Chapter 15

Short-Run Effects

of Border-Tax Adjustments

I. INTRODUCTION AND SUMMARY

Largely because of the balance-of-payments difficulties that the United States has been facing in recent years, there has been increasing interest in the workings of border-tax adjustments. According to existing GATT rules, a country can rebate, on exportation of a commodity, the indirect taxes that have been paid in the course of the production of that commodity. Likewise, countervailing import surcharges can be levied on imports of types similar to domestically produced goods in the course of whose production indirect taxes are levied. These countervailing surcharges represent, in principle, the equivalent of the indirect taxes paid by the corresponding internally produced commodities.

Though the United States applies border-tax adjustments on those goods on which it levies indirect taxes, the fact remains that the weight of such adjustments is considerably less here than in most European countries because the latter rely more heavily on indirect taxation than the United States does. This fact gives rise to queries whether the United States could not improve its balance of payments by shifting some of the weight of its taxation from direct taxes (on which GATT rules do not permit border-tax adjustments) to indirect taxes (on which such adjustments are allowed). The discussion in this regard generally focuses on the substitution of a broad-based indirect tax (such as a value-added tax or manufacturers' excise tax) for some part of the personal income tax or of the corporation income tax. Also of current interest are the possible balance-of-payments effects of tax changes that are being contemplated in other countries.

These issues provide the motivation for this discussion, and consequently its focus is on the balance-of-payments effects of border-tax adjustments under various conditions. The qualification, "short-run" appearing in the title is intended mainly to call attention to the fact that no automatic adjustment mechanism (such as flexible exchange rates or differential price-level changes among countries) is assumed to be at work keeping in balance the international payments and receipts of the country in question. When such an automatic adjustment mechanism is at work, and working well, there is no longer any point in analyzing the effects of such measures as border-tax adjustments on

the balance of payments. The relevant issues turn on other variables such as the total volume of trade.[1] However, under the present conditions of the world economy, we obviously face an adjustment mechanism which is at best sluggish and imperfect. Under these conditions, as we well know, serious balance-of-payments problems can emerge, and it becomes a matter of interest to inquire into the balance-of-payments effects of alternative policy measures.

The assumed absence of an automatic adjustment mechanism obviously places the analysis in a world where neither flexible exchange rates nor the relative wage and price movements incorporated in traditional gold-standard analysis operate to produce balance-of-payments equilibrium. We build these characteristics into the analysis which follows by assuming that exchange rates remain fixed and that the level of wage rates in the country in question is independent of the policy changes that are treated.

On the basis of the assumptions of constant exchange rates and given wage rates, we build a macroeconomic model to determine the effects of various tax changes on the balance of payments. Although this model is simple, it incorporates all the key forces relevant to our problem. As is characteristic of mathematical models, it enables us to be certain that our conclusions follow logically from our assumptions, and that our argument does not entail internal contradictions.

The model presented takes two forms, one designed for an economy operating at less-than-full employment and the other designed for an economy in which full employment is maintained. Underlying the less-than-full employment model, a monetary policy is assumed which supplies to the economy the amount of money required for accommodating the levels of output and demand that result from the maintenance of the given wage rate and of a constant interest rate. In this model, therefore, monetary policy can be considered as passive — introducing neither inflationary nor deflationary forces into the economy, but permitting other forces, such as border-tax adjustments, to exert their own stimulating or depressing effects without attempting to offset them. Likewise, in the less-than-full employment model, fiscal policy as such plays a passive role. For example, when an increase in indirect taxes is assumed to take place in the model, direct taxes are assumed to decrease so as to keep total government revenue constant. Increases or reductions in budget surpluses or deficits being thus ruled out, the only changes in income that stem from fiscal actions occur because of changes in the *form* of taxation, not as a result of changes in its total amount.

Lying behind the full-employment variant of the model, on the other hand, are active monetary and/or fiscal policies. Here, if an assumed tax change — such as the introduction of border-tax adjustments — would create an increase in the total demand for the products of the economy, monetary and fiscal policy actions are assumed which offset this effect so as to leave the total demand for the country's output equal to its full-employment supply. The composition of

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[1] In Chapter 14, I have analyzed the effects of border-tax adjustments under conditions in which balance in international payments prevails both before and after the changes being considered.

output among different classes of goods can change in this model, but the aggregate output of the economy cannot.

Given the fact that the two variants of the model entail quite different assumptions about monetary and fiscal policies, it is noteworthy that the principal conclusions stemming from the two variants are identical with regard to the direction of the balance-of-payments effects of the various policies analyzed here. This stability of our conclusions in the face of varying assumptions about monetary and fiscal policies makes them considerably more useful and forceful than they otherwise might be. A brief review of these conclusions follows.

In section II the case of a truly general value-added tax is analyzed. It is shown there that the imposition of such a tax, counterbalanced by a corresponding reduction in direct taxes, would leave the balance of trade unchanged. Prices of final products would rise by the full amount of the tax, but purchasers of such products would have the requisite purchasing power because of the concomitant reduction in income taxes. If, on the other hand, the same tax substitution were made without border-tax adjustments, a deterioration of the balance of trade would result. Similarly, if border-tax adjustments were removed, after having been in effect for a general value-added tax, the balance of trade would worsen. But if new border-tax adjustments were applied to a general value-added tax that had previously been in effect without them, the balance of trade would improve. The most important conclusion of section II is that stated first — put simply, no balance-of-payments effect is to be expected from the introduction of a new and fully general value-added tax with border-tax adjustments.

In section III the analysis is complicated to take account of different effective rates of indirect tax on goods which are internationally traded and on those which are not. Here it is shown that the balance-of-trade effects of imposing new indirect taxes on the two classes of goods depends on which class is taxed at the higher effective rate. If, as is overwhelmingly likely to be the case, international goods carry a higher effective rate of tax than nontraded goods, then some improvement in the balance of trade will result, so long as border-tax adjustments are made. If border-tax adjustments are not made, however, the imposition of a new indirect tax on either of the two classes of goods will result in a deterioration of the trade balance. As before, the introduction of border-tax adjustments on an already existing tax system, where the adjustments were not previously applied, must lead to an improvement in the balance of trade.

