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How Does Industrial Protection Affect the Agricultural Sector? A Quantitative General Equilibrium Analysis for Peninsular Malaysia*

by

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Abstract

This paper investigates quantitatively the effects of trade policy on agriculture in the empirical context of Peninsular Malaysia using a SAM-based multi-sectoral, general equilibrium model. The focus of the analysis is on the economy-wide implications of changes in tariffs on import-substituting manufacturing activities. In general, the results bear out the expectation that industrial protection distorts incentives favoring manufacturing and nontradable activities over agriculture as a whole. Whereas this result is familiar from other recent studies, the general-equilibrium approach allows many additional disaggregate findings. Industrial protection in Malaysia taxes, e.g., not all agricultural sectors. The rubber sector is discriminated by tariff protection for manufacturing, but the oil palm sector is favored due to strong forward linkages to the protected industries.

I. Introduction

Since production sectors compete for limited resources any policy directed towards agriculture inevitably affects other parts of the economy. Conversely, measures to promote and protect other sectors can severely hamper agricultural development. It is therefore necessary to examine agricultural incentives by considering also the indirect impact of economy-wide policies rather than concentrating on the effects of sector-specific policies on particular agricultural activities [World Bank (1986), Valdés (1986)]. Within the recent literature on agricultural protection, authors have become increasingly aware of the importance of non-agricultural policies for agricultural incentives. On the basis of very different methodologies, it has been derived that industrial protection in developing countries taxes agriculture. A variety of country studies has been based on the concept of effective protection within a partial equilibrium framework. They showed that industrial protection policy increases the input costs of agricultural activities, thereby reducing effective protection below nominal protection [e.g. Reca (1980) on Argentina; Cuddihy (1980) on Egypt; Gotsch and Brown (1980) on Pakistan; Bertrand (1980) on Thailand and Bovet and Unnevehr (1981) on Togo][1].

Another branch of the literature applied the true-protection concept. This concept relies on a three-sector model with importables, nontradables and exportables as introduced by Dornbusch (1974) and extended by Sjaastad (1980)[2]. The true-protection studies, mostly done at IFPRI, suggest that trade and exchange rate policies in developing countries favor the manufacturing sector and place a heavy burden on agricultural exports [e.g. García (1981) on Colombia; Oyejide (1986) on Nigeria and Bautista (1987) on the Philippines]. Another important contribution comes from the World Bank's project on "The Political Economy of Agricultural Pricing Policies"[3]. A methodology was introduced there which allows for a direct comparison of the impacts of indirect and direct agricultural policies for agricultural incentives. A significant and surprising result of this project is that indirect effects dominate the direct effects in most developing countries [Schiff (1988) and Krueger, Schiff and Valdés (1988)].

This paper looks at similar questions like the above-mentioned studies but in a different methodological framework. A Computable General Equilibrium (CGE) model is used to analyze quantitatively for one particular country, namely Peninsular Malaysia, the effects on agriculture and other sectors of increasing protection in import-substituting manufacturing. The general equilibrium framework makes it possible to explicitly capture all the major linkages between agriculture and the rest of the economy which are the driving forces behind the intersectoral allocation effects. It will be shown that interindustry linkages, exchange rate revaluation and factor price effects are crucial in determining the final resource pull effects of protection policies. Missing anyone of these effects can lead to misleading conclusions and wrong or inadequate policy recommendations.

The most important differences between the CGE approach and the former models are the following:

1. The CGE model used in this study is Walrasian. It simulates the functioning of the Peninsular Malaysian economy by explicitly capturing the behavior of the various agents (households, firms, government, rest of the world), the institutional framework (fiscal system and transfer mechanisms), and the market clearing processes (price and quantity). As a result, the analysis is structural as opposed to the reduced form analysis applied in the true-protection studies and in the World Bank project.

2. Whereas the World Bank studies also analyze protection granted to value added, the true-protection studies rely on the three sector model for final goods. These models neglect interindustry linkages. Yet, as will be shown, interindustry linkages are important transmission mechanisms for "shifting" the burden of taxation. Moreover, it is difficult or even impossible to disentangle the substitution effects determining the "incidence" or "shift" parameter estimated in these studies.

3. The earlier studies assume small open countries which produce and consume importables, exportables and nontradable home goods with the prices of tradables fully determined by trade policy. By contrast, in the CGE model used in this study, imports and exports are viewed as imperfect substitutes for domestically and foreign produced goods, respectively. Such product differentiation permits "cross hauling" and provides some autonomy to the domestic price system not found in the models mentioned above [de Melo and Robinson (1985)][4].

Since this study is devoted to a calculation of the probable impacts of changes in the protective system in Peninsular Malaysia, we have tried to be as realistic as possible in designing an analytical scheme that can fit the available data, and give policy-relevant information. As a result, besides distortions in product markets, factor price differentials observed in the base year are taken as representative of differentials due to policy imposed distortions on labor and capital markets. These requisites also lead us to set up the data for accounting consistency in a Social Accounting Matrix (SAM), and to calibrate the "empirical" model so as to exactly reproduce the base year data observation as an equilibrium solution[5]. Generally, the magnitude of economy-wide effects is gauged by comparing output changes with changes of different prices obtained as a solution of the changed policy regime. In order to allow comparisons with other studies on the subject the analysis is conducted both at an 11 sector and a 4 sector level of aggregation[6].

The remainder of this paper is organized as follows. Section II introduces the analytical model used. The discussion is organized in terms of modules, or model components. In Section III, the most important structural characteristics of the Peninsular Malaysian economy are discussed first. Subsequently, general equilibrium analysis is applied to identify factors which account for structural changes to take place. Finally, in Section IV, major results are summarized and conclusions for further research are drawn.

II. The General Equilibrium Model on Malaysia

Because the focus is on agriculture, the multi-sectoral, general equilibrium model gives emphasis to agricultural activities and their linkages to other production sectors. Eleven sectors are distinguished, five agricultural sectors, five industrial sectors and one service sector. A sectoral distinction is made between an aggregate sector "Food Crops" and two major export-crops sectors, "Rubber" and "Oil Palm". The other agricultural sectors are "Fishing" and "Forestry". Another primary producing sector is "Mining". "Light Manufacturing" is separated from "Other Manufacturing" owing to the strong direct backward (forward) linkages to agricultural production of the former (latter) sector [see Appendix Table A4]. Two of the individual sectors - "Utilities" and "Construction" - produce pure nontradables[7].

