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January, 1985

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Commercial Policy in an Asymmetric World Economy†

by

T. Datta Chaudhuri* and M. Ali Khan**

November 1982

Revised: November 1984

Abstract. We present a two-country model of international trade and foreign investment with asymmetry in the sense that one of the countries, North, is a capital-rich, resource-poor economy whereas the other, South, is a resource-rich, labor-surplus economy. Our model thus highlights production interdependence as well as dependence through trade. We analyze the effects of commercial policies and factor accumulation on the allocation of resources and distribution of income.

†This extensively revised version of an earlier draft was prompted by anonymous referees. We thank them and Murray Kemp for their detailed and constructive comments. We also thank our Hopkins colleagues Bela Balassa, Tatsuo Hatta, Hiro Kawai and Ailsa Röell for their suggestions when the first version of this paper was presented at Balassa's Trade and Development Seminar. Errors are, of course, solely ours. This research was supported, in part, by a grant from the University of Illinois.

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I. Introduction

In this paper we present an integrated analysis of trade and foreign investment in the context of a North-South model. Since certain resources are not distributed evenly throughout the world, a significant portion of foreign investment of the North is directed towards industries in the South which are extractive or devoted to the production of raw materials. As noted by Bergsten et. al. [1978], essential importance of these raw materials have led the North to adopt three different strategies in the past; domestic self-sufficiency, colonization and direct foreign investment. The first was inefficient as these required large capital outlays, labor was not abundant and lead times for the development of these resources or their substitutes was long. The second, colonization, was an international extension of domestic self-sufficiency and has ceased to be an effective method of control. As an example, one may cite the extinction of British, French, Dutch and Portuguese colonies. Instead, direct foreign investment has emerged as the major instrument through which the North has developed connections with the South and this is revealed in the activities of the multinationals. Our attempt here is to analyze the effects of commercial policies and factor accumulation on income distribution, allocation of resources and welfare in a model which highlights production interdependence together with dependence through trade.

We divide the world economy into two parts, a capital-rich resource-poor North and a resource-rich labor surplus South. There are two goods in the model, a manufactured good and a primary resource. Following our observation on the unevenness in distribution of resources, we assume

that the primary resource is produced in the South only. This is an input in the production of a manufactured good produced both in the North and in the South. If we assume the South to be an aggregation of less developed countries (LDCs), then production of the manufactured good by the South is natural since with the process of development every LDC wants to industrialize. We justify our assumption of a specialized North on the basis of arguments that were provided against domestic self-sufficiency. Moreover, our assumption of a labor surplus South makes it profitable for the North to invest in the South as the resource is available there and labor is cheap.

Recently, Kemp-Ohyama [1978] developed a model¹ of trade between resource-rich and resource-poor countries where both sets of countries were completely specialized and conditions in the labor markets of both countries were not given explicit play. This ruled out any import substitution by the South and ignored one of the important factors underlying North's foreign investment, i.e., cheap labor. Our set-up is thus a generalization of their structure. From the policy point of view our set-up can additionally analyze the impact of policy measures on distribution of income between factors of production together with additional instruments like tariffs conducive to South's industrialization.

The plan of the paper is as follows. Section II describes the model and presents the basic properties of the equilibrium. Section III studies the effects of various instruments of commercial policy on factor rewards, terms of trade, output levels and international investment. Section IV examines the implications of these results for

welfare of either country and Section V examines, along the lines of Jones [1967] and Kemp [1969], commercial policies when either country has available to it more than one policy instrument. We end the paper with three concluding remarks.

II. The Model and Basic Properties of Equilibrium

The world economy is divided into two parts, North and South, each being endowed with positive amounts of capital and labor, i.e., (K^*, L^*) and (K, L) respectively. Each country produces a manufactured good u in accordance with a well-behaved,² constant returns to scale production function and using as inputs capital, labor and a primary resource z . We may thus write

$$X_u^* = F_u^*(L_u^*, K_u^*, M_u^*); \quad X_u = F_u(L_u, K_u, M_u) \quad (2.1)$$

The primary resource, which is produced only in the South, uses capital and labor as inputs and is produced in accordance with a well-behaved,³ constant returns to scale production function, i.e.

$$X_z = F_z(L_z, K_z) \quad (2.2)$$

The following material balance equations complete the specification of the real side of our model.

$$K_u + K_u^* + K_z = K + K^* = \kappa \quad (2.3a)$$

$$L_u^* = L^* \quad (2.3b)$$

$$M_u + M_u^* = X_z \quad (2.3c)$$

and the total employment in the South is given by $L_e \equiv L_z + L_u$.

