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ABSTRACT

This paper uses a dynamic computable general equilibrium model to compare, in an economy open to international capital flows, the effects of two U.S. policies intended to promote domestic capital formation. The two policies -- the introduction of an investment tax credit (ITC) and a reduction in the statutory corporate income tax rate -- differ in their treatment of old (existing) and new capital. The model features adjustment dynamics, intertemporal optimization by U.S. and foreign households and firms endowed with model-consistent expectations, imperfect substitution between domestic and foreign assets in portfolios, an integrated treatment of the current and capital accounts of the balance of payments, and industry disaggregation in the United States.

We find that the two policies (scaled to imply the same revenue cost) differ in their consequences for foreign and domestic welfare, the balance of payments accounts, international competitiveness, and U.S. industrial structure. The ITC produces larger domestic welfare gains because it is more effective in reducing intertemporal distortions, while the two policies have similar implications for intersectoral efficiency. From the point of view of domestic welfare, the relative attractiveness of the ITC is enhanced when international capital mobility is taken into account, a reflection of international transfers of wealth associated with foreign ownership of part of the U.S. capital stock. Whereas reducing the corporate tax rate improves the trade balance initially, introducing the ITC causes a deterioration of the trade balance in the short run. Reflecting a lower real exchange rate, export-oriented sectors perform better relative to non-tradable industries under a lower corporate tax rate than in the presence of the ITC, especially in the short run.

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I. Introduction

Recent studies have demonstrated that the effects of tax policies aimed at stimulating capital formation differ depending on the relative tax treatment of old and new capital. Reducing the corporate income tax (CIT) rate, for example, boosts the after-tax return on old and new capital alike. Raising the investment tax credit (ITC), in contrast, increases the marginal incentives to accumulate new capital but does not directly affect the after-tax return on old capital. Whereas both the ITC and a lower CIT rate alleviate intertemporal distortions associated with capital income taxation, the ITC is more efficient because it is a subsidy targeted to new (marginal) capital, while much of the tax benefits of CIT rate reductions apply to old (inframarginal) capital. Furthermore, the two policies yield different incidence effects: a lower CIT rate yields substantial windfall gains to corporate shareholders, while a higher ITC does not.

During the 1980s, industrial countries have significantly altered the tax treatment of old capital relative to that of new capital. In the United States, the Economic Recovery Tax Act of 1981 made the tax treatment of new capital relatively more favorable by liberalizing depreciation allowances and providing more generous investment credits. The Tax Reform Act of 1986 partially reversed these policy initiatives: it reduced the relative tax burden on old capital by cutting the statutory corporate tax rate, repealing the investment tax credit, and tightening depreciation allowances. Other industrial countries also have lowered corporate tax rates and broadened the corporate tax base by reducing depreciation allowances and investment credits.

This study compares the effects of two policies -- namely the introduction of the ITC and a reduction of the CIT rate -- that seek to

promote domestic capital formation but that treat old and new capital differently. Previous studies exploring such policies have abstracted from international capital flows. However, the growing international integration and openness of national economies -- especially in capital markets -- has caused policymakers to pay increasing attention to the implications of domestic tax policies for international capital and trade flows. Moreover, several studies have demonstrated that introducing international capital flows can substantially alter the effects of taxes on capital income. For example, Goulder, Shoven, and Whalley (1983) found that introducing international capital mobility may reverse the sign of the national welfare effects associated with the introduction of a consumption tax to replace the income tax. As another example, Summers (1986) and Goulder and Eichengreen (1989) observed that policies aimed at stimulating national saving (e.g., a government reducing taxes on all capital income earned by its residents irrespective of where it is earned) and policies promoting domestic investment (e.g., a government reducing taxes on capital income earned within its tax jurisdiction, irrespective of to whom the income ultimately accrues) yield similar outcomes in a closed economy but are likely to generate different effects on the domestic capital stock, trade flows, and international competitiveness if capital is mobile internationally.

To analyze the different effects of policies aimed at old and new capital, we employ a multi-sector general equilibrium growth model of the U.S. economy and the rest of the world that allows for international capital flows. The behavioral relationships in the model are grounded in intertemporal optimization based on forward-looking expectations. In particular, the model solves for a full intertemporal equilibrium generated by producers and

consumers endowed with perfect foresight. Hence, current account imbalances, representing the gap between domestic saving and investment, are explicitly modeled as the outcome of optimizing behavior in response to movements in intra- and intertemporal prices. This study, therefore, emphasizes the intertemporal aspects of net trade flows as well as the links between intertemporal and international trade. The model's fully dynamic approach distinguishes it from other general equilibrium models of the U.S. economy that have allowed for international capital mobility.[1]

Most general equilibrium models deal exclusively with long-term equilibria. This paper, in contrast, also addresses short- and medium-term issues related to adjustment dynamics. The model simulates the entire adjustment path toward a new steady-state equilibrium, incorporating adjustment costs in the investment process as well as imperfect substitution between domestic and foreign assets in portfolio demands.

The model incorporates a disaggregated treatment of U.S. production, enabling us to explore intersectoral distortions induced by capital income taxes. Whereas the Tax Reform Act of 1986 tended to worsen intertemporal distortions by raising the tax burden on new capital, it may have alleviated intersectoral distortions within the corporate sector: the lower corporate tax rate reduced the relative tax advantage of highly leveraged assets, while the elimination of the investment tax credit mitigated the apparently preferential treatment of equipment over structures.[2] In view of these recent policy changes, the relative magnitudes of intersectoral and intertemporal distortions induced by capital income taxation have become important issues in the debate on capital income taxation in the United States (see, e.g., Summers (1987)). Several studies, including Jorgenson and Yun (1986) and

Fullerton and Henderson (1989), have used general equilibrium models to investigate the relative importance of intertemporal and intersectoral distortions. These studies, however, do not incorporate international capital flows. This paper, in contrast, adopts a disaggregated dynamic model of an open economy integrated in world capital markets to explore how the intersectoral, intertemporal, and international effects of capital income taxes interact.

The use of a disaggregated model also allows us to examine how economy-wide policies yield differential sectoral impacts -- especially on selected tradable and nontradable industries. Policymakers in the United States have become increasingly concerned about international competition faced by import-competing and export-oriented industries, and, in particular, about the consequences of their fiscal policies for net capital flows and the international competitiveness of these sectors.

The paper uses numerical simulation because the complexity of the model defies an analytical solution. It compares the effects of different investment promoting policies on foreign and domestic welfare. It also analyzes short-run and long-run implications for net trade flows and international competitiveness of selected tradable sectors, as measured by their profitability.

We find that the ITC is more beneficial to national welfare than are lowered CIT rates. The presence of international capital mobility, with foreigners owning part of the domestic capital stock, reinforces this result. This is the case because an investment credit amounts to an implicit wealth tax on the owners — including foreign owners -- of the domestic capital stock. Hence, the introduction of the ITC tends to improve the net credit

position of the economy and, therefore, allows the domestic economy to run larger trade deficits than are possible with a lowered CIT rate. Relatively large initial interest rate effects that reduce initial domestic consumption contribute also to a stronger short-run trade performance in the case of a lower corporate tax rate: whereas introducing the ITC gives rise to a short-run deterioration, reducing the corporate tax rate causes a short-run improvement in the trade balance. We also find that the investment promoting policies that are most beneficial to overall national welfare tend to harm the international competitiveness of selected tradable sectors in the short run because these policies contribute to higher short-run real exchange rates accompanying larger initial trade deficits.

The rest of the paper is organized as follows. Section II describes the main features of the model. Sections III and IV present and interpret the simulation results in, respectively, the absence and presence of international capital flows. The results from sensitivity analysis are contained in Section V. The final section provides conclusions.

II. THE MODEL

In this section we offer a brief description of the model. A more detailed discussion of the model's structure is in Goulder and Eichengreen (1989). An appendix to the present paper, available upon request, includes a complete list of variable definitions and equations.

A. Overview

The growth model considers effects of policy changes on the allocation of resources across industries, across countries (the U.S. and rest of world),

and over time. Ten U.S. industries are distinguished; the industries differ in their dependence on the export market, in the degree to which they compete with foreign imports, and in the significance of foreign inputs in their production costs (see Table 1).

At each point in time, domestic and foreign producers combine cost-minimizing levels of labor and intermediate inputs with the existing capital stock. Intermediate inputs can be obtained both at home and abroad, and firms choose the mix of imperfectly substitutable domestic and foreign inputs in accordance with cost-minimization.

Industry capital stocks evolve over time as a result of managers' forward-looking investment strategies aimed at maximizing the value of the firm. Optimal investment involves balancing the costs of new capital (both the acquisition costs and the adjustment costs associated with installation) against the benefits in terms of the higher future profits made possible by a larger capital stock (see, e.g., Abel (1979) and Summers (1981)).

Forward-looking domestic and foreign households make consumption and portfolio decisions in accordance with intertemporal utility maximization. Overall consumption at each point in time is a composite of specific consumption good types which in turn are composites of domestically-produced and foreign-made goods of each type. When relative prices change, households alter the proportions of domestic and foreign consumer goods making up each composite in accordance with utility maximization. As on the production side, domestic and foreign consumer goods are treated as imperfect substitutes. Households' portfolio decisions include choosing the shares of domestic and foreign assets in financial wealth. An increase in the relative rate of

return offered by a given asset induces households to hold a larger fraction of their wealth in that asset.

Finally, the model incorporates a government sector in both the domestic and foreign economies. Each government collects taxes, distributes transfers, purchases goods and services, and faces a budget constraint according to which revenues and expenditures must balance in each year.

B. Production

1. U.S. Industries

a. Production technologies. Each of the ten domestic industries produces a single output using inputs of labor, capital, and intermediate goods. A multi-level structure governs the production in each industry (see Table 2). Firms choose the quantity of labor that maximizes profits, given the capital stock. Labor and capital combine to produce a value-added composite (VA). This composite then combines with intermediate inputs $(\bar{x}_1, \bar{x}_{2,\ldots}, \bar{x}_N)$ in fixed proportions to generate output (X).

Industry outputs serve both as intermediate inputs and as final goods for purchase by the government. These outputs also combine in fixed proportions to create 17 different consumer goods as well as the new capital goods used in investment.[3] Each intermediate input of type i is a constant-elasticity-of-substitution (CES) composite of foreign- and domestically-supplied intermediate goods of that type. To minimize costs, firms alter the mix of domestic and foreign inputs that make up each composite.

b. Producer behavior. Managers choose levels of employment, intermediate inputs, and investment to maximize V, the equity value of the firm. As discussed in Poterba and Summers (1985), this equity value can be

expressed as the discounted value of after-tax dividends (DIV) net of share issues (VN):

$$V_t = \int_t^{\infty} \left[\left(\frac{1-\theta}{1-\kappa}\right) DIV_s - VN_s \right] \exp\left[\int_t^s \frac{-r_u}{1-\kappa}\, du \right] ds \qquad (1)$$

where θ is the marginal income tax rate, κ is the capital gains tax rate, and r is the risk-adjusted rate of return that the firm must offer to stockholders. Equation (1) derives from the arbitrage condition requiring risk-adjusted rates of return to be equal across assets.

