



# Budget Model

## Corporate Debt: Historical Perspective and Options for Reducing Interest Deductibility

**Summary:** While corporations are at historically high levels of debt relative to assets, leverage remains close to its historical average relative to firms' market value and relative to interest expense as a fraction of cashflow. In PWBM's dynamic firm model, reducing the deductibility of interest expenses by 10 percentage points decreases corporate output by 0.26 percent while decreasing corporate debt by 6.76 percent.

### Key Points

- Corporate debt relative to assets is at historically high levels. In 2020Q3, the ratio of corporate debt assets was 68 percent for book value, 49 percent for fixed assets, and 56 percent for tangible assets. For the period 1960 to 2019, the average corporate debt to asset ratios were 43 percent for book value, 40 percent for fixed assets, and 44 percent for tangible assets.
- Corporate debt relative to the market value of the firm, however, is close to its historical average. The market leverage ratio was 23 percent in 2020Q3, versus a 34 percent average for the period 1960 to 2019. The interest coverage ratio, which measures the ratio of earnings before interest and taxes to interest expense, was also high at 6.88 in 2020Q3 versus an average of 5.92 for the period 1960 to 2019.
- Current law allows for 92 percent of interest expenses to be deducted from corporate taxes. Using PWBM's dynamic firm model, we find that a 10 percentage point reduction in deductibility decreases capital and labor usage by the firm by 0.26 percent and causes corporate debt to decline by about 7 percent.

Corporations raise capital for investment from (a) retained earnings, (b) borrowing/debt issuance, and (c) equity issuance. In the United States, debt financing has the advantage of a tax benefit to the corporation from the deduction of interest paid. This tax benefit of debt is one explanation for the size of debt chosen by corporations. Higher debt ratios relative to underlying corporate value can put the firm at greater risk of defaulting on its debt obligations. To offset this risk, lenders demand higher interest rates. Firms in PWBM's dynamic model calculate their optimal choice of debt leverage based on that trade-off between the tax benefit of debt and higher costs of more debt.

