by an across-the-board incentive to delever in the face of the post-World War I recession.

Although shocks to investment outlays and operating cash flows are largest and, more plausibly, exogenous during the WWI period, we find similar evidence of a positive association between leverage and investment outlays, and a negative association between leverage and operating cash flows in other periods as well. Perhaps most notably, we find that year-to-year changes in leverage over the entire sample period are positively related to investment and negatively related to earnings. Both of these relations are economically and statistically significant. Although the level of investments and earnings is substantially higher during the World War I period versus other periods, we do not find that the association of the change in leverage with these two variables is significantly different during the war period as compared with other periods.

Overall, our findings do not support capital structure models that emphasize taxes as a first-order determinant of leverage choices. At first glance, this appears to contradict recent

studies that provide support for the role of tax incentives in capital structure decisions. For example, Faccio and Xu (2012), Heider and Ljungqvist (2012), Longstaff and Strebulaev (2014), and Panier, Perez-Gonzalez, and Villanueva (2013) all conclude that firms alter their capital structures in response to changes in the tax code. It is important to note, however, that our experimental setting is designed to address the role of taxes in a different way from that of the papers cited above. Specifically, because the above studies are primarily interested in whether tax law changes have a causal impact on capital structure decisions, their tests are designed to isolate this causal impact by attempting to hold constant other potential influences on capital structure. By contrast, our experimental design deliberately allows other period-specific factors to influence capital structure, then asks whether observed leverage dynamics are consistent with taxes being of first-order importance. The fact that we find (i) no association between tax rates and average leverage ratios despite an enormous range in statutory tax rates over the sample period, and (ii) substantial variation in leverage ratios within individual firms implies that factors other than taxes are the primary determinants of financing decisions during this period.

Our evidence does provide support for capital structure models that emphasize the dynamics of investment opportunities and operating cash flows as factors influencing the dynamics of capital structure decisions. We discuss these models in greater detail in Section 5.

The remainder of the paper is structured as follows. Section 2 describes the two shocks during the sample period, i.e., the inception of a federal income tax system and a transitory increase in corporate investments caused by World War I. Section 3 describes the sample and data. Section 4 provides the empirical results. Section 5 includes a discussion of the results and concluding comments.

## 2. The Two Shocks During 1905-1924: Taxes and World War I

In this section, we describe the two shocks in more detail. We first describe the inception of federal income taxes and the variation in corporate and individual tax rates during the period. We then describe how the onset of World War I caused a large, transitory increase in investment expenditures by firms in our sample.

### 2.1. U.S. Corporate and Individual Income Taxes, 1905-1924

Federal taxes on both corporate and individual income varied considerably during the sample period of 1905-1924. Table 1 lists the annual federal tax rates on corporate and individual income, respectively, over this period.

During 1905 through 1908, the first four years of the sample period, neither corporate nor individual income was taxed in the U.S. at the federal level.[2] In 1909, the Corporate Tax Act, which called for the taxation of corporate income in the form of an excise tax, was adopted. This legislation, which represents the inception of the U.S. corporate income tax, called for a one percent tax on corporate income in excess of $5,000. Under this law, which was upheld by the U.S. Supreme Court in 1911 in *Flint v. Stone Tracy Company* 220 U.S. 107 (1911), interest expense on an amount of debt equal to the value of a corporation's capital stock was treated as a tax deductible item. Although cast as an excise tax, the U.S., in effect, had a corporate, but not individual, income tax from 1909 until 1913, when the Sixteenth Amendment, which eliminated the U.S. Constitution's apportionment requirement, was adopted.

[2] Prior to 1905, the U.S. had taxed corporate and/or individual income on two occasions. The Revenue Act of 1861, enacted to generate revenue for the U.S. government during the Civil War, taxed individual, but not corporate, income at a rate of three percent on annual income over $800. This law was replaced by the Revenue Act of 1862, which also taxed only individual income, this time at graduated rates as high as five percent. In 1870, after the cessation of the Civil War, a law calling for the expiration of the individual income tax in 1873 was enacted. From 1873 through 1893, neither individual nor corporate income was taxed at the federal level in the U.S. In 1894, the Wilson-Gorman Tariff Act, which taxed both corporate and individual income at a rate of two percent on income over $4,000, was adopted. However, one year later this tax was struck down by the U.S. Supreme Court in Pollock v. Farmers' Loan & Trust Co. 157 U.S. 428 (1895) on grounds that the apportionment requirement of the U.S. Constitution required direct taxes to be levied in proportion to the population of states.

The Revenue Act of 1913 established separate tax rates for corporate versus individual income. In effect, it converted the excise tax of one percent on corporate income into a corporate income tax rate of one percent. Under this law, interest expense was deductible on an amount of debt equal to one-half of the amount of outstanding debt and equity.[3] The legislation also established a "normal" individual income tax rate of one percent along with a set of graduated surtax rates as high as six percent. Hence, under the Revenue Act of 1913, the top individual rate of seven percent was considerably higher than the corporate rate of one percent. Whereas dividends were treated as individual income for tax purposes, retained earnings were not subject to the individual tax rate unless the tax authorities determined that a company was retaining earnings for the purpose of shielding their stockholders from paying taxes on dividend income.

The corporate and individual tax rates established under the Revenue Act of 1913 remained intact for three years. World War I, which began on July 28, 1914, was the catalyst for significant increases in U.S. tax rates in 1916 and 1917. Although the U.S. did not enter the war until April 6, 1917, President Wilson sought large tax increases in 1916 to finance war preparations. Income tax rates more than doubled in 1916 with the enactment of The Revenue Act of 1916, which increased the corporate tax rate from one percent to two percent and the top individual surtax rate seven percent to thirteen percent (on incomes over $2,000,000). Interest expense remained tax deductible as long as it was less than or equal to the sum of paid up stock and one-half the amount of outstanding interest bearing debt. In addition to the Revenue Act of 1916, the Munitions Manufacturers Tax, which increased the corporate income tax rate to 12.5 % for manufacturers of munitions, was adopted in 1916.

[3] We thank Steven Bank for pointing out the Treasury Department later changed its interpretation such that interest expense was deductible up to the paid up capital stock plus one-half of the outstanding debt.

Tax rates increased even more substantially in 1917, with the adoption of two amended war revenue bills on March 3, 1917 and October 3, 1917. The two bills created two new taxes -- a "war profits" tax and an "excess profits" tax. The first bill increased the "normal" tax rates on corporate and individual income to six percent and four percent, respectively. It also created a war profits tax that levied an 80% tax on a corporation's net income in excess of a war profits credit. The credit was calculated as the sum of (i) $3,000, (ii) the corporation's average net income during 1911, 1912, and 1913 (i.e., pre-war years), and (iii) ten percent of the increase in the corporation's invested capital over its average invested capital during 1911 to 1913. Under the legislation, invested capital was defined as the sum of (i) actual cash paid in, (ii) the cash value of tangible property, and (iii) paid in or earned surplus and the corporation's undivided profits. Plehn (1920) wrote that "invested capital came to be defined in substance as the amount paid in by stockholders, whether originally or out of profits, in money or in property."

The war revenue bill adopted on October 3, 1917 replaced the war profits tax with an excess profits tax. The excess profits tax levied a set of graduated tax rates ranging from 20 percent to 60 percent on the difference between a corporation's net income and an excess profits credit, calculated as the sum of (i) $3,000 and (ii) a measure of "normal" net income, calculated as eight percent of a company's invested capital. In both bills, interest expense was treated as tax deductible as it was in the Revenue Act of 1916.

Tax rates increased yet again in 1918, with the adoption of another war revenue bill. Under the Revenue Act of 1918, both the normal corporate and individual tax rates increased to 12 percent. In addition, this bill adopted both a war profits tax and an excess profits tax, in which corporations would pay whichever tax resulted in a higher tax payment. The 1918

revenue bill also provided for an unlimited interest tax deduction. Finally, the 1918 legislation increased the top individual surtax rate from 63% to 65%.

With the World War I armistice on November 11, 1918, Congress repealed the war profits tax, but not the excess profits tax, in January 1919. The corporate tax rate declined from 12 percent to ten percent in 1919, while the normal individual tax rate declined from 12 percent to eight percent. These rates remained intact until late 1921, when the Revenue Act of 1921 was enacted. This legislation eliminated the excess profits tax but called for an increase in the corporate tax rate from ten percent to 12.5 percent. It also called for a decrease in the normal individual tax rate from eight percent to six percent in 1924 and a gradual reduction in the top individual surtax rate from 65 percent in 1921 to 50 percent in 1922 and 40 percent in 1924.

*Implications for Capital Structure Decisions*

The wide variability in corporate and individual tax rates during 1905-1924 provides a rich opportunity to test the relation between taxes and capital structure decisions. The sample period can be organized into five four-year sub-periods with distinctly different tax environments.

First, there was no federal taxation of either corporate or individual income during the sub-period of 1905-1908. Hence, by definition, this sub-period can be viewed as one in which capital structure decisions were not distorted by tax considerations.

Second, during the period of 1909-1912, a federal tax on corporate income existed, albeit at the rate of one percent, while there was no tax on individual income. Under the standard tradeoff theory, the presence of a corporate income tax, with interest treated as a tax-deductible item (with some limitations), and no individual income tax biases companies towards debt financing. Consistent with this prediction, Bank (2010), citing Senator Adolphus Bacon of

Georgia, claims that the enactment of the excise tax on corporate income in 1909 led to "some concern that the new tax would only exacerbate the trend toward converting stocks into bonds through recapitalizations (p. 77)."

Third, during 1913-1916, a federal tax on both corporate and individual income was in place, but there was no war profits tax or excess profits tax. Because capital gains were taxed at the individual rate and the surtax rate applied to dividends, the net effect of the two taxes slightly favored debt financing. Note, however, that shareholders did have the advantage of timing their tax on capital gains.

Fourth, during 1917-1920, the war profits tax and/or the excess profits tax were in effect, in addition to the normal corporate income tax rate, the normal individual income tax rate, and the set of graduated individual surtax rates. In isolation, the interest tax deduction had substantial value during this period because of the war profits and excess profits taxes. However, two countervailing forces made equity financing more attractive during this period. First, the top individual tax rates also increased substantially during this period. More importantly, the definition of invested capital, which included equity but not debt financing, unambiguously created a bias towards equity financing. Under the war profits tax, a firm's tax credit increased in the amount of its invested capital – hence, as it increased its equity financing, it increased its tax credit and lowered its taxes. Similarly, the excess profits tax credit was calculated as eight percent of a firm's invested capital, so as it increased its equity financing, it increased its tax credit and lowered its taxes. Consistent with this reasoning, Columbia economist Carl Plehn (1920) wrote that "it is of course in the interest of the taxpayer to get as high a valuation of invested capital as possible … the excess profits tax is so heavy that the taxpayers strain themselves to get these items up (p. 293)." Insofar that tax considerations were

an important determinant of capital structure decisions, equity financing should have increased during 1917-1920.[4]

Finally, during the sub-period of 1921-1924, the excess profits tax is phased out, which substantially reduced the tax bias towards equity financing. However, given the high top individual surtax rates during this period and the sharp reduction in the capital gains tax rate, on balance, the income tax system maintained a bias towards equity financing.

Appendix A examines the relative advantage of debt financing over equity financing based on corporate and individual income tax rates for each year during the sample period. It then presents a numerical example to illustrate how the effects of the excess profits tax dominated the effects of both corporate and individual income tax rates during the 1917 to 1921 period, creating a strong bias to equity financing. To summarize the overall effect of tax rates on the preference for debt financing versus equity financing: debt held a slight advantage from 1909 to 1916 and equity held a substantial advantage from 1917 to 1924.

### 2.2.World War I and Corporate Investments

The onset of World War I in August, 1914 and the U.S. entry into the war in April, 1917 resulted in a large and transitory increase in investment expenditures by U. S. firms. Rockoff (2004, pp. 4-6) describes how World War I and the associated increase in federal spending after the U.S. entry into the war affected the U.S. economy:

> "When the war began the United States was in a recession. European purchases of goods for the war, mainly food and munitions, soon turned things around and created a long economic boom … Real plant and equipment were added, and because they were added in response to demands from countries already at war, they were added in precisely those sectors where they would be needed once the U.S. entered the war. Bethlehem Steel, for example, was expanded by adding facilities and through acquisitions into a major integrated steel maker during this period of neutrality in response to demands for steel coming mainly from Europe.

