8 THE IMPACT OF THE TAX REFORM ACT OF 1986 ON TRADE AND CAPITAL FLOWS

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I. INTRODUCTION

The effect of tax reform on the international position of the United States has been the subject of much debate. Some observers have expressed the concern that the United States would become deindustrialized because of a decline in international competitiveness. The direction of the change in capital flows has also been disputed. U.S. commentators have tended to worry about an outflow of capital from the United States because of higher taxes on business. In contrast, observers in other countries, such as Canada, fear a great inflow into the United States from their own countries because of the lower statutory corporate rates.

This paper evaluates the international implications of tax reform using a general equilibrium model with both trade and international capital flows. A general equilibrium model is necessary because it is impossible to judge the change in a particular sector's competitiveness by looking only at its costs, without paying attention also to changes of costs in other industries and to changes in real wages and rates of return. A properly specified general equilibrium model also maintains a consistent relationship between capital flows and the current account. In fact, the dependence of the trade balance on capital flows is one of the major aspects of this analysis, because tax reform has a very modest direct impact on trade in the absence of capital mobility and international investment income.

Before we proceed, it may be helpful to say a word on competitiveness. Unlike conventional old-fashioned terms used in trade theory, such as the terms of trade, welfare, comparative advantage etc., it is not clear what competitiveness is supposed to mean. In most people's minds, it seems to mean the trade (merchandise) balance, but why does one focus on certain kinds of U.S. products to the exclusion of others? Presumably it is the demand for U.S.

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output as a whole that it is at issue. Most discussions of competitiveness seem to assume that if a foreigner buys a U.S. made computer, ships it back to his resident country and leases it there, that is desirable; on the other hand if the foreigner leaves the computer in the United States to be leased here, that is undesirable because it is a capital inflow and not an export. The reverse would appear to be true because the computer stays here to contribute to U.S. productivity. One cannot look at the trade balance alone to evaluate the impact of tax reform on the international economy. But, one must look at the capital account as well; the capital inflow finances both the import surplus and additional capital spending in the United States.[1] Looking at all demands for U.S. resources, both from trade and investment flows, gives a better indication of U.S. welfare.

II. GENERAL OVERVIEW OF MODEL

The simulation model used in this paper was developed by the authors to study the impact of export incentives and the significance of capital mobility in altering the effects of personal and corporate taxation (Mutti and Grubert, 1984a, 1985 and 1986). The purpose of the simulations is to determine the magnitude of price and output changes at a rather broad sectoral level. Other attempts to evaluate the impact of tax reform on trade (International Trade Commission, 1986 and Gravelle, 1986) have used a more detailed array of industries, but they have been essentially partial-equilibrium treatments with an attempt to make a general equilibrium correction through the use of a balance of payments equation. In particular, they overlook the non-traded sector entirely because they assume that consumers only choose between imports and similar competing domestic goods. In addition, they do not explicitly model changes in capital flows, rates of return, real wage rates or real income, but must depend on other analyses to provide information on them. The model in this paper solves simultaneously for the new trade flows, capital flows, real wages, rates of return and relative prices of traded and nontraded goods.

The model used in this paper has two countries: the United States and the rest of the world. Each country produces 4 goods: equipment, a non-equipment net export good (from the U.S. point of view), a non-equipment net import good, and a non-traded good such as housing and services. Each good is produced from varying proportions of three factors: unskilled labor, skilled labor and physical capital. Capital used in each country is in turn a composite made up of domestically produced equipment, foreign-produced equipment, and the nontraded good, with the proportions depending on relative costs.

Domestic output in an industry is not assumed to be perfectly substitutable in consumption with output from the same industry abroad. Consumers in each country therefore choose among the local non-traded good and the 4 traded consumer goods, of which 2 are domestically produced.[2] Similarly, residents in each country can allocate their saving to the acquisition of capital

located either at home or abroad. The real growth of capital used in each country thus depends upon savings by both foreign and domestic residents. Although foreign and domestic investment are not regarded as perfect substitutes in portfolios, an increase in after-tax returns in one location relative to another will attract more investment from both foreign and domestic savers. Foreign investment is, therefore, treated as a two-way flow; this pattern may be attributed to the decision of investors to diversify their asset holdings.

The emphasis of the analysis will be on the effect of a policy change on long-run steady state income, trade, and the capital stock. However, the contrast with short-run results will also be noted. This contrast can be significant because, in the short run, any permanent shift in the accumulation of foreign assets does not yet yield significant investment income in relation to the additional expenditure on foreign assets. Any increase in the acquisition of foreign assets must therefore be financed in the short run by an increase of exports relative to imports. In the long run, however, investment income from abroad will increase as a result of the reallocation of assets, and this service flow can reverse the initial export surplus.

We also note that the acquisition price of the composite capital good can be different in the two countries. One reason is that each contains a large component of nontraded goods. In addition, tariffs and export incentives can create differences even in the price of traded goods.

III. SPECIFIC COMPONENTS OF THE MODEL

In order to clarify how taxes enter into the model, it is helpful to describe its basic components:

1. Zero-profit equations for each sector relate producers prices to input requirements and the cost of factor inputs. The cost of capital depends on the net (after personal and corporate tax) rate of return required by resident savers, the price of the capital good, and on the tax at both the corporate and personal level. To illustrate the role of each of these levels of tax, the cost of capital in a country is $P_i/(1-t_c)(1-t_p)$ where P is the price of the capital good in the country, i is the after tax rate of return received by resident savers, and t_c and t_p are the marginal tax rates at the corporate and personal level.

2. Factor utilization equations relate total factor demands to factor supply. Factor demands depend upon relative gross-of tax factor prices, and a reduction in either capital tax variable reduces the desired ratio of labor to capital per unit of output. The size of this adjustment depends importantly upon the relevant partial elasticities of substitution in production. These factor demands are set equal to the factor supplies. Aggregate labor supply is exogenous while the supply of capital depends on endogenous savings decisions.

3. Product demand equations relate total (foreign and domestic) demand for each sector's output to relative prices and income. If there are (tax or non-tax) export incentives, prices paid by foreigners are less than those paid by domestic consumers.