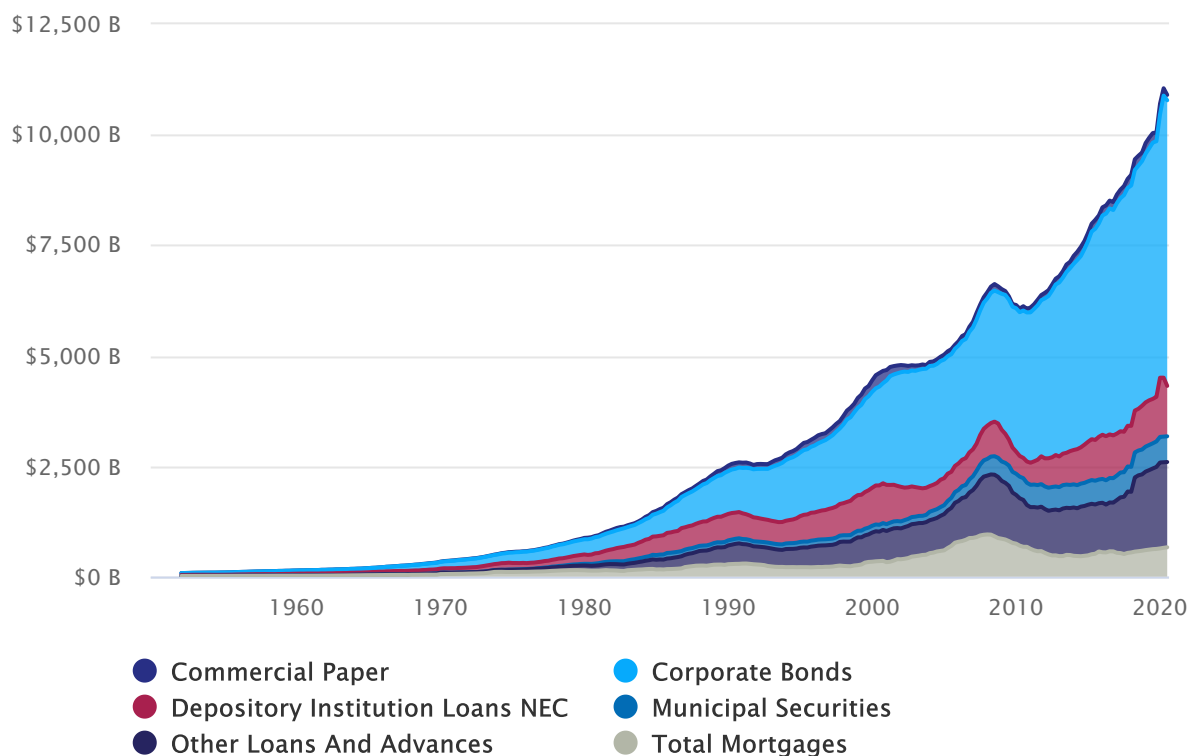
## Historical debt

Business debt financing comes from borrowing directly from financial institutions and from issuing corporate bond securities in capital markets. Debt raised from capital markets varies significantly in its repayment structures and maturity. Commercial paper debts are short-term loans provided by banks with a maturity of less than 270 days, while corporate bonds usually have a maturity greater than one year. Terms of debt vary widely, including debt convertible into equity and government-backed loans such as industrial revenue bonds issued by state and municipal governments to finance private investment. In the previous year, corporations have issued more debt and at longer maturities: U.S. [corporate bond issuance](#) was \$2.28 trillion in 2020 versus \$1.42 trillion in 2019, and the average maturity at issuance was 17.6 years in 2020 and 17.1 years in 2019. Figure 1 shows the different components of business debt and their changing importance over time.

Figure 1. Historical composition of corporate debt.

*Billions of Dollars*

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Debt leverage is the amount of debt outstanding divided by the assets of the firm. Higher leverage implies higher risk to the lender due to increased uncertainty about recovery in case of default. When interest rates are fixed, more debt also implies larger interest payments by the firm and a higher probability that the firm will be unable to make the contracted payments—that is, a higher risk of default.

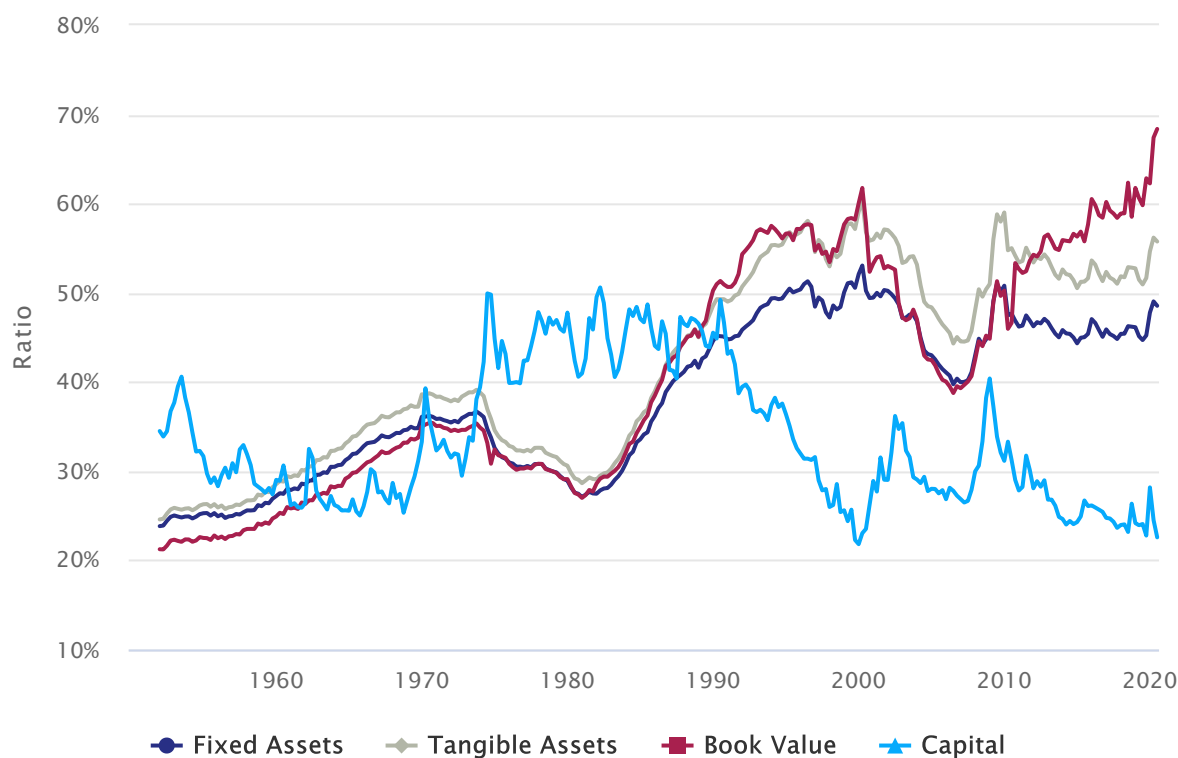
Total debt is the sum of commercial paper, corporate bonds, municipal securities,<sup>1</sup> loans from depository institution loans, mortgages and other loans and advances. Different measurements of the leverage ratio depend primarily on the denominator used: fixed asset value, tangible asset value, book value, or enterprise value. Fixed assets are the sum of equipment, real estate, and intellectual property products.<sup>2</sup> Tangible assets