Dividends and new share issues in each period are related through the cash-flow identity equating sources and uses of funds:

$$EARN + BN + VN = DIV + IEXP \qquad (2)$$

where EARN represents earnings after taxes and interest payments, BN is the value of new debt issue, and IEXP is the value of investment expenditure. Earnings are given by:

$$EARN = [pF(K,L,M) - wL - P_M M - iDEBT](1 - \tau) + \tau D \qquad (3)$$

where K and L are inputs of capital and labor, M is the vector of composite intermediate inputs, p is output price (net of output taxes), F is quantity of output (gross of adjustment costs), w is wage rate (gross of taxes on labor), P_M is the vector of composite intermediate input prices (gross of tariffs and intermediate input taxes facing the industry), i is the gross-of-tax nominal

interest rate paid on debt, DEBT is the stock of nominal debt, τ is the corporate tax rate, and D is the value of currently allowable depreciation allowances. We assume that firms pay dividends equal to a constant fraction, a, of after-tax profits net of economic depreciation and issue debt to maintain a constant debt-capital ratio, b. We also assume that new share issues represent the marginal source of finance: that is, they make up the difference between EARN + BN and DIV + IEXP in equation (2).[4]

Investment expenditure is the sum of the "direct" costs of the new capital (net of the investment tax credit) plus adjustment costs associated with its installation:

$$IEXP = (1 - ITC)p_K I + (1 - \tau)p\phi I \qquad (4)$$

where ITC represents the investment tax credit rate, P_K is the purchase price of new capital goods, I is the quantity of investment, and $\phi(I/K)$ is adjustment costs per unit of investment. We model adjustment costs as internal to the firm: to add capital, currently available resources (labor, existing capital, and intermediate goods) must be devoted to installation.[5]

Output is separable between inputs and adjustment costs: $X = F(K,L,M) - \phi I$. Using the capital stock accumulation condition, $\dot{K} = I - \delta^R K$, one can derive an expression for the value of the firm in terms of I, L, M, prices, taxes, and the technology. Firms maximize this value subject to the capital accumulation condition. Optimal investment is given by

$$\frac{I}{K} = h(Q) = h\left[\left[\frac{V-B}{P_K K} - 1 + ITC + b + \omega Z\right]\left[\frac{P_K}{(1-\tau)p}\right]\right] \tag{5}$$

where $h(\cdot) = [\phi + (I/K)\phi']^{-1}$, B is the present value of depreciation allowances on existing capital, Z is the present value of depreciation allowances on a dollar of new investment, and $\omega = a(1-\theta)/(1-\kappa) - a + 1$. Q is in fact the shadow value of marginal capital, or tax-adjusted q. Since the components of Q — namely, V, B, and Z — are defined in terms of discounted streams of dividends and depreciation allowances, they incorporate expectations about the future.

The adjustment cost function is:

$$\phi(I/K) = \frac{(\beta/2)(I/K - \xi)^2}{I/K} \tag{6}$$

implying that the relationship between the rate of investment and Q is simply $I/K = \xi + (1/\beta)Q$.

2. Foreign Industry

The structure of foreign production is identical to that of domestic production, except for aggregation. A representative foreign firm produces output using inputs of capital, labor, and domestic and foreign intermediate inputs. Input and investment levels are chosen to maximize the value of the firm.

C. Household Behavior

Households are forward-looking and endowed with perfect foresight. The treatment of domestic and foreign households is symmetric.

1. Consumption and Asset Choices

In each country, a representative, infinitely-lived household solves a multilevel decision problem (Table 3). Each household chooses a path of consumption and a path of portfolio holdings. Labor supply is exogenous. When domestic and foreign assets are imperfect substitutes and offer different expected returns, portfolio and consumption choices need to be coordinated, since the choice of portfolio affects the overall rate of return to the household. One approach to this problem would be to incorporate risk explicitly, but the integration of portfolio choice and consumption demands in the face of uncertainty presents difficult and unresolved theoretical issues when there are many time periods and many consumption goods.[6] Moreover, risk may only partly explain the main empirical fact of interest: that households hold diversified portfolios despite sustained differences in rates of return.[7] We adopt an alternative approach that starts with the observation that households exhibit strong home-country preference: assets from their own country often make up the bulk of their portfolios, even when rates of return on other-country assets are comparable or higher. In keeping with this observation, we posit a portfolio satisfaction index which is consistent with observed home-country preference yet which can be embedded within a utility-maximizing framework that allows households to adjust asset shares in accordance with differences in rates of return.[8] For concreteness, we discuss the domestic household problem here (the structure of the foreign household's

maximization problem is perfectly analogous). In each period t, the domestic household maximizes a utility function of the form:

$$U_t = \int_t^{\infty} e^{-\delta(s-t)} \frac{\sigma}{\sigma-1} (C_s^{\beta} A_s^{1-\beta})^{\frac{\sigma-1}{\sigma}} ds \tag{7}$$

where δ is the rate of time preference, σ is the intertemporal elasticity of substitution, C is an index of overall consumption at a given point in time, and A is the portfolio satisfaction index, a function of the household's asset holdings. We specialize A to a CES function of α and $1-\alpha$, the shares of the household's portfolio devoted to domestic and foreign assets:[9]

$$A = k[\alpha_o^{1-\rho}\alpha^{\rho} + (1-\alpha_o)^{1-\rho}(1-\alpha)^{\rho}]^{1/\rho} \tag{8}$$

The household maximizes utility subject to the wealth accumulation condition:

$$\dot{WK}_t = r_{DD,t}\alpha_t WK_t + r_{DF,t}(1-\alpha_t)WK_t + YL_t - p_t C_t \tag{9}$$

where WK is the total nonhuman wealth owned by the household, r_{DD} and r_{DF} are the annual after-tax returns offered to the domestic household on its holdings of domestic and foreign assets, YL is labor income net of all taxes and transfers, and p is the price index for overall consumption.

$A(\cdot)$ summarizes the household's portfolio preferences: if $r_{DD} = r_{DF}$, households maximize utility by choosing the asset shares α_o and $1-\alpha_o$. When

rates of return differ, however, maintaining the portfolio shares α_o and $1-\alpha_o$ has a cost in terms of a lower overall return than that which could be obtained if the household held more of the asset with the higher return. The household chooses the path of α that balances the rewards of approaching preferred shares against the costs in terms of a lower overall return on the portfolio.

The parameter ρ in the portfolio satisfaction index is related to σ_A, the elasticity of substitution between asset shares ($\rho = 1 - 1/\sigma_A$). When $\sigma_A = 0$, households maintain shares α_o and $1-\alpha_o$ of domestic and foreign assets irrespective of differences in rates of return. As σ_A approaches infinity, household behavior approaches the limiting case of perfect substitutability, where the slightest difference in return leads households to hold only the asset offering the higher return.

In the solution to the household's decision problem (shown in appendix), current consumption and saving depend on full (human and non-human) wealth and the expected interest rates.[10] Higher future interest rates reduce wealth and thereby reduce consumption and raise savings. Changes in the relative returns offered by home and foreign assets induce households to raise the portfolio share of the asset whose relative return has increased.

Each asset generally yields a different return to residents of different countries; this reflects anticipated exchange rate movements and features of tax systems that impose different rates according to the residence of the taxpayer. $\bar{r}$ and $\bar{r}^*$, the average returns on the portfolios of domestic and foreign residents, are given by:

$$\bar{r} = \alpha r_{DD} + (1-\alpha) r_{DF} \tag{10}$$

$$\bar{r}^* = \alpha^* r_{FF} + (1-\alpha^*) r_{FD} \qquad (11)$$

The variables r_{FF} and r_{FD}, defined analogously to r_{DD} and r_{DF}, are the after-tax returns expected by foreign residents on assets located in the foreign country and in the U.S., respectively.[11]

2. Demands for Specific Consumer Goods

For domestic households, overall consumption (C) in each period is a Cobb-Douglas aggregate of 17 composite consumption goods ($\bar{c}_i$), implying that consumption spending is allocated across consumption goods according to fixed expenditure shares. Each good $\bar{c}_i$ is a CES composite of domestic and foreign goods of type i.

D. Government Behavior

The model incorporates very specific elements of the U.S. tax system. Overall real government spending (transfers plus purchases) is exogenous and increases at the steady-state growth rate, g.[12] The model is parameterized so that in the base case, government revenues equal expenditures in each period. In policy change simulations, budget balance is maintained through lump-sum adjustments to personal taxes on labor income. The foreign government performs the same functions and has the same tax instruments as the domestic economy government.

E. Equilibrium

The model is calibrated to exhibit steady-state growth in the base case (or benchmark) equilibrium. Following a policy shock, temporary equilibria (in the sense employed by Grandmont, 1977) with market-clearing are generated in every period. These temporary equilibria form a transition path on which the economy gradually approaches a new long-run, steady-state equilibrium.

The requirements of temporary equilibrium are that in each country and in each period: (1) the demand for labor equal its supply, (2) the demand for output from each industry equal its supply, (3) total external borrowing by firms equal total saving by residents of the given country plus the net capital inflow, and (4) government revenues equal government spending. Equilibrium is established by adjustments in the nominal exchange rate, in domestic and foreign output prices, and in lump-sum adjustments to domestic and foreign taxes.[13] To solve for the temporary equilibrium of each period, we employ the algorithm of Powell (1970), which is designed to solve systems of nonlinear equations.

Since households and firms are forward-looking with perfect foresight, solution of the model requires that expectations conform to the actual future values. To derive perfect foresight expectations, we repeatedly solve the model forward, each time generating a path of equilibria under a given set of expectations. After each path of equilibria is obtained, we revise the expectations and solve for a new path. Using an approach similar to that of Fair and Taylor (1983), we obtain perfect foresight expectations and the consistent intertemporal equilibrium path.

F. Data and Parameters

A detailed documentation of the model's data sources and parameterization methods is in Goulder and Eichengreen (1989). Econometric estimates provide many important parameters for the model. Remaining parameters are obtained through a calibration procedure in which the requirements of utility maximization, cost minimization, and balanced growth serve as identifying restrictions. The calibration procedure includes the restriction that in the base (or status quo) case, the current and capital accounts of the balance of payments are both zero.

The fully parameterized data set generates a base case simulation in which the domestic and foreign economies exhibit balanced growth at the rate g, the rate of growth of effective labor services. Policy shocks cause growth rates to differ from g during transition periods but to return asymptotically to that rate. In the simulations performed for this study, the value of g is 2.5 percent.

