Dutch Disease in a Developing Country: The Case of Foreign Capital Inflows to Sri Lanka

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Several attempts have been made in recent years to investigate the Dutch disease type effects arising from windfall gains in Developing countries (LDCs) by using the traditional Australian Dutch disease model. This paper is another such attempt to examine the Dutch disease type consequences of foreign capital inflows to Sri Lanka within an ceonomy-wide framework. The results of our study show that this traditional model does not adequately address the impact of windfall gains on the economic structure of LDCs. Therefore, some modifications to the traditional model are needed to explain Dutch disease type consequences in these countries. (*JEL* Classification: C68)

I. Introduction

While most of the literature on the "Dutch disease" refers to developed countries some attempts have been made in recent years to investigate the Dutch disease type effects arising from windfall gains in developing countries (LDCs). Despite the fact that the results of the majority of these recent studies support the hypothesis that a commodity boom or foreign capital inflows may cause traditional Dutch disease type effects in those countries (e.g. Michaely 1981; van Wijnbeggen 1985; White 1992), some studies (such as Benjamin et al. 1989 and Fordmanesh 1991) suggest that one of the standard Dutch

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disease results can be reversed (i.e., not all traded sectors will contract) when certain features of developing countries, particularly the imperfect substitutability between domestic and imported goods, are considered. According to the findings of Benjamin et al. (1989), some tradable sectors may expand output even with a boom and agricultural export sectors may be severely affected in LDCs. Further, in contrast to the "core" model of Dutch disease economics, the manufacturing sectors in most developing oil-exporting countries expanded (following the oil boom of the 1970s) while the agriculturai-traded goods sectors contracted (World Bank 1984). Clearly, these issues merit further analysis.

The purpose of this study is to investigate these issues further by using evidence from another developing country. In this study, we not only consider the imperfect substitutability between domestic and imported goods but also other structural characteristics of LDCs such as the inelastic supply of tree crop exports in many LDCs. The remainder of this paper is arranged as follows. Section II provides a brief introduction to Dutch disease economies and summarizes the main features of the traditional model. Section III explains why the case of foreign capital inflows to Sri Lanka is suitable for a case study and also provides background information. Section IV develops and presents the theoretical structure of the CGE model applied to Sri Lanka. The results of the main simulations are discussed in Section V, and the final section contains conclusions of the study.

II. The Core Model of "Dutch Disease" Economics

Many economies, including both developed and developing economies, have been subjected to severe external shocks as a result of changes in prices or the availability of natural resources during the 1970s and 1980s. A large body of both theoretical and empirical literature analysis these shocks and the nature and consequences of the adjustment policies followed by various countries. This includes the body of literature which has come to be known as the "Dutch disease" economics literature (e.g., Corden and Neary 1982; Corden 1984; Neary and Wijnbergen 1986). The Dutch disease literature provides a useful framework for analyzing the real effects of such shocks.

Corden (1984) provides a lucid survey of Dutch disease economics with extensive references. The Dutch-disease type consequences have been analyzed by Corden and others with a three-sector model, known as the "core model". In this model, three sectors are defined: (i) the

"booming" sector, which could be the oil sector or any other primary exporting sector during a period of increasing prices, exploitation of a major resource discovery, or cost-reducing technological changes; (ii) the other tradables, or "lagging" sector, which includes other exports and import-competing industries; and (iii) the non-tradable sector, which includes services, utilities, transportation and so on. According to the core model, possible reasons for the Dutch disease type effects are: (i) an improvement in the technology of the booming sector; (ii) a discovery of new resources or foreign capital inflows; and (iii) an increase in the price of the export commodity.

