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ON THE OPTIMAL TAXATION OF CAPITAL INCOME IN THE OPEN ECONOMY

David G. Hartman

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ABSTRACT

The optimal taxation of foreign and domestic investors' incomes is examined with a simple overlapping-generations model.

Even when tax rates are allowed to discriminate between these groups, the optimal tax rates on both domestic and foreign investors' incomes in the small open economy are identical and equal to the optimal rate of tax in the closed economy. In light of the emphasis in the literature on the extent to which the elasticity of international flows might lower optimal capital income taxes, this conclusion is quite a surprise.

In the large open economy, the optimal tax rate on foreign investors' income alone is a weighted average of one and the small economy tax rate. The optimal tax rate on domestic income is, again, unaffected by the openness of the economy.

When a uniform tax rate must be set in the large open economy, it is generally higher than the optimal tax rate for a closed economy, a conclusion contrary to the conventional wisdom. However, a higher elasticity of international capital flows is associated with a lower tax rate, as expected, but the rate remains above the closed-economy rate.

In summary, openness matters for optimal tax policy, primarily in the case of the large economy. The reason is mainly the ability to burden foreign investors with a tax liability.

David G. Hartman
Vice President and Chief
International Economist
Data Resources, Inc.
24 Hartwell Avenue
Lexington, MA 02173

On the Optimal Taxation of Capital Income in the Open Economy

The first Reagan term brought fundamental shifts in the U.S. tax treatment of savings and investment. Even prior to this complete reorientation of policy toward an encouragement of capital formation, the taxation of capital income had become probably the most popular topic of researchers in public finance, and interest has increased since. In light of the growing integration of the world's economies, it is curious that in all of the recent literature on taxation and investment, little attention has been devoted to international capital flows.

At best, authors recognize the possibility of capital flowing abroad and point out that international flows could prove to be problematic for their closed-economy results.[1] A major exception is the work of Goulder, Shoven, and Whalley (1983), in which investment abroad is explicitly incorporated in a large general equilibrium model of the U.S. GSW conclude that if capital outflows are highly elastic, the welfare effects of various tax changes can be drastically altered. International capital mobility is, thus, viewed in the literature as a potential constraint on domestic policymaking which becomes important only under the condition that the degree of mobility is quite high.

Having focused on the elasticity of international capital flows as the key factor in determining whether the traditional closed-economy models of public finance are appropriate, researchers have been reassured by the findings of Feldstein and Horioka (1980) and Feldstein (1983) that capital apparently does not flow freely across national boundaries. The conclusion that inelastic capital flows are not a matter of great concern has been shown in a previous paper to be deceptively simple (see Hartman (1985)). What the existing litera-

ture has ignored and that paper highlighted the possibility that foreign ownership of a portion of the domestic capital stock could imply that a tax burden could be imposed on those "outside the system." That is, a welfare gain to the economy could result from tax revenue collections from foreign investors. Since the tax revenue change can be a first-order effect, as compared to the welfare effects of capital income taxation in a closed (and otherwise non-distorted) economy, this consideration could loom large in the determination of welfare effects, as Hartman (1985) suggests.

It was, until very recently, understandable that the presence of foreign-owned capital in the U.S. was ignored despite its growing magnitude, since the U.S. position was that of a large net creditor. In fact, though, it is far from obvious that the net flows being outward implies that welfare analyses can neglect the gross inflows. Now, with the U.S. becoming a net debtor nation and the foreign-owned portion of the U.S. capital stock growing rapidly, it is far more difficult to ignore the foreign component.

In this paper, the issue of optimal taxation of capital income is addressed in the context of an economy facing an elastic supply of capital from abroad. It will be of particular interest to investigate whether the optimal tax is lowered by "openness" in line with the conventional wisdom, or raised, as one might suspect based on the fact that tax burdens borne by foreign investors represent a domestic welfare gain. While our primary motivation is to determine how, if at all, the openness of the economy affects the optimal tax rate on all capital income, it is also simple to derive an optimal tax rate for foreign-owned capital for situations in which that rate can be set indepen-

dently.

