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Profits Theory and Profits Taxation

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The 1970s witnessed the rise of a field of fiscal economics called optimum income taxation. Its subject is the properties of income tax structures, or tax tables, that are efficient, hence leaving no possibility for a general reduction of tax rates, except at a sacrifice of tax revenue, and no possibility for a reduction of the burden of taxation borne by one group, except at a cost to another. Thus far, research in this field has been confined to the taxation of personal income: wages, interest, and rent; the economics of business, or company, income taxation has been left untouched. In the now standard models of optimum income taxation there are no company profits and indeed no companies at all, incorporated or unincorporated; these models are extensions of the competitive general-equilibrium model of neoclassical theory.

It is generally agreed that, in fact, profits are common in most present-day market economies and there is a widespread (though far from unanimous) sense that they are a quantitatively important component in national income. Yet insofar as basic classical theory makes any room for profits, it sees each instance of profit as an exceptional and usually localized phenomenon of natural or unnatural monopoly power. Hence, it is generally conceded that an adequate theory of profits must rest on some different, nonclassical theory. Since there is not so far a modern theory of profits that approximates the clarity and precision of neoclassical theory, the recent discussions of profits taxation have not converged upon a unified and fully articulated model of optimum profits taxation. Nevertheless, much progress toward that goal can now be discerned.

1/ The author is McVickar Professor of Political Economy at Columbia University. He wrote this paper while a Visiting Scholar in the Fiscal Affairs Department of the Fund. In the course of this research the author had useful discussions inside the Fund with Vito Tanzi, Mario Blejer, Lans Bovenberg, and Andrew Feltenstein, and outside the Fund with Arnold Collery, Alberto Giovannini, Joseph Stiglitz, and Andrew Weiss. The paper was presented before the Economic Section of the New York Academy of Science on May 7, 1985.

This paper offers a review and integration of the two streams of thought on the efficiency effects--the so-called excess burdens and benefits--of a corporate income tax. One purpose of this analysis is to cast the discussion into the same theoretical terms employed elsewhere in the optimum taxation literature, where the lifetime prospects of a participant in the economy are seen as depending upon wealth (including human capital) and after-tax real prices (including after-tax wage rates and financial rates). The analysis further aims to cast the arguments for and against a positive tax on profits into a common general-equilibrium model so that, at least in principle, the various welfare effects can be compared and assessed. To that end, the individual national economy will be modeled as an open economy operating in a world of perfect capital mobility (but not, in general, with perfect product and credit markets). Thus, foreign ownership of equity shares and terms-of-trade effects generally enter into the analysis. In the last section, the paper sketches a microeconomic model of profits as a vanishing return to innovation with which to examine the costliness of taxing entrepreneurship and there is a brief examination of cross-national evidence on the relationship between the rate of profits tax and economic efficiency.

I. Early Formulations of Two Opposing Doctrines

The indictment of the corporate profits tax by Arnold Harberger (1962, 1966) seems to mark the start of a long trial for profits taxation. Referring evidently to a closed economy, the indictment contains two counts. First, a profits tax reduces the real rate of interest--that is, the rate before personal income tax--and thereby may reduce saving and, in turn, investment. Second, such a tax distorts the allocation of any given investment total between the corporate and noncorporate sectors. 1/

Subsequently, with the increased openness of most countries' capital markets and the heightened mobility of capital (that is, the speed with which capital movements tend to erase interest disparities), Harberger (1983) revised the argument: unless the tax is large and imposed by a very large country, there will be only a negligible fall in the country's real rate of interest, which equals the world real interest rate. A contraction, however, of the nation's corporate capital stock will occur to the point where its rate of return net of the profits tax again equals the world real interest rate--the rate that cosmopolitan investors can earn by investing in capital abroad

1/ Presumably the reason why, in countries having profits taxation, such a tax is not applied to unincorporated proprietorships is that it would be cumbersome and hazardous to try to decide how much of a proprietor's income represented profit and how much wages.

through foreign corporations. 1/ (Thus, capital moves from the home country's corporate sector to the rest of the world, not to the country's noncorporate sector as in the closed-economy argument.) To be precise, the revised hypothesis states that if the before-tax rate of return is a decreasing function, μ, of the domestic capital stock, K, given the labor supply, L, and if τ is the profits tax rate, then

$$(1-\tau)\ \mu(K;\ L) = r^* \equiv \text{const.},\ d\mu/dK < 0,\ L = \text{const.} \qquad (1.1)$$

where r^* is the world real interest rate; 2/ hence K is decreasing in the "cost of capital," $r^*(1-\tau)^{-1}$, and thus decreasing in τ.

For simplicity we shall suppose (with Harberger) that the capital stock adjusts quickly--in a figurative jump--in response to any shock to the cost of capital. Our focus, then, is on the Marshallian long run. A model made dynamic by the presence of rising adjustment costs to investment, in the manner of Hayashi (1983), implies that an increase in the profits tax rate causes investment to drop (via Tobin's q) and to recover only asymptotically as the capital stock approaches its new stationary level; a decrease in the tax rate has the opposite effect. But, it seems likely that most of this adjustment occurs within a few years, especially in an open economy, so we shall abstract from this refinement here.

Capital goods are not sacred objects so there is no ipso facto loss of welfare from the efflux of capital. To be complete, the argument against the profits tax needs to show a resulting welfare loss, or at least the conditions under which it will result. Consider therefore that a person's welfare, or set of opportunities, depends positively

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1/ It is clearly implicit in the argument that foreign corporations producing within the national border are impelled or required to set up subsidiaries under national laws of incorporation and so become equally liable to the national profits tax.

2/ Both μ and r^* are naturally defined, as the real wage is usually conceived, in terms of some consumer good, say, or mix of such goods consumed by the home country. If the home country produces a different mix, the product wage and product interest rate may differ from the real wage and real interest rate. The product interest rate will exceed the real rate if loans in terms of the domestic product have to compensate for its falling real price. But to the extent that the focus here is kept on stationary states, no such disparity of rates can occur. Regarding μ, it should be noted that a real appreciation of the currency, by increasing the real value of the marginal domestic product of physical capital, will increase the marginal productivity of capital insofar as some domestic investment takes the form of imported capital goods whose real price is unaffected. It will be assumed in the present paper that this effect is negligible or that there are no imported capital goods.

upon the after-tax wage rate obtainable for his work and the after-tax real rate of interest available on his saving for bequests or retirement. This is the basic notion behind the "indirect utility function" of optimum tax theory, and it is presumably in these terms that any argument against profits taxation ought to be cast. 1/ Consequently, proponents of the case against the profits tax are obliged to show that the revenue collected by a profits tax cannot provide sufficient wage income tax relief to raise the after-tax wage rate despite the contractionary effect on the nation's capital stock and thus on labor's productivity. It has to be shown that the revenue collected by a profits tax is necessarily insufficient, other things being equal, to prevent a resulting fall of after-tax wage rates.