A SAM for 1970, the base period of the study, has been constructed that integrates national income, input-output, flow-of-funds and balance-of-payments current accounts into a comprehensive and consistent data set. The SAM and its components are presented in Appendix Tables A1 to A4. It is assumed to represent the initial (benchmark) equilibrium position of the Peninsular Malaysian economy and provides numerical values to several parameters of the analytical model[8].

The analytical model used belongs to a class of planning models developed by Dervis, de Melo and Robinson (1982) which focus on issues of foreign trade. A formal statement of the model is presented in Appendix Table B1, whereas Appendix Table B2 defines the variables and parameters. The number of endogenous variables in the model is $21n + kn + 2k + 5$, which is one less than the number of equations. Only relative prices and other variables in the real sphere of the economy are determined. A price normalization rule, represented in equation (5), fixes the absolute price level and hence reduces the number of independent equations. Sectoral prices, as well as the wage and exchange rate, are therefore defined relative to an aggregate price level.

Other salient features of the model structure are the following:

1. Given its emphasis on trade policy, an important feature of the model is that foreign and domestically produced goods are assumed to be imperfect substitutes. Although the model retains the standard small country assumption, trade policy will have much less effect on domestic prices with product differentiation than in the standard model of international trade. By allowing different degrees of tradability, the model provides a much more realistic framework for analyzing issues of trade policy than models that only allow imports to be either perfect substitutes or perfect complements to domestically produced goods. In order to distinguish between domestic goods and foreign goods a composite commodity is defined that is a Constant Elasticity of Substitution (CES) aggregation of imports and domestic goods [Armington (1969)]. Domestic consumers and producers demand this composite commodity so that the demands for imports and domestic tradable goods become derived demands similar to the derived demand for factors in producer theory. We assume that demanders seek to minimize the cost of acquiring a given amount of the composite goods. Thus, the ratio of imports to the domestic good is derived from first-order conditions and is a function of the relative prices of the domestic good and the imported substitute. These assumptions about import behavior are contained in equations (1), (3), (12) and (25). On the export side, product differentiation between domestic tradables and imperfect foreign substitutes is reflected in a downward-sloping foreign demand curve for exports. Exports of tradables depend on the world price of domestically produced tradables relative to the exogenous world price of imperfect foreign substitutes. This specification is contained in equations (2) and (11).

2. For each market captured in the CGE model supply and demand conditions are formulated explicitly. For the product markets production technology is represented by Cobb-Douglas functions for capital and labor and fixed coefficients for intermediate inputs. A sectoral Cobb-Douglas aggregation function for rural and urban labor is assumed. Profit-maximizing behavior of producers determines labor demand while intersectoral wage differentials (γ_{ik}) are fixed, as observed in the base period. We further depart from neoclassical assumptions by fixing the sectoral capital stock; once installed it is not freely mobile across sectors in the short-run. Total supply of both types of labor is exogenously given and their wage rate is determined through market clearing. These assumption about product supply and factor markets are contained in equations (6) to (10).

3. For each product market, the model specifies all categories of demand, namely intermediate demand, private consumption, government consumption, investment, and exports [equations (11), (19)-(26)]. Intermediate demand by domestic producers for the composite commodities is given by fixed input-coefficients albeit substitution is possible among the components of composite goods. Sectoral consumption and investment demand are given by constant expenditure proportions. For private consumption, demands are derived from Cobb-Douglas utility functions, implying unitary income and uncompensated own-price elasticities and zero cross-price elasticities. These assumptions are restrictive (Shoven and Whalley 1984) because they rule out substitution possibilities in private consumption. However, they facilitate the interpretation of results, since the elasticity of private final demand due to a policy-induced change in the sectoral composite price is the same across all sectors. Moreover, the effects of trade policy on the factoral distribution of income are not permitted to feed back through the demand system because all consumers have the same demand system.

4. Savings of households, companies and government are each a fixed proportion of disposable income. Foreign savings are regarded as exogenous. Investment is determined endogenously by total savings. Each sector demands investment goods according to exogenously specified sectoral share parameters Inventories are a fixed proportion of sectoral supply [equations (14)-(20)].

5. Supply and demand on product markets yield a set of simultaneous market clearing equations [equation (27)], the solution of which provide market clearing relative prices. Finally, the price-sensitive import and export flows, along with exogenous capital inflows, yield the market-clearing condition for foreign exchange [equation (13)]. This condition provides the additional equation needed to solve for the exchange rate.

6. A model solution represents a short-run equilibrium position for the economy which depends on the exogenous variables, the behavior of the various agents and the market-clearing mechanisms.

III. Effects of Increased Industrial Protection

The model outlined above is the basis for the analysis of increased industrial protection reported in this section. The analysis consists of examining the impact on resource allocation of a doubling of tariffs on "Light Manufacturing" and "Other Manufacturing". The impact of general equilibrium effects is measured by comparing the changes in sectoral output with the changes of different domestic price vectors obtained as a counterfactual equilibrium. The analysis is conducted at an 11 and a 4 sector level of aggregation. In the aggregated version, "Export Crops" include "Rubber" and "Oil Palm". "Food Crops" is the same as at the disaggregated level. "Nontradables" comprise "Utilities" and "Construction". All remaining sectors are lumped together into "Other Tradables". This aggregation allows us to compare our results with those obtained in the studies of the true-protection type.

In investigating the economy-wide effects of industrial protection, an initial situation of static equilibrium for the Peninsular Malaysian economy is assumed, which replicates the observed conditions in 1970 exactly, i.e. the model equations are satisfied[9].

Sectoral Characteristics of the Peninsular Malaysian Economy

The data base is presented in Appendix Tables A1 to A4. Table 1 provides a summary of the most important structural features of the economy together with the crucial elasticities for determining the results of policy simulations. Columns (1) and (2) describe the structure of production across sectors[10]. The structure of gross outputs reveals a typical composition of output found in a semi-industrial country where agriculture and services still provide more than 50 percent of gross domestic production. Within the manufacturing sector, the traditional non-durable food and basic consumer goods industries dominate. The importance of intermediate inputs for each sector is

Table 1: Structure of the Peninsular Malaysian Economy in the Base Solution[a]

