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IMMISERIZING GROWTH AND ENDOGENOUS PROTECTION

By

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I. INTRODUCTION

This paper discusses how either physical or value-based quotas (rationed foreign exchange) used in developing countries as part of the trade regime affect the likelihood of immiserizing growth occurring in the two senses of Bhagwati (1958) and Johnson (1967). The former is where resource growth induces a deterioration in the terms of trade leaving the country worse off. The latter is where domestic distortions are present and unbalanced growth involving augmentation of the factor used intensively in the protected sector is welfare-worsening (even at fixed terms of trade).

We argue that the presence of such distortions tends to reduce the possibility of immiserizing growth occurring in the sense of Bhagwati (1958). This is because the *ad valorem* protective equivalents (quota premia) are endogenously determined for these forms of protection. A deterioration in the terms of trade induced by resource growth reduces premium values, which improves efficiency and offsets some of the loss from the terms of trade deterioration. Where rent seeking accompanies such quotas, these effects are larger.

In contrast, protection of this form tends to increase the probability that immiserization in the sense of Johnson (1967) will occur. This is because augmenting the factor used intensively in the protected sector draws resources away from the export sector, reduces export earnings, and increases *ad valorem* equivalents for endogenously determined protection. Endogenous protection thus has opposite effects on the probability that immiserizing growth in the two senses of Bhagwati and Johnson will occur.

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In the paper, we both present diagramatic arguments to support these contentions, and explore the strength of these effects using a numerical general equilibrium model of the Philippines due to Clarete and Roumasset (1987) which we have extended here to capture endogenous protection of the type we analyze diagrammatically. Numerical results from the model confirm the intuition given above for the role that endogenous protection plays in affecting both types of immiserization. They also suggest that influences from other domestic policies can be significant. Analysis of immiserizing growth which does not take into account the presence of quota trade-based and other domestic distortions can, therefore, be misleading.

II. ENDOGENOUS PROTECTION AND THE LIKELIHOOD OF IMMISERIZING GROWTH

Ever since Bhagwati's classic 1958 paper, the literature on immiserizing growth has continued to expand. It is now widely accepted that there are two different senses of immiserizing growth; the first as originally discussed by Bhagwati (1958); the second as set out in Johnson (1967).[1]

Bhagwati's original analysis showed that balanced growth in the economy can lead to a sufficiently large deterioration in the terms of trade that the economy is left worse off. In Johnson's analysis, no terms of trade effects come into play but unbalanced growth occurs. If this growth is concentrated on the factor used intensively in a tariff-protected sector, the efficiency cost of the tariff distortion is increased by the unbalanced growth, and this can more

[1] Bhagwati (1968) subsequently pointed out that these can, in principle, be combined into a single generalized concept.

than offset the direct benefits of factor growth. Here we investigate how the likelihood that each of these two forms of immiserization will occur is affected by the presence of trade policies which are part of a class we call "endogenous protection."

Endogenous protection refers to situations in which the *ad valorem* equivalent protection implied by a trade policy measure changes as endowments, technology or other policies change. One example is the practice of rationing foreign exchange in developing countries. What happens in this case is that exporters are required to surrender foreign exchange to the central bank at a fixed exchange rate, at which there is also excess demand for foreign exchange from importers. An implicit premium value associated with the scarce foreign exchange is established, effectively resulting in a two-tier exchange rate system for importers and exporters. When changes in endowments occur in the economy involving either balanced or unbalanced growth, the *ad valorem* equivalent protection operating against imports changes because the excess demand for foreign exchange is affected. If the premium associated with rationed foreign exchange changes as growth occurs, then the possibility that immiserizing growth will occur will be correspondingly affected.[2]

In the case of immiserizing growth in the sense of Bhagwati, the intuition is that as growth occurs and the terms of trade deteriorates, the demand for imports will fall, reducing excess demand for foreign exchange. This weakens the severity of foreign exchange rationing which also lowers the *ad valorem* equivalent protection implied by it. The likelihood of

[2] See the analyses of foreign exchange rationing in Dervis, de Melo and Robinson (1981) and Clarete and Whalley (1991).

immiserization occurring in the presence of endogenous protection would, therefore, seem to be lowered.