only include real estate and equipment. Book value is the difference between a corporation's total assets (including financial assets) and total liabilities, so the book value is effectively the liquidation value of the assets of the business.

Leverage can also be assessed from enterprise value or capital, which is defined as the sum of the value of debt and equity. The resulting leverage ratio of debt over capital is sometimes referred to as market leverage.<sup>3</sup> Figure 2 shows the different leverage ratios for the period 1949 to the present for nonfinancial corporate business sectors using aggregate data from the Federal Reserve's [Financial Accounts](#).

Figure 2. Historical corporate leverage ratios.

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Debt-to-Assets and Debt-to-Tangible Assets have very similar trends. These two measures of leverage both remained relatively low and stable from 1960 to 1980 but then increased significantly from 1980 to 2000. During the 1980 to 2000 period, nonfinancial corporate bond issuance rose more than other forms of debt. The gap between these two measures of the leverage ratio is relatively small, typically less than 3 percent before the 1990s but increasing to more than 5 percent afterwards due to the growing value of intellectual property such as software. From 2000 to the global financial crisis (2007-2009), nonfinancial corporations entered a period of deleveraging. Leverage ratios dropped from around 60 percent to around 45 percent. The financial crisis was a turning point for corporate borrowing as leverage ratios began to rise past levels last seen in the 1990's with leverage measured by book value reaching an all-time high of 69 percent in 2020.

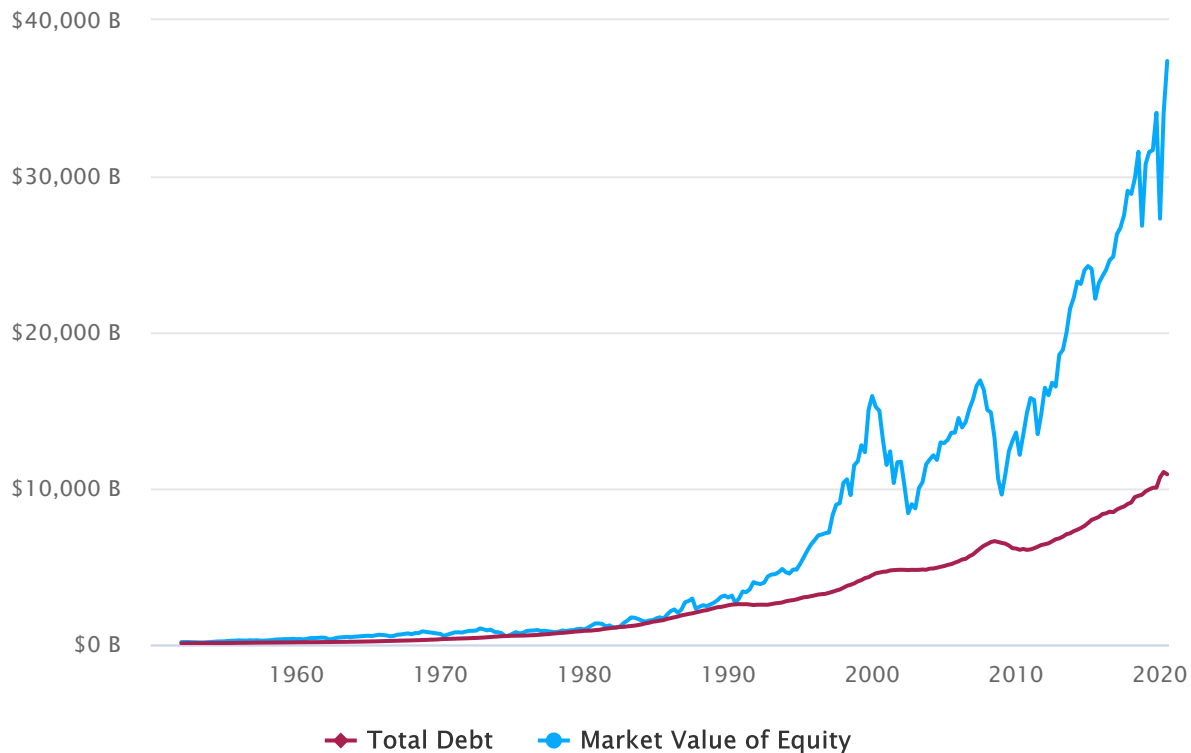
The Debt-to-Capital leverage ratio follows a very different path. This ratio held steady until the early 1970's, when it rose quickly to levels above 40 percent. This regime lasted until 1990, when Debt-to-Capital began to decline steadily, reaching a low of about 24 percent in 2000. The ratio remained low over the next two decades, with a notable spike during the financial crisis.

