



LONG-TERM MACROECONOMIC EFFECTS OF THE 2017 CORPORATE TAX CUTS

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“Long-term Macroeconomic Effects of the 2017 Corporate Tax Cuts”

Introduction

In December 2017, President Donald Trump signed into law the largest corporate tax reduction since the Tax Reform Act of 1986 signed by President Ronald Reagan. The Tax Cuts and Jobs Act of 2017 (TCJA) reduced the top marginal tax rate levied on corporate income from 35% to a flat 21%, leading to extensive speculation on the anticipated effects of the tax cut on key economic variables. This study uses an objective methodology to project the long-term economic impact of the corporate tax cut by simulating business decisions that determine dividend issuance and equity valuation as well as household decisions that determine equity ownership and the U.S. wealth distribution.

In order to trace the effects of the corporate tax cut throughout the economy, a dynamic general equilibrium model with explicit corporate activity and an endogenous household wealth distribution is calibrated to the U.S. economy and modified to reflect the change in the corporate tax rate. The model's baseline parameters are chosen so that the model matches key economic statistics, including firm-level values estimated from COMPUSTAT data and household values derived from the Survey of Consumer Finances (SCF) and other studies. To measure the long-run effects of the reform, several key values are computed after simulating the corporate tax reform and compared to the corresponding benchmark values.

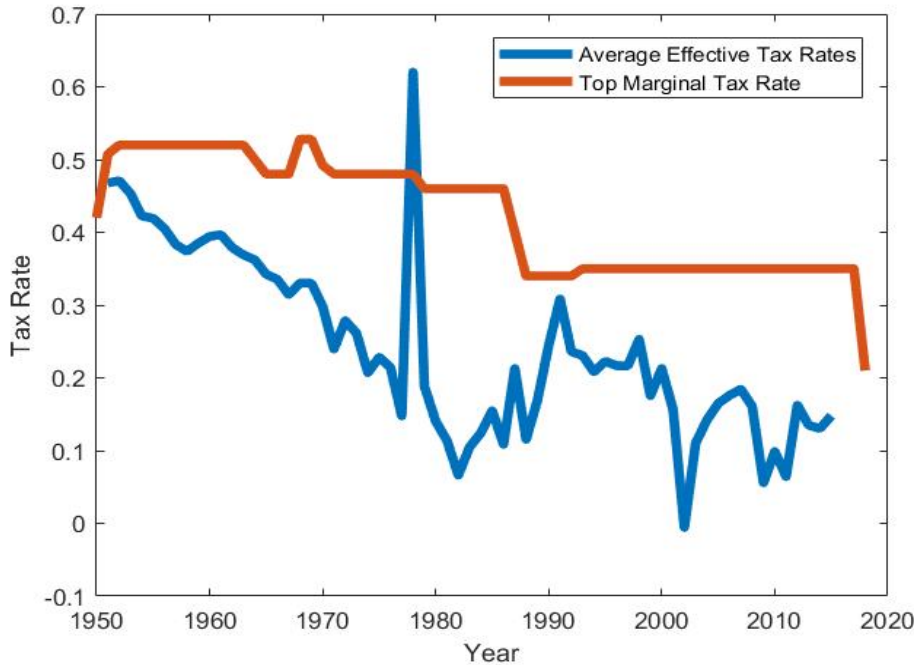
The results show a modest decline in wealth inequality resulting from the decline in the corporate tax rate implemented in the TCJA. Although total wealth remains highly concentrated among individuals in the top quintile, the model shows a small shift in the concentration of wealth toward each of the bottom four quintiles. Other key economic variables, including wages, household consumption, and corporate investment, experience a moderate increase, while total output remains roughly unchanged. The economic variables most directly impacted by corporate tax cuts are average dividend issuance and equity valuation, which increase more significantly. Total corporate tax revenue declines by about 40%, but nearly 20% of that decline is recaptured through increased personal income tax revenue.