Ascertaining this effect requires completion of the model with respect to the before-tax wage and rate of return. In what appears to be the usual interpretation of Harberger's position, the rate of return and the wage rate (both before tax) are taken to be determined competitively through the workings of a perfect labor market and perfect product markets. The rate of return is therefore equal to the marginal productivity of capital and the wage to the marginal productivity of labor. It is left unexplained why in such a case some or all capital investment is equity financed, which leaves corporations with taxable corporate income despite the absence of "economic profit"--frequently called "pure profit;" however, this is a matter we will of course return to. In this "competitive" case then, we have, omitting inessentials,

$$\left.\begin{aligned} \mu &= \phi_K(K,L^o) \\ w &= \phi_L(L,L) \\ d\phi_L{}^{\cdot}L + d\phi_K{}^{\cdot}K &= 0 \end{aligned}\right\} \quad (1.2) \qquad \left.\begin{aligned} \omega &= (1-t)w \\ r^* &= (1-\tau)\mu \\ \tau\mu K + twL^o &= T \equiv \text{const.} \end{aligned}\right\} \quad (1.3)$$

Here w is the market wage (before personal tax) and ω the after-tax wage of households. L^o denotes the amount of labor that would be supplied if τ, the profit tax rate, and therefore μ, were left at their original, reference-level values. Of course, $\phi_K(\cdot)$ and $\phi_L(\cdot)$

1/ It is also true that, if he is a shareowner in domestic corporations, a person's welfare will depend upon his dividends from the corporate profits being taxed plus similar overseas income. Clearly an increase in the corporate tax does temporarily reduce this income until the reallocation of depreciation allowances from replacing domestic capital to overseas investment has proceeded long enough to raise μ up to the new level of the cost of capital. Somewhat similarly, a decrease in the tax rate may cause a temporary rise of after-tax dividend income until new capital has rushed in to drive μ down. It could be argued that the effect is of negligible significance for social welfare. In any case it will not be convenient in the present paper to attend to this transient effect.

denote the marginal products of capital and labor; by Samuelson's factor-price relation, the increase, $d\phi K$, of the former when "weighted" by K gives the decrease, $-d\phi_L$, of the latter if weighted by L. The tax rate on wage income is t and total tax revenue is constrained to equal T.

Profits tax revenue according to (1.1) is $\tau\mu K$, hence $(\mu-r^*)K$, and therefore, by (1.2),

$$\tau\mu K = (\phi_K - r^*)K \tag{1.4}$$

Writing total tax revenue as $(w-\omega)L^o + (\mu-r^*)K$, by (1.3), we obtain at once the solution for ω,

$$\omega L^o = wL^o + (\phi_K - r^*)K - T. \tag{1.5}$$

To see how an increase of τ, which increases ϕ_K provided $r^* > 0$, affects ω we may differentiate (1.5) with respect to ϕ_K, holding L^o constant, thus obtaining

$$d\omega/d\phi_K = dw/d\phi_K + K/L^o + (\phi_K - r^*)dK/d\phi_K(1/L^o). \tag{1.5a}$$

Using (1.2), and noting that $dw/d\phi_K = d\phi_L/d\phi_K$, we obtain

$$\begin{aligned} d\omega/d\phi_K &= -K/L^o + K/L^o + (\phi_K - r^*)\left[\phi_{KK}(K,L^o)\right]^{-1}(1/L^o) \\ &= (\tau\mu)\left[\phi_{KK}(K,L^o)\right]^{-1}(1/L^o) < 0 \text{ if } \tau > 0. \end{aligned} \tag{1.6}$$

This result says that the after-tax wage rates facing households are reduced by the increased tax rate in proportion to the size of the wedge that was already created between μ and r^*. Note that an increased subsidy to corporate profits, $d\tau < 0$, when there is already a subsidy, thus $\tau < 0$, similarly diminishes the after-tax wage rate. Apparently the optimum τ is zero in the above model.

We have arrived at the root of the matter. Under the Harberger assumptions, the introduction or increase of the profits tax reduces wages beyond the power of the profits-tax revenue thereby raised to compensate; and a decrease of the tax (when positive) raises wages by more than enough for "workers" (i.e., those supplying labor), to be able to compensate the treasury and still gain through a net rise of the after-tax wage rate. (Whether the latter rise induces a rise or a fall in the amount of labor supplied only affects the size, not the algebraic sign, of the welfare effect. 1/)

One can add a tax rate, t_S, on personal income from (past) savings, r^*S^o, so that the after-tax interest rate, ρ, becomes $(1-t_S)r^*$, and tax revenue becomes

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1/ A proof of this proposition has been shown to me by Lans Bovenberg.

$$(w-\omega)L^o + (r^*-\rho)S^o + (\mu-r^*)K.$$

With the power to tax wages and interest differently--at rates t and t_S--the government could support ω in the face of a fall of w due to an increase of τ by reducing ρ; at least this route is open if saving is not taxed beyond its revenue-producing capacity to begin with. But then the government is simply "taking out" the ineluctable welfare loss in the form of reduced ρ rather than reduced ω. Either way the individual's opportunity to earn income by work and saving is worsened. There is contracted choice.

How does the introduction of some degree of monopoly power among some or all of the corporations affect the above results? Then some of those corporations' profits represent an economic profit, or pure profit, rather than a competitive return to capital not offset by interest deductions. To keep the notation simple, imagine that the degree of monopoly power is uniform across all industries producing domestically made consumer goods. Letting η denote the so-called measure of monopoly power--that is, the proportionate shortfall of marginal cost from price, and hence of the product wage from labor's marginal product--we have

$$w = (1-\eta)\phi_L(K,L^o), \qquad \mu = \phi_K + \eta \cdot \phi_L L/K. \tag{1.2'}$$