The above conclusions of section III are derived from an analysis of the less-than-full employment variant of the basic model. In section IV the analysis is extended to the full-employment case, and it is shown that the conclusions summarized above apply without modification.

Whereas in the earlier analysis no distinction was made between a situation in which a new indirect tax is offset by a reduction in personal taxes and a case in which it is offset by a reduction in corporate taxes, section V extends the analysis to cover this specific issue. It is shown there that while the immediate balance-of-trade effects are likely to be the same regardless of whether personal or corporate taxes are reduced, the reduction of corporate taxes is likely to

produce effects on capital flows and, in the longer run, secondary effects on the trade balance, both of which operate to improve the balance of payments. Thus, so far as balance-of-payments effects are concerned, corporate tax reduction is preferable to personal tax reduction.

II. THE CASE OF A GENERAL VALUE-ADDED TAX

The assumption of constant wages, together with the traditional assumption that wages represent overwhelmingly the most important variable cost of production in the short run, enables us to express the quantity supplied of any category of goods as a function of its price alone. As we are focusing on the balance-of-trade consequences of tax measures, it is convenient to group commodities in two broad categories — international goods and domestic goods. International goods consist of both importables and exportables, and it will be assumed that the country in question has no significant influence on the world price of these goods. With this assumption, the unit of each international good can be chosen as that amount which sells for, say, one dollar in world markets (the dollar here representing foreign currency), and the balance of trade of the country in question can accordingly be expressed as the difference between its quantities supplied and demanded of international goods.

As a general value-added tax will fall with equal weight on all components of cost, its impact on the cost curve of any sector will be to raise it by the percentage rate of tax. By itself this would lead to a reduction in output everywhere in the economy, and would thus generate unemployment and downward pressures on wages. But if the value-added tax were imposed as a replacement for a part of an already existing income tax, these results would be obviated. Suppose that the total demand for goods before the tax change were $100 million, that at the same time a value-added tax of 10 percent was introduced, and that income-tax rates were so adjusted as to reduce income-tax yields by $10 million. Under these circumstances, with border-tax adjustments, the equilibrium of the economy would end up exactly the same, in real terms, as it was before. All prices would rise by 10 percent, relative prices would remain unchanged, earned incomes would remain unchanged but disposable incomes would rise by an amount sufficient to "finance" the same real purchases as were made previously. If border-tax adjustments were not made, relative prices would change, with international goods becoming relatively cheaper than domestic goods, inducing an increase in demand for and a reduction in supply of international goods and a corresponding deterioration in the balance of trade. In this case, then, border-tax adjustments are necessary in order to prevent a deterioration of the balance of trade, and do not confer on the country in question any net balance-of-payments advantage.

The result is quite different when one considers the case of a value-added tax which is already in existence, and to which the economy has already fully adjusted. Here the truth seems to be that "whatever is, is right," so far as balance-of-payments effects are concerned. If the existing value-added tax does not entail border-tax adjustments, and the economy has already fully accommodated itself to this setup, then the arbitrary introduction of border-tax

adjustments will result in the expansion of exports and the contraction of imports and will thus improve the balance-of-payments position of the country in question. If, on the other hand, the existing value-added tax were one incorporating border-tax adjustments, the elimination of these adjustments would cause a balance-of-payments deficit, while their maintenance would be required to preserve the status quo in the balance of payments.

Let me attempt to summarize by citing three rather stylized examples — the United States, Germany, and France. If the United States were to impose a value-added tax while simultaneously reducing income taxes and holding wages to their normal course, the result would be a deterioration in the United States balance of payments unless the value-added tax were accompanied by border-tax adjustments, in which case the potential detrimental effect of the border-tax adjustments appear to be "good" in the sense that their introduction value-added tax on the balance of payments would be neutralized. Here border-tax adjustments appear to be "good" in the sense that their introduction imposes no burden either on the balance of payments of the United States or on that of the rest of the world.

Now consider the case of Germany. Germany has a rather highly developed system of indirect taxes, based on the turnover or "cascade" system. Border-tax adjustments are made in Germany, but it is generally agreed that these adjustments are only partial. Because indirect taxes are paid in various stages of the productive process, it is necessary to estimate the amount of such taxes that are "incorporated" in a given type of good being exported. The Germans use rough rules-of-thumb in this estimation, and these rules-of-thumb are conservative in the sense that they on the average underestimate the total amount of tax that has been paid on account of an export good as it passed through its various stages of elaboration. Germany is now contemplating a shift to the French system of value-added taxation. Assuming the new value-added tax to be a general one at a flat rate, there will be no need for rules-of-thumb to guess at the amount of indirect tax that has been paid on account of an export good, for it can then be presumed that, say, 10 percent of its market value has in fact been paid at one or another stage in the elaboration process. Thus a 10 percent rebate upon exportation will be called for. This rebate will be greater than the rebates being paid under the current rule-of-thumb system and will accordingly confer balance-of-payments advantages upon Germany, so long as wages are held to their "normal" course. It is as if Germany had had, up to now, a value-added tax without full rebates, had adapted her economy to this setup, and now introduces increased rebates on exports. Here the increased rebates do confer a net balance-of-payments advantage to Germany and a corresponding disadvantage to the rest of the world.

The French case is one in which the value-added tax has been a part of the tax system for some time, with full border-tax adjustments being made. If now the French were to abolish the border-tax adjustments while maintaining the value-added tax as it is, they would thereby induce a substantial deterioration of their balance of payments, and a corresponding improvement in that of the rest of the world. Thus, border-tax adjustments appear to be "neutral" (a) when new indirect taxes are being introduced (the United States example), or (b) when old indirect taxes already involve border-tax adjustments (the French

example). Border-tax adjustments appear to be nonneutral when they are newly applied on indirect taxes to which the economy has already accommodated itself in the absence of border-tax adjustments (the German example).

