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THE CORPORATION TAX*

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1. Introduction

The tax on corporations is one which has engendered a great deal of controversy, concerning both its desirability and its economic effects. One of the reasons for the controversy is that the effects of the tax depend critically on a number of details, including depreciation allowances and deductibility of interest. In my earlier paper (1973), I showed that, with a particular set of provisions and in a particular institutional context, in the absence of uncertainty the tax was nondistortionary: firms would invest up to the point where the marginal return on investment was equal to the rate of interest. This result, which cast doubt on much of the earlier theoretical and empirical literature, has aroused some interest and controversy, as evidenced by two recent papers in this Journal. I would like to take this occasion to put my result within a broader context, and to see how it relates to the questions raised by these other papers.

The tax on corporations has variously been viewed as a tax on capital in the corporate sector, a tax on entrepreneurship in the corporate sector, a tax on pure profits in the corporate sector, and a tax on risk taking. To some extent, it is all of these, but our understanding of the tax is enhanced if we view the tax separately in each of its roles. This we shall do in the following sections. In sections 2–4 we shall assume that there is no risk, so that the peculiar problems posed by bankruptcies can be avoided.

2. The corporate tax as a tax on profits

A tax on corporate income with immediate write-off of costs and no interest deductibility is nondistortionary and is essentially a tax on pure profits. To see this, consider and asset yielding an income stream of $R(t)$ for $t \geqq 0$ and costing C. The present discounted value of that asset before taxation is

$$\int Re^{-rt}\,dt,$$

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where r is the rate of interest. After taxes, if the relevant rate of discount were unchanged, with immediate write-off of costs, the net return to investing in the project is

$$(1-\tau)[\int Re^{-rt} - C],$$

where τ is the tax rate. It immediately follows that if a project was worth undertaking before, it still is: the tax is completely non-distortionary in its effect.

We need to argue now that the relevant rate of discount is unchanged. To see this, we consider a firm which is contemplating investing a dollar with a (known marginal) return in a one period project of $\hat{r}$. It can borrow at the rate r to finance the investment. The firm is not allowed to deduct interest, but is allowed immediate write-off of the expenditure. Thus, the net cost of the project is $(1-\tau)$, while the net return is

$$(1-\tau)(1+\hat{r})-(1-\tau)(1+r).$$

Thus, the required marginal rate of return is just $\hat{r}$: investment will be carried to the point where

$$\hat{r} = r.$$

On the other hand, a tax on corporate income with appropriate depreciation allowances and interest deductibility is, at the margin, a pure corporate profits tax and is also nondistortionary.

To see this, again consider a marginal one-period investment yielding a return of $\hat{r}$ before tax, $(1-\tau)\hat{r}$ after tax. (The gross return is $1+\hat{r}$. The value of the asset was \$1 last period and, by definition, at the end of the period it is worthless. Thus the depreciation allowance is \$1, and taxable income is just $\hat{r}$.) The firm can borrow to finance the investment at the market rate r. Thus the project will be undertaken if and only if $\hat{r} > r$: again the relevant cost of capital is just the before-tax rate of interest. This is the case which I analyzed in my earlier paper in somewhat greater detail.

Indeed, the present discounted value of the tax revenues under these two systems are perfectly equivalent: a project yielding a return of $\hat{r} > r$ yields a present discounted value of revenue of

$$\frac{\tau(1+\hat{r})}{1+r} - \tau = \frac{\tau(\hat{r}-r)}{1+r}$$

under the first scheme, and a present discounted value of revenues of

$$\frac{\tau[(1+\hat{r})-(1+r)]}{1+r} = \frac{\tau(\hat{r}-r)}{1+r}$$

under the second.

In short, any tax scheme which between its interest deductibility provisions and its depreciation allowances allows a deduction whose present value is equal to the cost of the investment is equivalent to one with immediate write-off, and should be interpreted as a pure profits tax.

3. The corporation tax as a tax on capital

On the other hand, a tax on corporate income with true economic depreciation is also nondistortionary with respect to the choice of projects, and is equivalent to a tax on imputed interest income.

