

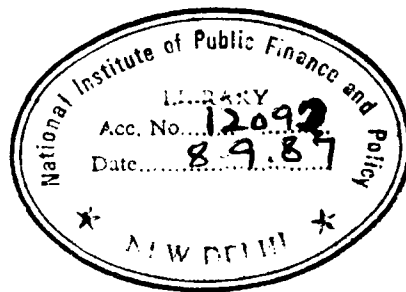


SHOULD THERE BE A CAPITAL GAINS TAX ?

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ABSTRACT

It is argued that, when assets are ranked by present value per unit investment, a capital gains tax necessarily interferes with pre-tax asset ranks; that a tax on sales proceeds of capital assets with a rollover provision in a proportional tax regime interferes neither with asset ranks nor has any 'lock-in' effect in small economies; and that for large economies, similar neutrality requires that short-term cash flows, inclusive of capital gains, be taxed lightly as compared to long-term flows within the context of a tax on sales proceeds.

1. INTRODUCTION

The appropriate taxation of income from capital gains is one of the knottiest problems in taxation theory. As things stand, no scheme of taxation of capital gains in existence today is entirely satisfactory and no reform proposals have met with universal approval. Among the problems created by capital gains taxation three issues are of major importance. First, (in common with taxes on income other than capital gains) misallocation of resources occurs due to distortion in the profitability ranking of assets. Second, the date of termination of a project is affected by capital gains taxation. A related problem is that transfer of ownership to those capable of utilising the capital most efficiently is impeded since the investible funds of current owners is eroded by capital taxation on transfer (see Stiglitz, 1983). Both of these points are facets of the 'lock-in' effect of capital gains taxes (Holt and Shelton, 1962) and are linked with the taxation of capital gains on realisation rather than accrual. Finally, in inflationary regimes, non-neutralities are created by taxation of nominal capital gains.

In this study an attempt is made to contribute to the study of means of taxing the proceeds from the sale of a capital asset in a manner which does not create inter-asset distortions and does not result in lock-in.

The real present discounted value of assets per unit of investment is taken to be the basis for ranking assets (as would be appropriate for a firm maximising expected profits or for a risk-neutral investor).

2. TAXATION AND INTER-ASSET RANKING: THE SMALL COUNTRY CASE

Consider a capital asset held for T years yielding a stream of nominal returns r_i per period purchased at the start of the first period ($i=0$) and having a terminal value of zero.^{1/} Given a discount factor, the present value of this asset, V, is given by:

$$V = \sum_{i=0}^{T-1} \delta^i r_i / P_i - 1 \quad (1)$$

where $P_i = (1+p_1) (1+p_2) \dots (1+p_i)$ and p_j is the inflation rate in period j . The price level at $i=0$ is normalised to unity.

If taxes are now levied at the (proportional) rate t , then, in a small country with free mobility of capital, the value of the asset after taxes, V_t , will be

$$V_t = (1-t) \sum_1^T \delta^i r_i / p_i - 1$$

or $V_t = V(1-t) - t$ (2)

Thus, to be certain that taxation leaves asset ranks unaffected, the post-tax value of all assets should be given by $V(1-t)-t$ regardless of capital appreciation or depreciation. Otherwise some asset with zero terminal value will have a changed rank. For an asset with a positive terminal value, g , (1) must be modified to

$$V = \sum_1^T \delta^i r_i / p_i + \delta^T g / P_T - 1; g > 0. \quad (3)$$

A nominal capital gain occurs if $g > 1$ and a nominal capital loss occurs if $g < 1$. In the presence of taxation we now have

$$V_t = (1-t) \sum_1^T \delta^i r_i / p_i + \delta^T g / P_T - \delta^T S(g-1) P_T - 1 \quad (4)$$

In (4), $S(\cdot)$ is the tax function for capital gains taxation assumed to be levied on nominal capital gains. We now establish the following result:

Proposition 1. For the asset in equation (4), no function $S(\cdot)$ with the average tax rate bounded away from infinity exists which permits $V_t = V(1-t) - t$.