Corporate Income Tax and Household Wealth: A Look Back

Corporate Income Tax

Since the early 1950s, the U.S. corporate income tax experienced a decline in both the effective and statutory corporate income tax rates. Figure 1 shows how the top statutory marginal tax rate trended downward from a peak in excess of 50% in that decade to the recent 21% rate implemented in the TCJA. The average effective tax rate declined more rapidly in the first three decades after 1950, increased throughout the 1980s, and continued a downward trend thereafter. The ratio of corporate income tax revenue to gross domestic product (GDP) also trends downward for much of its history, as shown in Figure 2.

Figure 1. Average Effective and Top Statutory Marginal Corporate Tax Rates since 1950

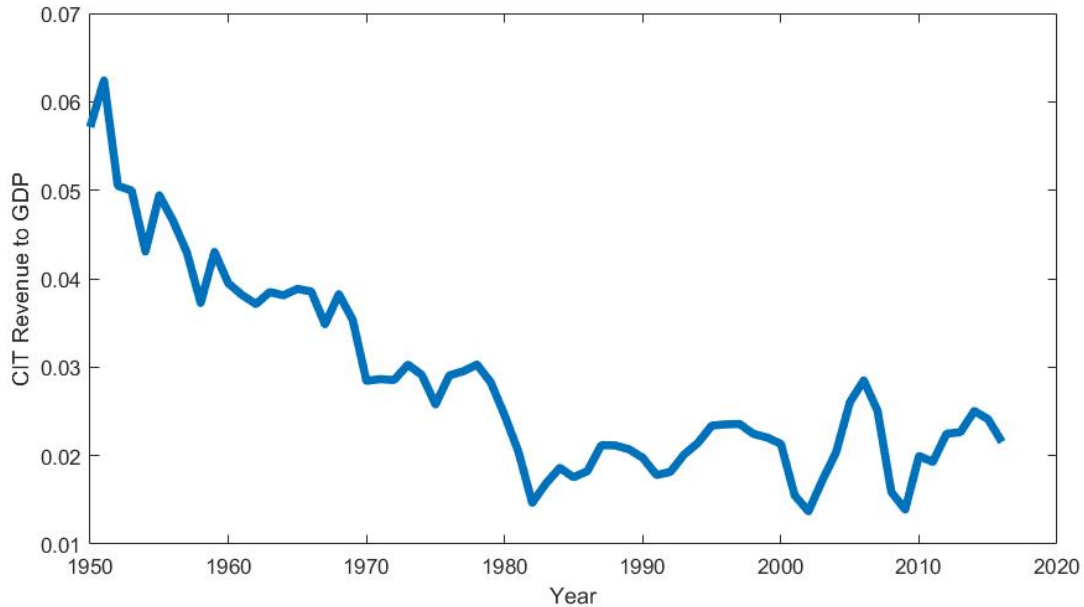


Note: Effective tax rate is defined as the ratio of a company's federal taxes paid to pre-tax income. Source: Author's analysis of COMPUSTAT data; IRS SOI Historical Tables, Table 24

Despite a historic decline in corporate income taxation, the corporate tax rates and aggregate corporate tax revenue-to-GDP ratio potentially stabilized in the two decades preceding the TCJA. Although this observation is the subject of ongoing exploration, a sustainable corporate tax base is an important assumption for the purpose of modeling long-term corporate tax reform. A long-run trend of a diminishing corporate tax base otherwise undermines macroeconomic projections.

Since the tax reform of 1986, corporate tax revenue as a share of GDP has averaged around 2%, while total federal tax revenue to GDP averaged about 17%. As a share of all taxes, corporate income tax revenue comprised about 12% of total tax revenue. If the decline in corporate tax revenue is proportional to the 40% decline in the top marginal tax rate, then total tax revenue would decline by 7%, which is roughly 0.8% of GDP. However, as the results below suggest, a portion of the decline in corporate tax revenue is regained through personal income tax revenue.

Figure 2. Corporate Tax Revenue to GDP



Source: U.S. Bureau of Economic Analysis, “Federal Government: Tax Receipts on Corporate Income.”