III. TAXES WITH UNEQUAL IMPACT ON INTERNATIONAL AND DOMESTIC GOODS: CONSTANT WAGE RATES AND LESS-THAN-FULL EMPLOYMENT

Although it is typically the purpose of value-added taxation to apply indirect taxes in a nondiscriminatory fashion to as wide a spectrum of goods as possible, no actual tax system has achieved the goal of striking *all* the value produced in an economy. Service activities, in particular, tend to be exempted from indirect taxation, even in very broad-based tax systems, and often agricultural production is also exempt. Moreover, many countries discriminate among activities according to the "luxury" or "necessity" character of their principal products. The net result of the failure to tax all activities, and of differential taxation of some, is that international goods and domestic goods are normally not taxed equally. Because of the great importance of the services as a component of domestic goods, the presumption is that domestic goods are typically taxed at lower *average* rates than international goods. In this section we therefore inquire into the short-run balance-of-payments effects of various tax policies, operating on the assumption that the effective rate of indirect taxation upon domestic goods will be no greater than that on international goods. For this analysis, we take the effective tax on a final product to be the sum total of indirect taxes paid in the process of producing it; thus, the taxes allocated to automobiles include those paid on the steel, rubber, copper, glass, etc., that are used to make the automobiles. This assumes implicitly that materials and intermediate goods enter into the production of products at higher stages in fixed proportions, certainly a highly plausible approximation.

Apart from materials, labor is taken to be the only factor of production that is significantly variable in the short run. This is a standard assumption for short-run analysis of this type, which stems from the fact that capital equipment cannot typically be transferred from one industry to another — as labor can — in a short period of time, and that the augmentation of the capital stock of an industry through investment typically is a time-consuming process. These assumptions permit us to describe the supply of any final good as a function of its net-of-tax price and of the wage rate paid to labor. Since we have adopted the convention of investigating the reactions of the economy to tax changes under conditions in which the course of wages is independent of such tax changes, we can treat the quantities supplied as functions of the net-of-tax price alone.

Thus we have

$$(15.1) \qquad\qquad dI^s = e_1\, dp_1 \quad (e_1 > 0)$$

$$(15.2) \qquad\qquad dH^s = e_2\, dp_2 \quad (e_2 > 0)$$

where I^s refers to the supply of international goods, and p_1 to their net-of-tax price, and H^s refers to the supply of domestic goods and p_2 to their net-of-tax price.

On the demand side, let us first proceed on the assumption of a less-than-full-employment situation with constant interest rates. Demand for each good will then depend upon its relative price and the level of real income (y). We take the initial level of prices as being unity; this is simply a matter of choosing the units in which we measure the goods, and places no constraint upon the results.

We therefore have

$$(15.3) \qquad dI^d = b_1(dp_1 + t_1 - dp_2 - t_2) + c_1 \, dy \quad (b_1 < 0; c_1 > 0)$$

$$(15.4) \qquad dH^d = b_2(dp_2 + t_2 - dp_1 - t_1) + c_2 \, dy \quad (b_2 < 0; c_2 > 0).$$

Here $(dp_1 + t_1 - dp_2 - t_2)$ represents the change in the price of international goods relative to domestic goods, where t_1 is the effective rate of tax on international goods and t_2 the effective rate of tax on domestic goods. Similarly, $(dp_2 + t_2 - dp_1 - t_1)$ represents the change in the relative price of domestic goods stemming from the imposition of taxes at the rate t_1 on international goods and at the rate t_2 on domestic goods.

The responses of demand for the two goods to changes in relative price are measured by b_1 and b_2, respectively. The interpretation of these coefficients depends upon one's assumptions about how the tax system accommodates the changes in indirect taxes implied by the imposition of t_1 and t_2. The most convenient — and, I believe, the most relevant — assumption in this regard is that direct taxes are reduced, as indirect taxes are imposed, so as to keep the total tax receipts of the government unchanged. Under these circumstances, b_1 and b_2 must be interpreted as reflecting the substitution effect only, and they must be equal in magnitude (see appendix for the proof of this statement), and, of course, negative in sign.

The change in real income, dy, is measured by the sum of the changes in the real output of the economy, measured at initial prices, which it will be recalled are set equal to unity. Thus we have

$$(15.5) \qquad dy = dI^s + dH^s.$$

Also, while there is no requirement in this model for trade to be balanced — indeed, we are seeking to measure the effects of tax changes on the trade balance — we do require the equilibration of supply and demand for domestic goods. Thus

$$(15.6) \qquad dH^d = dH^s.$$

This completes the model for the case of less-than-full employment, and we can now proceed to analyze the consequences of different tax changes.

A. *The Introduction of New Indirect Taxes Levied on the Purchaser.* When indirect taxes are levied on the purchaser, the price paid by domestic buyers for international goods rises by the amount of the tax, while the price received by local producers of international goods remains unchanged. This is the consequence of the fact that the foreign price of international goods is taken as

given, and of our assumption of a fixed exchange rate. We therefore have, in this case, that the price received by producers of international goods (net-of-tax) remains unchanged, or $dp_1 = 0$. The system reduces to

$$(15.1') \qquad dI^s = 0$$

$$(15.2') \qquad dH^s = e_2 \, dp_2 = dy$$

$$(15.3') \qquad dI^d = b_1(t_1 - dp_2 - t_2) + c_1 \, dy$$

$$(15.4') \qquad dH^d = b_2(dp_2 + t_2 - t_1) + c_2 \, dy = dH^s$$

Solving for dp_2, we find that

$$(15.7) \qquad e_2 \, dp_2 = b_2 \, dp_2 + b_2 t_2 - b_2 t_1 + c_2 e_2 \, dp_2, \quad \text{or}$$

$$dp_2 = \frac{b_2(t_2 - t_1)}{e_2(1 - c_2) - b_2}.$$

Substituting into (15.3'), we have

$$dI^d = b_1(t_1 - t_2) - \frac{b_1 b_2(t_2 - t_1)}{e_2(1 - c_2) - b_2} + \frac{c_1 e_2 b_2(t_2 - t_1)}{e_2(1 - c_2) - b_2}$$

$$dI^d = \frac{e_2(1 - c_2)b_1(t_1 - t_2) + c_1 e_2 b_2(t_2 - t_1)}{e_2(1 - c_2) - b_2}.$$