Sector	XD (1)	PN (2)	TM (3)	E/XD (4)	M/X (5)	V_m/V (6)	β (7)	ε^s (8)	ε^d (9)	σ (10)	η (11)
11 Sector Aggregation Level											
1. Rubber	10.72	66.1	0.00	70.6	7.1	16.3	0.96	1.75	0.00	1.5	2.0
2. Oil Palm	1.72	85.4	0.00	32.8	0.0	42.8	0.98	0.43	-0.14	-	2.0
3. Food Crops	6.52	77.0	8.35	2.9	16.4	36.3	0.96	1.27	-0.40	3.0	2.0
4. Fishery	1.73	88.4	11.11	10.6	0.1	41.3	0.91	0.30	-0.71	3.0	2.0
5. Forestry	1.51	75.2	4.55	23.5	2.2	36.1	0.86	0.97	-0.14	1.5	2.0
6. Mining	5.28	63.1	0.43	13.3	20.4	27.4	0.82	1.29	0.00	0.7	2.0
7. Light Mfg.	21.03	17.5	23.12	42.7	40.9	23.1	0.49	1.33	-0.70	2.0	3.0
8. Other Mfg.	9.75	29.5	9.71	20.3	58.9	40.6	0.34	1.37	-0.33	1.5	3.0
9. Utilities	1.73	66.3	0.00	0.0	0.0	30.5	0.46	0.80	-	-	-
10. Construction	6.28	35.3	0.00	0.0	0.0	37.0	0.44	0.96	-	-	-
11. Services	33.75	69.9	0.00	6.8	6.7	21.8	0.47	2.03	-0.75	2.0	3.0
4 Sector Aggregation Level											
1. Export Crops	12.44	68.8	0.00	65.3	5.3	23.0					
2. Food Crops	6.52	77.0	8.35	2.9	16.4	36.3					
3. Other Tradables	73.03	49.5	13.16	19.8	28.1	27.4					
4. Nontradables	8.01	42.0	0.00	0.0	0.0	35.6					
Sum/Average	100.00	52.2	12.78	22.8	31.6	28.5					

[a]XD = Sectoral composition of gross domestic output; PN = Sectoral value-added as a percentage of domestic price; TM = Import tariff rate (%); E/XD = Exports as a percentage of domestic output; M/X = Imports as a percentage of absorption; V_m/V = Share of imported intermediate inputs in total intermediate inputs (%); β = Composite labor elasticity with respect to rural labor; ε^s = Price elasticity of output supply; ε^d = Own-price elasticity of composite demand; σ = Trade substitution elasticity; η = Price elasticity of export demand.

Source: (1)-(5),(8) calculated from Appendix Tables A2-A4; (6) and (7) calculated from Table 4.1 and Table 4.11 in Pyatt and Round (1984), (9) estimated on the basis of import-demand elasticities given in Stern, Francis and Schumacher (1976); (10) taken from Ahluwalia and Lysy (1983).

indicated by the per-unit value added in column (2). High value-added ratios in the agricultural sectors indicate small backward linkages. Contrarily, the manufacturing sectors exhibit the lowest value-added ratios suggesting high backward linkages[11].

Column (3) indicates the percent ad valorem tariff structure. As can be seen, no sector enjoys a nominal tariff rate higher than 25%. This implies that nominal protection was rather low in 1970 by international standards and tariffs were mainly a revenue-raising instrument. In the policy simulation below, we double nominal tariffs on sectors 7 and 8, "Light Manufacturing" and "Other Manufacturing".

The next three columns provide information about each sector's trade orientation. Column (4) indicates that 7 out of the 9 tradables-producing sectors export more than 10 percent of their output, with "Rubber" and "Light Manufacturing" being the most export-oriented sectors in the economy. These export ratios are quite high, and reflect a country that has followed an outward-looking development strategy. On the import side, the typical picture emerges when one considers both the share of imports in domestic absorption (which indicates the degree of import "orientation") and the share of imported intermediate inputs in total intermediate inputs (which indicates the degree of import "dependence"). Food crops, mining and the manufacturing sectors are the most import-oriented sectors and all sectors are highly import-dependent. Utilities and construction are the only non-traded sectors, yet 31 and 37 percent of sectoral inputs are imported.

The last five columns give the crucial elasticities for determining the results of policy simulations generated by the model. Because production technology for sectoral value added is modeled by two-level Cobb-Douglas production functions, the share observations obtained in the benchmark equilibrium data set provide us with a set of labor demand and output supply elasticities[12]. Given this technology specification, price elasticities of supply are the highest in labor-intensive sectors with a large share of labor value added in total value added. Column (9) indicates the share of final demand in sectoral absorption and therefore gives an approximation of the price elasticity of demand. Thus, composite good price elasticities of demand are absolutely highest for sectors with close proximity to final demand. The foreign trade elasticities given in the last two columns roughly capture the extent of product differentiation due to differences in quality and degree of product homogeneity. Thus, sectors with a high share of intermediate demand and investment demand are seen to be the least homogeneous products with limited substitutability. On the other hand, agricultural products along with the more traditional non-durable consumer goods are close substitutes for imports. Rubber imports consist mainly of synthetic rubber needed in rubber processing activities and are less substitutable. Finally, the export demand elasticities in Column (10) reflect the ease with which foreign users can substitute domestic products. Here, primary products are more substitutable than manufactures and services.

Industrial Protection, Domestic Price System and Resource Allocation

We can now use our fully specified numerical model to examine the effects of a doubling of tariffs in manufacturing. Because we are primarily interested in the impact on agriculture, emphasis will be given to a discussion on how and why individual agricultural sectors are affected differently.

Rising tariffs on manufactured imports increase the difference between the domestic price of imports and domestically produced substitutes. This will induce domestic users to change their composition of the composite good, thereby increasing demand on the domestically produced substitute and causing upward pressure on the domestic price of manufactures. The resulting change in domestic prices depends on the cross-price elasticity of demand for the domestic good, which itself depends on the price elasticity of demand for the composite good and the elasticity of substitution in use between the domestically produced and foreign goods. Increasing tariffs on manufactures will, ceteris paribus, lead to a large increase in demand for the domestically produced substitutes

- if it is easy to substitute them for imports (as indicated by high substitution elasticities);
- if the sectoral import share is large (implying relatively large demand increases for the domestic product in order to compensate for relatively small reductions in imports);
- if the demand for the composite good is relatively inelastic with respect to the composite price (reflecting the importance of these goods as intermediates in domestic production).

Moreover, the extent of the increase in the domestic price also depends on production characteristics as indicated by the elasticity of domestic supply. Low supply elasticities imply large increases of the domestic price in the case of small shifts of the demand curve. Finally, export demand is also important when there is a change in the tariff rate, especially when the export share is large. The higher the elasticity of export demand, the smaller will be the domestic price change resulting from the tariff increase. The tariff increase will lead to a fall in exports as domestic output is withdrawn from foreign markets towards domestic use. The easier this substitution process, the smaller will be the price increase.