To clarify the role of the open economy assumption yet adequately address the motivation for saving and investing, we choose a much-simplified overlapping-generations model for analysis. As is true of similar models in general, the justification for taxing capital income on welfare grounds is very limited for the closed economy.

2. A Simple Growth Model

The purpose of this section is to lay out the elements of a steady-state growth model with overlapping generations of individuals who work in the first period of their lives and are retired in the second period.[2] Since our focus will be on the effects of foreign ownership of capital on the optimal tax rate, the approach will not lead to quite as compact a specification as could be used in a closed-economy analysis. At the same time, the model will be specified quite simply; in particular, it will take no account of complications such as government investment or the labor supply response examined by Feldstein (1984).[3] We simplify further by assuming that any deficiency in tax revenue from that required to finance a fixed per capita level of government expenditure is made up through use of a lump-sum tax. By building on such a straightforward closed-economy model in which a very traditional set of optimal taxation results obtain, we can more readily highlight the implications of "openness."

Our simple economy is characterized by population growth at rate n. The utility of each of $N_{t+1} = N_t(1+n)$ members of the younger generation at time

t is given by $u = u(c_1, c_2)$ where c_1 is consumption in the working years and c_2 is consumption during retirement. The young employ K_t of capital which lasts only one period and, thus, represents the savings (S_{t-1}) of the older generation during the prior period. Production per person can be expressed as $f(k)$, where $k = [K_t/(N_t(1+n))]$. The gross-of-tax return paid to members of the older generation equals rk per worker (or, equivalently, $rk((1+n)/n)$ per recipient). The young, in turn, save $s_t = [S_t/(N_t(1+n))]$ per capita. In steady state, s_t must, of course, equal $k(1+n)$. Dropping the time subscript for simplicity, the young's consumption is period 1 (the period of work) equals:

$$(2.1) \qquad c_1 = f(k)-rk-s$$

Suppose, further, that the government spends $g_t = [G_t/(N_t(1+n))]$ in each period, financing their expenditure by a "tax" at rate t on the capital income of retirees and/or a lump sum "tax" on retirees. We will allow either "tax" to be negative if such a result turns out to be optimal. Per capita consumption of today's young in their retirement is given by:

$$(2.2) \qquad c_2 = (1+r(1-t))s-[g-trs] = (1+r)s-g$$

The government utilizes its capital income taxing and lump-sum taxing capabilities to maximize steady-state utility, subject to the constraints of technology and of consumers' and producers' decisions. Consumers optimize across the two periods by choosing s such that:

$$(2.3) \qquad -U_1 + U_2\,(1+r(1-t)) = 0$$

The government, in turn, would evaluate tax changes according to:

$$(2.4) \qquad \frac{dU}{dt} = U_1 \frac{dc_1}{dt} + \frac{U_1}{1+r(1-t)} \frac{dc_2}{dt}$$

From (2.1), (2.2), (2.4), and the condition of steady-state growth in capital, the government sets:

$$(2.5) \qquad 0 = \frac{dU}{dt}/U_1 = \left[-k\frac{dr}{dt} - (1+n)\frac{dk}{dt}\right] + \frac{1}{1+r(1-t)}\left[(1+r)(1+n)\frac{dk}{dt} + k(1+n)\frac{dr}{dt}\right]$$

With some tedious manipulation, we arrive at the optimal tax rate:

$$(2.6) \qquad t_{opt} = \frac{(n-r)}{-r\left[\frac{(1+n)}{k}\frac{dk/dt}{dr/dt} + 1\right]}$$

It is useful at this point to define the capital demand and supply elasticities:

$$(2.7) \qquad e_k \quad - \frac{dk}{dr}\frac{r}{k}; \quad e_s \quad \frac{ds}{dr}\frac{r(1-t)}{s}$$

To simplify our descriptions of the results, we will usually implicitly assume that $e_s > 0$, although a postive value is not assured. Now, we can re-write the optimal tax expression as:

$$(2.8) \qquad t_{opt} = \frac{(n-r)}{(1+n)e_k - r}$$

As expected in so simple a model with the possibility of lump-sum taxation, the optimal tax on capital income is zero if the economy is at the "golden rule" level of capital per worker already (that is, if f'=n). Otherwise, there is some scope for a "tax" (positive or negative) to improve welfare by moving the economy in the direction of the golden rule.

