Corporate Taxes, Tax Incidence, and Pretax Returns: Causes and Measurement

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ABSTRACT: We develop a model to investigate the relations among (1) corporate tax incidence, (2) tax capitalization, and (3) implicit corporate tax in a competitive equilibrium. The economic pretax return is independent of whether the incidence of the corporate tax is shifted from shareholders to non-shareholders, such as customers or workers. However, tax incidence does affect the pretax *accounting* return, because the denominator of the return measure reflects the historical cost of the firms' assets and is often measured using prior year book values. To the extent a tax rate change changes the fair values of corporate assets (i.e., tax capitalization), the corporate tax affects pretax economic returns but not pretax accounting returns. The implicit tax rate for corporations reflects differences in corporate tax rates but is independent of pretax accounting returns.

Keywords: Tax incidence; Tax capitalization; Implicit tax; Corporate tax

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I. INTRODUCTION

We model pretax and after-tax returns on investments made by corporations to investigate how pretax returns at the corporate level respond to changes in the corporate tax rate. Our study is motivated by the desire to clearly understand the nature of the relations among three related economic concepts—tax incidence, tax capitalization, and implicit tax—when these concepts are applied to the taxation of investments made by corporations.

The notion that these concepts are related seems evident from prior accounting studies. For example, Maydew (2001 p 397) states that "Tax capitalization viewed more broadly is a manifestation of the economic incidence of the tax," and (p 395) "implicit taxes and tax capitalization are the same phenomena." Jennings, Weaver and Mayew (2012 p 1024) state that "The issue of implicit taxes at the corporate level is a special case of the incidence of corporate income taxes." If tax capitalization and implicit tax are the same phenomena, and both are a manifestation of tax incidence, then what is the relation among the three concepts with respect to the corporate income tax? We investigate that question in the context of a competitive equilibrium in which the after-tax rate of return to corporations is equal to the cost of capital.

We illustrate Maydew's (2001) argument that tax capitalization and implicit tax are two sides of the same coin with the following example. Consider two riskless perpetuity bonds each with an annual coupon payment of 12. The after-tax risk-free interest rate is 3% and the statutory tax rate is 25%. The first bond is taxable with a price of 300 and thus a pretax rate of return of 4%. The second bond is tax-exempt with a price of 400 and thus a pretax rate of return of 3%. If one compares the pretax returns, the tax-exempt bond bears an implicit tax rate of (4% – 3%)/4% = 25%. If one instead compares the bond prices, the present value of the future taxes on the first

bond of $100 is capitalized into the bond price, driving the price from $400 to $300. In this example, implicit tax and tax capitalization are the same phenomena.[1]

In applying this idea to investments made by corporations, important differences arise. Unlike bonds, the pretax cash flows to corporate investments (the numerator of the pretax rate of return) can change in response to changes in the corporate tax rate, and this change is referred to as a shifting of the incidence of the tax.[2] Tax incidence refers to the idea that the economic burden of the corporation income tax can be shifted to stakeholders other than shareholders, such as workers (through lower wages) or customers (through higher prices), so that all of the burden (i.e., the incidence) of a corporate income tax may not fall on the corporation's shareholders.

For example, there is empirical evidence that part of the incidence of the German corporation income tax is shifted to workers in the form of lower wages (Fuest, Peichl and Siegloch 2018) and consumers in the form of higher prices for gasoline (Jacob, Muller and Wolff 2019). This shifting of the incidence of the tax is reflected in a higher pretax cash flow to the corporation (due to higher output prices or lower wages), resulting in a higher pretax rate of return, which partly offsets the additional tax that the corporation pays. The higher cash flow is also reflected in a higher *accounting* rate of return, measured using either pretax financial accounting income as the numerator and the prior year book value of equity as the denominator (ROE) or financial accounting income before interest and taxes as the numerator and prior year book value of assets as the denominator (EBIT/Assets).

