DOMESTIC DISTORTIONS
AND
THE THEORY OF TARIFFS*

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I. INTRODUCTION

The theory of tariffs, which evolved out of the classical controversy over free trade and protectionism, occupies an important position in the study of trade and welfare. Early in the present century Bickerdike (1906, 1907 a, b) formalized the proposition that a country is able to increase its real income by imposing a tariff on imports. The theme, labelled by Edgeworth (1908) as "poison," was later revived by Kaldor (1940) and thus achieved general recognition in the literature. Known today as the optimal tariff argument, it postulates fully competitive conditions, and relies crucially upon the assumption that the tariff-imposing country is potentially capable of affecting the international prices by restricting the volume of trade. In the absence of such national monopoly power, however, the argument ends up in endorsing the doctrine of free trade as the best policy for the country.

On the other hand, the explicit introduction of distortions in the domestic market has given rise to independent cases for tariff protection. Hagen (1958) popularized the idea of Manoilesco's pioneering work (1931) on the consequence of wage differentials between manufacturing and agriculture. Haberler (1952) provided a diagramatic interpretation of Graham's earlier study (1923) concerning the implications of external economies. Despite the skepticism expressed in Bhagwati and Ramaswami (1962), these lines of thinking indeed serve to justify tartiff protection for a country without monopoly power. This point was made clear by the companion papers by Kemp and Negishi (1969), and Bhagwati, Ramaswami and Srinivasan (1969).

Although the literature on the subject is bulky, there seems to be no thoroughgoing algebraic treatment of the theory of tariffs for a general case in which elements of domestic distortions may be present. Perhaps as a result of the traditional distinction between the positive and normative aspects of the theory, the analysis of the subject, until recently, was not made fully explicit even for the case of ideally competitive conditions(1). In this paper we intend to fill in this

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(1) See Sodersten and Vind (1968), pp. 394–395. They provide an explicit account of the general equilibrium model appropriate for the theory of tariffs. By way of comment on their paper, Jones (1969) achieves an alternative development of algebra of tariffs.

gap in the literature, primarily with a view to synthesizing the standard optimal tariff argument and the distortion-oriented causes of protectionism. We shall first describe our model which, as in Jones (1969), incorporates the real incomes of trading countries among its endogeneous variables. This will then be followed in Section III by the positive analysis of tariffs in the presence of domestic distortions. All the qualitative results of the standard theory will be shown to remain valid for our general case provided that the supply of a commodity is a positive function of its relative price, and that no commodities are inferior in social consumption., Finally, in Section IV, we shall investigate the real income effect of tariffs and combine alternative arguments for a protective tariff in a generalized formula for the optimal tariff.

II. TARIFFS IN TRADE EQUILIBRIUM

We select as the vehicle of our discussion the simple model of trade wherein two countries, home and foreign, produce and consume two commodities. The supply of productive resources is fixed and fully utilized in production in each country. The home country is assumed to export commodity 1, and the foreign country commodity 2. To clarify the make-up of this prototype, let us first concern ourselves with the home country. We define the home *excess* demand e_i for commodity i as the difference between the domestic demand x_i and the domestic supply y_i:

(1) $$e_i = x_i - y_i \qquad (i = 1, 2)\,.$$

The supply of commodities is supposed to be determined directly or indirectly by the competitive firms' efforts to maximize profits. For the moment we merely characterize y_i as a function of the domestic relative price of commodity 2.

(2) $$y_i = y_i(p) \qquad (i = 1, 2)\,.$$

We shall return to the discussion of this formulation later in the next section.

The home country is assumed to impose a tariff on the import of commodity 2. This creastes a discrepancy between the home relative price p and the international relative price π of commodity 2. We write

(3) $$p = t\pi$$

where t represents unity plus the ad valorem rate τ of the tariff, or

(4) $$t = 1 + \tau\,.$$

The tariff proceeds are assumed to be reimbursed to the home consumers in the form of lump-sum subsidies. The values of excess demand in the domestic price must always add up to the tariff proceeds. Thus, the aggregate budget constraint is written as

(5) $$e_1 + pe_2 = (t - 1)\pi e_2\,.$$

In what follows, we abstract from complications due to distributional changes, and define the index u of the home country's welfare as a strictly concave, differentiable function of consumption demands.

$$u = u\,(x_1, x_2) \tag{6}$$

Note that any function

$$v = v(u);\ v'(u) > 0$$

formed by a monotonic transformation of u also serves as a valid index of welfare.

