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THE EFFECTS OF PROTECTION ON THE GROWTH  
RATE AND ON THE NEED FOR  
EXTERNAL ASSISTANCE.

by

Stephen R. Lewis, Jr.

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## A B S T R A C T

### The Effects of Protection on the Growth Rate and on the Need for External Assistance

by Stephen R. Lewis, Jr.

Most studies of protection in developing countries are concerned with questions of static losses of real output or inefficient resource allocation at some point of time. These studies are often criticised as not relevant to problems of development. This paper incorporates the effects of protection into the most widely used macro-economic projection model, the "two-gap" model of Chenery and Strout, and examines some dynamic implications of protection.

The adaptation of the two-gap model explicitly allows for two facts related to protection:

- 1) The apparent amount of import substitution or foreign exchange saving, overstates the actual import saving if the new industry is protected.
- 2) The apparent amount of export growth or new foreign exchange earned, is understated whenever protection applies only to import substitutes.

Thus, the presence of protection will cause the usual macro-economic projection models to understate import demand whenever conventional definitions of value added are used, if there is emphasis on import substitution behind protection in the plan period.

The adaptation to the model makes it quite clear why countries pursuing industrialization by means of protection often run into balance of payments difficulties: The factor payments generated in import-substituting industries exceed the value of foreign exchange saved in the industry - sometimes by substantial amounts. For countries like Kenya, Uganda and Tanzania with a high marginal propensity to import, and for industries as highly protected as some of the large establishments in East Africa, it is quite possible for an investment in import substitution to produce a deterioration, rather than an improvement, in the balance of payments.

The paper also explores the implications of protection for the "requirements" of foreign assistance to sustain a given development program. The results show that, because protection to industries in fact results in less balance of payments improvement than it appears to, the need for foreign assistance will be greater (i.e. the balance of payments constraint is more severe) the greater is the reliance on protection to "encourage" growth.

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INTRODUCTION

One of the most widely used innovations in economic analysis of the past decade is the "two-gap" model of economic development in an open economy. The most definitive statement of the model is that of Chenery and Strout, "Foreign Assistance and Economic Development," though the model has been used in numerous countries and by national and international lending agencies for planning purposes, for projecting "requirements" of foreign assistance inflows, and for bargaining between international lending agencies and their client countries.

The basic notion of the two-gap class of models is that the growth of domestic investment determines the growth of income; and that the growth of investment may be constrained either by a lack of domestic saving, or by a failure of the foreign exchange earnings of the economy to keep step with the increased demand for imports generated by higher levels of domestic investment and GDP. Foreign assistance, public or private, may be used to cover the saving gap (where private voluntary saving plus feasible levels of public saving fall short of the level of investment needed to meet income targets) or the foreign exchange gap (when export earnings fall short of import demand). The national accounts definitions assure that the gaps will be the same ex post; but the essence of the two-gap approach is that the gaps can differ ex ante; and more particularly, that while there may be sufficient increases in potential domestic saving to cover the increase in planned investment, the level of investment and the rate of growth of output that are planned would generate more import demand than can be covered by export supply, and unless foreign assistance can cover the projected "import gap" the rate of investment (and the rate of domestic saving) will have to be adjusted downward to meet the balance of payments constraint.

The logic of the two-gap analysis is heavily supply oriented. It argues that there must be a change in the structure of production in the economy to increase the output of traded goods (import substitutes and exports) in order to bring the balance of payments into a long-run equilibrium. But, since the investment process takes time, foreign assistance can supplement the earnings of foreign exchange from exports and permit a movement to a sustainable higher rate of growth than would be possible with export earnings as the only source of foreign exchange.

The purpose of this paper is to modify the usual two-gap analysis of trade and growth to take into account the fact that foreign trade policy, in particular protection to the import-substituting sectors, has substantial macro-economic effects in the economy. These effects can be systematically incorporated into the two-gap analysis to give both a better understanding of the effects of protection on the macroeconomic behavior of the economy, and a better (more accurate) method of projecting the balance of payments consequences of any given investment program (or plan) in the context of any given system of import substitution protection. A by-product will be a more accurate set of projections of the "requirements" for foreign assistance for any given plan under a given set of import tariffs (or equivalent import quotas). Thus, whatever the choice of the level of protection to be given to import-substituting industries, the revised model will give better means of predicting the balance of payments consequences than the existing two-gap models. Why this is so will become apparent in the course of the paper.

The next section looks at the relation of protection to measured value added in each sector, and to the net foreign exchange earning or saving that is done in any sector. Section III presents the formal modification of the model to take trade and protection policies into account. Section IV looks at the implications of this modification for the rate of growth of output and investment, for the balance of payments, and for the "requirements" of foreign assistance. Section V discusses a few qualifications to the results; and Section VI gives a brief summary.