The disconnect between the asset ratios and market leverage started in 1990, as the market value of equity began rising faster than the market value of debt (see Figure 3). In 2020, leverage based on more physical measures (book value and tangible assets) is at historically high levels while leverage on the basis of enterprise value is near historic lows.

Figure 3. Historical value of corporate debt and equity.

*Billions of Dollars*

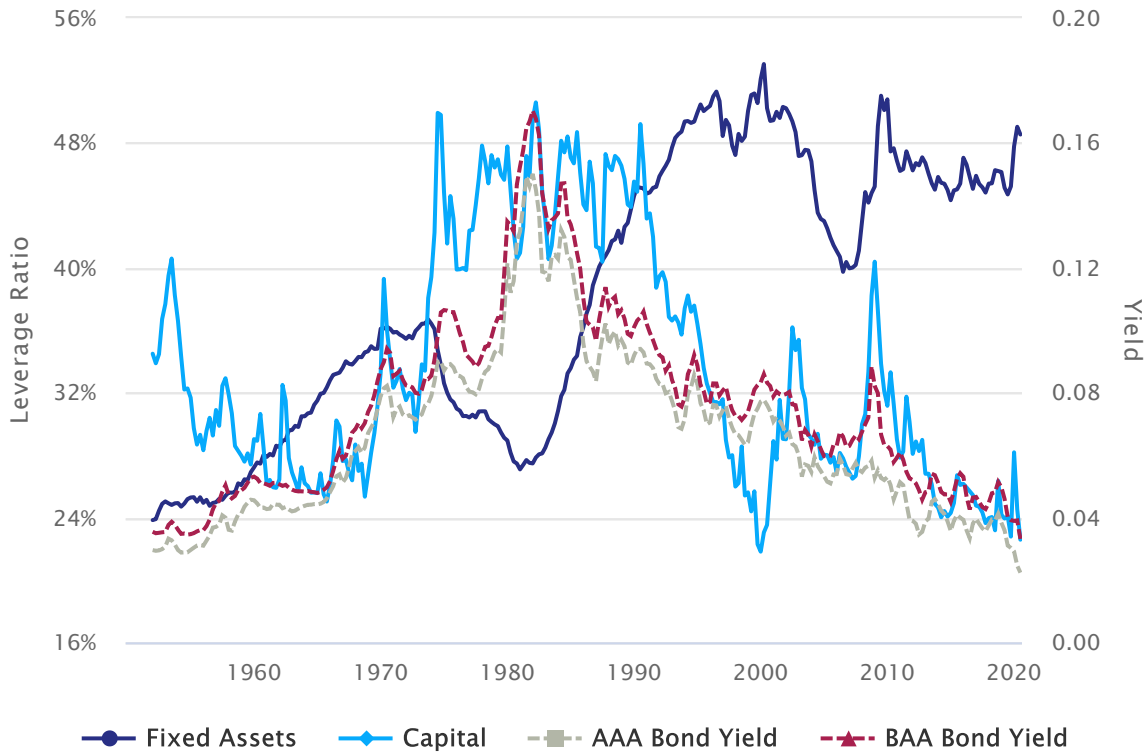
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The firm’s debt obligations are determined by both the size of the firm’s debt and the level of interest rates. Declining interest rates since 1980 (see Figure 4) have implied a lower cost of corporate borrowing and may justify a higher leverage ratio for a comparable level of risk. A large existing stock of debt, however, puts the firm at higher risk of default if interest rates increase and the firm borrows at higher rates to refinance.

