THE INCIDENCE OF TAXES ON INCOME FROM CAPITAL IN AN OPEN ECONOMY: A REVIEW OF CURRENT THINKING*

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August, 1982

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The purpose of this paper is to review the current state of thinking on the incidence of taxes on the income from capital in an open economy. In the background of this discussion is the received theory analyzing similar disturbances for a closed economy.

1. A quick review: closed economy case

The standard approach here works on the basis of given stocks of capital and labor. These may change through time but are assumed to be zero-elastic with respect to the policy changes analyzed (and with respect to wages (for labor) and rates of return (for capital) in particular). The assumption of zero-elastic supply of capital itself is sufficient to guarantee that a fully general and uniform tax on the income from capital will be borne in its entirety by the owners of capital, out of their economic rents. There will be a fall in the net rate of return to capital which will fully reflect the tax.

Where the tax is sectoral (e.g. the corporation income tax) the picture is more complicated. The most straightforward way of representing this case is illustrated in Figure 1. The two downward-sloping curves in Figures 1a and 1b represent the marginal net (of depreciation) product of capital in the two sectors. In the absence of special taxation the given stock of capital would be so divided as to equalize this marginal net product across sectors, as shown by the points K_x^o and K_y^o. When a tax of T_{kx} is imposed on the return to capital in sector X, it is the net-of-tax marginal products that are equalized. This entails a reshuffling of the capital stock, reducing its employment in the taxed sector and increasing it in the untaxed sector, producing a new equilibrium represented by K_x' and K_y'.

The new equilibrium is characterized by a rise in the marginal product of capital in the taxed sector and a fall in the untaxed sector, the wedge between these two marginal products being equal to the tax imposed on the earnings of capital in the taxed sector. The net of tax return is thus once again equalized in the two sectors, but at a lower level than before.

Incidence is determined as follows. The tax proceeds are given by the two diagonally shaded rectangles and in Figure 1a. The amount of the burden borne by capital is given by the sum of (the burden borne by capital that remains in the taxed sector after the tax has been imposed) plus (the burden borne by the capital that was initially in the untaxed sector and stays there) plus (the burden borne by the amount of capital that shifts from sector X