Recalling that $b_2 = b_1$, this can be expressed as

$$(15.8) \qquad dI^d = \frac{e_2(1 - c_2 - c_1)b_1(t_1 - t_2)}{e_2(1 - c_2) - b_1},$$

and the change in the balance of trade can be written

$$(15.9) \qquad dI^s - dI^d = \frac{-e_2(1 - c_2 - c_1)b_1(t_1 - t_2)}{e_2(1 - c_2) - b_1} \qquad [(1 - c_2 - c_1) > 0].$$

The relevance of (15.9) to our discussion stems from the fact that to levy indirect taxes upon the purchaser of a product is equivalent to levying the same taxes on the producer of the product and simultaneously introducing border-tax adjustments. Consider a good selling in the world market for $1. If a tax of 10 cents a unit is levied on domestic producers of that good, they will receive a net-of-tax price of 90 cents. But if border-tax adjustments are made on exportation of the product, they will receive $1 per unit, as before, on the exported portion of their production. But this in turn means that any part of their product that they sell domestically will also sell for $1, net of tax, since two different prices cannot apply to the same good in the same market. (I pass over here the possibilities of monopoly pricing, and particularly of discriminating monopoly as between the foreign and domestic markets.) Thus the burden of a tax levied on the producers of exportable goods is in effect borne by the domestic purchasers of them, when border-tax adjustments are made, just as would be the case if the tax were directly levied on domestic purchasers. Similarly, if a tax is levied on producers of an importable good

selling for \$1 in world markets and if border-tax adjustments are made, the countervailing duty paid on imports of that good will cause its internal price to rise by the amount of the tax, and producers will receive the world price as their net-of-tax receipt per unit sold. This, too, is just what would happen if the tax had been levied directly on domestic purchasers of the commodity. Finally, so far as purely domestic goods are concerned, it is a matter of indifference whether an indirect tax is levied nominally on the producer or nominally on the purchaser; the change in the "label" of the tax should have no economic effects.

Thus, the problem that has been analyzed, whose results are given in equation (15.9), is really the problem of the balance-of-trade effects of the introduction of new indirect taxes accompanied by border-tax adjustments. The principal results are as follows:

1. If a truly general value-added tax were introduced, so that $t_1 = t_2$, there would be no effect on the balance of trade so long as border-tax adjustments were made. This confirms the assertion made to this effect in the preceding section.
2. If new indirect taxes are imposed (together with border-tax adjustments) in the "typical" pattern, with the taxes falling more heavily on international goods than on domestic goods (i.e., $t_1 > t_2$), the balance of trade of the country in question will necessarily be improved, the extent of the improvement being proportional to the excess of t_1 over t_2.

B. *The Introduction of New Indirect Taxes Levied on the Producer, Without Border-Tax Adjustments.* If indirect taxes are introduced without border-tax adjustments, the price received (net-of-tax) by local producers of international goods will fall by the amount of the tax. Thus, in our model, $dp_1 = -t_1$. Introducing this into the general model yields

$$(15.1'') \qquad dI^s = -e_1 t_1$$

$$(15.2'') \qquad dH^s = e_2 \, dp_2$$

$$(15.3'') \qquad dI^d = b_1(-dp_2 - t_2) + c_1 \, dy$$

$$(15.4'') \qquad dH^d = b_2(dp_2 + t_2) + c_2 \, dy = dH^s$$

$$(15.5'') \qquad dy = -e_1 t_1 + e_2 \, dp_2.$$

Equating dH^s and dH^d, we obtain

$$e_2 \, dp_2 = b_2 \, dp_2 + b_2 t_2 + c_2 e_2 \, dp_2 - c_2 e_1 t_1,$$

or

$$dp_2 = \frac{b_2 t_2 - c_2 e_1 t_1}{e_2(1 - c_2) - b_2}.$$

Substituting into (15.5'') and (15.3''), we get

$$dI^d = (-b_1 + c_1 e_2)\left(\frac{b_2 t_2 - c_2 e_1 t_1}{e_2(1 - c_2) - b_2}\right) - b_1 t_2 - c_1 e_1 t_1,$$

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and

$$dI^s - dI^d = -e_1(1 - c_1)t_1 + b_1 t_2 - \frac{(c_1 e_2 - b_1)(b_2 t_2 - c_2 e_1 t_1)}{e_2(1 - c_2) - b_2}$$

$$(15.10) \qquad = \left[-e_1(1 - c_1) + \frac{(c_1 e_2 - b_1)c_2 e_1}{e_2(1 - c_2) - b_2}\right] t_1$$

$$+ \left[b_1 - \frac{(c_1 e_2 - b_1)b_2}{e_2(1 - c_2) - b_2}\right] t_2.$$

Using the fact that $b_1 = b_2$, and defining $s = (1 - c_1 - c_2)$, (15.10) can be simplified to

$$(15.11) \qquad dI^s - dI^d = \frac{e_1 s(b_1 - e_2)t_1 + e_2 s b_1 t_2}{e_2(1 - c_2) - b_1}.$$

Since b_1 is negative, and all the rest of the parameters positive, it is clear that the balance of trade must deteriorate as a consequence of a tax on producers, regardless of whether the tax is levied on producers of international goods or on producers of domestic goods or both. The conclusion of this part of the analysis is strong:

3. If new indirect taxes are levied, falling nominally upon producers, and without being accompanied by border-tax adjustments, they will necessarily lead to a deterioration of the trade balance of the levying country.