Competitive consumers are supposed to maximize u unsatiably subject to the budget constraint (5). This implies that, for each level of welfare achieved, the consumers minimize their expenditure, i.e., the value of the consumption bundle in the domestic price. Otherwise, there would be a consumption bundle costing less and yielding the same level of welfare. Consumers could choose it and buy more of both commodities without violating the budget constraint. This is a contradiction unless consumers are satiated. The minimization of expenditure for a given level of welfare, in its turn, implies that the demand for each commodity is a function of p and u. Therefore, we are able to write.

$$x_i = x_i(p, u) \qquad (i = 1, 2)\,. \tag{7}$$

Although this formulation of demand functions is neither conventional nor operational, it will prove to be useful for our analytical purposes.

For the foreign country we posit exactly symmetric assumptions. We put an asterisk to each symbol and indicate the corresponding foreign variable. The foreign excess demand e_i^* is the difference betwen the foreign demand x_i^* and the foreign supply y^*.

$$e_i^* = x_i^* - y_i^* \qquad (i = 1, 2)\,. \tag{8}$$

Without reiterating the explanation, we may write

$$y_i^* = y_i^*(p^*) \qquad (i = 1, 2); \tag{9}$$

$$x_i^* = x_i^*(p^*, u^*) \qquad (i = 1, 2) \tag{10}$$

where

$$u^* = u^*(x_1^*, x_2^*)\,. \tag{11}$$

The foreign country imposes a tariff on the import of commodity 1. With t^* signifying unity plus the foreign ad valorem rate of tariff, we have the relationship,

$$\pi = p^* t^*\,. \tag{12}$$

The foreign aggregate budget constraint is written

$$e_1^* + p^* e_2^* = \left(\frac{t^* - 1}{t^*}\right) e_1^*\,. \tag{13}$$

The demand functions given in (10) reflect the foreign consumers' welfare maximization in conformity with the budget constraint(2).

The familiar condition for an international trade equilibrium states

$$e_1^* = \pi e_2 \tag{14}$$

where

$$e_1^* > 0; \quad e_2 > 0\,.$$

In words, the value of foreign imports is equal to that of home imports when expressed in the international price. This is equivalent to the market clearance condition for all commodities because of the budget constraints (5) and (13). Given t and t^*, we have so far nineteen independent equations to determine the equilibrium value of the same number of variables.

Recall, however, that welfare functions u and u^* are uniquely given only up to a monotonic transformation. Needless to say, their choice does not affect the equilibrium values of other variables. Without loss of generality, let us assume

$$\frac{\partial u}{\partial x_1} = 1; \quad \frac{\partial u^*}{x\partial_1^*} = 1$$

where the partial derivatives are evaluated at the equilibrium position. One can best see the significance of this normalization in the following variational forms:

$$du = dx_1 + \left(\frac{\partial u}{\partial x_2}\right)dx_2 = dx_1 + pdx_2; \tag{17}$$

$$du^* = dx_1^* + \left(\frac{\partial u^*}{\partial x_2^*}\right)dx_2^* = dx_1^* + p^*\,dx_2^*\,. \tag{18}$$

A small change in u (resp. u^*) is expressed as a priceweighted sum of changes in x_1 and x_2 (resp. x_1^* and x_2^*). In case that welfare functions are linear-homogeneous, we observe

$$u = x_1 + px_2;$$

$$u^* = x_1^* + p^*x_2^*\,.$$

The index u (resp. u^*) of the home (resp. foreign) country's welfare is tantamount to the home (resp. foreign) consumption expenditure. In this light we propose to call u (resp. u^*) the real income of the home (resp. foreign) country. Thus,

(2) To understand (3), (5), (12) and (13), note the definitions

$$p = p_2/p_1; \quad p^* = p_2^*/p_1^*; \quad \pi \equiv p_2^*/p_1$$

where p_i and p_i^* denote the domestic price of the i^{th} commodity in unit of account in the home and foreign countries respectively. For example, we can write the budget constraint of the foreign country first as

$$p_1^*e_1^* + p_2^*e_2^* = (t^* - 1)p_1e_1^*\,.$$

Dividing through both sides by p_1^* and noting $p_1^* = t^*p_1$, we obtain equation (13).

demand functions (7) and (10) states that the demand for each commodity is a function of the domestic relative price and real income in each country.

