

## Theory of Effect of Corporate Income Tax on Optimal Production

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### Abstract

*This article is devoted to the theory of the effect of corporate income tax on optimal production, and the effect of corporate taxes on investment and entrepreneurship is considered as a central issue of both public finance and development. If the average effective tax rate on profit is high, then the effect of the tax on the optimal output volume is studied to bring it closer to the optimal output of the risk-insensitive firm.*

**Keywords:** Profit, Corporate Income Tax, Enterprise, Investment, Production

### Introduction

The impact of corporate taxes on investment and entrepreneurship is one of the central issues of both public finance and development. This effect is important not only for the assessment and development of tax policy, but also for ensuring economic growth.

In the last decade, there has been growing concern about the level of corporate capital accumulation in the United States. According to some indicators, a sharp decrease in the rate of capital accumulation was observed along with a sharp decrease in the valuation of corporate assets in the stock market. The Dow Jones average, measured in 1981, was nearly 2,000 in 1965. Dow Jones Average This decline in investment and market value has been accompanied by significant changes in the effective taxation of capital gains caused by inflation. Although the causal relationships between these developments have not been clearly established, a consensus has emerged in favor of some form of tax relief for business capital formation [1].

### Main part

Many economists and policymakers believe that the US corporate tax system is in need of serious reform, and point to the system's 35 percent rate, the highest statutory rate among developed nations, as evidence in favor of reform. To address the higher rate in a way that would not have a significant impact on the federal budget, many proposals have proposed neutralizing the revenues that would pay the reduced rate by broadening the corporate tax base.

Despite the widespread support for such proposals, relatively little empirical work has been able to directly assess the impact of corporate tax rate reductions on entrepreneurship [2].

For example, Chirinko found that if the effective tax rate had remained at the 1965 level, the net investment output ratio would have increased by only 16% of its historical value in 1978, compared to the 75% reduction previously reported.

The effective tax rate model, if properly defined and calculated, does mean that taxes have had a negative effect on business capital formation during the recent inflationary period [3]. According to Simeon et al., 2004 empirical analysis of the impact of the effective corporate tax rate on 85 countries found that in a number of countries, the effective corporate tax rate has a significant negative impact on total investment, foreign direct investment, and entrepreneurship. For example, a 10 percent increase in the effective corporate tax rate reduces the share of gross investment in GDP by 2 percentage points. Corporate tax rates are also negatively related to growth and positively related to the size of the informal economy [4].

Thus, as a result of the empirical analysis carried out using cross-country open data, effective corporate tax rates have been found to have a significant negative impact on corporate investment and business activity. The effect is also shown to be strong if we control for other tax rates, including personal income tax and VAT, for tax compliance measures, property rights protection, regulation or economic development, foreign trade openness, and inflation. Also, a higher effective corporate income tax is positively associated with debt financing and slower economic growth, as opposed to private equity financing, which increases the size of the informal sector [4].

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According to Ohrn, the Domestic Production Activities Deduction (DPAD is a deduction in the corporate tax system that allows a percentage of domestic production income to be deducted from the taxable income under this regulation). provides a new opportunity to understand how the decline affects corporate behavior and the economy. Because firms that derive all of their income from domestic production activities and face the maximum statutory corporate income tax rate have an effective tax rate that is 3.15 percent ( $=0.09 \times 35$  percent) lower than firms without domestic production activities. DPAD has a major impact on corporate behavior.

According to the analysis, a 1 percent reduction in the effective corporate income tax rate through DPAD would reduce equity investment by 4.7 percent, income payments by 0.3 percent, and debt use by 5.3 percent of total assets [2]. It can be seen that DPAD does not increase the taxable base in relation to total assets and, as a result, does not generate higher tax revenues. A 3.15 percent tax rate cut would not only make a significant difference from the perspective of individual businesses, but these policies would also represent significant tax costs at the national level (Table 1).