This result highlights the point made by Atkinson and Stiglitz (1980) that the optimal tax moves the economy part way to the golden rule; the result

is even clearer when rewritten as:

$$(2.9) \qquad rt_{opt} = \frac{(n-r)}{\frac{(1+n)e_k}{r} - 1}$$

This equation illustrates the tradeoff being made between reducing the distortionary effects of the tax and realizing the benefits of getting the net rate of return facing savers "correct" in the sense of the golden rule. If, for instance, the capital demand schedule is perfectly inelastic, so that distortions are absent, a subsidy or tax, as the case may be, is imposed, to insure equality of the rate of growth and the net rate of return to capital.

Since this result is not surprising (see Atkinson and Stiglitz (1980), Feldstein (1984), and Ihori (1984)), it will not be discussed in further detail. It is intended mainly as a basis for comparison with later findings for the open economy.

3. A Model of the Small Open Economy

The simplest type of open economy to analyze is the "small" open economy, faced with a perfectly elastic supply of capital from abroad. The small open economy will probably not provide the most interesting results, since the ability to burden foreign investors with a capital income tax was a critical element in our belief that openness might matter for tax policy. The government of a small open economy can impose no such burden. Nevertheless, the small economy case is a useful starting point since the model is simple to describe and is also the characterization almost exclusively found in the public finance literature. There are several similar tax questions we will

address in turn: the optimal differential tax on foreigners' capital income when the domestic tax rate is fixed, the optimal differential tax when the domestic tax rate is set simultaneously and optimally, and the optimal uniform tax rate for all capital income.

A. The Optimal Tax on Foreign Investors' Incomes with a Fixed Domestic Tax Rate

We begin our analysis with an issue which has attracted the most attention from economists in the past: the optimal taxation of foreign investors' returns, when the domestic tax rate is given. The conventional widsom holds that a country faced with highly-elastic capital inflows should not tax foreign investors' incomes. For reasons we will examine in some depth, the result obtained here is quite at variance with the received wisdom.

The model is very similar to that already considered, except that the presence of foreign-owned capital supplied with infinite elasticity (assuming that the autarky return in the domestic economy exceeds the world return) implies complete separation of the savings and investment decisions. Furthermore, the net-of-tax rate of return earned by foreigners is determined abroad. Thus, the tax rate, t^*, and the foreign return, r^*, determine the gross domestic rate of return as $r^*/(1-t^*)$. As before, consumption in the first period is given by equation (2.1), which now simply indicates that gross payments to <u>all</u> capital owners plus the workers' savings must account for the entire non-consumed production of the economy. Consumption in period 2, however, must explicitly reflect the payment of taxes by foreign owners of capital, and is given by:

$$(3.1) \qquad c_2 = (1+r)s - [g - t^*r(k(1+n)-s)]$$

That is, the lump sum tax on the older generation is reduced to the extent that the foreign-owned portion of the capital stock generates tax revenue. The government, then, optimally sets t^* so that:

$$(3.2) \qquad 0 = \frac{dU}{dt^*}/U_1 = \left[-k\frac{dr}{dt^*} - \frac{ds}{dr}\frac{dr}{dt^*}\right] + \left[(1+r)\frac{ds}{dr}\frac{dr}{dt^*} + S\frac{dr}{dt^*} + rk^* + t^*k^*\frac{dr}{dt^*} + t^*r(1+n)\frac{dk}{dr}\frac{dr}{dt^*} - t^*r\frac{ds}{dr}\frac{dr}{dt^*}\right]$$

or

$$(3.3) \qquad t^*_{opt} = t\left[\frac{e_s s}{(1+n)e_k k + e_s s}\right] + \frac{(n-r(1-t))}{(1+n)e_k + e_s \frac{s}{k}}$$

Ignoring the second term for the moment, it may be somewhat awkward but is quite helpful to think of the optimal tax on foreign investors' income as being a weighted average of the fixed tax rate on domestic investors' income and zero, with the weights being determined by the relative elasticities of domestic savings supply and domestic investment demand.