Returning to Table 1, from the demand characteristics of the regulated markets one would expect large price increases for both "Light Manufacturing" and "Other Manufacturing" in response to increasing tariffs. Both sectors exhibit high substitution elasticities, large import shares, and low composite good demand elasticities. Together, these characteristics imply large shifts of the domestic demand towards domestically produced goods. However, price increases are limited by adjustments in export demand. For a given supply for domestic use, increasing domestic demand leads to a rise in domestic price, which has a secondary repercussion on the demand for exports. At a fixed exchange rate exports will fall as export prices rise. This leads to an outward shift of the supply curve of the domestic good for domestic use following the decline in demand for exports. As a result, the net effect of a tariff on the domestic price will be less than it would have been if there had been no feedback via the demand for exports.

These are the direct effects determining the initial domestic output price response in the regulated markets. In order to estimate the final resource shifts in the economy, we must also take into account the economy-wide effects:

1. There are the effects on intermediate input costs. Other things equal, those sectors having strong backward linkages to manufacturing are penalized the most, whereas strong forward linkages stimulate production. As can be seen from the input coefficients, secondary inputs are not very important in any of the agricultural sectors. Yet, around 75% of agricultural imports stem from manufacturing. Obviously, industrial protection will not affect agricultural input costs dramatically. It can be expected that changes in output prices correspond to changes in net prices. Or, in other words, nominal protection is nearly identical with effective protection. Forward linkages to manufacturing are strong for "Palm Oil" and "Food Crops" as indicated by the share of intermediate demand in gross domestic production in connection with the input coefficients. This means that the policy-induced expansion of manufacturing would stimulate the production of these two sectors. Note that in case of substantial intrasectoral purchases it may well turn out that net prices of protected sectors fall. This result corresponds to the case where a sector has a negative effective rate of protection because the weighted sum of tariffs on intermediates exceeds protection afforded to the final commodity.

2. There is an exchange rate effect. An increase in tariffs will induce a shift of demand towards domestically produced tradables and nontradables. Because increasing tariffs will lead to an increase in the absolute price of home goods, the price

of tradables must fall if the overall price index is to remain at its predetermined value. The larger the weight of home goods in the commodity basket defining the price level (normalization rule), the larger must be the decline in the price of tradables and therefore the appreciation. In the tariff simulation, the Malaysian Dollar appreciates by 25.7%.

3. There is a strong wage effect that will have a differential impact across sectors. Due to tariff protection, the average wage increases by 13.2% with rural and urban wage rates increasing by 8.2% and 17.9%, respectively. This is because additional industrial protection has a strong impact on economic structure. In general, protection increases domestic wages. Protected and nontradeables producing sectors benefit from industrial protection. Since these sectors are very intensive in the use of urban labor, the urban wage rate rises the most. Rural labor which is intensively used in the primary producing sectors is attracted into manufacturing and nontradables sectors, thereby increasing rural wage rates. The rural-urban migration is reinforced by a higher tariff protection for industrial goods.

4. There are income effects associated with changes in the foreign terms of trade. The doubling of tariffs on manufactured imports improves the terms of trade by 27.6%.

These effects are reflected in Table 2 which reports on sectoral resource allocation of increased industrial protection with sectoral capital stock fixed; it may be viewed as the short-run response of the economy to forced industrial import substitution.

In general, the resulting resource allocation bears out the expectation that industrial protection

- produces large indirect effects, and that the changes in relative prices create significant incentives to alter resource allocation in the economy;
- discriminates against tradables and favors the nontradable goods producing sectors.

Table 2: Resource Pull Effects of Increased Tariffs on Manufactured Products in Peninsular Malaysia[a]

Sector	$\hat{XD}$ (1)	Rank	$\hat{PD}$ (2)	Rank	$\hat{PN}$ (3)	Rank	$\hat{W}$ (4)	PN/W (5)	Rank	$\hat{P}$ (6)
11 Sector Aggregation Level										
1. Rubber	-2.4	7	3.1	7	4.5	8	5.8	-1.3	7	0.5
2. Oil Palm	5.6	2	16.3	1	18.5	2	5.5	13.0	2	16.3
3. Food Crops	-9.1	10	-2.1	11	-1.4	10	5.8	-7.2	10	-7.8
4. Fishery	1.5	5	11.3	3	11.4	6	6.4	5.0	3	11.2
5. Forestry	-3.2	9	4.9	6	3.7	9	7.0	-3.3	9	3.6
6. Mining	-11.6	11	1.2	9	-1.6	11	7.4	-9.0	11	-5.7
7. Light Mfg.	-2.9	8	0.9	10	9.7	7	11.9	-2.2	8	-6.3
8. Other Mfg.	3.2	4	2.2	8	16.3	3	14.0	2.3	4	-11.3
9. Utilities	0.8	6	9.5	5	13.3	5	12.3	1.0	6	9.5
10. Construction	17.2	1	10.3	4	30.5	1	12.6	17.9	1	10.3
11. Services	3.6	3	12.3	2	14.0	4	12.2	1.8	5	9.5
4 Sector Aggregation Level										
1. Export Crops	-1.3	3	4.9	3	8.1	3	5.7	2.4	3	4.6
2. Food Crops	-9.1	4	-2.1	4	-1.4	4	5.8	-7.2	4	-7.8
3. Other Tradables	0.4	2	6.2	2	16.0	2	11.5	4.5	2	-2.6
4. Nontradables	13.7	1	10.1	1	27.1	1	12.6	14.5	1	10.0

[a] Percentage changes over initial solution; XD is the gross domestic production, PD the domestic output price and PN the net price; w stands for the wage rate and P for the composite good price.

Source: Own computations.

This is illustrated best at the four sector level of aggregation. The main agricultural sectors "Export Crops" and "Food Crops" contract by 1.3% and 9.1% respectively, while "Other Tradables" and "Nontradables" increase their production by 0.4% and 13.7%. These results correspond with the findings reached for other countries in the true-protection studies.

A more differentiated picture emerges when we turn to an examination of the resource pulls at the eleven sector aggregation level. As can be seen, the expansion of "Nontradables" is mainly attributable to an increase in "Construction", which benefits the most from the indirect effects of protection. On the other hand "Mining" is seen to be the most heavily penalized sector. In agriculture, "Rubber", "Food Crops", and "Forestry" are discriminated while "Palm Oil" and "Fishery" benefit from indirect effects of industrial protection. From the different results obtained for agricultural sectors we can conclude that a separation of agriculture into export-oriented and import-competing sectors - both of which are discriminated by industrial protection - is too simple and obscures the structural characteristics which determine the final incentives or disincentives brought about by industrial protection.