C. *The Introduction of Border-Tax Adjustments in Connection with Already Existing Taxes.* The introduction of border-tax adjustments amounts, as has been indicated before, to the conversion of a tax levied upon producers into a tax levied on purchasers. The balance-of-trade effects of such a change can therefore be ascertained by subtracting the balance-of-trade effects of a tax on producers from the balance-of-trade effects of a tax on purchasers. We therefore subtract equation (15.11) from equation (15.9). Recalling that $(1 - c_1 - c_2) = s$, we obtain

$$(15.12) \qquad dI^s - dI^d = \frac{-e_2 s b_1 t_1 - e_1 s(b_1 - e_2)t_1}{e_2(1 - c_2) - b_1} = \frac{(e_1 e_2 - b_1(e_1 + e_2)]s t_1}{e_2(1 - c_2) - b_1}.$$

This expression is necessarily positive. It is independent of t_2, as should be the case, for it is impossible to make border-tax adjustments for purely domestic goods. Thus we conclude:

4. The introduction of border-tax adjustments on an already existing tax system must have favorable effects on the balance of trade.

IV. TAXES WITH UNEQUAL IMPACT ON INTERNATIONAL AND DOMESTIC GOODS: CONSTANT WAGE RATES AND FULL EMPLOYMENT

We can now proceed to check on whether the four principal conclusions arrived at in the preceding section are valid when the model is altered so as to permit the continuous maintenance of full employment. If full employment is

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to be maintained, the production of home goods must go up whenever the production of international goods declines, and vice versa. This requires, to a close approximation, that $dI^s = -dH^s$, or $dy = 0$.

Thus, if a tax is imposed which causes a reduction in the production of international goods, something must happen to create a corresponding increase in the demand for home goods. This "something" will not, in general, happen automatically; policies must be followed that will produce this result. Obviously, there is some choice among alternative policies that will achieve this end — both monetary and fiscal policies are in principle suited to the purpose, and they can be used singly or in combination. But we need not here inquire as to the precise nature of the policy mix that will be used to generate and maintain full employment. The only restriction that we will place on that mix is that it operates in such a way that when it is expansionary, both the demand for home goods and the demand for international goods will increase, and vice versa when the policy is restrictive. We will call dE the change in expenditures (measured at initial prices) brought about by such policies and will assume it to be divided in the fractions g_1 and g_2 between international and domestic goods. The "full-employment" system of equations thus reads:

(15.1) $\qquad\qquad dI^s = e_1\, dp_1$

(15.2) $\qquad\qquad dH^s = e_2\, dp_2$

(15.3*) $\qquad\qquad dI^d = b_1(dp_1 + t_1 - dp_2 - t_2) + g_1\, dE$

(15.4*) $\qquad\qquad dH^d = b_2(dp_2 + t_2 - dp_1 - t_1) + g_2\, dE$

(15.5*) $\qquad\qquad dI^s = -dH^s$

(15.6*) $\qquad\qquad dH^s = dH^d$

For a tax on the home good (t_2), with no taxes on the international good, we have $t_1 = 0$, $dp_1 = 0$, $dI^s = 0$, $dH^s = 0$ [from (15.5*)], and therefore $dH^d = 0$, and $dp_2 = 0$. We obtain dE from (15.4*):

$$0 = b_2 t_2 + g_2\, dE; \qquad dE = \frac{-b_2 t_2}{g_2}.$$

Substituting into (15.3*), we obtain

$$dI^d = -b_1 t_2 - \frac{g_1 b_2 t_2}{g_2}.$$

Therefore

$$dI^s - dI^d = \frac{(g_2 b_1 + g_1 b_2)}{g_2}\, t_2,$$

and since $b_1 = b_2$, and $(g_1 + g_2) = 1$, we have

(15.13) $\qquad\qquad dI^s - dI^d = \frac{b_1 t_2}{g_2}.$

For a tax on purchases of international goods we have $t_2 = 0$ and $dp_1 = 0$, $dI^s = 0$, $dH^s = 0$, and therefore $dH^d = 0$ and $dp_2 = 0$. Again obtaining dE from (15.4*), we get

$$0 = -b_2 t_1 + g_2\, dE; \qquad dE = \frac{b_2 t_1}{g_2}.$$

Substituting into (15.3*), we obtain

$$dI^d = b_1 t_1 + \frac{g_1 b_2 t_1}{g_2}, \quad \text{and}$$

(15.14)

$$dI^s - dI^d = -b_1 t_1 - \frac{g_1 b_2 t_1}{g_2} = \frac{-b_1 t_1}{g_2}.$$

Amalgamating (15.13) and (15.14) for the case of taxes on both purchases of home goods and purchases of international goods, we have

(15.15) $\qquad\qquad dI^s - dI^d = \frac{-b_1(t_1 - t_2)}{g_2}.$

This expression is zero when $t_1 = t_2$, and positive when $t_1 > t_2$. Therefore conclusions (1) and (2) from page 266 above apply to the full-employment case just as well as to the less-than-full-employment case.

For a tax on production of the international good, we have $dp_1 = -t_1$. Since dH^s must equal $-dI^s$, we obtain $dp_2 = e_1 t_1/e_2$. Equating dH^d with dH^s, we get

$$e_2\, dp_2 = b_2\, dp_2 + g_2\, dE,$$

so

$$dE = \frac{(e_2 - b_2)}{g_2}\, dp_2 = \frac{(e_2 - b_2)e_1 t_1}{e_2 g_2}.$$

We now substitute into (15.3*) to obtain

$$dI^d = \frac{-b_1 e_1 t_1}{e_2} + \frac{g_1(e_2 - b_2)e_1 t_1}{e_2 g_2}$$

and

(15.16) $\qquad dI^s - dI^d = -e_1 t_1 + \frac{b_1 e_1 t_1}{e_2} - \frac{g_1(e_2 - b_2)e_1 t_1}{e_2 g_2}.$

This result is unambiguously negative, as was the result in equation (15.13), for a tax on home goods. (There is no difference in effect between a tax levied nominally on producers of home goods and the same tax levied nominally on purchasers of home goods.) Thus the third conclusion reached above, that a tax levied on producers always leads to a deterioration of the trade balance, remains valid for the full-employment case.