III. THE POSITIVE EFFECTS OF TARIFFS

In the description of the model given in the preceeding section, the supply of each commodity is assumed to be a function of the domestic relative price. One can best justify this assumption for a competitive model with strictly convex production set, exempt from all sources of market failures: the production of each commodity is then related by the transformation schedule to the production of the other, and, for a given relative price, a point on the schedule is chosen such that the marginal rate of transformation is equal to the relative price. The dependence of the supply of commodities on the relative price is certainly conceivable in a more general situation possibly saddled with domestic distortions such as external economies and factor-reward differentials between sectors. In this broader context, however, we have to take into account at least two additional problems. First of all, an increase in a commodity's relative price may now result in a decrease in the quantity of that commodity produced. The possibility of this anomalous phenomenon has been extensively discussed for the case of intersectoral factor-reward differentials(3). In the present study, we choose to eliminate this possibility arbitrarily and assume that the supply of commodities is *normally* responsive to a change in the relative price. As a matter of fact, this assumption is implicit in Haberler's analysis of external economies, as well as Hagen's treatment of factor reward differentials, each intended to rationalize tariff protection.

In the second place, with distortions in production, the marginal rate of transformation is no longer expected to be equal to the relative price. We propose to express this fact as

$$\alpha p = -\frac{dy_1}{dy_2} \qquad (\alpha > 0) \tag{19}$$

for the home country. The value of α will generally depend upon the choice of production point, (y_1, y_2). The social marginal opportunity cost of commodity 2 falls short of its relative price if α is less than one, and the former exceeds the latter if α is greater than one. Needless to say, the standard special case obtains if and only if α is equal to one(4). For simplicity, we suppose that there are no domestic distortions in the foreign country.

Assuming the differentiability of all functions, we now wish to investigate the effect of an increase in the level of the home country's tariff on the key variables

(3) This and some other interesting implications of factor market distortions are largely outside the scope of the present study. We refer the reader to Magee (1969), Herberg and Kemp (1971), and Jones (1971).

(4) Thus, α may be taken to comprise "distortions parameters" discussed by Fishlow and Davis (1961).

of the model. To ease notation, let a circumflex (^), indicate the relative change in a variable or a parameter. For example, $\hat{t}$ denotes dt/t and $\hat{p}$ denotes dp/p. Totally differentiating the home excess demand for commodity 2 in the light of (2), (3) and (7), we obtain

$$\hat{e}_2 = -(\xi_2 + \psi_2)\hat{\pi} - (\xi_2 + \psi_2)\hat{t} + m_2\left(\frac{1}{pe_2}\right)du \tag{20}$$

where

$$\xi_2 \equiv -\frac{p}{e_2}\frac{\partial x_2}{\partial p}; \quad \psi_2 \equiv \frac{p}{e_2}\frac{\partial y_2}{\partial p}; \quad m_2 \equiv p\frac{\partial x_2}{\partial u}.$$

The common coefficient $-(\xi_2 + \psi_2)$ of $\hat{\pi}$ and $\hat{t}$ is the income compensated elasticity of the home country's import demand. The term ξ_2 is positive by the assumption of utility maximization. As noted above, we assume

A1. $$\psi_2 > 0$$

i.e., that the supply of commodity 2 increases as a result of an increase in its relative price. The coefficient m_2 of $(1/pe_2)du$ represents the home country's marginal propensity to consume the imported commodity. We assume

A2. $$0 \leqq m_2 \leqq 1$$

i.e., that no commodity is inferior in the home consumption. The role of assumptions A1 and A2 will be made clear in a moment.