Perhaps the most surprising finding at the disaggregated level pertains to the magnitude of the economy-wide effects. As can be seen, even in the two manufacturing sectors where the intent was to protect commodities, the negative effect of general equilibrium repercussions is large enough to provide a significant offset to it, and in "Light Manufacturing" to lead to negative overall protection.

What then determines the final impact on resource allocation of industrial protection? In order to provide an answer to this question suppose first, we wish to predict output response to changes in tariffs on the basis of price information. Furthermore, suppose we carried out our general equilibrium analysis at the four sector level of aggregation. In that case, if we are interested in the change of the production structure, it makes no difference whether we consider interindustry linkages and/or factor price effects in the analysis or not. As can be seen in the lower panel of Table 2 the rankings of sectors according to different prices are identical. Moreover, these rankings are identical with the ranking of sectors by output changes implying that we can use any ranking of price changes to predict output changes. This is not the case if we move to an examination of price and resource pull effects at the eleven sector aggregation level given in the upper panel of Table 2. Starting with the domestic output prices, one can check by comparing columns (1) and (2), whether prices and outputs have the same sign. They do only in seven of the eleven sectors; in four instances output declines despite increasing prices. In this case, it is necessary to examine the change in net prices which includes changes in intermediate input costs. Turning to a comparison of the direction of per-unit value added [column (3)] and output changes the price change of one more sector ("Mining") corresponds with output response.

It is interesting to note that the structure of output and net price changes in agriculture is nearly the same. This result can be explained by the low input requirements in each of these sectors. All agricultural sectors (except "Forestry") benefit in the same manner from the appreciation of the Malaysian Dollar which decreases input costs thereby increasing net effective protection over net nominal protection. With regard to the other sectors there is no clear pattern. The mining sector is seen to be heavily penalized by increasing input costs. It has strong backward linkages to the manufacturing and home good sectors, the output prices of which increase strongly. "Light Manufacturing", "Other Manufacturing" and "Construction" benefit the most from the appreciation of the domestic currency. All three sectors are highly input-intensive and exhibit high shares of imported intermediate inputs in total intermediate inputs. Consequently, the lowering of the exchange rate drastically decreases input costs in these sectors.

Including indirect effects brought about by interindustry linkages drastically changes the ranking of sectors if compared with the ranking by output price changes. However, the ranking by net price changes still differs from the ranking by output changes. One can, therefore, conclude that both output price changes and net price changes are no good indicators of resource pulls in general equilibrium - even if the exchange rate revaluation is taken into account. As can be seen by comparing columns (3) and (5), factor price effects are substantial and outweigh product price effects in three sectors. In contrast to the results suggested by a highly aggregated analysis, all identified economy-wide effects are important in determining the final resource allocation if sectors are disaggregated.

The necessity of including factor price effects is best illustrated in the case of rubber. Being highly export-oriented the possibility for shifting increasing costs to the domestic and foreign users are limited. Consequently, sharp rises in wages induced by outmigration increase the cost of rubber planting which is very labor-intensive. On the contrary, oil palm is not imported to Peninsular Malaysia, implying that there is no price competition through import substitutes. Increases in production costs brought about by rising wages can be passed on to the users of oil palm. The output of the food crops sector diminishes despite economy-wide increasing wages. Since we assumed the same representative demand system with fixed consumption shares for all households we would expect rising domestic prices for food crops with increasing demand. But since domestically produced food crops are easy to substitute by imports and the Malaysian dollar appreciates drastically, demand shifts to imports, thereby reducing the domestic price. Additionally, the sector is further discriminated by wage effects.

IV. Summary and Conclusions

This paper has addressed specific questions within the much broader discussion on the discrimination of agriculture in developing countries. The short-run impact of increasing industrial protection on resource allocation in Peninsular Malaysia was analyzed numerically using a computable general equilibrium model featuring product differentiation between domestically and foreign produced goods. The analysis was carried out on an 11-sector and a 4-sector level of aggregation. In the disaggregated version emphasis is given to agricultural activities. The aggregated analysis allows comparisons with the results obtained by true-protection studies which rely on the 3-sector model of Dornbusch (1974):

1. Industrial protection, besides direct effects, induces general equilibrium repercussions which have large indirect effects on the protected and other sectors. Generally, industrial protection discriminates against the agricultural sector as a whole and stimulates the production of manufactures and nontradables. Although the effects are weaker with product differentiation this general pattern is conform with recent results of true-protection studies and within the World Bank's project on "The Political Economy of Agricultural Pricing Policies".

2. The benefit of structural analysis as opposed to reduced form analysis becomes apparent when turning to a more disaggregated level of analysis since individual indirect effects have a differential impact across sectors. Most important are exchange rate and factor price effects.

3. Nontradables expand the most because of the exchange rate appreciation. Whereas the output price of nontradables is not affected by the revaluation of the Malaysian dollar, the appreciation lowers input costs drastically, thereby increasing net effective protection of nontradables. "Mining" is

the sector which is most heavily penalized by rising input costs and higher wages. As an energy-intensive sector with high backward linkages to utilities, it suffers the most from the real-exchange-rate appreciation.

4. Within agriculture, palm oil benefits from import protection for manufactured goods. This is due to linkages to the protected industrial sectors and from being not substitutable in domestic use. Rubber, which is highly export-oriented, suffers from the decline in exports induced by the appreciation of the domestic currency and the dominating factor-price effect. Food crops are easy to substitute by imports and, therefore, their production is discriminated by the exchange-rate effect.

The results point to the importance of economic structure in determining the final resource allocation effects of industrial import-substitution. It will be a task for future research to extend the findings of this paper:

1. As Chenery and Duloy (1974) point out, the structure of the model used and the parameter estimates are crucial determinants of the resource allocation effects generated by model simulations. In order to keep the analysis simple, we introduced specific assumptions on production technology, the labor market, the income distribution and redistribution process and on consumption behavior. These assumptions were relatively restrictive. It will be a task for the future to relax some of these assumptions and to model economic behavior and the institutional framework in more detail. More specifically, we will describe production technology by Constant Elasticity of Substitution functions and private consumption by the Linear Expenditure System.

2. The analysis is restricted to Peninsular Malaysia. It will be a task for the nearest future to extend it to Malaysia, including the states of Sabah and Sarawak.

3. Due to data limitations, the 1970 input-output table for Peninsular Malaysia was used. As Malaysia is a rather rapidly changing economy, it seems necessary for future research to work with a more recent input-output table as soon as it becomes available. Otherwise, a RAS procedure [Bacharach (1970)] could be applied in order to update the input-output table.