To anticipate the conclusion, the ironic result of the analysis is that, other things equal, the more a plan concentrates its investment resources on protected import substituting industries, and the greater the level of protection these industries receive, the greater will be the requirements for foreign capital inflow to meet plan targets, and the sharper will be the balance of payments constraint facing the economy. The failure to take account of protection in projections of the balance of payments will result in a systematic understatement of the demand for imports, and will produce balance of payments difficulties where none were anticipated in the plan.

#### PROTECTION AND VALUE ADDED

The key modification in the two-gap analysis of trade and growth involves the adjustment of value added in the sectors producing tradable output for the effects of protection and currency overvaluation. What we need for this purpose is the notion of "protection to value added",

or "effective protection," as it is known in the literature. A variety of critiques have been written on the theory of effective protection. Most of the critiques argue that, due to possibilities for substitution, it is not possible, a priori, to tell accurately the extent of protection a sector is receiving, or the amount of productive factors that are engaged in a sector relative to a free-trade situation. This conclusion is reached because in a different situation with different factor, input, and product prices, the choice of inputs, factors, and the output mix would change, and the existing coefficients are not a good guide to the coefficients that would be chosen under those different conditions. While I concur with this objection, it does not apply to the use that is made of effective rates of protection here.

The nominal rate of protection to a good,  $t_i$ , measures the percent by which its domestic price exceeds its world price at the official exchange rate. (Note that quantitative import restrictions will push the domestic price even higher than that implied by a tariff if the restrictions, rather than the tariff, are the binding constraint on the level of imports.) If  $Q_i$  is the domestic value of imports (or importables) and  $\hat{Q}_i$  is the world value c.i.f.,

$$\hat{Q}_i = \frac{Q_i}{1+t_i} \quad (2.1)$$

The value added in an industry  $Y_i$  is the difference between the value of its output ( $Q_i$ ) and the value of its purchased inputs

$$\sum Q_{ji} : \quad Y_i = Q_i - \sum Q_{ji} \quad (2.2)$$

In order to look at the foreign exchange earned (by export industries) or saved (by import substitution industries) we take the difference between the value of output  $\hat{Q}_i$  and the value of inputs  $\sum \hat{Q}_{ji}$  at world (i.e. at c.i.f. or f.o.b.) prices (or world marginal costs or marginal revenues, if world supply and demand elasticities are significantly less than infinity):

$$\hat{Y}_i = \hat{Q}_i - \sum \hat{Q}_{ji} = \frac{Q_i}{1+t_i} - \sum \frac{Q_{ji}}{1+t_j} \quad (2.3)$$

$\hat{Y}_i$  is sometimes called "value added at world prices," but this is a misleading term. It should not suggest that if an enterprise faced world prices it would choose to produce the existing output mix using the existing factor and input mix, which were chosen on the basis of domestic,

not world, prices. In any given period,  $\hat{Y}_i$  is simply a measure of foreign exchange (valued at the official exchange rate) earned or saved an industry  $i$ .<sup>1</sup>

Once we have  $Y_i$  and  $\hat{Y}_i$ , we can compare them to find the "effective rate of protection" or the "domestic resource cost of earning or saving foreign exchange" in each industry. The measure of protection that is comparable to nominal tariffs, or to nominal protection (i.e. the percent by which domestic value added exceeds "value added at world prices") is usually expressed as  $Z_i$ , where

$$Z_i = \frac{Y_i - \hat{Y}_i}{\hat{Y}_i} = \left( \frac{Y_i}{\hat{Y}_i} \right) - 1 \quad (2.4)$$

If, for example,  $Y_i$  were 50,000, and  $\hat{Y}_i$  were 25,000, the "effective rate of protection" would be 100 percent; or, the cost of saving a unit of foreign exchange in this industry is twice what it would be in an unprotected sector. At an official exchange rate of shs 7.1/\$1.00, this industry is saving a dollar at an implicit exchange rate, or an implicit price of foreign exchange, of shs 14.2/\$1.00.<sup>2</sup>

An alternative way of expressing the rate of protection, or the cost of earning or saving foreign exchange, is to give the share of measured value added that is "due to" or accounted for by, protection:

$$U_i = \frac{Y_i - \hat{Y}_i}{Y_i} = 1 - \frac{\hat{Y}_i}{Y_i} \quad (2.5)$$

If an industry actually uses more tradeable inputs than the value of its tradeable output, producing "negative value added" at world prices (and, unfortunately, cases of this seem to arise in Kenya as well as other developing countries),  $U_i$  takes a value greater than unity, or, expressed in percentages, greater than 100. If one has values of  $Z_i$  or  $U_i$ , one can arrive at the value of foreign exchange earned or saved in a sector by a simple transformation of measured value added:

1. Note that in this formulation I am using a Corden-type definition where  $Q_{ji}$  are tradeable inputs, and non-tradeable inputs (such as local transport costs, etc.) are treated as part of value added in the industry. In a strict interpretation, even non-tradeable inputs would be divided up into a tradeable portion (i.e. diesel fuel for transport vehicles) which becomes part of a  $Q_{ji}$ , and non-tradeable portions (repair services to vehicles) and value added, which become a part of  $Y_i$ . Regardless of how sophisticated the measure the general point is the same. The measure used here, and in part III, will assume that the values added are measured according to strict Corden definitions.