Proof: Rearranging (4) we get

$$V_t = (1-t) \sum_1^T \delta^i r_i / p_i + \delta^T g / P_T - t \delta^T g / P_T - 1 + t \delta^T g / P_T + t - t - S(g-1) / P_T$$

or $V_t = (1-t)V - t + \delta^T (tg - S(g-1)) / P_T. \quad (5)$

Thus, to satisfy (2), we must have $t = S(g-1)/g$. Clearly, the average tax rate, $a=S/(g-1)$, must increase with $g-1$ since $a = tg/(g-1)$. Furthermore, for any number M , we can find a value of g sufficiently close to 1 such that $a>M$. This proves the proposition.

Thus, capital gains taxation necessarily causes inter-asset distortions. However, equation (5) provides a important clue for non-distortionary taxation of the proceeds from the sale of capital assets. It is obvious that neutrality is achieved by taxing the sale proceeds from the capital asset at the rate $t^{2/}$. We state this as proposition 2.

Proposition 2. Taxing the sales proceeds of assets at the same rate as cash inflows during the bidding period leaves the pre-tax asset ranking unaffected.

Proof: Obvious from equation (5).

Our analysis thus leads us to advocate the replacement of the tax on capital gains by one on the sales proceeds of capital assets, at least for small countries.

3. THE 'LOCK-IN' EFFECT AND ROLL-OVER PROVISIONS

The tax proposal of the previous section fails to come to grips with the 'lock-in' effect and, therefore, requires modification. Lock-in occurs if the termination date of a project or the sale date of a capital asset changes on account of taxation.

To examine this problem, consider the holder of a capital asset who finds it profitable to sell and reinvest the sales proceeds in another asset on date T , given that it was unprofitable on date $T-1$. Given an $N-T$ period planning horizon (which may be infinite) and denoting the sale value of the capital asset on date i by g_i , we have

$$\sum_{i=T}^{N-1} \delta^{i-T-1} r_i/P_i \rightarrow \sum_{i=T}^{N-1} \delta^{i-T-1} R_i/P_i ; \quad (6)$$

$$\text{and } \sum_{i=T+1}^N \delta^{i-T} r_i/P_i \leq g_T \sum_{i=T+1}^N \delta^{i-T} R_i/P_i \quad (7)$$

where R_i is the return in the i th period on the new asset. The tax scheme of the previous section results in the left hand side of both inequalities being multiplied by $(1-t)$ but the right hand sides being multiplied by $(1-t)^2$. This is since after-tax investible funds are $(1-t)g_1$ and since earnings continue to be taxed at rate t . The inequality (6) will continue to be satisfied but (7) may now be violated. Thus lock-in will occur in some cases. However, if no tax is levied in the event of reinvestment - a roll-over provision - both (6) and (7) remain unaffected, so that no lock-in occurs. Furthermore, if the results of the previous section are interpreted as being applicable to an entire sequence of investment projects, they may be seen to continue to be true. Finally, as should be obvious, if only part of the sales proceeds are invested, taxes should clearly be waived on only the reinvested fraction. Thus we have the following proposition:

Proposition 3. In a small country, taxation of the sales proceeds from the sale of a capital asset at the same rate as other capital income, with a roll-over provision for reinvested sales proceeds, leaves pre-tax asset ranks and the termination date for projects unaffected.

4. CAPITAL TAXATION IN LARGE COUNTRIES

The results of the previous two sections are only approximately true for a large country. Two problems in a large country create additional difficulties:

- i. The discount factor, which reflects the opportunity cost to investors, will not in general remain the same in the presence of taxes.
- ii. The inflation rate may also be affected by taxes.

Consider the impact of a variation in the discount factor first. The discount factor for a profit-maximising firm will be given by $\delta = 1/(1+\rho)$, where ρ is an appropriately weighted average of market interest rates. We refer to ρ as 'the interest rate' for brevity. In the presence of taxes the post-tax interest rate becomes $\rho' = \rho(1-t)(1+e)$ where $e = \Delta\rho/\rho$ is the

proportionate change in the pre-tax interest rate on account of taxes. In a small country with free capital mobility, since the interest rate is pegged to that prevailing internationally, capital outflows ensure that $\rho' = \rho$ in the post-tax equilibrium. For a large country capital out-flows will have a depressing effect on world interest rates^{3/} so that parity will be restored at $\rho' < \rho$. However, a decrease in the pre-tax interest rate in the large country is most unlikely.^{4/}

To examine the result of the change in the discount rate, we first analyse the impact on assets with $r_i \geq 0$ for all i and then take up the general case.