Bhagwati immiserizing growth in the with and without endogenous protection cases is illustrated by the two panels in Figure 1. In the case where no endogenous protection is present (Panel A), pre-growth equilibrium is characterized by production at point P and consumption at point C. The welfare level is U and the terms of trade are reflected in the world price line PC. Balanced growth implies a parallel shift of the production possibility curve from AA to $A'A'$, production moves from P to P', and consumption to C'. If the terms of trade also deteriorates along with the growth, as indicted by the new world price line $P'C'$, post-growth welfare is U' which is less than U. The terms of trade decline more than offsets the direct benefits of growth, and immiserization occurs.

Panel B indicates that if growth occurs when endogenous protection is present, the chance of immiserizing growth occurring is lower. In Panel B, initial equilibrium output, given that a trade-protective instrument is in place is at Q, and consumption is at D. The world price line is QD, while the domestic price line is the line tangent to the production possibility frontier at Q. The presence of protection is reflected in the difference between the slopes of these two price lines.

With balanced growth reflected in a parallel shift in the production possibilities frontier, production changes to Q', and consumption to D'. Reduced imports lower *ad valorem* equivalent protection as indicated by the smaller wedge between domestic prices (i.e. the price line tangent to D') and the world prices (e.g. the line through $D'Q'$). The welfare level is V' which is lower than V, again indicating immiserization. But the reduction of real income from

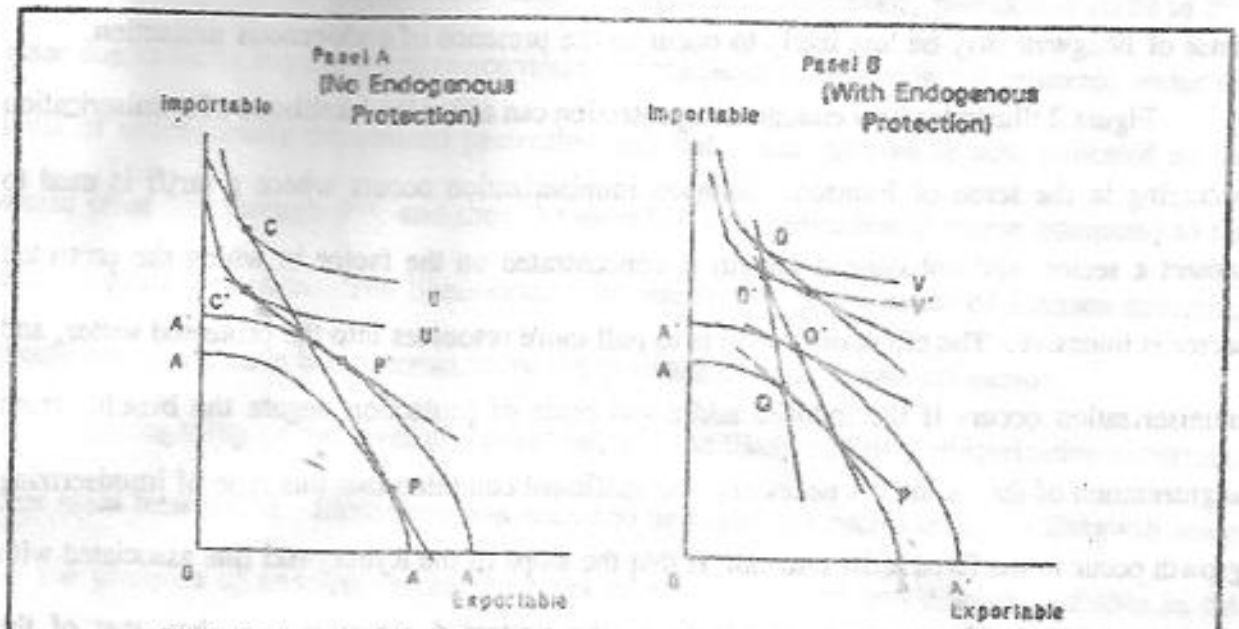

Figure 1. Immiserizing Growth in the sense of Bhagwati (Terms of Trade Change)