[4] Appendix A presents a numerical example of how the excess profits tax favored equity financing. The example uses the 1917 excess profits tax with numbers similar to those of U.S. Steel Co.

> … America's entry into the war in April 1917 unleashed a torrent of Federal spending. Spending rose from month to month, reaching a peak of $2,087 million in January of 1919, about 32.43 percent of GDP."

Similarly, U.S. Steel's 1917 annual report states that the "large demand for iron and steel products which existed during 1916 continued during the year 1917. This was increased after the entrance of the United States into the European war, especially for certain lines of products required for the war program. These demands largely exceeded the producing capacity of the manufacturers …" According to the company's 1918 annual report, U.S. Steel's capital expenditures increased from $100.1 million during August 1, 1914 to April 1, 1917 (the period before the U.S. entered the war), or $3.2 million per month, to $202.7 million during April 1, 1917 to December 31, 1918 (the period following the U.S. entry into the war), or $10.1 million per month.

U.S. Steel's experience was not unique. The median level of inflation adjusted investment (i.e., the sum of investments in working capital and fixed assets adjusted to 1905 dollars) during 1905-1908, 1909-1912, and 1913-1916 were $547,000, $418,000, and $537,000, respectively. During 1917-1920, the four-year period encompassing the U.S. entry into World War I, median investment increased sharply to $1.422 million. Following the war, during the 1921-1924 period median investment dropped precipitously to $18,000. Hence, the U.S. entry into World War was associated with a large but transitory increase in investment expenditures by U.S. firms.

*Implications for Capital Structure Decisions*

Various dynamic capital structure models yield different predictions for how firms finance investment expenditures. Under the pecking order theory (Myers and Majluf (1984)), firms will initially finance the investments with cash on hand, followed by the issuance of

external debt, and finally by the issuance of external equity. A second class of models emphasizes fixed costs of adjusting capital structure and, therefore, predicts that such adjustments will be lumpy and infrequent (see, for example, Dudley (2010)). Since adjustment costs are sunk when firms are forced to access external capital, large investment needs will be associated with movements towards target leverage ratios. A third class of models emphasizes the financial flexibility benefits of debt capacity (see, for example, DeAngelo, DeAngelo and Whited (2011)). In these models, firms preserve debt capacity so that debt can be issued to finance investment needs. This debt is transitory in that it is rapidly paid down (if possible) in order to preserve the ability to issue debt for future investment needs. A final class of models predicts that the debt capacity of real options is negative. Thus, firms will sequence financing so that equity is issued before debt during a project's financing period (see, for example, Barclay. Morellec, and Smith (2006), Tsyplakov (2008)). The shock of World War I provides an opportunity to shed light on these models in that it represents a sudden, large, and transitory increase in investment expenditures.

## 3. Sample and Data

### 3.1 Sample

We begin by identifying all U.S. industrial companies that were publicly traded in 1905. Specifically, we include all U.S. industrial firms with stock price data listed in the *Wall Street Journal* on either September 30, 1905 or December 30, 1905. We exclude utilities, railroads, and mining companies, which reduces the initial sample of 212 firms to 92 firms. Because our primary source of financial data are annual issues of *Moody's*, our final sample consists of the 57

publicly traded companies for which we are able to obtain sufficient financial data from the *Moody's* manuals.[5] A list of the sample is included in Appendix B.

The sample includes a diverse group of companies in terms of both size and industry. U.S. Steel is by far the largest firm in the sample, with average assets of $2.03 billion during the period. Other large companies in the sample include Swift ($238 million), General Electric ($199 million), American Smelting & Refining ($174 million), and Pullman ($147 million). At the other end of the spectrum are very small firms, including American Cement ($4.6 million), American Grass Twine ($5.7 million), and Pacific Mail Steamship ($16.4 million). The sample also includes firms from a wide variety of industries, including steel, coal, paper, food, textiles, tobacco, chemicals, rubber, and real estate.

**3.2 Data**

We are not aware of existing databases that contain financial information for U.S. firms during the early part of the 20th century. As a result, we hand-collect financial data from annual issues of *Moody's* during the sample period. Specifically, we record various data from income statements and balance sheets that are published in *Moody's*, including information about earnings, interest expense, taxes, cash holdings, working capital, property plant and equipment, and debt. Although there is some variation in how companies report these items we endeavor to maintain consistency within firms across time. We are unaware of any systematic biases this may cause. We collect data on the market prices of the stocks from the *Commercial and Financial Chronicle.*

Table 2 reports summary statistics for the variables used in the subsequent analysis over the entire sample period of 1905-1924. The median value of assets is $51.3 million.[6] As

[5] Nine of the firms exit the sample before 1924. Five were acquired, three exited due to bankruptcy, and one firm in the alcoholic beverage industry, American Malting Co., liquidated assets in 1918 apparently because of the prohibition movement. The results are robust to excluding these nine firms from the sample.

described above, there is considerable variation in the size of firms in the sample, with asset values ranging from $3.4 million to $2,572 million. The table also presents data on inflation-adjusted assets, using constant 1905 dollars. This inflation-adjusted number also reveals wide variation in the size of firms in the sample.

Table 2 also shows wide variation in the debt ratios of firms in the sample. Whereas the median ratio of the book value of debt to the book value of assets is 0.115, this variable ranges from 0 to 0.554. Similarly, the ratio of the book value of debt to the market value of assets ranges from 0 to 0.915, with a median value of 0.204.[7]

Other variables known to be associated with leverage also vary widely across firms during the sample period. The market to book value of assets, which generally is found to be inversely related to leverage, ranges from 0.041 to 2.342, with a median value of 0.675. The ratio of earnings before interest and taxes to the book value of assets, also generally found to be inversely related to leverage, ranges from -0.171 to 0.395, with a median value of 0.053. The ratio of tangible to total assets, often found to be directly related to leverage has a median value of 0.653 and it ranges from 0 to 0.973. Finally, the ratio of investment, defined to be the sum of investment in working capital and fixed assets, to total assets varies enormously, from -1.240 to 0.883, with a median value of 0.014.

In sum, the data in Table 2 shows wide variation in leverage and several of its traditional determinants. The remainder of the paper examines the extent to which the two shocks that occurred during the sample period, namely (i) the introduction of corporate and individual

[6] Appendix C lists a description of each of the variables used in the paper.
[7] Graham, Leary, and Roberts (2013) report similar levels of leverage for U.S. firms between 1920 and 1945, but then report that leverage increases steadily and significantly between 1946 and 1970, so that average leverage levels in 1970 are more than three times those in 1945.

income taxes and (ii) the investment spikes associated with World War I, contribute to time series variation in leverage.

## 4. Results

### 4.1. Univariate Tests of Changes in Variables Over Time

Table 3 contains univariate data showing the intertemporal variation in the key variables over the sample period. We partition the sample period of 1905-1924 into five four-year sub-periods, each of which has a unique tax and/or investment environment. The periods are:

a. 1905-1908 – a sub-period in which there was no corporate or individual income tax at the federal level.

b. 1909-1912 – a sub-period in which there was a corporate excise tax on income, but not an individual income tax at the federal level.

c. 1913-1916 – a sub-period in which there was both a corporate and individual income tax at the federal level.

d. 1917-1920 – a sub-period in which there was (i) both a corporate and individual income tax at the federal level, (ii) a high war-related excess profits tax, (iii) a high war-related surtax on individual income, and (iv) investment spikes related to the U.S. entry into World War I.

e. 1921-1924 – a sub-period in which the war-related excess profits tax was phased out, individual income tax rates decreased, and the capital gains tax dropped sharply.

Table 3 lists the mean and median values of the key variables for each sub-period, along with a test of whether the mean and median values for each sub-period differs significantly from the corresponding mean and median values for the rest of the period. Several noteworthy facts emerge from this analysis.

First, the two measures of leverage, one based on the book value of assets and the other based on the market value of assets, are not significantly different during 1905-1908, a period in which there were no federal income taxes at either the corporate or individual level, than they are throughout the rest of the sample period, during which U.S. corporate and individual tax rates varied widely. The mean value of the book-based leverage ratio during 1905-1908 is 0.148, which is higher (albeit not significantly higher) than the corresponding mean value for any of the other sub-periods. The median value of this variable during 1905-1908 is 0.114, which is the third highest value among the five sub-periods. Similarly, the mean and median values of the market-based leverage ratios reveal that leverage is used as a source of financing during 1905-1908 on a level comparable to the rest of the sample period. Contrary to the predictions of standard tradeoff models, the univariate data implies that tax considerations had an inconsequential effect on the financing decisions of firms during the sample period.[8]

Second, whereas the mean and median debt ratios do not change significantly over the sample period as tax rates varied widely, the debt ratios of individual firms do exhibit considerable variation over the sample period. Table 4 lists summary statistics for the ratio of debt to the book value of assets for each firm in the sample. The data show substantial variation in the debt ratio of most firms over the sample period. For example, the debt ratios of U.S. Realty & Improvement Co., American Tobacco Co., and Virginia-Carolina Chemical Co. ranged from 0.000 to 0.454, 0.007 to 0.434, and 0.1615 to 0.554, respectively. More generally, on average, the debt ratios of firms in the sample range from 0.067 to 0.232. These data indicate that firms vary their use of debt financing throughout the sample period.[9] However, given that

[8] If we use yearly averages of leverage (both book and market-based), we find no evidence of significant differences in average leverage over the sample period.

[9] Although the pattern of substantial variation in individual firm leverage through time is similar to that reported in DeAngelo and Roll (2013), the time-series variation in leverage in our sample is lower than that in DeAngelo and

the mean and median debt ratios do not change significantly over the period as tax rates change, it appears that factors other than tax considerations are the primary drivers of the financing decisions of firms during our sample period.

Third, several key determinants of leverage change significantly during the sub-period of 1917-1920 when the U.S. entered World War I. The profitability of firms increased substantially during this sub-period. The mean and median ratios of EBIT to assets during this sub-period are 0.084 and 0.076, respectively, which are significantly higher than the corresponding ratios during the rest of the sample period (at the 0.01 level), which generally average around 0.050. This is the only sub-period in which the profitability of firms is significantly higher than it is during the rest of the sample period.

In addition, as discussed above, the investment expenditures of firms increase sharply and significantly during this sub-period. The mean and median ratio of investment to assets are 0.044 and 0.035, respectively, during 1917-1920, and both are significantly higher (at the 0.01 level) than the corresponding ratios during the rest of the period, which generally are in the range of 0 to 0.018. Again, this is the only sub-period in which this ratio is significantly higher than it is for the rest of the period, which is consistent with the conclusion that these investments were transitory. It is notable that the mean and median values of the ratio decline to -0.002 and 0.002, respectively, in the subsequent sub-period, which further suggests the transitory nature of the investments during 1917-1920. Furthermore, notwithstanding the increase in profitability of firms during the sub-period, the mean and median market-to-book ratios were not significantly different during 1917-1920 as compared with the rest of the period. Insofar as market-to-book ratios are a proxy for growth opportunities, these data suggest that market participants viewed

Roll (2013). This is most likely due to the more conservative average levels of leverage exhibited by firms during our sample period (1905-1924) relative to those in the later years studied in DeAngelo and Roll (1950-2008). DeAngelo and Roll (2013) demonstrate a strong association between leverage stability and leverage conservatism.

the investments that firms were making during 1917-1920 as transitory and not indicative of a more permanent increase in the growth opportunities of firms.

### 4.2. Regression Results

To provide more formal evidence on whether the leverage ratios of firms change significantly over time after controlling for the primary determinants of leverage, we estimate several regression models in which the book-based and market-based leverage ratios serve as dependent variables. Included as independent variables are (i) the natural log of assets, (ii) market-to-book ratio, (iii) the ratio of EBIT to assets, and (iv) the ratio of tangible to total assets, which are typically included as independent variables in leverage equations.[10] In addition, we include dummy variables for time periods. In one specification, we include dummy variables for each year after the first sub-period, and in the other specification, we include dummy variables for all but the first sub-period. The models include firm fixed effects and all variables are winsorized at the 0.01 and 0.99 levels. Standard errors are clustered at the firm level. The results are reported in Table 5.