Following Lewis [1954], we assume that there is surplus labor in the South at an exogenously given subsistence wage \bar{w} . We assume \bar{w} to be fixed in terms of commodity u which is the only consumable good in the system. We also assume that labor is internationally immobile while capital is perfectly mobile and that there is universal marginal productivity pricing. Given competitive markets, it is a well known⁴ proposition that the technologies can be equivalently depicted in terms of the underlying unit cost functions. Thus (2.1) and (2.2) can be rewritten as

$$1 = C_u^*(w^*, R, p); \quad 1 = C_u(\bar{w}, R, p); \quad p = C_r(\bar{w}, R) \quad (2.4)$$

where p is the unit price of the primary resource in terms of the numeraire commodity u , R is the international rental rate of capital and w^* is the wage rate in the North.⁵

In order to understand better the effect of the changes in the exogenous variables on the endogenous variables, we rewrite (2.3) in terms of input-output coefficients. Let C_{ij} denote the requirement of the i th input per unit of the j th good, $i = L, K, M$ and $j = u, u^*, z$. We then have

$$C_{Ku} X_u + C_{Ku}^* X_u^* + C_{Kz} X_z = K + K^* = \kappa \quad (2.3a')$$

$$C_{Lu}^* X_u^* = L^* \quad (2.3b')$$

$$C_{Mu} X_u + C_{Mu}^* X_u^* = X_z \quad (2.3c')$$

With quasi-concave and linearly homogenous production functions, each C_{ij} is a function solely of input prices and is homogenous of degree zero in all input prices.

The first point to be noted about our equilibrium is that factor prices (w^*, R, p) are independent of endowments of capital and labor and depend solely on \bar{w} . This is simply the observation that (2.4) is a system of three equations in three unknowns. Given \bar{w} , R and p is determined in the South which then determines w^* in the North. Once factor prices are determined, factor intensities are determined and (2.3a') - (2.3c') can be used to determine the output levels X_u , X_u^* and X_z .

As in a standard Heckscher-Ohlin-Samuelson (HOS) trade model, changes in commodity and factor prices affect output levels through changes in factor intensities. Towards this end, we differentiate (2.3a') - (2.3c') to obtain, as in Batra-Casas [1976],

$$\lambda_{Ku} \hat{X}_u + \lambda_{Kz} \hat{X}_z + \lambda_{Ku}^* \hat{X}_u^* = \hat{\kappa} - (\lambda_{Ku} \hat{C}_{Ku} + \lambda_{Kz} \hat{C}_{Kz} + \lambda_{Ku}^* \hat{C}_{Ku}^*) \quad (2.5a)$$

$$\lambda_{Mu} \hat{X}_u + \lambda_{Mu}^* \hat{X}_u^* = \hat{X}_r - (\lambda_{Mu} \hat{C}_{Mu} + \lambda_{Mu}^* \hat{C}_{Mu}^*) \quad (2.5b)$$

$$\lambda_{Lu}^* \hat{X}_u^* = \hat{L}^* - \lambda_{Lu}^* \hat{C}_{Lu}^* \quad (2.5c)$$

where a hat ($\hat{\cdot}$) denotes a rate of change (e.g., $\hat{\kappa} = d\kappa/\kappa$) and where λ_{ij} is the proportion of the total supply of the i th factor used in the j th sector (e.g., $\lambda_{Ku} = C_{Ku} X_u / \kappa = K_u / \kappa$).

Since factor intensities are independent of factor endowments, the effects of an increase in L^* or κ (K or K^*) can be read off from the simplified system

$$\begin{bmatrix} \lambda_{Ku} & \lambda_{Kr} & \lambda_{Ku}^* \\ \lambda_{Mu} & -1 & \lambda_{Mu}^* \\ 0 & 0 & \lambda_{Lu}^* \end{bmatrix} \begin{bmatrix} \hat{X}_u \\ \hat{X}_z \\ \hat{X}_u \end{bmatrix} = \begin{bmatrix} \hat{\kappa} \\ 0 \\ \hat{L}^* \end{bmatrix} \quad (2.6)$$

Given our specialized North where labor is fully employed, an increase in either Southern or Northern capital stock does not affect the level of production of the manufactured good in the North. The impact is only felt in the South where both X_u and X_z rise. Since X_z is an input for X_u , a rise in X_u is naturally accompanied by a rise in X_z . Existence of surplus labor makes this overall expansion feasible. An increase in L^* however causes X_u^* to increase. This immediately entails an inflow of capital and the primary resource into North. In other words, direct foreign investment of North falls. As capital flows out of the South, the level of production of X_u will fall. Whether the level of production of the primary resource will fall or not depends on the extent to which resources released from a reduction in X_u is matched by an increased demand from an expansion in X_u^* . Indeed $\hat{X}_z/\hat{L}^* \gtrless 0$ if and only if $K_u^*/M_u^* \lessgtr K_u/M_u$. In other words, if X_u is resource-intensive relative to capital, then a reduction in its production will release more X_z than an increase in X_u^* can absorb. This will cause X_z to fall and will release the additional capital which X_u^* requires. We summarize the above analysis in the following Proposition.

Proposition 1

- a) An increase in Southern or Northern capital increases output levels of both commodities produced in the South leaving Northern

output unchanged. An increase in Northern labor supply increases Northern output of commodity u but decreases Southern output of commodity u. Production of the primary resource will increase, remain constant or decrease if and only if $K_u^*/M_u^* \leq K_u/M_u$.

- b) Any increase in Northern capital K^* is invested totally in the South, i.e., leads to an increase in K_u and K_z and leaves unchanged K_u^* . The same is true for any increase in Southern capital stock K . An increase in Northern labor supply, however, leads to a reduction in foreign investment by the North, i.e., increases K_u^* .