But we still have $\phi_K(K,L) = r^*/(1-\tau)$, provided that the monopolistic firms can obtain their capital goods without a monopolistic markup; then, given L, capital is not contracted by the introduction of η. The reason is that capital goods prices, in terms of the monopolized product price, drop in equal proportion with the marginal revenue product of physical capital at the point when the monopoly power is perceived and exploited; the marginal rate of return is thus left unchanged at a given level of labor input. 1/ Hence, using (1.2'),

$$(1-\tau)\mu = r^* + (1-\tau)\eta\phi_L L/K.$$

The revenue from the profits tax is now higher:

$$\tau\mu K = (\phi_K - r^*)K + \tau\eta\phi_L L. \tag{1.4'}$$

The after-tax wage bill is lower:

$$\omega L^o = (1-\eta)\phi_L L^o + (\phi_K - r^* + \tau\eta\phi_L L^o/K)K - T. \tag{1.5'}$$

Now an increase of ϕ_K associated with a rise of τ gives

1/ This is not the only case worth considering. Chapter II of this paper gives partial attention to the other case in which capital goods prices are inflated in equal proportion.

$$d\omega/d\phi_K = \left[1-(1-\tau)\eta\right](d\phi_L/d\phi_K) + (K/L^o) + (d\tau/d\phi_K)\eta\phi_L$$
$$+ (\phi_K - r^*)(dK/d\phi_K)(1/L^o)$$
$$= (1-\tau)\eta K/L^o + (d\tau/d\phi_K)\eta\phi_L$$
$$+ (\phi_K - r^*)\left[\phi_{KK}(K,L^o)\right]^{-1}(1/L^o) \qquad (1.6')$$

where $(d\tau/d\phi_K) = (1-\tau)/\phi_K$. A comparison of (1.6') and (1.6) shows that η introduces two new terms, both positive, in the total effect of τ upon ω. The first measures the degree to which w falls by less (in absolute terms) than ϕ_L falls, when K contracts, since η reduces w to $(1-\eta)\phi_L$. The second is the enhanced extra tax revenue from the τ increase that results from the fact that η makes the profits larger. Hence, in the presence of monopoly power, it is no longer theoretically certain that increased profits taxation will lower after-tax wages; up to a point, after-tax wages may benefit from profits taxation. A fuller and more general analysis of this issue is the subject of Chapter II of this paper.

What was the antecedent wisdom on profits taxation prior to the criticisms of such a tax made by Harberger? A number of countries have chosen the system of corporate taxation introduced by the United States in 1909. 1/ In broad outline, the corporation pays a flat tax rate on all taxable profits without any tax credit going to the shareowner for his share of the profits tax paid. The shareowners are liable for the personal income tax, if any, on their dividends and capital gains. Finally, on the principle that only income, not gross receipts, should be taxable, the corporations (and thus, indirectly, their owners) are permitted to deduct interest expense in the calculation of taxable profit income. The economic historian is left to infer the intended "economics" of this legislation. There was no formal defense of it using recognizable economic theory.

The term classical system, which has come increasingly to designate a tax structure of this type, suggests the rationale that is now imputed to it. 2/ In classical theory any profit produced by an enterprise, excluding here all one-time capital gains, is seen as an economic profit, or surplus, and is attributable to monopoly power, which may

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1/ A recent history is given in King (1977). Australia, Denmark, Holland, Luxembourg, Spain, and Switzerland are identified as using this tax system. "It was employed in the United Kingdom in the period 1965-73, and also tried and subsequently abandoned in both France and West Germany" (King, p. 50).

2/ The earliest use of the term the author has found so far is in the report to the European Economic Community by Professor A. J. van den Tempel, "Corporation Tax and Individual Tax in the European Communities" (November 1969). This is summarized by him in an appendix to Chown (1971).

be ascribed in turn to a monopolistic hold over some natural resource or to decreasing costs, which create obstacles to entry and competition. (Of course, such monopoly power is not a sufficient condition for the generation of a pure profit, only a necessary condition at one level of classical analysis.) In an economy displaying the competitive equilibrium of classical theory--from Ricardo and Mill to Samuelson, Arrow, and Debreu--no economic profit is generated; enterprises will avoid showing even an apparent profit if they merely finance all their capital expenditures by borrowing in the (perfect) credit market, which in classical theory is feasible and costless to do. Viewed through the lens of classical theory, then, taxable corporate profits are telltale evidence of corporate income beyond the return needed by the enterprises to obtain their capital from savers. In theory, this surplus or, more accurately, an arbitrarily large fraction of it, can be taxed away without causing a decline in the rate of interest that enterprises can afford--and be willing to bid--for investible savings and thus without a diminution of investment and saving.

It was from this classical perspective that Joseph Stiglitz (1973) registered the now well-known objection to Harberger's model. If firms finance their capital expenditures through borrowing, the profits tax (whether or not there are positive profits) will not raise the cost of capital and hence will not have the Harberger effects on the capital stock and wages. This objection might seem to be a mere debating point, and a highly academic one, as Harberger could reply that in fact firms do equity-finance a significant portion of their capital stock, including their marginal investment, and this is so because informational imperfections in the credit market frighten lenders from debt-financing the whole of a firm's capital outlays. But it is right to object: the Harberger argument asks to have its cake and eat it too, that is, to suppose that credit markets are seriously imperfect, so the classical option of financing purely (or even predominantly) with debt is closed, while the product and labor markets reliably ensure that capital and labor (before tax) receive their marginal products. One could add the observation that the proportion of the capital stock that is financed through equity has been declining in recent years, partly as a result of powerful corporate takeovers that may have had just that objective.

A theoretical demonstration of the "classical" rationale for corporate profits taxation is given in the recent paper by Guillermo Calvo and Edmund Phelps (1983). That exercise, although perhaps not the only formal analysis of the benefit from taxing economic profit, may be the first full general-equilibrium treatment. The paper paints a starkly simple closed economy without possibilities for capital, and a homogeneous population of dynastic families of the Ricardo-Ramsey-Barro type. The novelty of the otherwise familiar setting is its non-Walrasian view of the product market. It is a "customer market" subject to frictions in the transmission of price information, as in the partial-equilibrium model of non-Walrasian competition set out by Edmund Phelps and Sidney Winter (1970). Owing to this market imperfection, the competition of

firms for market share will fail to wipe out all pure profit, and so leave price hanging above average and marginal cost, provided that the real interest rate, which firms must pay (or charge themselves) when "investing" in a larger market share, is positive. The pure profit per unit of output will be greater the higher is the real interest rate. With this model Calvo and Phelps show that a flat rate of tax on profits, the proceeds of which are used to finance an employment subsidy or a cut in wage-income taxes, will induce an increase in the amount of labor supplied, through the incentive effects of the higher wage and lower dividend income, and thereby an increase of output that is worth more (in labor units) to households than it costs (since price exceeds marginal cost, so labor's marginal product exceeds the wage). There is expanded choice from the increased profits taxation.