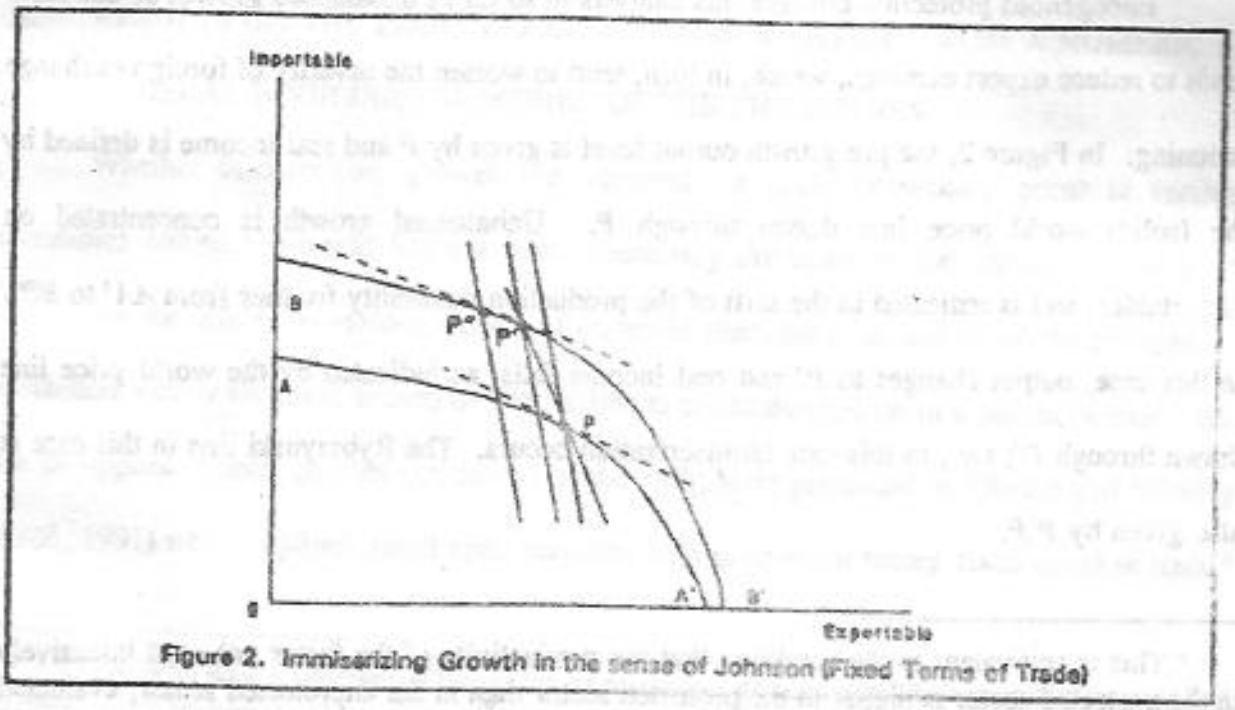

Figure 2. Immiserizing Growth in the sense of Johnson (Fixed Terms of Trade)

V to V' is less than that from U to U' in Panel A, suggesting that immiserizing growth in the sense of Bhagwati may be less likely to occur in the presence of endogenous protection.

Figure 2 illustrates how endogenous protection can affect the likelihood of immiserization occurring in the sense of Johnson. Johnson immiserization occurs where a tariff is used to protect a sector, and unbalanced growth is concentrated on the factor in which the protected sector is intensive. The effect of growth is to pull more resources into the protected sector, and immiserization occurs if the induced additional costs of protection negate the benefits from augmentation of the factor. A necessary and sufficient condition that this type of immiserizing growth occur in the fixed tariff rate case is that the slope of the Rybszynski line associated with the growth of the factor used intensively in the protected sector is less than that of the international price line (Bhagwati and Srinivasan (1983)).[3]

Endogenous protection changes this analysis in so far as unbalanced growth of this form tends to reduce export earnings, which, in turn, tend to worsen the severity of foreign exchange rationing. In Figure 2, the pre-growth output level is given by P and real income is defined by the (solid) world price line drawn through P. Unbalanced growth is concentrated on importables, and is indicated in the shift of the production possibility frontier from AA' to BB'. In this case, output changes to P' and real income falls, as indicated by the world price line drawn through P'; i.e., in this case immiserization occurs. The Rybszynski line in this case is also given by $P'P$.