Wealth Inequality

A series of publications by the Federal Reserve Bank of Minneapolis documents the changing wealth distribution over the past 20 years.^{1,2,3} Using data from the corresponding Survey of Consumer Finances release, the authors of the respective papers find that the U.S. wealth Gini coefficient rose from 0.80 to 0.82 between 1998 and 2007 and continued rising to 0.85 in 2013. A closer look at the concentration of wealth by quintiles shows that the rising wealth inequality has largely coincided with the increase in the share of wealth held by the wealthiest 20% of U.S. households. In 1998, the top quintile held 81.7% of total wealth. That value rose to 83.4% in 2007 and continued rising to 87.0% in 2013.

Wealth, as defined by a household’s net worth, consists of different types of assets, including physical and financial assets, as well as debt. Kuhn and Ríos-Rull (2016) decompose household balance sheets and find that the top quintile held 88.1% of total financial assets in 2013, suggesting that much of the decline in the corporate tax will benefit

¹ Santiago Budria Rodriguez, Javier Díaz-Giménez, Vincenzo Quadrini, and José-Víctor Ríos-Rull, “Updated Facts on the U.S. Distributions of Earnings, Income, and Wealth,” *Quarterly Review, Federal Reserve Bank of Minneapolis* 26, no. 3 (2002): 2.

² Javier Díaz-Giménez, Andy Glover, and José-Víctor Ríos-Rull, “Facts on the Distributions of Earnings, Income, and Wealth in the United States: 2007 Update,” *Quarterly Review, Federal Reserve Bank of Minneapolis* 34, no. 1 (2011).

³ Moritz Kuhn, and José-Víctor Ríos-Rull, “2013 Update on the U.S. Earnings, Income, and Wealth Distributional Facts: A View from Macroeconomics,” *Quarterly Review, Federal Reserve Bank of Minneapolis, April* (2016): 1-75.

these households. A decline in the corporate tax rate, however, effectively reduces the marginal tax on each equity share held, regardless of a household's locus within the wealth distribution. Accordingly, of particular interest is whether the decline in the corporate tax rate can induce enough of an increase in savings by the bottom 80% of households to reverse the trend in wealth inequality over the last two decades.

Literature Review

Understanding the effects of corporate taxation and projecting the effects of corporate tax reform has been the focus of extensive research, spanning academic and applied work. Existing methodologies for studying corporate taxation are divided between quantitative theoretical modeling and reduced form, data-driven approaches. Both approaches have focused on identifying how corporate tax incidence is divided between employees' wage income and shareholders' return on equity. Gravelle (2011) reviews the empirical literature on corporate tax incidence and identifies the limitations of reduced form approaches. Because of the considerable variation in reduced form estimates and the implausible implications of estimated values, she argues in favor of general equilibrium approaches, which are summarized in a subsequent publication (Gravelle 2013).

The general equilibrium model employed for policy evaluation in this paper is a contribution to the structural measurement of the 2017 corporate tax reform implemented in the TCJA. To that extent, the approach aligns more closely with the research summarized in Gravelle (2013), which finds that several key modeling assumptions influence the measurement of corporate tax incidence. In particular, factors such as international capital mobility and relative country size determine the extent to which the corporate tax incidence falls on employees relative to shareholders. Greater flexibility of firms to shift assets internationally is found to impose greater corporate tax incidence on labor, while larger country size is associated with greater corporate tax incidence on shareholders. Although the model in this paper is a closed economy with no international factors influencing outcomes, Gravelle (2013) identifies several limitations of open economy models, citing the stylistic nature of open economy models whose implications correspond to arbitrary modeling choices. Despite the stylistic nature of open economy models, accounting for international factors can improve measurement of the corporate tax incidence.

While an extensive literature evaluates corporate tax reform more generally, some recent publications have focused specifically on the TCJA (or the proposals that immediately preceded it). An October 2017 report published by the Council of Economic Advisers cites cross-country empirical evidence to claim that the high corporate tax rates preceding the TCJA largely restricted U.S. wage growth and multinational corporate profit repatriation. That report projected an increase in average household income from \$83,143 to at least \$87,520—a 4.8% improvement. By contrast, the results of this paper show that average income remains roughly constant, suggesting that the decline in tax outlays is roughly equal in magnitude to the increase in household consumption. In other words, the crowd-out effect of government expenditures on private consumption is roughly proportional.