A common feature of the so-called core model of this literature is a distinction between two separate effects of a boom—the *spending effects* and the *resource movement* effects. A boom increases domestic income leading to extra spending on both tradable and non-tradable goods. Since, for a small country, the price of tradables is determined in the world market, extra expenditure does not cause the price of tradables to increase. However, it raises the price of non-tradable goods, which are determined in the domestic market. Therefore, the price of non-tradables relative to tradables (i.e., the real exchange rate) tends to increase. Higher relative prices of non-tradables make the production of these more attractive, discouraging the production of tradables. This is the spending effect. When a boom is generated by a favorable price rise or new resource discovery, mobile factors may be drawn directly out of other sectors as their factor prices are bid up in line with increases in their marginal products in the booming sector. To the extent that a mobile factor (say, labor) is used in the production of the expanding nontraded goods industry, its price, too can rise. This is the resource movement effect. Both effects can adversely affect the competing tradable sectors giving rise to the so-called "deindustrialization" effect. Capital inflows can create similar effects (though, of course, the resource movement effects are exerted through the expanding non-tradable sectors).

The core model is based on the experiences of developed countries such as Holland and Australia. As mentioned in the introdution, recently attempts have been made to apply the same model to LDCs using different models including computable general equilibrium (CGE) models (see Bandara 1991a for a survey). A CGE model can easily be developed to reflect the basic structure of the core model of Dutch disease economics for a developing economy. This has been clearly demonstrated in some recent studies (e.g. Benjamin et al. 1989;

Bandara 1991b). In Section IV such a model for the Sri Lankan economy has been developed which can be used to examine the effects of foreign capital inflows to Sri Lanka. The next section provides a background to Sri Lanka's case for Dutch disease type effects.

III. Sri Lanka as a Case For Dutch Disease Type Consequences

According to the World Bank classification, Sri Lanka is considered as a non-oil exporting, low income, less developed country. Its per capita income was $US 354 in 1986. Rice, tea, rubber and coconut are the major agricultural crops in the economy. Tea, rubber and coconut—the main plantation crops—are perennial with long gestation periods. This means that their supply elasticities are low. The production of tea and rubber is mainly for export while coconuts are important in domestic consumption as well as exports. Rice production is for domestic consumption; Sri Lanka has been a rice importer for the past century.

At the time of independence in 1948, the economy was dominated by the plantation agricultural sector. This sector's share in GDP was about 30 per cent while the services sector was also dependent on plantation crops. The "domestic" agriculture and industrial sectors were relatively small in the immediate post-independent period. Changes in the structure of production are presented in Table 1. By the early 1980s the share of export agriculture in GDP declined from about 30 per cent during 1950-54 to 10 per cent, while the share of domestic agriculture exceeded that of export agriculture. The main contributing factor for this decline was import substitution in domestic food production, agriculture and manufacturing (Athukorala 1981). The agricultural sector was affected by the anti-export bias implicit in the import-substitution strategy which was in place from the early-1960s. The continuing fear of nationalization during the post-independence period and mismanagement in the public owned plantation sector after its partial nationalization during 1972-75, also contributed to the decline of the agricultural export sector. The share of the industrial sector was around 10 per cent of GDP up until the mid-1960s. However, it expanded to about 25 per cent by 1983-86. The share of the services sector in GDP gradually increased until 1977 and thereafter expanded dramatically following the 1977 policy reform (Table 1).

Sri Lanka provides an ideal case for further study of Dutch disease economics in LDCs as the economy experienced massive capital inflows

TABLE 1
GROSS DOMESTIC PRODUCT OF SRI LANKA*

Sector	1950-54	1955-59	1960-64	1965-69	1970-77	1978-83	1984-86
Agriculture	46.6	45.5	46.1	41.4	36.8	24.8	25.5
	(3.9)	(2.5)	(2.5)	(2.4)	(2.1)	(4.1)	(5.7)
Of which:							
Export Agriculture (including processing)	29.8	27.7	26.7	22.7	17.0	10.2	9.6
	(2.8)	(1.4)	(1.5)	(0.5)	(-1.7)	(0.5)	(9.3)
Domestic agriculture	14.4	14.6	8.3	15.6	17.5	11.8	15.9
	(10.2)	(4.2)	(7.0)	(5.6)	(3.5)	(5.3)	(4.0)
Industry	11.2	11.0	10.3	12.9	16.5	19.0	24.7
	(3.4)	(1.7)	(7.6)	(12.0)	(1.0)	(4.2)	(4.8)
Of which:							
Construction	4.2	4.9	2.4	4.7	4.9	4.8	7.4
	(11.8)	(2.4)	(5.0)	(13.1)	(-2.6)	(8.8)	(1.0)
Manufacturing (excluding tree crops processing)	5.0	5.1	5.6	7.5	9.1	9.7	12.1
	(-1.4)	(1.6)	(10.1)	(11.6)	(2.3)	(6.4)	(7.8)
Services	42.3	43.8	43.6	45.6	46.7	56.2	49.8
	(6.5)	(2.5)	(3.7)	(3.8)	(3.7)	(7.2)	(4.2)
Total GDP	100	100	100	100	100	100	100
	(4.5)	(2.5)	(4.1)	(4.8)	(2.9)	(6.0)	(4.7)