Prior accounting research assumes that the shifting of the incidence of the corporate tax will be reflected in the measure of implicit tax. Researchers have studied how a change in the

[1] The same idea applies to changes in bond yields when tax rates change. See e.g., Shackelford (1991) and Guenther (1994).
[2] Empirical evidence of tax incidence suggests that such a change may occur relatively quickly (Markle, Mills and Williams 2020).

corporate tax rate affects implicit tax at the corporate level by looking at changes in pretax accounting returns for corporations (Wilkie 1992; Jennings et al. 2012; Markle et al. 2020). Although this shifting of tax incidence is assumed to be reflected in implicit tax through the effect on the numerator of the pretax return ratio, it does not capture the entire effect because accounting returns do not capture changes in the fair value of the corporation's assets (the denominator of the pretax return ratio) when such changes are caused by the tax rate change. For example, Jennings et al. (2012) measure pretax returns as pretax financial accounting income divided by the prior year book value of equity and Markle et al. (2020) measure pretax returns as earnings before interest and taxes divided by the prior year book value of assets. The use of prior year accounting book values in the denominator of these measures means that the pretax returns do not reflect any changes in the fair value of the corporations' assets. In addition, accounting book values reflect historical cost (net of depreciation) rather than current fair values.[3]

In the case of implicit tax on bonds, it is clear from the use of yields as the measure of pretax returns that researchers are using a measure that reflects the economic return, capturing both the pretax cash flow and the fair value of the investment. In the case of pretax returns on corporate investments, prior research in accounting has relied on accounting-based measures of returns, which reflect only pretax cash flow (the numerator of the return ratio) and ignore the fair value of invested assets (the denominator of the return ratio). However, researchers seem to recognize that corporate implicit tax should be based on economic returns. Wilkie (1992 p 102) states that "the financial accounting measures for PTROE [pretax return on equity] … are only *estimates of their economic values*," and Jennings et al. (2012 p 1021) state that "Implicit taxes are cross sectional variations in pre-tax *market returns*" [emphasis added].

[3] As discussed more fully in Section 3, asset impairments are unlikely to capture changes in asset fair values due to tax rate changes.

While our model demonstrates that a change in the corporate tax rate has an indeterminate effect on pretax returns, it is straightforward to show that the implicit tax rate change depends solely on the change in relative tax rates. In fact, it is possible to express the change in the implicit tax rate solely in terms of the corporate tax rates, without reference to pretax returns. The change in the corporate implicit tax rate is independent of the amount of the corporate tax incidence that is shifted to customers or workers, and thus is independent of the amount of any change in the accounting-based measure of pretax returns.

The results from our model can help explain an empirical finding by Jennings et al. (2012), who find that implicit tax for U.S. corporations apparently goes away after the tax changes in the 1986 tax reform act (TRA86). They state (p 1044) "If investors observed the decline in implicit taxes after TRA86, the relative market value of the high tax preference firms should increase after 1986." In other words, a decrease in the tax rate for the "high tax preference firms" should result in an increase in stock price. To the extent that a firm's stock price reflects the fair value of the firm's assets, we interpret this as suggesting that the fair value of the assets of the high tax preference firms should increase after TRA86. An increase in the fair value of the firm's assets (the denominator of the pretax return ratio) will cause a decrease in pretax economic returns, and thus an increase in implicit tax. In fact Jennings et al. (2012) find an increase in post-TRA86 market value for the high tax preference firms, consistent with a decrease in pretax economic returns that is reflected in asset values rather than cash flows.

Our results make two additional contributions to accounting research. First, our results suggest that the change in pretax accounting returns found by Markle et al. (2020) would be expected to occur within a country, and do not necessarily reflect a cross-country implicit tax for corporations. In other words, even if frictions or transaction costs prevent firms from shifting

investments between countries to take advantage of tax rate differences, a change in the tax rate within a country would be expected to produce the type of change in accounting-based returns that Markle et al. (2020) observe.