For assets with $r_i \geq 0$ for all i , in the absence of taxes, real returns in the i th period are weighted by the discount term $\delta^i = 1/(\rho+1)^i$. In the presence of taxes, the weight for the i th period becomes

$$(1-t)/(1+\rho(1+e)(1-t))^i = (1-t)/(1+\rho')^i \equiv (1-t)\lambda^i$$

Simple algebra shows that $(1-t)\lambda < \delta$ provided $\rho' < \rho$. However, $\rho' < \rho$ also implies that $\lambda > \delta$. Thus as i grows large, $(1-t)\lambda^i$ ultimately exceeds δ^i . The break-even value is given by $i^* = \ln(1-t)/\ln(\delta/\lambda)$ ^{5/}, ^{6/}. Thus, (see Figure 1), income taxation creates a bias against short-term projects (by given short-term returns less weight) and in favour of long-term projects. Thus we get the following surprising result:

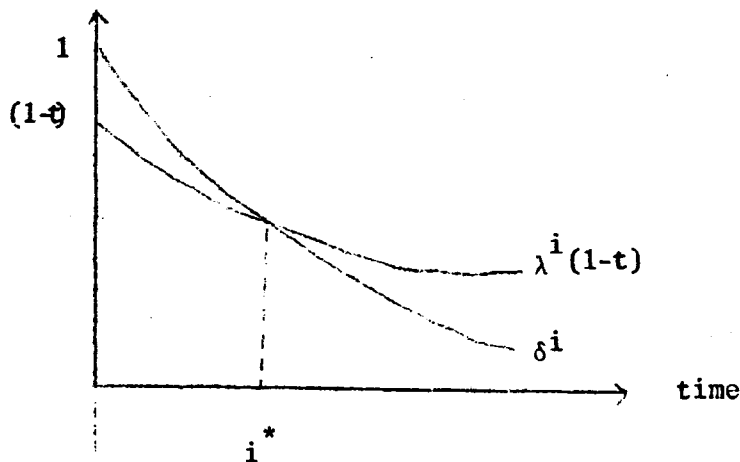


Figure 1. Pre- and post-tax discounting

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Proposition 4. In a large country, to rectify tax-induced neutrality violations on account of a changed discount rate, the tax on short-run capital income and sales proceeds should be less than that on long-run capital income and sales proceeds.

Proof: See the previous paragraph.

Corollary to Proposition 4. In a large country, to rectify tax-induced neutrality violations due to a changed discount rate, short-run capital gains should be taxed less heavily than long-term capital gains.

To avoid any misunderstanding, it may be pointed out that capital gains in the tax system proposed by us earlier are a part of sales proceeds. Separate relief or penalties to the gains component is not what is advocated.

The extent of tax relief or penalty is, in general, dependent on asset-specific features. We consider a few special cases.

Example 1: Assets with constant, positive annual cash flow: Consider two assets with the same pre-tax present value, V , with lifespans of T and U years respectively and constant real cash flows r_T and r_U . Real cash flows are used since we are not allowing for a changing inflation rate in this exercise. We have

$$V = (\delta - \delta^{T+1})r_T / (1 - \delta) - 1 + (\delta - \delta^{U+1})r_U / (1 - \delta) - 1, \quad (8)$$

$$V_T = (1 - \lambda^T)(1 - t)r_T / (1 - \lambda) - 1 = (1 - S_T)(V + 1)(1 - \delta)(\lambda - \lambda^{T+1}) / ((\delta - \delta^{T+1})(1 - \lambda)) - 1 \quad (9)$$

$$V_U = (1 - \lambda^U)(1 - t)r_U / (1 - \lambda) - 1 = (1 - S_U)(V + 1)(1 - \delta)(\lambda - \lambda^{U+1}) / ((\delta - \delta^{U+1})(1 - \lambda)) - 1 \quad (10)$$

where S_T and S_U are the appropriate capital gains tax rates and $S_1 = t$.