As a standing hypothesis for the analysis to follow, we will assume that $K_u^*/M_u^* > K_u/M_u$. Given that the South is not as industrialized as the North, it seems to us reasonable to assume that the capital intensity of its manufacturing sector cannot exceed that of North. Under this hypothesis, it follows that the effective level of employment in the South, L_e , will increase with an increase in κ and decrease with an increase in L^* .

III. The Effects of Policy Measures on Factor Rewards, Output Levels and International Capital Movements

In this section we analyze the impact of tariffs, export taxes and profits taxes on the variables in our economy. Imposition of tariffs by the South on the imports of the manufactured good can be justified on the grounds of the standard "infant-industry argument." A similar argument can be provided for the imposition of an export tax on the primary resource by the South. Profits taxes imposed by the South on repatriated earnings to the North is a standard policy prescription and needs little justification.

Our analysis will revolve around equation systems (2.4) and (2.5a) - (2.5c). In order to solve for changes in output levels resulting from changes in factor prices, it is necessary to express the change in each C_{ij} in terms of input prices. Total differentiation of any such C_{ij} yields

$$\hat{C}_{ij} = \theta_{Lj} \sigma_{Li}^j \hat{w} + \theta_{Kj} \sigma_{Ki}^j \hat{R} + \theta_{Mj} \sigma_{Mi}^j \hat{p} \quad (3.1)$$

where θ_{ij} is the distributive share of the i th factor in the j th sector and σ_{is}^j is the partial elasticity of substitution between the i th and the s th factor in the j th industry, $i, s = L, K, M$; $j = u, z, u^*$ and w stands for \bar{w} or w^* . Since C_{ij} is homogenous of degree zero in w^* , R and p , it follows that

$$\theta_{Lj} \sigma_{Li}^j + \theta_{Kj} \sigma_{Ki}^j + \theta_{Mj} \sigma_{Mi}^j = 0 \quad (3.2)$$

Combining (3.1) and (3.2) and noting that \bar{w} is a constant yields

$$\begin{aligned} \hat{C}_{Lu}^* &= -\theta_{Ku}^* \sigma_{KL}^{u*} (\hat{w}^* - \hat{R}) - \theta_{Mu}^* \sigma_{ML}^{u*} (\hat{w}^* - \hat{p}) \\ \hat{C}_{Mu} &= -\theta_{Lu} \sigma_{LM}^u \hat{p} + \theta_{Ku} \sigma_{KM}^u (\hat{R} - \hat{p}) \\ \hat{C}_{Mu}^* &= \theta_{Lu}^* \sigma_{LM}^{u*} (\hat{w}^* - \hat{p}) + \theta_{Ku}^* \sigma_{KM}^{u*} (\hat{R} - \hat{p}) \\ \hat{C}_{Ku} &= -\theta_{Lu} \sigma_{LK}^u \hat{R} - \theta_{Mu} \sigma_{MK}^u (\hat{R} - \hat{p}) \\ \hat{C}_{Kz} &= -\theta_{Kz} \sigma_{LK}^z \hat{R} \\ \hat{C}_{Ku}^* &= \theta_{Lu}^* \sigma_{LK}^{u*} (\hat{w}^* - \hat{R}) - \theta_{Mu}^* \sigma_{MK}^{u*} (\hat{R} - \hat{p}) \end{aligned} \quad (3.3)$$

For the analysis to follow we assume all the partial elasticities of substitution to be positive, i.e., that all factors are weak

substitutes for each other. The signs of \hat{C}_{ij} then depend on the direction of change in the factor prices with respect to the parameters.

a. Tariffs

Consider first a tariff that Resourcia might adopt in order to protect its u-sector. Given our assumption that the Resourcian subsistence wage is in terms of commodity u, an increase in a tariff has to be compensated by a corresponding increase in the nominal wage rate. Thus (2.4) has to be modified to

$$1 = C_u^*(w^*, R, p); (1+t) = C_u(\bar{w}(1+t), R, p); p = C_z(\bar{w}(1+t), R, p) \quad (3.4)$$

Totally differentiating (3.4) we obtain

$$\begin{bmatrix} \theta_{Lu}^* & \theta_{Ku}^* & \theta_{Mu}^* \\ 0 & \theta_{Ku} & \theta_{Mu} \\ 0 & \theta_{Kz} & -1 \end{bmatrix} \begin{bmatrix} \hat{w}^* \\ \hat{R} \\ \hat{p} \end{bmatrix} = \begin{bmatrix} 0 \\ \hat{t}(1-\theta_{Lu}) \\ -\theta_{Lz}\hat{t} \end{bmatrix}$$

which in turn yields $\hat{R}/\hat{t} = \hat{p}/\hat{t} = 1$ and $\hat{w}^*/\hat{t} < 0$. The above results can also be obtained if we choose the primary resource as the numeraire. In this case we have

$$p_u = C_u(w^*, R, 1); p_u(1+t) = C_u(\bar{w}p_u(1+t), R, 1); 1 = C_z(\bar{w}p_u(1+t), R) \quad (3.5)$$