4. Two savings or portfolio equations for residents of each country generate the demand for capital located domestically and abroad. Portfolio demands by savers depend on total income and relative after-tax rates of return. In the case of income from foreign investment, the relevant after-tax return has to be spelled out more explicitly because domestic and foreign investors may face different taxes at the personal level on investment in a particular location. Let i_A represent the percentage return to capital after taxation at both the corporate and personal level that is received by A residents from capital used in A. The return to B residents who own capital assets in A is based on the after-corporate-tax rate of return in A, $i_A/(1-t_p^A)$, which is then reduced by any residual corporate-level tax in B, and finally, by the personal tax paid by B residents on this foreign-source income. (There may also be corporate level foreign withholding taxes in A.) This personal level tax will be basically the normal domestic personal level taxes on that income because foreign withholding taxes tend to be small and are usually credited in the home country. Thus the final after-tax return of B savers who invest in A is $(i_A/(1-t_p^A))(1-t_F^B)(1-t_p^B)$ where t_F^B is the residual corporate-level tax (after credits) in B on foreign investment income. (See Mutti and Grubert (1985) for a discussion of the assumptions on the sectors to which foreign investment flows. The allocation of portfolios is a relevant issue because of sectoral differences in personal taxes. Therefore, t_p^A above is not unique and the particular value relevant for foreign investors has to be specified. If there is only a single sector, then using the above expression for foreign investors' after-tax return from investments in A in order to determine the cost of capital in A yields the same equation as the one given in item 1. That is, the cost of capital is the same irrespective of whether resident or nonresident after-tax returns are used as the starting point.)

5. An income equation for each country defines income as a function of the market value of output, net international investment income and net tariff (or subsidy) collections (or payments). If the United States grants a general export incentive to foreigners, the lower price enjoyed by foreign consumers is financed by lower income available to U.S. residents.

6. There are also two equations which relate annual investment in a country to the stock of capital in the steady state. As previously

noted, the change in nominal investment in A depends upon the saving decisions of both A and B residents. In the steady state framework utilized in this analysis, the rate of growth of the real capital stock for each country must be constant and equal to the sum of exogenous growth of the labor force and Harrod-neutral productivity growth, assumed to be identical in each country. This steady state, equilibrium condition appears as follows for country A:

$$\frac{S_A/P_A}{K_A} = g, \tag{8.1}$$

where S_A/P_A is nominal investment in A divided by the price of capital goods, K_A is the initial capital stock in A, and g is the exogenous steady state rate of growth. The change in the capital stock from one steady state to another is therefore $\hat{K}_A = \hat{S}_A - \hat{P}_A$, where a carat denotes the percentage change in a variable. An analogous equilibrium condition exists for K_B.

IV. ELEMENTS OF THE TAX REFORM ACT MODELED

A. Changes in Sectoral Tax Rates at the Corporate and Personal Level

The basic simulations include the "standard" changes in domestic taxation usually modeled in studies of the cost of capital, i.e. the reduction in the statutory personal and corporate rates, the elimination of the investment tax credit, the modification of the Accelerated Cost Recovery System (ACRS), and the repeal of the capital gains exclusion. (Supplemental runs in which an attempt is made to include other major items are described below.) The changes in marginal effective tax rates by sector resulting from these "standard" reforms are based on the tax wedge and effective tax rate calculations described in the paper by Fullerton, Gilette and Mackie (1987) in this volume. Estimates on the cost of capital were provided for industries at the two-digit level of detail and these were classified into the four domestic sectors: equipment, non-equipment net export goods, non-equipment import goods, and non-traded goods.[3] Sectoral costs of capital were then calculated using industry capital stocks as weights. The sectoral costs of capital were available for 3 situations: pre-tax reform law, fully phased-in business provisions under the Tax Reform Act but with pre-reform personal taxes, and fully phased-in tax reform. It was therefore possible to divide the percentage change in sectoral cost of capital into the component attributable to changes in personal taxation and to changes in business taxation. This division is necessary in an open economy model because foreign investors do not face the same personal tax rates as domestic investors, and domestic

investors can choose to invest in capital which is unaffected by the U.S. corporate tax.

Before discussing the changes in the sectoral tax rates it may be useful to more specific about the composition of the sectors. Equipment includes electrical and nonelectrical machinery, aircraft and instruments. Non-equipment export goods includes most of agriculture, chemicals, and printing and publishing. The import-competing sector includes a large variety of mainly manufacturing industries such as textiles, primary metals and motor vehicles. The large non-traded good sector includes construction, transportation, utilities, finance, services, wholesale and retail trade and housing.

The changes in the sectoral costs of capital are given in Table 8.1. The cost of capital in the import competing sector increases somewhat more than in the other sectors. This is due to the tax changes at the business level and results from the import-competing sector's heavier dependence on types of capital adversely affected by tax reform, particularly equipment. At the personal level, the import-competing sector and the equipment sector have virtually identical changes, because in both sectors activity is almost exclusively in corporate form. The tax increase in these sectors at the personal level results from the increased tax rate on capital gains; it has a large weight because of the significance attributed to retained earnings under the "new view" of dividend taxation adopted by Fullerton, Gillette, and Mackie. The differing personal changes in the other two sectors are due to the greater significance of unincorporated business, such as in agriculture, and in owner-occupied housing in the nontraded sector. Finally, it should be noted that even the largest percentage increase of the cost of capital in Table 8.1, which is in the import-competing sector, is less than 10 percent and translates into a much smaller relative increase in prices once the share of capital in total costs is considered.

Table 8.1 **Changes in Sectoral Tax Rates Resulting from Basic Changes in Domestic Taxation***

	Percent Change in Cost of Capital Due to		
Sector	Business Tax Changes	Personal Tax Changes	Total
Equipment	0.5%	3.7%	4.2%
Non-Equipment net export goods	4.0	-1.3	2.7
Import-competing goods	5.0	3.6	8.6
Non-traded goods	3.9	.8	4.7

*Note that these are changes in percent. not percentage points. They are basically values for the expression dt/1-t, which represents the percentage change in the cost of capital directly attributable to the change in the tax rate.

B. Changes in the U.S. Corporate Tax on International Investment Income

The Internal Revenue Code has various provisions governing the U.S. tax both on foreign income received by U.S. residents and the tax imposed on payments of U.S. income to nonresident investors. The Tax Reform Act made changes applying to both types of income. With respect to foreign income earned by U.S. corporations, there were a number of base-broadening changes, such as the provision on the allocation of interest expense to foreign income, described below, which increase U.S. tax. On the other hand, the reduction of the U.S. statutory corporate rate has an offsetting effect. The tentative U.S. corporate tax on foreign source income is the U.S. statutory rate applied to the foreign income. This is then reduced by the amount of allowable foreign credits. Thus, if the corporation was not initially in an excess foreign tax credit position, a reduction in the U.S. statutory rate reduces the residual U.S. tax.