Given that $\lambda > \delta$, $(\lambda - \lambda^{T+1})(1 - \delta) / ((\delta - \delta^{T+1})(1 - \lambda))$ is an increasing function of T (this is easily proved by induction) so that $V_U > V_T$. Further, $V_1 = \lambda(1 - t)(V + 1) / \delta - 1$.

Therefore, to restore neutrality, a T period asset should be taxed so that the after-tax present value is V_1 . Thus, we should have

$$(1-S_T) = (1-t)(1-\lambda)(1-\delta^T)/((1-\lambda)(1-\delta^T)) \quad (11)$$

The limit as T tends to infinity is

$$(1-S_\infty) = (1-t)(1-\lambda)/(1-\delta) \quad (12)$$

For example, if $\rho = 0.11$, $e = 0.2$ and $t = 0.25$, then we must have

$$S_\infty = 0.93.$$

Example 2: Geometrically increasing annual cash flows: We now consider a T period asset with a cash flow of $(Z+1)/\delta^i$ in the ith period. The present value of this asset is Z, independent of T. With taxation, the present value becomes

$$V_T = (Z+1)(1-S_T)\lambda(\lambda^T - \delta^T)/T(\lambda - \delta) - 1. \quad (13)$$

Once again, $V_1 = (Z+1)(1-t)\lambda/\delta - 1$, so that we must have

$$(1-S_T) = (1-t)\delta^{T-1}(\lambda - \delta)/(\lambda^T - \delta^T).$$

Here the limit of S_T , as T approaches infinity is unity.

Example 3: Geometrically declining annual cash flows: We now assume a cash flow of $K\delta^i$ in period i. We thus have a value in the absence of taxes given by

$$V = K\delta^2(1-\delta^{2T})/(1-\delta^2) - 1 \text{ and } V_T = (1-S_T)K\lambda\delta(1-\lambda^T\delta^T)/(1-\lambda\delta) - 1.$$

We now have $V_1 = (1-t)K\lambda\delta - 1$, so that we require

$$(1-t) = (1-S_T)(1-\lambda^T\delta^T)/(1-\lambda\delta)$$

$$\text{or } (1-S_T) = (1-t)(1-\lambda\delta)/(1-\lambda^T\delta^T) \quad (14)$$

This has the lower limit $(1-t)(1-\lambda\delta) = (1-S_{\infty})$. For example, with the numbers used earlier this gives $S_{\infty} = 0.87$ which is less than in the case of constant cash flows.

These examples indicate that, while distant cash flows should be taxed more heavily than near term cash flows, the appropriate tax rates depend heavily on the pattern of cash flows. In general however some discrimination in favour of short-term flows would make the tax system less distortionary.^{8/}

Turn now to assets with some $r_i < 0$. Such a situation may arise for one of two reasons: instalment payments or losses. For assets with instalment payments, the increase in the discount rate lowers the per period cash inflow to the asset holder per unit of investment in present value terms. That is, if C_i is the instalment payable ^{9/} in the i th period with $\sum \delta^i C_i = 1$ then $\sum \lambda^i C_i > 1$. To find the value per unit investment, pre-tax cash inflows should be divided by $\sum \lambda^i C_i$. Thus we have:

Proposition 5. The value of assets purchasable on payment in instalments reduces by more than assets purchasable in a single instalment but with the same cash inflows per unit investment in pre-tax present value terms. To restore pre-tax inter-asset ranks, therefore, such assets should be given additional relief.

The problem of losses requires detailed consideration of the treatment of loss by the tax system. However, it is clear that full loss offset (i.e., tax refunds so that the net loss is $(1-t) r_i$ when r_i is negative) alone can achieve neutrality. As is well know, loss offset provisions bring with them their own problems, especially in connection with tax avoidance and in exacerbating moral hazard. On balance, a satisfactory method of dealing with assets subject to periodic losses is yet to be found.