4. It is planned to further disaggregate the agricultural sector, e.g. to separate paddy and cocoa from other food crops. Increasingly serious constraints on new land development will heighten the competition for land among crops, and the relative incentives afforded to the cultivation of each crop will be a crucial determinant of future land use. This is particularly true for paddy cultivation, as all present indications are that areas where rice is mainly a subsistence crop have little economic potential for paddy production. The question is whether to continue subsidization of inefficient farmers or to allow market forces and incentives to move them into higher valued crops or occupations. Cocoa, on the other hand, is a rapidly growing sector with considerable potential as an export earner and its cultivation is planned on a large scale. It therefore seems necessary to break down "Food Crops".

5. The numerical investigation concentrates on the short-run allocation effects with fixed sectoral capital stocks. However, one cannot deduce Malaysia's comparative advantage on the basis of this information alone, since comparative advantage refers to the long-run when all factors of production are mobile between sectors. The static model should be extended to a dynamic model in order to capture the long-run allocation effects.

Notes

1 The methodology on which the countries studies are based is described, reviewed and evaluated in Scandizzo and Bruce (1980). Important contributions on the measurement of protection include Balassa and Associates (1971) and Corden (1971).

2 The methodology is described, evaluated and compared with the effective protection approach in Greenaway and Milner (1987).

3 Descriptions and first results on the comparative study, which encompasses 18 country studies are provided by Krueger (1988), Krueger, Schiff and Valdés (1988) and Schiff (1988). The country reports by Jansen (1988) and Avillez, Finan and Josling (1988) analyze in detail the impact on agriculture of sector-specific and economy-wide policies in Zambia and Portugal, respectively.

4 More recently Greenaway and Milner (1988) extended the "true protection" concept by including intra-industry trade.

5 Among others, Pyatt and Thorbecke (1976) point out that for the numerical specification of a macroeconomic model, a SAM provides a useful vehicle for organizing data of different origin. See King (1981) for an introduction into SAMs. Note, that the benchmark solution is a second-best solution due to the product and factor market distortions. While such a representation may be questionable, it has the empirical advantage in that the reference solution from the model is close to the observed allocation in the base year.

6 Note that there is no full comparability with commodity-oriented studies, since we converted the Peninsular Malaysian input-output table (which follows SNA recommendations) into a symmetric industry x industry format [Wiebelt (1980a)] using the market share and industry technology assumptions [Bulmer-Thomas (1982)]. This prevented us from adjusting the import matrix (and value added) which can only be done by assuming a common technology across countries for each sector. Such an assumption is typically unrealistic. It also rules out the presence of two-way trade which is observable even at the most narrowly defined SITC level. We prefer to work with an industry x industry table and interprete differences in the structure of the import matrix and the domestic absorption matrix as well as the presence of two-way trade as a result of product differentiation abroad and at home.

7 The Malaysian input-output table reports low exports of utilities (1.2 Mio. M$), which we combined with services. To keep the account balances, we assumed these sales were produced totally by capital. We therefore reduced capital value added of utilities by the amount transferred to services, and increased the value added produced in services by an equal amount.

8 See Shoven and Whalley (1984) and Mansur and Whalley (1984) for a description of the calibration procedure. A critical comment on calibration is provided by Lau (1984). The construction of a consistent data base (like a SAM) for numerical general equilibrium analysis is described by St. Hilaire and Whalley (1983).

9 1970 was a fairly typical year in Peninsular Malaysia. This year provides a natural starting point for investigating increased industrial protection because at that time Malaysia had completed a "natural" import-substitution phase and policy makers had to decide whether to rely on "forced" import substitution with high tariff walls or export promotion for the future.

10 Agriculture accounts for roughly 30 percent of GDP at factor costs. The sectoral composition of GDP at factor costs can be computed as $XD_i\ PN_i/52.2$, where 52.2 is the average per-unit value added.

11 Of course, value-added ratios and input coefficients only measure direct backward linkages and take no account of the indirect effects induced if an investment goes ahead. To measure the full impact of interindustry linkages requires solving the simple open Leontief model. See Bulmer-Thomas (1982) for an excellent treatment of linkage analysis. However, indirect effects are not limited to interindustry linkages. Increased production leads to increases in income, which in turn lead to increases in demand and subsequent increases in production. For Peninsular Malaysia, Wiebelt (1988b) estimated Keynesian type SAM multipliers and contrasted them with multipliers derived from the open Leontief model.

12 See Mansur and Whalley (1984). Of course, Cobb-Douglas functions are limited in their capability for describing production technology in all sectors included in the model. For example, short-run supply elasticities for rubber estimated by Tan (1984) with a Wickens and Greenfield (1973) model range from 0.3 for estates to 0.7 for smallholders. Supply elasticities for manufacturing were estimated by Hoffmann and Tan (1980).

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Appendix

Table A1: Social Accounting Matrix for Peninsular Malaysia, 1970 (Mio. M$)

Expenditures / Receipts	Activities 1	Commodities 2	Labor 3	Capital 4	Sum (3-4) 5	Urban Workers 6	Rural Workers 7	Companies 8	Government 9	Urban Workers 10	Rural Workers 11	Capitalists 12	Sum (10-12) 13	Capital Account 14	Rest of the World 15	Totals 16
1. Activities	0.00	13674.66	0.00	0.00	0.00	0.00	0.00	0.00	-290.94	0.00	0.00	0.00	0.00	0.00	4331.59	17715.31
2. Commodities	7888.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1741.99	2356.23	2261.52	1731.43	6349.19	2015.21	0.00	17995.25
Factors																
3. Labor	5390.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5390.16
4. Capital	3647.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3647.85
5. Sum (3-4)	9038.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9038.01
Institutions																
6. Urban Workers	0.00	0.00	2742.51	0.00	2742.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2742.51
7. Rural Workers	0.00	0.00	2647.64	0.00	2647.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2647.64
8. Companies	0.00	0.00	0.00	3647.85	3647.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-527.30	3120.82
9. Government	788.45	469.76	0.00	0.00	0.00	0.00	0.00	828.67	0.00	68.14	65.40	50.07	183.60	0.00	0.00	2270.48
Households																
10. Urban Workers	0.00	0.00	0.00	0.00	0.00	2742.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.00	2758.51
11. Rural Workers	0.00	0.00	0.00	0.00	0.00	0.00	2647.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2647.64
12. Capitalists	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2027.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2027.04
13. Sum (10-12)	0.00	0.00	0.00	0.00	0.00	2742.51	2647.04	2027.04	0.00	0.00	0.00	0.00	0.00	0.00	16.00	7433.19
14. Capital Account	0.00	0.00	0.00	0.00	0.00	0.00	0.00	205.12	819.42	334.14	320.72	245.54	900.40	0.00	30.29	2015.21
15. Rest of the World	0.00	3850.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3850.85
16. Totals	17715.31	17995.25	5390.16	3647.85	9038.01	2742.51	2647.64	3120.82	2270.48	2758.51	2647.64	2027.04	7433.19	2015.21	3850.85	68859.29

Source: Computed from Department of Statistics, Malaysia (1975).