The impact of these changes in the taxation of foreign income was, however, not estimated in a manner entirely comparable to the Fullerton-Gilette-Mackie calculations for domestic income. The system of taxing corporation foreign income, which involves many specific provisions, has not yet been modeled in a manner parallel to the hypothetical Hall-Jorgenson type of estimation undertaken by Fullerton, Gillette, and Mackie. In principle it would be possible to do so, but it would require starting with hypothetical investments having very specific characteristics. The additional sources of financing foreign investment, not relevant for domestic investment, could also be included. For example, investment abroad can be financed by earnings retained abroad, in particular the earnings of foreign corporations controlled by U.S. taxpayers. Income retained by the domestic parents can also be invested abroad, both in the form of new equity or of new foreign lending. There can also be portfolio investment abroad, either by U.S. individuals or through U.S. corporations. (The most important source of portfolio investment abroad is overseas lending by U.S. banks.)

As indicated, no attempt was made to make these modeling extensions because they would have required a major new study by themselves. Instead, the revenue estimates for the foreign provisions were used. In order to convey the long run impact of the reforms, the version of the revenue estimates employed were the "fully phased-in" changes at 1986 activity levels estimated by the Treasury Department. These fully phased-in estimates give the revenue change after all transition rules have expired and all short-run timing effects no longer play a role.

The fully phased-in estimates for each of the foreign items are given in Table 8.2. They are divided into several categories because some of the provisions apply to investment in the United States and because the provisions vary in how closely they are linked to real investment in a given location. The first grouping applies to investment by U.S. corporations abroad that is

Table 8.2 **Fully-Phased-In Annual Revenue Increase of Foreign Provisions (1986 levels at a 34 percent corporate rate)**

Provision	Revenue Increase (millions of dollars)
1. General Foreign Investment Income	
Separate foreign tax credit limitations	351
Separate limitation for high withholding taxes on interest	1,500
Treatment of losses in foreign tax credit	19
Revision of deemed paid foreign tax credit	71
Allocation of interest expenses to foreign source income	806
Allocation of expenses other than interest and R&D	77
U.S. transportation income of foreign entities	22
Transfers of intangibles abroad	101
2. Foreign Investment in the United States	
Dual residence companies	109
Income of foreign governments	43
3. Financial Investment in Tax Havens	
Expand Subpart F income	155
Revision of de minimis rule for tax haven income	58
Captive insurance Companies	105
Foreign investment companies	15
Use of deficits in E&P	19
4. Other	
Possession credit	59
Memorandum item:	
Total in category (1)	2,947
Reduced tax on foreign source income because of lower statutory corporate rate.	3,243

assumed to be directly linked to real investments there. The most important of these are the new interest allocation rules and the separate foreign tax credit limitation for interest on foreign loans which are subject to high withholding taxes. The first of these will generally require a larger allocation of U.S. interest expense to foreign income because U.S. companies will no longer be able to avoid an allocation by devising an advantageous tier structure for their domestic affiliates. The separate limitation for high withholding interest mainly applies to bank loans to certain countries that impose high gross withholding taxes, which heretofore could be credited to other, lightly-taxed foreign income. It is assumed that these loans lead to higher real investment abroad.

The second category of foreign provisions apply to income from investment by foreigners in the United States. It is used to compute the additional U.S. tax paid by foreigners on their investments in the United States. The provision on dual residence companies applies to U.S. corporations which are also regarded by some jurisdictions as being resident in their own country because of differing definitions of residence. In these situations, it can be consolidated with affiliated companies in both countries, so that any loss can be used twice. The Tax Reform Act restricted this double use of losses. The second item in this category reduces the scope of the tax exemption on investment income received by foreign governments by denying its use for "commercial" activities.

The third grouping involves financial investments of U.S. corporations in tax havens. These are presented separately from the first category because they are anti-conduit (Subpart F) provisions where the ultimate location of the marginal real investment or business being financed may well be the United States. The provisions limiting the benefits of using captive insurance companies are a typical example. The captives are insurance companies organized in certain low-tax locations which insure the U.S. parents' risks. The new provision applies to "group" captives (i.e., those whose business is not restricted to a small number of controlling U.S. companies, and therefore not covered by pre-TRA rules). It requires the current recognition of income from the insurance of U.S. risks. The country-specific risk at issue, and probably the ultimate destination of most of the insurance companies' financial reserves is the United States. It would therefore be incorrect to regard this provision as an increased tax on income from real investments abroad.

The necessity for the rather arbitrary groupings in Table 8.2 is due to the fact that we do not in this paper explicitly model the relationship between real and financial assets. This has been attempted by the authors in the past (Mutti and Grubert, 1984b), but not in the detail required for the present analysis. The main problem is that international portfolios do not seem to obey any logical pattern, such as diversification, so that one cannot have any confidence in behavioral parameters based on standard portfolio models. (See Adler and Dumas, 1983.)

Some of the specific items do not of course fit neatly into a single category. For example, the major component of the separate foreign tax credit limitations in the first category might properly be regarded as principally a tax on passive financial investment income abroad and therefore placed in the third group, as is the closely related provision on Subpart F income. The conceptual problem arises because in these kinds of cases, a tax benefit depends on the interaction of two activities. For example, if a U.S. company received highly-taxed operating income from abroad, any excess credits generated by the income could (before the Tax Reform Act) shield some types of low-tax financial income. Depending on the position of any particular taxpayer, the benefit could be regarded as an incentive on the margin for increased operating investments abroad (if the taxpayer was not in an overall excess credit position) or as an incentive on the margin for passive financial income. The effect of marginal incentives of putting these two types of income in separate foreign-tax-credit-limitation categories will therefore depend on this pre-reform position. (In contrast, reduced opportunities for deferring passive income as a result of new Subpart F provisions always represent increased taxes on financial income).

The provision applying to dual residence companies, referred to earlier, is also problematical. The restrictions on this type of arrangement can affect real investments in either country. Putting it in the second category rather than the first is therefore quite arbitrary.