The first two columns of Table 5 show the results for the regressions in which the book-based leverage ratio is the dependent variable. The results show that firm size, as measured by the natural log of assets is directly related to leverage, a result generally consistent with more recent evidence. Similarly, an inverse relation exists between firm profitability, as measured by the EBIT to asset ratio, and leverage, which also is generally consistent with the existing literature. The tangibility of assets enters with a positive but not significant coefficient. Contrary to findings based on more recent data, however, we find a direct relation between market to book ratios and leverage. We note, however, that Graham, Leary, and Roberts (2013)

[10] See Frank and Goyal (2009) for a study of which variables are reliably associated with observed capital structures.

also report a positive relation between book leverage and market to book ratios in the early part of their sample, 1925-1940.

The dummy variables for both the sub-periods and individual years reveals that leverage is significantly higher during the 1917-1920 period than it is in other sub-periods. The coefficient on the period dummy variable is 0.033, which is economically as well as statistically significant (at the 0.05 level). The equation in which dummy variables for individual years are included reveals that leverage is significantly higher in four of the five years during 1916-1920 than it is in other years. Here, too, the coefficients on the four dummy variables, range from 0.019 to 0.041, revealing economic as well as statistical significance.[11]

The second two columns of Table 5 contain the corresponding results for the equations in which the market-based leverage ratios are the dependent variables. The coefficient estimates for the 1917-1920 period dummy and the year dummies during this period are similar to the book-based leverage ratio estimates, but, due to an increase in the standard errors, the estimates are not statistically significant at conventional levels.[12]

The results in Table 5 warrant additional comments. First, the univariate tests in Table 3 show that the mean and median values of both leverage variables were not significantly different during 1917-1920 than they were during the rest of the period. In light of this result, we interpret the results in Table 5 as follows. As shown, the profitability of firms increased substantially during World War I. Given that leverage is inversely related to profitability, the large increase in profitability during 1917-1920, by itself, would be expected to reduce the leverage ratios of

[11] When we replace the control variables with their lagged values, the 1917 - 1920 period dummy is significant in both the BVA and the MVA regressions and the significant year dummies shift to 1918 – 1921.

[12] In untabulated results, we run yearly regressions of Leverage (BVA) on the same set of continuous independent variables as in Table 5. This methodology allows the coefficients on the independent variables to vary across years. We then test the significance of the constant term across the 20 years in the sample using a Fama-MacBeth methodology. Our findings indicate that the only years in which the coefficient is significant are 1905 (negative) and 1920 (positive).

firms. The fact that the leverage ratios of firms remained largely unchanged during this period, despite the large increase in profitability, accounts for the large coefficients on the dummy variable for the 1917-1920 sub-period and the dummy variables for each year during this sub-period as shown in Table 5.

Second, the significant increase in leverage during the 1917-1920 sub-period begs the question of what caused the increase in leverage. Recall that this sub-period was characterized by both a large increase in war-related taxes on both corporate and individual income and a large, sudden, and transitory increase in investments by firms. As discussed previously, the net effect of the tax system during this period created a bias in favor of equity financing because of both the net effect of the corporate and individual tax rates and the inclusion of equity financing but not debt financing in the capital base used to determine a firm's excess profits. Hence, if taxes were a primary determinant of financing decisions during this period, we would expect, based on tax considerations alone, that leverage would have declined, not increased, during 1917-1920. Because leverage is actually higher than expected during this period, we conclude that other factors are responsible for this result.

### 4.3. Further Evidence on the dynamics of leverage ratios

To this point, our evidence suggests that leverage ratios exhibit substantial variation through time, but that these changes do not appear to be primarily a response to tax incentives. In this section, we attempt to shed further light on the primary determinants of leverage dynamics by focusing on the links among the sample firms' cash flows, investment needs, and financing sources.

### *4.3.1. Univariate comparisons*

As a starting point, in Table 6 we stratify the sample of firm years into two categories representing the highest and lowest quartiles of year-to-year changes in leverage, where leverage is defined as debt to the book value of assets ratio. We then test whether measures of investment, operating cash flow, and cash holdings differ across the two quartiles. Panel A contains the results over the entire sample period, while panel B focuses on the World War I period that is characterized by the exogenous shock to investment.

As shown in Panel A, there are significant differences between the characteristics of firms with the smallest leverage changes and those with the largest changes. The mean level of investment to assets is significantly lower (0.004) for the firm years in the lowest quartile versus firm years in the highest quartile (0.040). Similar results hold for the median value of this variable. Recall also that the average level of investment across all firm-years in the sample is 1.9%. Thus, the difference of 3.6 percentage points between the top and bottom quartile of leverage changes is economically meaningful as well.

Panel A also finds that both (i) the ratio of EBIT to assets and (ii) the ratio of cash to assets are significantly higher for firms in the lowest versus the highest quartile. The mean value of the ratio EBIT to assets is 0.072 for the lowest quartile, versus 0.043 for the highest quartile, a difference that is significant at the 0.01 level. Similar results hold for the median values of this variable. The ratio of cash to assets is 0.053 for the lowest quartile versus 0.039 for the highest quartile, a result that also is significant at the 0.01 level. The difference in the median value of this variable is less pronounced but nonetheless significant at the 0.05 level. Hence, firms that increase their leverage the most from year to year have larger investment requirements and less

cash and operating cash flow than firms that are in the lowest quartile of year to year changes in leverage.

Panel B contains the corresponding results for the 1917-1920 sub-period. The panel shows that during the war period the mean ratio of investment to assets was 0.098 for firms in the highest quartile of change in leverage, versus 0.028 for firms in the lowest quartile, a difference that is significant at the 0.01 level. Similar results hold for the median values of this variable. The difference in this ratio across the two quartiles is 0.070, which is almost twice the corresponding difference for the entire sample period and indicative of the economic significance of the result.

The panel also finds that the mean ratio of EBIT to assets is significantly higher (at the 0.01 level) for firms in the lowest (0.107) versus the highest (0.052) quartile. The results are similar for the median values of this variable. The mean ratio of cash to assets is higher for firms in the lowest quartile (0.068) versus firms in the highest quartile (0.058), but this difference is not significant. The median value of this variable is slightly higher (0.049) for firms in the highest quartile versus the lowest quartile ((0.047), but this difference also is not significant.

The evidence in Panel B thus shows that firms that increased their leverage the most during World War I had investment requirements (i.e., 9.8% of assets, on average) that outstripped both their EBIT (5.2% of assets) and cash (5.8% of assets). In contrast, the firms in the lowest quartile of year to year changes in leverage during World War I had relatively low investment requirements (2.8% of assets, on average) as compared with both their EBIT (10.7% of assets) and cash (6.8% of assets). Furthermore, the disparity between investment requirements and both EBIT and cash for firms in the highest quartile is more pronounced during the World War I period than it is over the entire sample period. Whereas the difference between

mean investment and both EBIT and cash, all expressed as a percentage of assets, is 4.6% and 4.0%, respectively, during the World War I period, the corresponding differences over the entire sample period are -0.3% and 0.1%, respectively. Hence, the evidence in Table 6 is consistent with the aforementioned increase in leverage during World War I being driven, at least in part, by the substantial increase in investment expenditures versus both the earnings and cash holdings of firms during the war period.[13]

#### *4.3.2. Leverage changes and shocks to investment and cash flows*

The evidence reported in Table 6 indicates that increases in leverage are associated with higher levels of investment and lower levels of profitability. To provide more formal evidence of this association, we estimate regression models in which the change in leverage is the dependent variable. The primary independent variables of interest are the firm's contemporaneous investment and the firm's operating cash flow (measured as EBIT). In various specifications, we also control for the firm's lagged leverage, cash levels, book value of assets, market-to-book ratio, predicted leverage, and dummy variables denoting our four primary sub-periods. Predicted leverage is estimated from a regression in which the ratio of the book value of debt to the book value of assets is estimated as a function of lagged values of the market-to-book ratio, the book value of assets, the ratio of EBIT to assets, and the ratio of tangible to total assets.

The results, presented in Table 7, indicate that changes in leverage are strongly positively related to investment and negatively related to operating cash flows. These results are highly robust to inclusion of all of the above control variables as well lagged leverage and predicted leverage. There is evidence that leverage is mean-reverting and that changes in leverage are

[13] The differences between the highest quartile and lowest quartile groups in the overall sample are not driven completely by the 1917-1920 period. When we exclude the 1917-1920 period from the sample, we also find significant differences between the highest quartile and lowest quartile groups for Investment / Assets, EBIT / Assets, and Cash / Assets.

positively associated with the firm's market-to-book ratio. However, the inclusion of these variables has virtually no impact on the coefficients of the investment and cash flow variables. Interestingly, when we test the interaction of the investment and cash flow variables with a dummy variable denoting the World War I sub-period (1917-1920), we find that the associations between changes in leverage and investment and changes in leverage and cash flow are no different during the WWI sub-period than during other periods. We interpret this finding as indicating that investment and cash flow are strong, general determinants of leverage changes. We observe more extreme changes in leverage during the 1917-1920 sub-period because of the large shock to investment needs induced by the onset of the U.S. involvement in World War I.

#### *4.3.3. The World War I sub-period and transitory leverage*

Table 8 provides additional evidence on the evolution of leverage in the years surrounding World War I. In this table, we list the 50 firms with sufficient data in our sample ranked by the change in their leverage ratio during the World War I period, i.e., 1917-1920. We then tabulate the change in leverage during the subsequent four-year period, 1921-24. During the War period Diamond Match Co. exhibits the largest increase (20.3 percentage points), followed by New York Air Brake (18.9 percentage points), American Linseed Co. (17.6 percentage points), and General Electric Co. (15.5 percentage points). All of these firms decrease their leverage over the four year period following World War I and in three cases, by approximately the same amount as the increase in leverage during the World War I period. The reduction in leverage is 20.3, 18.4, 4.6, and 17.9 percentage points for Diamond Match Co., New York Air Brake Co., American Linseed Co., and General Electric Co., respectively. This

anecdotal evidence is consistent with the increase in leverage for these firms during the World War I period being a transitory response to the investment shock of WWI.

In contrast, the four firms with the largest decrease in leverage during World War I do not exhibit any reversion after the war. The firms with the largest decreases in leverage during the World War I period are United Fruit Co. (-21.0 percentage points), Virginia Iron, Coal & Coke Co. (-16.8 percentage points), Railway Steel Spring Co. (-15.0 percentage points), and Lehigh Coal & Navigation (-13.8 percentage points). The corresponding changes in leverage in the post war period for the four companies are -0.2, -04.9, 0.0, and -7.9 percentage points, respectively.

To examine more systematically whether the increase in leverage during the World War I period reflects the issuance of transitory debt, we calculate the correlation between changes in leverage over the thirteen successive four year periods during the sample period. These results are contained in Table 9. The table shows that all thirteen correlation coefficients are negative, suggesting an element of mean reversion, but ten of the thirteen are not statistically significant at the 0.10 level. The only correlation coefficient that is significant at the 0.05 level is the correlation coefficient corresponding to the changes in leverage over the 1917-1920 (i.e., the World War I period) and the 1921-1924 periods. Whereas the median correlation coefficient is -0.101 for the other twelve correlations, it is more than three times higher, -0.340, for the correlation corresponding to the 1917-1920 and 1921-1924 periods. This evidence is consistent with the view that the debt issued to finance investment spikes during World War I was transitory.

As further evidence, we also calculate the correlation coefficient across the various four year periods separately for cases in which a firm's change in leverage during the earlier period

was positive and for those that are negative. These untabulated results suggest that the significant correlation between changes in leverage across the 1917-1920 and 1921-1924 periods is driven entirely by firms that increased their leverage during the World war I period – the correlation coefficient for these firms is -0.649 and significant at the 0.01 level versus 0.002 and not significant for firms that decreased leverage during the World War I period.