2. Note that nothing here says that the industry could not produce at a lower domestic cost of saving foreign exchange if it faced different tariffs and prices. This merely says at existing tariffs (or exchange controls or import restrictions) the industry takes more domestic resources to save foreign

$$\hat{Y}_i = Y_i \left( \frac{1}{1+Z_i} \right) = Y_i (1-U_i) \quad (2.6)$$

In the modification of the macro-economic model I will use the transformation with  $U_i$ , since it simplifies the algebra.

The notion of "protection" of an activity usually involves the use of an import tariff or quota or an export subsidy which raises the returns to that activity above what they would have been otherwise. But, protection to one sector necessarily involves "disprotection" or discrimination against other sectors of the economy. The most important aspect of this phenomenon involves the difference between the exchange rates that can be maintained with and without protection to some import-competing sectors. Since protection to these latter sectors will generally reduce the demand for imports (unless the activity has negative value added at world prices) tariff protection makes it possible to keep external payments in balance at a higher value of local currency, or a lower price of foreign exchange, than would be the case without such tariffs. Thus, as compared with a situation of no tariffs, the gross receipts of exporters (and of import-competing industries where tariffs are zero) are lower than they would be with free trade. If these sectors also have to purchase inputs from protected sectors they are worse off still. The latter problem (e.g.  $t_j$  greater than zero for export industries) results in "negative" protection, or discrimination against, export industries, with the result that both  $U_i$  and  $Z_i$  are less than zero. But, the exchange rate adjustment (where the protection system defends a price of foreign exchange that is too low) must also be made; and this adjustment has the effect of lowering the measured net protection given to the tariff protected sectors (since the free-trade value of foreign exchange is higher than that given by the official exchange rate) and increasing the measured net penalty to export industries and those that compete with duty-free imports.<sup>3</sup>

## 2. (cont'd)

exchange than an unprotected activity. In fact, to the extent that some domestic factor payments are pure rents, domestic value added payments will overstate real resource costs. Thus, for several reasons one can not use measured rates of effective protection to make definitive statements about comparative advantage.

3. To get to the "equilibrium" price of foreign exchange one needs estimates of protection to various activities and estimates of elasticities of foreign supply and demand for imports and exports of the country in question. Estimates of the undervaluation of foreign exchange due to protection are made in Balassa and Associates, The Structure of Protection in Developing Countries for a number of less developed countries. If  $R$  is the percent increase in the price of foreign exchange that would be necessary to bring external payments into balance with a constant level of capital inflow in the absence of tariffs, we can convert from  $U_i$  (measured at the official exchange rate) to  $U_i'$  (Measured protection at an "equilibrium" exchange rate) by the following transformation:

...../cont. p.6

In the next section,  $U_i$  unadjusted for exchange rate changes is used throughout, since the use of the corrected  $U_i'$  (from expression 2.5a) would logically require the recalculation of all of the national accounts at "world" prices at the shadow exchange rate, which is well beyond the scope of this exercise, and takes us into issues that are even more fundamental to the measurement of growth than those raised here.<sup>4</sup> But one final caution should be raised. The usual procedure for calculating capital/output ratios and comparing the productivity of capital among sectors involves the use of gross domestic product for the output part of the calculation. This is done in part, at least, because foreign factor payment estimates are not usually available on a sector-by-sector basis. But, where foreign capital (public or private, loan or equity) or foreign management agreements, are important, it may be more appropriate to use contribution to gross national product in the value added calculations, particularly when one is concerned with the balance of payments aspects of alternative investment programs. In the calculation of  $U_i$  or  $Z_i$ , the change from domestic to national product contribution involves subtracting a similar absolute amount (the factor payments abroad) from both  $Y_i$  and  $\hat{Y}_i$ , which will in all cases result in higher measured levels of protection to national product contribution than to domestic product contribution, since the presence of foreign factors repatriating income is equivalent to the use of more imported inputs.

#### THE MODEL - ASSUMPTIONS AND STRUCTURE

Having shown how protection can be applied to modify value added in sectors producing tradeable output, we are ready to modify the two-gap model. We start with the usual model in which value added in each sector depends on the capital stock in that sector at the beginning of the production period  $t$ :

$$Y_{it} = \alpha_i K_{it} \quad (3.1)$$

and changes in value added depend on investment in the previous period:

$$\Delta Y_{it} = \alpha_i I_{i, t-1} \quad (3.2)$$

Gross domestic product is the sum of value added in the three sectors of the model, which produce, respectively, (1) import substitutes, (2) exports, and (3) non-tradeables:

3. (cont'd)

$$U_i' = U_i (1+R) - R \quad (2.5a)$$

This expression is derived in Lewis and Guisinger, "Measuring Protection in a Developing Country," and is used there to adjust measured rates of protection in Pakistan.