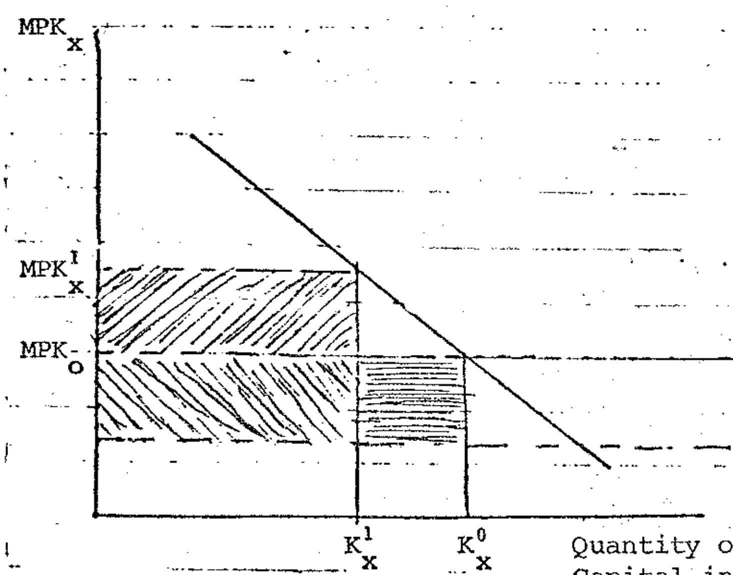


Figure 1a

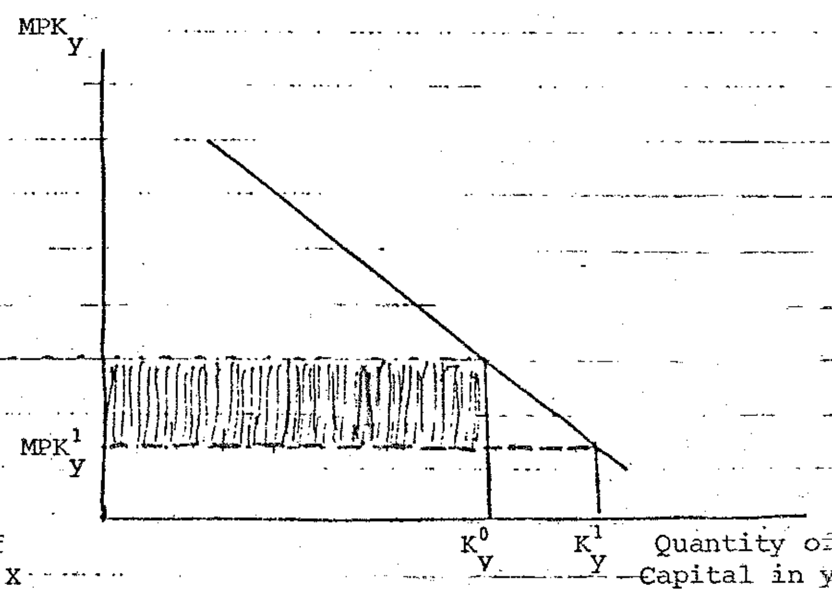
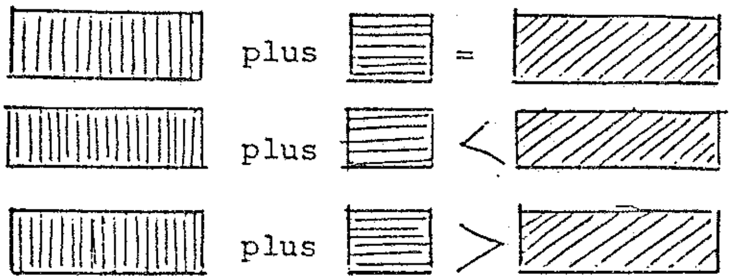


Figure 1b

to sector Y as a consequence of the tax being imposed). Thus we have three possible outcomes :



capital just bears the full burden of the tax

capital bears less than the full burden

capital bears more than the full burden (this is the case depicted in Fig. 1)

which of these cases will result depends on various parameters -- the elasticities of substitution between labor and capital in the two sectors, the elasticity of substitution in demand between the two final products X and Y, and the initial shares (of X and Y in final demand, and of capital and labor in the total costs of each sector). A very important insight stemming from the analysis is that it is very "easy" for capital to end up bearing more than the full burden of the tax. See Figure 1 once again : there is nothing extreme or implausible about that picture, yet it results in capital's bearing more than the full burden of the tax.

2. <u>The Corporation Income Tax in an Open Economy (Corporate Sector = Tradeable Sector)</u>

The simplest representation of the open economy case embodies the assumption that the international capital market works to equalize rates of return in the different interconnected national capital markets of the world. This assumption renders impossible movements along marginal productivity of capital schedule of the type shown in Figure 1b. The after-tax marginal product of capital has to remain equal to the world market rate of return; it cannot be driven down as it was in the previous case. The element that prevents its being driven down is the international mobility of capital. A tax on capital in either sector will cause some capital to leave the country (as compared with the capital that otherwise, at a given point of time, would choose to locate there). This, in turn, guarantees that the owners of capital will not, in that particular role, suffer as a consequence of the tax. Any suffering that is to be done -- and there must be someone who bears the burden of the tax -- will have to be done by people in their roles either as laborers or as demanders of goods and services.

It turns out that there are two polar open-economy cases, each reflecting one of the two alternative outcomes just mentioned. In the first of these, the taxed (corporate) sector is the one producing tradeable goods; in the second it is the one producing non-tradeables.