In order to tie the transitory increases in leverage during the 1917-1920 period directly to investment, we separate the sample firms into high investment and low investment firms during the period. Specifically, we calculate a firm's total investment from 1917 to 1920 divided by its assets at the end of 1916. High (low) investment firms are above (below) the median investment to assets ratio during the period. For each group, we then calculate the correlation coefficient between the change in leverage during the 1917-1921 and 1921-1924 periods. We find the correlation coefficient for the high investment firms is -0.556 with a *p*-value of 0.004, while the correlation coefficient for the low investment firms is 0.164 with a *p*-value of 0.465. These results suggest that the transitory leverage increases observed during the 1917-1920 period are specific to firms with high investment during the period.

### 4.4. Robustness

In this section we address several robustness issues in the paper.

#### *4.4.1. Post-World War I recession and deflation*

The end of World War I was accompanied in 1920 by a severe recession and significant price deflation. It is possible, therefore, that the post-war reductions in leverage that we observe are due more to an across-the-board incentive to delever to avoid deflation related increases in the real value of debt obligations than to the reversal of debt-funded expansion during the war.[14]

[14] We thank Harry DeAngelo for bringing this alternative to our attention.

To address this issue, we first re-estimate our results in Tables 3 and 5 after redefining WWI period to be 1917 to 1919 and the post-war period to be 1920 to 1924. Our findings are qualitatively similar. We also note that in the regressions in Table 5 using yearly indicator variables, the coefficient on 1920 is positive and significant. Deleveraging did not begin to take place until 1921.

Second, our evidence on the cross-sectional variation in post-war deleveraging is consistent with an unwinding of a debt funded expansion during the war. Specifically, we find that post-war reductions in leverage are substantially greater for those firms that increased leverage to fund investment during the war than for those firms that had no such debt expansion.

Third, in untabulated results, we match the firms with the ten largest increases in leverage between 1916 and 1919 with firms having similar leverage levels in 1919. In the latter group, leverage changes between 1916 and 1919 are slightly negative. When we compare subsequent changes in leverage over the 1920 to 1924 period, we find a sharp decline in leverage for the first group, but little change in the second group. We conclude, therefore, that there does not appear to be an across-the-board deleveraging of higher leverage firms in the post-war period. Rather, deleveraging appears to be confined primarily to those firms that had a debt-funded expansion of investment during the war.

Finally, in untabulated results we analyze the maturity of bond issues over the various sub-periods of our sample. Consistent with firms issuing shorter-term debt to finance transitory investment shocks, we find the median maturity of newly issued debt during the WWI period (1917-1920) is only half that of the lowest median maturity of the other sub-periods. Following completion of the war, the median maturity returns to pre-war levels.

### *4.4.2. Including direct measures of tax incentives in the regressions*

The net tax incentive of debt financing depends on five different tax rates – the corporate tax rate, the personal tax rate on debt income, the personal tax rate on dividends, the personal tax rate on capital gains, and the excess profits tax – all of which vary widely over our sample period. Our regressions in Table 5 identify the net impact of tax law changes through time period dummy variables. An alternative is to attempt to construct direct measures of tax incentives using assumptions about the tax rate of the marginal investor and the company's payout policy. Although we can use this method to summarize the net capital structure incentives of four of these rates in a single variable, *Relative Advantage of Debt*, the fifth rate, the excess profits tax rate, has a complex dependence on past and present net income and invested capital and therefore does not seamlessly combine with the other rates.

Nonetheless, as a robustness check that incorporates all five tax rates, we estimate the net tax incentive for each firm-year observation by calculating the change in total dollar return to debt and equity holders if the firm had $1,000 more in debt and $1,000 less in equity for the year. The calculation is based on the implied corporate and excess profits taxes for the firm-year and the highest marginal individual income, dividend, and capital gains tax rates for the year. One benefit of this approach is that it incorporates both the time-series changes in statutory tax rates and cross-sectional variation in firms' exposure to taxes.

The results are shown in Table 10. Because the dollar return depends on the payout policy of the firm, for both Leverage BVA and Leverage MVA, we tabulate separate results assuming the return is all in the form of dividends, 50% dividends and 50% capital gains, and all capital gains. The sign of the estimated coefficient is negative in all six models and significant at the 0.10 level in two models. If taxes have a first order effect on capital structure, we would expect

a positive relation between leverage and the dollar return to adding more debt. These results further suggest that taxes do not have a first order effect on capital structure during the period.[15]

#### *4.4.3. The marginal investor*

Thus far, we have assumed that the marginal investor faced the highest marginal personal tax rates. We now examine the opposite extreme: the marginal investor faced a marginal personal tax rate of zero. As demonstrated in Table A2, if personal tax rates were zero, equity financing would have an even stronger advantage over debt financing during the period the excess profits tax was in place. Therefore, we would expect even lower levels of leverage during this period. This prediction is inconsistent with the results in Table 5. We find significantly positive coefficients on the year and period variables during the time the excess profits tax is in place.

#### *4.4.4. State taxes*

Variations in state taxes could also affect incentives for equity versus debt financing. In our sample, 40 firms are incorporated in New Jersey, six in New York, four in Illinois, three in Pennsylvania, and one each in Colorado, Connecticut, Delaware, and Virginia. The New Jersey tax structure at the time did not offer a significant advantage to debt or equity financing, charging a rate of only $50 per year per $1,000,000 of capital stock in excess of $5,000,000. The results to the Table 5 regressions are similar if we include only firms incorporated in New Jersey.

#### *4.4.5. Supply of debt, cost of debt, and cost of equity*

Thus far, our analysis focuses on changes to corporate demand for debt; however, WWI also created a shock to the supply of debt. The U.S. government issued hundreds of billions of

[15] If we include a measure of the relative advantage of debt instead of dollar return in the Table 10 regressions and exclude all years during the excess profits tax, we also find no evidence that taxes are associated with leverage. Similarly, if we exclude the excess profits tax years from the dollar return analysis in Table 10, we find no evidence of a direct association between net tax incentives and leverage.

dollars of Liberty Bonds to help fund the war effort and interest rates increased sharply between 1915 and 1920. As documented in Graham, Leary, and Roberts (2013), government issuance of debt can squeeze out corporate debt. We would expect the constriction of the supply of debt to corporations to have a dampening effect on corporate leverage during the period, but in Table 5 we observe the opposite, higher than expected leverage. The diminished supply and the higher cost of debt both suggest that the supply shifts are not driving the higher than expected leverage levels during the WWI.

Despite a higher cost of debt, a sharp increase in the cost of equity could lead to higher corporate leverage during the WWI period. However, several results suggest that the cost of equity did not increase sharply during the period. First, in untabulated results, we find no evidence of a decrease in equity issuance during the 1917-1920 period which we would expect if the cost of equity jumped up. Second, in the post-war 1921-1924 period the shock of WWI dissipates and interest rates drop back to pre-war levels, yet we do not observe the lower levels of leverage we would expect based on tax incentives. Third, because a change in the cost of equity affects the market value of equity and not the book value of equity, if the cost of equity increased sharply during the 1917-1920 period, then we would expect the pattern of results across periods in the leverage based on MVA regressions of Table 5 to differ from the pattern of results in the leverage based on BVA regressions. Specifically, an increase in the cost of equity would decrease MVA, thus increasing leverage based on MVA in the 1917-1920 period. This effect would reverse out when the cost of equity settled back down in the post-WWI 1921-1924 period, resulting in greater variability in the estimated period coefficients for the MVA regression. However, we do not observe greater changes in the coefficient estimates in the MVA

regression than in the BVA regression on the period dummy for the 1917-1920 period or for the 1921-1924 period. In fact, the variability of the estimates is greater in the BVA regression.

#### *4.4.6. Debt changes vs. changes in leverage*

Chang and Dasgupta (2009) argue that tests of capital structure based on leverage changes are potentially misleading and suggest that such tests should also examine incremental changes in debt and equity. We re-estimate our Table 7 regressions using the change in debt scaled by lagged assets as the dependent variable. Our results are qualitatively identical.

## 5. Discussion and Conclusion

The sample period of 1905 through 1924, a period that encompasses the initiation of corporate and individual taxes as well as the investment shock of World War I, provides a rich institutional environment for analyzing the factors that drive capital structure decisions. Despite tax rate changes during the sample period that are among the largest rate changes in U.S. history, we find little evidence that taxes are a first-order consideration for firms during this period. Firms relied heavily on debt financing before the inception of federal corporate and individual income taxes. Furthermore, on average, the use of debt financing changed little after the adoption of the corporate income tax in 1909 and the individual income tax in 1913, despite the fact that these tax rates varied widely over the sample period.

Our lack of evidence in support of taxes as a primary driver of leverage decisions is consistent with the findings in Graham, Leary, and Roberts' (2013) study of the leverage of US firms over the past century and with Li and Whited's (2013) dynamic contracting model of financing decisions. Interestingly, our finding that the initiation of federal income taxes had no discernible impact on corporate capital structures contrasts with the impact of such initiation on

ex dividend day price effects. Barclay (1987) finds significant changes in ex dividend day price effects following the initiation federal and personal income taxes. The fact that Barclay (1987) finds such significant effects implies that the tax changes are large enough to make tests of potential tax effects sufficiently powerful over this period of time. Yet we find no traces of a tax effect on financing decisions.

Why don't such large changes in taxes affect capital structure decisions? One possibility is that financial flexibility considerations of debt capacity dominate incremental tax considerations. DeAngelo and DeAngelo (2007) emphasize that if there is a reasonable probability that future unexpected changes in investment or earnings create a need for external financing, the marginal value of preserving debt capacity might well exceed the tax-related opportunity cost. Indeed, they note that Modigliani and Miller (1963) themselves recognize such flexibility benefits of debt capacity and argue that such benefits most likely exceed any of the tax advantages associated with debt in their model.

Broadly consistent with this view, we find evidence of considerable within-firm variation in leverage over time that is strongly associated with investment needs and operating cash flows. Such findings are consistent with capital structure models that emphasize the dynamics of leverage ratios being connected with the dynamics of investment opportunities and operating cash flows. One such model is the pecking order model of Myers (1984). Consistent with the existence of a pecking order in financing choices, we find that firms were less likely to issue external debt or equity to finance investment outlays during the World War I period if their cash flows were large in relation to their investment expenditures. Furthermore, among firms that raised external capital during the war period and, more generally, over the sample period, the number of debt issues was approximately three times the number of equity issues. Nonetheless,

inconsistent with the pecking order model, we do observe equity issues during the sample period and, in many cases, these equity issues are completed by firms that appear to have substantial debt capacity.

Another broad class of capital structure models emphasizes the role of adjustment costs in affecting the dynamics of capital structure.[16] These models predict that firms will have target leverage ratios, but that adjustments towards those targets will be infrequent and 'lumpy' due to adjustment costs. As a result, firms will tend to adjust leverage ratios towards targets only when required financing events take place. Many of our findings are broadly consistent with predictions of these dynamic models in that there appears to be a strong association between leverage changes and financing required for investment outlays. Nonetheless, the frequency with which firms make relatively large adjustments to leverage ratios appears to undermine the view that adjustment costs are substantial.

A third class of dynamic models directly emphasizes the role of financial flexibility in capital structure policy. In perhaps the most prominent example of these models, DeAngelo, DeAngelo and Whited (2011) predict that firms increase their debt from target levels to finance transitory increases in investments that are prompted by external shocks. Subsequently, debt is paid down as the firm generates cash flows in excess of required investment outlays. Our findings fit well with these predictions. As previously mentioned, our regression results document significantly higher than expected debt-to-asset ratios during 1917-1920, years in which firms generally were expanding productive capacity for reasons related to World War I. This increase in debt is transitory; the sample firms quickly reverse the leverage increase when required investment outlays decrease following the end of the War.

[16] Examples include Leary and Roberts (2005), Strebulaev (2007), and Dudley (2010).

**Appendix A: The relative advantage of debt and the excess profits tax**

This appendix examines the relative advantage of debt financing over equity financing based on corporate and individual income tax rates for each year during the sample period. It then presents a numerical example to illustrate how the effects of the excess profits tax dominated the effects of both corporate and individual income tax rates during the 1917 to 1921 period, creating a strong bias to equity financing.