From (8), (9), (10) and (12), we similarly get

$$e_1^* = (\xi_1^* + \psi_1^*)\hat{\pi} + m_1^*\left(\frac{1}{e_1^*}\right)du^* \tag{21}$$

where

$$\xi_1^* \equiv \frac{p^*}{e_1^*}\frac{\partial x_1^*}{\partial p^*}; \quad \psi_1^* \equiv -\frac{p^*}{e_1^*}\frac{\partial y_1^*}{\partial p^*}; \quad m_1^* \equiv \frac{\partial x_1^*}{\partial u^*}.$$

In the derivation of (21), the foreign country's tariff is assumed to be constant, i.e., $\hat{t}^* = 0$. To obtain an appropriate expression for the change in the home real income du, we note (17), and differentiate the home budget constraint to discover

$$du = (dy_1 + pdy_2) - \pi e_2\hat{\pi} + \pi e_2(t-1)\hat{e}_2\,. \tag{22}$$

From (3), (19) and the definition of ψ_2, we find

$$dy_1 + pdy_2 = \pi e_2\psi_2 t(1-\alpha)(\hat{\pi} + \hat{t})\,. \tag{23}$$

When there are no domestic distortions, the price-weighted sum of output changes $(dy_1 + pdy_2)$ vanishes to zero because of the tangency condition that the marginal rate of transformation is equal to the relative price. The introduction of domestic distortion serves to destory this elegant property of the model. Equations (22) and (23) demonstrate the fundamental fact that if α differs from one, output changes give rise to a change in real income. Substituting (23) into (22) and collecting terms, we get

$$du = -\pi e_2\{[1 - \psi_2 t(1-\alpha)]\hat{\pi} - \psi_2 t(1-\alpha)\hat{t} - (t-1)\hat{e}_2\}\,. \tag{24}$$

In a similar fashion, we obtain the corresponding expression for du^* from (12), (13) and (18) as

$$du^* = e_1^*\left[\left(\frac{1}{t^*}\right)\hat{\pi} + \left(\frac{t^*-1}{t^*}\right)\hat{e}_1^*\right]. \tag{25}$$

The relative simplicity of the expression for du^* is attributable to the assumption that there are no domestic distortions in the foreign country. Equation (20), together with (24), yields

$$\hat{e}_2 = -\varepsilon_2\hat{\pi} - \bar{\varepsilon}_2\hat{t} \tag{26}$$

where

$$\varepsilon_2 \equiv \frac{t}{t - m_2(t-1)}\left\{\xi_2 + [1 - m_2(1-\alpha)]\psi_2 + \left(\frac{1}{t}\right)m_2\right\};$$

$$\bar{\varepsilon}_2 = \frac{t}{t - m_2(t-1)}\{\xi_2 + [1 - m_2(1-\alpha)]\psi_2\}\,.$$

Now, ε_2 ($\bar{\varepsilon}_2$) is the (compensated) elasticity of the home country's offer curve. Assumptions A1 and A2 ensure that both ε_2 and $\bar{\varepsilon}_2$ are positive irrespective of the value of α. Therefore, the presence of domestic distortions does not affect the standard result that a rise in the level of the home country's tariff brings about an inward shift of the home offer curve. This intermediate conclusion will suffice to enable the reader acquainted with the geometry of international trade to anticipate the terms of trade effect of a tariff reform. We shall, however, follow the present logic to its end. In a similar fashion, equation (21), together with (25), results in

$$\hat{e}_1^* = \varepsilon_1^*\hat{\pi} \tag{27}$$

where

$$\varepsilon_1^* \equiv \frac{t^*}{t^* - m_1^*(t^*-1)}\left\{\xi_1^* + \psi_1^* + \left(\frac{1}{t^*}\right)m_1^*\right\}.$$

The equilibrium condition (14) is shown in rates of change as

$$\hat{e}_1^* = \hat{\pi} + \hat{e}_2\,. \tag{28}$$

From (26), (27), and (28), we obtain

$$\hat{\pi} = -\bar{\varepsilon}_2\left(\frac{1}{\Delta}\right)\hat{t} \tag{29}$$

where

$$\Delta \equiv \varepsilon_1^* + \varepsilon_2 - 1\,.$$

As is easily seen, the stability condition of the system requires that the generalized Marshall-Lerner expression Δ be positive. Hence, we can state

Proposition 1. Under assumptions A1 *and* A2, *an increase in the home level of tariff gives rise to an improvement in the home country's terms of trade.*

In the standard special case, assumptions A1 and A2 are not reguired for the validity of this proposition. As long as assumption A1 is acceptable, the price of generalization is probably not so demanding since the inferiority of a commodity is always considered to be aberrant in a highly aggregated model like the present one.