The result is highly intuitive when we consider that a tax on foreign investors distorts the domestic investment decision, while a differential tax on foreign investors' returns differentiates the domestic investors' returns from the given world level, distorting the domestic savings decision. The higher is the elasticity of capital demand relative to the domestic savings supply, the more is the optimal tax on foreign investors pushed toward zero and away from the domestic tax rate.

The second term is a "golden rule" adjustment to the optimal tax,

which affects the optimal tax rate unless t has been set so that $n=r(1-t)$. Since we have indicated nothing about how t is determined, we cannot be much more specific about the implications of this expression. We can see, however, that the extent to which the economy is pushed toward the golden rule depends on the elasticities of the savings and investment relations. Also, it is clear (as long as $e_s > 0$, as we are assuming throughout) that t* is positively related to t. So, if the domestic tax rate is fixed at a level below the optimum, the optimal tax rate on foreign investors' incomes is reduced as well.

More interesting is the problem of setting both t and t* simultaneously, to which we will now turn.

B. The Optimal Tax Rates on Foreign and Domestic Investors' Incomes

In determining simultaneously the optimal tax rate on foreign investors' returns and domestic investors' returns, the government's basic behavior is governed by the same equations for utility and consumption in Section 3.A. This time, however, the government is able to differentially influence the net rate of return which determines k (by changing t*) and that which determines s (by changing t). Corresponding to (3.2) , then, is:

$$(3.4) \qquad 0 = \frac{dU}{dt^*}/U_1 = -k\frac{dr}{dt^*} + \frac{1}{1+r(1-t)}\left[s\frac{dr}{dt^*} + rk^* + t^*k^*\frac{dr}{dt^*} + t^*r(1+n)\frac{dk}{dr}\frac{dr}{dt^*}\right]$$

so,

$$(3.5) \qquad t^*_{opt} = \frac{(n-r(1-t))}{(1+n)e_k}$$

For comparison purposes, the optimal tax on domestic investors is given by:

$$(3.6) \qquad 0 = \frac{dU}{dt}/U_1 = -\frac{ds}{dt} + \frac{1}{1+r(1-t)}\left[(1+r)\frac{ds}{dt} - t^*r\frac{ds}{dt}\right]$$

or:

$$(3.7) \qquad t_{opt} = t^*, \text{ thus } t_{opt} = t^* = \frac{(n-r(1-t))}{(1+n)e_k} = \frac{(n-r)}{(1+n)e_k - r}$$

This conclusion deserves emphasis. Despite the fact that the nature of foreign investors' and domestic investors' behavior may be quite different, both tax rates are independently set to be equal. Also, they are non-zero only when the world economy does not generate a rate of return consistent with the golden rule growth path.

Furthermore, looking back at equation (2.8) we note that the optimal tax rate on capital income is the same as that produced in a closed-economy model. That is, the small open economy's optimal tax policy for capital income is uniform and identical to that of the closed economy. While such a conclusion is certainly striking and clearly at odds with the conventional wisdom, the intuition is straightforward. Obviously, the government of the small open economy is unable to burden the foreign investor with any tax liability. The tax rate placed on the foreign investor is translated directly into an impact on the domestic rate of return. Conversely, the only way the return to capital in the domestic market (and, hence, the domestic rate of capital formation) can be altered is by taxing the foreign investor. In general, the objectives toward which the closed economy directs tax policy must be met by taxing foreign investors' incomes. In this case, the taxation of foreign investors is dictated by the desire to move the economy toward the golden rule. An equivalent tax rate applied to the domestic investor is required for an efficient level of savings to be generated in the domestic economy, although

the domestic tax rate has no influence on the rate of capital formation. Thus, the problem of how to tax the foreign investor is directly analogous to the problem of capital taxation in the closed economy, despite the fact that the questions, at first glance, seem unrelated. Consequently, it is hardly surprising in retrospect that the optimal tax formulae for the domestic investor in the closed economy and the foreign investor in the small economy should turn out to be identical.

It should be noted that it is because the foreign investor cannot be forced to share any burden of the tax, that a tax is levied only for "golden rule" reasons. That is, if any other government policies can be used to achieve n=r, then a zero tax on capital income, regardless of recipient, is optimal. In the closed economy, government debt or social security could be used as alternative instruments, but in the open economy the options are limited to those affecting foreign investment.