In the case where the taxed sector is the one producing tradeables it is evident that the price of the final product (P_x) cannot rise to reflect the tax, P_x being given by world market conditions. The net-of-tax return to capital cannot change either. Hence, if the X industry is to remain in business it can only do so on the basis of a fall in the wages of labor sufficient to permit such an outcome. In symbols :

$$(1) \qquad -L_x dP_\ell = T_{kx} K_x$$

But if P_ℓ falls, it is not only going to fall in one sector but in both. The above equation determines the condition for survival of the X industry. The total fall in wage incomes will be, of course, $(L_x + L_y)dP_\ell$. Thus the loss in incomes of workers will be equal to $(L_x + L_y)/L_x$ times the burden of the tax. Labor, in this case must necessarily bear more than the full burden of a sectoral tax in capital!!! Capital gets off scot free as a factor, but capitalists actually gain in their role as consumers. This stems from the fact that the price of Y goes down to reflect the reduced wages of labor. If P_k (the net-of-tax return to capital) is determined in world markets, and P_x as well, then capitalists neither gain nor lose in their role as earners of a factor reward or in their role as buyers of X. But they do gain in their role as buyers of Y.

Laborers, on the other hand, lose in their role as sellers of labor services an amount greater than the burden of the tax. Part of the excess they get back, because they too can now buy product Y at lower prices. But they still end up bearing a net burden which is greater than what the government receives from the tax. Neglecting second order effects, the total burden on labor is the sum of what the government gets in tax receipts plus what capitalists gain in their role as buyers of product Y.

3. Th<u>e Corporation Income Tax in an Open Economy (Corporate Sector = Non Tradeables Sector)</u>

When a tax on the income from capital is imposed in the sector producing non-tradeable goods, the pattern of factor rewards, is, in effect, "frozen" by what is occuring (or, perhaps better put, not occuring) in the tradeables sector. The net-of-tax return to capital P_x is determined in the international market; since there is no tax on capital in X, the gross-of-tax return to capital is equal to the net-of-tax return. The price, P_x, of tradeables is likewise determined in the world market place. Hence the marginal physical product of capital ($=P_k/P_x$) is determined by world market conditions, and independent of the tax. But so long as the law of variable proportions (constant returns to scale) can be assumed to hold at least approximately, corresponding to each MPP_k there will be one and only one MPP_{ℓ}. Thus if the marginal physical product of capital is governed by world market conditions and independent of the tax, so too in this case will be the marginal physical product of labor ($= P_{\ell}/P_x$), and with it, therefore, the wage of labor, P_{ℓ}.

In this case the only degree of freedom in the system is the price P_y of the product of the non-tradeable sector. This must go up to reflect the tax. As a consequence, labor and capital must share the burden of the tax, but only (and exclusively) in their roles as demanders of product Y. If, as is usually assumed at this level of abstraction, the respective demand patterns of laborers and capitalists are not biased one way or another in favor of (or against) tradeables or non-tradeables, we can say that in this case labor and capital share the burden of the tax in proportion to their respective contributions to national income (net product). (As a minor footnote, note that the correct magnitude here is net national, not net domestic product, for capitalists can spend the income they receive from capital invested abroad as well as that from investments made within the nation's borders).

Note also that the results of this and the preceding section do not depend on parameters such as elasticities, initial factor proportions or shares, etc. So long as both industries X and Y remain in business after the tax is imposed, we can say that when capital is taxed in the sector producing tradeables, labor ends up bearing $(L_x + L_y)/L_x$ times the burden of the tax. Similarly, where capital is taxed in the sector producing non-tradeables, both capital and labor share the burden of the tax in their role as demanders of the non-tradeable good, and in proportion to their spending in it, again independent of parameter values.

4. A General Tax on the Earnings of Capital in an Open Economy.

It was stated in Section 1 that, in a closed economy with a fixed capital stock, a general tax on the earnings of capital is fully and exclusively borne by that factor -- paid, as it were, out of its economic rent. Rather surprisingly, essentially nothing of this result carries over to the case of a general capital-income tax in an open economy. Rather than looking like the result of section 1, the answer for a general tax on the income from capital looks, in the open economy case, like a combination of the answers from Sections 2 and 3. In particular, it is overwhelmingly likely in this case that labor will bear close to the full burden of the tax.