4. These issues are discussed in Little, Scitovsky, and Scott, Industry and Trade in Some Developing Countries, and in Lewis, "Domestic Saving and

...../cont. p. 7

$$Y_t = Y_{1t} + Y_{2t} + Y_{3t} \quad (3.3)$$

The level of aggregate demand in this open economy in the base period (where, for simplicity at the moment, no import substitutes are produced)

$$Y_{dt} = C_t + I_t + X_t - M_t \quad (3.4)$$

We assume simple linear consumption and saving functions, such that

$$C_t = (1 - \alpha) Y_t \quad (3.5)$$

and

$$S_t = \alpha Y_t \quad (3.6)$$

where the marginal rates of consumption and saving are  $(1 - \alpha)$  and  $\alpha$ , respectively.

Investment in any year is the sum of investment in the three sectors:

$$I_t = I_{1t} + I_{2t} + I_{3t} \quad (3.7)$$

Exports are determined by the output (not the value added) of the export sector, so we must multiply value added by the inverse of the ratio of value added to gross output  $(1/r)$ :<sup>5</sup>

$$X_t = Q_{2t} = Y_{2t} \frac{1}{r} \quad (3.8)$$

The demand for importables depends on the level of GDP and on the level of investment:<sup>6</sup>

$$M_t = m_k I_t + m Y_t \quad (3.9)$$

The basic balancing equations involve the net inflow of foreign capital (F) such that

$$F_t = M_t - X_t \quad (3.10)$$

and

$$I_t = S_t + F_t \quad (3.11)$$

Since the purpose of this model is to explore the effects of trade policies and investment allocation on the growth rate of national income, the aggregate balancing equations must allow investment to improve

#### 4. (cont'd)

Foreign Assistance when Foreign Exchange is Undervalued," which elaborates more on the effects of measurement bias in interpreting the results of two-gap model projections.

5. If foreign demand for the exports which will be increased is significantly less than perfectly elastic, increased export production should be valued at marginal export revenues not export price.

6. The government may use various instruments to control the demand for imports (e.g. tariffs) which do not control the demand for importables. In the rest of the Paper I assume that the structure of demand is already set by government policies, and further efforts at making the economy balance ex ante must operate on the supply side.

the trade balance either through import substitution or through growth of exports. In the standard two-gap model these are not separated but are lumped together in a "trade-improving" sector. The inflow of foreign capital can either be set exogenously by private and public decision outside the country, or be determined endogenously on the basis of other parameters in the model.

To deal with the question of the effects of investment in either sector on the trade balance, I use the distinction of the last section between value added domestically and "value added at world prices," or the domestic currency value of foreign exchange earned or saved in an activity. This distinction is crucial for the model, as the results of the model which differ from other "gap" models depend solely on this key distinction. In a protected activity, the value added (in Corden's sense), or the payments to factors of production,  $Y_1$  exceeds the domestic value of foreign exchange saved, which is the difference between tradeable output and tradeable inputs (both measured at world trade opportunity costs), or  $\hat{Y}_1$ . Similarly, in an export activity that purchases inputs subject to tariff but exports at the official exchange rate, the domestic factor payments  $Y_2$  are less than the difference between the value of tradeable output and the value of tradeable inputs, or  $\hat{Y}_2$ .<sup>7</sup> These distinctions mean that the measured increase in domestic value added in protected import substituting industries overstates the improvement in the trade balance, or the net foreign exchange saving; and the measured increase in value added in export activities that are discriminated against understates the improvement in the trade balance, or the net foreign exchange earning.

For simplicity I use the U measure of effective protection in order to convert from  $Y_{it}$  to  $\hat{Y}_{it}$ :

$$\hat{Y}_{it} = Y_{it} (1 - U_i) \quad (3.12 \text{ or } 2.6)$$

Also for simplicity of exposition, I assume that the tradeable inputs used by producers of both exports and import substitutes are imported, so that one can work out the adjustment for protection of import substitutes and the discrimination against exports on the import demand side of the foreign balance equation.<sup>8</sup>

7. There should be an explicit adjustment in the terms of trade in the export sector when calculating the value added that will result from investment in sector 2.

8. The use of exportable raw materials in either sector would not change the principal conclusions regarding the effect of protection on the growth rate or the requirements for foreign capital inflow; they merely move some of the adjustment from the import side to the export side of the equation for foreign balance. The question of "import intensity" is discussed in Section V.