Parenthetically, it should also be noted that if a small open economy is somehow prevented from taxing the income of foreign investors, it should not tax domestic capital income either. Naturally, such a result is necessary to insure the optimality of domestic savings decisions.

C. The Optimal Uniform Tax Rate on Domestic and Foreign Investors' Incomes

Since the exercise carried out in Section B led to a uniform tax rate on foreign investors and domestic investors, the tax treatment appropriate to situations which the taxing authority is forced to set a uniform tax rate is obviously the same (given by equation (3.7)). When we relax the strict <u>small</u>

open economy assumption in the next section, a variety of factors will contribute to the inequality of optimal tax rates set separately and, thus, make the restriction of equal rates a binding constraint on government action.

4. A Model of the Large Open Economy

The optimal tax analysis for an open economy sufficiently "large" to influence the net return it must pay to foreign investors is significantly more complex than that for the small open economy. At the same time, it is probably the case for a number of countries, and is certainly true of the United States, that the small economy assumption is unrealistic. Thus, we turn to the more complex situation; as in Section 3, we will consider the setting of an optimal tax on the foreign investor under three different assumptions about the way the tax on domestic investors is determined.

A. The Optimal Tax on Foreign Investors' Incomes with a Fixed Domestic Tax Rate

As before, we first take the domestic tax rate as pre-determined. The government's optimization problem remains basically the same as before, but now we must take explicit account of the simultaneous determination of the domestic rate of return (and, hence, domestic savings and investment) and any tax-induced change in the level of foreign investment. Since the supply of foreign capital is no longer determined simply as the excess of domestic capital demand over supply, k^* must be explicitly introduced (as will be its elasticity e_{k^*}):

$$(4.1) \qquad c_2 = (1+r(1-t))s - [g-trs-t^*rk^*] = (1+r)s - [g-t^*rk^*]$$

The basic relations to be solved are, then, the familiar equation for welfare change, plus:

$$(4.2) \qquad \frac{dc_1}{dt^*} = -k\frac{dr}{dt^*} - \frac{ds}{dt^*}$$

$$(4.3) \qquad \frac{dc_2}{dt^*} = (1+r)\frac{ds}{dt^*} + s\frac{dr}{dt^*} + rk^* + t^*r\frac{dk^*}{dt^*} + t^*k^*\frac{dr}{dt^*}$$

$$(4.4) \qquad s + k^* = k(1+n)$$

The optimal tax is, finally, given by:

$$(4.5) \qquad t^*_{opt} = t\left[\frac{e_s s}{(1+n)e_k k + e_s s}\right]\left[\frac{e_{k^*}}{1+e_{k^*}}\right] + \left[\frac{(n-r(1+t))}{(1+n)e_k + e_{sk}\frac{s}{}}\right]\left[\frac{e_{k^*}}{1+e_{k^*}}\right] + \left[\frac{1}{1+e_{k^*}}\right]$$

The optimal tax expression could have been written in a slightly more compact form, but each of the three terms in (4.5) represents a distinct motive for taxing foreign investor's income. The first term obviously represents the "domestic tax factor." In this term, the domestic tax rate is multiplied by an expression representing the domestic savings elasticity relative to the domestic investment demand elasticity and an expression in the elasticity of foreign capital supply. The first bracketed expression, as noted in our discussion in Section 3.A, can be viewed as a weighting factor indicating that the optimal foreign investors' tax rate is pushed closer to the domestic investors' tax rate as investment demand is relatively less elastic (and, hence, the distortionary effect on investment of discouraging capital inflows is less). The second bracketed expression in the first term indicates that this domestic tax factor becomes less important as the elasticity of foreign capital supply is lower.

Similarly, the second term of (4.5) consists of the familiar "golden rule factor" multiplied by the same expression in the elasticity of foreign capital supply. Again, this factor becomes less important as the foreign capital supply elasticity declines.