Let us define in (3.5) $p_u(1+t) \equiv \bar{p}_u$. Then it can be rewritten as

$$\bar{p}_u/1+t = C_u^*(w^*, R, 1); \bar{p}_u = C_u(\bar{w}p_u, R, 1); 1 = C_z(\bar{w}p_u, R) \quad (3.6)$$

The last two equations indicate that \bar{p}_u and R are unchanged. With an increase in t , p_u is lower and so is w^* . Thus, among other things, an increase in Southern tariff does not alter the domestic price ratio (or the internal terms of trade between manufactures and primary resource) in the South. We thus have

Proposition 2

- (a) With an increase in tariffs, the relative price of the primary good in terms of the final good is unchanged in the South while in the North the relative price of the primary good is higher.
- (b) The real reward to Southern capital is unchanged while that to Northern capital is lower.
- (c) The real reward to Northern labor is lower.

Next, we turn our attention to the North. Suppose it imposes a tariff t^* on the import of the commodity u , or alternatively, an export subsidy on the export of u . In this case only the first equation in (2.4) changes to $(1+t^*) = C_u^*(w^*, R, p)$ and we obtain

Proposition 3

An increase in a Northern tariff or export subsidy has no effect on the price of the primary resource and on the rate of return to capital but increases the Northern wage rate.

The above proposition will play an important role in the welfare analysis to be presented later. We will observe that as long as the South remains a labor-surplus economy, the North cannot exploit the South with any quantity instruments.

b. Profits Taxes

Consider next a tax imposed by the South on the earnings of foreign capital. Let R be the gross rate of return earned by Northern capital in the South and R^* that earned in the North. If the ad valorem profits tax is given by τ , arbitrage requires

$$R^* = R(1-\tau) \quad (3.7)$$

and we can rewrite (2.4) as

$$1 = C_u^*(w, R(1-\tau), p), \quad 1 = C_u(\bar{w}, R, p), \quad p = C_z(\bar{w}, R) \quad (3.8)$$

The following result can be easily derived.

Proposition 4

An increase in the Southern profits tax leaves the price of the primary resource and the gross rate of return to capital in the South unchanged. The rate of return to capital in the North falls but the Northern wage rises. Identical results are obtained for an increase in Northern profits tax.

Thus, a Southern profits tax benefits Northern labor. The same is true for a tax imposed by the North on the rental of that part of its capital that is invested in the South.

c. Export or Import Taxes on the Primary Resource

A third set of instruments of commercial policy that we can consider are taxes imposed on the export or import of the primary resource. Let v be an ad valorem tax imposed by the South on the export

of the primary resource. In this case, the first equation (2.4) is changed to

$$1 = C_u^*(w^*, R, p(1+v)) \quad (3.9)$$

and we obtain the following result.

Proposition 5

An increase in the export tax imposed by the South on the primary resource leaves its price and the rate of return to capital unchanged but lowers the Northern wage. Identical results are obtained in the case of an increase in an import tax imposed by the North.

Batra-Casas [1976] have shown that changes in output levels due to changes in factor prices depend on the ranking of factor intensities among different sectors and on the extent to which factors of production are substitutable. In our model, since the South is a labor-surplus economy, the ranking of the two sectors there in terms of capital-labor ratios is of no consequence for the analysis. Moreover, since labor is internationally immobile, the ranking of the u-sector in both North and South in terms of their capital-labor ratios also does not enter the analysis. The only intensity ranking that appears in the capital-primary resource ratio and we have already assumed $K_u^*/M_u^* > K_u/M_u$ as our standing hypothesis.

As regards partial elasticities of substitution we will assume that in both the North and the South, the extent of substitutability between capital and labor is higher than that between labor and the primary resource, i.e., $\sigma_{LK}^u > \sigma_{LM}^u$ and $\sigma_{LK}^{u*} > \sigma_{LM}^{u*}$. This assumption is

also a natural one and brings out the essential importance of the primary resource. It emphasizes the fact that the South, in spite of having surplus labor, cannot significantly substitute away from the primary resource towards labor with a change in the price of the former. It should therefore encourage foreign investment. On the same ground this also justifies Northern investment in the South. An extreme assumption would be to treat the primary resource-output ratio constant in both countries.

Equations (2.5a)-(2.5c) give us the effects of changes in factor techniques on output levels and (3.3) gives us the relationship between changes in factor techniques and input prices. These combined with Propositions 2 to 5, together with the above assumptions, will yield the effect of various policy measures on output levels. In particular we have

Proposition 6

Let $(K_u^*/M_u^*) > (K_u/M_u)$, $\sigma_{LK}^u > \sigma_{LM}^u$ and $\sigma_{LK}^{u*} > \sigma_{LM}^{u*}$.

- (a) An increase in a Southern tariff on good u, or a Southern export tax on the primary resource or a Northern import tax on the primary resource are all equivalent in that they increase X_u and X_z and decrease X_u^* .
- (b) An increase in a Northern tariff on good u, or an increase in the profits tax imposed by either the South or the North leads to changes opposite to those in (a).