Second, our results clarify the relations among the three concepts: shifting of tax incidence, tax capitalization, and corporate implicit tax. A shifting of tax incidence results in a change in pretax cash flow, which is reflected in the numerator of both the economic and accounting pretax return measure. A change in the fair value of invested assets due to a tax rate change (i.e., tax capitalization) affects the denominator of the economic pretax return measure, but does not affect an accounting-based pretax return measure because accounting pretax returns reflect the historical cost of assets, and are often measured using prior year book values of assets or equity. The implicit tax rate reflects the economic pretax return, which is a combination of the numerator effect (due to shifting of tax incidence) and the denominator effect (due to tax capitalization). The implicit tax rate is independent of the accounting-based pretax return measure, which reflects only the change in pretax cash flow.

Section 2 presents the model and illustrates the concepts of tax incidence, tax capitalization, and implicit tax. In section 3 we determine how a change in the tax rate affects tax incidence, tax capitalization, and the after-tax return to shareholders in the context of our model. Section 4 concludes.

II. MODEL

Equilibrium

Our model investigates implicit tax, tax incidence, and tax capitalization in an industry that faces a statutory tax rate t and an effective tax rate τ. To generate pretax cash flows, all firms in each industry invest in productive assets. An investment of amount k allows each firm in the

industry to produce and sell one unit of output each year in perpetuity.[4] Pretax cash flow per unit of output produced and sold is π. The annual after-tax cash flow $\pi(1-\tau)$ is distributed to shareholders as a dividend.

Firms in the industry face a competitive equilibrium, in which each firm earns zero after-tax economic profits, so the cost of capital *r* is also the after-tax rate of return for each firm. The zero-profit condition implies

$$\pi(1-\tau) = rk. \tag{1}$$

The pretax rate of return (*R*) is

$$R = \frac{\pi}{k} = \frac{r}{1-\tau}. \tag{2}$$

Research on corporate tax incidence investigates whether the corporate income tax is borne by shareholders in the form of lower after-tax returns *r*, is capitalized into the asset value *k*, or is shifted to consumers (in the form of higher prices) or workers (in the form of lower wages), both of which increase the pretax cash flow π.

We illustrate the effects of taxation on π and *k* with an example in which π and *k* are functions of the total industry output quantity (*Q*). Let the pretax cash flow per unit be

$$\pi = d - \alpha Q. \tag{3}$$

Let the asset acquisition cost be

$$k = s + \beta Q. \tag{4}$$

We assume that $\alpha \geq 0,\ \beta \geq 0$, and at least one of the two inequalities is strict. For any given tax rate τ and cost of capital *r*, equations (1), (3), and (4) together constitute a system of three

[4] Generalizing the model to a setting in which capital depreciates is straightforward but provides no additional insights into our research question.

equations with three unknowns that can be solved for the equilibrium output quantity Q and the equilibrium values of π and k.

$$Q = \frac{d(1-\tau)-rs}{\alpha(1-\tau)+r\beta} \tag{5}$$

$$\pi = \frac{r(\beta d+\alpha s)}{\alpha(1-\tau)+r\beta} \tag{6}$$

$$k = \frac{(1-\tau)(\beta d+\alpha s)}{\alpha(1-\tau)+r\beta} \tag{7}$$

This solution requires that the parameter d be sufficiently large that industry output Q is strictly positive, or

$$d > \frac{rs}{1-\tau}. \tag{8}$$

Tax incidence and tax capitalization

Equation (2) shows that the pretax rate of return R reflects the cost of capital r and the effective tax rate τ. R does not depend on π and k in any meaningful sense because these values are jointly determined in equilibrium. To see this, first suppose that $\alpha = 0$. In that case, equations (6) and (7) imply that $\pi = d$ and $k = \frac{(1-\tau)d}{r}$. The corporate income tax has no effect on the cash flow per unit, and instead decreases the value of the firm's assets. Second, suppose that $\beta = 0$. In that case, $\pi = \frac{rs}{1-\tau}$ and $k = s$. The corporate income tax has no effect on the value of the assets, and instead drives up the cash flow per unit. In each case, $\frac{\pi}{k} = \frac{r}{1-\tau}$. Therefore, the pretax rate of return does not depend on whether the corporate income tax is shifted to consumers and workers via an increase in π or is capitalized into the asset value k.