Consider, finally, the issue of inflation. For assets with given real flows, no further problem arises. For assets with given nominal flows the inflation impact is of some consequence. If inflation rates change on

account of the imposition of taxes, then if no other distortions are present, nominal flows must adjust to keep real flows constant. Thus, failure of nominal flows to adjust is a consequence of market imperfections other than any that may be created by the tax. However, with a capital gains tax rather than a tax on sale proceeds, the real tax liability is sensitive to the inflation rate (even in the absence of tax progressivity). This problem is absent with a sales proceeds tax.

5. SUMMING UP

We have argued above that to achieve neutrality with respect to asset ranking and project termination dates, a tax on the sales proceeds of capital assets with a roll-over provision for reinvestment should replace the capital gains tax. Furthermore, on the same criterion, tax relief should be granted, if at all, to short-term cash flows from a capital asset, and to assets purchasable against instalment payments in large countries or countries which restrict access to international capital markets. If tax authorities choose to deviate from this structure due to objectives other than neutrality, this should be done with full knowledge of the inefficiencies thus engendered.

Certain deficiencies in our analysis should now be pointed out. First, the existence or lack of existence of other taxes will still lead to distortion. As is well known, the absence of estate duties or the concessional taxation of estates leads to lock-in. In countries with a wealth tax a bias is created towards consumption and perhaps, projects with mainly short-term capital gains.^{10/} Both these taxes disturb pre-tax asset ranks. The exact pattern of these distortions when both taxes are present will vary from country to country. Tax progressivity, which we have not dealt with, itself has distortionary implications. As is well known, averaging provisions are a way of mitigating this distortion and restoring equitable treatment with respect to lifetime income. Finally, we have not explicitly considered the impact of uncertainty. For a small country our tax proposal results in post-tax cash flows, $(1-t)x$ where x is the pre-tax cash flow. Thus, barring the impact of losses and loss-offset treatment, ranking of

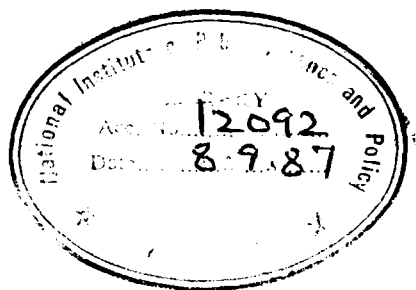
assets with uncertain returns will not be affected. Our tax scheme for large countries however may make risky assets with short-term capital gains less attractive than risky assets with long-term capital gains. If so, this is likely to be a desirable bonus.

NOTES

1. It is assumed throughout that $r_i > 0$ except as indicated in section 4. However, note that a capital asset is characterised by three things: its holding period (T); its real terminal value (V/P_i) before taxes; and its stream of real returns r_i/P_i .
2. An interesting sidelight is that neutrality would require the average tax on capital gains, α , to always exceed the tax on interest income contrary to provisions in existing tax systems (as revealed by (5)). However, the problem of unbounded average taxes remains.
3. A switch from investment to consumption may also occur at the margin.
4. In the absence of free capital mobility, switches to consumption would still raise pre-tax interest rates, but should leave $\rho' < \rho$.
5. Actually, $(1-t)\lambda^i$ exceeds δ^i at the closest integer greater than this value.
6. For the terminal period the weighting function will depend on the capital tax function used. $(1-t)\lambda^T$ applies only to the scheme we propose. The distortion conclusion is, however, general.
7. The terminal cash flow may be part sales proceeds and part income. In view of our tax system the exact distribution is irrelevant.
8. Our results attempt to indicate the appropriate taxation of capital purely from the non-distortion point of view. Full taxation of short-term gains on grounds of their speculative nature flows from a different objective. We submit that the taxing authorities should consciously balance both objectives and should not act in ignorance. If this paper sheds some light on the relevant issues it will have served its purpose.
9. Maintenance expenses may also be interpreted as instalments if they are not tax deductible.
10. An annual wealth tax at rate w would result in an asset value given by

$$V_w = V(1-w) - w \sum_{i=1}^{T-1} \delta^i g_i / P_i, \text{ where } g_i \text{ is the nominal capital value in period } i. \text{ If the capital value has a constant growth rate, the project value is a decreasing function of } T.$$

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