Now define first the import demand in each year to take account of the effects of new import substitution under the assumption of no protection:<sup>9</sup>

$$\hat{M}_t^* = m_k I_t + m Y_t - Y_{1t} \quad (3.13)$$

There is no protection to sector 1 and no discrimination against sector 2 in (3.13). We must then modify the demand for import equation to take account of the effects of protection by introducing  $U_1$  and  $U_2$ , where  $U_1$  is always positive and  $U_2$  is always negative:<sup>10</sup>

$$\hat{M}_t = m_k I_t + m Y_t - Y_{1t} (1 - U_1) + Y_{2t} U_2 \quad (3.13a)$$

This expression says that import demand depends on the demand for importables due to the level of investment activity and to the level of GDP, net of the effects of "real" import substitution (i.e. real saving on the import bill because some processing is now done locally, as measured by  $\hat{Y}_1$ ) and also net of the effects of the discrimination against export industries. In other words, this import demand function takes into account the overstatement of import saving by  $Y_1$  and the understatement of the improvement in the balance of payments by  $Y_2$ .<sup>11</sup> In general, unless the import substitution industries have negative value added at world prices,  $\hat{M}_t$  will be less than  $M_t$  but will exceed  $\hat{M}_t^*$ ; i.e. import substitution behind protection will decrease the demand for imports, but not as much as it appears to do when measured by the value added in the protected import substituting industries.

It is now necessary to re-write the expression for aggregate demand to take account of the growth of import substitution and export industries under conditions of protection:

$$Y_t = C_t + I_t + X_t - \hat{M}_t \quad (3.4a)$$

Note that the export function does not change in this version, since the fact that export industries' values added are understated under conditions of protection is handled by adjusting the demand for imports.

#### IMPLICATIONS OF THE MODEL

Now that the basic definitions and behavioral functions are set, we can examine some of the properties of the model and the aggregate effects of explicitly introducing protection into the model. Since the level of domestic product is a function of the capital stock, the increase of GDP

9. This is the assumption made in the usual two-gap model. And, it is in the modification of this that the present paper diverges from the usual analysis.

10. Sectors 1 and 2 are the aggregates of import substitutes and exports.  $U$  need not be positive for all import substitutes; but it will be for the aggregates of the import-competing domestic sector.

11. One must remember that  $U_2$  is always negative for export industries, so given the value of exports,  $Y_2$  will overstate the world trade value of tradeable inputs (here assumed to be imported) that are used in their production.

is a function of the level of investment, and the annual growth rate of GDP depends on (and in the case of a constant proportional distribution of investment, or one that leaves the aggregate capital output ratio unchanged through time, is equal to) the annual growth rate of investment. Thus, one can look at the characteristics of the model starting from a base level of equilibrium ex ante in period  $t-1$ , and ask about the conditions of continued equilibrium (which is the general procedure in a planning exercise).

Begin with the saving-investment conditions:

$$\Delta I_t = \Delta S_t + \Delta F_t \quad (4.1)$$

$$\Delta I_t = \alpha \Delta Y_t + \Delta F_t \quad (4.1a)$$

$$\Delta I_t = \alpha \sum_{i=1}^{\infty} \sigma_i I_{i,t-1} - 1 + \Delta F_t \quad (4.1b)$$

If we let:

$$\bar{\sigma} = \frac{\sum_{i=1}^{\infty} \sigma_i I_{i,t-1}}{\sum_{i=1}^{\infty} I_{i,t-1}} \quad (4.2)$$

and divide both sides of (4.1b) by  $I_{t-1}$ , we obtain:

$$\frac{\Delta I_t}{I_{t-1}} = \alpha \bar{\sigma} + \frac{\Delta F_t}{I_{t-1}} \quad (4.3)$$

Expression (4.3) is a familiar variant on the Harrod-Domar condition that given the productivity of capital, the rate of growth of investment is the warranted rate (set by domestic saving) augmented by the increased inflow of foreign capital as a ratio to base period investment. It should be noted that, even if the foreign capital inflow is large in relation to GDP, unless it increases continually, the rate of growth of domestic investment is basically constrained by the domestic marginal saving rate,  $\alpha$ . Any attempt to raise the annual rate of growth of investment (and, thus, the growth rate of GDP) must be matched by an increase in either domestic or foreign saving rates (or both). We could also express the problem in terms of foreign capital inflow as a constraint on the increase in domestic investment, such that if the following inequality:

$$\Delta F_t \geq \Delta I_t - \alpha \Delta Y_t \quad (4.4)$$

is not fulfilled, investment cannot increase as much as planned in  $I_t$  and, therefore, the increase in output in  $t+1$  will be less than planned, or less than it could have been had either foreign or domestic saving been larger.