Cline (2017) uses a simplified structural framework to explain how the increase in wages could be significantly lower than the CEA projects, on the order of 1.4%. While the model in this paper applies an alternative approach, wage change estimates are similar, with the model used herein projecting a 1.1% increase in wages.

While the impact of corporate taxation on wages and capital accumulation is a subset of the results presented in this paper, the anticipated effects of the reform span a broader set of economic variables than those typically provided in the literature. Specifically, the model projects the long-run effects of corporate tax reform on equity ownership and wealth inequality. Further, the model used to reach these results improves upon many existing methodologies by differentiating between capital and firm equity. This is an important distinction, as many models assume that the corporate income tax is simply a tax on capital. By explicitly considering corporate profits and dividend policy, the model captures the mechanism through which the corporate tax rate distorts a firm's intertemporal trade-off between higher current dividends or greater capital investment to increase future production.

Dynamic Model Overview

To evaluate the effects of the corporate tax cuts, a dynamic model of equity ownership with explicit corporate activity and household wealth variability is calibrated to match firm data, the U.S. wealth distribution, and other key statistics of the U.S. economy.⁴ Endogenous household wealth heterogeneity allows the model to directly evaluate the impact of tax reform on wealth inequality, while modeling corporate behavior captures the channel through which corporate taxation permeates through businesses to shareholders.

Firms

Firms seek to maximize their net present value, as defined by the expected discounted stream of dividends. When the government reduces corporate tax rates, firms' contemporaneous cash flows increase, and firms choose how much of the new cash flow to invest in capital or to distribute to shareholders as dividends. Because the model is in general equilibrium, firms also account for the increased demand for output, labor market variation, and changes in the market rate of return implied by changes in the market valuation of equity.

Demand for an individual firm's production varies stochastically over time but maintains some level of persistence. Each firm takes this idiosyncratic risk, as well as wages and its own ex-dividend market value as given, and maximizes its current value by choosing its current labor force and capital investment. In order to adjust its total assets, the firm incurs capital adjustment costs, and in each period, a constant fraction of the firm's assets depreciates.

⁴ See Barro and Berkovich (2017), which describes the benchmark macroeconomic model under more restrictive assumptions. The extensions of the benchmark model are summarized in the appendix.

Firms are taxed on their gross corporate profits. They can deduct wages, capital adjustment costs, and a fraction of investment from total revenues. After choosing its resource allocation and paying its tax bill, a firm's remaining cash flow is distributed to shareholders as dividends.

Households

Households in the model are dynastic to reflect the intergenerational transfers and bequests that play an important role in generating an accurate wealth distribution. Each household faces uninsurable labor income risk that is correlated over time. Households maintain shares of a mutual fund, which in turn owns the firms. In each period, households take their wages, labor productivity, dividend issuance, and market value of equity as given and choose how much to work and how to adjust their portfolios. Households with a negative equity position are debtors. In equilibrium, this is equivalent to a financial intermediary issuing debt to households, since all outstanding debt must be in zero net supply.

Key Assumptions

While the model contains several innovative features to provide particular economic values of interest, certain assumptions are imposed to ensure the model's tractability. Each of these limitations is discussed below.

Long-term Reform

Certain provisions of the TCJA are set to expire after a five-year window. While these provisions may have significant short- and medium-term consequences, these effects will eventually wash out in the long run. For example, the investment incentive is likely to stimulate capital growth, but capital depreciation will eventually bring the economy's capital stock back toward its long-run trend. As a result, the only part of the corporate tax reform that is modeled in the long-term is the decline in the corporate tax rate.

Closed Economy

The model excludes foreign ownership of U.S. equity. In reality, a decline in corporate taxation effectively reduces the taxes paid by foreign shareholders. However, according to a U.S. Treasury Department report on international financial transactions, foreign entities held only 13.6% of U.S. equity in 2016.⁵ Accordingly, although foreign owners of U.S. equities benefit from corporate tax reductions, the total measure of these shareholders is limited.