Source: Annual Reports of Central Bank of Sri Lanka.
Note: * : Average growth rates are given in brackets.

during the end of the 1970s and early-1980s (Little et al. 1993; Athukorala and Jayasuriya 1994). The economy had been subjected to stringent trade and foreign exchange controls since the early 1960s, which had been further strengthened during the early 1970s in response to balance of payments pressures associated with the first oil shock. Unlike many LDCs, the Sri Lankan response to the first oil crisis was strongly deflationary and did not involve a strategy of large external borrowing. However, in 1977, the resulting economic recession created the political climate for the defeat of the left-of-centre government, in power since 1970. A pro-Western government of the United

National Party (UNP) came to power pledged to market oriented economic policies.

The UNP government immediately implemented a major trade policy reform, removed exchange controls, eliminated the previous dual exchange rate system and carried through a large devaluation (Cuthbertson and Athukorala 1990; Lal and Rajapathirana 1989). The new government's pro-Western political stance and pro-market economic policy stance led to a huge influx of foreign grants and concessionary aid flows from Western donor countries and international financial institutions such as the World Bank. A large proportion of these capital inflows went to finance a massive public sector investment programme initiated by the government which centered around a number of "Lead Projects". These projects included the Accelerated[1] *Mahaweli* project—a massive irrigation and power project and a major house building programme. Foreign capital inflows were supplemented by remittances by overseas workers, particularly from the Middle East where large numbers of Sri Lankan workers found employment during this period (Table 2). As a result, gross investment in the economy rose to 30 per cent during 1978-82 from an average of 14 per cent during 1970-77; the growth rate reached historically high levels. For example, real GDP growth increased to 8.2 percent in 1978 from an average of 2.9 percent during 1970-77. It also remained around 6 percent during 1978-82. Meanwhile both the current account and budget deficits (as a percentage of GDP) increased after the introduction of reforms. While the current account deficit (as a percentage of GDP) rose to 18.2 percent in 1982 from a very low level of 3.9 percent during 1970-77, the budget deficit increased to 19.8 percent in 1982 from 7.7 percent in 1970-77.

These events generated considerable discussion and analysis (Lal 1985; Lal and Rajapathirana 1989; Rajapathirana 1988; White and Wignaraja 1992; Athukorala and Jayasurija 1994). Much of the discussion was motivated by concern over the unprecedentedly high current account deficits which emerged from 1978 onwards. Lal (1985) argued that the large current account deficit was necessary to absorb the capital inflows and was not a problem to be corrected by expenditure switching and absorption reduction policies. Many studies related to the experience of the Sri Lankan economy during this period have emphasized that the massive increase in foreign capital was equivalent

[1]This Project was originally planned to be developed over 30 years but the new government decided to 'accelerate' it and complete the project in 6 years.

TABLE 2
FOREIGN CAPITAL INFLOWS TO SRI LANKA, 1978-82
(Rs. million)

Year	1978	1979	1980	1981	1982
Net Transfers	343	747	2,248	3,908	5,495
Net Direct Investment	31	731	711	943	1,311
Official Grants	905	2,242	2,281	3,118	3,371
Concessionary	2,763	2,460	3,884	6,468	8,356
Other Sources	-1,763	359	6,315	1,078	2,206
Total Capital	2,279	6,538	15,436	15,515	20,768
Balance of Trade	-2,279	-6,538	-15,436	-15,515	-20,768
	(5.3%)	(12.5%)*	(23.5%)*	(18.2%)*	(20.7%)*

Source: World Bank (1986).
Note: * : Capital inflows as a percentage of GDP are shown in brackets.

to a Dutch disease type shock to the Sri Lankan economy. These studies, however, have not considered this shock quantitatively. In this study a CGE model is employed to do just that.