The substitution of (29) back into (27) gives the effect of a tariff increase upon the home country's export.

$$\hat{e}_1^* = -\varepsilon_1^*\bar{\varepsilon}_2\left(\frac{1}{\Delta}\right)\hat{t}\,. \tag{30}$$

From (28), (29) and (30), we get the relation between a change in the tariff and a change in the home country's import.

$$\hat{e}_2 = -\bar{\varepsilon}_2(\varepsilon_1^* - 1)\left(\frac{1}{\Delta}\right)\hat{t}\,. \tag{31}$$

We have established

Proposition 2. Under assumptions A1 *and* A2, *the home country's export diminishes as a result of a tariff increase: Its import diminishes as a result of a tariff increase if and only if the foreign country's offer curve is elastic.*

Raising tariffs is said to be protective if it brings about an expansion of the import-competing production. Under the present assumption of positive ψ_2, the effect of a tariff increase upon the domestic price is the key reference as to whether a given tariff increase is in fact protective. Using (3) and (29), we obtain

$$\hat{p} = \left(\frac{1}{\Delta}\right)(\Delta - \bar{\varepsilon}_2)\hat{t}\,. \tag{32}$$

From the definition of Δ, ε_2 and $\bar{\varepsilon}_2$, we can easily calculate the relationship

$$\Delta - \bar{\varepsilon}_2 = \varepsilon_1^* - 1 + \frac{m_2}{t - m_2(t-1)}\,. \tag{33}$$

This is nothing but the famous Metzler expression.

Proposition 3. Under assumption A1, *an increase in the home level of tariff is protective if and only if the Metzler condition*

$$\varepsilon^* > 1 - \frac{m_2}{t - m_2(t-1)} \tag{34}$$

is satisfied.

Note that the Metzler expression is completely independent of the value of α. The introduction of domestic distortions does not affect the condition for a protective tariff under assumption A1. This result is of course not surprising. In fact, a rise in the rate of tariff will be protective if there exists a positive world excess demand for commodity 2 when the home relative price is fixed at the initial level. But as long as the home relative price is fixed, there will be no output changes, and therefore no real income change associated with them. Thus, the crucial real income effect of output changes has no role to play in determining the condition for a positive world excess demand to arise for the initial home relative price.

IV. TARIFFS AND THE REAL INCOME

We have so far concerned ourselves with the "positive" aspect of the theory of tariffs. It is shown that all the clear-cut outcomes of the standard special case carry over to the present general setting under rather simple assumptions A1 and A2. The propositions obtained, however, would be of little significance if they were in no way related to the question how tariffs affects the real incomes in trading countries. In fact, their relevance is evident for the present model positing the real incomes as endogenous variables. We are now in the position to investigate the "normative" aspect of the theory of tariffs and trade.

Let us substitute equations (29) and (31) into (24) to connect a change in the home country's real income directly with a change in the tariff.

$$(35) \qquad du = \frac{\pi e_2 t}{\Delta}\left\{\left[1 - \left(\frac{t-1}{t}\right)\varepsilon_1^*\right]\bar{\varepsilon}_2 + \psi_2(1-\alpha)(\Delta - \bar{\varepsilon}_2)\right\}\hat{t}\,.$$

Consider the case, $\alpha < 1$, in which the social marginal opportunity cost of commodity 2 is smaller than its domestic relative price, and therefore, its marginal rate of substitution in the domestic consumption. Under such a circumstance, an increase in the output of commodity 2 is expected to improve the home country's welfare since the increment is more valuable than the amount to be forgone of commodity 1. This consideration is justified by the second term $\psi_2(1-\alpha)\cdot(\Delta - \bar{\varepsilon}_2)$ in the bracket of the righthand side of equation (35). So long as an increase in the home level of tariff is protective, it contributes to the country's real income by that account alone. If there is no tariff in the initial situation, i.e., if $t = 1$, equation (35) simplifies to

$$(36) \qquad du = \frac{\pi e_2}{\Delta}\{\bar{\varepsilon}_2 + \psi_2(1-\alpha)(\Delta - \bar{\varepsilon}_2)\}\hat{t}\,.$$

This leads us to

Proposition 4. Let $\alpha < 1$. *Under assumptions* A1 *and* A2, *a small tariff starting*

(5) See Metzler (1949).

from free trade increases the home country's real income if the tariff is protective.(6)