Figure 4. Comparison of historical leverage (fixed asset and enterprise value) versus historical bond interest rates.

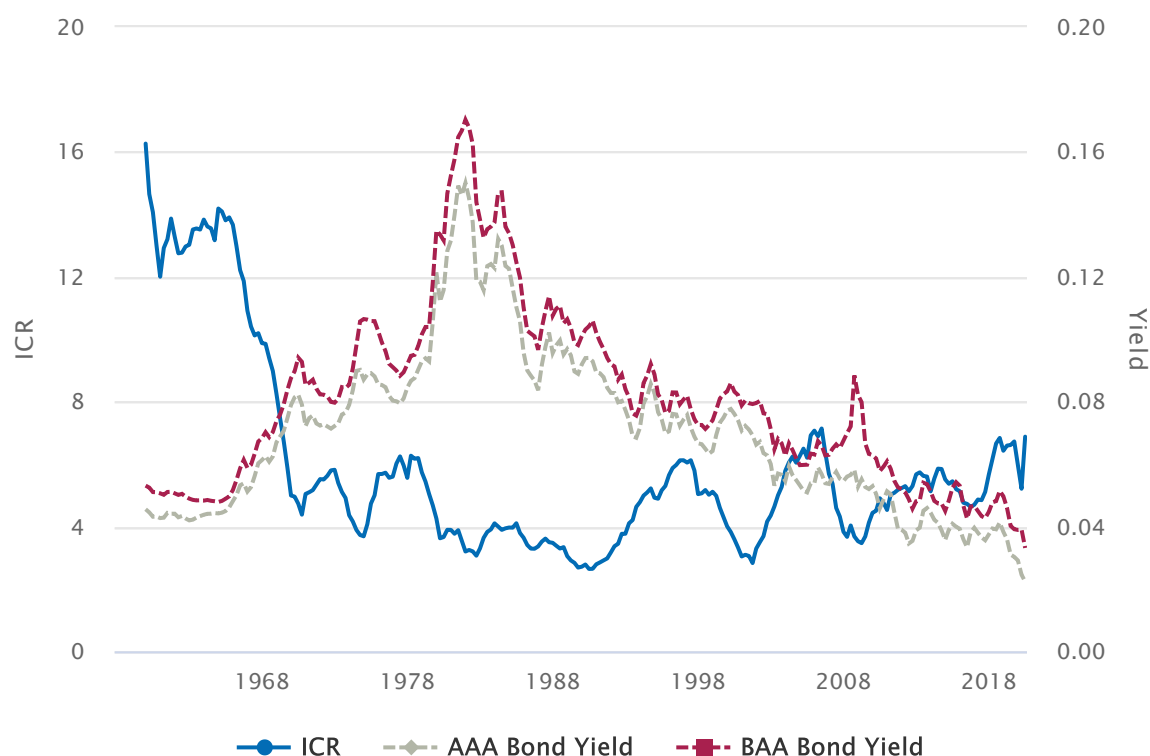
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The interest coverage ratio (ICR) measures earnings before interest and taxes over interest expense. This ratio quantifies a company’s ability to fulfill its debt obligation. A higher ratio implies that the company is generating enough cash to cover its interest payments, and therefore, faces a lower probability of default. Figure 5 shows that, although the ICR fell from 1960 to 1970, it stayed relatively stable from 1970 onwards. In 2020, the ICR is near the high of the period since 1970, implying debt payment is not a large burden to corporations.

Figure 5. Historical comparison of interest coverage ratio (ICR) to corporate bond interest rates.

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## Leverage choice model

There are three main theories of a firm's debt-equity choice.