Implicit taxes

We can also relate our results to the concept of implicit tax for corporations. A firm bears an implicit tax when its pretax rate of return is less than that earned by another firm with the same risk-adjusted after-tax return but whose effective tax rate is equal to the higher statutory tax

rate, *t*. The assumption of equal after-tax returns is fundamental to the concept of implicit tax. This idea was expressed by Wilkie (1992 p. 99) as: "In the equilibrium setting of a perfectly competitive and frictionless economy, all firms expect equal risk-adjusted, after-tax returns."

The implicit tax is

$$\frac{r}{1-t} - \frac{r}{1-\tau} = \frac{r(t-\tau)}{(1-t)(1-\tau)}. \tag{9}$$

Given the same after-tax rate of return, two firms with different effective tax rates must necessarily have different pretax rates of returns.

III. EFFECTS OF TAX RATE CHANGES

In this section we examine the effect of a change in the firm's effective tax rate on its pretax rate of return. This is an important question, since prior accounting studies (Wilkie 1992; Jennings et al. 2012; Markle et al. 2020) look for empirical evidence of implicit tax at the corporate level by looking at pretax rates of return, either pretax income divided by equity (Wilkie; Jennings et al.) or EBIT divided by assets (Markle et al.). In addition to the effects of a change in the effective tax rate τ on pretax cash flows π and asset value *k*, we also consider the possibility that an increase in the effective tax rate decreases the cost of capital *r*. Unless the supply of capital is perfectly elastic, a tax rate change can change *r*. We use the subscript *i*, $i \in \{0,1\}$, to denote the values of τ, π, *k*, and *r* before (*i* = 0) and after (*i* = 1) a tax rate change.

We consider two measures of the pretax rate of return, an economic measure and an accounting measure. The *economic* measure is $\frac{\pi_i}{k_i}$, where both the numerator (pretax cash flow) and the denominator (value of the asset) reflect the same tax rate, either before (*i* = 0) or after (*i* = 1) a tax rate change. The *accounting* measure is $\frac{\pi_i}{k_0}$, where the numerator (pretax cash flow) reflects the tax rate either before (*i* = 0) or after (*i* = 1) a tax rate change, but the denominator

(value of the asset) only reflects the tax rate before a change ($i = 0$). The distinction between the two measures is that the change in pretax cash flow π is reflected in cash flow and accounting income when the tax rate change occurs, whereas the accounting balance sheet book value of k_i typically does not change when the tax rate changes, either because it is based on the prior year book value (e.g., Jennings et al. 2012; Markle et al. 2020), or because under U.S. GAAP book values of productive assets typically do not change to reflect fair values unless there is an impairment loss.[5]

We consider three special cases of the effects of tax changes using the example from Section 2. First, suppose that $\beta = 0$ and $r_0 = r_1 = r$, which using (6) and (7) implies that $\pi_i = \frac{s}{1-\tau_i}$ and $k_i = s$, so that $k_1 = k_0$. In this case, taxes have no effect on the value of the asset, but instead increases the cash flow that each unit generates. This increase can be in the form of higher prices paid by consumers or lower input prices (e.g., employee wages). Therefore, the economic incidence of the tax falls entirely on non-shareholders in this case. Using equation (2), an increase in τ_i induces a corresponding increase in π_i, increasing both the economic and accounting pretax rates of return.

Second, suppose that $\alpha = 0$, and $r_0 = r_1 = r$, which using (6) and (7) implies that $\pi_i = d$ (so that $\pi_1 = \pi_0$) and $k_i = \frac{d(1-\tau_i)}{r}$. In this case, taxes have no effect on the pretax cash flow per unit, but do change the fair value of the asset from k_0 to k_1. In this case, the tax rate change is fully capitalized into asset values, resulting in a change in the economic pretax rate of return but not the accounting pretax rate of return.