The economics of this proposition are straightforward. Consider, for example, an increase in the tariff, t , imposed by the South. The

output of the protected sector, X_u , increases and thus leads to an increased demand for capital and the primary resource. This requires increased borrowing of foreign capital brought about by a fall in X_u^* . Given our ranking of the factor intensities and our assumptions on the partial elasticities of substitution, it is immediate that the increased demand for the primary resource from the u-sector in the South is not matched by resources released from a decrease in X_u^* and thus leads to an increase in X_z . The effects of the other policy parameters can be argued along similar lines.

The effect of policy measures on total employment in the South and on international capital movements can also be derived from Proposition 6. We have

Proposition 7

Under the hypotheses of Proposition 6,

- (a) an increase in a Southern tariff on good u, or a Southern export tax on the primary resource, or a Northern import tax on the primary resource lead to an increase in Southern employment and to an increased inflow of Northern capital to the South;
- (b) an increase in a Northern tariff on good u, or an increase in the profits tax imposed by either the South or the North leads to changes opposite to those in (a).

IV. The Effects of Policy Measures and Factor Accumulation on Welfare

We can now bring together the results of Section II and III and analyse the effects of commercial policy and factor accumulation on welfare. Throughout this section we shall take the hypotheses of Proposition 6 as our standing hypotheses.

In the first place we examine the effects of factor accumulation in the presence of tariffs. Next we consider the effects of commercial policies in the presence of foreign capital.

Since there is only one final good, Southern welfare is given by the level of consumption Q_u of this good, where

$$Q_u = (1+t)X_u + p(X_z - M_u) - R(K_z + K_u - K) + t(Q_u - X_u) \quad (4.1)$$

The sum of the first two terms represents the value of national output at domestic prices. The third term represents repatriation of earnings of foreign capital and the last term represents tariff revenue.

Let us first consider the effect on Q_u of an increase in K and K^* . On differentiating (4.1) with respect to K we obtain $(1-t)\frac{\partial Q_u}{\partial K} = \frac{\partial X_u}{\partial K}$ the sign of which is positive. The economic rationale is as follows. An increase in K does not increase X_u^* and thereby keeps M_u^* and K_u^* constant. This implies that in (4.1), the change in the second term is zero. Moreover, since all of the increase in K is retained in the South, the change in repatriated earnings, that is the third term, is zero. These, together with the fact that u is the only consumable good, yield the above result.

With an increase in K^* , however,

$$(1-t)\frac{\partial Q_u}{\partial K^*} = -t\frac{\partial X_u}{\partial K^*} + \frac{\partial L_u}{\partial K^*} + p\frac{\partial M_u}{\partial K^*} - R\frac{\partial K_z}{\partial K^*}. \quad (4.2)$$

Given our assumption of a specialized North in which labor is fully employed, an increase in Northern capital flows into the South and therefore increases repatriated earnings from the South. Thus the gain in output has to be weighed against this loss. A little simplification would

yield insight into the above formula. We know that $K_z = C_{Kz} X_z$. This implies that $\frac{\partial K_z}{\partial K^*} = C_{Kz} \frac{\partial X_z}{\partial K^*}$. Since X_u^* remains constant, M_u^* remains constant and thus yields that $\partial M_u / \partial K^* = \partial X_z / \partial K^*$. The last two terms can now be simplified to

$$\frac{\partial M_u}{\partial K^*} (p - RC_{Kz}) = p \frac{\partial M_u}{\partial K^*} (1 - \theta_{Kz})$$

the sign of which is positive. Thus the increase in national product net of repatriated earnings is positive. But the term $-t \partial X_u / \partial K^*$ signifies a decrease in tariff revenues resulting from an increase in domestic production. The change in Southern welfare then would depend on whether the increase in value of national product is greater than or less than the decrease in tariff revenue. If the initial position is one of laissez-faire, i.e., $t = 0$, then Southern welfare rises unambiguously.

Northern welfare is also given by the level of consumption of commodity u , Q_u^* where

$$Q_u^* = X_u^* - p M_u^* + R(K_r + K_u - K) = X_u^* - p M_u^* + R(K^* - K_u^*) \quad (4.3)$$

Changes in Northern welfare corresponding to changes in K and K^* are given by $\partial Q_u^* / \partial K = 0$ and $\partial Q_u^* / \partial K^* = R$. Thus an increase in Southern capital does not affect Northern welfare, whereas an increase in Northern capital is welfare-improving for the North due to an increase in repatriated earnings from the South.

The welfare effects of an increase in the supply of Northern labor, L^* , can be similarly analyzed. We have $(1-t) \partial Q_u / \partial L^* = \bar{w} \partial L_e / \partial L^* - t \partial X_u / \partial L^*$ and $\partial Q_u^* / \partial L^* = w^*$. Since $\partial X_u / \partial L^* < 0$ and $\partial L_e / \partial L^* < 0$, welfare will

increase if the loss in total wages due to contraction is less than an increase in tariff revenues. Welfare of the North necessarily increases. We thus have

Proposition 8

- a) An increase in the stock of Southern capital improves Southern welfare, keeping the level of Northern welfare unchanged.
- b) An increase in the stock of Northern capital improves Northern welfare, but will improve Southern welfare if the increase in national product net of repatriated earnings exceeds the decrease in tariff revenues.
- c) An increase in labor supply in the North improves Northern welfare, but will improve Southern welfare if the increase in tariff revenues exceeds the loss in total wages due to economic contraction.