In brief, when we have a general tax on the earnings of capital in an open economy, we must first confront the situation of the tradeables sector (X). Here the conditions described in Section 2 continue to apply without essential modification. The world price of tradeables, P_x, and the world market return to capital, P_k, both remain unaffected by the presence or absence of a general tax T_k on the earnings of capital in one small economy. Thus the earnings of labor must fall in order to permit the continued existence of industry X in that economy. Equation (1) is only modified by substituting the rate T_k of the general tax where we previously had the rate T_{kx} of the sectoral tax on capital's earnings. Thus we have :

$$(1') \quad -L_x dP_\ell = T_k K_x$$

The fall in labor's earnings is once again the same. ~~[illegible])~~ The total burden borne by labor is again $(L_x + L_y)dP_\ell$.

A second slight modification comes in in terms of the definition of the total burden of the tax. Whereas with a partial tax the total burden was $T_k K_x$ $(=-L_x dP_\ell)$, now, with a general tax it is $T_k(K_x + K_y)$. So we have that the total burden of the tax is $(K_x + K_y)/K_x$ times the right hand side of (1'), while the burden borne by labor is $(L_x + L_y)/L_x$ times the left hand side of (1'). It is immediately obvious, therefore, that when factor proportions are the same in the two sectors (that is, when $(K_x + K_y)/K_x$ is equal to $(L_x + L_y)/L_x$), labor, not capital, will bear precisely the full burden of a general tax on the income from capital in both sectors!!

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Labor will bear more than the full burden when $(L_x + L_y)/L_x$ is greater than $(K_x + K_y)/K_x$, that is, when the tradeables sector is relatively capital intensive. Conversely, when tradeables production is relatively more labor intensive, labor will bear somewhat less than the full burden of the tax.

The mechanism can be described as follows. In all cases, and invariably, the imposition of a general tax on the income from capital generated in an open economy will entail a fall in the earnings of labor relative to capital. That this should happen is a condition of the survival of the tradeables sector, where labor earnings is the only element that can "give" in response to the introduction of the tax.

This in turn predestines that there will be an element at work tending to cause the price (P_y) of non-tradeables to fall. In the analysis of section 2 this was the only force operating on the price of non-tradeables, which therefore (in that case) had to fall, leading to a necessary net gain to the owners of capital insofar as they bought any non-tradeable goods (and to a correspondingly necessary bearing by labor of more than the full burden of the tax).

In the present case, however, this is not a necessary result, because we have a second force at work on the price of non-tradeables -- the fact that the income from capital in the non-tradeable sector is also subject to tax. This was the motive force behind the mechanism described in Sector 3. There, the price of non-tradeables had necessarily to rise, and the price of labor was necessarily prevented (by the conditions of equilibrium in the tradeables sector) from moving, relative to that of capital or to the price of tradeables. Hence in that case both capital and labor suffered from the tax, but only in their role as buyers of the non-tradeable good.

Here, in the analysis of a general tax, we have the two forces operating together on P_y. The necessary fall in P_ℓ operates to make P_y go down; the fact that tax must be paid on the income earned by capital in the Y sector operates to make P_y go up. When these two forces exactly cancel, obviously P_y does not change. In that case, then , capital, whose net-of-tax earnings are unchanged, also faces unchanged prices of both P_x and P_y. Capital therefore neither gains nor loses, and labor bears precisely the full burden of the general tax on capital income.

When, however, the downward force on P_y predominates, both of the following things are true : i) capital gains in its role as buyers of Y and ii) labor loses more than the full burden of the tax. All this happens when $(L_x + L_y)/L_x$ is greater than $(K_x + K_y)/K_x$; i.e., when the tradeables sector is relatively capital intensive. The opposite package of results, with capital losing something (but always less than the full burden) as a consequence of the tax, and with labor therefore also bearing less than the full burden, occurs in the case where the tradeables sector is relatively labor intensive. The easy way to see why this is the case is to recall that, as a condition of survival of the tradeables sector, the tax burden accruing in the tradeables sector is cancelled precisely by the fall in wages accruing to the labor that continues to work there in the presence of the tax. That much is true regardless of relative labor and capital intensities. Therefore, the tax burden in the non-tradeables will also be precisely cancelled by the fall in wages to the labor working there whenever the relative factor intensities are the same in the two sectors. When there is relatively more labor in the non-tradeables sector, the downward pressure on prices there will predominate over the upward pressure, and capital will gain, while labor loses more than the full burden of the tax (which is what it loses in the case of equal factor proportions).