The quantitative estimate of the impact of tax reform on the U.S. corporate tax on investment abroad is derived by summing the tax increases in the first category in Table 8.2 ($2,947 million) and netting them against the reduction in U.S. tax on foreign corporate income due to the reduction in the statutory rate ($3,243 million).[4] The difference is then divided by total U.S. foreign income to arrive at the change in the tax rate in percentage points. The result of the procedure is a tax reduction of 0.3 percentage points.[5] While this is small, it contrasts with the substantial increase in corporate tax on domestic investment evident in Table 8.1 and in the overall business revenue estimates.

The increased U.S. tax on investment by foreigners in the U.S., over and above the changes that apply to all domestic investment, is derived in a similar fashion, by summing the items in the second group in Table 8.1. There is a very small increase in U.S. tax.

One of the issues in the use of the fully phased-in long run estimates is whether they adequately capture changes in effective tax rates attributable to deferral of taxes. In the long run, the increased deferral of taxes would only affect annual revenue because of growth in income. For example, reduced opportunities for accelerated depreciation will not change tax revenues in the long run stationary steady state even though effective tax rates have clearly risen. However, this problem is not serious in the use of the estimates for the foreign provisions because the most important provisions, related to interest allocation and separate limitations for high-withholding

tax interest income, do not have significant deferral or acceleration effects. The use of the fully-phased in estimates, rather than the actual 5 year revenue estimates is intended to reflect the impact of the tax reform after all the transition rules no longer play any role.

Having calculated the change in the corporate level U.S. tax on foreign income, we are now faced with the question as to its role in the analysis. Some discussions of the residual U.S. corporate tax on foreign income seem to regard it as a tax on investment in the United States, i.e. the tax constitutes a barrier to repatriating foreign income and investing it in the United States. They therefore expect an increase in repatriations and presumably greater U.S. investment as a result of the TRA. However, David Hartman's analysis of dividend repatriation decisions is an effective refutation of this view. (See Hartman, 1984, and references therein.) Hartman has in a series of papers expressed the position that the residual U.S. tax on dividend repatriations is irrelevant for the choice of investments to be financed out of foreign earnings. The reason is that the tax has to be paid sooner or later. This parallels the "new view" of the taxation of dividends in the domestic context that is embodied in the Fullerton-Gilette-Mackie effective tax rate estimates. The Hartman analysis thus concludes that only the after-foreign-tax return on investments abroad and the U.S. after-tax return on competing domestic investment is relevant for dividend repatriation decision.

The Hartman argument should, however, not be pushed too far. It applies only to dividend repatriations and not to the U.S. tax on other types of foreign income. These types of income are significant and play an important role in the estimation of the change in overall U.S. corporate taxes on foreign income. Statistics of Income (SOI) tabulations for 1982 indicate that dividend income only accounts for about 30.0 percent of foreign source gross income. (See SOI Bulletin, Spring, 1986.) There is substantial interest income, largely to U.S. banks, and because it is lightly taxed, this income is a major beneficiary of the statutory rate reduction. In addition, rents, royalties and service income are almost as significant as dividends. They represent income from investment abroad not in the form of corporate equity and therefore there is no opportunity for retaining it abroad. Any change in U.S. tax on this income is therefore a change in the tax on marginal foreign investment in this non-equity form.

Another way of looking at this issue is to examine the financing sources for U.S. investment abroad. Retained earnings have not been the dominant source in recent years. For example, in the 7 years from 1979 through 1985, earnings retained abroad by incorporated affiliates accounted for 21.7 percent of all private gross U.S. capital outflows. Claims reported by banks, which presumably are bank loans, accounted for 72.6 percent of all private outflows for the period.

In view of these considerations, no adjustment is made to reflect the Hartman argument. The small magnitude of the change in the U.S. corporate tax on foreign income makes the issue largely moot in any case.

The above discussion of funding sources for U.S. foreign investment is also relevant for the evaluation of the change in the personal-level tax on marginal foreign income. The Fullerton-Gilette-Mackie estimates for domestic investment used in Table 8.1 assume that retained earnings account for 61.4 percent of any marginal investment. In view of the significance of debt flows abroad (of which only a small percentage could represent loans of the banks' own equity capital), the share of retained earnings is assumed to be 40.0 percent, instead of the 61.4 percent used in the domestic context, with debt accounting for 50.0 percent and new equity the remaining 10.0 percent. The financing share attributed to debt is conservative in view of the role of debt in capital flows cited above. Because the risk characteristics of foreign investments may be different from domestic investments (e.g. assessing an equity investment abroad may be much more difficult), it is not illogical to assume different financing shares for domestic and foreign investment.

The version of the model used in this paper does not distinguish between portfolio and direct investment abroad; that is, there is no distinction between locally-controlled or foreign-controlled production in a country. But, for the purposes of the current exercise, this fact does not seriously restrict the responses that are captured. Any increases or decreases in relative sectoral costs in the United States because of tax changes, and the resulting redistribution of trade, is reflected. The main advantage of a more detailed characterization of capital flows would be the ability to use U.S. tax rates for investment abroad in specific sectors. That is, while the average U.S. corporate tax rate on foreign investment income barely changes, it may change substantially for some sectors, e.g., U.S.-controlled manufacturing. Any significant effect of this type seems unlikely, however. The reduction of the U.S. statutory rates to 34 percent only reduces the U.S. tax on foreign manufacturing income by about 4.0 percentage points and the significant revenue raisers such as interest allocation would narrow the reduction to perhaps 2.0 percentage points or less. The impact of this change would be further diluted because U.S.-controlled manufacturing abroad is only one of the (and in most cases a relatively insignificant) sources of U.S. manufacturing imports (or competition for domestically produced exports).

C. Changes in Specific Tax Provisions Directed at Exports

Exports can be affected because changes in domestic taxation change costs in the export sector relative to costs in other domestic sectors. In addition, there are specific tax provisions that apply specifically to export income and reduce the price of U.S. produced goods to foreigners for any given level of domestic costs. One of these provisions is the Foreign Sales Corporation (FSC) rules that exempt from U.S. tax the portion of export income attributable (by either administrative pricing rules or actual arm's-length prices) to marketing activities by the offshore FSC. This generally results in an exemption from tax of 15 percent of the total corporate income from FSC

exports. Because the value of the provision to exporters depends upon the statutory tax rate, the reduction of the corporate rates from 46 to 34 percent reduces the effective FSC benefit. Specifically, Treasury data indicate that the average FSC benefit declines from 1.08 percent of sales to 0.80 percent.