Table A1 lists the relative advantage of debt for each year. The relative advantage of debt, based on Miller (1977) is defined as $\frac{(1-T_{Pd})}{(1-T_{Pe})(1-T_C)}$, where $T_{Pd}$ is the individual tax rate on debt, $T_{Pe}$is the individual tax rate on equity (dividends or capital gains), and $T_C$ is the corporate tax rate. The table lists the values under three different payout scenarios: the return is composed entirely of dividends, the return is composed of 50% dividends and 50% capital gains, and the return is composed entirely of capital gains. In short, debt was slightly advantaged from 1909 to 1916, the relative advantage depended on payout policy from 1917 to 1921, and equity had a strong advantage from 1922 to 1924 (with the exception in 1924 for firms whose return was all dividends).

However, as we illustrate in the numerical example of the excess profits tax in Table A2, the excess profits tax dominated the other tax rates regardless of the payout policy, thus creating a strong bias in favor of equity financing from 1917 to 1921.[1] The example uses numbers similar to U.S. Steel in 1917. Table A2 presents financial information for the firm under two scenarios. In the first scenario, the firm has $600 million of debt outstanding, $400 million in retained earnings, and $900 million of paid in capital, resulting in total capital of $1,900 million. In the second scenario, the firm has the same amount of total capital, but it has no debt.

[1] Based on our calculations, at least 87% of firms in our sample were exposed to the excess profits tax during the period.

Specifically, under this scenario, the firm has $1,500 million in paid in capital, $400 million in retained earnings, and $1,900 million in total capital.

We assume that under both scenarios the firm generates $500 million of EBIT and that, under the first scenario, the interest rate on the firm's debt is 4%. To calculate the excess profits tax under each scenario, we apply the graduated excess profits tax to the difference between the firm's net income and an eight percent return on its "invested capital," which was defined to be the sum of paid in capital and retained earnings (i.e., invested capital does not include capital provided by debtholders). This graduated tax rate starts at 20% for ratios of net income to invested capital above eight percent and increases to 25%, 35%, 45% and 60% for ratios above 15%, 20%, 25%, and 33%, respectively.

Under the first scenario, net income is $476 million, calculated as EBIT ($500 million) minus interest expense ($24 million). In this scenario, invested capital is $1,300 million, consisting of $900 million of paid in capital plus $400 million of retained earnings. Applying the graduated excess profits tax results in an excess profits tax of $132,198,200. Corporate taxes are calculated as the corporate tax rate of six percent (i.e., the prevailing corporate tax rate in 1917) times (EBIT – interest expense – excess profits tax), resulting in corporate taxes of $20,628,108 under scenario 1. Hence, total corporate taxes under the first scenario are $152,826,308.

Under scenario 2, net income is $500 million. In this scenario, invested capital is $1,900 million, consisting of $1,500 million of paid in capital plus $400 million of retained earnings. Note that although total capital is identical under both scenarios, invested capital, as defined for purposes of the excess profits tax is $600 million higher under scenario 2. Applying the graduated excess profits tax based on the higher value for invested capital results in an excess

profits tax of only $94,848,650. Hence the excess profits tax is more than $37 million higher when the firm has debt (i.e., scenario 1) than when it has no debt (i.e., scenario 2). Corporate taxes under scenario 2 are $24,309,081, calculated as the six percent corporate tax rate times (EBIT – excess profits tax). Hence, total corporate taxes under scenario 2 are $119,157,731, or over $33 million less than corporate taxes under scenario 1. This example illustrates that, at the corporate level, the excess profits tax favored equity financing.

To incorporate the impact of individual taxes, we consider two extreme assumptions, one in which all equity income is paid out as a dividend, and the other in which no equity income is paid out as a dividend, i.e., all equity income takes the form of capital gains. Under the first scenario, equity income is $323,173,692, calculated as (EBIT – interest expense – total corporate taxes). Applying the maximum individual surtax rate of 63% to the equity income, on the assumption that all equity income is paid out as a dividend, the total dollar return to equity holders after taxes $119,574,266. Adding the total dollar return to debtholders (after the 67% individual income tax rate on the $24 million interest payments) yields a total dollar return of $127,494,266 under scenario 1. The corresponding total dollar return under scenario 2 is $140,911,640.

If we assume all of the return is earned through capital gains and apply the 67% individual income tax rate to capital gains, then the total dollar return under scenario 1 is $114,567,318. The corresponding total dollar return under scenario 2 is $125,677,949. Note that the example does not account for the additional advantage for equity holders of timing capital gains.

In summary, the excess profits tax generated a bias for equity financing of over $13 million under one assumption about payout policy and over $11 million under the other assumption.

Therefore, the overall effect of tax rates on the preference for debt financing versus equity financing can be summarized as follows: debt financing held a slight advantage from 1909 to 1916. Equity then held a substantial advantage from 1917 to 1924. The advantage from 1917 to 1921 was due to the excess profits tax; the advantage from 1922 to 1924 was due to the combination of relatively high individual tax rates and the capital gains rate being reduced to 12.5%.

**Table A1: The relative advantage of debt**

The table lists the relative advantage of debt for each year under three different scenarios: the return is composed entirely of dividends, the return is composed of 50% dividends and 50% capital gains, and the return is composed entirely of capital gains. The relative advantage of debt is defined as $\frac{(1-T_{Pd})}{(1-T_{Pe})(1-T_C)}$, where $T_{Pd}$ is the individual tax rate on debt, $T_{Pe}$ is the individual tax rate on equity (dividends or capital gains), and $T_C$ is the corporate tax rate.

| Year | Return is 100% Dividend | Return is 50% Dividend | Return is 100% Capital Gain |
|---|---|---|---|
| 1909 | 1.01 | 1.01 | 1.01 |
| 1910 | 1.01 | 1.01 | 1.01 |
| 1911 | 1.01 | 1.01 | 1.01 |
| 1912 | 1.01 | 1.01 | 1.01 |
| 1913 | 1.00 | 1.00 | 1.01 |
| 1914 | 1.00 | 1.00 | 1.01 |
| 1915 | 1.00 | 1.00 | 1.01 |
| 1916 | 1.00 | 1.01 | 1.02 |
| 1917 | 0.95 | 1.00 | 1.06 |
| 1918 | 0.75 | 0.90 | 1.14 |
| 1919 | 0.86 | 0.97 | 1.11 |
| 1920 | 0.86 | 0.97 | 1.11 |
| 1921 | 0.86 | 0.97 | 1.11 |
| 1922 | 0.96 | 0.70 | 0.55 |
| 1923 | 0.96 | 0.70 | 0.55 |
| 1924 | 1.03 | 0.84 | 0.71 |

**Table A2: Example of excess profits tax**

The table lists an example of the total dollar return to debtholders and stockholders for the same firm under two different capital structure scenarios, levered and unlevered. For each capital structure scenario, the total dollar returns are calculated under two different assumptions: equity income takes the form of dividends only or equity income takes the form of capital gains only.

| | **1917 Levered** | **1917 Unlevered** |
|---|---|---|
| Paid in capital | 900,000,000 | 1,500,000,000 |
| Retained earnings | 400,000,000 | 400,000,000 |
| Debt | 600,000,000 | - |
| Total Capital | 1,900,000,000 | 1,900,000,000 |
| Invested capital | 1,300,000,000 | 1,900,000,000 |
| EBIT | 500,000,000 | 500,000,000 |
| Interest rate | 4% | |
| Interest payment | 24,000,000 | - |
| Net income | 476,000,000 | 500,000,000 |
| Excess profit tax deduction | 3,000 | 3,000 |
| Net profit after deduction | 475,997,000 | 499,997,000 |
| | | |
| Tax (np<.15): rate = .20 | 18,200,000 | 26,600,000 |
| Tax (.15<np<.20): rate = .25 | 16,250,000 | 23,750,000 |
| Tax (.20<np<.25): rate = .35 | 22,750,000 | 33,250,000 |
| Tax (.25<np<.33): rate = .45 | 46,800,000 | 11,248,650 |
| Tax (.33>np): rate = .60 | 28,198,200 | 0 |
| Excess Profits Tax 1917 | 132,198,200 | 94,848,650 |
| Corporate Tax 1917 | 20,628,108 | 24,309,081 |
| **Total Corporate Tax 1917** | **152,826,308** | **119,157,731** |
| | | |
| **Assume Payout is all Dividend:** | | |
| After-Tax Payout to Bondholders | 7,920,000 | - |
| After-Tax Dividend | 119,574,266 | 140,911,640 |
| **Total $ Return after-tax** | **127,494,266** | **140,911,640** |

**Appendix B: List of firms**

The sample includes firm-years from the 1905 to 1924 for all U.S. industrial firms that were publically traded in 1905 with financial statement information available in *Moody's Manuals*. Utilities, railroads, and mining companies are excluded from the sample. The table lists the name of each firm and the number of years in the sample.

| Name | Years in sample | Name | Years in sample |
|---|---|---|---|
| Allis-Chalmers Co. | 18 | Lehigh Coal & Navigation Co. | 20 |
| American Agricultural Chemical Co. | 20 | National Biscuit Co. | 20 |
| American Can Co. | 20 | National Carbon Co. | 12 |
| American Car & Foundry Co. | 20 | National Lead Co. | 20 |
| American Cement Co. | 17 | New York Air Brake Co | 17 |
| American Cotton Oil Co. | 18 | New York Dock Co. | 20 |
| American Grass Twine Co. | 19 | Pacific Coast Co. | 20 |
| American Hide & Leather Co. | 20 | Pacific Mail Steamship | 20 |
| American Linseed Co. | 16 | Pittsburgh Coal Co | 20 |
| American Locomotive Co. | 20 | Pressed Steel Car Co. | 20 |
| American Malting Co. | 14 | Pullman Co. | 20 |
| American Smelting & Refining Co. | 20 | Quaker Oates | 20 |
| American Snuff Co. | 20 | Railway Steel Spring Co. | 20 |
| American Steel Foundries Co. | 19 | Republic Iron & Steel | 20 |
| American Sugar Refining Co. | 18 | Rubber Goods Mfg. Co. | 9 |
| American Tobacco Co. | 20 | Sloss-Sheffield Steel & Iron Co. | 20 |
| American Woolen Co. | 20 | Streets Western Stable Car Line | 9 |
| Cambria Steel Co. | 17 | Swift & Co. | 20 |
| Central Leather Co. | 20 | Union Bag and Paper Co. | 20 |
| Colorado Fuel & Iron Co. | 20 | United Fruit Co. | 20 |
| Corn Products Co. | 19 | United States Cast Iron Pipe & Foundry Co. | 19 |
| Diamond Match Co. | 20 | United States Realty & Improvement Co. | 20 |
| Distillers Securities Corporation | 16 | United States Reduction & Refining Co. | 10 |
| Electric Storage Battery Co. | 20 | United States Rubber Co. | 19 |
| General Asphalt Co. | 20 | United States Steel Co. | 20 |
| General Chemical Co. | 15 | Virginia Iron, Coal & Coke Co. | 20 |
| General Electric Co. | 20 | Virginia-Carolina Chemical Co | 20 |
| International Paper | 20 | Westinghouse Air Brake Co. | 20 |
| Lake Superior Corporation | 20 | | |

**Appendix C: Variable definitions**

| Variable | Definition |
|---|---|
| Leverage (BVA) | Total debt / book value of assets (Total debt includes long and short term debt) |
| Leverage (MVA) | Total debt / market value of assets (market value of assets = book value of assets - book value of equity + market value of equity) |
| M/B | Market value of assets / book value of assets |
| EBIT | Earnings before interest and taxes |
| EBIT (1905 dollars) | EBIT adjusted to 1905 dollars using the Consumer Price Index (CPI) |
| EBIT / Assets | EBIT / book value of assets |
| Tangible Assets | PPE / book value of assets |
| Assets | Book value of assets |
| Assets (1905 dollars) | Assets adjusted to 1905 dollars using the CPI |
| Investment | Capital expenditures + change in net working capital |
| Investment (1905 dollars) | Investment adjusted to 1905 dollars using the CPI |
| Investment / Assets | Investment / assets |
| LnAssets (1905 dollars) | The natural log of Assets (1905 dollars) |
| Cash / Assets | Cash and marketable securities / assets |
| Change in leverage | A firm's change in Leverage (BVA) from the previous year. |
| Investment * 1917-1920 period | (Investment / assets) * indicator variable for the period 1917 to 1920 |
| EBIT / Assets * 1917-1920 period | (EBIT / assets) * indicator variable for the period 1917 to 1920 |
| Predicted leverage | The level of Leverage (BVA) predicted by a regression of leverage on the lagged values of M/B, LnAssets (1905 dollars), EBIT / Assets, and Tangible / Assets |