The next section extends the model of profits as surplus to an economy that is open and uses capital. It will be shown that the openness of the economy causes profits taxation to have some complicating side effects upon national welfare that modify--whether bolstering or weakening--the case for a positive profits tax. That accomplished, it will then be possible to introduce the harmful Harberger effects, which arise insofar as there has to be some equity financing of firms' capital stock, and to weigh these effects with the therapeutic Calvo-Phelps effects of the same tax (together with the other side effects that arise in the analysis).

II. The Modified Case for Profits Taxation in an Open Economy

The model here describes a homogeneous and stationary open economy--"our" economy--that produces a single consumer good, some (or all) of which is consumed at home, that amount being denoted C_1. Government purchase of the national output, excluding any outlay for employment subsidies, is a constant, G_o. Export demand, X, is an increasing function, νe^{γ}, where ν and γ are positive constants, of the real exchange rate, e; the latter is the foreign price level (P*) after conversion by the exchange rate to our currency units, EP*, as a ratio to our price level (which is the GDP deflator). In stationary states these three demands add up to net domestic product, 1/ which we take to be a constant-returns-to-scale function, ϕ, of capital, K, and labor, L,

$$\phi(K/L,\ 1)L = C_1 + G_o + \nu e^{\gamma}. \qquad (2.1)$$

This is a balance relation stating that net investment equals zero.

The other macrobalance relation states that the balance on current account equals zero, hence that net national expenditure is equal to net national product. The latter will exceed, for example, the net

1/ If we think of firms as having to import their replacement needs, some reinterpretation and a few amendments of the model are required.

domestic product by the amount of the excess of interest and dividend income from our past foreign investments, r*eF, over the opposite income that foreigners earn on their holdings of our firms' debt and equity; for simplicity it will be supposed that our nationals' relative share of our firms' equity at the moment of a hypothetical shift of the profits tax rate parameter happens to equal our nationals' relative share of our firms' debt, the common share being denoted h, where $0 \leq h \leq 1$. Our country also spends foreign exchange on importing a quantity C_2 of foreign-made consumer goods at a cost eC_2 in terms of the home good.

$$\phi(K,L) + r^*eF - (1 - h)\left[\phi(K,L) - (w^fL + T_\pi)\right] = G_o + C_1 + eC_2 \quad (2.2)$$

Here w^fL denotes the net wage bill of the firms, in terms of product, after subtracting any employment subsidies, σ, from the product wage, w, times labor input, L. That is, letting T_W denote wage income taxes (positive or negative),

$$w^fL = \omega L + T_W - \sigma \quad (\equiv wL - \sigma).$$

Profits taxes, T_π, must match the sum of government expenditure and the subsidy (if any) not covered by wage taxes:

$$T_\pi = G_o + \sigma - T_W \quad (\equiv G_o + \omega L + T_W - w^fL - T_W).$$

Adding these latter two equations gives

$$w^fL + T_\pi = \omega L + G_o.$$

Hence (2.2) can be written as

$$r^*eF + \omega L + G_o + h\left[\phi(K/L,1)L - (\omega L + G_o)\right] = G_o + C_1 + eC_2. \quad (2.2a)$$

The strategy of the following analysis is to examine the welfare effects of a small increase of τ that succeeds in raising government revenue, calculated at the initial level of L, with which to finance wage-tax relief or employment subsidies in order to raise the after-tax wage rate. A useful relationship here is the following:

$$\begin{aligned}\omega L &= wL - T_W \\ &= w^fL + \sigma - (\sigma + G_o - T_\pi) \\ &= (1-\eta)\phi_L L + \tau\left[\phi_L L - (1-\eta)\,\phi_L L\right] - G_o \\ &= \left[1 - (1-\tau)\eta\right]\phi_L L - G_o.\end{aligned}$$

In this linkage we are free to regard ω as the shift parameter and τ as the variable. Thus, the two equations (2.1) and (2.2a) are viewed as

containing a policy parameter, ω, and five dependent variables, C_1, C_2, L, e, and K, given r* and hence the corresponding ϕ_K, ϕ_L, and ϕ.

An expedient class of demand functions for present purposes are those of the form

$$C_1 = \alpha(C_1 + eC_2), \quad 0 < \alpha < 1, \tag{2.3}$$

so that domestic consumption is a constant share of total consumption expenditure. Naturally, this feature of the model is best conceived as an approximation where nothing crucial hinges on it.

The problem of the behavior of the labor supply, or demand for leisure, does not have so attractive a solution. When ω is increased, do households increase or decrease their effort? There may be a positive net income effect here, for although there is a permanent loss of after-tax dividends resulting from a permanent decline in the firms' pure after-tax profits, the nationals' share of this offset, h, may be less than one; so this loss may not wash out the gain of income from the higher ω. Rational choice theory says only that if consumer goods are not inferior, a household's effort will not decrease (if at all) by so much as to prevent an increase of (after-tax) wage <u>income</u> when the (after-tax) wage rate rises. In the inadmissible borderline case, the effort change, dL, is given by $-\omega dL = (1-h)Ld\omega$. For all admissible cases, therefore, we have

$$dL = (1-h)\left[-L + \Delta\right]d\omega/\omega, \quad \Delta > 0. \tag{2.4}$$

An interesting case is $\Delta = L$, so that L is perfectly inelastic; but, since the income effect is possibly weak (because our nationals may have owned a large fraction h of the profits taxed away), the case $\Delta > L$ would be a reasonable guess.

To determine (K/L) in (2.1) and (2.2a), we refer again to the cost of capital and the marginal rate of return. Let us first take the pure case in which all capital investment is costlessly bond financed; equity owners therefore receive only the economic profit. So the cost of capital is r*, independent of the profits tax rate, τ. As noted earlier (p. 6), the marginal rate of return to investment--that is, the increase of a firm's revenue from investing an extra consumer-good unit's worth of physical capital in the production of that consumer good--decreases with the introduction of monopoly power, <u>given</u> the relative price (P_K/P) of the capital good, by the factor η; but the relative price of the capital good is also decreased by the same factor, so the marginal rate of return remains equal to the familiar "marginal product of capital," ϕ_K:

$$(1-\eta)\phi_K(K/L,1)/(P_K/P) = r^* = \phi_K(K/L,1). \tag{2.5}$$

Thus K/L is a constant, say k, determined by r*.