III. Old and New Capital Taxes in the Absence of International Capital Mobility

Our study compares two unilateral policies aimed at stimulating domestic investment in the United States. The first policy is the introduction of an 8.38 percent ITC applicable to investment in equipment. In its focus on equipment, this ITC is similar to the one in effect in the United States prior to the Tax Reform Act of 1986. This ITC subsidizes different industries at different rates (see Table 1) for two main reasons. First, industries that invest primarily in equipment (as opposed to other assets such as structures) benefit disproportionately. In addition, the ITC discriminates against the

housing sector: while investments by corporations and proprietorships are eligible for the ITC, investments in new housing capital by individual homeowners are not. Reflecting the large share of housing investments carried out by owner-occupants, the effective ITC rate is quite small in the housing sector.

The second investment promoting policy is the reduction of the statutory corporate income tax rate from 34 percent to 30 percent in all U.S. industries.[14] The effective corporate tax rate in the housing industry is lower because only a small percentage of housing capital faces the corporate tax.[15]

Each of the two policies is introduced in the first simulation period and is treated as unanticipated and permanent. The tax rate changes are scaled so that the two policies involve the same present value of lost tax revenues. This section examines the alternative policies in the absence of international capital flows. Thus, households' portfolios consist only of home-country assets.

1. Welfare Effects

Table 4 indicates that the introduction of the ITC yields domestic welfare gains that are more than twice as large as those produced by a lower CIT rate with the same revenue cost. The three factors that determine domestic welfare are intertemporal efficiency, intersectoral efficiency, and the international distribution of welfare over domestic and foreign households. In the flow diagram (Figure 1), which illustrates some major relationships in the model, the boxes labelled B_1, B_2, and B_3 represent these three factors. The different intertemporal welfare effects are mainly due to differential effects on investment. Table 4 reveals that the ITC is most

effective per dollar of lost revenue in stimulating domestic investment and saving and, thus, in alleviating the intertemporal distortions that are due to initial taxes on capital income.[16] Whereas a lower CIT raises domestic investment by 0.88 percent in the first period and by 2.24 percent in the new steady state, the ITC boosts domestic investment more than twice as much -- both in the short and long run (by 2.06 percent and 5.51 percent, respectively). The long-run percentage increases in investment correspond to the steady-state additions to the capital stock; on a balanced growth path, the ratio of the flow of investment to the stock of capital returns to its initial value because this ratio is affected only by the exogenous steady-state growth rate of the economy.

Compared to introducing the ITC, lowering the CIT rate stimulates investment less because it focuses less sharply on marginal investment. A lower CIT reduces the tax not only on marginal but also on inframarginal (previously accumulated) capital; hence, much of the lost revenue is associated with lower nondistortionary (unanticipated) wealth taxes rather than lower effective tax rates on marginal investment. The ITC, in contrast, channels the tax benefits only to new capital by maintaining the nondistortionary wealth tax on existing capital.

Differences in the two policies' effects on the intersectoral margin can be ascertained by controlling for the changes in the domestic capital stock. The CIT policy's slightly higher ratio of welfare gains to changes in the domestic capital stock (see Table 5) indicate that it may be slightly superior in terms of intersectoral efficiency. However, the differences after normalizing in this way are extremely small. Hence, most of the differences

between the overall efficiency gains of the ITC and a reduced CIT appear to be attributable to differences in effects on the intertemporal margin.[17]

As regards the international distribution of welfare, both policy experiments improve not only domestic but also foreign welfare. In both cases, the foreign gain in relative welfare amounts to about 6 percent of the relative domestic gain (Table 5). Investment promoting policies are transmitted positively abroad because they improve the present value of the foreign terms of trade; domestic capital accumulation boosts the supply of domestic goods compared to that of goods supplied abroad and, therefore, raises the price of foreign commodities relative to that of domestically produced commodities.

To summarize, the ITC's larger welfare gains are closely related to this policy's ability to improve intertemporal efficiency by generating larger increases in the capital stock (per dollar of lost revenue). Both investment promoting policies have very similar intersectoral and international implications.

2. Intra-Country Distributional Effects

The distributional effects across capital and labor correspond to differences in the treatment of existing capital. Decreasing the CIT rate boosts the value of the domestic capital stock by 1.62 percent in the initial period (Table 4). This capitalization effect reflects the higher stream of after-tax earnings on the existing capital stock. The value of human capital, in contrast, falls by 1.22 percent in the first period after reducing the CIT rate.[18] Hence, most of the welfare gains accrue to capital rather than labor. In contrast to decreasing the CIT rate, introducing the ITC reduces the value

of domestic capital (by 0.46 percent).[19] Accordingly, a smaller share of the welfare gains accrues to capital.

IV. The Influence of International Capital Mobility

1. Welfare Effects

The relative domestic and foreign welfare gains of the two policies turn out to be different once international capital mobility is allowed for. In the initial steady state, net foreign assets are zero but foreigners own 9 percent of the U.S. capital stock. Two indicators in Table 5 reveal that, in terms of domestic welfare, international capital mobility widens the ITC's advantage over a CIT rate cut. First, without capital mobility, the ITC yields a 141 percent larger increase in domestic welfare than the CIT cut. With capital mobility, this percentage rises to 160 percent.[20] Second, capital mobility reverses the rankings of the CIT rate cut and the ITC in terms of their domestic welfare gains per unit of increase in the domestic capital stock.

Foreigners obtain a larger share of the global welfare gains under a lower CIT rate. Introducing the ITC produces a relative foreign welfare gain equal to only 8 percent of the relative domestic gain while the foreign gain exceeds 12 percent of the domestic gain in the case of reducing the CIT rate (Table 5).

If initial cross-holdings are larger and foreigners own 20 percent of the U.S. capital stock, the CIT rate cut becomes even less attractive from a domestic point of view. In that case, the ITC generates a 233 percent larger increase in domestic welfare (Table 5). From a foreign point of view,

however, a lower CIT rate becomes more attractive and the relative foreign gain amounts to 37 percent of the relative domestic gain.

In order to explain the domestic and foreign welfare gains, we need to examine the factors which influence the distribution of wealth and welfare between the domestic and foreign economy. These "international transfer effects" correspond to the boxes labelled D_1, D_2, and D_3 in Figure 1. They include not only changes in the commodity terms of trade but also two other transfer effects whose size depends on the extent of cross-holdings of capital. These additional transfer effects play an important role in explaining the relatively small domestic welfare gains and relatively large foreign gains associated with a lower CIT rate -- especially if cross-holdings of capital are large.

a. The relative capitalization effect. The first additional transfer effect -- the relative capitalization effect -- involves changes in asset prices. It occurs because foreign owners of domestic capital benefit directly from the lower CIT rate through a higher value of domestic capital reflecting increased after-tax earnings. Hence, a larger portion of the welfare gains from lower intertemporal and intersectoral distortions accrues to foreigners.[21] The ITC, in contrast, amounts to an implicit wealth tax on the owners -- including the foreign owners -- of the existing capital stock, with the tax revenue accruing to domestic residents through lower taxes. Adopting a life-cycle model of a closed economy, Auerbach and Kotlikoff (1987) emphasize the consequences of capitalization effects associated with the tax treatment of existing capital for the distribution of wealth across generations. Our open economy model, which abstracts from life-cycle

considerations, draws attention to how the tax treatment of old capital influences the international distribution of wealth.

The relative capitalization effect is related to the distribution across capital and labor. As subsection III.a. indicated, reducint the CIT rate favors capital over labor. In an integrated world capital market, some of the owners of domestic capital are foreigners. Hence, foreigners benefit from a larger share of global welfare gains.

The short-run changes in the net foreign asset position of the domestic economy reflect the relative capitalization effect. Table 6 shows that the ITC reduces the value of capital located domestically relative to that located abroad. Consequently, the value of foreign claims on domestic capital, WK_{FD}, falls relative to the value of foreign assets owned by domestic residents, WK_{DF}. Thus, the net foreign asset position of the domestic economy improves. A lower CIT rate, in contrast, depresses the value of net foreign assets on impact by raising the value of domestic capital owned by foreigners relative to the value of the initial domestic holdings of foreign capital.

b. The relative rate of return effect. The second additional transfer effect involves international differentials in rates of return and, in particular, differential rates of return paid on international cross-holdings of capital. This can be interpreted as an intertemporal terms of trade effect. If assets are imperfect substitutes, policy shocks affect the domestic rate of return paid to foreigners who hold domestic assets relative to the foreign rate received by domestic owners of foreign capital. If the domestic rate of return increases relative to the foreign rate, for example, net income flows transferred abroad increase because capital income remitted abroad rises relative to investment income received from foreigners.

The relative rate of return effect also contributes to the smaller domestic and larger foreign welfare gains under a lower CIT rate. In particular, for each unit of additional capital that is accumulated in the United States, a lower CIT rate puts more upward pressure on U.S. returns than the ITC does. Figure 2 indicates that beginning 6 years after the policy shock, the ITC produces larger rate of return differentials in favor of domestic assets. Relative to the changes in capital accumulation produced by the two policies, however, the CIT cut continues to yield the largest rate of return differentials. The relatively large effect on the U.S. rate of return in the case of a lower CIT rate is closely related to the treatment of old capital, which affects the value of domestic relative to foreign assets. On impact, lowering the CIT rate raises the value of assets located domestically relative to foreign assets, thereby increasing the value share of domestic assets in portfolios. As a result, the rate of return on domestic assets has to rise relative to the foreign rate in order to induce households to hold a larger proportion of their wealth in domestic assets.

2. Macroeconomic Effects

a. Balance of payments accounts. The short-run effect on the account registering international income flows reflects the two international transfer effects identified above. As can be seen from Table 6, in the first period following the ITC's introduction, the net income account is in surplus mainly because the relative capitalization effect improves the net foreign asset position of the domestic economy. Lowering the CIT rate, in contrast, worsens the income account initially not only because the value of net foreign assets falls but also because domestic firms have to pay higher yields to foreigners than domestic residents receive from foreign firms.