IV. Structure of the Model

As described in Section II, the original core model of Dutch disease contains only three sectors, i.e., the booming sector, the lagging sector and the non-tradable sector. This framework is very useful for analytical purposes. A CGE model can be used to provide an empirical basis for this analytical model as demonstrated by Bandara (1991b). However, it is not necessary to keep only three sectors in a CGE model, as in the core model. Indeed a more disaggregated CGE model can be developed for a developing country which closely resembles the main features of the core model which would be more useful for empirical purposes. This section provides a summary of such a disaggregated CGE model of the Sri Lankan economy.

Before providing a brief description of the Sri Lankan Model, one important justification needs to be made. This model does not contain a booming sector. However, the large amount of foreign capital alone can have effects similar to those created by derived demand from a booming sector. As demonstrated in Benjamin et al. (1989, 73), revenue flows from booming sectors in some countries are similar to foreign capital flows since those sectors are simply supply enclaves. In such cases, the resource movement effect of Dutch disease is very

small and the spending effect is very large. Foreign capital inflows also create a large spending effect. In the case of Sri Lanka, focus is on the latter. In fact, the spending effect alone is sufficient to create Dutch disease type consequences (see Benjamin et al. 1989, for details). It is, therefore, justifiable to use a more disaggregated CGE model without an explicit booming sector or sectors to examine the Dutch disease effects of foreign capital inflows.

With this justification the following provides a summary of a 24 sector CGE model of the Sri Lankan economy which will be used to analyze the Dutch disease effects of foreign capital inflows to Sri Lanka (see Bandara 1989, for details of the model). The model is comparative static in nature. Hence it is not designed to simulate a particular time path for the Sri Lankan economy. Rather, its aim is to provide insights into the implications of various shocks which carry the economy away from previously established trends. It should be noted that the model is not designed to capture the inter-temporal changes of the economy arising from factors such as the impact of investment on future projects. It focuses on the real side of the economy and its structure pays close attention to microeconomic theory, highlighting the role of relative prices and substitution possibilities in determining commodity trade flows and their effects on the economic structure and distribution of factor incomes. The system of equations in the model closely follow the ORANI model of the Australian economy (Dixon et al. 1982) which belongs to the well-known Johansen (1960) class. In this model, we assume that there is an one-to-one correspondence between both industries and commodities and between occupational type labor and household types. There are 24 industries each producing one of the 24 commodities. Location (urban, rural and estate) is the basis for the categorization of labor and household into three types.

The model utilizes a 1981 input-output data base which allows us to include many types of commodity and factor flows such as those from domestic and imported sources to current production, capital creation, different households, government and exports, and primary factor flows, i.e., different types of labor and capital to industries for use in current production.

The model's main equations are derived from the constrained optimization of neo-classical production and utility functions as follows:

• Producers choose inputs to minimize the cost of a given output subject to three level constant returns to scale industry production functions. The Leontief assumption is made at the first level, specifying

no substitution between "effective" intermediate inputs and aggregate primary factors. At the second level, CES functions are employed to allow substitution between domestic and imported sources of each input category and between primary factors (aggregate labor and fixed capital). Finally, at the third level are CES functions specifying substitution between different types of labor within the aggregate category.

• Households (urban, rural and estate) are assumed to choose purchases which maximize additive utility functions subject to aggregate budget constraints. This consumption behavior is characterized by the Linear Expenditure System (LES) which accommodates substitution between effective commodities. CES functions are used to describe the substitution possibilities in consumption between domestic and imported sources of each category of household.