Next, we consider the welfare effects of a Southern tariff, t . The change in Southern welfare is given by

$$(1-t)\frac{\partial Q_u}{\partial t} = Q_u + \frac{\partial L_e}{\partial t} + (X_z - M_u)\frac{\partial p}{\partial t} - (K_z + K_u - K)\frac{\partial R}{\partial t} - t\frac{\partial X_u}{\partial t}. \quad (4.4)$$

It is clear that the result should depend on a combination of the terms of trade effect, the direct effect and the repatriation effect. The first two and the last term represent the direct effect, the third term gives the terms of trade effect and the fourth term the repatriation effect. With an increase in protection, Southern production expands leading to an increase in employment but a decrease in tariff revenue. An increase in p increases its revenue from sales of the

intermediate good to the North, but an increase in the return to capital increases repatriated earnings. If, on the other hand, South is an exporter of capital, and we start from a zero tariff situation, then South welfare necessarily rises.

The change in Northern welfare is given by

$$\frac{\partial Q_u^*}{\partial t} = -M_u^* \frac{\partial p}{\partial t} + (K^* - K_u^*) \frac{\partial R}{\partial t} \quad (4.5)$$

If the North is an importer of capital then Northern welfare falls. But if it is an exporter of capital, then the change in welfare depends on increases in capital earnings from abroad matched against increased expenditure on the primary resource.

A similar analysis can be conducted for a Northern tariff t^* . Southern welfare is now given by (4.1) with $t = 0$ and on differentiating this, we obtain

$$\frac{\partial Q_u}{\partial t^*} = -w \frac{\partial L_e}{\partial t^*} \quad (4.6)$$

Northern welfare is given by

$$Q_u^* = (1+t^*)X_u^* - pM_u^* + R(K^* - K_u^*) + t^*(Q_u^* - X_u^*). \quad (4.7)$$

On differentiating this with respect to t^* , we obtain

$$(1-t^*) \frac{\partial Q_u^*}{\partial t^*} = Q_u^* - t^* \frac{\partial X_u^*}{\partial t^*}. \quad (4.8)$$

If we let E_u^* denote Northern imports $(Q_u^* - X_u^*)$ and η^* the price elasticity of demand of Northern imports, (4.8) reduces to the optimum tariff formula

$$\frac{\partial Q_u^*}{\partial t^*} = 0 \quad \text{iff} \quad \frac{E_u^*}{Q_u^*} = \frac{1}{\eta^*}. \quad (4.9)$$

Proposition 9

An increase in the Northern tariff decreases Southern welfare and always increases Northern welfare from an initial position of laissez-faire. Otherwise it increases Northern welfare if and only if
 $(Q_u^* | E_u^*) > \eta^*.$

Next, we consider the effect of a tax v imposed by the South on the export of the primary resources. In this case, Southern welfare is given by

$$Q_u = X_u + p(1+v)(X_z - M_u) - R(K_z + K_u - K) \quad (4.10)$$

and Northern welfare by

$$Q_u^* = X_u^* - p(1+v)M_u^* + R(K^* - K_u^*). \quad (4.11)$$

On differentiating (4.11), we obtain

$$\frac{\partial Q_u^*}{\partial v} = -pM_u^*$$

which is negative without any additional hypotheses. On the other hand, the differential of Q_u yields

$$\frac{\partial Q_u}{\partial v} = \bar{w} \frac{\partial L_e}{\partial v} + p(X_z - M_u) + v(\bar{w} \frac{\partial L_z}{\partial v} + R \frac{\partial K_z}{\partial v} - p \frac{\partial M_u}{\partial v}). \quad (4.12)$$

On simplifying the above equation, we obtain

$$\frac{\partial Q_u}{\partial v} = \frac{\bar{w}L_e}{v} \epsilon_{Lv} + p(X_z - M_u)(1+\eta)$$

where ϵ_{Lv} and η are, respectively, the elasticities of Southern employment and Southern exports with respect to the export tax. If we let θ_L and θ_E denote the proportion of labor income and value of exports in Southern income, we obtain

$$\frac{\partial Q_u}{\partial v} = 0 \quad \text{iff} \quad v = - \frac{\theta_L \epsilon_{Lv}}{\theta_E \eta} \frac{1}{(1+1/\eta)} . \quad (4.13)$$

Proposition 10

An increase in a Southern export tax on the primary resource decreases Northern welfare. It increases Southern welfare from a position of laissez-faire and more generally, iff $v > - \frac{\theta_L \epsilon_{Lv}}{\theta_E \eta} \frac{1}{(1+1/\eta)}$.

It is worth pointing out that the value of v in (4.13) is none other than the optimum tariff formula adjusted in our context to take account of the fact that an export tax also increases domestic employment.