**Table 1.** Detailed information on DPAD implementation and costs [2]

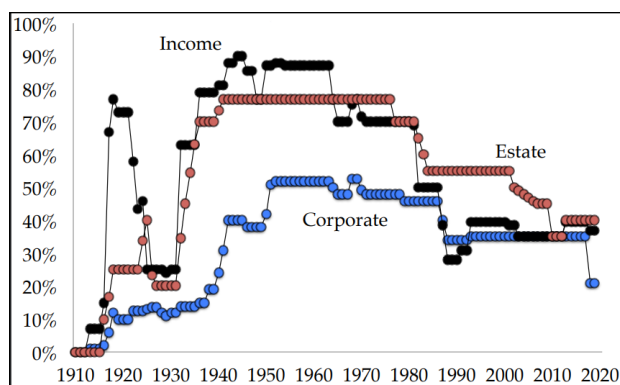
| Years | DPAD rate, in % | Reduction of the maximum corporate income tax rate, in % | Discount (billion dollars) | Tax expenses (billion dollars) |
|-------|-----------------|----------------------------------------------------------|----------------------------|--------------------------------|
| 2005  | 3,00            | 1,05                                                     | 9332                       | 3266                           |
| 2006  | 3,00            | 1,05                                                     | 11106                      | 3887                           |
| 2007  | 6,00            | 2,10                                                     | 21058                      | 7370                           |
| 2088  | 6,00            | 2,10                                                     | 18374                      | 6320                           |
| 2009  | 6,00            | 2,10                                                     | 14198                      | 4970                           |
| 2010  | 9,00            | 3,15                                                     | 24365                      | 8528                           |
| 2011  | 9,00            | 3,15                                                     | 27388                      | 9586                           |
| 2012  | 9,00            | 3,15                                                     | 31966                      | 11188                          |

The last column of Table 1 lists DPAD's tax costs, assuming a 35 percent corporate tax rate on all income. In 2010, when DPAD reached 9%, corporations deducted 24 billion from their taxable income. managed to save more than \$ 8.5 billion to the US government. cost in dollars. In 2012, DPAD was 11 billion. exceeded the US dollar. As of 2010, the 2010 DPAD has become the third largest corporate tax expense in the corporate tax system, after accelerated depreciation and tax deferral of controlled foreign corporations, according to estimates by the US government's Accounting Chamber. From 2004 to 2017, enterprises engaged in qualified production activities could receive tax credits in the amount of 9 percent of the annual income received as a result of this activity. In theory, the deduction was simple, but the more complex the business, the more complicated the math to calculate what constitutes qualified manufacturing activity. In short, enterprises engaged in manufacturing and other skilled production activities were required to implement cost accounting mechanisms to ensure the correct calculation of tax deductions [5].

The results of the empirical analysis presented above show that a high effective rate of corporate corporate income tax can have serious consequences for the business environment and economic development. Allows companies to deduct a specified percentage of income from qualified manufacturing activities from taxable income. In general, corporations will see lower DPAD rates and corporate income tax rates leading to increased investment and payments and reduced use of debt capital. Any increase in revenues resulting from lower corporate tax rates is the product of real effects

such as investment rather than a reduction in tax avoidance activity. These results are especially important for the effective implementation of the corporate tax reform. Contrary to the neutrality of the investment effect, these two types of investment promotion policies are very different in other respects. In fact, estimates show that using the proceeds from the repeal of accelerated depreciation to finance corporate rate cuts would have little effect on corporate investment. In contrast to the neutrality of this investment effect, the two types of investment promotion policies are very different in other ways. Companies respond to lower tax rates by raising payouts and raising equity capital by issuing shares. Firms responding to accelerated depreciation, on the other hand, are less likely to pay dividends and prefer debt financing for expansion. While larger companies with more cash flow are responding to lower corporate rates, smaller, more financially challenged companies are responding to more amortization policies [2]. As a result, tax policymakers should choose to support income-neutral reforms, provided they seek to encourage corporate payments and equity financing and favor policies that favor large corporations with high financial potential [2].

In general, the marginal tax rate of the US corporate income tax is low compared to the marginal tax rates of income taxes and property taxes, but corporate tax rates were much higher in periods prior to 1993, with a top corporate income tax rate of 35 percent since 1993 ( Fig. 1). Much of the academic and policy debate about the US corporate tax rate cut (which took effect in 2017) has focused on its impact on income distribution.