Now, as the initial rate of tariff increases, the term $[1-(t-1/t)\varepsilon_1^*]\bar{\varepsilon}_2$ will eventually become non-positive over the elastic portion of the foreign offer curve, and may at some point exactly cancel out the non-negative term $\psi_2(1-\alpha)(\Delta-\bar{\varepsilon}_2)$. In view of equation (35), it is at this point that the optimal tariff obtains. Recalling (4), we may characterize the optimal position by

$$(37) \qquad \tau = \frac{\bar{\varepsilon}_2 + \psi_2(1-\alpha)(\Delta-\bar{\varepsilon}_2)}{\bar{\varepsilon}_2(\varepsilon_1^*-1) - \psi_2(1-\alpha)(\Delta-\bar{\varepsilon}_2)}\,.$$

Note that if $\alpha = 1$, (39) gives the familiar optimal tariff formula for the standard special case:

$$(38) \qquad \tau = \frac{1}{\varepsilon^* - 1}\,.$$

When α is strictly less than one, the term $[1-(t-1/t)\varepsilon_1^*]\bar{\varepsilon}_2$ must be strictly negative at the optimal point. Hence, everything else being unchanged, the presence of domestic distortions is expected to push up the level of the optimal tariff.

Let us briefly consider the case $\alpha > 1$. In this case, the social marginal opportunity cost of commodity 2 is greater than its marginal rate of substitution in the domestic consumption. Therefore, an increase in the output of commodity 2 brings about a loss in the home country's real income. Starting from free trade, the imposition of a small tariff improves the home country's terms of trade, but if it is protective, it increases the output of commodity 2 at the same time. In the presence of two opposing forces thus set loose, there is no a priori way to determine the net effect of the protective tariff on the real income. In consequence, the usual optimal tariff argument breaks down in this case. A small tariff, however, improves the home country's welfare unambiguously whenever it fails to be protective.

Now suppose that the home country is very small compared to the foreign country, and that the home export of commodity 1 plays only a neglible role in the foreign consumption. Consider the definition:

$$\xi_1^* \equiv \frac{p^*}{e_1^*}\frac{\partial x_1^*}{\partial p^*} = \frac{x_1^*}{e_1^*}\left(\frac{p^*}{x_1^*}\frac{\partial x_1^*}{\partial p^*}\right);$$

$$\psi_1^* \equiv -\frac{p^*}{e_1^*}\frac{\partial y_1^*}{\partial p^*} = -\frac{y_1^*}{e_1^*}\left(\frac{p^*}{y_1^*}\frac{\partial y_1^*}{\partial p^*}\right).$$

One can approximate such state by letting ξ_1^* and ψ_1^* to infinity because terms

(6) This summarily expresses various arguments for a protective tariff. Bhagwati, Ramaswami and Srinivasan (1969) argue that if there exist domestic distortions and national monopoly power, a tariff may not increase the country's real income above the free trade level. Without contradicting their result, we have here established that a protective tariff, if possible at all, will always increase the country's welfare in case that α is less than one.

x_1^*/e_1^* and y^*/e_1^* are considered to be practically as large as desired. Note also that ε_1^* tends to infinity as ξ_1^* and ψ_1^* tend to infinity. Therefore, letting ε_1^* to infinity in (37), we obtain

$$du = \pi e_2 t\left[\psi_2(1-\alpha) - \left(\frac{t-1}{t}\right)\bar{\varepsilon}_2\right]\hat{t} \tag{39}$$

which approximates the relationship between a change in the home country's real income and a change in the tariff for the present special case. If there is initially no tariff, equation (39) reduces to

$$du = \pi e_2[\psi_2(1-\alpha)]\hat{t}\,. \tag{40}$$

The right-hand side of this is positive or negative according as whether α is less or greater than one. Hence, we have

Proposition 5. Assume that the home country is sufficiently small. (i) *Let* $\alpha < 1$. *Under assumption* A1, *a small tariff starting from free trade increases the home country's real income.*

(ii) *Let* $\alpha > 1$. *Under assumption* A1, *a small* (*export or import*) *subsidy starting from free trade increases the home country's real income.*

Once the intial rate of tariff or subsidy departs from zero, we must revert to equation (39). Notice that the two terms in the right-hand side bracket are of opposite signs for each case. The term $\psi_2(1-\alpha)$ is positive, but the term $-(t-1/t)\bar{\varepsilon}_2$ is negative if α is less than one and there is initially a tariff. The converse is true if α is greater than one and there is initially a subsidy. Thus, the optimal tariff or subsidy obtains when the two terms are exactly equal in absolute value. The rate of the optimal tariff or subsidy is therefore given by

$$\tau = \frac{\psi_2(1-\alpha)}{\bar{\varepsilon}_2 - \psi_2(1-\alpha)} \tag{41}$$

One can easily check that τ is positive if α is less than one and negative if α is greater than one.