To see this, again consider our one-period marginal project with the return $(1+\hat{r})$. True economic depreciation in this case is 1, so after tax return is equal to

$$1+\hat{r}(1-\tau).$$

On the other hand, by assumption, interest payments are not tax exempt, so that the marginal rate of substitution of, say, the owners of the firm will be just

$$1+r(1-\tau),$$

where r is the rate at which they can borrow and lend (before tax). Thus, the project will be undertaken if and only if

$$1+\hat{r}(1-\tau) \geqq 1+r(1-\tau),$$

i.e.,

$$\hat{r} \geqq r.$$

But note that the present value of the tax revenue from the marginal project is $\tau\hat{r}/(1+r)$, whereas in the previous section, tax revenue from the marginal project is $\tau(\hat{r}-r)/(1+r)$.

More generally, we define true economic depreciation as the change in the value of the asset

$$d = -\dot{V}, \tag{1}$$

and

$$V(t) = \int_{\tau}^{\infty} [R(v)(1-\tau)+\tau d] \exp [-r(1-\tau)(v-t)]\, dv, \tag{2}$$

so

$$\dot{V} = r(1-\tau)V - R(t)(1-\tau) - \tau d. \tag{3}$$

Substituting (1) into (3), we immediately obtain

$$\dot{V}(1-\tau) = r(1-\tau)V - R(t)(1-\tau), \tag{4}$$

or

$$\dot{V} = rV - R(t). \tag{5}$$

Thus the differential equation describing the value of an asset is independent of the tax rate; since if the returns to the project terminate in T years $V(T) = 0$, again independent of the tax rate, this means that the value of the project is unaffected by the imposition of the tax with true economic depreciation.

Using (1) and (5), we observe that tax revenue is

$$\tau R - \tau d = \tau r V, \tag{6}$$

confirming that the tax is, as we suggested, simply a tax on interest income (rV is the imputed value of interest income on an asset whose value is V).

4. The corporate tax as a tax on entrepreneurship

An individual who establishes a firm and incorporates it (to take advantage of the limited liability rules, or of the special tax treatment of corporations, to be noted below) may decide not to 'withdraw' from the firm his entire imputed wage, but rather to reinvest it in the firm. In that case, the corporation tax is in effect a tax on (imputed) wage (entrepreneurial) income.

Since the individual has the option of withdrawing the income from the firm, and thus avoiding the corporate tax, we must inquire into why such an individual would elect to have the firm retain the earnings. Since the analysis is essentially the same as that in our earlier study, we only sketch the argument.

In the absence of uncertainty, we assume that the individual, either personally or in his corporate guise, can borrow at the market rate r. If interest payments are tax exempt, he will borrow up to the point where the marginal return equals the rate of interest.

The real distortion is in the return to the individual's entrepreneurship. Consider a wholly owned firm, which the individual is planning to sell in T years. Assume it pays out a dollar to the individual, and the individual then reinvests the dollar in the firm. In the absence of taxation, that would simply be a paper transaction with no consequences. With taxation, however, the corporate profits taxes are reduced by τ_c, personal income taxes increased by τ_p, and that part of the stock of the firm purchased is revalued, leading to a reduction in capital gains taxation when the shares are sold. If T is a long way in the future, or τ_{cg} is small, we can ignore this last effect. In that case, the desirability of paying out the wage depends simply on whether the personal rate is below or above the corporation rate. An

increase in effort, resulting in an increase in output, is thus subjected to a tax which is the minimum of the personal tax rate, and the corporate tax rate plus the present value of the tax on the capital gain resulting from the additional retention. Thus the effect of the corporation is to reduce the tax rate on entrepreneurship from what it would have been had the entrepreneurial income been imputed back to the entrepreneur and subjected to the personal tax rate.

Thus, although there is no doubt that a part of the income upon which the corporation tax is levied is really wage income, the fact that this is true only reflects the fact that the corporation tax allows a reduction of the tax from what it otherwise would have been.

The assumption of no uncertainty and a perfect capital market was crucial for the above analysis. Assume that firm borrowing is restricted; e.g., that firms can only borrow up to a given debt equity ratio, α, and that the constraint is binding: in the judgment of the owner of the firm, their marginal return to investment is safe and exceeds the rate of interest. Then by working a little harder, increasing output by a unit, and retaining the earnings within the firm, the firm is able to borrow, say, $(1-\tau_c)\alpha$. Thus the present value of the total return to increased effort is

$$\frac{(1-\tau_c)[1+\hat{r}(1-\tau_c)+\alpha(\hat{r}-r)(1-\tau_c)]}{1+r(1-\tau_c)}.$$

It is clear that raising the corporation tax rate will reduce the return on effort (entreprenuership), not only because of the direct effect (the tax on wage income) but also because it reduces the return to the additional investment which the increased effort allows.