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**Table 1: Yearly tax rate**

The table lists the highest marginal yearly federal tax rates during the 1909 to 1924 period for the corporate income tax, the normal individual income tax, the individual income surtax, the total individual income tax, the capital gains tax, and the excess profits tax. The capital gains rate listed for 1922 to 1924 is the tax rate on investments held at least two years. The excess profits tax in 1918 was defined as the maximum of two separate taxes. The highest marginal rate for each is listed.

| Year | Top Corporate Rate | Normal Individual Rate | Top Individual Surtax Rate | Top Total Individual Rate | Top Capital Gains Rate | Top Excess Profits Tax Rate |
|---|---|---|---|---|---|---|
| 1909 | 1% | | | | | |
| 1910 | 1% | | | | | |
| 1911 | 1% | | | | | |
| 1912 | 1% | | | | | |
| 1913 | 1% | 1% | 6% | 7% | 7% | |
| 1914 | 1% | 1% | 6% | 7% | 7% | |
| 1915 | 1% | 1% | 6% | 7% | 7% | |
| 1916 | 2% | 2% | 13% | 15% | 15% | |
| 1917 | 6% | 4% | 63% | 67% | 67% | 60% |
| 1918 | 12% | 12% | 65% | 77% | 77% | 65%, 80% |
| 1919 | 10% | 8% | 65% | 73% | 73% | 40% |
| 1920 | 10% | 8% | 65% | 73% | 73% | 40% |
| 1921 | 10% | 8% | 65% | 73% | 73% | 40% |
| 1922 | 12.5% | 8% | 50% | 58% | 12.5% | |
| 1923 | 12.5% | 8% | 50% | 58% | 12.5% | |
| 1924 | 12.5% | 6% | 40% | 46% | 12.5% | |

**Table 2: Summary statistics**

The sample includes firm-years from the 1905 to 1924 for all U.S. industrial firms that were publically traded in 1905 with financial statement information available in *Moody's Manuals*. Utilities, railroads, and mining companies are excluded from the sample. *Leverage (BVA)* is ratio of the total debt to the book value of assets. *Leverage (MVA)* is the ratio of the total debt to the market value of assets. *M/B* is the ratio of the market value of assets (book value of assets – book value of equity + market value of equity) to the book value of assets. *EBIT* is the earnings before interest and taxes. *EBIT (1905 dollars)* is EBIT adjusted to 1905 dollars using the Consumer Price Index (CPI). *EBIT / Assets* is the ratio of EBIT to the book value of assets. *Tangible / Assets* is the ratio of PPE to the book value of assets. *Assets* is the book value of assets. *Assets (1905 dollars)* is the book value of assets adjusted to 1905 dollars using the CPI. *Investment* is the sum of capital expenditures and the change in working capital. *Investment (1905 dollars)* is investment adjusted to 1905 dollars using the CPI. *Investment / Assets* is the ratio of investment to the book value of assets. The columns list the number of observations, the mean value, the median value, the standard deviation, the minimum value and the maximum value for the sample.

| Variable | N | Mean | Median | StDev | Minimum | Maximum |
|---|---|---|---|---|---|---|
| Leverage (BVA) | 1,107 | 0.1433 | 0.1150 | 0.1356 | 0.0000 | 0.5536 |
| Leverage (MVA) | 1,072 | 0.2372 | 0.2035 | 0.2218 | 0.0000 | 0.9149 |
| M/B | 1,072 | 0.7169 | 0.6745 | 0.3097 | 0.0411 | 2.3416 |
| EBIT | 1,105 | 7,274,049 | 2,508,549 | 26,693,258 | -20,590,006 | 493,802,947 |
| EBIT (1905 dollars) | 1,105 | 4,936,894 | 1,912,265 | 16,600,000 | -8,989,554 | 305,292,783 |
| EBIT / Assets | 1,098 | 0.0594 | 0.0531 | 0.0463 | -0.1710 | 0.3948 |
| Tangible /Assets | 1,105 | 0.6113 | 0.6534 | 0.2256 | 0.0000 | 0.9727 |
| Assets | 1,107 | 107,559,756 | 51,297,288 | 276,461,591 | 3,369,439 | 2,571,617,280 |
| Assets (1905 dollars) | 1,107 | 76,265,670 | 38,375,692 | 195,317,584 | 1,830,827 | 1,686,522,752 |
| Investment | 1,041 | 2,870,043 | 576,957 | 15,513,462 | -99,459,640 | 191,968,144 |
| Investment (1905 dollars) | 1,041 | 1,958,672 | 458,466 | 10,152,578 | -84,589,504 | 108,646,552 |
| Investment / Assets | 1,041 | 0.0187 | 0.0137 | 0.1031 | -1.2397 | 0.8827 |

**Table 3: Summary statistics by period**

The sample includes firm-years from the 1905 to 1924 for all U.S. industrial firms that were publically traded in 1905 with financial statement information available in *Moody's Manuals*. Utilities, railroads, and mining companies are excluded from the sample. The table breaks the sample into five four year sub-periods: 1905-1908, 1909-1912, 1913-1916, 1917-1920, and 1921-1924. For each firm, the median value of the variable over the sub-period is calculated. The table lists the mean and median values across all firms in each sub-period. The *p-value* from a difference in means (Wilcoxon rank-sum) test between each period and the other four periods is listed beneath the mean (median).

| | 1905 - 1908 | | 1909 - 1912 | | 1913 - 1916 | | 1917 - 1920 | | 1921 - 1924 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Mean | Median | Mean | Median | Mean | Median | Mean | Median | Mean | Median |
| Leverage - BVA | 0.1482 | 0.1135 | 0.1460 | 0.1463 | 0.1459 | 0.1108 | 0.1358 | 0.1156 | 0.1349 | 0.0937 |
| *p-value* | *0.714* | *0.731* | *0.820* | *0.755* | *0.827* | *0.945* | *0.689* | *0.690* | *0.660* | *0.726* |
| Leverage - MVA | 0.2379 | 0.2115 | 0.2363 | 0.2253 | 0.2587 | 0.2642 | 0.2065 | 0.1835 | 0.2271 | 0.1822 |
| *p-value* | *0.858* | *0.746* | *0.906* | *0.929* | *0.371* | *0.504* | *0.319* | *0.393* | *0.824* | *0.799* |
| Market-to-book | 0.7094 | 0.6560 | 0.7281 | 0.6925 | 0.7064 | 0.6587 | 0.6866 | 0.6752 | 0.7319 | 0.6841 |
| *p-value* | *0.934* | *0.819* | *0.648* | *0.972* | *0.856* | *0.705* | *0.476* | *0.910* | *0.598* | *0.478* |
| EBIT | 4,293,131 | 2,098,906 | 4,785,580 | 2,143,760 | 5,445,753 | 2,162,284 | 13,712,432 | 4,817,271 | 7,854,493 | 2,772,414 |
| *p-value* | *0.313* | *0.066** | *0.418* | *0.057** | *0.516* | *0.282* | *0.022*** | *0.000**** | *0.805* | *0.466* |
| EBIT (1905 dollars) | 4,146,023 | 2,013,574 | 4,353,340 | 1,852,687 | 4,528,348 | 1,823,018 | 6,791,271 | 2,498,445 | 3,883,568 | 1,370,409 |
| *p-value* | *0.728* | *0.928* | *0.824* | *0.588* | *0.846* | *0.767* | *0.212* | *.048*** | *0.634* | *0.214* |
| EBIT / Assets | 0.0531 | 0.0495 | 0.0494 | 0.0462 | 0.0518 | 0.0465 | 0.0840 | 0.0762 | 0.0547 | 0.0510 |
| *p-value* | *0.264* | *0.244* | *0.047*** | *0.046*** | *0.067** | *0.065** | *0.000**** | *0.000**** | *0.483* | *0.655* |
| Tangible | 0.6452 | 0.7133 | 0.6504 | 0.6997 | 0.6473 | 0.6855 | 0.5463 | 0.5699 | 0.5557 | 0.5719 |
| *p-value* | *0.196* | *0.068** | *0.133* | *0.070** | *0.185* | *0.147* | *0.019*** | *0.004**** | *0.054** | *0.016*** |
| Assets | 83,252,137 | 41,541,118 | 87,736,609 | 48,995,768 | 96,419,484 | 49,846,640 | 134,217,612 | 62,396,172 | 139,992,952 | 68,205,680 |
| *p-value* | *0.472* | *0.042*** | *0.556* | *0.173* | *0.693* | *0.538* | *0.417* | *0.060** | *0.343* | *0.023*** |
| Assets (1905 dollars) | 80,186,059 | 40,071,192 | 78,768,746 | 43,658,016 | 79,924,695 | 42,226,364 | 66,609,585 | 31,641,812 | 69,258,905 | 33,652,800 |
| *p-value* | *0.811* | *0.438* | *0.858* | *0.509* | *0.893* | *0.479* | *0.730* | *0.203* | *0.823* | *0.350* |
| Investment | 1,612,380 | 568,406 | 1,794,424 | 486,216 | 2,287,545 | 638,088 | 7,228,812 | 2,102,859 | 794,316 | 38,224 |
| *p-value* | *0.391* | *0.938* | *0.465* | *0.556* | *0.630* | *0.536* | *0.000**** | *0.000**** | *0.156* | *0.004**** |
| Investment (1905 dollars) | 1,571,324 | 546,736 | 1,596,711 | 418,389 | 1,879,594 | 536,540 | 3,704,441 | 1,421,758 | 378,860 | 17,985 |
| *p-value* | *0.751* | *0.466* | *0.772* | *0.860* | *0.926* | *0.764* | *0.013*** | *0.001**** | *0.071** | *0.004**** |
| Investment / Assets | 0.0183 | 0.0154 | 0.0187 | 0.0132 | 0.0202 | 0.0125 | 0.0440 | 0.0353 | -0.0022 | 0.0022 |
| *p-value* | *0.766* | *0.575* | *0.828* | *0.631* | *0.932* | *0.569* | *0.000**** | *0.000**** | *0.000**** | *0.000**** |

**Table 4: Within firm variation in leverage**

The sample includes firm-years from the 1905 to 1924 for all U.S. industrial firms that were publically traded in 1905 with financial statement information available in *Moody's Manuals*. Utilities, railroads, and mining companies are excluded from the sample. For each firm in the sample, the table lists the mean, median, and standard deviation of Leverage (BVA) over the sample period. It also lists the minimum and maximum value over the sample period and the difference between the maximum and minimum values. The mean and median values of each column are tabulated at the bottom of the table.