Turning to the balance of trade conditions (again starting from ex-ante equilibrium in  $t-1$ , as we would with a plan projection) the marginal conditions are:

$$\Delta \hat{M}_t = \Delta X_t + \Delta F_t \quad (4.5)$$

Substituting values for  $\hat{M}_t$  and for  $X_t$  we obtain:

$$m_k \Delta I_t + m \Delta Y_t - \Delta Y_{1t} (1-U_1) + \Delta Y_{2t} \cdot U_2 = \Delta Y_{2t} \cdot \frac{1}{r} + \Delta F_t \quad (4.6)$$

Working back to the prior period investment allocations,

$$m_k \Delta I_t + m \bar{I}_{t-1} - \bar{I}_{t-1} (1-U_1) + \bar{I}_{t-1} U_2 = \bar{I}_{t-1} \cdot \frac{1}{r} + \Delta F_t \quad (4.7)$$

We can put the demand for importables alone on the left side:

$$m_k \Delta I_t + m \bar{I}_{t-1} = \bar{I}_{t-1} (1-U_1) + \bar{I}_{t-1} U_2 + \Delta F_t \quad (4.8)$$

Then dividing through by  $\bar{I}_{t-1}$  and rearranging terms we get:

$$\frac{\Delta I_t}{\bar{I}_{t-1}} = \frac{1}{m_k} \left\{ \frac{\bar{I}_{t-1}}{\bar{I}_{t-1}} (1-U_1) + \frac{\bar{I}_{t-1}}{\bar{I}_{t-1}} U_2 + \frac{\Delta F_t}{\bar{I}_{t-1}} - m \right\} \quad (4.9)$$

What does one make of this expression? It says that the balance of payments constraint on the rate of growth of domestic investment (and, ultimately, the rate of growth of domestic product) varies directly with the productivity of investment (and the share of total investment) in the import substituting and exporting sectors, and with the increase in capital inflow from abroad, and inversely with the marginal propensity to purchase importables (both  $m_k$  and  $m$ ), and the average productivity of investment in the entire economy (due to the effect higher incomes have on the demand for importables).

Most important from our point of view, however, are the ways in which  $U_1$  and  $U_2$  effect the growth rate of investment. The higher the level of protection to the import substituting industries, given the value added measured in these industries, the lower will be the permissible rate of growth of investment. Presumably, a changing  $U_1$  with a constant  $Y_1$  must imply a different mix of import substituting industries. But it is clear that plan projections of growth rates and the balance of payments constraint must take into account the levels of protection that are being given to new investments, and that the protection in itself will influence the net balance of payments contribution of each project.

There is an interesting result on the export side. Given the growth of production for export, the permissible growth rate of investment is higher (from a balance of payments standpoint) the greater is the discrimination against exports by the protection system. This means that in a country

where despite the discrimination against exports the profitability of export industries is high enough to allow exports to expand rapidly, the balance of payments effects of a given growth of exports are even more favourable than they appear to be, since the net earnings of foreign exchange are greater than the conventional national accounts measures would suggest.<sup>12</sup>

Foreign borrowing usually is justified in part by the fact that capital inflow from abroad can relax the balance of payments constraint and allow a higher rate of growth of investment than would be possible without foreign financing of imports. Looking at our problem in terms of the "requirements" for foreign capital inflow, we can rearrange equations (4.5) and (4.6) and express them as inequalities:

$$\Delta F_t \geq \Delta K_t - \Delta Y_t \quad (4.5a)$$

$$\Delta F_t \geq m_k I_t + m I_{t-1} + c_1 I_{t-1} U_1^{-1} + c_2 I_{2t-1} (U_2^{-1} - \frac{1}{r}) \quad (4.6a)$$

Thus, the required levels of foreign capital inflow to sustain an increased investment program are greater the larger is the level of protection to the import substituting sectors, the less successfully one can discriminate against exports and still achieve export growth, etc. Again, it should be stressed that changes in  $U_1$  for a constant  $c_1$  and  $I_{t-1}$  implies a different mix of import substitution industries. But, expression (4.6a) shows that the foreign capital "requirements" to sustain an investment program or plan are larger the greater is the protection to the import substituting sectors.<sup>13</sup>

Finally, one can look at the conditions under which one would choose import substitutes rather than exports as the means of improving the balance of payments and lessening the foreign exchange constraint on growth. Going back to (4.6) we can pick out  $I_1$  and  $I_2$  to see the conditions under which investment in section 2 will improve the balance of payments more than, the same as, or less than investment in sector 1:

$$c_2 (1 - U_2) \geq c_1 (1 - U_1) \quad (3.23)$$

This expression says that the productivity of additional capital in sectors 2 and 1 ( $c_2$  and  $c_1$ ) as it would normally be measured must be modified to take into account the fact that due to protection (i) the value

12. In a country when exports are predominantly agricultural, this is a variant of the familiar proposition that the more one can go on squeezing agriculture without getting an adverse production response the more one can subsidise inefficient import - substituting industry without lowering the growth rate.

13. Alternatively, this analysis shows how there is a choice between subsidizing inefficient sectors from other sectors in the same economy or through the use of foreign assistance.

added generated in the import substituting industry will overstate the value of foreign exchange saved and (ii) the domestic value added in the export sector will understate the value of foreign exchange earned by a given capital investment in each of the sectors. In terms of general equilibrium implications, since an increase in protection to sector 1 will increase the discrimination against sector 2, it would not be surprising to find that import substituting industries looked like more productive investments from the point of view of comparing  $Q_2$  and  $Q_1$  unadjusted for protection.