Thus, even when the tax is nondistortionary with respect to investment in a first-best world, in the second-best situation with credit constraints, the tax affects both labor supply and investment.

5. The corporate tax as a tax on risk taking

To the extent that mean returns exceed the safe rate of interest for risky investments, the difference may be viewed as a return to risk taking, and a tax with interest deductibility provisions may be viewed as a tax on risk taking. But, as Domar and Musgrave (1944) argued, the fact that returns which fall below the safe rate of return are subsidized by the government means that the government is participating as a silent partner, sharing the risk. Indeed, for the corporation tax with interest deductibility provision, it can be shown that risk taking is always increased. (This should be contrasted with the results where there is no interest deductibility provision, where Stiglitz (1969) and Mossin (1968) have shown that it is possible that risk taking be reduced.)

To see this, let e be the return from the risky asset, r the return from a safe

asset (the safe rate of return), a the proportion of wealth (assets) invested in the risky asset. This may be viewed either as a portfolio problem or as a 'real' investment problem with stochastic constant returns in each project. Let U be the utility function and w_0 be the wealth to be invested: the investor maximizes

$$EU[w_0(1+r+a(e-r)(1-\tau_c))], \tag{7}$$

i.e.,

$$EU'(e-r) = 0. \tag{8}$$

(8) can be solved for $a(1-\tau_c)$: the demand for the risky asset is inversely proportional to $1-\tau_c$. Mean government revenue is

$$a\tau_c(\bar{e}-r) > 0.$$

Thus, such a tax raises revenue, mean national income, and, perhaps more striking, leaves expected utility of all investors unchanged.

6. The corporation tax and the debt–equity ratio

In our earlier analysis of the effect of taxation on the debt–equity ratio and on the cost of capital, we ignored uncertainty, and thus we ignored the complications arising out of the possibility of bankruptcy. But it is exactly these complications which, in the absence of taxation, are central in the determination of the debt–equity ratio. A complete analysis of this problem would take us beyond the scope of this note, but an examination of a particular case may be of some interest: this is the case originally discussed by Modigliani and Miller (1958), where there are a large number of firms with the same pattern of returns across the states of nature.

We write the (net) returns to a (one-period) investment project as Max $\{0,\ \theta h(I)-(1+\bar{r})B\}$, where θ is the stochastic variable, $\bar{r}$ is the nominal return to a bond, and B the number of bonds. We let $F(\theta)$ be the cumulative distribution of θ, so π, the probability of bankruptcy, is given by $\pi = F[(1+\bar{r})B/h(I)]$. We assume that the cost of capital $\bar{r}$ is a function simply of the ratio $h(I)/B$, since that completely determines the pattern of returns of the risky bonds: $1+\tilde{r} = \text{Min}\{1+\bar{r},\ \theta h(I)/B\}$. (If the value were proportional to $h(I)$, then this would be equivalent to assuming that the cost of capital was a function of the debt–equity ratio. But of course, the whole point of the exercise is that the value may not be independent of the debt–equity ratio.) Thus an individual who owns a firm, who is risk neutral, and can obtain a return of ϕ on some other security,[1] maximizes

$$h(I)\left[\int_{(1+\bar{r})B/h}^{\infty} \theta\, dF-(1+\bar{r})(1-\pi)\frac{B}{h}\right]+\phi(B-I+w_0), \tag{9}$$

[1]Obviously, with risk neutrality and individuals differing in their judgments concerning returns, we must limit short sales. For simplicity, we assume that no short sales are allowed.

where w_0 is the individual's initial wealth. Hence

$$h'\left[\int_{(1+\bar{r})B/h}^{\infty} \theta \, dF-(1+\bar{r})(1-\pi)\frac{B}{h}\right] = \phi\left(1-\frac{Bh'}{h}\right), \tag{10}$$

$$[(1+\bar{r})+(B/h)\bar{r}'](1-\pi) = \phi. \tag{11}$$

Eq. (11) can be solved for h/B, the optimal debt–equity ratio, and then (10) can be solved for I, the equilibrium level of investment.