Figure 3 shows the effects of the two alternative policies on the trade balance (which is zero along the base case equilibrium path). Whereas reducing the CIT causes the trade balance to go into surplus in the first 25 years, introducing the ITC moves the trade account into deficit during the first five years. Thus, the sign of the initial effect of investment promoting policies on the trade balance is ambiguous. This result contrasts with Summers (1986), who argued that these policies would unambiguously worsen the trade balance in the short run by raising domestic investment relative to saving. The initial trade balance depends on the response of domestic absorption because domestic supplies are essentially fixed in the short run since domestic capital accumulates only gradually and total labor supply is exogenously given. Consumption and investment demand, which correspond to the boxes labelled T_1 and T_2in Figure 1, are the two components of absorption that can change. Accordingly, the trade balance improves on impact if domestic consumption demand falls enough to offset the effect of larger investment demand on domestic absorption. Hence, the short-run effect on the trade balance depends on the consumption response per unit of additional investment, which is explored below.

b. Consumption. Figure 4 shows the influence of these policies on real domestic consumption. Compared to introducing the ITC, cutting the CIT reduces short-run consumption more for each additional unit of investment demand. Two factors, which correspond to the boxes labelled C_1 and C_2 in the flow diagram, explain the differences across the two policies in the initial consumption response per unit of additional investment. The first is the level of domestic permanent income and reflects the international transfer effects identified above. In particular, in the case of a lower CIT rate, the

weaker net foreign asset position together with higher domestic rates of return negatively affect domestic permanent income and force the domestic economy to transfer more real resources abroad by running larger trade surpluses than in the case of the ITC. Hence, the trade balance effects of investment-promoting policies depend on how those policies treat foreign-owned capital and how they affect capital income transferred abroad.[22]

The second factor explaining the differential short-run consumption effect across the two policies is the consumption rate of return, which affects the intertemporal allocation of consumption. As indicated in the discussion of the relative interest rate effect, a lower CIT rate puts relatively heavy pressures on domestic rates of return for a given increase in domestic capital accumulation. As a result, returns on domestic portfolios rise in view of the large share of domestically located assets in the portfolios of U.S. households. This, in turn, encourages domestic households to shift more of their consumption to the future, thereby financing a larger share of U.S. capital accumulation through higher domestic saving. Thus, compared to introducing the ITC, reducing the CIT rate yields a stronger short-run performance of the trade balance through both intertemporal substitution effects and effects on permanent income.

When they compare the two investment promoting policies in their life-cycle model of a closed economy, Auerbach and Kotlikoff (1987) find that reducing the CIT rate is less effective in lowering short-run consumption than is introducing the ITC. In their model this occurs because a lower CIT rate transfers wealth to the elderly, who have the highest propensity to consume. Our model abstracts from life-cycle considerations but allows for open-economy considerations. Hence, instead of focusing on the *intergenerational*

distribution of wealth and its consequences for consumption behavior, we emphasize effects on the *international* wealth distribution. While a lower CIT rate *stimulates* domestic consumption by transferring income to the *elderly* in a life-cycle model in a closed economy, this policy *reduces* domestic consumption by distributing wealth to *foreigners* and away from domestic residents in an infinite-horizon consumption model in an open economy.[23]

In both policy experiments domestic consumption falls on impact but rises in the long run -- even relative to the base case (Figure 4 and Table 6). Thus, the presence of an international capital market does not induce the domestic households to smooth consumption completely. Several factors, which are represented by the boxes labelled R_1, R_2, and R_3 in the flow diagram, cause domestic saving to rise in response to policies that encourage domestic investment. First, investment promoting policies raise world rates of return because the domestic economy is "large" and affects conditions on world capital markets.[24] Moreover, domestic consumption rates of return can rise relative to foreign rates because of imperfect substitutability -- not only in assets demands but also in demands for foreign and domestic goods. If assets are imperfect substitutes, rates of return expressed in a common numeraire can diverge. As a result, returns on domestic and foreign portfolios typically deviate because of differences in portfolio composition. If goods are imperfect substitutes, real consumption rates of return can differ across countries because of international differences in the composition of consumption baskets. In this case, purchasing power parity does not hold and households may expect the price of the domestic consumption goods to change relative to that of foreign consumption goods.[25]

In Table 6, the international differentials in consumption rates of return are separated into two components. The first component uses the same numeraire (U.S. dollars) to measure the difference in the rates of return on the domestic and foreign portfolios. Hence, it reflects the effects of imperfect asset substitutability and international differences in portfolio composition.[26] The second component amounts to the difference in inflation rates measured in the same currency (U.S. dollars). It represents the effects of imperfect good substitutability and international differences in the composition of consumption by measuring changes in the price of the domestic consumption basket relative to that of the foreign basket. Table 6 indicates that the first component tends to be the largest in absolute value.

c. The real exchange rate. The real exchange rate is measured as the price of domestically produced goods relative to that of foreign produced goods (i.e., the ratio of producer price indices). The initial movements in the real exchange rate reflect the consequences for the short-run trade balance. The introduction of the ITC causes an initial appreciation of the real exchange rate corresponding to the initial trade deficit -- although the appreciation is reversed within three years (Figure 5 and Table 6). The initial trade deficit indicates that global absorption is redistributed to the U.S. This raises the price of U.S. goods because additional U.S. spending falls primarily on U.S. goods. The reduction in the CIT rate, in contrast, depreciates the exchange rate in the first period as the trade balance moves into surplus and U.S. spending falls. In both policy experiments, the real exchange rate is lower in the long run than in the initial steady-state equilibrium. This development is due to the accumulation of domestic capital, which raises the supply of domestically produced goods compared to that of

foreign goods, and therefore, depresses the relative price of domestic goods.[27] The decline in the real exchange rate is especially large in the ITC case, reflecting this policy's larger effects on the capital stock.

3. Industry Effects

Table 7 presents disaggregated effects on investment, output, and equity values across the ten U.S. industries. Three factors underlie these effects. The first is the share of investment demand in total demand for the outputs of the various industries. In particular, the investment promoting policies benefit industries producing capital goods. While the outputs of other non-housing sectors fall in the short run, the construction, metal, and machinery sectors expand their production. At the same time, the equity values of these industries rise most.

The second determinant of interindustry differences is the sectoral structure of the investment incentives. Both the ITC and the lower CIT rate apply only to a small portion of the housing sector. Consequently, housing investment is crowded out in the short run as domestic interest rates rise in response to higher investment in the rest of the domestic economy. Furthermore, the value of equity in the housing sector falls relative to that in other sectors. The petroleum industry sector receives the smallest investment credit of all non-housing sectors because the share of equipment in its capital stock is low. Hence, the investment response of the petroleum industry after the introduction of the ITC is subdued compared to that of the other non-housing sectors.

The third factor affecting industry performance is the interaction of the trade orientation of the various sectors with movements in the real exchange rate. Exchange rate adjustments affect the competitiveness of U.S. tradable

goods and the costs of imported intermediate goods. The differences in sectoral effects between the two alternative investment promoting policies illustrate this channel. Table 7 indicates that export-oriented industries perform better relative to other sectors under a lower CIT rate than under the ITC — especially in the short run. With a lower CIT rate, the equity values of export-oriented sectors (such as agriculture, machinery, and motor vehicles) are higher relative to those of other sectors than with the ITC. At the same time, compared to the ITC case, the equity values of sectors less dependent on the export market (such as services and textiles) perform worse relative to the equity values of other sectors. Export-oriented sectors benefit most from the lower CIT rates because this policy yields a lower real exchange rate (reflecting the need to transfer more resources abroad). In fact, lowering the CIT rate boosts exports and reduces the real exchange rate both in the short and the long run (Table 6). The introduction of the ITC, in contrast, appreciates the exchange rate initially, thereby reducing exports in the short run.

V. Sensitivity Analysis

Table 8 indicates how alternative parameter values affect the consequences of the two investment promoting policies. The first panel shows the implications of alternative assumptions regarding adjustment costs in investment. In both policy experiments, lower adjustment costs correspond to larger domestic welfare gains. This occurs for two reasons. First, smaller adjustment costs raise the global welfare gains associated with enhanced intertemporal efficiency by accelerating the speed of adjustment toward a new steady state. Second, more of the global welfare gains accrue to domestic

residents because more rapid adjustment reduces the inframarginal rents that foreign owners of U.S. capital can extract.

Lower adjustment costs and the related higher investment demands imply that in the short run the trade balance is weaker and the real exchange rate stronger. In the medium run, however, the trade balance improves relative to the base case because faster capital accumulation raises the capital stock and, therefore, the supply of domestic goods. Consequently, the real exchange rate falls below its value in the central case.

The second panel illustrates the sensitivity of results to alternative values for the "Armington" elasticities governing intratemporal goods substitution. More intratemporal substitution between domestic and foreign goods mitigates the long-run reductions in the terms of trade and the real exchange rate. The smaller price effects improve U.S. welfare by reducing the discounted fall in the U.S. terms of trade. Moreover, the smaller fall in the terms of trade enhances the profitability of domestic investment. This encourages capital accumulation at home and therefore boosts the improvement in intertemporal efficiency.

When asset substitutability (third panel) is higher, the trade balance weakens initially relative to the central case as domestic households face less incentives to shift their consumption to the future. A higher degree of intertemporal substitution (fourth panel), in contrast, improves the initial trade performance and weakens it later. The reason is that households shift more of their consumption to the future. This leaves more room for short-run investment demand; thus domestic capital formation procees more quickly, leading to higher domestic welfare.

VI. Conclusions

The simulations presented in this paper indicate that alternative investment promoting policies differ in their consequences for foreign and domestic welfare, the balance of payments accounts, international competitiveness, and industrial structure. The ITC generally produces larger domestic welfare gains than a CIT rate reduction of equal revenue cost. This is mainly because the ITC is more effective in reducing intertemporal distortions, while the two policies have similar implications for intersectoral efficiency. From the point of view of domestic welfare, the relative attractiveness of the ITC is enhanced when international capital mobility is taken into account. The reason is that the favorable treatment of old capital under a lower CIT rate transfers wealth to foreign owners of domestic capital; this offsets some of the positive domestic welfare effects resulting from lower intertemporal and intersectoral distortions.

These transfer effects contribute to the different implications of the two policies for the balance of payments accounts and the relative performance of export-oriented, import-competing, and non-tradable industries. While introducing the ITC yields trade deficits and an appreciation of the exchange rate in the short run, the international transfer effects generated by the CIT reduction contribute to short-term trade surpluses and an initial depreciation of the exchange rate. As a result, a lower CIT rate tends to improve the performance of export-oriented sectors -- especially in the short run.

Our results highlight the importance of considering how tax policies treat old capital -- especially when the integration of world capital markets allows foreigners to acquire a signficant share of the domestic capital stock. This observation suggests that policymakers ought to pay increasing attention

to how they treat old capital when they consider policies aimed at enhancing overall efficiency -- for example, when they propose replacing an income tax by a consumption tax or removing the double taxation of dividends.

The international transfer effects identified in this paper may also have implications for the international coordination of tax policies. If foreign ownership of domestic capital increases, governments face growing incentives to adopt policies that discriminate against old capital. As foreigners anticipate these policies, international capital flows may be discouraged. Hence, just as governments have concluded the General Agreement on Tariffs and Trade (GATT) to ensure that "beggar-thy-neighbor" policies do not inhibit international trade in commodities, they may have to enter into international agreements involving the tax treatment of foreign holdings of domestic assets. These agreements should ensure that the world reaps the fruits from increased mobility of capital in the form of a more efficient global allocation of resources.

The results demonstrate the usefulness of incorporating international capital flows, adjustment costs, and sectoral detail in general equilibrium models that analyze the effects of capital income taxation. Still, some limitations in the model used here, and areas for worthwhile model extensions, should be noted. In the current model, the composition of domestic and foreign portfolios is the same in two respects. First, foreign and domestic residents invest the same share of their domestic assets in particular domestic industries. Second, the share of industry-specific assets invested in debt and equity is identical across foreign and domestic investors. Allowing industry shares to differ across households would permit intersectoral policies, such as changes in the tax treatment of owner-occupied

housing, to yield direct international implications. Different debt and equity shares across foreign and domestic portfolios would allow for further differences in the ways that changes in asset values would affect foreign and domestic investors.