If the productivity of new capital, or the incremental output capital ratio, is to be used as a rule of thumb or as a structural parameter in projection models for planning purposes (and it often is used for the first and generally is used for the second) then it is important to adjust these measures for the effects of the protection system. In other words, we should define:

$$\hat{Q}_1 = Q_1 (1 - U_1) \quad (4.11)$$

and aggregate projection models should use  $\hat{Q}_1$  instead of  $Q_1$  in projecting output from the balance of payments point of view. Using  $Q_1$  for planning will overstate the amount of real value added in import substituting industries for a given capital investment, and it will lead to "plan failure" in the sense that the output targets can be met only if the balance of payments constraint is loosened by a greater inflow of foreign saving than had been predicted in the plan.

This problem will be more severe the greater is the difference between  $U_1$  and  $U_2$  and the greater is the proportional allocation to import substituting investment. Moreover, the latter is very likely to be a function of the former.

#### COMMENTS AND QUALIFICATIONS

Up to this point the argument has largely been in terms of the negative or distorting effects tariffs may have from the aggregate point of view. A brief word is in order on the situations where tariffs may be justified as an instrument of policy - in which case the above modification to the two-gap model loses its "normative" significance and simply becomes a means of taking into account the aggregate effects of using tariffs instead of some other, more neutral, policy. The usual arguments for tariff protection are based on failures of the market (under either private or public ownership of the means of production) to achieve efficient allocation of resources: infant industry; optimum tariff (to take advantage

of less than perfectly elastic offer curves from the rest of the world); external benefits (that lower the rate of return privately even if it is high socially); factor price disequilibrium between traditional and modern (often exporting and import substituting) sectors of the economy. Tariffs also are justified at times in terms of raising rates of saving; and in terms of improving the distribution of income. A comment or two on each of these arguments is in order, with more emphasis on the infant industry case.

The distribution of income. If one wishes to price the goods and services consumed by the rich above world trade prices at the official exchange rate (and I would, as a matter of personal preference) then tariffs are not the appropriate measure. Sales taxes should be used, otherwise scarce resources domestically will be used in producing luxuries behind protection, at a higher real cost to the economy than if they had been acquired by exporting something else to pay for the imports.

Raising the rate of saving. This argument sometimes takes the form of raising public saving through the tariff collections, or raising private saving through transferring income to the modern sector with the relatively high marginal saving rate. Sales taxes are a better way of raising public saving, as they avoid the side-effects of protecting inefficient production. The evidence from several international studies suggests that using tariffs to turn the terms of trade against the traditional sector (usually export agriculture) in favour of the modern sector (usually import substituting manufacturing) raises saving, if at all, only at very high real costs to the economy, and probably makes the distribution of income within the country significantly worse as well.<sup>14</sup>

Factor price disequilibrium. The "first-best" solution is a wage subsidy to employment in the modern sector. Second-best is adjusting the exchange rate facing the high-wage sector both in producing for the home market and for exporting. Tariffs are only a poor third at best.

External economies. While externalities present a valid basis for some sort of direct subsidy, again, exchange rate adjustment in both foreign and domestic markets might be justified as a second-best, with import tariffs a poor third. However, the argument must be made in terms of the relative amount of external benefits of the industry or project in question compared with other projects or industries which also have some external benefits. In practice, "external benefits" often seem to be the refuge of promoters or agencies that cannot justify their projects on measurable criteria.

14. For a review of this problem see Lewis, "Agricultural Taxation and Inter-sectoral Resource Transfers."

Optimum tariff. Some amount of tariff protection, depending on the world offer curve facing the country, is clearly justified. The problem is to make sure the low elasticity of demand for one or two major export products does not dominate one's thinking or policies. Major exports are special cases, and should be handled through export taxes, not through undervaluation of foreign exchange for all exports.

Infant Industry. The justification for infant industry protection must be that there is some period during which the industry will have higher costs than competing alternative sources of supply; and for some reason, the project, or the industry, itself cannot be expected to absorb early losses in the prospect of future profits. That tariffs are inefficient instrument for achieving the desired goal is well known. The fact that an industry is an infant in the domestic market makes it more of an infant in export markets, yet seldom is infant industry status given to potential exports. But, if the industry is to be protected by tariffs, there should be a time phasing for that protection. Over some period of time, the growth rate of productivity of all factors in the industry should be higher than (i) productivity growth rate in other sectors of the economy, and (ii) productivity growth rate of factors in similar industries abroad. If these productivity growth conditions are met, the industry will have a decline in costs relative to the rest of the economy and to the imported supply; and, in the terms of the preceding sections, the difference between  $Y_1$  and  $\hat{Y}_1$  will be reduced - the need for subsidy from other sectors of the economy will diminish - and the real saving in foreign exchange through import substitution will approach the apparent saving.