[5] An impairment loss is recognized under ASC 360-10 if the *undiscounted* future cash flows are less than the book value of the asset, k_0. In our model (and under other reasonable assumptions), the undiscounted future cash flows always exceed the book value k_0 of the asset.

Third, suppose that π_i and k_i do not change in response to the tax rate change, but the cost of capital r_i does change. Using equation (2), in this case

$$r_1 = \frac{r_0(1-\tau_1)}{1-\tau_0}. \quad (10)$$

and neither the economic nor accounting pretax rates of returns are affected by the tax rate change; the cost of capital absorbs the effect of any tax rate change.

We illustrate these three cases with a numerical example. Let $\pi_0 = 240, \tau_0 = 25\%$, $k_0 = 3000$, $R_0 = 8\%$, and $r_0 = 6\%$. The pretax tax of return is 8%, the tax payment is 240 x 25% = 60, and the after-tax cash flow is 180. The table below illustrates the three cases if the effective tax rate τ_1 is 20%.

π_1	Tax	k_1	r_1	Economic pretax rate of return	Accounting pretax rate of return
225	45	3000	6%	7.5%	7.5%
240	48	3200	6%	7.5%	8%
240	48	3000	6.4%	8%	8%

In the first row of the table, the decrease in the tax rate induces greater output and thus a lower output price and/or higher input cost, which drives down both the economic and accounting pretax rates of return from 8% to 7.5%. In the second row, the decrease in the tax rate induces greater output, which drives up demand for and thus the value of the asset. This in turn drives down the economic pretax rate of return but leaves the accounting rate of return unchanged, because the accounting rate of return reflects the historical cost of the asset (3000) and not its current value (3200). In the third row, the decrease in the tax rate induces no change in output or pretax returns, but does increase after-tax returns from 6% to 6.4%.

Moving beyond the three special cases, we expect a decrease in the tax rate to decrease π_1, increase k_1, and increase r_1 to some degree. For example, suppose the reduction in the effective tax rate from 25% to 20% results in $\pi_1 = 235, k_1 = 3008$, and $r_1 = 6.25\%$. Equation (1) holds, as required. The economic pretax rate of return decreases to 7.8125%, whereas the accounting pretax rate of return decreases to 7.8333%.

To summarize, tax rate cut only reduces the accounting pretax rate of return to the extent the rate cut decreases the pretax cash flow and accounting income. To the extent the tax rate cut is capitalized into the value of the asset or increases the cost of capital, the accounting pretax rate of return is not affected.

IV. CONCLUSION

We develop a model of firm investment and production in a competitive equilibrium to investigate the relations among three related economic concepts—tax incidence, tax capitalization, and implicit tax—when these concepts are applied to the taxation of investments made by corporations. Unlike the familiar example of bonds, the pretax cash flow to corporate investments (the numerator of the pretax rate of return) can change in response to changes in the corporate tax rate, thereby shifting of the incidence of the tax to non-shareholders.

Our results also suggest that a change in pretax accounting returns due to a change in the statutory tax rate may occur within a country, but it does not necessarily reflect a cross-country implicit tax for corporations. The amount by which the implicit tax rate changes due to a change in the corporate tax rate depends solely on the relative tax rates before and after the change, and is independent of the amount of the corporate tax incidence that is shifted to customers or workers. Therefore, it is independent of the change in the accounting-based measure of pretax returns.

Our results help to clarify the relations among the three concepts: (1) shifting of tax incidence, (2) tax capitalization, and (3) implicit tax. A shifting of tax incidence results in a change in pretax cash flows, which is reflected in the numerator of both the economic and accounting pretax return measure. A change in the fair value of invested assets due to a tax rate change (i.e., tax capitalization) affects the denominator of the economic pretax return measure, but does not affect an accounting-based pretax return measure, since accounting pretax returns are generally based on the historical cost of assets, and are often measured using prior year book values of assets or equity. The implicit tax rate reflects the difference in economic pretax returns between two firms with the same cost of capital, where one firm's effective tax rate is less than the other firm's.

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