In addition, the model abstracts from direct investment flows. On the one hand, direct investment could make lowering CIT rates a more attractive option because such a policy tends to boost the domestic tax base by encouraging multinational corporations to move taxable profits to countries with low CIT rates. On the other hand, if foreign countries operate a foreign tax credit system, lowering the CIT rate below that in other countries would not affect investment incentives and would merely amount to a transfer to foreign treasuries. In those circumstances countries would still be able to use the ITC to stimulate foreign inward investment (see Gersowitz (1987)). Finally, endogenous government policies could be examined within a game-theoretic framework in order to address international policy coordination and retaliation, as well as issues of time inconsistency.

Footnotes

1. Goulder, Shoven, and Whalley (1983), for example, incorporate neither forward-looking expectations nor explicit forward-looking investment behavior by firms. Grubert and Mutti (1987) consider international capital flows using a steady-state model that does not explicitly consider the transition to a new long-run equilibrium.

2. The extent to which equipment is favored is a matter of some debate. Gordon, Hines, and Summers (1987) argue that structures receive important tax preferences because of possibilities for asset resale (allowing the stepping up of depreciation bases) and because of opportunities for tax arbitrage between high-bracket landlords and low-bracket tenants.

3. All capital goods are assumed to be produced with the same technology.

4. This specification conforms to the "traditional" view of dividend behavior. Empirical support for this view is presented in Poterba and Summers (1985) and Shoven (1987).

5. See Mussa (1978) for a discussion of alternative approaches to modeling adjustment costs.

6. The consumption-based capital asset pricing model (see, for example, Duffie and Zame, 1987) offers a potential approach to this problem, although the difficulties of empirical implementation are formidable.

7. Adler and Dumas (1983), for example, argue that exchange rate risk provides only part of the explanation as to why households maintain internationally diversified portfolios.

8. The model is agnostic as regards the specific bases for households' portfolio preferences. One explanation might invoke risk considerations.

Another might refer to different liquidity services offered by domestic and foreign assets. Poterba and Rotemberg (1983) refer to such services to justify including money in individual utility function.

9. An alternative formulation would define A in terms of asset levels rather than shares. But since asset stocks are used to finance future consumption, adding levels of asset holdings to the utility function would introduce an element of double-counting.

10. Human wealth is the present value of the infinite stream of after-tax earnings and transfers; non-human wealth is the present value of the stream of after-tax dividends (net of new share issues) and interest payments.

11. The rate r_{DD} is a weighted average of the after-tax rates of return (inclusive of risk premium) offered to the domestic household from its ownership of domestic equities and debt. Similarly for r_{DF}, r_{FF}, and r_{FD}. The returns r_{DF} and r_{FD} incorporate the capital gains from exchange rate movements.

12. This facilitates welfare evaluations, since household utility functions do not incorporate welfare derived from government-provided goods and services.

13. The number of equilibrating "prices" is one less than the number of equilibrium conditions, as one of the equilibrium conditions is redundant from Walras's Law. Both domestic and foreign nominal wages are fixed in their respective currencies. The exchange rate variable permits the relative prices of domestic and foreign labor to vary. It may be noted that balance of payments equilibrium does not require an additional equilibrium condition: Walras' Law assures that this equilibrium is established when the other markets clear.

14. The corporate tax is treated as a source-based tax because the model focuses on portfolio capital flows. Even in the case of direct investments, the corporate tax may be effectively source-based, i.e., the host country tax system determines the effective corporate tax rate on marginal investment. This is the case, for example, if the residence country has a territorial system of corporate taxation. Moreover, if residence countries allow deferral, host taxes become more important in determining marginal investment incentives. See, e.g., Hartman (1985).

15. The corporate tax applies only to rental housing owned by corporations, which represents 2.5 percent of the housing stock. Capital income to noncorporate rental housing faces the personal income tax. Implicit rentals from owner-occupied housing are not taxed.

16. In our model of infinitely-lived households, the economy is intertemporally efficient in the absence of taxation. Since the effective tax rate on marginal investments is positive, the social benefits associated with a marginal investment exceed the social costs. Hence, capital accumulation enhances welfare. In a life-cycle model, in contrast, the laissez-faire solution is not necessarily optimal in any meaningful sense. Consequently, lower capital income taxes that induce capital accumulation do not necessarily raise welfare. See, e.g., Diamond (1965).

17. We have also performed experiments involving a more general ITC that applies equally to structures and equipment investments. The domestic welfare gains per unit of new capital under this policy are somewhat higher, reflecting the more neutral treatment of investments in different assets.

18. Human wealth is the present value of the stream of after-tax earnings and transfers net of lump-sum taxes. The fall in the value of human wealth

reflects higher lump-sum taxes on personal income as well as higher discount rates.

19. In general, the effect of the ITC on the value of capital is ambiguous (see Summers (1981)). Without adjustment costs, old and new capital are perfect substitutes and, therefore, carry the same price. Accordingly, reducing the price of new capital lowers the value of old capital. Adjustment costs, however, can drive a wedge between the prices of old and new capital. For example, old capital sells at a premium relative to new capital (that is, it falls in price by a smaller amount) when the ITC encourages firms to expand their capital stocks. If adjustment costs are sufficiently high, the ITC may actually increase the value of old capital because substantial rents to inframarginal capital can be sustained for an extended period of time. Using a closed economy model, Goulder and Summers (1989) examine the domestic incidence effects of the two policies in more detail.

20. The ITC rates and the CIT rate reduction are of the same magnitude as in the no mobility case (section III). The different economic environment here leads to only slight differences in revenue costs.

21. Adjustment costs prevent capital owners from fully shifting source-based capital income taxes on existing capital -- even in a small open economy with perfect substitution between foreign and domestic assets in portfolio demands. See Bovenberg (1986).

22. Grubert and Mutti (1987) also find that changes in corporate tax rates affect the short-run trade balance through changes in net investment income transferred abroad. Bovenberg (1989) demonstrates that investment incentives may improve the short-run trade balance -- even if cross-holdings of capital are zero initially, assets are perfect substitutes in particular demands, and

the economy is small in capital markets. The reason is that capital accumulation may cause changes in commodity prices and the intertemporal pattern of income that stimulate domestic saving sufficiently to finance higher domestic investment.

23. Auerbach and Kotlikoff (1987) argue that fiscal policy is best described in terms of its impact on the intergenerational distribution of resources. They claim that officially reported fiscal deficits are misleading indicators of intergenerational transfers. Our simulations demonstrate that policy-induced capitalization effects can influence the international distribution of resources. The balance of payments accounts typically fail to record these capitalization effects and, therefore, provide only imperfect information on how the stock of net foreign assets evolves over time.

24. In the base case, wealth located in the United States accounts for 30 percent of the value of global wealth.

25. Bovenberg (1989) demonstrates how investment incentives tend to raise the domestic consumption rate of return by initially putting pressure on domestically produced resources, thereby raising the price of current domestic goods relative to that of future domestic goods.

26. This component -- international differences in portfolio returns -- is closely related to the international rate of return differential in favor of domestically located assets (see Figure 1). If households hold only home assets, these differentials are equal. In the presence of cross holdings, the absolute value of the return differential in favor of domestic assets exceeds that in favor of domestic portfolios. In that case, international differences in asset returns produce an international transfer effect corresponding to the relative interest rate effect discussed in subsection IV.1.b. above.

27. Using analytical solutions in an aggregated two-country model, Bovenberg (1989) elaborates on these effects.

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Table 1 Industry Characteristics
(All Rates Expressed as Percentages)

Industry	Export Intensity[a]	Import Substitution[b]	Import Dependency[c]	ITC Rates[d]
Agriculture	13.52	1.55	2.49	6.02
Oil Refining	6.16	24.85	15.82	2.74
Construction	0.03	0.00	3.45	7.91
Textiles	2.66	1.23	1.80	5.93
Metals	2.86	15.21	5.63	5.79
Machinery	16.13	2.06	5.11	6.20
Motor Vehicles	7.12	2.26	4.67	6.58
Misc. Manufact.	10.81	1.42	2.75	6.60
Services	4.64	0.50	1.89	5.36
Housing	--	--	--	0.36
U.S. AVERAGE[e]	6.61	3.13	3.05	2.98

[a]Share of exports in total demand for gross output.

[b]Imports as share of total demand for corresponding industry output.

[c]Imported intermediates as share of industry's total inputs.

[d]These apply only in ITC policy simulations.

[e]Weighted average, using industry gross outputs (columns 1 and 2), total inputs (column 3), and investment (column 4) as weights. Except in column 4, weights are calculated after excluding the housing industry.

Table 2 Industry Production Structure

Production Relationship	Functional Form
$X = X(VA, \bar{x}_1, \bar{x}_2, \ldots, \bar{x}_N)$	Leontief
$VA = VA(L, \bar{K})$	CES
$\bar{x}_i = \bar{x}_i(x_i, x_i^*) \quad (i = i, N)$	CES

Key:
- X = gross output (exclusive of adjustment costs).
- VA = value added.
- L = labor input.
- $\bar{K}$ = capital input (fixed in the current period of time).
- $\bar{x}_i$ = composite intermediate input ($i = 1, \ldots, N$).
- x_i = intermediate domestically-produced input ($i = 1, \ldots, N$).
- x_i^* = intermediate foreign-produced input ($i = 1, \ldots, N$).

Table 3 Household Consumption Structure

Consumption Relationship	Functional Form
$U = U(\bar{C}_t, \bar{C}_{t+1}, \ldots)$	constant intertemporal elasticity of substitution
$\bar{C}_s = \bar{C}_s(C_s, A_s)$	Cobb-Douglas
$C_s = C_s(\bar{c}_{1,s}, \bar{c}_{2,s}, \ldots, \bar{c}_{m,s})$	Cobb-Douglas
$A_s = A_s(\alpha_s, 1-\alpha_s)$	CES
$\bar{c}_{i,s} = \bar{c}(c_{i,s}, c_{i,s}^*)$	CES

Key:
- U = intertemporal utility.
- C_s = overall consumption at time s.
- A_s = portfolio preference index at time s.
- $\bar{c}_{i,s}$ = consumption of composite consumer good i at time s.
- $c_{i,s}$ = consumption of domestically-made consumer good i at time s.
- $c_{i,s}^*$ = consumption of foreign-made consumer good i at time s.
- α_s = share of portfolio devoted to domestically-located assets.