The system (2.1), (2.2a), (2.3), (2.4), and (2.5) provides five equations with which to solve for the five variables (C_1, C_2, L, K, and e). Our interest in this system is its implications for the effect of higher ω—achieved through higher τ—upon household welfare. It is desired to calculate the change of welfare, dU, resulting from a small increase, $d\omega$, of the after-tax wage.

The first differential of the utility function, $U(C_1, C_2, L)$, gives

$$dU = U_1, dC_1 + U_2 dC_2 + U_3 dL. \tag{2.6}$$

From utility theory $U_2 = eU_1$ and $U_3 = \omega U_1$, where $U_1 > 0$. Hence,

$$dU = U_1(dC_1 + edC_2 - \omega dL). \tag{2.7}$$

But the first differential of (2.2a) is 1/

$$(1-h)Ld\omega + \left[\omega+h(\phi_L-\omega)\right]dL - (C_2-r^*F)de = dC_1 + edC_2,$$

and hence

$$dC_1 + edC_2 - \omega dL = (1-h)Ld\omega + h(\phi_L-\omega)dL - (C_2-r^*F)\,de.$$

Therefore

$$dU = U_1\left[h(\phi_L-\omega)dL + (1-h)Ld\omega - (C_2-r^*F)de\right]. \tag{2.8}$$

The above result shows that three separate welfare effects occur. The first of these terms in (2.8) is the work incentive effect on which the Calvo-Phelps model rests. Provided $dL > 0$ there is a utility gain in proportion to the gap between ϕ_L and ω. (With $t_w > 0$, τ cannot be large enough to close the gap.) The new features here are that potentially $dL < 0$ and, second, as implied by the coefficient h, the force of the effect of dL is attenuated by the fact that not all of the increase (or decrease) of output will accrue to nationals since they are only part owners of the firms' equity.

The second term measures the gain from a higher profits tax that arises to the extent that the national firms being taxed are owned by foreigners rather than nationals. In Harberger's analysis, taxation of the foreigners' profits constitutes an increase in the cost of capital, but not here; the profits are a surplus that is a "sitting duck" for the national treasury.

1/ The change of the capital stock, dK, which equals kdL, drops out here since, at the margin, more K does not add to national income (after netting out foreigners' share of interest plus profits and adding nationals' overseas counterpart). If h is constant, for example, $edF = -hdK$ costs r^*hdK of national income while the benefit is only $h\phi_K dK$; since $\phi_K = r^*$ there is no gain.

The sum of these first two effects, in view of (2.4), is

$$U_1(1-h)Ld\omega\lfloor 1-h(\phi_L-\omega)/\omega + h(\phi_L-\omega)\Delta/L\rfloor,$$

which can fail to be positive only if Δ is very small, so dL is negative and absolutely large, and ω is very small in relation to ϕ_L.

The last term captures the indirect welfare effect through the real exchange rate of the two direct effects of increased ω just discussed. To determine the real exchange rate in the present stationary setting, we may view it as equilibrating the supply of the domestic consumer good,

$$C_1^s = \phi(k,1)L - G_o - \nu e^{\gamma},$$

which is obtained from (2.1), and the demand for the domestic consumer good,

$$C_1^d = \alpha^{-1}\{er^*F + \omega L + h\lfloor\phi(k,1)L - (\omega L + G_o)\rfloor\},$$

which is derived from (2.2a) and (2.3). Consider now the $(C_1, 1/e)$ plane. The supply curve is rising with reference to 1/e because a real appreciation causes foreigners to relinquish more of the domestic output for domestic consumption. The demand curve is falling because the appreciation reduces the purchasing power of nationals' overseas income, thus reducing consumption of the domestic consumer good.

In this supply-demand system, a rise of ω buoys domestic demand, provided $h < 1$, as it transfers income from foreign owners to nationals, which, according to the model, has no offsetting effect on supply; so the effect is to appreciate the currency (i.e., to raise 1/e). This produces a welfare gain or loss according to whether C_2 exceeds or falls short of r*F, as the third term in (2.8) shows. But if and only if $dL/d\omega > 0$ there is an opposing effect. The induced increase of labor supplied and output produced increases the supply, C_1^s, by the amount $\phi(k,1)$ per unit of increased L, while it increases the demand, C_1^d, by $\alpha^{-1}\lfloor(1-h)\omega + h\phi(k,1)\rfloor$, which, if α is near enough to 1, must be a smaller increase; so the effect here, at least for large α, is to depreciate the currency and to produce the opposite effect on welfare.

One could imagine, at least when only nationals own the firms, so that there is no possibility of $\alpha L < 0$, that if all the domestic output were produced by a single monopolist he would aim to raise his price enough from the standpoint of its shareowners--with account taken of his effect on the real exchange rate and his shareowners' foreign holdings and imported consumption--to maximize their utility while neglecting his disincentive effect on the amount of effort supplied. The increased ω would then produce an unambiguous welfare gain: the labor incentive effect would outweigh the depreciation of the currency, at least until ω grew larger. If this is true, it can be seen that if the domestic

output is produced instead by many firms, each with monopolistic power, there will be no tendency for the firms to take account of their collective effect on the exchange rate, so there may be too little real appreciation from the national standpoint. The monopolists, acting alone, do not replicate the optimum national tariff. Hence increased ω would not unambiguously produce a welfare gain: the benefit of increased labor might be outweighed by the loss, if $C_2 > r^*F$, from depreciation, but this is perhaps a remote possibility. A welfare gain from some increase of ω is more likely.

It remains to show the effect in the present model of supposing that firms cannot or will not finance all their capital investments by borrowing. If b is the proportion that can be financed by debt, the cost of capital is calculable from the condition of zero profit on the marginal investment,

$$(1-\tau)\phi_K(K,L) = b(1-\tau)r^* + (1-b)r^*. \tag{2.5'}$$

The implication is

$$\phi_K(K,L) = r^*(1-b\tau)/(1-\tau). \tag{2.5a'}$$

It follows that for the term $b < 1$, an increase of τ has the effect on ϕ_K emphasized by Harberger. The consequences for welfare of an increase of the profits tax rate must now be recalculated to include this effect.