1. **Tradeoff:** Given that the U.S. tax system allows corporations to deduct their net interest expenses, tradeoff theory says that a firm chooses its debt to maximize tax benefits net of the costs of possible financial distress.
2. **Pecking order:** The pecking order theory predicts that to fund capital investment, a firm would first use internal sources of finance, then turn to borrowing, and finally resort to issuing equity. This effect is driven by information asymmetry where investors infer from the manager's decision to issue equity that the shares are overvalued. Given that debt has a priority claim, an announcement of debt issuance exerts a smaller downward pressure on a firm's stock price compared to equity issuance. As a result, a manager whose objective is to maximize shareholder value would only raise funds through equity when debt becomes too costly.
3. **Free cashflow:** The free cashflow theory highlights agency costs and considers debt as a way to discipline managers from overinvesting and motivate them to generate and pay out cash instead.

Other theories look at the effect debt has on stock-based compensation of managers, as higher leverage implies higher value to stock-options.

The PWBM dynamic model uses tradeoff theory to reproduce the firm's choice of debt. We impose a non-linear leverage cost function which increases the cost of borrowing as leverage rises and calibrate the function

to match data on corporate credit spread and corporate interest expense.

## Changes of interest deductibility

Under the tradeoff model, the leverage ratio of a firm decreases when the corporate tax rate and interest rate are lower. The deductibility of interest income also affects the benefit of corporate borrowing and so provides a direct policy lever to affect the leverage ratio. According to the PWBM tax model, the average deductible share of corporate net interest expense is 92 percent in 2021.<sup>4</sup> Table 1 shows the effects of either a 5 or 10 percentage point reduction in interest deductibility on the capital stock, labor demand, free cash flow, debt and interest paid of the nonfinancial corporate sector under various interest rate scenarios.

Lower deductibility has the direct effect of raising corporate tax liability and so reducing free cash flow. Economies at higher interest rates show larger percentage effects from the policy change. Under all interest rate assumptions, corporate capital stock and labor demand both decline, though both effects are relatively small. Debt issued by the firm also declines as the tax benefit of additional debt is lower, which reduces the probability of default, and therefore, decreases the corporate credit spread and interest payments by the firm.

Table 1. Reduction by 5 percent in the average deductible share of net interest expense. Percentage changes relative to current policy economy.

*Percent change relative to current law*

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<b>Interest rate</b>	<b>Capital stock</b>	<b>Labor demand</b>	<b>Free cash flow</b>	<b>Debt</b>	<b>Interest paid</b>
1	-0.13	-0.13	-0.12	-3.38	-3.83
3	-0.13	-0.13	-0.13	-3.38	-3.83
5	-0.13	-0.13	-0.16	-3.38	-3.83
7	-0.13	-0.13	-0.22	-3.37	-3.82

Table 2. Reduction by 10 percent in the average deductible share of net interest expense. Percentage changes relative to current policy economy.

*Percent change relative to current law*

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<b>Interest rate</b>	<b>Capital stock</b>	<b>Labor demand</b>	<b>Free cash flow</b>	<b>Debt</b>	<b>Interest paid</b>
1	-0.26	-0.26	-0.22	-6.76	-7.62
3	-0.26	-0.26	-0.26	-6.76	-7.62
5	-0.26	-0.26	-0.33	-6.77	-7.62
7	-0.26	-0.26	-0.44	-6.76	-7.61

These results indicate that reduction of interest deductibility is likely to have less than a 1 percent effect on capital, labor demand, and firm earnings. At the same time, lower benefits to borrowing reduce corporate debt by about 3.4 percent for a 5 percentage point reduction in deductibility and by about 6.8 percent for a 10 percentage point reduction in deductibility. Historical measures do not give a clear signal that the corporate sector is over-leveraged, but our analysis implies that reducing the deductibility of interest may reduce corporate leverage with relatively small costs on the production sector.

*This analysis was conducted by [Zheli He](#) and [Xiaoyue Sun](#). Prepared for the website by [Mariko Paulson](#).*

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1. Municipal securities are issued by state and local governments to finance private investment and are secured in interest and principal by the industrial user of the funds. Detailed data source: <https://www.federalreserve.gov/apps/fof/SeriesAnalyzer.aspx?s=FL103162000&t=B.103&suf=Q>. ↩
  2. Assets are measured at market value. ↩
  3. Graham et al. (2015) define capital as the sum of interest-bearing debt and book value of equity. Frank and Goyal (2008) bring up the issue of whether to examine book leverage (debt divided by total assets) or market leverage (debt divided by the sum of book debt plus the market value of equity). ↩
  4. PWBM estimates the interest deductibility share to be 86 percent in 2026 under current law. ↩