| Name | Mean | Median | StDev | Min | Max | Max - Min |
|---|---|---|---|---|---|---|
| United States Realty & Improvement Co. | 0.345 | 0.391 | 0.134 | 0 | 0.454 | 0.454 |
| American Tobacco Co. | 0.147 | 0.086 | 0.159 | 0.007 | 0.434 | 0.427 |
| Virginia-Carolina Chemical Co. | 0.297 | 0.285 | 0.111 | 0.161 | 0.554 | 0.393 |
| United Fruit Co. | 0.130 | 0.092 | 0.125 | 0.006 | 0.398 | 0.392 |
| American Cement Co. | 0.223 | 0.181 | 0.126 | 0.046 | 0.400 | 0.354 |
| American Agricultural Chemical Co. | 0.237 | 0.242 | 0.095 | 0.068 | 0.414 | 0.347 |
| Quaker Oates | 0.109 | 0.086 | 0.092 | 0 | 0.346 | 0.346 |
| Allis-Chalmers Co. | 0.067 | 0.000 | 0.114 | 0 | 0.277 | 0.277 |
| Virginia Iron, Coal & Coke Co. | 0.316 | 0.364 | 0.094 | 0.155 | 0.421 | 0.266 |
| Swift & Co. | 0.289 | 0.282 | 0.071 | 0.156 | 0.420 | 0.263 |
| New York Air Brake Co. | 0.237 | 0.227 | 0.082 | 0.134 | 0.393 | 0.260 |
| American Steel Foundries Co. | 0.107 | 0.069 | 0.100 | 0 | 0.259 | 0.259 |
| Pittsburgh Coal Co. | 0.208 | 0.251 | 0.096 | 0.073 | 0.328 | 0.254 |
| American Cotton Oil Co. | 0.191 | 0.188 | 0.075 | 0.105 | 0.357 | 0.252 |
| American Smelting & Refining Co. | 0.091 | 0.071 | 0.087 | 0 | 0.249 | 0.249 |
| International Paper | 0.259 | 0.291 | 0.065 | 0.084 | 0.325 | 0.241 |
| United States Rubber Co. | 0.253 | 0.219 | 0.080 | 0.139 | 0.378 | 0.238 |
| Lehigh Coal & Navigation Co. | 0.387 | 0.403 | 0.070 | 0.247 | 0.476 | 0.229 |
| Central Leather Co. | 0.299 | 0.298 | 0.066 | 0.191 | 0.412 | 0.221 |
| Union Bag and Paper Co. | 0.157 | 0.128 | 0.068 | 0.063 | 0.279 | 0.216 |
| General Electric Co. | 0.104 | 0.098 | 0.054 | 0.024 | 0.229 | 0.205 |
| Diamond Match Co. | 0.073 | 0.062 | 0.080 | 0 | 0.203 | 0.203 |
| American Sugar Refining Co. | 0.031 | 0.000 | 0.072 | 0 | 0.193 | 0.193 |
| Railway Steel Spring Co. | 0.085 | 0.111 | 0.076 | 0 | 0.187 | 0.187 |
| Colorado Fuel & Iron Co. | 0.432 | 0.455 | 0.061 | 0.324 | 0.510 | 0.186 |
| American Hide & Leather Co. | 0.165 | 0.183 | 0.058 | 0.075 | 0.261 | 0.186 |
| American Linseed Co. | 0.066 | 0.032 | 0.067 | 0 | 0.176 | 0.176 |
| Sloss-Sheffield Steel & Iron Co. | 0.169 | 0.166 | 0.032 | 0.062 | 0.228 | 0.166 |
| Pacific Mail Steamship | 0.043 | 0.000 | 0.058 | 0 | 0.163 | 0.163 |
| American Locomotive Co. | 0.084 | 0.093 | 0.051 | 0.005 | 0.164 | 0.159 |
| Distillers Securities Corporation | 0.237 | 0.263 | 0.053 | 0.120 | 0.278 | 0.158 |
| American Woolen Co. | 0.084 | 0.085 | 0.040 | 0.027 | 0.177 | 0.150 |
| United States Steel Co. | 0.303 | 0.339 | 0.053 | 0.224 | 0.359 | 0.135 |
| American Can Co. | 0.052 | 0.060 | 0.047 | 0 | 0.130 | 0.130 |
| National Lead Co. | 0.039 | 0.001 | 0.050 | 0 | 0.125 | 0.125 |
| Pressed Steel Car Co. | 0.032 | 0.000 | 0.046 | 0 | 0.120 | 0.120 |
| Republic Iron & Steel | 0.159 | 0.150 | 0.039 | 0.109 | 0.227 | 0.118 |
| General Asphalt Co. | 0.109 | 0.103 | 0.028 | 0.071 | 0.166 | 0.095 |
| Corn Products Co. | 0.068 | 0.069 | 0.026 | 0.023 | 0.114 | 0.091 |
| United States Reduction & Refining Co. | 0.128 | 0.115 | 0.028 | 0.107 | 0.196 | 0.088 |
| Lake Superior Corporation | 0.189 | 0.174 | 0.029 | 0.158 | 0.242 | 0.085 |
| Cambria Steel Co. | 0.022 | 0.024 | 0.022 | 0 | 0.079 | 0.079 |
| American Malting Co. | 0.088 | 0.092 | 0.024 | 0.040 | 0.117 | 0.078 |
| Streets Western Stable Car Line | 0.222 | 0.223 | 0.015 | 0.196 | 0.245 | 0.049 |
| Pacific Coast Co. | 0.236 | 0.235 | 0.015 | 0.218 | 0.264 | 0.046 |
| New York Dock Co. | 0.384 | 0.389 | 0.014 | 0.362 | 0.406 | 0.045 |
| Rubber Goods Mfg. Co. | 0.025 | 0.019 | 0.013 | 0.011 | 0.044 | 0.033 |
| United States Cast Iron Pipe & Foundry Co. | 0.027 | 0.029 | 0.006 | 0.015 | 0.035 | 0.020 |
| General Chemical Co. | 0.004 | 0.000 | 0.007 | 0 | 0.020 | 0.020 |
| National Biscuit Co. | 0.003 | 0.000 | 0.006 | 0 | 0.017 | 0.017 |
| American Grass Twine Co. | 0 | 0 | 0 | 0 | 0.002 | 0.002 |
| American Car & Foundry Co. | 0 | 0 | 0 | 0 | 0 | 0 |
| American Snuff Co. | 0 | 0 | 0 | 0 | 0 | 0 |
| Electric Storage Battery Co. | 0 | 0 | 0 | 0 | 0 | 0 |
| National Carbon Co. | 0 | 0 | 0 | 0 | 0 | 0 |
| Pullman Co. | 0 | 0 | 0 | 0 | 0 | 0 |
| Westinghouse Air Brake Co. | 0 | 0 | 0 | 0 | 0 | 0 |
| Mean | 0.141 | 0.136 | 0.054 | 0.067 | 0.232 | 0.166 |
| Median | 0.109 | 0.093 | 0.053 | 0.023 | 0.229 | 0.163 |

**Table 5: Multivariate analysis of leverage**

The sample includes firm-years from the 1905 to 1924 for all U.S. industrial firms that were publically traded in 1905 with financial statement information available in *Moody's Manuals*. Utilities, railroads, and mining companies are excluded from the sample. The dependent variable is Leverage (BVA) in models (1) and (2) and Leverage (MVA) in models (3) and (4). Models (1) and (3) include yearly indicator variables for 1909 to 1924. Models (2) and (4) include period indicator variables for 1909-1912, 1913-1916, 1917-1920, and 1921-1924. *LnAssets (1905 dollars)* is the natural log of Assets (1905 dollars). The other variables are defined in Table 2. The continuous variables are winsorized at 0.01 and 0.99. Each specification includes firm indicator variables. *P-values* are in brackets and are based on standard errors clustered by firm. Coefficients denoted with ***, **, or *, are significant at the 1%, 5%, or 10% level, respectively.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Leverage (BVA) | Leverage (BVA) | Leverage (MVA) | Leverage (MVA) |
| 1909 | -0.0003 | | -0.0220** | |
| | [0.957] | | [0.031] | |
| 1910 | 0.0019 | | -0.0052 | |
| | [0.775] | | [0.640] | |
| 1911 | -0.0079 | | -0.0068 | |
| | [0.352] | | [0.597] | |
| 1912 | -0.0049 | | -0.0012 | |
| | [0.595] | | [0.937] | |
| 1913 | 0.0082 | | 0.0276 | |
| | [0.421] | | [0.140] | |
| 1914 | 0.0075 | | 0.0293 | |
| | [0.452] | | [0.129] | |
| 1915 | -0.0033 | | -0.0025 | |
| | [0.762] | | [0.896] | |
| 1916 | 0.0188* | | 0.0304 | |
| | [0.094] | | [0.152] | |
| 1917 | 0.0378** | | 0.0419* | |
| | [0.010] | | [0.087] | |
| 1918 | 0.0388** | | 0.0391 | |
| | [0.033] | | [0.175] | |
| 1919 | 0.0228 | | 0.0148 | |
| | [0.195] | | [0.575] | |
| 1920 | 0.0410** | | 0.0483 | |
| | [0.038] | | [0.109] | |
| 1921 | 0.0003 | | -0.0004 | |
| | [0.988] | | [0.989] | |
| 1922 | 0.0069 | | 0.0177 | |
| | [0.736] | | [0.579] | |
| 1923 | 0.0119 | | 0.0482 | |
| | [0.569] | | [0.154] | |
| 1924 | -0.0012 | | 0.0303 | |
| | [0.960] | | [0.385] | |
| 1909-1912 period | | -0.0024 | | -0.0081 |
| | | [0.701] | | [0.403] |
| 1913-1916 period | | 0.0077 | | 0.0212 |
| | | [0.436] | | [0.233] |
| 1917-1920 period | | 0.0330** | | 0.0328 |
| | | [0.037] | | [0.193] |
| 1921-1924 period | | 0.0043 | | 0.0243 |
| | | [0.822] | | [0.425] |
| M/B | 0.0757*** | 0.0696*** | -0.0732 | -0.0846* |
| | [0.004] | [0.006] | [0.154] | [0.099] |
| LnAssets (1905 dollars) | 0.0596* | 0.0592** | 0.0752** | 0.0773** |
| | [0.058] | [0.046] | [0.045] | [0.031] |
| EBIT / Assets | -0.7428*** | -0.6946*** | -1.0206*** | -0.9214*** |
| | [0.000] | [0.000] | [0.000] | [0.000] |
| Tangible / Assets | 0.0104 | 0.0086 | 0.0676 | 0.0627 |
| | [0.897] | [0.914] | [0.560] | [0.584] |
| Constant | -0.9956* | -0.9851* | -1.1796* | -1.2094* |
| | [0.079] | [0.065] | [0.076] | [0.054] |
| Observations | 1,021 | 1,021 | 1,021 | 1,021 |
| Firm Indicators | Yes | Yes | Yes | Yes |
| Cluster errors | Firm | Firm | Firm | Firm |
| Adjusted R-squared | 0.789 | 0.790 | 0.785 | 0.784 |

**Table 6: Summary statistics for the lowest and highest quartiles of change in leverage**

The sample includes firm-years from the 1905 to 1924 for all U.S. industrial firms that were publically traded in 1905 with financial statement information available in *Moody's Manuals*. Utilities, railroads, and mining companies are excluded from the sample. Panel A summarizes the entire sample period, Panel B summarizes only the four year period 1917 to 1920. *Change in leverage* is the firm's change in Leverage (BVA) from the previous year. *Cash / Assets* is the ratio of cash and marketable securities to the book value of assets. Each panel lists the mean and median values of the variables for the lowest quartile of firm-years based on change in leverage and the highest quartile of firm-years based on change in leverage. For each variable, the *p-value* based on a difference in mean (Wilcoxon rank-sum) test between the highest and lowest change in leverage quartiles is listed beneath the mean (median) of the high quartile group.

*Panel A: All years*

| | Low Quartile | | High Quartile | |
|---|---|---|---|---|
| | Mean | Median | Mean | Median |
| Investment / Assets | 0.0037 | 0.0085 | 0.0404 | 0.0333 |
| *p-value* | | | *0.001**** | *0.000**** |
| EBIT / Assets | 0.0724 | 0.0625 | 0.0430 | 0.0436 |
| *p-value* | | | *0.000**** | *0.000**** |
| Cash / Assets | 0.0528 | 0.0349 | 0.0391 | 0.0304 |
| *p-value* | | | *0.001**** | *0.032*** |
| Change in leverage | -0.0402 | -0.0276 | 0.0423 | 0.0211 |
| *p-value* | | | *0.000**** | *0.000**** |

*Panel B: 1917 - 1920*

| | Low Quartile | | High Quartile | |
|---|---|---|---|---|
| | Mean | Median | Mean | Median |
| Investment / Assets | 0.0282 | 0.0251 | 0.0976 | 0.0811 |
| *p-value* | | | *0.000**** | *0.000**** |
| EBIT / Assets | 0.1067 | 0.0941 | 0.0520 | 0.0569 |
| *p-value* | | | *0.000**** | *0.000**** |
| Cash / Assets | 0.0676 | 0.0471 | 0.0577 | 0.0486 |
| *p-value* | | | *0.334* | *0.991* |
| Change in leverage | -0.0276 | -0.0226 | 0.0413 | 0.0193 |
| *p-value* | | | *0.000**** | *0.000**** |

**Table 7: Multivariate analysis of change in leverage**

The sample includes firm-years from the 1905 to 1924 for all U.S. industrial firms that were publically traded in 1905 with financial statement information available in *Moody's Manuals*. Utilities, railroads, and mining companies are excluded from the sample. The dependent variable is Change in leverage. The predicted value of leverage, estimated from a regression of Leverage (BVA) on the lagged values of M/B, LnAssets (1905 dollars), EBIT / Assets, and Tangible / Assets, is included as an independent variable in models (2) and (3). Investment * 1917-1920 period is the interaction between Investment / Assets and the 1917-1920 period indicator variable. EBIT * 1917-1920 period is the interaction between EBIT / Assets and the 1917-1920 period indicator variable. The other independent variables are defined in the previous tables. The independent variables include period indicator variables for 1909-1912, 1913-1916, 1917-1920, and 1921-1924. The continuous variables are winsorized at 0.01 and 0.99. *P-values* are in brackets and are based on heteroscedasticity-consistent standard errors. Coefficients denoted with ***, **, or *, are significant at the 1%, 5%, or 10% level, respectively.