In turn, as the supply of capital by foreign investors becomes less elastic, the final term, which we can call the "revenue factor" comes to dominate tax policy. That is, the less elastic is the supply, the greater is the fraction of the tax borne by the foreign investor and the higher is the optimal tax. Thus, for instance, as the elasticity goes to zero, the optimal tax rate approaches one.

A simple way of viewing (4.5) is that the optimal tax is a weighted average of the optimal tax derived in the small open economy case (given by (3.3)) and one, with weights $[e_{k*}/(1+e_{k*})]$ and $[1/(1+e_{k*})]$. The government would like to tax away all the return earned by foreign investors, but is restrained by the foreign investors' response to tax policy. The significance of that response determines the extent to which the government moves away from that revenue objective and toward matching domestic tax policy and moving toward the golden rule path, as would the government which could impose no burden on foreign investors.

B. The Optimal Tax Rates on Foreign and Domestic Investors' Incomes

Now, suppose that the domestic tax rate is also a flexible element of government policy and can be set jointly with t* in order to improve welfare in the steady state. The mathematical exercise is similar to those previously carried out, so the only expressions we will report here are the basic maximi-

zation result:

$$(4.6) \qquad 0 = \frac{dU}{dt^*}/U_1 = -k\frac{dr}{dt^*} + \frac{1}{1+r(1-t)}[s\frac{dr}{dt^*} + tr\frac{dk^*}{dt^*} + t^*k^*\frac{dr}{dt^*} + rk^*]$$

and the optimal tax rate expression which follows from it:

$$(4.7) \qquad t^*_{opt} = \frac{(n-r(1-t))}{(1+n)e_k}[\frac{e_{k^*}}{1+e_{k^*}}] + [\frac{1}{1+e_{k^*}}]$$

Similar to the result of the previous section, this expression is readily interpretable as the weighted average of one and the optimal tax rate previously derived for the small open economy. As discussed in Section 3.B it also is equal to a weighted average of one and the optimal domestic tax rate derived for the closed economy case. Expression (4.7), then, reflects a balancing of the desire to collect tax revenue from the returns of foreign investors and the desire to treat domestic and foreign investors similarly in terms of pushing of the capital stock toward the golden rule level.

Since a major focus of this exercise is on the impact of foreign investment on the optimal domestic tax rate, that rate is also derived. It might be supposed, because t* is available as an instrument for influencing the level of foreign investment, that t_{opt} would be the same as in the closed-economy case. Algebraic manipulation yields:

$$(4.8) \qquad t_{opt} = \frac{(n-r(1-t)) - (k^*/k)(1-t^*(1+e_{k^*}))}{(1+n)e_k + e_{k^*}\,k^*/k}$$

which, when combined with (4.7), does, indeed, imply that

$$(4.9) \qquad t_{opt} = \frac{n-r(1-t)}{(1+n)e_k},$$

the same conclusion as in the closed economy (and in the small open economy). Thus, <u>the presence of foreign investment does not alter the optimal domestic</u>

tax policy, so long as the tax rates facing foreign and domestic investors can be differentiated.

C. The Optimal Uniform Tax Rate on Domestic and Foreign Investors' Incomes

Unlike the case of the small open economy, in which the optimal domestic and foreign investor tax rates turned out to be equal even when not constrained to be so, the revenue term in (4.7) implies an important difference in the case of the large economy. Thus, the setting of an optimal uniform tax rate is a distinct problem here.

This exercise is the most interesting one in the context of our main original question, that of the extent to which an economy open to foreign investment would optimally select a different domestic tax policy than would a closed economy. To simplify the presentation, we recognize that the consumption derivatives are the same as given by (4.2) and (4.3), with t* replaced by t. Solving for the derivative of welfare with respect to t and setting it equal to 0 yields:

$$(4.10) \qquad t_{opt} = \frac{(n-r(1-t))}{(1+n)e_k}\left[\frac{e_{k^*} + e_s s/k^*}{1 + e_{k^*} + e_s s/k^*}\right] + \left[\frac{1}{1+e_{k^*} + e_s s/k^*}\right]$$

Thus, the optimal uniform tax rate on domestic and foreign investors' incomes exceeds the optimal tax rate for the closed economy. In particular, the optimal rate turns out to be a weighted average of one and the closed economy rate of tax or subsidy. The more inelastic are the supply of foreign capital and the supply of domestic savings, the higher is the optimal tax rate. While the former conclusion is not consistent with the prevailing wisdom, the

latter is.