The equation system of the model is expressed in linear percentage form to solve the model. In order to provide a broad picture of the model, all equations can be grouped into nine blocks as provided in Table 3. It was decided not include a full list of equations and variables in this paper in order to avoid a lengthy description of equations and variables.[2]

(i) Industry Inputs (Block 1): This represents the substitutability between inputs of domestic and imported sources, between primary factors (aggregate labor and capital) and between different types of labor in current production. The relevant substitution elasticities govern the magnitude of substitution for a given change in relative prices. There are two equations to define the price of aggregate labor and to handle production subsidies.

(ii) Final Demands (Block 2): Final demand for domestic and imported commodities by households, capital creators, the government and foreign sources are included in the model. The equations describe demands for inputs to capital formation in aggregate investing sectors (agriculture, manufacturing, construction and services). Producers of capital goods can substitute between domestic and imported sources on the basis of changes in relative prices between the two sources. Household demands are shown by equations which permit different types of households to substitute between domestic and imported sources of consumption goods in response to changes in the relative price of goods from the two sources. Once again, the magnitude of the

[2]A full version of the model can be obtained from the author on request or see Bandara (1989).

TABLE 3

MAIN BLOCKS OF EQUATIONS IN THE MODEL

Block 1	Industry Inputs Intermediate inputs (domestic and imported) Primary factors, i.e. labor in general and capital Labor by occupation Production subsidies
Block 2	Final Demands for Commodities Demands for capital creation Household demands Exports Government demands
Block 3	Demands for Margins
Block 4	Zero Pure Profit Conditions (Price System) Production Capital creation Importing Exporting Distribution
Block 5	Investment Allocation Distribution of investment Investment budget constraint
Block 6	Market-Clearing Equations Domestically produced commodities Imported commodities Primary factors, i.e. labor and capital
Block 7	Balance of Trade Imports Exports Balance of trade
Block 8	Income Distribution Firms' income Household income Government income
Block 9	Miscellaneous Equations

substitution for a given change in relative prices is governed by the relevant values of the substitution elasticities. Households can also substitute between different commodity categories within their consumption bundle. This substitution is a function of changes in the relative prices of the commodity categories and the cross-price elasticities

between categories. The equation which describes demand for exports permits Sri Lankan exports to influence world commodity prices when it is necessary. Finally, there are equations which express the demands for imported and domestically produced commodities by the government. They are related to real private consumption expenditure.

(iii) Demands for Margins (Block 3): There are equations to describe the demands for margins to facilitate commodity flows to intermediate and final users. It is assumed that demands for margins are proportional to the relevant commodity flows.

(iv) Zero Pure Profit Conditions (Block 4): Competitive pricing behavior is imposed in the model by relating prices to costs for each of the five activities (current production, capital creation, imports, exports and distribution). Profits can accrue only to factors of production since constant returns to scale production technology and competitive behavior is assumed in the derivation of the structural equations in the model. The output prices of industries equal the production costs of intermediate inputs, different types of labor and fixed capital. Similarly the price of a unit of capital in each investing industry is equal to its production cost. The costs of importing are equal to the domestic currency equivalent of the foreign currency price, including the tariff. The revenue from exports is equal to the cost of exports. The purchaser prices of commodities are equal to their basic values plus margins (trade and transport margins, and sales taxes or subsidies) which are involved in the distribution of commodities to various users.

(v) Allocation of Investment (Block 5): The allocation of investment across industries is done on the basis of the following assumptions: (a) investment takes one period of time to install; (b) investors have an expected rate of return schedule from new investment which is downward sloping; and (c) aggregate investment is allocated across industries to equate with the expected rate of return.

(vi) Market Clearing (Block 6): Supply and demand are equated for domestically produced commodities, occupational labor and fixed capital. The model does not necessarily impose full employment assumptions.

(vii) Balance of Trade (Block 7): Equations describe imports, exports and the balance of trade.

(viii) Income Distribution (Block 8): Distribution of income between different types of households and other institutions are explained by appropriate equations.

(xi) Miscellaneous Equations (Block 9): These are a group of miscella-

neous equations being defined.