How does the corporation tax affect the analysis? A uniform corporation tax, with interest deductibility, simply multiplies all the terms in (9) by $1-\tau_c$ and the rest of the analysis is unaffected. Thus, both the debt–equity ratio and the level of investment will be unaffected by the imposition of this form of the corporation tax.

7. Equity and efficiency in depreciation allowances

One of the central determinants we have identified in our analysis of the nature of the tax – whether the tax should be viewed as a tax on pure profits or on interest income – involved the nature of the depreciation allowance. Discussions concerning the appropriateness of one depreciation allowance versus another have often confused equity and efficiency considerations, and, as usual, it is useful to distinguish the two.

The basic 'equity' principle is that costs of earning income ought to be deducted from income to avoid double taxation.

The basic 'efficiency' principle is that the rules for depreciation allowances not affect the choice of investment. True economic depreciation and immediate write-off of capital expenditures are both depreciation policies which are equitable and efficient in this sense; which is to be preferred depends on whether we wish to tax just profits or to tax profits and interest income. Neither, however, is generally used; actual depreciation allowances introduce elements of inefficiency as well as inequity. But it is important to emphasize that the tax provisions may be roughly equitable (i.e., equitable for the 'average asset') but still distortionary.

8. Concluding comments

The corporation tax has long been a subject of controversy in economics. Much of the earlier controversy centered around whether the tax was shifted. Such questions necessarily focus on the degree of competitiveness of the given market and the nature of the long-run adjustment mechanisms in the economy.

In this note, I have attempted to center the discussion around the more basic issue of exactly what the corporation tax is. The tax has a number of provisions,

which make it inappropriate to simply take either the legislated rate or the average rate paid as the appropriate tax rate for economic analysis. We have argued that the incidence of the tax depends on exactly what the provisions are.

In my interpretation of the U.S. tax system, the dominant feature in interpreting the corporation tax is the interest deductibility provision. The implications of this provision, as I noted in my earlier article, were unambiguous in the absence of uncertainty: the tax should *not* be viewed as a tax on interest income. It is partly a tax on pure profits, partly a tax on entrepreneurship, and partly a return on an implicit government partnership in risk taking. Quantitatively, I suspect that the third role is the most important.

What would be the effect of the elimination of the corporation tax, imputing the income back directly to the shareholders? For present owners whose personal tax rate is identical to the corporation rate, there would be no difference; for those with a lower rate, the present discounted value of net (after tax) dividends would be increased. If such individuals dominated, then the value of shares would increase: owners of securities would experience a capital gain. To the extent that the tax should be viewed as a tax on entrepreneurship, and to the extent that the original entrepreneurs no longer own shares in their original firms, the elimination of the tax would represent a windfall gain to present owners; the tax had already been borne by the original entrepreneurs, and capitalized in the value of the shares which they had sold. The allocative effect is only through the flow of new entrepreneurship.

On the other hand, to the extent that the tax can be viewed as a return to the government partnership in risk taking, the effect would be a reduction in the demand for risky assets and a capital loss on existing assets.[2]

Similar differences arise in assessing the distributional impact of the tax. To the extent that the tax is a tax on entrepreneurship, the characteristics of the present owners of the shares are irrelevant for ascertaining the distributional impact of the tax; all that needs to be assessed are the characteristics of the entrepreneurs. To the extent, however, that the tax is a tax on risk taking if there are no credit constraints, then the tax has no effect on expected utility; with credit constraints, again because of capitalization, it does have an impact on the original entrepreneurs.

Again, if the tax is capitalized, there is also no issue of horizontal equity with respect to present owners of the assets (who are not entrepreneurs) in the differential treatment of the corporate and noncorporate sector. And to the extent that entrepreneurs can choose whether to incorporate or not, there is not an issue of horizontal equity involved in the treatment of entrepreneurship.

Finally, because the tax may be to a large extent capitalized, the incidence of a tax change may be considerably different from the long-run incidence of the tax itself.

[2]Obviously, just the converse obtains if the personal rate exceeds the corporate rate.

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