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[3] This is equivalent to the condition that the productivity of the factor not used intensively in the protected sector is higher in the protected sector than in the unprotected sector, evaluated at world prices (Bertrand and Flatters (1971)), or the condition that the trade bias (i.e. the ratio of internal to external prices) is less than the ratio of the labor share in the exportable sector to the labor share in the protected import substituting sector (Martin (1977)).

If the level of protection is instead endogenously determined, production shifts to P'', since due to factor augmentation concentrated on the factor-intensive in the protected sector the level of endogenously determined protection will rise. Real income is now indicated by the world price line through P'', and thus the extent of immiserization is worse compared to the case of tariff protection. The likelihood of immiserization in the sense of Johnson occurring would seemingly have been increased by the presence of endogenous protection.

Endogeneity of the level of protection, and the likelihood of immiserization occurring, thus seem interrelated. Immiserization seems to be made less probable in the Bhagwati sense by the presence of endogeneity in the level of protection, and made more probable in the Johnson sense.

III. RESULTS ON THE LIKELIHOOD OF IMMISERIZATION FROM A NUMERICAL GENERAL EQUILIBRIUM MODEL OF THE PHILIPPINES

Whether immiserizing growth has occurred, or could potentially occur in various economies around the world has not been extensively discussed in the literature. Here we investigate the effects of various trade and domestic distortions, including of the endogenous protection variety we stress above, on the likelihood of immiserization in a particular case. We use an applied general equilibrium model of the Philippines presented in Clarete and Whalley (1988, 1991) which captures small open economy with production facing fixed terms of trade.[4]

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[4] There is by now a substantial literature on numerical general equilibrium modelling applied to developing countries, of which our particular model is but one. The early volume by Dervis, de Melo and Robinson (1982) sets out early applications, and more recent surveys by Robinson (1989a,b), and de Melo (1988) substantially update these. The majority of these models use a so-called "Armington" country qualitatively different good assumption unlike our model

Into this model both domestic distortions and trade policies are incorporated. In analyzing how the likelihood of Bhagwati or Johnson immiserization is affected by endogenous protection, various changes in factor endowments and the terms of trade are considered and corresponding counterfactual experiments conducted with the model.

Model Structure

Seven sectors, each producing a traded product, are specified in the model. Foreign and local goods are assumed to be identical, with excess demands of traded goods absorbed by the rest of the world. Each industry uses two variable factors (capital and labour), and an industry-specific fixed factor.[5] Production in each industry is described by a Leontief function defined over the its value-added and a Leontief composite of intermediate inputs. The arguments of each industry value-added function are the two variable factors, and a sector-specific factor.[6] Intermediate goods are used in fixed proportion to output. Since there are also non-traded goods in the model, their price relative to that of traded goods (the real exchange rate) has to be computed to obtain a general equilibrium in the model.

Domestic absorption of products in the model is reflected in the final demands of consumers. Each consumer has a Cobb-Douglas utility function and owns the domestic factors

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(although see de Melo (1978) for a further homogenous good treatment).

[5] The fixed factor in each industry production function precludes specialization effects occurring as can happen in homogeneous good trade models (see the discussion of this in Shoven and Whalley (1989)).

[6] A reason for using Cobb-Douglas functions is that the share parameter on the sector-specific factor can be directly related to industry supply elasticities (see Clarete and Whalley (1988, 1991) for more details).

identified in the model. Incomes of consumers are derived from factor payments to resource owners and lump-sum income transfers from the government. Government income is derived from tax revenues and rents from quantitative and value-based import restrictions (i.e., licences are assumed to be auctioned, and receipts are used to finance both transfers and real expenditures by government).

The model incorporates a number of domestic and trade-related policy distortions; quantitative import restrictions, foreign exchange rationing, trade taxes, rent seeking, and a fixed urban wage (and associated urban-rural migration as in Harris and Todaro (1971)). The presence of some of these features reflects earlier applications of the model. Trade taxes including import tariffs and export taxes are modelled in *ad valorem* form and are applied to the international value of imports and exports. Revenues collected from these are transferred back to consumers.