Finally, to check on the validity of the fourth conclusion we simply subtract expression (15.16) from expression (15.14). This tells us what would happen if a tax on producers of international goods were converted into what is in effect a tax on consumers of such goods via border-tax adjustments. Since (15.16) is

unambiguously negative, and (15.14) unambiguously positive, the net result of such a shift must be an improvement in the trade balance. Thus all four of the conclusions reached in section III for the less-than-full-employment case apply without modification to the full-employment case as well.

V. AN EXTENSION OF THE ABOVE ANALYSIS: VALUE-ADDED TAX VS. CORPORATION INCOME TAX

As the United States seeks ways of improving its balance-of-payments position, it is frequently suggested that some of the weight of the tax system be shifted from direct to indirect taxes. It is asserted or implied, when this suggestion is made, that the possibility of introducing border-tax adjustments concomitantly with new or increased indirect taxes will result in a significant improvement of the balance of trade. As we have seen, this conclusion is probably unwarranted when indirect taxes are substituted for personal income taxes. On the one hand, if the indirect tax were a truly general value-added tax, or if it, without being general, struck domestic and international goods at roughly the same effective rate, the presumption is that there would be no balance-of-trade effects. On the other hand, if the tax were nongeneral, and at the same time struck international goods at higher effective rates than at domestic goods, there would be a favorable effect on the balance of trade, but it would be related not to the level of the effective rate of new taxation on international goods but to the excess of that rate over the effective rate of new taxation on domestic goods. Thus, for example, suppose that a 10 percent tax were placed on value added over a broad sector of the economy, but with some exemptions. Let us assume, that, say, 20 percent of all value added in the production of international goods, and 50 percent of all value added in the production of domestic goods turned out to be exempt from the tax. Then one would have an effective rate of tax of 8 percent on international goods and of 5 percent on domestic goods. The consequent "leverage" for improving the balance of trade would be the 3 percent differential between these two rates rather than the 10 percent tax that was actually being rebated upon exportation and charged as a countervailing duty on importation. The balance-of-trade effects would accordingly be only some 30 percent of those that would be calculated on the basis of a presumably full stimulus from the 10 percent border-tax adjustment. There would be favorable effects, to be sure, but they would not be nearly so substantial as a naive approach to the problem would lead one to expect.

What differences are introduced into this set of conclusions when we assume that new indirect taxes are counterbalanced by a reduction in the corporate rather than the personal income tax? This question asks, in effect, whether the reduction of corporate taxes will result in a lower internal price level of international goods than would a reduction of equal magnitude in personal income taxes. I see no reason to presume that this would be the case in the short run. The prevailing prices for goods represent the equilibrium of supply and demand in their respective markets. Only if a reduction in the

corporation tax (as against the personal income tax) would cause the supply function for international goods to shift to the right, could such a presumption be sustained. But in the short run, corporate profits are not reflected as a cost underlying the supply function, but rather as the residual share which emerges after all other costs are met. Since corporate profits are not a component of short-run marginal costs, an alteration in the tax rate on them will not influence short-run marginal costs, hence will not affect the short-run supply functions of the affected industries.

I would thus maintain that for a strictly short-run analysis of the balance of trade the presumption is that the results obtained in the preceding sections hold regardless of whether the new indirect taxes are counterbalanced by a corporate or a personal tax reduction. However, the medium- and longer-run effects of corporate tax reduction do appear to be more favorable to the balance of trade than those of personal tax reduction, and there might be significant short-run effects on the balance of payments as distinct from the balance of trade. Both of these results stem from the fact that a reduction in corporate taxes makes investment in the corporate sector more profitable than it otherwise would be. The greater profitability of the corporate sector will stimulate investment there, and will presumably draw some funds into such investment which otherwise would have been placed abroad by financial institutions, etc. This effect will lead to an improvement in the balance of payments on capital account, which could take place quite rapidly. It should be pointed out here, however, that this effect would not apply to direct investment abroad, since the reduction in corporate taxes would presumably enhance the profitability of such investment as well as the profitability of purely local investment. Nonetheless, I would anticipate that, in the net, an improvement in the balance of payments would result. If full-employment policies are pursued, it is almost certain that the equilibrium rate of interest will rise as a consequence of the reduction in corporate tax rates, and this in turn should have a favorable effect on the balance of payments, causing a net diversion of some funds from the foreign to the internal market.

As investments in the corporate sector reach the productive stage, there will be an increase in the supply of corporate products and a reduction in their price, as an equilibrium is gradually brought about between profit rates in the corporate sector (which were specially favored by the corporate tax reduction) and other rates of return to capital in the economy. Broadly speaking, this price readjustment would entail a lowering of the prices of the products of the corporate sector and a raising of the prices of the products of the noncorporate sector. Since corporate sector products are much more predominantly international goods, in the terminology of this paper, than noncorporate products, the net result of this relative price shift would be an improvement in the balance of trade.

This last assertion can be demonstrated rigorously within the framework of the model developed in this paper. Since we are here concerned with working out the longer-run adjustment to a change in the tax system, we are dealing with a set of reactions that occur after the new tax setup is in existence; thus we need not introduce tax changes explicitly into this part of the analysis.