There is, however, another change in international taxation which is an indirect consequence of the reduction of statutory corporate rates and more than offsets the reduction in FSC benefits. Under the rules for determining the source of income (i.e., whether domestic or foreign), which were in large part not changed by the Tax Reform Act, a U.S. producer exporting abroad can arrange to classify 50.0 percent of the total taxable income from the export as foreign source.[6] Thus, if the exporter is in an excess foreign tax credit position, 50.0 percent of the export income can be effectively exempt from U.S. tax.

The foreign tax credit limitation, the amount of foreign taxes that be credited against U.S. tax liability, is basically the U.S. statutory rate applied to foreign source taxable income. In other words, it is limited to what the U.S. tax would be on the income. Therefore the reduction of the U.S. statutory corporate rate from 46 percent to 34 percent will greatly increase the number of U.S. companies in an excess foreign tax credit position. For example, Treasury data indicate that the percent of U.S. manufacturing companies (weighted by worldwide income) that are in an excess foreign tax credit position increases from 20.2 to 69.2 percent. Therefore, the 50 percent rule becomes much more important at the lower corporate rate.

The question is whether all or most of U.S. exporters who are in an excess credit position will choose not to use a FSC because they can get a higher level of tax exemption on export income simply by using the source rules. (An exporter who uses a FSC can also get some benefit from the source rules, but on only half of the export income so that the sum of the benefits [15 plus 25 percent] is less than the pure 50.0 percent exemption). In this paper, we assume that all exporters in an excess credit position will avail themselves of the maximum benefit under the source rules. We also assume that the percent of exporters in an excess foreign tax credit position is the above mentioned 69.2 percent. (In other words, we assume that weighting by exports and weighting by worldwide income yield the same results.)

When these two effects, the reduced FSC benefit and the enhanced value of the source rules, are added together, we conclude that export costs will fall by 0.50 percent, holding the cost of the equivalent domestically consumed good constant.[7] In the model, there is a equivalent reduction in the cost of capital in the export sector because both the FSC and the source rule benefits are based on taxable corporate income from exports.

D. Other Significant Changes in Domestic Taxation

The changes in domestic taxation included in the basic model runs are those described above: the change in statutory tax rates, the elimination of the

general business credit, the revision of depreciation and the elimination of the capital gains exclusion. The reason for excluding the other major provisions is simply that they have not yet been put into a cost of capital framework. (See, however, the paper by Lowell Dworin on the Alternative Minimum Tax in this volume.)

However it would be of interest to know if including items such as the passive loss rule, the corporate alternative minimum tax and the uniform capitalization rules would significantly change the results. The Conference Report indicates that these three items by themselves account for $92.0 billion in increased revenue in fiscal years 1987 through 1991. An attempt was therefore made to test the sensitivity of the results by using the revenue estimates for the passive loss rule, the corporate minimum tax, and the uniform capitalization rules. Most of these major domestic items relate to the deferral of taxable income. As a consequence, the long-run fully phased-in revenue gains or losses may not sufficiently reflect the significant acceleration of income recognition (or reduced deferral) that takes place. In order to correct this possible error, two alternative simulations were made. One is based on the fully phased in estimates and the other uses the average increase in revenue estimated for the initial 5 year 1987-1991 period (i.e., the revenue estimates considered during the legislative process). This presumably overstates the actual increase in marginal effective tax rates.

We assume that the passive loss rules increase taxes only in the non-traded sector on the grounds that they mainly affect real estate partnerships. It is further assumed that the corporate minimum tax and the uniform capitalization rules increase business level taxes uniformly in all sectors because it is difficult to make judgments with respect to their sectoral impact. In each case the revenue increases are translated into percentage point changes in tax rate by expressing them as a percent of total capital income in the appropriate sector.

V. PARAMETERIZATION OF THE MODEL

The model described above contains a relatively small number of sectors and is solved in differential form, so that strictly analytical solutions could be derived from it. However, the purpose of this paper is to evaluate the quantitative significance of certain effects rather than simply their direction. Therefore, it is necessary to choose specific parameters for simulation analysis. This section provides a summary of the data and parameter values used in addition to the measures of tax changes discussed earlier.

The four aggregate goods produced in each country were created from the 85 sector input-output table of the United States. As indicated above, nontraded goods and services, x_{NA}, include utilities, construction, transportation and communication, wholesale and retail trade, social and personal services, finance, real estate, and government. U.S. net non-machinery export goods, x_{2A}, essentially are grains, and chemicals. U.S. net import goods, x_{1A},

include many consumer durables and nondurables. The output of the U.S. machinery sector is x_{MA}.

Allocations of factor inputs across industries are based upon the direct and indirect factors requirements necessary to produce current levels of output. The nontraded sector and the three traded goods sectors all have relatively similar capital requirements. The nontraded sector and the import competing sector are intensive in unskilled labor while the two export sectors are relatively skill intensive. The relative supply of these two types of labor depend on the real rate of return to investment and are therefore affected by changes in tax; for example a lower real rate of return encouraging more training.

Partial elasticities of substitution between capital and unskilled labor, unskilled labor and skilled labor, and capital and skilled labor are in part based on estimates reported in Hammermesh and Grant (1980). For example, they report a virtually zero degree of substitutability between capital and skilled labor, but the values applied to all industries in this study are $\sigma_{KL} = \sigma_{SL} = 1.0$ and $\sigma_{KS} = 0.5$, where S is skilled labor and L is unskilled labor.

Demand elasticities for goods and portfolio elasticities for savings are based on a utility tree framework developed by Armington (1969). Residents in a particular country are assumed to first allocate their income between current consumption and total saving in view of the weighted worldwide after-tax rate of return. The current consumption branch has 3 sub-branches, net export goods, net import goods and the nontraded good. Thus U.S. consumers first allocate current consumption among the net export good, the net import good and the nontraded good and then within each of the first two categories allocate income between the domestic and foreign produced good. This formulation allows us to use a high elasticity of substitution within the inner nest of the utility function (between foreign and domestic output of the same good). If this nested utility function is CES in form, then as shown by Armington (1969) own and cross-price elasticities of demand can be derived directly from information regarding expenditure shares and elasticities of substitution at different levels of the utility tree.