In their 1963 paper, Bhagwati and Ramaswami cast a strong doubt to the validity of the conjecture that there exists a tariff or subsidy superior to free trade in the presence of domestic distortions. Except for the explicit statement of assumption A1, the conjecture is later rehabilitated, in the form similar to Proposition 5, by Kemp and Negishi (1969), and Bhagwati, Ramaswami and Srinivasan (1969). The principal historic interest of Proposition 5 consists in its first part, which elaborates in a single procedure the Haberler-Graham case, as well as the Manoilesco-Hegen case, for a protective tariff.

V. CONCLUDING REMARKS

Throughout the foregoing analysis we have adhered to the assumption A1 that the output of a commodity expands as its relative price increases. As noted above, this is no longer an innocuous assumption in the presence of domestic distortions. We must therefore be well aware of the consequences of its failure. First of all, note that the sign of $\bar{\varepsilon}_2$ is crucial for the conclusion of Propositions 1, 2, and 4. While the positivity of ψ_2 is not necessary for the positivity of $\bar{\varepsilon}_2$, nothing can be said as to the sign of $\bar{\varepsilon}_2$ if ψ_2 is negative. Secondly, the Metzler condition for a protective tariff must be reversed if the output of a commodity decreases as its domestic prices increases. Propositions 3 and 5 are accordingly to be modiffed. If the foreign country is sufficiently large relative to the home country, the value of ε_1^* will be such that condition (34) is always satisfied. But this now implies that a subsidy is protective, but not a tariff.

It may be worth dwelling for a moment upon some of these anomalous implications of the failure of assumption A1. Let us first reconsider the significance of Proposition 5 in relation to the Manoilesco-Hagen case for protection. Suppose that there are two factors of production, say, labor and capital. In the case that there are factor-reward differentials between sectors, assumption A1 holds if and only if the factor-intensity ranking of sectors in a value sense coincides with the ranking in a physical sence(7). Hagen argues that wages in manufacturing are typically higher than in agriculture in an economy in which per capita income is rising secularly. If this is the case, and if agriculture is more labor intensive than manufacturing in a physical sence, then the latter may as well be more labor intensive in a value sence because of the wage premium paid to the labor hired in manufacturing. Therefore, assumption A1 may fail to hold, and the case may have to be made for subsidy protection rather than tariff protection.

There are also some points of interest concerning the re-evluation of the message contained in Proposition 1. Early in the present century, Marshall (1903) pondered over the possibility that a tariff on wheat might turn the terms of trade against England when the "Giffen" paradox seemed to operate in respect to imports of wheat into England(8). In view of equation (29) and the definition of $\bar{\varepsilon}_2$, Marshall's conjecture may be justified if assumption A1 fails to hold *and* the social marginal opportunity cost of the import commodity is smaller than its relative price ($\alpha < 1$). It should be noted, however, that, in the standard special case in which there are no domestic distortions and the output of a commodity expands as its elative price rises, an increase in the home level of tariff turns the terms of trade against the home country if an only if

$$m_2 > \frac{t}{t-1} > 1 .$$

This implies that the export commodity (and not the import commodity) is inferior in the home country's consumption.

(7) Jones (1971) gives a most lucid account of this condition.

(8) Marshall (1903), pp. 382–383. Kemp (1966) gives a re-examination of the Marshallian conjecture on the assumption that the government consumes out of the tariff revenue.

Finally, it is well established that a tariff is *not* the best policy instrument available for a country subject to domestic distortions(9). Although we have confined ourselves to the theory of tariffs, we can likewise develop the theory of other (indirect) forms of intervention in foreign trade. The use of a tariff in combination with a corrective production tax-cum-subsidy is capable of yielding the best solution and is superior to the use of a tariff alone. This consideration, however, will not discount the significance of the present exercise as a study of the piecemeal economic policy.

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