The model treatment of quantitative import restrictions implies that the domestic price of importables is endogenously determined, as is also the case with non-traded goods. Domestic prices for quota-restricted importables adjust until domestic output plus quota-restricted imports equal domestic demands. The government sells import licences to importers, with a licence required to import a unit of any good subject to quantitative restrictions. The price of the import licence represents the scarcity premium associated with the import quota (Clarete and Whalley (1988)). The scarcity premium associated with the quantitative import restriction constitutes an element of the endogenously determined protection in the model.

The model also incorporates foreign exchange rationing, reflecting the pursuit of a fixed exchange rate but with non-accommodative domestic monetary policy. A monetized extension

of the model is used with a fixed domestic money supply, and a simple Cambridge equation of exchange; i.e., money is held solely for final demand transactions (Clarete and Whalley (1991)).[7]

Under this treatment, the government announces a fixed exchange rate at which exporters must surrender all foreign exchange earnings to the central bank. The government then auctions off foreign exchange licences to importers since there is an excess demand for foreign exchange at the official exchange rate. The scarcity premium associated with the shortage of foreign exchange operates akin to a trade-restricting measure and is another element of endogenous protection for local producers in the model. Unlike import licencing, this applies equally to all sectors. The income from auctioning foreign exchange licences is assumed to be transferred back to consumers in lump-sum manner as with commodity-specific quotas.

We also consider rent-seeking along with licencing in an extended version of the model. The treatment assumed is that import licences and foreign exchange are provided to importers at cost (i.e., without the premium). This induces agents to allocate resources to seek out access to import licences and foreign exchange from the government (Krueger (1972); Bhagwati (1982)). Under competitive rent-seeking, the rents which would otherwise accrue to recipients of licences are thus completely dissipated in resource costs devoted to rent-seeking. The proportion of each factor used in rent seeking is assumed to reflect the relative economy-wide endowments of each factor input (Hamilton, Mohammed and Whalley (1984)).

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[7] The difference from the earlier formulation due to Dervis et al. (1981) is the explicit incorporation of a monetary specification, and the associated non-neutrality of monetary policy given the fixed nominal exchange rate.

Economic and policy data for the Philippines in 1988 are used to implement the model; a fuller description of this data set is available in Clarete and Whalley (1991). Following standard practice with numerical general equilibrium modelling, the model is first calibrated to a benchmark equilibrium data set (see Mansur and Whalley (1984)), with counterfactual equilibrium analysis performed around this. Here we highlight the main features of the calibrated model.

The seven traded goods sectors of the model are crops, livestock and natural resources, milling, other processed agricultural products, manufacturing, other industries, and services. The first three are exportables while the remaining four are importables. There are eleven consumers in the model grouped according to their respective incomes. Information about the distribution of resources among the eleven consumers is obtained from Habito (1984).

Premium values associated with quantitative import restrictions are obtained from Clarete (1989) who derives estimates from price comparisons. The premium value associated with foreign exchange rationing is assumed to be 20 percent. The model features three indirect taxes; the import tariff, excise tax, and the value-added tax; and two direct taxes, personal and corporate income taxes.

Different versions of the model are used in analyzing possibilities for immiserization. The simplest model variant incorporates only tax distortions. A further variant includes both tax distortions and quantitative import restrictions. Yet a further variant includes tax distortions and foreign exchange rationing. And a final model variant includes all distortions for these model variant which include quotas and foreign exchange rationing. There are also model

subvariants where quotas and/or rationed foreign exchange is present which include competitive rent-seeking activity.

Model Results

We have made a number of calculations with the models described above using Philippine data for 1988 which allow us to analyze how endogenous protection and other distortions affect the likelihood of immiserization occurring in the senses of Bhagwati and Johnson.