In the case of an import tax v^* imposed by the North, we obtain

$$Q_u = X_u + p(X_z - M_u) + R(K_z + K_u - K) \quad (4.14)$$

$$Q_u^* = X_u^* - p(1+v^*)M_u^* + R(K^* - K_u^*) + pv^*M_u^* \quad (4.15)$$

which on differentiation yields

$$\frac{\partial Q_u}{\partial v^*} = - \frac{\partial L_e}{\partial v^*} \quad (4.16)$$

$$\frac{\partial Q_u^*}{\partial v^*} = pv^* \frac{\partial M_u^*}{\partial v^*} . \quad (4.17)$$

Proposition 11

An increase in a Northern import tax on the primary resource decreases Northern welfare but increases Southern welfare.

Finally, we consider the consequences for Northern and Southern welfare of a profits tax τ imposed by the South. In this case, Southern welfare is given by

$$Q_u = X_u + p(X_z - M_u) - R(1-\tau)(K_z + K_u - K) \quad (4.18)$$

and Northern welfare by

$$Q_u^* = X_u^* - pM_u^* + R(1-\tau)(K_z + K_u - K). \quad (4.19)$$

On differentiating with respect to τ , we obtain

$$\frac{\partial Q_u}{\partial \tau} = \bar{w} \frac{\partial L_e}{\partial \tau} + R(K_z + K_u - K) \quad (4.20)$$

$$\frac{\partial Q_u^*}{\partial \tau} = -R(K^* - K_u^*). \quad (4.21)$$

On appealing to Proposition 7, we can write

Proposition 12

- (a) If South is a borrower of capital, an increase in the Southern profits tax decreases Northern welfare and increases Southern welfare if and only if $(\tau/1-\tau) > (\theta_L/\theta_R)(-\epsilon_{L\tau})$ where θ_L and θ_R are respectively the shares of labor and repatriated earnings in Southern income and $\epsilon_{L\tau}$ is the elasticity of Southern employment with respect to the profits tax.
- (b) If South is a lender of capital, an increase in the Southern profits tax hurts the South and benefits the North.

The above result is easy to interpret. An increase in a Southern profits tax affords a direct saving to the South in terms of repatriated capital earnings (assuming it is a borrower of capital), but an outflow of capital certainly reduces Southern output. An optimal profits tax is one which would balance these considerations, modulo second order conditions.

In the case of a profits tax τ^* imposed by the North, one simply puts $\tau = 0$ in (4.18) and (4.19). On differentiation of the resulting equations with respect to τ^* , we obtain

$$\frac{\partial Q_u^*}{\partial \tau^*} = 0 \quad \text{and} \quad \frac{\partial Q_u^*}{\partial \tau^*} = -\bar{w} \frac{\partial L_e}{\partial \tau^*}. \quad (4.22)$$

On using the result in Proposition 7, we can write

Proposition 13

An increase in the Northern profits tax leaves Northern welfare unchanged but decreases Southern welfare.

This result is simply a consequence of the fact that a Northern profits tax just redistributes income from Northern capitalists to Northern labor and our aggregate measure of welfare cannot catch this effect. As regards the South, the inflow of foreign capital displaces Southern labor and thereby decreases Southern welfare.

V. Commercial Policy with Two or More Instruments

Jones [1967] and Kemp [1969] have studied commercial policy in a two commodity, two factor, two country world economy in which one of the factors, capital, is internationally mobile.⁶ They have pointed out

that optimal policy by either country consists in that country exploiting its monopoly power in both the product market as well as in capital market. As such, an optimal policy requires two policy instruments-- a tariff and a tax-cum-subsidy on capital. A natural question arises as to how all of this fares in our North-South model of the world economy. In this section we turn to this.

Begin with the North. Its objective function is given by

$$X_u^*(L^*, K_u^*, M_u^*) - pM_u^* + R(K - K_u^*). \quad (5.1)$$

The first point to observe is that the optimal policy for the North is one of laissez-faire if the only instruments available to it are K_u^* and M_u^* . This is simply a consequence of the fact that p and R depend only on Southern technologies and on the Southern wage rate. This fact also precludes the North from using p and R as possible policy instruments.

However, as brought out in Proposition 11, an import subsidy by the North on the primary resource increases, under our assumptions, North's welfare and decreases that of the South. This is just the Kemp-Ohyama result that "there is no limit to the extent to which the North can 'exploit' the South by the imposition of an export tax" with the only qualification that instead of an export tax on the commodity u , the North should use an import subsidy on the resource. This also highlights the fact that the North does not need two instruments for the conduct of its commercial policy.