5. A General Tax on Interest in an Open Economy

The case of a general tax on interest payments can easily be handled within the framework developed in the preceding section. Let us divide the total capital in any sector into two parts K_1 and K_2, representing equity and debt financing, respectively. From a physical production standpoint, it should make no difference how a unit of capital (machine, building, etc.) is financed, its marginal contribution to the productive process should be the same. Hence, looking at the production side, the relevant capital inputs are $(K_{1x} + K_{2x})$ and $(K_{1y} + K_{2y})$ for sectors X and Y, respectively. From the side of the demanders of capital funds, however, there are considerations of risk, leverage, etc. and obviously also taxation, which make the two forms of financing non-homogeneous. Hence we would have, for sector X, a demand function of the following type :

(2a) $K_{1x} = a_1 + b_1 X + c_{11}(P_{k1} + T_{k1}) + c_{12}\ (P_{k2} + T_{k2})\ \ldots$

(2b) $K_{2x} = a_2 + b_2 X + c_{21}(P_{k1} + T_{k1}) + c_{22}\ (P_{k2} + T_{k2})\ \ldots$

The parameters c_{ij} should obey the symmetry and adding-up properties usually summarized as the Slutzky conditions : thus for prices initially equal to unity, we have :

$$c_{12} = c_{21};\ c_{11} + c_{12} = -c_{13}\ ;\ c_{11} + c_{21} = -c_{31}\ ;\ c_{13}=c_{31}$$

This enables us to write

(3a) $(K_{1x} + K_{2x}) = (a_1 + a_2) + (b_1 + b_2)X + (c_{11}+c_{21})(P_{k1} + T_{k1}) +$
$(c_{12} + c_{22})(P_{k2} + T_{k2})$

(3b) $(K_{1x} + K_{2x}) = (a_1 + a_2) + (b_1 + b_2)X - c_{31}(P_{k1} + T_{k1}) -$
$c_{32}(P_{k2} + T_{k2}) + \ldots$

If now the two types of capital were to be treated equally, e.g. by $T_{k1} = T_{k2} = T_k^X$, we would have

(3_c) $(K_{1x} + K_{2x}) = (a_1 + a_2) + (b_1 + b_2)x - (c_{31} + c_{32})(P_k + T_k^*)$,

which can be simplified to :

(3d) $K_x = a^* + b^* - c^* (P_k + T_k^*)$, the standard case.

In this section we will be considering equations like (3b) for the two sectors -- X (tradeables) and Y (non-tradeables). We shall show that the analysis of the preceding section carries through virtually unaltered, when it comes to the analysis of a general tax on interest payments.

The key element is, once again, the condition of equilibrium in the tradeables sector. If by a general tax on interest payments we raise the cost $(P_{k2} + T_{k2})$ of debt capital there, and if neither the price (p_x) of the product nor the cost $(P_{k1}+T_{k1})$ of equity capital can respond (owing to their being determined in a world market), the only price that can "give" in the face of the imposition of an increment to T_{k2} is the level of wages. And they must fall by enough to "accomodate" the new tax as a component of costs. The relevant relationship is

$$(1'') \quad - L_x dp_\ell = K_{2x} T_{k2}$$

Having established (1"), we now note that, as before, the burden on labor is $-(L_x + L_y)dp_\ell$, while in the present example the revenue yield of the tax is $(K_{2x} + K_{2y}) T_{k2}$. Therefore, when $(L_x + L_y)/L_x$ is equal to $(K_{2x} + K_{2y})/K_{2x}$, labor is bearing precisely the full burden of the tax. When $(L_x + L_y)/L_x$ is greater than $(K_{2x} + K_{2y})/K_{2x}$, labor bears more than the full burden. This occurs when the tradeables sector is relatively more intensive in its use of debt capital than it is in its use of labor.