Instead we shall assume that, as a consequence of the incentives to invest in corporate sector, we observe over time a rightward shift of k_1 in the supply function of international goods, and a leftward shift of k_2 in the supply function for domestic goods. The model then becomes, for the full-employment case:

$$(15.1^{**}) \qquad dI^s = e_1 \, dp_1 + k_1$$

$$(15.2^{**}) \qquad dH^s = e_2 \, dp_2 - k_2$$

$$(15.3^{**}) \qquad dI^d = b_1(dp_1 - dp_2) + g_1 \, dE$$

$$(15.4^{**}) \qquad dH^d = b_2(dp_2 - dp_1) + g_2 \, dE$$

$$(15.5^{**}) \qquad dI^s = -dH^s$$

$$(15.6^{**}) \qquad dH^d = dH^s.$$

Since the world price of international goods is given, $dp_1 = 0$. From (15.1^{**}), (15.2^{**}) and (15.6^{**}), we obtain $dp_2 = (k_2 - k_1)/e_2$. From (15.1^{**}), (15.5^{**}) and (15.6^{**}), we get $dH^d = -k_1$. Substituting this and the expression for dp_2 into (15.4^{**}), we obtain

$$-k_2 = \frac{b_2(k_2 - k_1)}{e_2} + g_2 \, dE, \quad \text{or}$$

$$dE = \frac{-e_2 k_1 - b_2(k_2 - k_1)}{e_2 g_2}.$$

Substituting for dp_2 and dE in (15.3^{**}), we have

$$dI^d = \frac{-g_2 b_1(k_2 - k_1) - g_1 e_2 k_1 - g_1 b_2(k_2 - k_1)}{e_2 g_2},$$

which, using the fact that $(g_1 + g_2) = 1$ and $b_1 = b_2$ can be simplified to

$$dI^d = \frac{-b_1(k_2 - k_1) - g_1 e_2 k_1}{e_2 g_2}.$$

The expression for the change in the trade balance then becomes

$$(15.17) \qquad dI^s - dI^d = \frac{e_2 g_2 k_1 + b_1(k_2 - k_1) + g_1 e_2 k_1}{e_2 g_2} = \frac{e_2 k_1 + b_1(k_2 - k_1)}{e_2 g_2}.$$

This expression is unambiguously positive so long as $k_1 > k_2$. This last condition means that the rightward shift in the supply curve of international goods set in motion by the reduction in corporate taxes cannot be more than outweighed by the leftward shift in the supply curve of domestic goods stemming from the same cause. This is certainly not a very stringent condition, and even if it were not met, this would only mean that one of the two terms in (15.17) would be negative, not that the change in the trade balance would necessarily itself be negative.

For the case of less-than-full employment the model corresponding to an upward shift of k_1 in the supply function for international goods and a downward shift of k_2 in the supply function for domestic goods consists of equations (15.1^{**}), (15.2^{**}), (15.6^{**}), plus

$$(15.3^{***}) \qquad dI^d = b_1(dp_1 - dp_2) + c_1 \, dy$$

$$(15.4^{***}) \qquad dH^d = b_2(dp_2 - dp_1) + c_2 \, dy$$

$$(15.5^{***}) \qquad dy = dI^s + dH^s.$$

Here again, the assumption of constant exchange rates requires that $dp_1 = 0$. From (15.1^{**}), (15.2^{**}), and (15.5^{***}) we obtain

$$dy = (k_1 - k_2) + e_2 \, dp_2.$$

From this, plus (15.2^{**}) and (15.4^{***}), we have

$$dp_2 = \frac{k_2 + c_2(k_1 - k_2)}{e_2(1 - c_2) - b_2}.$$

Substituting into the expression for dy, we have

$$dy = (k_1 - k_2) + \frac{e_2 k_2 + e_2 c_2(k_1 - k_2)}{e_2(1 - c_2) - b_2}$$

$$dy = \frac{e_2 k_1 - b_2(k_1 - k_2)}{e_2(1 - c_2) - b_2}.$$

Now substituting into (15.3^{***}), we obtain

$$dI^d = \frac{-b_1 k_2 - b_1 c_2(k_1 - k_2) + c_1 e_2 k_1 - c_1 b_2(k_1 - k_2)}{e_2(1 - c_2) - b_2}.$$

Now using $dI^s = k_1$, we have for the change in the balance of trade

$$dI^s - dI^d = \frac{k_1 e_2(1 - c_2) - k_1 b_2 + b_1 k_2 + b_1 c_2(k_1 - k_2) - c_1 e_2 k_1 + c_1 b_2(k_1 - k_2)}{e_2(1 - c_2) - b_2}$$

which, using the fact that $b_1 = b_2$, can be reduced to

$$(15.18) \qquad dI^s - dI^d = \frac{(1 - c_1 - c_2)[k_1 e_2 - b_1(k_1 - k_2)]}{e_2(1 - c_2) - b_2}.$$

This expression, like (15.17) is necessarily positive so long as $k_1 > k_2$. We can accordingly conclude that the secondary stimulus to the balance of trade, stemming from the increases in corporate sector output induced by a reduction in the corporation income tax will clearly be positive, except in the most unlikely event that the downward shift in supply of noncorporate goods and services greatly outweighs the upward shift in supply of corporate products. This is true both for the case of a less-than-full-employment economy and for an economy in which a full-employment policy is continuously pursued, subject always to the course through time of wage rates being unaffected by the policy measures here analyzed.[2]

[2] As I have reflected further upon the model presented in section V, I have been troubled by one aspect of it. When $k_2 \neq k_1$, the full-employment output of the economy should grow, and we should allow for an income effect on demand for both home goods and international goods. I have subsequently worked out this case, and find that when this effect is allowed for, an unambiguous improvement in the trade balance results from the investment incentives associated with a corporate tax reduction in the full-employment case. The model as presented need not be modified if k_2 is assumed equal to k_1.