Table A2: Domestic Physical Material Balances for Peninsular Malaysia, 1970 (Mio. M$)

Sector	XD	VD	CD	GD	ZD	ZD_2	ED
11 Sector Aggregation Level							
1. Rubber	1898.60	419.73	0.00	0.00	85.40	53.52	1339.90
2. Oil Palm	305.20	102.18	25.54	0.00	67.90	9.52	100.06
3. Food Crop	1154.30	647.97	452.99	0.00	1.91	18.01	33.40
4. Fishery	306.10	79.31	194.39	0.00	0.00	0.00	32.40
5. Forestry	266.82	173.71	29.48	0.00	0.00	0.92	62.71
6. Mining	935.56	800.01	2.14	0.00	0.00	9.23	124.17
7. Light Mfg.	3726.30	798.40	1242.34	0.00	22.14	73.57	1589.90
8. Other Mfg.	1726.70	758.66	343.78	0.00	237.40	35.92	350.95
9. Utilities	305.00	209.55	95.45	0.00	0.00	0.00	0.00
10. Construction	1109.50	387.78	0.00	0.00	721.73	0.00	0.00
11. Services	5981.30	1404.97	2353.19	1625.74	189.10	1.14	407.18
4 Sector Aggregation Level							
1. Export Crops	2203.80	521.91	25.54	0.00	153.30	63.03	1439.96
2. Food Crops	1154.30	647.97	452.99	0.00	1.91	18.01	33.40
3. Other Tradables	12942.78	4015.05	4165.32	1625.74	448.64	120.78	2567.31
4. Nontradables	1414.50	597.33	95.45	0.00	721.73	0.00	0.00
Sum	17715.38	5782.27	4739.30	1625.74	1325.57	201.82	4040.67

Notes: XD = Gross domestic output
VD = Intermediate demand by sector of origin
CD = Private consumption demand
GD = Government consumption demand
ZD = Investment demand by sector of origin
ZD_2 = Inventory investment
Ed = Export demand

Source: Computed from Department of Statistics, Malaysia (1975).

Table A3: Composite Nominal Material Balances for Peninsular Malaysia, 1970 (Mio. M$)

Sector	PX	PV	PC	PG	PZ	PZ2
11 Sector Aggregation Level						
1. Rubber	601.60	451.96	0.00	0.00	91.95	57.62
2. Oil Palm	205.14	102.18	25.54	0.00	67.90	9.52
3. Food Crop	1340.29	774.79	541.65	0.00	2.28	21.54
4. Fishery	274.70	79.60	195.10	0.00	0.00	0.00
5. Forestry	208.71	177.63	30.14	0.00	0.00	0.94
6. Mining	1010.49	1005.18	2.69	0.00	0.00	11.60
7. Light Mfg.	3613.88	1350.55	2101.52	0.00	37.44	124.45
8. Other Mfg.	3344.26	1844.20	835.68	0.00	577.09	87.31
9. Utilities	305.00	209.55	95.45	0.00	0.00	0.00
10. Construction	1109.50	387.77	0.00	0.00	721.72	0.00
11. Services	5972.70	1505.43	2521.46	1741.99	202.62	1.22
4 Sector Aggregation Level						
1. Export Crops	806.74	554.14	25.54	0.00	159.85	67.14
2. Food Crops	1340.29	774.79	541.65	0.00	2.28	21.54
3. Other Tradables	14433.74	5962.59	5686.59	1741.99	817.15	225.52
4. Nontradables	1414.49	597.33	95.45	0.00	721.72	0.00
Sum	17995.26	7888.85	6349.23	1741.99	1701.01	314.20

Notes: PX = Value of the composite good
PV = Value of intermediate demand
PC = Value of private consumption
PZ = Value of fixed investment demand
PZ2 = Value of inventory demand

Source: Computed from Department of Statistics, Malaysia (1975).

Table A4: Input-Output Coefficients for Peninsular Malaysia, 1970

Sector	1	2	3	4	5	6	7	8	9	10	11
1. Rubber	0.2269	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0121	0.0000	0.0000	0.0000
2. Palm Oil	0.0000	0.0008	0.0047	0.0000	0.0000	0.0000	0.0251	0.0006	0.0000	0.0000	0.0003
3. Food Crops	0.0000	0.0000	0.0094	0.0004	0.0000	0.0000	0.1951	0.0004	0.0000	0.0000	0.0060
4. Fishery	0.0000	0.0000	0.0000	0.0003	0.0000	0.0000	0.0164	0.0000	0.0000	0.0000	0.0031
5. Forestry	0.0009	0.0000	0.0001	0.0000	0.0190	0.0054	0.0384	0.0065	0.0000	0.0100	0.0000
6. Mining	0.0007	0.0020	0.0043	0.0000	0.0000	0.0047	0.2265	0.0730	0.0000	0.0210	0.0001
7. Light Mfg.	0.0031	0.0043	0.1430	0.0271	0.0016	0.0161	0.1804	0.0806	0.0090	0.1564	0.0279
8. Other Mfg.	0.0591	0.0989	0.0341	0.0590	0.0638	0.0878	0.0466	0.3248	0.1623	0.2784	0.0756
9. Utilities	0.0037	0.0049	0.0007	0.0000	0.0000	0.0547	0.0055	0.0135	0.0619	0.0019	0.0141
10. Construction	0.0037	0.0036	0.0001	0.0000	0.0000	0.0000	0.0001	0.0000	0.0489	0.0799	0.0461
11. Services	0.0403	0.0316	0.0328	0.0291	0.0276	0.0634	0.0676	0.0952	0.0550	0.0991	0.1275
Sum	0.3385	0.1461	0.2293	0.1160	0.1121	0.2322	0.8019	0.6065	0.3370	0.6466	0.3007

Source: Computed from Department of Statistics, Malaysia (1975).