The situation for the South is somewhat more intricate. The objective function for the South is given by

$$X_u(L_u, K_u, M_u) = p(X_z - M_u) + R(K_z + K_u - K). \quad (5.2)$$

The South can choose as its instruments of commercial policy K_u , K_z and M_u in the knowledge that through these it can affect p and R , given our underlying assumption that the North's passive response is

$$p = \frac{\partial X_u^*}{\partial M_u^*} \quad \text{and} \quad R = \frac{\partial X_u^*}{\partial K_u^*}. \quad (5.3)$$

It may be noted that X_u^* is a function of L^* , $K + K^* - K_u - K_z$ and $X_z(L_z, K_z) - M_u$. The only variables which are unaccounted for are L_z and L_u and these are determined in the South as a consequence of our labor-surplus assumption.

$$\frac{\partial X_u}{\partial L_u} = \bar{w} \quad \text{and} \quad p \frac{\partial X_z}{\partial L_z} = \bar{w}. \quad (5.4)$$

However, the above discussion has used three instruments of commercial policy rather than two. If we are limited to only two, we would have to impose the additional condition

$$\frac{\partial X_u}{\partial K_u} = p \frac{\partial X_r}{\partial K_r}. \quad (5.5)$$

It is worth emphasizing that there is no rationale in our second best context for (5.5).

A similar analysis can be conducted if the South is limited to price instruments, say p and R . In this case (5.5) can be rewritten as

$$X_u(L_u, K_u, X_r(L_r, K_r) - M_u^*) + pM_u^* - R(K^* - K_u^*). \quad (5.6)$$

On differentiating this with respect to p and R , we can derive the optimal policy for the South in terms of Northern responses $\partial K_u^* / \partial R$,

$\partial K_u^*/\partial p$, $\partial M_u^*/\partial R$, $\partial M_u^*/\partial p$. Note that the values of L_u , L_z and K_z can be obtained from the three constraints (5.4) and (5.5). K_u is given as the residual $K + K^* - K_u^* - K_z$.

VI. Concluding Remarks

The basic thrust of this paper is the analysis of a labor surplus economy but, of course, labor supply is never literally unlimited. It is clear that with increased development or in terms of the language of our model, with sufficiently pronounced changes in K or L^* , South may jump to the inelastic part of the labor supply curve. In this case, terms of trade are no longer independent of factor endowments and our conclusions need modifications along lines analysed by Kemp-Ohyama. We leave such an analysis for the interested reader.

Our second remark relates to the question raised as to what labor does in labor-surplus South when it is not producing either of the two goods. One way out of this difficulty is to assume that it is engaged in subsistence farming and the consequent loss of output recognized in the expressions. However, to introduce the farming sector in a more meaningful fashion would require an expanded model.

Our third remark relates to the fact that an increase in labor supply in the North raises Northern output but reduces that of the final good in the South; and that a decrease in capital stock in either country keeps Northern output unchanged but reduces that of both goods in the South. These results are independent of any factor intensity assumptions and eventually force the international economy to move out of its cone of diversification. Put differently, these parametric

changes can force the South to specialize in the production of the primary resource. It is of some interest to examine the qualitative properties of such a model.

Footnotes

¹In addition, see Findlay [1979], Lawrence-Levy [1982] and Tower [1978].

²We shall assume that F_u , F_u^* and F_z (below) are each twice continuously differentiable in each of their arguments with strictly diminishing marginal productivities.

³Ibid.

⁴It is a simple consequence of Samuelson's Envelope theorem that $\partial C_i / \partial w_i = L_i / X_i$ and $\partial C_i / \partial R_i = K_i / X_i$. Additional properties of the unit cost function are that it is positively homogeneous of degree one in its arguments and concave. On all this, see, for example, the references in Mussa's [1980] paper.

⁵The choice of u as the numeraire is also in accord with Kemp-Ohyama.

⁶See Chipman's paper for references to the work of the other authors.

References

- Batra, R. N. and F. R. Cases (1976), "A Synthesis of the Heckscher-Ohlin and Neoclassical Model of International Trade," Journal of International Economics, 6:21-38.
- Bergsten, C. F., Thomas Horst and T. H. Moran (1978), "American Multi-nationals and American Interests," The Brookings Institution, Washington, D.C.
- Chipman, J. S. (1972), "The Theory of Exploitative Trade and Investment Policies: A Reformulation and a Synthesis," in L. E. Di Marco (ed.), International Economics and Development (New York: Academic Press).
- Findlay, R. (1979), "Economic Development and the Theory of International Trade," American Economic Review, 69:186-190.
- Jones, R. W. (1967), "International Capital Movements and the Theory of Tariffs and Trade," Quarterly Journal of Economics, 81:1-38.
- Kemp, M. (1969), The Pure Theory of International Trade and Investment, Englewood Cliffs, N.J.: Prentice-Hall.
- Kemp, M. and M. Ohyama (1978), "On the Sharing of Trade Gains by Resource-Poor and Resource-Rich Countries," Journal of International Economics, 8:93-115.
- Lawrence, C. and V. Levy (1982), "On Sharing the Gains from International Trade: The Political Economy of Oil Consuming Nations and Oil Producing Nations," International Economic Review, 23:711-721.
- Lewis, W. A. (1954), "Economic Development with Unlimited Supplies of Labor," Manchester School Econ. Soc. Stud.

- Mussa, M. (1979), "The Two-Sector Model in Terms of its Dual: A Geometric Exposition," Journal of International Economics, 4:513-526.
- Tower, E. (1979), "Economic Imperialism and Resource Nationalism: Comment on Kemp and Ohyama," Journal of International Economics, 3:423-437.

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