International capital allocation decisions faced by firms are directly influenced by domestic corporate tax reform. The value of investing in the U.S. increases when the corporate income tax rate declines. The extent to which a corporate tax reduction induces a capital inflow to the domestic economy corresponds to the magnitude by which the effects of a

⁵ U.S. *Portfolio Holdings of Foreign Securities as of June 30, 2016*, joint report from the Department of Treasury, Federal Reserve Bank of New York, and Board of Governors of the Federal Reserve System, April 2017.

corporate tax reduction are understated by the model. As mentioned above, however, any choice of international tax model introduces additional assumptions about international finance that may arbitrarily vary the model's key results.

No Long-term Government Debt

Standard macroeconomic theory suggests that government debt and corporate debt compete for lenders. Consequently, when the government issues new debt, the market interest rate increases, discouraging private capital investment. However, the macro-finance literature has shown that government debt can also improve market outcomes by providing a financial instrument for industries requiring liquid, low-risk assets.⁶ Without a clear mechanism through which these countervailing forces are captured within the model, the impact of government debt on production factors is left for future consideration.⁷

No Explicit Accounting for the Top 1%

While the model provides a reasonable match for the individual quintiles of wealth—especially the top quintile—the share of wealth concentrated in the top 1% is potentially driven by factors not included in this model. For example, entrepreneurial activity may contribute to the heightened asset accumulation by the wealthiest households. The driving forces behind wealth accumulation at the top of the wealth distribution are the subject of extensive ongoing research and allow for future extensions of the benchmark model once they are better understood.

No Pass-Through Entities

Another important consideration related to the right tail of the U.S. wealth distribution is the opportunity for firms to organize as a pass-through entity, such as a Subchapter S-corporation. These business entities avoid corporate taxation altogether but depend on private investment rather than public issuance of equity. Chen et al. (2017) show that reducing the corporate tax rate reduces the relative value of pass-through organization, motivating firms to access broader capital markets by filing as corporate-taxable C-corporations. The authors show that reducing the corporate tax rate to 20% causes a small increase in labor, capital, output, and consumption, and a small decline in the non-employment rate and wealth Gini coefficient. Although this paper does not directly account for the ability to choose legal form of corporate organization, omitting that mechanism does not create a significant disparity in the respective models' results.

⁶ See, for example, Holström and Tirole (1998).

⁷ Another important consideration is how much debt the government chooses to maintain in the distant future. Since this model focuses on the long-term macroeconomic impact of the corporate tax reform, any choice of future debt is arbitrary and potentially unrelated to current debt levels.

Calibration

This section presents the model parameters and discusses the calibration process. To validate the results, several key model statistics are compared to the corresponding statistics from the data. The results show that the model provides a close match for several key features of the U.S. economy in the periods leading up to the TCJA. Specific model functional forms and parameter values are provided in the appendix.

Households

Key parameters corresponding to household decisions are the elasticity of intertemporal substitution (EIS) and the Frisch labor supply elasticity (FLSE). The EIS determines the responsiveness of households' current consumption to a change in the return to savings. Havranek et al. (2015) review the literature and find that estimates of the EIS tend to fall between 0.5 and 0.7 in the U.S. The model used in this paper has a value of $EIS = 0.59$, which is in the midrange of the plausible interval.

When wages increase, two countervailing factors determine the labor supply response. An increase in income for a given amount of labor causes an individual to increase both consumption and leisure (i.e., work less), since both are normal goods (income effect).⁸ However, an increase in wages also increases the relative cost of leisure, inducing an increase in labor hours (substitution effect). The FLSE measures this latter effect. Estimates of the FLSE in the literature vary widely depending on certain properties of the underlying behavioral assumptions. In general, higher FLSE estimates are needed to generate the variation in work hours over the business cycle as observed in aggregate data, while microeconomic estimates tend to be much lower. The model in this paper takes a value of $FLSE = 1.7$, which falls in the middle of the estimates reported in Peterman (2016).

Two additional parameters determine total savings and labor in the model—the preference weight of consumption (relative to leisure) and the household's personal discount factor. Following the literature, the preference weight of consumption is chosen so that individuals on average spend approximately 25% of their time endowment working, which is consistent with a typical 40-hour work week. The personal discount factor directly affects the market interest rate, which, in turn, directly influences the firm's dividend payout and price-to-earnings (P/E) ratios. Accordingly, the personal discount factor of 0.95, which is consistent with values reported in the literature, is chosen so that firms' dividend payout and P/E ratios are close to their observed values.