In Table 1, we analyze immiserization in the Bhagwati sense, reporting results from an assumed 20 percent deterioration in the Philippines terms of trade for a variety of model variants. Across the variants, we make different assumptions as to which policies are present in the model as the terms of trade declines. In all cases, the sum of Hicksian equivalent income variations across households in the model is reported as both the welfare criterion of any economy-wide real income gain or loss and the measure. This is calculated as a percent of base-period income in each of the model variants considered.

Results in Table 1 support the arguments made earlier in this paper; namely, that in the presence of endogenous protection, a secondary benefit is induced by a terms-of-trade deterioration which partially offsets the welfare cost of the deterioration and hence makes immiserization less likely to occur. As we stress above, the way this arises is that as the terms of trade declines, the demand for imports falls and hence the endogenous protection associated with both foreign exchange and import rationing falls. The effect is to reallocate resources to export sectors and improve efficiency.

Table 1

Welfare Costs of a 20% Terms-of-Trade Deterioration in the Presence of Different Combinations of Trade and Domestic Distortions

(1978 Philippine Hicksian equivalent variations as a percent of base-period income)

Combinations of Trade and Domestic Distortions Present in the Model	Welfare Cost as a % of 1978 Base-Period Income
All distortions present	2.37
No distortions present	5.77
All distortions present except export taxes	1.48
All distortions present except tariffs present	2.34
All distortions present except tariffs & export taxes	2.14
All distortions present except import quotas	2.37
All distortions present except import quotas & trade taxes	2.37
All distortions present except foreign exchange rationing	1.96
All distortions present except rent seeking	3.60
All distortions present except urban-rural migration	2.24
No distortions present	5.77

Hence, in Table 1 welfare goes down by 2.37 percent relative to the base-period equilibrium due to the lowered terms of trade when all distortions are present in the model. In contrast, when all distortions are removed before the terms of trade decline is considered, the same terms of trade deterioration imposes a welfare cost of 5.77 percent of base-period income. When tariffs are excluded, the terms of trade decline reduces welfare by 2.34 percent, but when both tariffs and export taxes are absent, the percent fall in welfare is only 2.14 percent. A regime without export taxes has the smallest welfare loss from a lowered terms of trade (1.48 percent), and removing foreign exchange rationing generates a welfare cost of only 1.96 percent. There is no incremental benefit if tariffs are removed, because protection through tariffs is redundant due to the presence of foreign exchange rationing. Other results (not reported in Table 1 due to space constraints) also show that when the Philippine terms of trade is 20 percent lower the welfare gains of removing distortions tend to be smaller. This is consistent with our argument above. Removing all distortions, for instance, implies efficiency gains equal to 8.05 percent compared to 11.96 percent of income under the benchmark terms of trade case.

We also use the model to determine the terms-of-trade deterioration required to offset resource growth and assess whether this is greater or smaller than without distortions being present. These experiments indicate how endogenous protection affects the probability of Johnson immiserization occurring. Table 2 shows the welfare effects of a 3 percent growth of resources for four different cases: (i) Case A involves growth in all resources (capital, labour, and sector-specific factors); (ii) Case B considers growth of only capital and labour; (iii) Case C considers growth only of labour; and (iv) Case D growth of capital. Along with factor growth

Table 2

Welfare Effects of 3 Percent Resource Growth and Terms of Trade Changes Needed to Offset the Benefits from Growth

(1978 Philippine Hicksian equivalent variations as a percentage of base period income; lower case numbers in parentheses give terms of trade deterioration needed to offset the effects of growth)

	Factor Growth Assumptions[1]			
Distortions Present	A	B	C	D
All Distortions Present[2]	3.00 (-23.08)	0.13 (-1.19)	-0.283 (2.56)	-0.76[3] (7.35)
No Distortions Present	3.00 (-9.99)	1.05 (-3.57)	0.72 (-2.44)	0.33 (-1.12)
Tariffs	3.00 (-10.47)	1.05 (-3.71)	0.73 (-2.53)	0.32 (-1.16)
Foreign Exchange Rationing	3.00 (-13.42)	0.53 (-2.51)	0.17 (-0.76)	-0.31 (1.47)
Fixed Urban-Rural Wage Differential	3.00 (-10.01)	1.06 (-3.57)	0.73 (-2.48)	0.33 (-1.12)

Notes:

1. Cases of resource growth are: A - 3 percent growth of capital, labour, and all sector specific factors; B - 3 percent growth of capital and labour; C - 3 percent growth of labour; and D - 3 percent growth of capital.