Table B1: Model Equations

		No. of Equations
I. Prices		
(1)	$PM_i = \bar{PW}_i (1+tm_i) R$	n
(2)	$PE_i = PD_i / [(1+te_i) R]$	n
(3)	$P_i = 1/\bar{F}_i [\delta_i^{\sigma_i} PM_i^{(1-\sigma_i)} + (1-\delta_i)^{\sigma_i} PD_i^{(1-\sigma_i)}]^{\frac{1}{1-\sigma_i}}$	n
(4)	$PN_i = PD_i - \Sigma_j a_{ij} P_j - td_i PD_i$	n
(5)	$\bar{P} = \Sigma_i \Omega_i P_i$	1
II. Production, Employment, and Wage Rates		
(6)	$XS_i = \bar{A}_i \bar{K}_i^{(1-\alpha_i)} L_i^{\alpha_i}$	n
(7)	$L_i = \bar{B}_i L_{Ri}^{\beta_i} L_{Ui}^{(1-\beta_i)}$	n
(8)	$\gamma_{ki} W_k = (1-tv_i) PN_i (\partial XS_i / \partial L_{ki})$; $k = R,U$	kn
(9)	$LD_k = \Sigma_i L_{ki}$	k
(10)	$LD_k - \bar{LS}_k = 0$	k
III. Foreign Trade		
(11)	$E_i = \bar{E}_i (\pi_i / PE_i)^{\eta_i}$	n
(12)	$M_i = [\delta_i / (1-\delta_i)]^{\sigma_i} (PD_i / PM_i)^{\sigma_i} D_i$	n
(13)	$\Sigma_i \bar{PW}_i M_i - \Sigma_i PE_i E_i - \bar{F} = 0$	1

Table cont.

IV. Income, Savings, and Investment			
(14) Y_k	=	$(1-t_k)[\Sigma_i\, w_k\, L_{ki} + \bar{F}_{1k}\, R]; \quad k = R,U$	k
(15) Y_K	=	$(1-t_K)\ \Sigma_i[PN_i\, X_i - \Sigma_k\, w_k\, L_{ki} + \bar{F}_{2K}\ R]$	1
(16) Y_G	=	$\sum_k\ t_k\, Y_k/(1-t_k) + t_K\, Y_K/(1-t_K)$	
		$+ \Sigma_i\ tm_i\ \bar{\bar{PW}}_i\ R\, M_i - \Sigma_i\ te_i\ PE_i\ R\, E_i$	
		$+ \Sigma_i\ td_i\ PD_i\ XS_i + \Sigma_i\ tv_i\ PN_i\ XS_i$	1
(17) S	=	$\Sigma_k\, s_k\, Y_k + s_K\, Y_K + s_G\, Y_G + \bar{F}_3\, R$	1
(18) I_i	=	$\theta_i\ S$	n
(19) Z_i	=	$\Sigma_j\ b_{ij}\ I_j$	n
(20) $Z2_i$	=	$Z_i\ XS_i$	n
V. Sectoral Demand and Product Markets			
(21) V_i	=	$\Sigma_j\ a_{ij}\ X_j$	n
(22) C_i	=	$\Sigma_k\ C_{ik} + C_{iK} + C_{iG}$	n
(23) C_{ij}	=	$q_{ij}(1-s_j)Y_j/P_i \qquad j = k,\ K,\ G$	4n
(24) D_i	=	$d_i\,(V_i+C_i+Z_i+Z2_i)$	n
(25) d_i	=	$1/f_i(M_i/D_i,\ 1)$	n
(26) XD_i	=	$D_i + E_i$	n
(27) $XD_i - XS_i = 0$			n

Total: 21n + kn + 3k + 5

Notes: Endogenous variables are denoted by capital letters; lower case letters, Greek letter, and letters with a bar are exogenous variables or parameters. In equation (25) f_i denotes the CES trade aggregation function for imports and domestically produced substitutes.

Table B2: Definition of Variables and Parameters

Endogenous Variables			No. of Variables
PM_i	=	domestic price of imports	n
R	=	exchange rate (M$/US$)	1
PE_i	=	world price of exports	n
PD_i	=	price of domestic products	n
P_i	=	price of composite goods	n
PN_i	=	net price or unit value added	n
XS_i	=	sectoral production	n
L_i	=	aggregated sectoral employment	n
L_{ki}	=	labor of category k in sector i	kn
W_k	=	average wage of labor category k	k
LD_k	=	total demand for labor category k	k
E_i	=	sectoral exports	n
M_i	=	sectoral imports	n
D_i	=	domestic demand	n
Y_k	=	disposable income of labor households	k
Y_K	=	disposable income of capitalist household	1
Y_G	=	government revenues net of export subsidies	1
S	=	total investment	1
I_i	=	investment by sector of destination	n
Z_i	=	investment by sector of origin	n
$Z2_i$	=	inventories	n
V_i	=	intermediate demand	n
C_i	=	sectoral consumption demand	n
C_{ij}	=	consumption by category of consumer	4n
d_i	=	domestic demand ratio	n
XD_i	=	total demand for sectoral domestic production	n
		Total:	21n + kn + 3k + 4

Table cont.

Exogenous Variables and Parameters		
$\bar{PW}_i$	=	world price of imports
$\bar{P}$	=	exogenous level of aggregate price index
π_i	=	exogenous world price of other-country goods
$\bar{LS}_k$	=	exogenous labor supply for category k
$\bar{A}_i$	=	productivity parameter in Cobb-Douglas production function
$\bar{F}_i$, $\bar{B}_i$	=	scale parameter in CES trade aggregation or Cobb-Douglas labor aggregation functions
$\bar{K}_i$	=	exogenous sectoral capital stock
$\bar{F}$	=	exogenous net inflow of foreign exchange = $\bar{F}_{1k} + \bar{F}_{2K} + \bar{F}_3$
td_i	=	indirect tax rate
tv_i	=	value added tax rate
tm_i	=	tariff rate
te_i	=	export subsidy rate
t_k, t_K	=	direct tax rates on institutional income
s_k, s_K, s_G	=	institutional savings rates
θ_i	=	sectoral investment allocation shares
b_{ij}	=	capital composition coefficients
a_{ij}	=	input-output coefficients
q_{ij}	=	expenditure shares
Ω_i	=	price index weights
δ_i	=	distribution parameters in trade aggregation function
$f_i(\cdot)$	=	CES trade aggregation function
σ_i	=	trade substitution elasticity
α_i	=	output elasticity with respect to composite labor
β_i	=	composite labor elasticity with respect to rural labor
η_i	=	price elasticity of export demand