In the forgoing analysis we relied upon constancy of ϕ_K to argue that increased τ would boost ω through the relation

$$\omega L = (1-\eta)\phi_L + \tau\eta\phi_L L - G_o.$$

Now, with $b < 1$, there are quasi-rents not offset by interest expense which add a taxable "profit" on top of the pure profit:

$$\mu K = \phi_K K - br^*K + \eta\phi_L L \ (\equiv \Pi). \tag{2.9}$$

Multiplying by τ and using (2.5') yields

$$\tau\mu K = (\phi_K - r^*)K + \tau\eta\phi_L L \ (\equiv T_\pi). \tag{2.10}$$

Hence

$$\omega L = (1-\eta)\phi_L L + \sigma - (\sigma + G_o - T_\pi)$$

$$= (1-\eta)\phi_L L + (\phi_K - r^* + \tau\eta\phi_L L/K)K - G_o \tag{2.11}$$

$$= \phi(K,L) - r^*K - (1-\tau)\eta\phi_L L - G_o, \tag{2.11a}$$

which is equivalent to (1.6') after the introduction of any employment subsidies, σ. But in the present model, the wedge between ϕ_K and r^*

appearing in (2.11) is narrowed by the factor 1-b, becoming $\tau(1-b)r^*/(1-\tau)$, according to (2.5'). Hence

$$\omega L = (1-\eta)\phi_L L + \tau\left[(1-b)r^*K/(1-\tau) + \eta\phi_L L\right] - G_o. \qquad (2.11b)$$

For increased profits taxation to produce increased welfare it is not essential that the after-tax wage should increase as a result, but without it there would be little chance of a welfare gain. To determine whether increased τ will increase ω in the present case it is equivalent to determine, as in Chapter I, whether increased ϕ_K will have that effect, since ϕ_K must increase with τ, as shown by

$$d\phi_K/d\tau = (\phi_K - br^*)/(1-\tau). \qquad (2.5b')$$

This effect on ω, at the initial labor level L^o, can be calculated from (2.11) or (2.11a) to be

$$d\omega/d\phi_K = -(1-\tau)\eta(d\phi_L/d\phi_K) + (d\tau/d\phi_K)\eta\phi_L \qquad (2.12)$$

$$+ (\phi_K - r^*)\left[\phi_{KK}(K,L^o)\right](1/L^o),$$

which is identical in form to (1.6'). But, with $b > 0$ rather than $b = 0$ as in (1.6'), a larger increase of τ is needed to produce a given damage to ϕ_K, so that a given damage (a given increase of ϕ_K) buys a larger increase of τ and thus a larger gain through the taxation of economic profit; the second term is larger since $d\tau/d\phi_K$ is increased by the increased b. Equivalently,

$$d\omega/d\tau = -(1-\tau)\eta(d\phi_L/d\phi_K)(d\phi_K/d\tau) + \eta\phi_L$$

$$+ (\phi_K - r^*)\left[\phi_{KK}(K,L^o)\right](1/L^o)(d\phi_K/d\tau) \qquad (2.12a)$$

now shows diminished weight to the first and third terms, the sum of which could be negative, so the entire right hand is now more likely to be positive. As b approaches one--an extreme case--increased τ must result in higher ω, provided $\eta > 0$, and in any case not a lower ω.

The findings contained in (2.12) make clear what is the direction of the effect on the after-tax wage of increasing the profits tax rate at least up to a point. Evidently, the effect is positive at least when τ is small. Then the wedge, $\phi_K - r^*$, is likewise small so that increasing τ has no first-order cost via ϕ_{KK} while it does have first-order benefits through the two channels that depend on η--the first two terms in (2.12a). From the viewpoint of maximizing ω, then, the optimum τ is necessarily positive. This maximum occurs when ϕ_K is such as to make the right-hand side of (2.12) equal to zero, in which case 1/

1/ The result here uses (2.5') to find that $1-\tau = (1-b)r^*/(\phi_K - br^*)$.

$$0 = -\left[(1-b)r^*/(\phi_K - br^*)\right]\eta(-K/L^o) + \eta\phi_L\left[(1-b)r^*/(\phi_K - br^*)\right]/(\phi_K - br^*)$$
$$+ (\phi_K - r^*)\left[\phi_{KK}(K,L^o)\right](1/L^o)$$
$$= \eta\left[(1-b)r^*/(\phi_K - br^*)\right]\left[K(\phi_K - br^*) + \phi_L L^o\right]$$
$$+ (\phi_K - br^*)(\phi_K - r^*)\left[\phi_{KK}(K,L^o)\right]. \qquad (2.13)$$

An implication is that the maximizing τ is less than one--despite the omission of special additions to the model applying at $\tau = 1$ that would protect the model against the imagined possibility that no interior optimum, at some τ less than one, would occur.

It remains true that an increase of after-tax wages is not sufficient for an increase of welfare. The analysis of (2.8) showed that increased ω may decrease welfare if there results a decrease of labor owing to income effects or the increase of labor produces an excessive real depreciation of the currency. The re-analysis of this matter, now with the more general provision that $b < 1$, does not fundamentally differ. But the net income effect of the profit tax is larger now. If, for example, nationals own all of the national equity shares, in which case there was no income effect before, some of the decline of after-tax domestic profits is finally replaced by overseas dividend income or interest as more of national wealth is transformed into capital abroad. So a decrease of labor is made less unlikely, assuming leisure to be a normal good. But, by the same token, a real appreciation of the currency is also less unlikely. The main point to bear in mind, however, is that the net increase of households' income, as dividends ultimately fall by less than the (hypothetical) rise of after-tax wages, is itself a source of a welfare gain--and this positive element in the total welfare effect is also larger now. That is why when $b = 0$ the rise or fall of the after-tax wage rate is decisive. It is a reasonable assumption that the net force of these income-effect complications will not be so strong as to outweigh the welfare gain from improved after-tax wages.

III. Concluding Observations

The main objective of this paper has been reached: to embed the profits as surplus notion into an open-economy model with capital goods and to integrate into the analysis of that model the assumption, implicitly introduced by Harberger, that firms are compelled to equity-finance some (or all) of their marginal investment, either through retained earnings or new share issues, possibly because of credit-rationing phenomena arising in (necessarily imperfect) credit markets.

The conclusion to which this analysis points, considered in isolation from other factors, is that up to a point the imposition of a tax rate on corporate profits is welfare-increasing. The principal

benefit is that the siphoning off of some of the firms' pure profit, originating from the information frictions prevailing in product markets or more classical sources, makes possible a net addition to total tax revenue out of which there can be a lightening of the marginal tax rates on work, a consequent narrowing of the wedge between the after-tax real wage and the marginal productivity of labor, and a resulting increase in the amount of work done and output produced. The principal cost is that the consequent efflux of capital reduces the before-tax wage, which finally limits the optimum size of the profits tax rate to something less than 100 percent. There are side benefits if there results a real appreciation of the currency or if foreign shareowners bear some of the redistributive burden of the profits tax--and a side cost if instead there is a real exchange rate depreciation. With the introduction of partial equity financing it is still possible, though less likely, that an increase of after-tax wages will result. It was noted that any improvement of the after-tax wage will be less than offset by the fall of dividends--some capital will move abroad to restore some of the dividends; consequently there is a greater possibility of a net income effect strong enough to induce a cutback in the amount of labor supplied; but the resulting damage cannot erase the extra net income created (when after-tax wages rise by more than households' dividends finally fall) since it is only because their after-tax income has increased that households would work less.