TABLE 4

Aggregate Effects in the Absence of International Capital Mobility (1)

	ITC				CIT			
YEAR:	1	4	15	INF	1	4	15	INF
REAL EXCHANGE RATE (2)	-0.130	-0.147	-0.234	-0.574	-0.053	-0.053	-0.080	-0.216
TERMS OF TRADE (3)	-0.018	-0.155	-0.451	-0.798	-0.011	-0.062	-0.172	-0.293
DISC. TERMS OF TRADE	-0.266				-0.103			
REAL CONSUMP. RATE OF INT.								
DOMESTIC	6.269	6.125	6.073	5.963	6.078	6.037	6.011	5.962
FOREIGN	5.996	5.992	5.978	5.964	5.995	5.976	5.971	5.964
NONHUMAN WEALTH (4)								
WK_D	-0.458	-0.068	0.938	2.688	1.615	1.775	2.197	2.902
WK_DD	-0.458	-0.068	0.938	2.688	1.615	1.775	2.197	2.902
WK_DF	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WK_F (IN REAL $)	0.257	0.172	0.085	0.511	0.096	0.058	0.020	0.212
WK_FF (IN REAL $)	0.257	0.172	0.085	0.511	0.096	0.058	0.020	0.212
WK_FD (IN REAL $)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
HUMAN WEALTH								
DOMESTIC	-2.125	-1.764	-0.646	1.661	-1.223	-1.046	-0.528	0.455
FOREIGN	-0.033	-0.023	0.006	0.074	-0.014	-0.010	0.002	0.028
INVESTMENT								
DOMESTIC	2.058	2.449	3.508	5.505	0.876	1.031	1.457	2.236
FOREIGN	-0.013	-0.008	0.009	0.057	-0.009	-0.003	0.004	0.024
CONSUMPTION								
DOMESTIC	-0.634	-0.400	0.309	1.763	-0.300	-0.191	0.128	0.737
FOREIGN	0.005	0.011	0.029	0.073	0.002	0.004	0.011	0.028
EXPORTS	0.173	0.462	1.193	2.375	0.073	0.164	0.397	0.817
WELFARE (5)								
DOMESTIC	0.590				0.245			
FOREIGN	0.037				0.014			

Notes:

(1) All figures are percentage changes from base case path, except for those corresponding to consumption rates of interest (which are in percentage points).

(2) Ratio of the domestic producer price index to the foreign PPI (in dollars).

(3) Terms of trade are computed as the export-weighted index of domestic prices divided by the import-weighted index of net-of-tariff foreign prices.

(4) WK_i denotes the total value of non-human wealth owned by residents of country i; WK_ij denotes the value of non-human wealth owned by residents of country i and located in country j.

(5) Welfare gain is expressed as the dynamic equivalent variation as a percent of base case wealth.

Figure 1

TAX POLICY TRANSMISSION CHANNELS

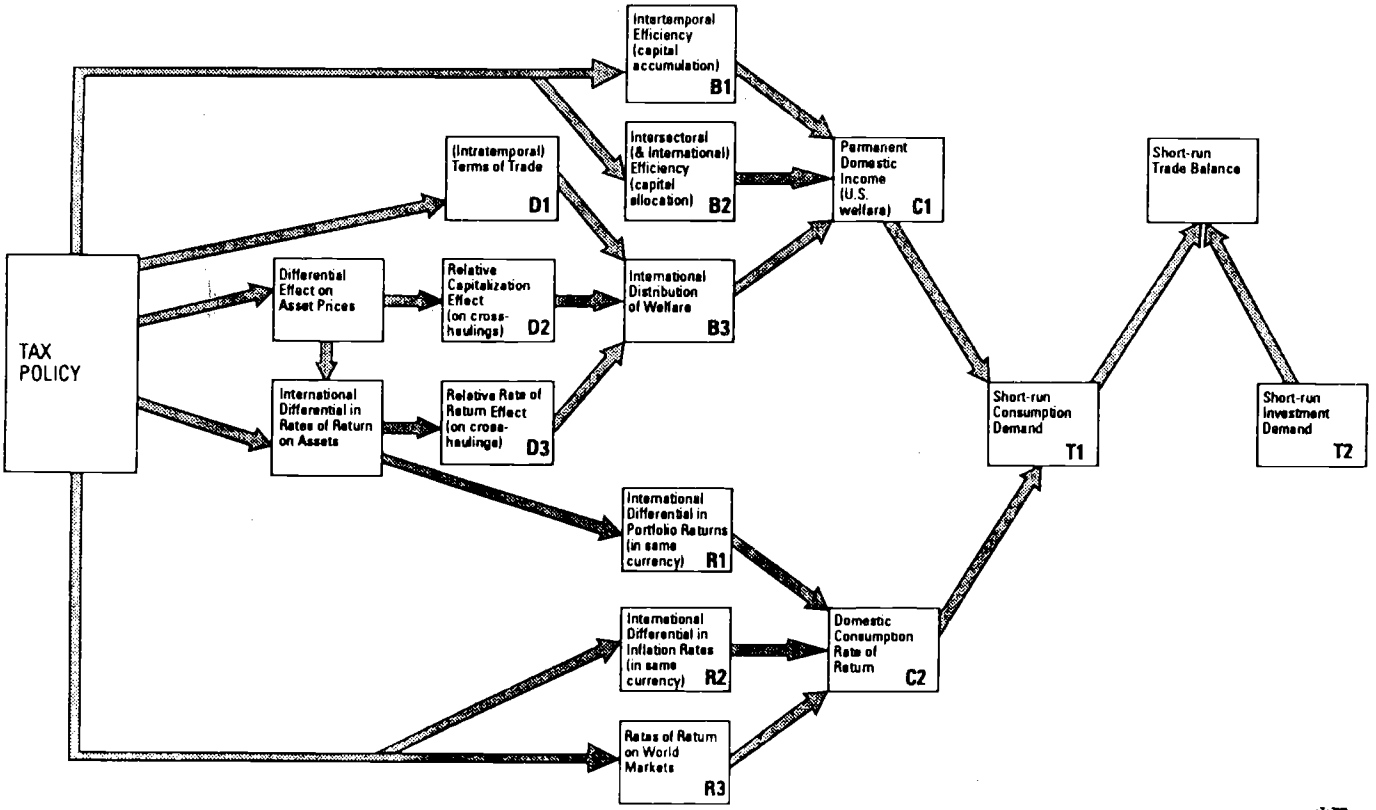

Table 5 Welfare Effects

	Welfare Gains[a]			Domestic Residents' Welfare Gain Normalized by Change in Capital[b]
	Domestic Residents (1)	Foreign Residents (2)	Ratio [(2)/(1)] (3)	(4)
No International Capital Mobility				
(a) CIT Rate Reduction	0.245	0.014	0.057	0.187
(b) ITC	0.590	0.037	0.063	0.186
(c) Ratio (b)/(a)	2.41	2.65		
International Capital Mobility, Actual Cross-Holdings[c]				
(a) CIT Rate Reduction	0.219	0.027	0.123	0.172
(b) ITC	0.570	0.047	0.082	0.179
(c) Ratio (b)/(a)	2.60	1.74		
International Capital Mobility, Higher Cross-Holdings[c]				
(a) CIT Rate Reduction	0.154	0.057	0.370	0.139
(b) ITC	0.513	0.071	0.138	0.168
(c) Ratio (b)/(a)	3.33	1.24		

[a]Welfare gain is expressed as the dynamic equivalent variation as a percentage of base case wealth. Policy changes are scaled so as to imply the same present value of revenue cost in the no-mobility scenario.

[b]Ratio of domestic welfare gain to change in the present value of domestically-located capital along the entire transition path.

[c]In central case simulations, foreigners initially own 9 percent of non-human wealth located in the U.S. In bottom panel, foreigners are assumed to own 20 percent of this wealth initially.

TABLE 6

Aggregate Effects in the Presence of International Capital Mobility (1)

	ITC				CIT			
YEAR:	1	4	15	INF	1	4	15	INF
REAL EXCHANGE RATE	0.108	-0.111	-0.358	-0.514	-0.219	-0.186	-0.116	-0.149
TERMS OF TRADE	0.194	-0.123	-0.563	-0.738	-0.153	-0.179	-0.207	-0.227
DISC. TERMS OF TRADE	-0.267				-0.188			
REAL CONSUMP. RATE OF INT.								
DOMESTIC	6.203	6.079	6.061	5.963	6.083	6.034	6.012	5.962
FOREIGN	5.991	5.996	5.980	5.964	5.979	5.974	5.968	5.964
DIFFERENCE	0.212	0.083	0.080	-0.001	0.103	0.061	0.045	-0.002
DIFF. IN NOM. RET. (in $)	0.003	0.056	0.089	-0.001	0.093	0.084	0.052	-0.002
DIFF. IN INFL. (IN $)	-0.209	-0.030	0.004	0.000	-0.015	0.018	0.005	0.000
NONHUMAN WEALTH (2)								
WK_D	-0.227	-0.057	0.777	2.948	1.440	1.651	2.218	3.227
WK_DD	-0.241	-0.005	0.878	2.954	1.549	1.749	2.282	3.231
WK_DF	-0.077	-0.575	-0.252	2.881	0.335	0.655	1.571	3.195
WK_F (IN REAL $)	-0.083	0.156	0.326	0.356	0.382	0.278	0.069	0.026
WK_FF (IN REAL $)	-0.076	0.135	0.282	0.353	0.335	0.237	0.042	0.025
WK_FD (IN REAL $)	-0.241	0.708	1.426	0.425	1.549	1.320	0.733	0.060
HUMAN WEALTH								
DOMESTIC	-1.644	-1.409	-0.515	1.700	-1.217	-1.052	-0.547	0.491
FOREIGN	-0.125	-0.056	0.048	0.059	0.047	0.049	0.048	0.016
BAL. OF PAYMENTS (IN % GDP)								
TRADE BALANCE	-0.114	-0.021	0.059	-0.035	0.081	0.066	0.023	-0.038
NET INCOME FLOW	0.007	-0.022	-0.022	0.067	-0.025	-0.015	0.017	0.066
CAPITAL ACCOUNT	0.107	0.043	-0.037	-0.033	-0.055	-0.051	-0.041	-0.028
NET FOREIGN ASSET POSITION	0.038	-0.295	-0.382	0.553	-0.279	-0.153	0.192	0.715
INVESTMENT								
DOMESTIC	2.289	2.591	3.505	5.547	0.812	0.965	1.397	2.282
FOREIGN	-0.082	-0.037	0.045	0.053	0.038	0.043	0.049	0.022
CONSUMPTION								
DOMESTIC	-0.575	-0.403	0.247	1.835	-0.404	-0.284	0.079	0.816
FOREIGN	-0.045	-0.001	0.059	0.048	0.040	0.040	0.032	0.001
EXPORTS	-0.668	0.322	1.649	2.129	0.666	0.644	0.554	0.551
WELFARE								
DOMESTIC	0.570				0.219			
FOREIGN	0.047				0.027			

Notes:

(1) All figures are percentage changes from base case path, except for those corresponding to consumption rates of interest (which are in percentage points) and balance of payments accounts (which are in changes from the base path relative to GDP).