For a given allocation of income to current consumption the elasticity of substitution between the two traded goods in the same utility tree is assumed to be 3, and the corresponding elasticity between the three general categories X_1, X_2 and X_N is assumed to be .75. A similar nested scheme is assumed to generate the demand for each of the capital goods used in production, with X_{MA} and X_{MB} in one branch and the nontraded good in the other. As examples of what these values imply with respect to more commonly estimated parameters, the import elasticity of demand in the U.S. for X_{1B} equals -2.21, and the elasticities of demand for U.S. exports of X_{2A} and X_{MA} to the rest of the world are -2.63 and -2.64 respectively.

The elasticities of demand for assets located at home and abroad are computed in a manner analogous to the commodity demand elasticities. Making the Armington separability assumption for foreign and domestic assets within

the overall savings branch yields two basic parameters, the elasticity of substitution between foreign and domestic assets, σ, and the elasticity of overall saving with respect to the weighted worldwide after-tax rate of return, η. Because values for σ are not well established, a range of estimates is used: 0.0, 3.0, and 30.0. The 3 values of σ represent zero, moderate or very high substitutability between U.S. and foreign assets. With respect to the overall saving elasticity, in this application we assume a zero interest elasticity of savings although a range has also been used in other simulations. The zero overall savings elasticity is used here to simplify the analysis and focus on the role of capital mobility.[8]

We can illustrate how these values are related to asset demand elasticities. For the case of $\sigma = 3.0$ and $\eta = 0.0$, both the own-interest rate elasticity of demand by U.S. savers for U.S. assets and the cross-interest rate elasticity with respect to foreign interest rates are equal in absolute value to .67. The corresponding own and cross-interest rate elasticities of demand for U.S. assets by foreign savers are 2.87 in absolute value. These two figures yield a weighted average interest rate elasticity of demand for U.S. assets of 1.16. Model simulations in earlier work by the authors suggest how much capital actually ends up moving if these parameters are used (Mutti and Grubert 1985). For example, a 1.0 percent increase of after-tax capital income (or a one percent reduction of the cost of capital) as a result of a corporate tax cut would result in an increase of the U.S. capital stock of .18 percent in the final general equilibrium solution. Consequently, the direct increase in demand of 1.16 percent is substantially offset in the model by induced changes in returns at home and abroad.

VI. SIMULATIONS

In order to highlight the role of certain tax changes and behavioral parameters, as well as the time frame being considered, several different scenarios are simulated. All but the last case exclude consideration of the passive loss rule, the corporate alternative minimum tax and the uniform capitalization rules.

Case 1. The short run, impact effect with moderate ($\sigma = 3.0$) capital mobility. In the short run, a savings outflow from the United States induced by a tax change can affect the demand for sectoral output and the trade balance by increasing the demand for capital goods output abroad and reducing it at home. However, the change in savings flows is not yet reflected in the capital stocks used in each country. This case is simulated by setting the two $\hat{K}$s, the percentage change in each country's capital stock, equal to zero.

Case 2. Long run, but with no interest sensitivity of international savings flows on the margin ($\sigma = 0$). This identifies the

changes in trade flows and sectoral output in the absence of a change in the capital account. There can, however, be an impact on merchandise trade due to changes in after-tax returns to capital which affect net international investment income. There is initial cross-ownership of capital reflecting the actual existing situation; but the stock does not respond to changes in rates of return.

Case 3. Long run, with moderate asset mobility, ($\sigma = 3.0$)

Case 4. Long run, with very high asset mobility, ($\sigma = 30.0$)

Case 5. Moderate asset mobility ($\sigma = 3.0$) with changes in the passive loss rule, corporate minimum tax and uniform capitalization rules included in the tax changes modeled.

Table 8.3 gives the simulation results for Case 1, the immediate short run impact of the Tax Reform Act before capital stocks have had a chance to adjust (although the impact of asset mobility on sectoral demands is included). The increased corporate tax on domestic capital lowers the after tax return and leads to a reduced saving outflow of $11.4 billion (at an annual rate). Offsetting the outflow of savings somewhat is smaller net payments of investment income to foreigners because of lower after-tax returns earned in the United States. An improvement of the trade balance of $8.5 billion (rather than $11.4 billion) is thus necessary to finance the capital outflow indicated above.

The short run improvement of the trade balance takes the form mainly of increased exports, not reduced imports. One reason for this split is the relatively large increase in the tax rate on capital in the import-competing sector presented in Table 8.1. In addition there is the impact of the increased incentive for exports resulting from the increased frequency of excess foreign tax credits.

The change in the pattern of sectoral output only weakly reflects the change in exports and imports. The import-competing sector declines in the United States in spite of the decrease in imports, which thus indicates that there is a shift away from these kinds of goods in general. (Imports of these goods become somewhat more expensive because the U.S. demand for foreign assets worsens the U.S. terms of trade.) In addition, equipment output declines in spite of the increase in exports. This is due to the offsetting reduction in the demand for equipment because of lower investment spending in the United States when $11.4 billion of savings flow out. An increase in savings outflows reduces equipment production in the United States because physical capital located in a country tends to have a much larger component of domestically produced equipment than imported equipment.

The tables report the estimated change in real consumption, but it should be noted that this model focuses on the taxation of capital in the broad

Table 8.3 **Short Run Impact of Tax Reform ($\sigma = 3.0$)**

Variable		Change
(^'s refer to change in percent and Δ's to change in billions of dollars at 1986 levels)		
$\hat{X}_{1A}$	Output of import-competing sector	- .59
$\hat{X}_{2A}$	Output of non-equipment export sector	1.83
$\hat{X}_{MA}$	Output of equipment sector	- .07
$\hat{X}_{NA}$	Output of nontraded sector	- .39
$\hat{i}_A$	After tax return in U.S.	- 4.41
$\hat{i}_B$	After tax return in rest of world	.08
ΔS_{AB}	U.S. acquisitions of foreign assets	10.29
ΔS_{BA}	Foreign acquisitions of U.S. assets	- 1.11
ΔF	Net change in capital outflows	11.40
ΔX	U.S. exports	7.31
ΔM	U.S. imports	- 1.16
ΔB	Net change in trade balance (not including investment income)	8.47
ΔI_R	Receipts of investment income	.49
ΔI_P	Payment of investment income	- 2.45
ΔR	Net change in investment income	2.94
$\hat{C}_A$	Real consumption	- .193
$\hat{t}$	U.S. terms of trade	- .97
$\hat{K}_A$		0.0
$\hat{K}_B$		0.0

sectors used and therefore abstracts from some behavioral changes which could increase real consumption. For example, the impact of real wages on total labor supply is not reflected in the model.