Two other values of note are the income distribution and the percentage of indebted households. Although the income distribution is not targeted, the model generates an income Gini coefficient of 0.34, which understates the 0.48 value estimated from the 2016 American Community Survey. Future emphasis on matching the income Gini coefficient could identify the channels through which corporate tax reform affects income inequality

⁸ Burkhard Heer and Alfred Maussner, *Dynamic General Equilibrium Modeling: Computational Methods and Applications* (New York: Springer Science & Business Media, 2009).

in addition to wealth inequality. The remaining targeted household value is the percentage of indebted households. According to the 2016 Survey of Consumer Finances released by the Federal Reserve, approximately 15% of households had a negative net worth. This value was matched by reducing the borrowing constraint until the model-generated value coincided with the observed value.

Firms

Production parameters of the firm are derived from Michaels, Page, and Whited (2016), and other firm parameters are chosen to match targeted firm-level statistics. Since the household's discount factor is chosen to improve the match between model-generated firm statistics and the corresponding values from the data, the objective of the remaining parameters is to bring these model-generated values within a reasonable distance from their observed counterparts. In particular, the annual capital depreciation rate of 9% and capital adjustment cost parameter are chosen to target the profit margin and dividend yield. The dividend yield and P/E ratio are inversely related, since the equity value of a firm declines with an increase in the interest rate. Both of these model-generated values exceed the corresponding observed values, as shown in Table 1, implying that neither can be reduced to reach the targeted value without increasing the other.

Firms' profit margins, dividend yields, and P/E ratios are emphasized because they provide a comparable measure of the firms' profits, dividends, and equity valuations. Each of these variables helps to capture how cash flows throughout the firm, beginning at the sale of a firm's production, continuing through the investment decision, passing through the corporate tax levy, and finally ending as dividend payments distributed to shareholders. Understanding this mechanism helps to trace the impact of a corporate tax change through corporate activity.

Government Policy

Households in the model pay taxes directly only on labor and dividend income. The dividend tax rate is set to 20%, while the progressive personal income tax function is calibrated so that aggregate personal tax revenue (including dividend tax revenue) is roughly 9% of GDP. A baseline corporate income tax rate of 35% in the model generates nearly as much revenue as the entire personal income tax, which would vastly exceed the 2% corporate tax share of GDP observed in recent decades. Conversely, a 12% corporate income tax rate generates the observed share of GDP but understates the average effective rate estimated from the data. As a compromise, the baseline corporate tax rate is set to 20% and generates an elevated 5.8% of GDP. Alternative approaches to reconciling the output share and average effective rate would have required *ad hoc* adjustments to the model.

Benchmark Model

The results from the benchmark model and corresponding data values are shown in Tables 1 and 2 below. The model generates a close match to the wealth distribution and firm-level statistics. The wealth Gini coefficient from the data corresponds to an interpolated weighted average within the time span from 2000 to 2015. It should be noted again,

however, that this value has been steadily rising over those years. Although the model can be calibrated to match the wealth Gini by appropriately adjusting the personal discount factor, the equilibrium interest rate relates closely to the personal discount factor and such adjustment separates the firm-level statistics further from their target values.

Table 1. Survey Data and Benchmark Model Comparison

	Data	Model
HOUSEHOLDS		
Wealth Gini	0.826	0.802
Indebted Households	15%	14.8%
BUSINESSES		
Profit Margin	14.1%	14.8%
Dividend Yield	1.6%	1.8%
P/E Ratio	23.8	30.1

Table 2. Wealth Quintiles: Data versus Model

	1 st Quintile	2 nd Quintile	3 rd Quintile	4 th Quintile	5 th Quintile
Data ⁹	-0.7	0.6	3.2	9.8	87.0
Model	-0.3	0.2	0.4	13.8	85.9

Measuring the Effects of the TCJA Corporate Tax Reform

The TCJA reduced the top marginal corporate tax rate from 35% to 21%, reflecting a 40% decline in the rate. Since the marginal and effective tax rates are equal in the model, the corporate tax rate is reduced from 20% to 12% to reflect a proportional decline of 40%. The long-term impact of the simulated tax reform is summarized in Table 3.