But two things should be noted about the process of an infant growing into an adult. First, there is nothing automatic about it; and firms that are given monopolistic or oligopolistic access to protected domestic markets are not under the pressure to reduce costs and increase productivity of all factors that firms in a competitive situation would be. Thus, there needs to be some policy at the outset that will force infant industries to grow up, and to grow up within some specified period of time. Second, the modifications made to the two-gap model in this paper would make it possible to include the infant (subsidized) phase of growth in the planning process - indeed the logic of the paper is that this must be taken into account or there will be unanticipated failure of the planned output and investment targets because the balance of payments constraint will become binding sooner than anticipated. One could easily modify the model to take account of the unexpected gains

as the infants grew up, providing foreign exchange saving where none was "planned" in the investment allocation, simply due to the increase in the efficiency with which traded goods are produced. However, plan "failures" due to unexpected surpluses of foreign exchange are not usually the sort that concern planners.

The argument of the paper does not deal in terms of industries that produce consumer goods, intermediate goods, or capital goods. It does not depend on such distinctions. The model is concerned with measures that result in high real costs of producing any importables - regardless of their destination in the domestic economy. In practice, it is usually the consumer goods that get tariff protection first; and they often end up being produced at high cost, absorbing excessive amounts of resources away from the production of intermediate products and capital goods for domestic use and from production for export. As pointed out earlier, the use of import tariffs makes it possible to maintain an artificially low price of foreign exchange - which has the somewhat ironic effect that it is then more difficult for infants that are growing up to fully meet competition from imports at zero duties, or, more especially, to export.

The model in the paper also departs from a characteristic commonly used to categorize industries - their import-intensiveness in using raw materials. An import-intensive industry is not necessarily bad - or good - regardless of whether it produces for the domestic or the export market, unless one knows something about the resource cost of saving or earning foreign exchange in that industry - i.e. the relation between  $Y_i$  and  $\hat{Y}_i$ . Problems start to arise when protected industries are import-intensive in their use of raw materials - the more so when they receive protection for their output but import their raw materials duty-free. In effect, such industries are not making their profits (or, perhaps, even paying their wages) by adding value, but by a thinly disguised form of exchange rate arbitrage, buying at a low price of foreign exchange, selling at a high one. The dangers in such industries are that they produce strongly vested interests in both management and their labour force that prevent adoption of measures to reduce the difference between  $Y_i$  and  $\hat{Y}_i$  or to increase the use of locally produced intermediate products, i.e. extend import substitution "backward".<sup>15</sup>

15. An example may be helpful. Industry A uses all imported raw materials, imported duty free, which comprise  $\frac{2}{3}$  of the value of its output, which is all sold in the domestic market behind an nominal tariff of 20%. The ratio of imported inputs to domestic value added is 2/1; but the 20% tariff on output is cascaded into a rate of effective protection ( $U_e$ ) of fifty percent, so that the ratio of imported raw materials to foreign exchange saved is 4/1. Industry B uses all imported raw materials, imported duty free, which comprise  $\frac{2}{3}$  of the

#### CONCLUDING REMARKS

The purpose of this paper was to provide a modification to the "two-gap" models of trade and development that are being widely used by developing countries and international and bilateral lending agencies for planning and projection purposes. The basic two-gap model divides the economy into trade-improving sectors and non-traded sectors of the economy and examines the growth and balance of payments consequences of alternative allocations of investment between the sectors. In its careful formulations, the two-gap model is presented in such a manner that trade policy and price distortion are assumed not to be present. The careful formulations of the model also make it clear that the value of local currency is higher (i.e. the price of foreign exchange is lower) during the periods of large inflows of foreign capital than it will be when foreign resources are no longer available to finance the payments gap. The models also usually assume that the productivity of capital  $\sigma_1$  is lower in trade-improving sectors than it is in the production of non-tradeables - which is a major cause of the fact the balance of payments constraint on growth may be operative even after domestic saving could have been high enough to finance domestic investment.

Despite the careful formulation regarding the question of trade policy, the two-gap model has been applied in practice without taking into account the facts that there are systematic (and measurable) distortions in the prices in the economy, and, therefore, that there are systematic distortions in the measured macro-economic variables. It is these systematic distortions that the modifications in the present paper seek to take into account. In the present version of the model, the success in overcoming the balance of payments constraint depends not only on the percent of total investment that is allocated to the production of tradeables, but on the degree of protection that is operative over the planning period. The modification is one that is susceptible to measurement, and, indeed, the necessary data are available for a large number of countries and are being collected and analysed in a number of others.

It is highly likely, if not almost certain, that countries will continue to choose import tariffs as one of the policy measures to promote economic development. The systematic overstatement of the foreign exchange

15. (cont'd)

value of its output, which is sold domestically without tariff protection. The ratio of imported inputs to domestic value added is 3/1; it looks "less favourable" than industry A, until one finds that the ratio of imported inputs to foreign exchange saved in industry B is still only 3/1, which is more favourable than industry A.

saved by an investment program in protected import substitutes is a principal defect of the two-gap models. The modification here presents a method for correcting the defect and producing a more realistic means of projecting the balance of payments consequences of alternative levels and compositions of an investment budget.

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