With that proviso, we can note that in the simulations real consumption declines in the United States, even in the short run before capital stocks have adjusted. In part, this reflects the welfare loss attributable to higher export incentives, but it is also a result of the decline of the U.S. terms of trade because of the increased demand for foreign capital. (This decline in the U.S. terms of trade, the equivalent of a real devaluation, promotes an expansion of exports.) It indicates that any improvement of the trade balance is not necessarily associated with any economic benefits to the United States. On the contrary, there is an increased overall (trade plus investment) demand for foreign output.

Summers (1986) claims that an increase in U.S. corporate tax unambiguously

leads to a short run improvement in the trade balance. However, his conclusion results from his assumption that initial foreign ownership of capital, and therefore foreign investment income, is zero. The simulations indicate that the short run net change in investment income, which results from the change in after-tax returns, can be substantial, at least compared to the other changes. Because of the importance of this factor, an increase in U.S. corporate tax on capital could lead to a deterioration of the trade balance in the short run, given a somewhat lower degree of capital mobility than $\sigma = 3.0$. (For example, see the $\sigma = 0$ case in Table 8.4 where there is initial cross-ownership of capital but asset flows do not respond on the margin to changes in relative returns.)

Table 8.4 **Long Run Impact of Basic Tax Changes With Varying Degrees of Capital Mobility**

		$\sigma = 0$	$\sigma = 3.0$	$\sigma = 30.$
(^'s refer to changes in percent. Δ's refer to changes in billions of dollars at 86 levels)				
$\hat{X}_{1A}$		-1.46	-1.54	-1.59
$\hat{X}_{2A}$		0.90	0.84	0.81
$\hat{X}_{MA}$		0.46	- .18	- .51
$\hat{X}_{NA}$		- .09	- .31	- .43
$\hat{i}_A$		-4.38	-3.01	-2.29
$\hat{i}_B$		0.0	-0.43	-0.67
ΔS_{AB}		0.0	5.64	35.75
ΔS_{BA}		0.0	1.38	29.16
ΔF		0.0	-4.26	-6.59
ΔX		.24	0.57	0.76
ΔM		2.63	2.00	1.68
ΔB		-2.39	-1.43	-0.92
ΔI_R		- .01	5.52	37.17
ΔI_P		-2.40	- .18	29.69
ΔR		2.39	5.70	7.48
$\hat{K}_A$	U.S. capital stock	0.026	-1.17	-1.79
K_B	Capital stock in ROW	0.033	0.40	0.61
$\hat{C}_A$	Steady state real consumption	-0.134	-0.240	-0.295
$\hat{t}$		- .26	- .25	- .25

Table 8.4 gives the long run steady state results for each of the 3 different mobility cases, $\sigma = 0, 3.0$, and 30.0. There is a small increase of the trade deficit in all three cases. When $\sigma = 0$, this reflects the net improvement in net investment income attributable to initial foreign ownership of capital. The reason for this improvement in net investment income is the lower U.S. rate of return earned by foreigners because of the increased U.S. taxes on business; the foreign returns received by the United States hardly change. (Note the changes in i_A and i_B in Table 8.4.) When capital is mobile, the increase in the trade deficit persists, although at a smaller level, because the continuing (in each year of the steady state) increased net demand for foreign capital is not large enough to completely offset the improvement in net foreign investment income. The latter increases as capital becomes more mobile because of the increased stock of capital abroad owned by U.S. residents.

The import competing sector bears the impact of these small changes in the trade balance and its output falls by about 1.5 percent. The equipment sector gains only in the $\sigma = 0$ case; it declines in the other cases because of the lower investment spending in the United States when capital is mobile and savings flows out.

The U.S. capital stock declines by somewhat more than 1.0 percent in the moderate and high mobility cases. Note, however, that even when capital becomes highly mobile, the decline in the U.S. capital stock is not much larger than in the moderate mobility case. The reason is that the United States is not a small country in this simulation; the rate of return in the rest of the world is not constant. A shift toward U.S. asset holding abroad increases foreign capital stocks and reduces rates of return abroad. This in turn causes foreigners, whose own asset holdings are highly mobile, to shift their asset holdings to the United States. This large two-way flow of saving is clear in the $\sigma = 30$ case where gross outflows increase by $35.75 billion and inflows by $29.16 billion in the steady state.

Table 8.5 presents the long run steady state impact of the Tax Reform Act when estimates of the tax changes attributable to the passive loss rule, the uniform capitalization rules, and the corporate minimum tax are included. The two columns correspond to the two alternative bases for the tax change estimates, the fully phased-in estimates and the budget period estimates used in the legislative process. The main purpose of these simulations is to see how sensitive the results are to including these provisions that are left out of the standard cost of capital calculations.

The results in Table 8.5 should be compared to the $\sigma = 3.0$ results on Table 8.4. Adding these "nonstandard" provisions has a visible effect on capital flows and the U.S. capital stock. Even when the lower bound, fully phased-in estimates are used, the decline in the capital stock goes from 1.17 percent to 1.43 percent. When the more familiar budget-period estimates for the Act are used, the decline in the capital stock becomes 2.48 percent. Leaving these "nonstandard" tax provisions out of the analysis may therefore seriously understate the impact of the Tax Reform Act.