**Fig. 1.** The dynamics of the highest marginal tax rates in the US [6]

On December 20, 2017, the US Senate and House of Representatives passed the Tax Cut and Jobs Act (TCJA). A change in the corporate income tax rate A change in the tax rate can be expected to affect a firm's optimal production and consequently factor allocation decision. Among other provisions of the law, an effective corporate tax rate of 21 percent has been established on the profits of companies from January 1, 2018 [8]. Before and after the adoption of this law, the scientific literature discussed the economic consequences of lowering the corporate income tax rate. Much of the research discussion has focused on the redistributive effects of tax cuts, particularly on increases in dividends paid to shareholders, share buybacks, and bonuses and/or wages paid to employees.

Most economists argue that lowering corporate income tax rates can have two consequences for corporate behavior. An increase in a corporation's after-tax earnings can be reflected in the distribution effect. In the long run, the impact of lower tax rates on firms' investment policies is much more significant. An increase in shareholdings leads to more potential investments to meet capital budgeting criteria, which means that potential investments in companies can enrich shareholders in the long run. However, the third effect of lowering the corporate tax rate does not seem to have caught the attention of analytical models. It affects the firm's production decision under uncertainty if the tax rate is changed [8]. The model developed above is used to analyze how the corporate income tax can affect the firm's output. Suppose that the average effective tax rate applied to the firm's profits is denoted by  $T$  by the firm's after-tax corporate profits  $\pi_T(Q, x)$ . Profit after tax is calculated as follows [8]:

$$\pi_T(Q, x) = (1 - T)[D(Q, x)Q - C(Q)] \quad (1.11)$$

If the corporate income tax rate is fixed, the Taylor series expansion leads to an approximation to the equality given in equation (12). This is the after-tax alternative to equation (1.8) [8]:

$$E[U(\pi_T)] \cong (1 - T)\pi(Q) + (1 - T)^2 \frac{\theta}{2} Q^2 \sigma^2 \quad (1.12)$$

By taking the derivative of equation (1.12) with respect to  $Q$ , setting it equal to zero, and solving it, the first-order condition for the after-tax maximum in equation (1.13) was obtained [8]:

$$MR = MC - (1 - T)\theta Q \sigma^2 \quad (1.13)$$

Equation (1.13) can be compared with equation (1.10) to infer the effect of corporate income tax on the profit-maximizing output of a firm facing an uncertain demand curve. The after-tax ratio  $(1 - T)$  is less than 1, reducing the difference between the firm's profit-maximizing marginal revenue and its marginal cost, regardless of value  $\theta$ . Thus, the application of a fixed rate tax on corporate profits will tend to moderate fluctuations in output due to the firm's tolerance for alternative risks. Based on this, the following conclusion can be formed. For a firm facing a downward-sloping demand curve containing an additional random variable, if the firm's profits are taxed at a uniform rate, the effect of the tax will be to reduce the deviation of the firm's output from the risk-averse firm's output, regardless of risk attitude [8].

It can be seen that if the average effective tax rate on profits is high, then the effect of the tax on the optimal production volume is closer to the optimal production of the risk-insensitive firm. Based on the above, it is possible to consider the effect of the change in the parametric tax rate on the firm's production. For a profit-maximizing firm facing a downward-sloping demand curve representing an additional random variable, if the tax rate applied to the firm's profits is reduced, its subsequent effect on the firm's optimal output is determined by the firm's attitude to risk. That is, if the firm is not risk-averse, a decrease in the tax rate will lead to a decrease in optimal output. If a firm is risk averse, its optimal output will not be affected by a change in the tax rate. If the firm is risk-averse, a decrease in the tax rate leads to an increase in the optimal production volume [8].

## Conclusion

In our opinion, the conclusions made regarding the consequences of the application of the corporate income tax are of great importance in the improvement of the corporate tax system, and it is assumed that the reduction of the tax rate can stimulate the firm's optimal production volume (therefore, the location of the factors of production) only by risk-prone ( $\theta > 0$ ) firms. If the firm is risk-averse, a reduction in the corporate tax rate may have the opposite effect, encouraging firms to invest in expanding their capabilities. If the firm is risk averse, one would expect that a reduction in the corporate tax rate would not affect the firm's ability to invest. In general, the corporate behavior to lower the corporate income tax rate is to transfer the main part of the tax-exempt profits to the shareholders.

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