(2) WK_i denotes the total value of non-human wealth owned by residents of country i; WK_ij denotes the value of non-human wealth owned by residents of country i and located in country j.

Figure 2

INTERNATIONAL DIFFERENCE IN RATES OF RETURN
(domestice minus foreign; in dollar terms)

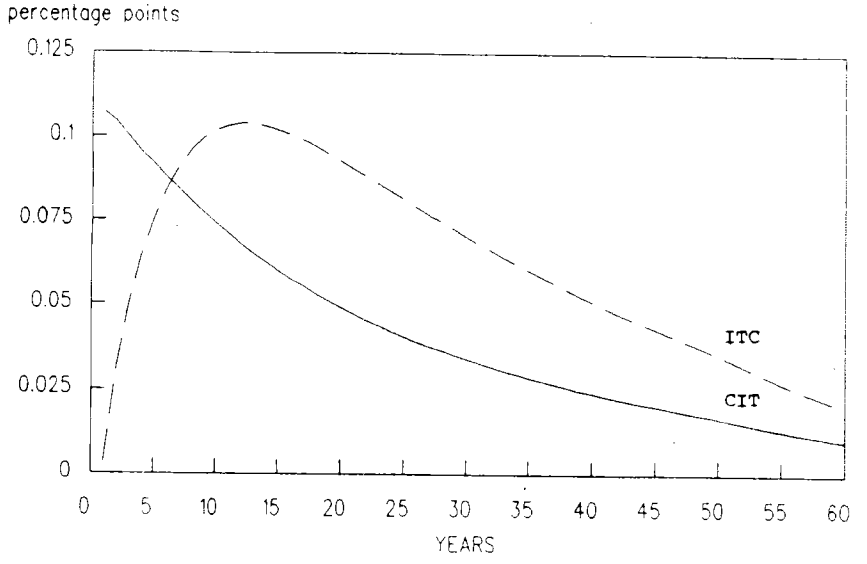

Figure 3

TRADE BALANCE
(change from base case as percentage of base case GDP)

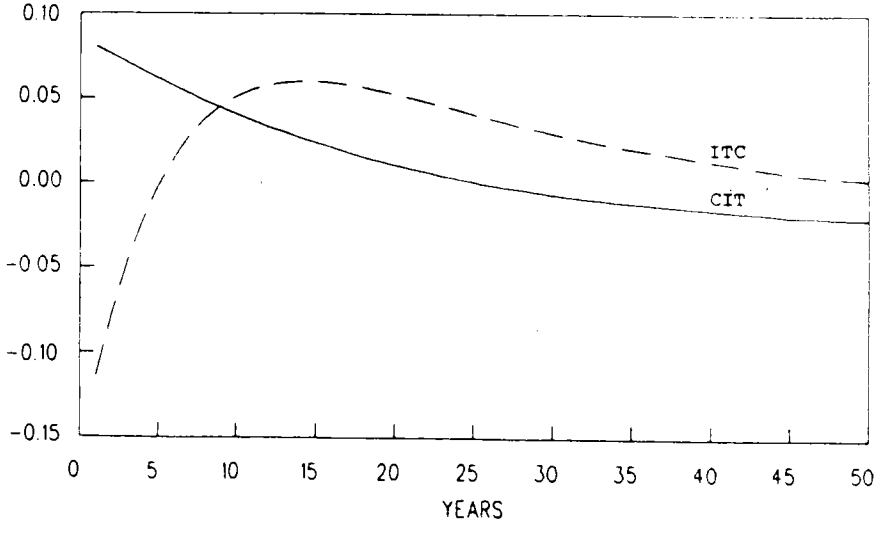

Figure 4

REAL CONSUMPTION
(percentage change from base case)

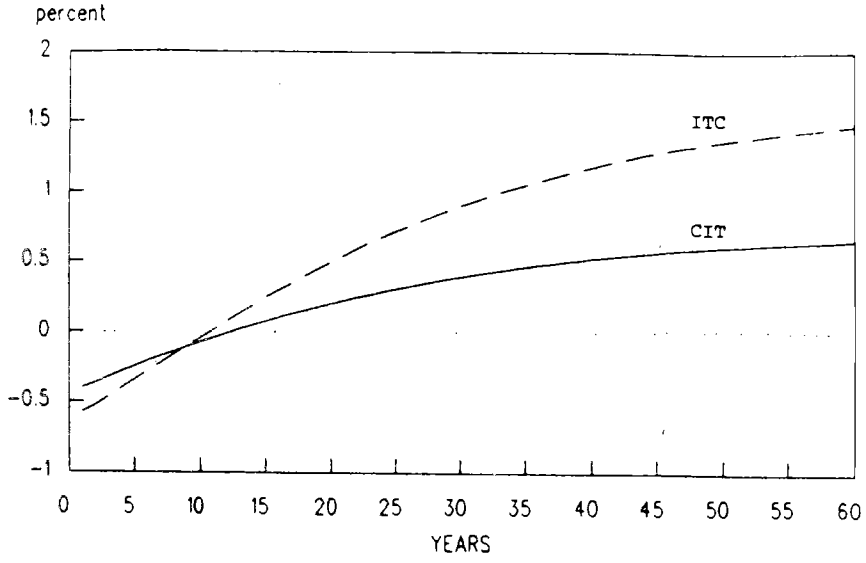

Figure 5

REAL EXCHANGE RATE
(percentage change from base case)

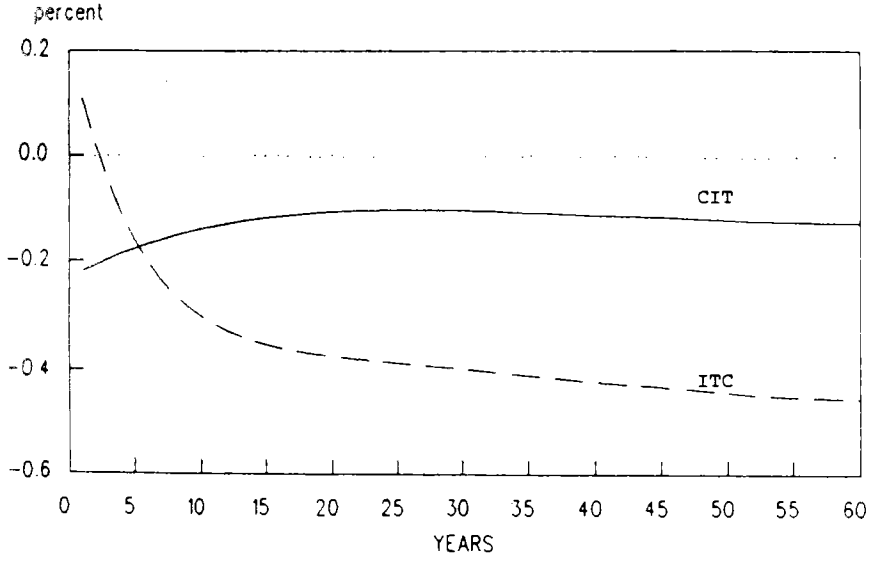

Table 7

Industry Effects in the Presence of International Capital Mobility (Percentage Changes from Base Case)

	ITC					CIT				
	Investment		Equity Value	Output		Investment		Equity Value	Output	
	SR	LR	SR	SR	LR	SR	LR	SR	SR	LR
Agriculture	3.14	4.84	-0.51	-0.18	2.98	1.47	2.08	4.94	-0.02	1.20
Oil Refining	2.12	4.59	-0.61	-0.17	3.04	2.90	3.96	4.87	-0.01	2.42
Construction	4.88	10.06	1.68	1.25	3.46	1.58	3.74	5.75	0.43	1.42
Textiles	4.46	9.79	0.11	-0.68	2.17	1.04	2.86	4.79	-0.18	0.62
Metals	5.35	10.87	1.71	0.55	3.39	1.76	3.80	5.45	0.36	1.20
Machinery	4.75	9.08	1.09	0.06	2.82	1.47	2.85	5.53	0.36	0.80
Motor Vehicles	4.26	9.02	0.64	-0.04	2.56	1.44	3.34	5.36	0.00	0.90
Misc. Manufact.	4.81	9.03	0.39	-0.18	2.34	1.49	3.16	5.09	-0.03	0.85
Services	5.44	10.61	0.53	-0.25	2.25	1.61	3.60	4.84	-0.13	0.83
Housing	-0.41	1.53	-1.42	0.18	1.48	-0.12	1.07	-0.43	0.05	1.04
TOTAL	3.29	5.55	-0.57	-0.03	2.46	0.81	2.28	2.08	0.01	1.01

TABLE 8

Sensitivity Analysis

	ITC						CIT					
	LOW			HIGH			LOW			HIGH		
YEAR:	1	15	INF	1	15	INF	1	15	INF	1	15	INF
A. ADJUSTMENT COSTS												
REAL EXCHANGE RATE	0.241	-0.439	-0.535	0.076	-0.292	-0.501	-0.176	-0.139	-0.154	-0.242	-0.093	-0.146
TERMS OF TRADE	0.336	-0.697	-0.756	0.155	-0.482	-0.723	-0.106	-0.251	-0.237	-0.178	-0.178	-0.218
DISCOUNTED TERMS OF TRADE	-0.326			-0.234			-0.207			-0.183		
REAL CONSUMP. RATE OF INT.												
DOMESTIC	6.286	6.074	5.963	6.167	6.041	5.963	6.113	6.017	5.962	6.069	6.005	5.962
FOREIGN	5.986	5.981	5.964	5.984	5.978	5.964	5.991	5.971	5.964	5.983	5.969	5.964
DOMESTIC NONHUMAN WEALTH	-0.825	0.792	2.938	-0.216	0.732	3.006	1.169	2.193	3.187	1.514	2.341	3.388
FOREIGN NONHUMAN WEALTH (IN REAL $)	-0.225	0.315	0.384	-0.042	0.216	0.342	0.316	0.049	0.026	0.428	0.017	0.025
DOMESTIC HUMAN WEALTH	-1.940	-0.492	1.720	-1.749	-0.897	1.720	-1.306	-0.505	0.516	-1.327	-0.760	0.482
FOREIGN HUMAN WEALTH	-0.152	0.073	0.062	-0.096	0.049	0.057	0.032	0.061	0.017	0.071	0.050	0.015
BAL. OF PAYMENTS (IN % GDP)												
TRADE BALANCE	-0.204	0.076	-0.032	-0.084	0.054	-0.037	0.051	0.029	-0.035	0.095	0.021	-0.042
NET INCOME FLOW	0.004	-0.021	0.064	0.004	-0.012	0.071	-0.025	0.018	0.063	-0.028	0.024	0.071
CAPITAL ACCOUNT	0.200	-0.055	-0.031	0.079	-0.042	-0.033	-0.026	-0.047	-0.027	-0.066	-0.045	-0.029
NET FOREIGN ASSET POSITION	0.145	-0.324	0.496	0.049	-0.290	0.609	-0.206	0.203	0.644	-0.306	0.276	0.804
DOMESTIC INVESTMENT	3.144	4.333	5.713	1.588	2.817	5.396	1.086	1.732	2.329	0.543	1.149	2.268
FOREIGN INVESTMENT	-0.182	0.033	0.055	-0.042	0.007	0.053	0.028	0.038	0.023	0.043	0.029	0.022
DOMESTIC CONSUMPTION	-0.596	0.352	1.841	-0.427	0.109	1.870	-0.405	0.120	0.807	-0.348	0.018	0.850
FOREIGN CONSUMPTION	-0.071	0.078	0.051	-0.041	0.060	0.044	0.024	0.042	0.003	0.046	0.032	-0.002
DOMESTIC WELFARE	0.697			0.496			0.271			0.194		
FOREIGN WELFARE	0.048			0.040			0.026			0.022		