Table 8.5 **Long Run Impact of Tax Reform Including Passive Loss Rule, Uniform Capitalization Rules, and AMT ($\sigma = 3.0$)**

Variable	Changes using fully phased-in estimates	Changes using Tax Reform Act revenue estimates (1987-1991 average)
$\hat{X}_{1A}$	-1.63	-1.66
$\hat{X}_{2A}$	.76	.69
$\hat{X}_{MA}$	- .36	- .93
$\hat{X}_{NA}$	- .36	- .67
$\hat{i}_{A}$	-3.34	-4.73
$\hat{i}_{B}$	- .52	- .91
ΔS_{AB}	6.19	8.32
ΔS_{BA}	1.02	- .70
ΔF	- 5.17	-9.02
ΔX	.44	-1.12
ΔM	2.02	1.04
ΔB	-1.58	-2.16
ΔI_{R}	6.01	7.84
ΔI_{P}	-.75	-3.34
ΔR	6.76	11.18
$\hat{K}_{A}$	-1.43	-2.48
$\hat{K}_{B}$	.48	.81
$\hat{C}_{A}$	-.27	-.39
$\hat{t}$	-.21	-.14

While we make an effort to evaluate the significance of these "nonstandard" items, it is only fair to remember that the simulations leave out potentially significant affects of the Tax Reform Act. Because of the aggregate nature of the study, the change in real consumption does not reflect the benefits of a more efficient allocation of U.S. capital among assets within one of the broad sectoral categories. These benefits are an important feature of the paper by Fullerton, Henderson and Mackie (1987). In addition, the specific simulations reported in this paper assume that aggregate saving is insensitive to the rate of return.

Nevertheless, even in this simplified framework, the results are not the straightforward predictable outcome of the increased business level taxes in

the United States. For one thing, predicting the change in capital flows requires an analysis of also how the U.S. tax on foreign income changes. Just knowing the change in taxes on domestic income is inadequate. In addition there are other important components of the model, such as changes in the terms of trade in response to capital flows, which can have a significant impact on real income. Finally, the purpose of simulations is to evaluate the quantitative significance of certain behavioral responses, not just their direction of change.

VII. SUMMARY AND CONCLUSIONS

The Tax Reform Act of 1986 has a relatively small impact on sectoral output and trade at the broad aggregate level examined in this paper. It does not have a dramatic effect on relative costs among sectors, and in the long run there is only a modest change in the trade balance.

Still, some of the changes are not insignificant and seem fairly robust under different assumptions about behavioral parameters. In the long run output in the import competing sector declines by from 1.0 to 2.0 percent because of a relatively large increase in capital costs, the (indirect) incentives provided to exports, and the outflow of capital. The U.S. equipment sector is helped, on the one hand, because it fares relatively well in terms of domestic business tax provisions, but on the other hand it suffers from reduced investment spending in the United States. On net, output declines somewhat, but less than the output of the import-competing sector. There is a decrease in the trade deficit in the short run because of the capital outflow in response to lower after-tax returns in the United States. In the long run, there is a small ($1 to 2 billion) increased trade deficit because the increased stock of U.S.-owned capital abroad generates greater investment income and finances more imports.

The changes in the U.S. capital stock appear to be more significant for U.S. welfare than the changes in sectoral output or the trade balance.[9] When the analysis is restricted to the "basic" tax changes, the U.S. capital stock is estimated to decline in the long run by 1.0 to 2.0 percent, depending on whether moderate or very high asset mobility is assumed. Assuming virtually perfect mobility does not have a large net effect because any large allocation of assets abroad by U.S. residents drives down returns in the rest of the world and induces a large reverse flow of assets by foreign savers. However, the "nonstandard" tax provisions such as the corporate minimum tax and the uniform capitalization rules may increase the decline in the capital stock to the 2.0 to 3.0 percent range.

The results demonstrate that the merchandise trade balance is not a good indicator of U.S. welfare or even a good predictor of sectoral outputs. In the short run, the capital outflow leads to a trade surplus but, since it is the result of an increased demand for foreign output (in the form of capital goods production) abroad, the U.S. terms of trade decline and real consumption

goes down. Furthermore, even though the U.S. equipment industry is normally a substantial net exporter, its output declines because of reduced investment spending in the United States, and the reduction in imports does not prevent a decline in the import competing sector.

The simulations demonstrate that changes in taxation are unlikely to have a significant impact on trade and sectoral output in the absence of international capital mobility. In the pure case (not simulated here) in which capital is not mobile and there is no initial cross-ownership of assets, a change in taxation will only affect trade to the extent that sectors are not affected uniformly (in terms of percentage cost changes), or if the overall size of the economy is altered. In addition, any increase in capital taxation in one sector relative to others translates into a much smaller percentage increase in price because of the significance of other costs such as wages, depreciation and purchases from other sectors. In contrast, if capital is mobile, a relatively modest change in the tax on U.S. capital income at the business level can have a significant effect on the trade balance in the short run, and can lead to a visible long run change in the capital stock.

FOOTNOTES

[1] While Summers (1986) stresses the importance of capital flows, he identifies competitiveness only with the size of the traded goods sector.

[2] Note that U.S. residents can import goods in the net export category, e.g., foreign agricultural products. We assume that equipment is not consumed directly by households.

[3] The particular estimates used assume a real after-tax return of 5 percent, an inflation rate of 4 percent, individual arbitrage of after-tax returns and the "new view" on dividend taxation.

[4] This procedure assumes that only operating investments abroad benefit from the rate reduction. This does not seem to require adjustment because the income in the other categories initially in the base for purposes of computing the effect of the rate cut were small or zero.

[5] Total foreign income includes total U.S. corporate foreign source net income reported on corporate tax returns, investment income received by individuals and the amount of income retained abroad by U.S. owned foreign corporations. It was estimated to be $100.0 billion in 1986. Some of the components were obtained from balance of payments data published in the *Survey of Current Business*.

[6] This refers to the special title-passage provision of the sales source rules. The Tax Reform Act requires the Treasury to conduct a study of source rules for inventory property. Nothing in this discussion should be taken as an indication of the results of the Treasury study.

[7] If we were fully consistent, we would increase the tax on real investment abroad computed in the previous section to balance the increased benefit on the margin to exports. In other words, some of the benefits of a lower statutory rate on foreign income should be attributed to exports.

[8] The zero elasticity of total saving implies that, for given income, nominal saving is fixed in terms of the numeraire good. If income is unchanged, real capital accumulation can only change if the price of the capital good changes relative to other goods.

[9] As indicated earlier, this paper focuses on capital mobility and the allocation of capital among broad sectors while abstracting from other potential sources of welfare improvements.

Labor supply and total saving do not respond to real wages or rates of return in these simulations. In addition, the simulations do not reflect the more efficient allocation of capital among specific assets within a broad sector, which is an important aspect of the paper in this volume by Fullerton, Gillette, and Mackie.

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