It is reasonable to conclude that the profits-as-surplus view of the benefit from a profits tax rate (up to a point) survives in an open-economy model and may well survive even though a sizable portion of capital investment (including investment at the margin) has to be equity-financed. It is perhaps true that the element of surplus, or pure profit, in taxable corporate profits is not typically large as a proportion of the capital stock; but it should be noted that the effect of profits taxation on the cost of capital is proportional to the real rate of interest, which is also not typically large--near zero in the decade before the enactment in 1981 of fiscal incentives to invest in the United States.

It is less clear, at this stage, that the profits-as-surplus view would survive certain extensions of the model. One of the needed extensions is to recognize that some or all young workers might not share in the loss (or gain) of dividends from a profits tax (or tax cut) through their parents' bequests or *inter vivos* gifts. Then the increase of after-tax wage rates permitted by an increased profits tax cannot be counted on to induce an increase in the amount of work supplied. (There is an income effect pulling against the substitution effect.) One simply has to hope that, as an empirical matter, such an outcome will occur. In fact, direct econometric studies do indicate some positive wage elasticity in the supply of labor. But if in fact the young decrease their effort as the result of their higher wages after tax, *they* cannot suffer--they will be found working less hard only if they are better off! At worse there is a one-time further loss

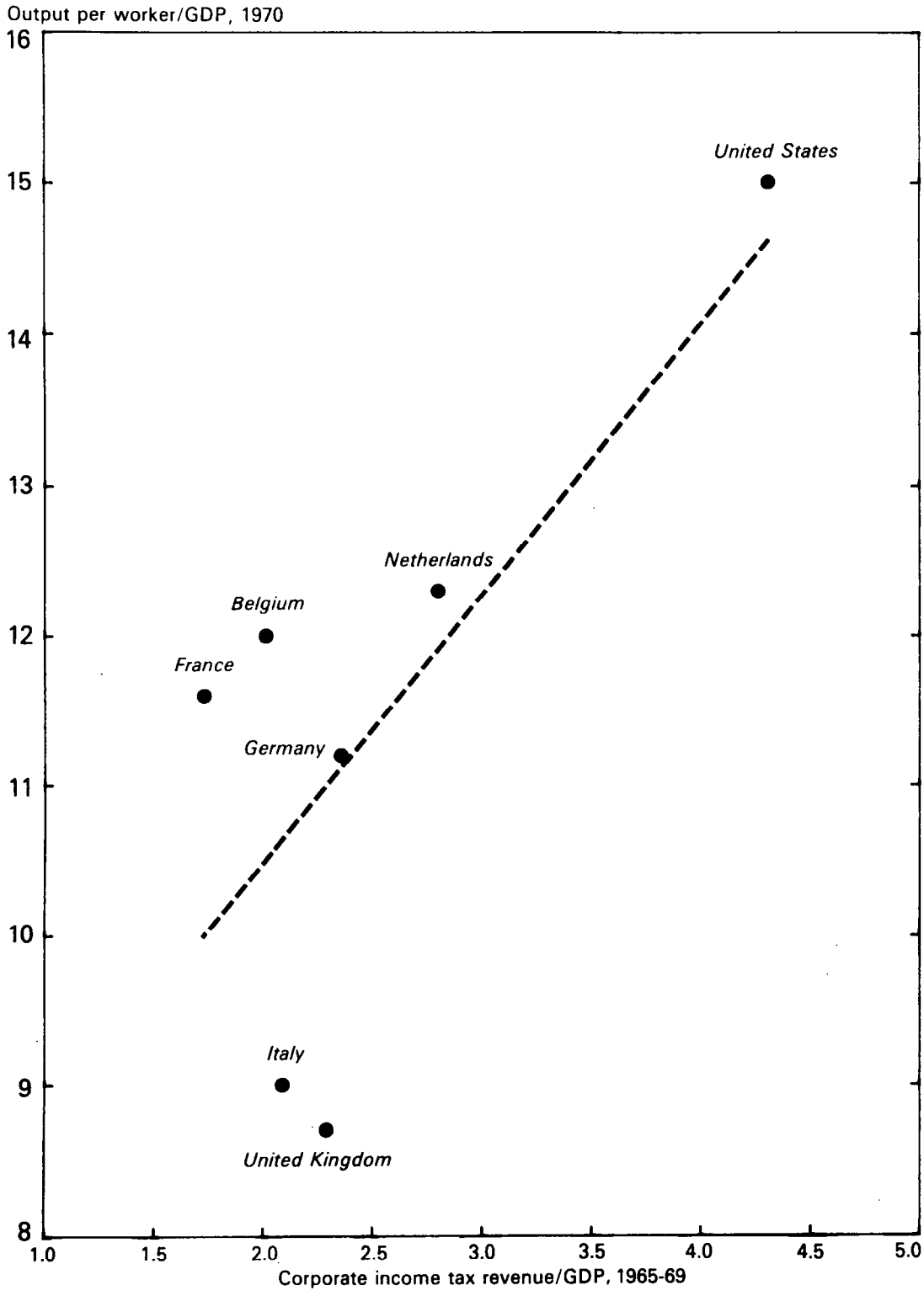
of income to the shareowners as a result of the reduced amount of labor, as long as capital is stuck in the short run.

A more radical extension of the model would recognize that the profits-as-surplus view does not serve as a complete theory of profits. In what has come to be known as the Schumpeterian view, innovators--called entrepreneurs--need finance to develop and try out their new ideas. The unsuccessful venture fails to recoup the investment-type outlay, recording a loss. The successful innovation earns a profit until-next period, as it were--imitators wipe out the profit by driving down the market price. In this view, a tax on profits is a fiscal penalty on innovation, or entrepreneurship. Since everyone likes progress this fact is reason enough, in the minds of some commentators, to oppose the taxation of profits.