5. Conclusions

In this paper, we have examined the optimal taxation of foreign and domestic investors' incomes. The model is a very simple one in which the only reason for taxing capital income in the closed economy is to move the economy closer to the golden rule rate of capital formation. Other complications could be introduced and some additional exercises have been carried out, but the broad outlines of optimal policy seem likely to be similar to the results obtained consistently throughout this paper.

The choice of an optimal capital income tax rate for the closed economy is made to partially close the gap between the economy's undistorted equilibrium and the golden rule. Because capital income taxes cause efficiency losses, the elasticity of supply of capital is the factor (inversely) influencing the extent to which the golden rule should be approached.

It is something of a surprise that the optimal tax rates on both domestic and foreign investors' incomes (when these can be set separately) in the small open economy are identical and equal to the optimal tax rate that would be set in the closed economy. The reason for this result is that the tax rate on foreign investors' incomes in the small open economy is the only instrument available to affect the level of the domestic capital stock and, thus, move the economy toward the golden rule. The tax rate on domestic investors' incomes, by contrast, affects only the savings rate and should be set to avoid any unnecessary welfare losses suffered if savings were distorted.

In the large open economy, the tax rate on foreign investors' incomes alone is used to meet two objectives: approaching the golden rule as in the small economy case but also shifting a tax burden onto foreign investors (whose welfare is assumed not to matter). The optimal rate is simply a weighted average of one and the small economy tax rate, with the optimal tax rate rising toward one as foreign investment is less elastic in supply. The optimal tax rate on domestic investment income is, again the same as in the small open economy and the closed economy, since there is no "revenue" effect on welfare to motivate a different outcome.

With respect to the question of primary importance, we note that in setting an optimal tax rate to apply to all capital income in the small open economy, we reach the conclusion that the openness of the economy does not matter - the same optimal tax rate reflecting deviations from the golden rule prevails.

In the large economy, by contrast, the government's optimal tax policy is affected by the possibility of and elasticity of the inflow of foreign capital. The optimal tax rate to be applied uniformly to capital income turns out to be a weighted average of one and the tax rate that would be set in the closed economy or the small open economy. That is, the optimal tax rate is higher than that for the closed economy. An exception would be the case of a negative doemstic elasticity of savings which exceeds, in absolute value, the elasticity of supply of foreign capital, since the weights are determined by the weighted sum of the two supply elasticities. The general conclusion is directly in contradiction to the received wisdom that the open-

ness of the economy should tend to lower the optimal tax rate. In fact, through, increased openness (an increase in the elasticity of foreign capital supply) is associated with a lower optimal tax rate (one closer to that derived for the closed economy), since the possibility for extracting a tax burden from foreigners is reduced relative to the foreign investment discouraged.

In summary, then, the openness of the large economy "matters" but, somewhat surprising, the openness of the small economy does not. The impact of openness itself (that is, the presence of foreign investment) on the optimal capital income tax does not accord with the arguments ordinarily made; but, the extent of the openness (that is, the elasticity of foreign investment) affects the optimal tax in a direction consistent with our intuition. Nevertheless, the optimal tax rate remains above that derived for the closed economy.

Footnotes

1. See, for example, Boadway (1979), Atkinson and Stiglitz (1980), and Kotlikoff (1984). An exception is, naturally, the literature which directly focuses on the tax treatment of the foreign income of multinational corporations. For an excellent review, see Caves (1982). An analysis to which the current paper owes a great deal, Dutton (1982), provides another example. However, this literature does not address the broader issues of tax policy in the open economy.

2. We, thus, have chosen simplicity over the richness of multi-period specifications, such as those used by Summers (1981) and Auerbach and Kotlikoff (1983). Our model is constructed much more in the spirit of King (1980), for example.

3. We also ignore such issues as the bequest motive for savings, the possibility of technical progress, and the availability of other policies to affect savings, as well as the welfare effects of tax policy along the path to a new steady state. We also follow the tradition of not discounting future generations' welfare, to simplify the algebra.

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