B. ARMINGTON ELASTICITIES

REAL EXCHANGE RATE	0.171	-0.884	-1.370	0.056	-0.118	-0.205	-0.392	-0.342	-0.417	-0.135	-0.025	-0.052
TERMS OF TRADE	0.268	-1.099	-1.592	0.133	-0.329	-0.428	-0.321	-0.437	-0.495	-0.073	-0.118	-0.129
DISCOUNTED TERMS OF TRADE	-0.549			-0.156			-0.404			-0.101		
REAL CONSUMP. RATE OF INT.												
DOMESTIC	6.241	6.041	5.963	6.166	6.060	5.963	6.055	6.004	5.962	6.098	6.011	5.962
FOREIGN	5.955	5.974	5.964	6.015	5.980	5.964	5.993	5.970	5.964	5.981	5.970	5.964
DOMESTIC NONHUMAN WEALTH	-0.410	0.772	2.578	-0.380	0.750	3.156	1.367	2.182	3.071	1.354	2.270	3.376
FOREIGN NONHUMAN WEALTH (IN REAL $)	-0.120	0.740	1.267	-0.059	0.053	0.034	0.543	0.250	0.308	0.302	-0.048	-0.073
DOMESTIC HUMAN WEALTH	-1.731	-0.705	1.427	-1.828	-0.790	1.831	-1.258	-0.656	0.395	-1.325	-0.672	0.557
FOREIGN HUMAN WEALTH	-0.117	0.052	0.132	-0.128	0.063	0.036	0.052	0.061	0.038	0.053	0.051	0.010
BAL. OF PAYMENTS (IN % GDP)												
TRADE BALANCE	-0.068	0.035	-0.019	-0.161	0.077	-0.041	0.066	0.021	-0.033	0.085	0.026	-0.041
NET INCOME FLOW	0.003	-0.004	0.046	0.007	-0.019	0.076	-0.023	0.021	0.058	-0.028	0.023	0.071
CAPITAL ACCOUNT	0.066	-0.031	-0.026	0.155	-0.058	-0.035	-0.043	-0.043	-0.026	-0.057	-0.049	-0.029
NET FOREIGN ASSET POSITION	0.077	-0.200	0.267	0.084	-0.317	0.662	-0.219	0.220	0.620	-0.274	0.257	0.760
DOMESTIC INVESTMENT	2.088	3.400	5.241	2.118	3.442	5.737	0.716	1.337	2.151	0.733	1.422	2.418
FOREIGN INVESTMENT	-0.066	-0.003	0.094	-0.090	0.026	0.043	0.039	0.026	0.033	0.042	0.035	0.022
DOMESTIC CONSUMPTION	-0.526	0.118	1.551	-0.460	0.213	1.976	-0.377	0.005	0.713	-0.359	0.069	0.892
FOREIGN CONSUMPTION	-0.031	0.088	0.124	-0.065	0.061	0.023	0.042	0.050	0.024	0.034	0.031	-0.006
DOMESTIC WELFARE	0.454			0.627			0.167			0.253		
FOREIGN WELFARE	0.079			0.030			0.040			0.019		

TABLE 8 (cont'd)

Sensitivity Analysis

	ITC						CIT					
	LOW			HIGH			LOW			HIGH		
YEAR:	1	15	INF	1	15	INF	1	15	INF	1	15	INF
C. ASSET SUBSTITUTION ELASTICITIES												
REAL EXCHANGE RATE	0.082	-0.339	-0.514	0.168	-0.388	-0.514	-0.277	-0.095	-0.149	-0.136	-0.137	-0.148
TERMS OF TRADE	0.172	-0.547	-0.738	0.246	-0.587	-0.738	-0.204	-0.191	-0.227	-0.079	-0.236	-0.226
DISCOUNTED TERMS OF TRADE	-0.275			-0.245			-0.197			-0.182		
REAL CONSUMP. RATE OF INT.												
DOMESTIC	6.202	6.063	5.963	6.201	6.057	5.963	6.093	6.010	5.962	6.069	5.999	5.962
FOREIGN	5.993	5.980	5.964	5.989	5.981	5.964	5.982	5.971	5.964	5.987	5.969	5.964
DOMESTIC NONHUMAN WEALTH	-0.245	0.853	2.946	-0.175	0.594	2.952	1.330	2.257	3.225	1.380	2.246	3.233
FOREIGN NONHUMAN WEALTH (IN REAL $)	-0.047	0.272	0.357	-0.175	0.454	0.354	0.467	0.001	0.027	0.275	0.034	0.023
DOMESTIC HUMAN WEALTH	-1.677	-0.529	1.699	-1.578	-0.460	1.699	-1.331	-0.648	0.491	-1.233	-0.672	0.492
FOREIGN HUMAN WEALTH	-0.114	0.049	0.059	-0.152	0.034	0.059	0.077	0.050	0.016	0.027	0.063	0.016
BAL. OF PAYMENTS (IN % GDP)												
TRADE BALANCE	-0.102	0.051	-0.034	-0.143	0.069	-0.035	0.109	0.017	-0.038	0.040	0.038	-0.039
NET INCOME FLOW	0.008	-0.007	0.067	0.006	-0.061	0.068	-0.027	0.030	0.066	-0.027	0.024	0.067
CAPITAL ACCOUNT	0.094	-0.044	-0.032	0.137	-0.008	-0.033	-0.082	-0.046	-0.028	-0.013	-0.062	-0.028
NET FOREIGN ASSET POSITION	0.052	-0.175	0.549	0.000	-0.904	0.561	-0.228	0.355	0.711	-0.292	0.237	0.727
DOMESTIC INVESTMENT	2.264	3.496	5.547	2.356	3.537	5.547	0.684	1.364	2.282	0.764	1.404	2.283
FOREIGN INVESTMENT	-0.074	0.048	0.054	-0.110	0.043	0.054	0.064	0.038	0.022	0.021	0.011	0.022
DOMESTIC CONSUMPTION	-0.587	0.251	1.835	-0.556	0.255	1.836	-0.389	0.060	0.816	-0.324	0.015	0.817
FOREIGN CONSUMPTION	-0.041	0.057	0.048	-0.053	0.055	0.048	0.050	0.031	0.001	0.018	0.050	0.001
DOMESTIC WELFARE	0.576			0.558			0.224			0.231		
FOREIGN WELFARE	0.045			0.053			0.023			0.024		

D. INTERTEMPORAL ELASTICITY OF SUBSTITUTION

REAL EXCHANGE RATE	0.183	-0.359	-0.515	0.043	-0.349	-0.514	-0.176	-0.120	-0.150	-0.272	-0.109	-0.149
TERMS OF TRADE	0.261	-0.591	-0.738	0.140	-0.550	-0.738	-0.115	-0.223	-0.227	-0.199	-0.197	-0.227
DISCOUNTED TERMS OF TRADE	-0.263			-0.283			-0.187			-0.197		
REAL CONSUMP. RATE OF INT.												
DOMESTIC	6.211	6.054	5.962	6.184	6.030	5.963	6.087	6.008	5.962	6.070	5.996	5.963
FOREIGN	5.992	5.979	5.964	5.984	5.979	5.964	5.984	5.969	5.964	5.993	5.969	5.964
DOMESTIC NONHUMAN WEALTH	-0.670	0.479	2.956	-0.066	1.139	2.939	1.213	2.093	3.239	1.536	2.415	3.215
FOREIGN NONHUMAN WEALTH (IN REAL $)	-0.208	0.225	0.355	0.050	0.288	0.356	0.330	0.027	0.027	0.448	0.033	0.026
DOMESTIC HUMAN WEALTH	-2.602	-1.723	1.718	-0.815	0.156	1.681	-1.687	-1.115	0.516	-0.801	-0.232	0.467
FOREIGN HUMAN WEALTH	-0.189	0.083	0.058	-0.042	0.059	0.061	0.047	0.086	0.016	0.053	0.035	0.016
BAL. OF PAYMENTS (IN % GDP)												
TRADE BALANCE	-0.146	0.087	-0.035	-0.085	0.042	-0.034	0.061	0.038	-0.039	0.105	0.012	-0.038
NET INCOME FLOW	-0.001	-0.017	0.068	0.012	0.004	0.067	-0.030	0.020	0.067	-0.022	0.032	0.065
CAPITAL ACCOUNT	0.147	-0.070	-0.033	0.073	-0.046	-0.032	-0.031	-0.059	-0.028	-0.083	-0.045	-0.028
NET FOREIGN ASSET POSITION	0.122	-0.280	0.557	0.031	-0.132	0.548	-0.233	0.246	0.721	-0.287	0.337	0.709
DOMESTIC INVESTMENT	1.807	3.107	5.555	2.456	3.795	5.539	0.574	1.230	2.293	0.910	1.546	2.272
FOREIGN INVESTMENT	-0.107	-0.001	0.053	-0.031	0.045	0.054	0.040	0.031	0.022	0.042	0.038	0.022
DOMESTIC CONSUMPTION	-0.304	0.065	1.838	-0.713	0.284	1.832	-0.264	-0.015	0.820	-0.496	0.107	0.812
FOREIGN CONSUMPTION	-0.057	0.085	0.047	-0.048	0.057	0.048	0.025	0.049	0.001	0.054	0.027	0.001
DOMESTIC WELFARE	0.565			0.597			0.223			0.230		
FOREIGN WELFARE	0.036			0.036			0.020			0.015		

Notes:

All figures are percentage changes from base case path, except for those corresponding to consumption rates of interest (which are in percentage points) and balance of payments accounts (which are in changes from the base path relative to GDP). The adjustment cost simulations (panel A) involve changes in the parameter β of the adjustment cost function with compensating changes in ζ that leave q unchanged at the base case value for I/K. The low and high adjustment cost simulations respectively reduce and raise β by 50%. The central case values for β and ζ are 19.607 and 0.076. In panel B, the elasticities of substitution between domestic and foreign goods are halved and doubled relative to their central values. The results in panel C are based on values of 0.5 and 2.0 for the elasticity of substitution between assets in portfolios; the central case value is 1.0. Simulations in panel D involve values of .33 and 1.0 for the intertemporal elasticity of substitution; the central case value is 0.5.