The complete system of the equations is:

$$Ax = 0,$$

where x is a vector of variables and A is a rectangular matrix. The total number of equations is $6n + 82n + 41$ and the total number of variables is $8n + 102n + 64$. This count indicates that the total number of variables exceeds the total number of equations by $2n + 20n + 23$ variables and this number of variables are declared as exogenous variables to close the model. The main exogenous variables are policy variables such as taxes and subsidies. Solution values for the remaining variables are obtained by a simple matrix method using GEMPACK software (see Pearson 1988 for details).

V. Results

This section presents the results of the simulation related to foreign capital inflows performed with the Sri Lankan CGE model. The simulation was carried out using a closure which is similar to the traditional core model of Dutch disease, called the "closure of full employment", in which real wages were permitted to be endogenous by setting aggregate employment as fixed. In this closure, real absorption was endogenous. Since this model is a short-run static model the physical capital stock was fixed in each industry. The nominal exchange rate is fixed and acts as a *numeraire*. This is also comparable to the traditional Dutch disease model. Therefore, changes in domestic price indices are to be interpreted as changes in domestic prices relative to world prices.

A relatively simple approach to modeling the effects of increases in foreign capital inflows is to treat the amount of capital inflows as a free "gift" of foreign currency for the economy, and to introduce the shock via the balance of trade variable in the model. This allows the economy to increase its balance of trade deficits by an amount equivalent to the change in foreign capital inflows for a typical year. However, this does not allow for a distinction to be made in terms of the sectoral recipients of capital inflows. The results of policy simulations show how the Sri Lankan economy would respond to a growth in capital inflows by 5.6 per cent of GDP; this percentage was chosen from the information given in Table 2. The effects of foreign capital inflows on key macroeconomic variables are summarized in Table 4.

TABLE 4
PROJECTIONS OF MACROECONOMIC EFFECTS OF FOREIGN CAPITAL INFLOWS*

Macroeconomic Variable	Effects of capital inflows (5.6% of GDP)
Aggregate consumer price	14.839
Aggregate export earnings (in foreign currencies)	–4.658
Aggregate import costs (in foreign currencies)	9.543
Sectoral employment:	
Urban	0.791
Rural	–0.331
Estate	–0.768
Real aggregate consumption	4.253
Real aggregate investment	4.253
Aggregate real wages	9.810
Real household income:	
Urban	5.735
Rural	5.404
Estate	10.576

Note: * : All projections are in percentage changes.

An increase in domestic absorption is required to accommodate a large flow of foreign capital. Similar to the traditional Dutch disease model, the total output of the economy cannot change given that aggregate employment and capital stocks are fixed in the present economic environment of the model. Therefore, an increase in imports and/or a decline in exports are necessary parts of the adjustment of domestic absorption to accommodate an increase in capital inflows. According to the results shown in Table 4, aggregate export earnings are projected to decline by 4.7 per cent and aggregate imports are projected to increase by 9.5 per cent. Assuming zero change in GDP in quantity terms, the above results are reflected in higher domestic absorption. The necessary changes in the pattern of international trade to absorb higher capital inflows require a decline in the competitiveness of the tradable industries as predicted in the traditional model. In our simulation with the Sri Lankan model, the demand for non-tradables increases and raises the domestic price of non-tradables. This causes a rise in the demand for labor in these sectors and, in turn, raises real wages and the domestic price level (see Table 4). This leads to a fall in the competitiveness of the tradable sectors. The decline in the competitiveness of tradable industries can be measured by using the change in the competitiveness index, which can be measured as:

$$\Phi_j^R = \frac{P_j^F}{C_j}, \quad j = 1,\ldots,n$$

where Φ_j^R is an index of the competitiveness of tradable industry j, C_j is an index of the cost of purchased inputs in industry j, and P_j^F is the domestic currency equivalent of the world price of the output of industry j. Variations in C_j depend on variations in the cost of labor and intermediate inputs. We assume that variations in the cost of inputs is approximately represented by the nominal wage rate. Hence the above equation can be written as:

$$\Phi_j^R = \frac{P_j^F}{W_j}, \quad j = 1,\ldots,n,$$

where W_j is the nominal wage rate in industry j (the nominal wage rate is identical in each industry in our model as labor is freely inter-sectorally mobile). The percentage change form of the above equation is:

$$\Phi_j^R = P_j^F - w_j, \quad j = 1,\ldots, n,$$

where ϕ_j^R, P_j^F and w_j denote percentage changes in their respective upper-case variables. Since there is no change in world prices of imports and exports, a fall in the competitiveness of both the import competing industries and the export industries is brought about by the increase in wages. The change in the competitiveness of both these sectors is (using the above equation):

$$\phi_j^R = 0 - (24.649) = -24.649, \quad j = 1,\ldots, n.$$

As a result aggregate export earnings are projected to fall. The magnitude of the contraction of export industries due to an increase in the overall cost level in the economy is shown in Table 4. Since there is no change in export prices, the contraction of export volumes equals the change in aggregate export earnings (about 4.7 per cent). In contrast, the import bill rises by about 9.5 per cent. This is similar to the increase in import volumes since there is no change in import prices. The increased domestic demand creates upward pressure on domestic prices as reflected in the projected results of the aggregate price index. Hence, imported commodities are substituted for domestic commodities. Of course the degree of import-replacement depends on the substitution elasticities between imported and domestically produced goods, and the base period import shares. The economy, therefore, has

the capacity to increase its import bill relative to its export earnings as a result of an increase in foreign capital inflows.

Considerable employment gains are projected in the urban category. This is predominantly in the non-traded and import-substitution sectors. The latter are very close to the non-traded sectors because of their low import-domestic substitution elasticities. The main reason for such increases in employment is the increased demand for these commodities stimulated by the expansion in domestic absorption. The rural and estate employment category is affected as a result of the projected contraction in traditional export sectors (tea and rubber). On the other hand, the rural employment category is severely affected by the contraction of import-substitution agricultural sectors. The employment losses of these two categories are offset by the employment gains in the urban sector which ensures that an increase in foreign capital inflows does not affect aggregate employment in the economy.

Real household income rises in all sectors as a result of the increase in real wages in the economy. Table 4 shows that the increase in real household income is relatively high in the estate household sector despite the employment losses in this category. This is mainly due to the increase in real wages, since almost all household income in this category is accrued from wage earnings. Hence, the real income losses from the decline in employment in the estate household sector are more than offset by the increase in real wages. Real income gains in the urban sector are greater than that of the rural sector, due to the greater employment gains which occurred in the urban household sector compared with the employment losses in the rural sector.

The results discussed so far are related to macroeconomic variables in the economy. The direction of changes in these variables are similar to the predictions of the traditional Dutch disease model.

We now turn to the results of the sectoral output projections of an increase in foreign capital inflows. These projections are shown in Table 5. According to this table all export industries are adversely affected due to the increase in real wages. The magnitudes of the negative output responses of the four export industries are mainly determined by the higher costs arising from higher real wages and the slope of the supply curves. The increase in the domestic cost level causes an upward shift in the supply curves of these industries. Because of the relatively steeper supply curves in the tea and rubber industries (inelastic supply of tree crops sectors), the adverse impacts on output are relatively small when compared to the other two export industries.

TABLE 5

PROJECTIONS OF OUTPUT EFFECTS OF FOREIGN CAPITAL INFLOWS*

Industry	Effects of Capital Inflows	Position of Each Industry
1. Tea	-1.045	E
2. Rubber	-1.175	E
3. Coconut	0.101	NT
4. Paddy	-7.393	NT
5. Other Agriculture	-0.217	E
6. Mining and Quarrying	-11.396	IC
7. Rice Milling	-8.460	NT
8. Flour Milling	2.062	IC
9. Textiles	0.989	E
10. Garments	-16.222	IC
11. Transport Equipment	-0.292	IC
12. Electrical Equipment	4.909	IC
13. Other Machinery	-1.870	IC
14. Light Engineering	1.357	IC
15. Food Processing	-0.899	IC
16. Agro-chemical and Fertilizer	-3.082	IC
17. Structural Clay Products	2.850	IC
18. Other Manufacturing	5.449	IC
19. Basic Metal	0.632	IC
20. Construction	3.560	NT
21. Petroleum and Gas	1.316	IC
22. Electricity	0.960	NT
23. Trade and Transport	1.979	NT
24. Other Services	-0.138	IC

Notes: * : All projections are in percentage changes.
E = Export industries
IC = Import-competing industries
NT = Non-tradables

The responsiveness of supply in the other two sectors to the increase in domestic costs is relatively large as a result of relatively flatter supply curves. Hence, the negative output responses of the other two export industries (mining and quarrying, and garments) are large (see Table 5).