The implications of corporate tax reform on labor market outcomes depend on the complementarity of consumption and leisure implied by the model. In this model, an increase in private consumption of 2.3%, which approximately offsets government consumption, induces households to increase leisure time by reducing work hours by 1.6%. Consequently, the decline in work hours also reduces efficient labor by 1.3%. This decline in labor supply drives up equilibrium wages by 1.1%.

⁹ Derived from Kuhn and Ríos-Rull (2016).

Table 3. Simulated Effects of the Corporate Tax Reduction on Key Variables

Variable	% Change
Wages	1.1
Interest Rate	11 (basis points)
Consumption	2.3
Output	-0.2
Capital (Investment)	1.5
Efficient Labor	-1.3
Hours Worked	-1.6
Dividends	10.7
Corporate Equity Value	8.6
Wealth Gini	-1.4
Indebted Households	-16.3
Total Government Revenue	-12.6
Corporate Tax Revenue	-40.6
Personal Tax Revenue	6.0

Although capital increases by 1.5%, the greater impact of labor in the production process means that a 1.3% decline in total labor slightly reduces total output. In a stable economy, the change in capital will equal the change in investment, since average investment is constantly just replacing depreciated capital. Higher demand for corporate equity shares slightly drives up the interest rate by 11 basis points from 4.71% to 4.82%. Perhaps the largest impact of the corporate tax reform can be observed by the sharp increase in average dividends by 10.8%, which, in turn, drives up equity values by 8.6%. Because the interest rate increases (or, inversely, the firm's discount rate declines), firms place a higher weight on dividend issuance, which partly explains why average dividends increase by more than average equity values. This effect increases the average dividend yield from 1.8% to 1.9%, while average profit margins and P/E ratios increase from 14.8% to 15.2% and from 30.1 to 32.4, respectively.

The decline in the corporate tax rate causes a roughly proportional decline in corporate tax revenue. Total revenue falls by 12.6%, which likely overstates the actual amount because of the high corporate tax revenue relative to output in the baseline model. This decline in total revenue reflects a 6.0% increase in personal income tax revenue, which recaptures 19.5% of the lost corporate tax revenue.

Table 4. Baseline and Tax Reform Comparison

	Baseline Economy	Corporate Tax Reform
HOUSEHOLDS		
Wealth Gini	0.802	0.791
Indebted Households	14.8%	12.4%
BUSINESSES		
Profit Margin	14.8%	15.2%
Dividend Yield	1.8%	1.9%
P/E Ratio	30.1	32.4

Table 5. Simulated Effect of the Reform on Wealth Quintiles

	1 st Quintile	2 nd Quintile	3 rd Quintile	4 th Quintile	5 th Quintile
Baseline Economy	-0.34	0.18	0.38	13.84	85.94
Corporate Tax Reform	-0.29	0.18	0.54	15.29	84.28

Perhaps one of the most surprising results of the model is the reduction in wealth inequality resulting from a reduction in the corporate income tax rate. The model shows an increase in the share of wealth held by the bottom 80% of the population, as well as a modest decline in the wealth Gini coefficient. Total indebted households decline by 16.3% as the percentage of indebted households falls from 14.8% in the baseline to 12.4% after the tax reform. Although much of the gains from corporate tax reduction are absorbed by wealthy households, the tax reform shifts wealth concentration toward the bottom four quintiles.

Conclusion

In addition to reducing tax revenue, the corporate tax reform in the TCJA will also change the structure and composition of the U.S. economy. The results of this paper show that private consumption grows by the magnitude of the tax cut, likely offsetting the decline in government consumption as long as the tax cut is eventually financed through a reduction in expenditures. Such a reform was shown to increase the returns to shareholders of corporate equity, leading to a reduction in wealth inequality and a reduction in the amount of indebted households. In addition to consumption and savings growth, the general equilibrium model captured the growth in personal tax revenue resulting from the decline in corporate taxation. The model showed that almost 20% of the decline in corporate tax revenue is offset by an increase in personal tax revenue resulting from increased dividends to shareholders.