It might seem at first blush that there is nothing fundamentally different in this view of profits from the profits-as-surplus view. If innovators are able wholly to debt-finance their development costs then there can be no harm from a profits tax, as Stiglitz argued; and if there is some pure profit arising from the fact that there are informational frictions in product markets (so innovators' early returns cannot be abruptly competed away by imitators owing to frictions in the flow of information to customers and to would-be imitators) one can expect a welfare gain to result from the introduction of a profits tax rate (at least up to some point); while if innovators must always equity-finance a portion of these development costs then there is some cost from a profits tax to be weighed against the expectable benefit. It would seem, then, that the analysis of this different view of profit would simply repeat the arguments that we have already heard (and integrated in the present paper). However, there are some significant differences between the political economy of innovation and the political economy of capital investment.

A familiar tenet of the now standard economics of innovation is that investments in ideas generate an external economy. The innovator is able at best to collect the increment in the national product accruing from his investment only in the first period, until imitators have had a chance to rush in. In subsequent periods the innovator is unable to appropriate the social return of his investment. Hence, it is argued, there is an under-production of new ideas. An extremely clear analysis of this view, with careful regard for certain qualifications, is contained in a paper by Kenneth Arrow (1961). If this is so, the introduction of a profits tax rate generates a first-order cost--curtailing investment in ideas when there is already a gap between marginal social product and the private cost of capital--that might overwhelm the firstorder benefit that can be expected from the redistribution of some of the economic profit originating in product market imperfections.

FIGURE 1


Output per worker/GDP, 1970
16
15
14
13
12
11
10
9
8
United States
Netherlands
Belgium
France
Germany
Italy
United Kingdom
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
Corporate income tax revenue/GDP, 1965-69

But perhaps it can sometime be shown that room should be made in our theory of innovation and profit for another image of the process. It would seem possible to argue that ideas are like an extractable (whether or not exhaustible) natural resource, such as fish or natural gas. Then it seems likely that just as there can be over-fishing there can also be over-spending in the competition to develop a new idea. There is a largely duplicative and hence somewhat wasteful competition to be first with the development of what is essentially the same idea that numerous other innovators would have brought out only a little later. On this revised view, then, it is no longer clear that there is under-investment in ideas even before profits taxation is introduced; on balance there may be over-investment in the development of new products and techniques. In that case there is a new first-order benefit to be obtained from introducing a profits tax rate (at least up to a point).

In view of the uncertainty over the consequences for profits-tax incidence raised by these needed extensions of our analytical model, one is compelled to admit that economic theorizing does not provide a strong a priori basis for a high corporate profits tax nor for a zero profits tax rate. It is of more than usual interest therefore to see the evidence on the association of profits taxation and economic efficiency. One is not in a position to argue that a statistical association is presumably spurious, since one is not sure what direction of association to expect, nor is one prepared to argue that a lack of association in either direction is merely the result of a failure to control properly for other variables, since one is not sure there is a true relationship.

An informal examination of the cross-national evidence on the relation between profits taxation and efficiency does not disclose a reliable relationship. The accompanying Figure 1 relates 1970 output per worker in seven countries, nations not radically dissimilar in cultural dimensions, to the level of profits tax revenue as a ratio to the gross domestic product over the preceding five years. There is some positive association here, although the steepness of the relationship cannot be taken seriously. One can imagine such a positive association as having arisen because reduced wage taxation, made possible by higher profits tax revenue, encourages a longer or more intensive work week or because the extra tax revenue was used to finance socially productive government investments. However, this positive relationship is not preserved in 1980. The most plausible inference appears to be that there is not a simple relationship between profits taxation and output per worker and that any partial relationship will only be uncovered by controlling for the other influential factors. A rather similar study of a much larger set of countries has recently been conducted by Vito Tanzi (1985). That study likewise disclosed no relationship between the two variables that could not be explained as a spurious association

(one involving mineral endowments). But these findings, limited though they are, are not altogether without significance. They lend some empirical evidence on top of the theoretical analyses discussed here in favor of the Scotch verdict, not proved. Neither evidence nor theory so far provides clear support for the position that profits taxation ought to be reduced.

References

Arrow, Kenneth J., "Economic Welfare and the Allocation of Resources for Invention," in The Rate and Direction of Inventive Activity: Economic and Social Factors, A Report of the National Bureau of Economic Research, New York (Princeton: Princeton University Press, 1962), pp. 609-25.

Calvo, Guillermo A., and Edmund S. Phelps, "A Model of Non-Walrasian General Equilibrium," in Prices, Quantities, and Macroeconomics, ed. by James Tobin (Washington: The Brookings Institution, 1983).

Chown, John, The Reform of Corporation Tax (London: Institute for Fiscal Studies, Publication No. 2, March 1971).

Giovannini, Alberto, "The Exchange Rate, the Capital Stock, and Fiscal Policy" (mimeographed, New York: Columbia University Graduate School of Business, October 1984, revised).

Harberger, Arnold C., "The Incidence of the Corporate Income Tax," Journal of Political Economy (Chicago), Vol. 70 (June 1962), pp. 215-40.

_____, "Efficiency Effects of Taxes on Income from Capital," in Effects of Corporation Income Tax, ed. by Marian Kreyzaniak (Detroit: Wayne State University Press, 1966).

_____, "The State of the Corporate Income Tax: Who Pays It? Should It be Repealed?" in New Directions in Federal Tax Policy for the 1980s, ed. by Charls E. Walker and Mark A. Bloomfield (Cambridge, Massachussetts: Ballinger Publishing Company, 1983).

Hayashi, Fumio, "Tobin's Marginal q and Average q," Econometrica, Vol. 50 (January 1982), pp. 213-24.

King, Mervyn A., Public Policy and the Corporation (London: Chapman and Hall, 1977).

Phelps, Edmund S., and Sidney G. Winter, Jr., "Optimal Price Policy under Atomistic Competition," in Edmund S. Phelps and others, Microeconomic Foundations of Employment and Inflation Theory (New York: W.W. Norton and Company, 1970).

Roy, A.D., "Labour Productivity in 1980: An International Comparison," National Institute Economic Review (London, August 1982).

Stiglitz, Joseph E., "Taxation, Corporate Financial Policy, and the Cost of Capital," Journal of Public Economics (Amsterdam), Vol. 2 (February 1973), pp. 1-34.

Tanzi, Vito, "Quantitative Characteristics of the Tax Systems of Developing Countries," International Monetary Fund (draft, May 20, 1985). Publication forthcoming in David Newbury and Nicholas Stern, eds., Modern Tax Theory for Developing Countries (Washington: The World Bank).

van den Tempel, A.J., "Corporation Tax and Individual Income Tax in the European Communities" (Brussels: European Economic Commission, November 1969).