The import-substitution agricultural sectors are projected to suffer to a greater extent. For example, the rice milling sector is adversely affected due mainly to the high import-domestic substitution elasticity in the rice milling sector. As noted earlier, the domestic price of these commodities increases as a result of a rise in the cost level and increased

domestic demand is met by imports. In this experiment the negative substitution effect is stronger than the positive absorption effect on the domestic demand for rice. Therefore, the domestic demand curve shifts to the left for this commodity. On the other hand, the supply curve shifts upward as a result of the higher domestic cost level. Because of the downward shift in demand and upward shift in supply, this industry experiences a large loss of output. Other agriculture and food processing sectors are also projected to suffer as a result of the high domestic cost level and import competition. The adverse output responses of transport equipment, other machinery (mainly agricultural machinery) and agro-chemical fertilizer follow the results of the domestic and export agricultural sectors since they are related industries. Many other import substitution industries such as electrical equipment, light engineering, structural clay products and other manufacturing benefit from an increase in foreign capital inflows as opposed to the predictions of the traditional Dutch disease model. On one hand, the domestic-import substitution elasticities of these industries are very low. In that sense, they are very close to being non-tradable. Hence, the negative import-substitution effects of these industries are quite small. On the other hand, the positive absorption effects are quite large. Hence, we would expect and upward shift in the domestic demand curves for these commodities. It appears that the upward shift in domestic demand for these commodities are much stronger than the negative effect of upward shifts in supply for output as a result of a higher domestic cost level. Overall, these industries experience a net positive output change in this simulation.

As would be expected, the output levels of all non-tradable industries, except paddy, are projected to increase due to the expansion in real absorption. These industries are construction, electricity and trade and transport. In the case of paddy, output is adversely affected as a result of a decline in demand for paddy by the rice milling sector. Overall, non-tradable industries and import-substitution industries which are very close to the non-tradable industries are the "winners" from the increase in capital inflows while all export and import-substitution agricultural industries are the main "losers". These results are different from the traditional model. In contrast to results obtained in other studies of Dutch disease economics in LDCs (e.g., Benjamin et al. 1989) export agricultural sectors are *not* severely affected in our experiment mainly because the agricultural export sectors in Sri Lanka are tree crops with inelastic supply. These results show that the applicabil-

ity of the traditional model to LDCs is limited as a result of the structural characteristics of LDCs, and a generalized model can *not* be applied to these countries as a result.

VI. Conclusion

This paper examined the Dutch disease type consequences of foreign capital inflows to Sri Lanka. Results show that the traditional Australian model can *not* be used to explain the impact of windfall gains in LDCs without modifications. Further, the results show that some tradable sectors may expand output despite the real exchange rate appreciation as confirmed by other studies. More importantly, these results differ from other studies related to Dutch disease (such as Benjamin et al. 1989) in terms of the effects of a boom on agricultural exports. While other studies show that agricultural exports are severely affected by windfall gains, this conclusion can *not* be generalized across many non-oil exporting developing countries such as Sri Lanka. The magnitude of detrimental effects on agricultural exports depend on the nature of the agricultural sectors in LDCs. In some LDCs like Sri Lanka, agricultural exports are entirely dominated by tree crops which have long-gestation periods. In such cases, agricultural exports are not severely affected by a boom compared to other tradable industries, as a result of inelastic supply. Overall, the results of our study show that the traditional Dutch disease model does not adequately address the impact of windfall gains on the economic structures of LDCs. Hence, some modifications to the traditional model are needed to explain Dutch disease type consequences in these countries.

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