   Upper level numbers are Hicksian equivalent income variation in percent of base case income associated with growth; lower level numbers in parentheses are percent change in the terms of trade which fully offset resource growth.

2. Distortions include: export taxes, tariffs, import quotas, fixed exchange rate, rent seeking, and a fixed urban-rural wage differential.

3. A reversal in the pattern of trade occurs with growth in this case.

in these cases, equal percent increases are allowed for in the money supply, and the import quotas.

We consider five variations on the policy mix assumed to be present. These are: all distortions present; no distortions present; tariffs present; foreign exchange rationing present; and a fixed urban wage. In each of these calculations we make the economy just as well off as before the growth occurred. We do this by calculating a post-growth equilibrium at fixed terms of trade, and then iteratively adjusting the terms of trade fall required to offset the effects of growth. We thus change the terms of trade and recompute equilibria in each case until a zero welfare effect is obtained. The upper level numbers reported in Table 2 are Hicksian equivalent variations as a percent of benchmark income; the lower level numbers in parentheses give the percentage changes in the terms of trade needed to offset the effects of growth.

Three percent growth in all factors results in a 3 percent improvement in welfare, as shown by the results under Case A of Table 3. However, a larger deterioration in the terms of trade is required to offset this growth in resources when the economy has rather than does not have distortions (-23.08 percent versus -9.99 percent). A similar pattern is obtained for policy regimes with tariffs and rationed foreign exchange (-10.47 percent and -13.42 percent).

These results clearly indicate that the decline in the terms of trade needed to offset growth has to be larger when endogenous protection exists, because of the induced secondary benefit from a lower terms of trade. The implication is that Bhagwati immiserizing growth is less likely when such distortions are present since induced trade liberalization serves to dampen the welfare costs of the terms of trade deterioration.

The welfare gains reported in Table 2 also follow a general declining pattern moving from Cases A through D, because growth is concentrated on progressively smaller factor bases. However, the occurrence of immiserizing growth becomes increasingly frequent as growth becomes unbalanced in favour of the protected sectors. Thus, under Case D where capital grows by 3 percent and foreign exchange rationing occurs, we obtain a result showing immiserizing growth (-0.31 percent). Immiserizing growth is also obtained when all distortions are present and either labour or capital is increased by 3 percent (-0.28 percent and -0.76 percent, respectively for Case C and Case D). The explanation for this is that as growth occurs and real income increases, the demand for imports also expands, tightening the rationing process in foreign exchange. This, in turn, heightens the level of protection, increasing inefficiency in the economy. Thus, as we argue earlier, immiserizing growth in the sense of Johnson is more likely if levels of protection are endogenously determined due to physical or foreign exchange quotas.

IV. SUMMARY AND CONCLUDING REMARKS

This paper focuses on immiserizing growth in the two senses of Bhagwati (1958) and Johnson (1967), and how the probability that either may occur can be affected by the presence of endogenous protection; i.e., quota and other forms of protection for which the *ad valorem* equivalent level of protection is endogeously determined.

We use a general equilibrium model of the Philippines due to Clarete (1986) to compute counterfactual equilibria involving changes in domestic policies, terms of trade, and resource endowments. When distortions include endogenous protection in the form of import or foreign exchange rationing, results indicate that a terms of trade decline is accompanied by a reduction

in the level of protection through quota or foreign exchange premia. This secondary benefit (or induced trade liberalization) tends to make immiserizing growth in the sense of Bhagwati less likely because the terms of trade fall required to offset the growth of resources has to be significantly larger than if no distortions were in the model. However, the induced changes in protection work in the opposite way when immiserization in the sense of Johnson is considered. As unbalanced growth occurs focused on the factor intensive in the protected sector, resources are drawn out of the export sector and export earnings decline and, if the level of protection is endogenously determined, the welfare costs of protection increase. Thus, immiserizing growth in the sense of Johnson tends to be more likely if endogenous protection of the type we discuss is present.

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