While the model delivered a close match to several household and firm-level statistics, several extensions of the model might improve the measurement of the anticipated impact of corporate tax reform. For example, explicit modeling of multinational corporate entities as well as international holdings of domestic equity can help capture the mechanisms through which international factors influence corporate activity. To that extent, lack of international activity in the model may understate the impact of a corporate tax reduction. A factor that may eventually diminish the direct impact of a corporate tax cut on the U.S. economy is the growth of government debt relative to GDP. Although the economy has shown little signs of strain from heightened levels of U.S. government debt in the periods preceding the TCJA, a decline in demand for U.S. treasuries may eventually place upward pressure on firms' costs of capital.

While this paper contributes to the literature regarding projections of corporate tax reform in the TCJA, several opportunities for applied and academic research remain. Specifically, this study focused on the long-term effects of the corporate tax reform component of the TCJA, leaving the short- and medium-term consequences, as well as personal income tax components of the TCJA for consideration. Future applied policy research should evaluate the transitory impact of TCJA in its entirety. From an academic perspective, the model's results provide a counterintuitive projection: a decline in the corporate tax rate can reduce wealth inequality. To that extent, future academic research should focus on understanding the mechanism through which corporate tax policy affects household wealth inequality.

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Appendix 1: Data

The only household-level statistic estimated and compared to the corresponding model value is the percentage of indebted households. This value is estimated from the 2016 Survey of Consumer Finances released by the Federal Reserve. The percentage of indebted households corresponds to the percentage of households in the sample with a negative net worth.

The remaining values estimated specifically for this study are firm-level statistics estimated from COMPUSTAT data. This data set collects firm-level data from publicly traded companies. Although the data set begins in 1950, the estimated statistics were restricted to post-2000 to reflect more recent corporate financial structures. Calculations for Figure 1, however, include observations dating back to 1950. Following Hennessey and Whited (2005), financial and regulated companies, as well as firms with total assets below \$2 million, are omitted. Such entities may follow different structural underpinnings that are not well-suited for a generalized firm model.

Appendix 2: Model

The dynamic general equilibrium model used for policy analysis is an extension of Barro and Berkovich (2017). The theoretical modifications allow for more generalized analysis, including elastic labor supply and personal borrowing, while the updated calibration provides a better match of key moments. Each is discussed below. In addition, the errors on market-clearing conditions are supplied for transparency.

Theory

The household problem is extended to include elastic labor supply and borrowing. The utility function remains constant relative risk aversion with Cobb-Douglas shares of consumption and leisure. The borrowing constraint is relaxed to a threshold below zero, which allows for positive borrowing. All other theoretical specifications of the model remain the same.

Parameters

The table below summarizes the key parameters of the model, as they appear in Barro and Berkovich (2017). The new parameters corresponding to the theoretical updates are the consumption share of utility (ψ) and the borrowing constraint.

Table 6. Model Parameters

Description	Parameter	Value
HOUSEHOLDS		
Risk-aversion	σ	3.0
Time discount	β	0.95
Consumption share	γ	0.35
FIRMS		
Shock persistence	ρ	0.767
Variance of shock of innovation	σ_ε^2	0.211
Capital share	α_k	0.370
Labor share	α_n	0.520
Depreciation	δ	0.09
Adjustment cost parameter	η	3
GOVERNMENT POLICY (baseline)		
PIT scale parameter	λ_1^{pit}	0.884
PIT progressivity parameter	λ_2^{pit}	0.181
Dividend scale parameter	λ_1^{d}	0.800
Dividend progressivity parameter	λ_2^{d}	0.000
Corporate income tax rate	τ_c	0.20
Investment Expense Share	ϕ	0.742

Precision

The model has three markets that need to clear in order to satisfy the requirements of a well-defined general equilibrium: labor market, asset market, and goods market. By Walras' Law, two markets clearing implies that the third one clears as well. Accordingly, the approximation error on the third market provides a test for the theoretical quality of the model and the precision corresponding to its computation. For transparency, the errors on all three markets are provided in the table below. All errors satisfy the subjective tolerances required for approximate convergence.

Table 7. General Equilibrium Precision

Market	Error
Labor	1.6895e-06
Asset	7.4944e-06
Goods	2.1622e-06