Appendix   A Note on Substitution Terms

Let us express the demand for home goods as a function of absolute prices and of disposable income, Y, in money terms:

$$(15.A1) \qquad dH^d = b_{22}(dp_2 + t_2) + b_{21}(dp_1 + t_1) + c_2\, dY.$$

Here b_{22} measures the responsiveness of home-goods demand to a change in the price of such goods, with other prices and disposable income held constant. Likewise, b_{21} measures the responsiveness of home-goods demand to changes in international goods prices, with other prices and disposable income held constant. These coefficients are related in the following way to the corresponding coefficients (denoted by primes) measuring the responsiveness of demand to relative price changes holding real income constant:

$$b_{22} = b_{22}' - c_2 H^d$$
$$b_{21} = b_{21}' - c_2 I^d.$$

This stems from the fact that a rise of Δp_2 in the price paid by purchasers of home goods lowers real income by $H^d\, \Delta p_2$, and a rise of Δp_1 in the price paid by buyers of international goods lowers real income by $I^d\, \Delta p_1$, in each case assuming that other prices and money income are held constant. The income effect of a change in price on the demand for home goods is simply c_2 times the change in income thus measured, and the substitution effect is the remaining part of the total effect. Similarly, in the demand function for international goods, expressed in absolute price and money-income terms,

$$(15.A2) \qquad dI^d = b_{11}(dp_1 + t_1) + b_{12}(dp_2 + t_2) + c_1\, dY,$$

we have

$$b_{11} = b_{11}' - c_1 I^d, \quad \text{and} \quad b_{12} = b_{12}' - c_1 H^d.$$

Turning now to the change in disposable income, we have, assuming initial equilibrium in the market for home goods ($H^d = H^s$) and the balance of trade ($I^d = I^s$), $dY = dy + I^d(dp_1 + t_1) + H^d(dp_2 + t_2)$.

The change in disposable income thus breaks down into a part due to the change in real output (dy); a part due to the reduction of direct taxes, $I^d t_1 + H^d t_2$, to counterbalance the increase in yield of indirect taxes ($I^d t_1 + H^d t_2$), and a part due to changes in prices received by producers ($I^s\, dp_1 + H^s\, dp_2$), which, under our assumption of initial equilibrium, is equal to ($I^d\, dp_1 + H^d\, dp_2$).

Inserting the expressions for b_{22}, b_{21}, and dY in (15.A1),

$$(15.A3) \qquad dH^d = (b_{22}' - c_2 H^d)(dp_2 + t_2) + (b_{21}' - c_2 I^d)(dp_1 + t_1)$$
$$+ c_2\, dy + c_2 I^d(dp_1 + t_1) + c_2 H^d(dp_2 + t_2).$$

Since the terms in I^d and H^d cancel, (15.A3) can be reduced to

$$(15.A4) \qquad dH^d = b_{22}'(dp_2 + t_2) + b_{21}'(dp_1 + t_1) + c_2\, dy.$$

Similarly, we can substitute for b_{11}, b_{12}, and dY in (15.A2) to obtain

$$(15.A5) \qquad dI^d = (b_{11}' - c_1 I^d)(dp_1 + t_1) + (b_{12}' - c_1 H^d)(dp_2 + t_2)$$
$$+ c_1\, dy + c_1 I^d(dp_1 + t_1) + c_1 H^d(dp_2 + t_2).$$

Again, the terms in I^d and H^d cancel, yielding

$$(15.A6) \qquad dI^d = b_{11}'(dp_1 + t_1) + b_{12}'(dp_2 + t_2) + c_1\, dy.$$

Now, it is a well-known property of substitution effects that the response of a commodity to a 1 percent rise in its own price is the negative of the sum of the responses of that commodity to a 1 percent rise in all the other prices in the system. Thus, recalling that units are so chosen as to set initial prices equal to unity, we have $b_{11}' = -b_{12}'$, and $b_{22}' = -b_{21}'$. Likewise we have the property of substitution terms that the partial derivative of one good with respect to the price of another must equal the partial derivative of the second with respect to the price of the first.[1] Hence we have $b_{12}' = b_{21}'$. Using these properties we can see that (15.A4) can be rewritten

$$(15.A7) \qquad dH^d = b_{22}'(dp_2 + t_2 - dp_1 - t_1) + c_2\, dy,$$

and (15.A6) can be rewritten

$$(15.A8) \qquad dI^d = b_{11}'(dp_1 + t_1 - dp_2 - t_2) + c_1\, dy.$$

(15.A7) and (15.A8) correspond exactly to equations (15.4) and (15.3) in the text, with b_{22}' being there relabeled b_2 and b_{11}' relabeled b_1. Moreover, from the facts that $b_{22}' = -b_{21}'$, $b_{11}' = -b_{12}'$, and $b_{12}' = b_{21}'$, it is easily seen that $b_{11}' = b_{22}'$, or, in the notation of the text, $b_1 = b_2$.   Q.E.D.

When trade is not initially balanced, equation (15.3) of the text becomes

$$dI^d = b_1(dp_1 + t_1 - dp_2 - t_2) + c_1\, dy + c_1 B\, dp_1,$$

and equation (15.4) of the text becomes

$$dH^d = b_2(dp_2 + t_2 - dp_1 - t_1) + c_2\, dy + c_2 B\, dp_2,$$

where B equals the initial balance of trade (positive for a surplus and negative for a deficit). The analysis of section III.A of the text remains completely unmodified, for in this part $dp_1 = 0$, and the above equations are reduced back to (15.3) and (15.4). The analysis of sections III.B and III.C becomes more complicated in the case of initial imbalance but conclusions (3) and (4), reached in these sections, remain unchanged for the case of an initial deficit. Sections IV and V remain completely unchanged when initial imbalance in trade is introduced, section IV because the demand functions (15.3*) and (15.4*) are not affected by initial imbalance, and section V because, for the effects analyzed there, $dp_1 = 0$.

[1] For a derivation of the properties of substitution terms used here, see J. R. Hicks, *Value and Capital*, 2d ed. (Oxford: Clarendon Press, 1946), pp. 309–311.