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | CHG_Leverage | CHG_Leverage | CHG_Leverage |
| Investment / Assets | 0.1653*** | 0.1656*** | 0.1522*** |
| | [0.000] | [0.000] | [0.000] |
| Investment * 1917-1920 period | | | 0.0416 |
| | | | [0.514] |
| EBIT / Assets | -0.2991*** | -0.3204*** | -0.2837*** |
| | [0.000] | [0.000] | [0.000] |
| EBIT / Assets * 1917-1920 period | | | -0.0912 |
| | | | [0.302] |
| Lag Leverage (BVA) | -0.0596*** | -0.0553*** | -0.0550*** |
| | [0.000] | [0.000] | [0.000] |
| Lag M/B | 0.0144** | 0.0121** | 0.0102 |
| | [0.016] | [0.035] | [0.101] |
| Lag LnAssets (1905 dollars) | 0.0002 | 0.0023 | 0.0024 |
| | [0.834] | [0.201] | [0.178] |
| Lag Cash / Assets | -0.0543* | -0.0595** | -0.0644** |
| | [0.066] | [0.046] | [0.035] |
| Predicted Leverage (BVA) | | -0.0813 | -0.0851 |
| | | [0.112] | [0.103] |
| 1909-1912 period | -0.0018 | -0.0015 | -0.0013 |
| | [0.575] | [0.634] | [0.685] |
| 1913-1916 period | -0.0007 | -0.0002 | -0.0003 |
| | [0.849] | [0.946] | [0.935] |
| 1917-1920 period | 0.0062 | 0.0042 | 0.0095 |
| | [0.143] | [0.320] | [0.216] |
| 1921-1924 period | 0.0041 | 0.0037 | 0.0036 |
| | [0.308] | [0.356] | [0.378] |
| Constant | 0.0102 | -0.0106 | -0.0133 |
| | [0.598] | [0.666] | [0.596] |
| Observations | 999 | 995 | 995 |
| Adjusted R-squared | 0.176 | 0.178 | 0.179 |

**Table 8: Change in leverage over the 1917-1920 period and the 1921-1924 period**

The sample includes firm-years from the 1905 to 1924 for all U.S. industrial firms that were publically traded in 1905 with financial statement information available in *Moody's Manuals*. Utilities, railroads, and mining companies are excluded from the sample. For each firm with leverage data in 1920, the table lists Leverage (BVA) for 1920, the change in leverage from the beginning of 1917 to the end of 1920, and the change in leverage from the beginning of 1921 to the end of 1924.

| Name | Leverage (BVA) in 1920 | Change leverage (BVA) 1917-1920 | Change leverage (BVA) 1921-1924 |
|---|---|---|---|
| United Fruit Co | 0.014 | -0.210 | -0.002 |
| Virginia Iron, Coal & Coke Co | 0.207 | -0.168 | -0.049 |
| Railway Steel Spring Co | 0.000 | -0.150 | 0.000 |
| Lehigh Coal & Navigation Co | 0.327 | -0.138 | -0.079 |
| Pittsburg Coal Co | 0.086 | -0.136 | -0.013 |
| Union Bag and Paper Co | 0.130 | -0.132 | 0.144 |
| International Paper | 0.084 | -0.116 | 0.176 |
| American Woolen Co. | 0.056 | -0.081 | 0.038 |
| United States Realty & Improvement Co | 0.359 | -0.081 | -0.359 |
| Republic Iron & Steel | 0.109 | -0.071 | 0.067 |
| United States Steel Co. | 0.241 | -0.061 | -0.018 |
| Giant Portland Cement Co. (successor to American Cement Co.) | 0.123 | -0.058 | -0.077 |
| Colorado Fuel & Iron Co. | 0.451 | -0.044 | 0.012 |
| American Steel Foundries Co. | 0.011 | -0.035 | -0.011 |
| American Can Co. | 0.073 | -0.035 | -0.020 |
| American Locomotive Co. | 0.021 | -0.034 | -0.016 |
| Corn Products Co | 0.041 | -0.028 | 0.026 |
| Cambria Steel Co. | 0.024 | -0.023 | NA |
| New York Dock co | 0.368 | -0.021 | -0.002 |
| Pacific Coast Co | 0.231 | -0.020 | 0.034 |
| U. S. Food Products Corp (Distillers Securities Corporation) | 0.228 | -0.012 | NA |
| Lake Superior Corporation | 0.163 | -0.009 | -0.006 |
| Sloss-Sheffield Steel & Iron Co | 0.171 | -0.007 | 0.058 |
| United States Cast Iron Pipe & Foundry Co | 0.022 | -0.005 | -0.007 |
| Allis-Chalmers Manufacturing Company | 0.0 | 0.0 | 0.0 |
| American Car & Foundry Co. | 0.0 | 0.0 | 0.0 |
| American Sugar Refining Co. | 0.000 | 0.000 | 0.184 |
| American Snuff Co. | 0.0 | 0.0 | 0.0 |
| Electric Storage Battery Co | 0.0 | 0.0 | 0.0 |
| National Biscuit Co | 0.0 | 0.0 | 0.0 |
| Pacific Mail Steamship | 0.000 | 0.000 | 0.135 |
| Pressed Steel Car Co | 0.000 | 0.000 | 0.120 |
| Pullman Co | 0.0 | 0.0 | 0.0 |
| Westinghouse Air Brake Co | 0.0 | 0.0 | 0.0 |
| American Agricultural Chemical Co | 0.261 | 0.027 | 0.091 |
| Virginia-Carolina Chemical Co | 0.305 | 0.034 | 0.248 |
| Central Leather Co. | 0.310 | 0.064 | -0.120 |
| United States Rubber Co | 0.350 | 0.065 | 0.007 |
| American Hide & Leather Co. | 0.184 | 0.076 | -0.105 |
| American Tobacco Co. | 0.094 | 0.078 | -0.087 |
| General Asphalt Co | 0.166 | 0.086 | -0.054 |
| National Lead Co | 0.097 | 0.097 | -0.020 |
| Swift & Co | 0.420 | 0.115 | -0.146 |
| American Smelting & Refining Co. | 0.152 | 0.121 | 0.083 |
| Quaker Oates | 0.306 | 0.139 | -0.285 |
| American Cotton Oil Co. | 0.323 | 0.140 | NA |
| General Electric Co | 0.229 | 0.155 | -0.179 |
| American Linseed Co. | 0.176 | 0.176 | -0.046 |
| New York Air Brake Co | 0.330 | 0.189 | -0.184 |
| Diamond Match Co | 0.203 | 0.203 | -0.203 |

**Table 9: Correlation between changes in leverage over consecutive four year periods**

The sample includes firm-years from the 1905 to 1924 for all U.S. industrial firms that were publically traded in 1905 with financial statement information available in *Moody's Manuals*. Utilities, railroads, and mining companies are excluded from the sample. For each year, starting in 1908 and ending in 1920, the table lists the correlation between the change in leverage for a firm over the prior four year period and the change in leverage over the subsequent four year period. The first column lists the four year periods being compared. The second column lists the number of firms in the correlation. The third column lists the correlation, and the last column lists the *p-value* from a test that the correlation equals zero.

| Periods compared | Number of firms | Correlation of change in leverage across periods | *p-value* |
|---|---|---|---|
| 1905-08 & 1909-12 | 45 | -0.062 | *0.686* |
| 1906-09 & 1910-13 | 50 | -0.267* | *0.061* |
| 1907-10 & 1911-14 | 50 | -0.092 | *0.525* |
| 1908-11 & 1912-15 | 51 | -0.071 | *0.619* |
| 1909-12 & 1913-16 | 50 | -0.089 | *0.54* |
| 1910-13 & 1914-17 | 51 | -0.139 | *0.331* |
| 1911-14 & 1915-18 | 52 | -0.268* | *0.055* |
| 1912-15 & 1916-19 | 51 | -0.221 | *0.119* |
| 1913-16 & 1917-20 | 48 | -0.109 | *0.462* |
| 1914-17 & 1918-21 | 48 | -0.077 | *0.601* |
| 1915-18 & 1919-22 | 48 | -0.235 | *0.107* |
| 1916-19 & 1920-23 | 48 | -0.064 | *0.666* |
| 1917-20 & 1921-24 | 47 | -0.340** | *0.019* |

**Table 10: The relative advantage of debt**

The sample includes firm-years from the 1905 to 1924 for all U.S. industrial firms that were publically traded in 1905 with financial statement information available in *Moody's Manuals*. Utilities, railroads, and mining companies are excluded from the sample. The dependent variable is Leverage (BVA) in models (1), (2), and (3) and Leverage (MVA) in models (4), (5), and (6). Models (1) and (4) assume that all of the return to the equity comes in the form of dividends. Models (2) and (5) assume that 50% of the return to the equity comes in the form of dividends and 50% of the return comes in the form of capital gains. Models (3) and (6) assume that all of the return to the equity comes in the form of capital gains. Dollar return is the total change in dollar return to shareholders and debtholders for the year if the firm had been financed with $1,000 less of equity and $1,000 more of debt. The calculation is based on the implied corporate and excess profits taxes for the firm-year and the highest marginal individual income, dividend, and capital gains tax rates for the year. The other variables are defined in Table 5. The continuous variables are winsorized at 0.01 and 0.99. Each specification includes firm indicator variables. *P-values* are in brackets and are based on standard errors clustered by firm. Coefficients denoted with ***, **, or *, are significant at the 1%, 5%, or 10% level, respectively.

| | Leverage (BVA) | | | Leverage (MVA) | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Dollar return (100% dividends) | -0.0029** | | | -0.0032 | | |
| | [0.022] | | | [0.104] | | |
| Dollar return (50% dividends) | | -0.0014 | | | -0.0037* | |
| | | [0.304] | | | [0.082] | |
| Dollar return (100% capital gains) | | | -0.0002 | | | -0.0017 |
| | | | [0.808] | | | [0.163] |
| M/B | 0.0626*** | 0.0503** | 0.0471** | -0.0872* | -0.0955** | -0.1051** |
| | [0.008] | [0.031] | [0.046] | [0.081] | [0.043] | [0.027] |
| LnAssets (1905 dollars) | 0.0534** | 0.0518** | 0.0483** | 0.0653** | 0.0708** | 0.0666** |
| | [0.037] | [0.039] | [0.049] | [0.040] | [0.023] | [0.031] |
| EBIT / Assets | -0.6930*** | -0.6004*** | -0.5655*** | -0.9776*** | -0.9374*** | -0.8545*** |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| Tangible / Assets | -0.0052 | -0.0140 | -0.0274 | 0.0347 | 0.0522 | 0.0349 |
| | [0.940] | [0.843] | [0.697] | [0.744] | [0.622] | [0.742] |
| Constant | -0.8704* | -0.8328* | -0.7606* | -0.9742* | -1.0807** | -0.9923* |
| | [0.051] | [0.055] | [0.071] | [0.069] | [0.038] | [0.053] |
| Observations | 1,021 | 1,021 | 1,021 | 1,021 | 1,021 | 1,021 |
| Firm Indicators | Yes | Yes | Yes | Yes | Yes | Yes |
| Clustered errors | Firm | Firm | Firm | Firm | Firm | Firm |
| Adjusted R-squared | 0.788 | 0.785 | 0.784 | 0.783 | 0.785 | 0.784 |