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**THE MACROECONOMIC EFFECTS OF FOREIGN AID:
ISSUES AND EVIDENCE**

by

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May 1987

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The Macroeconomic Effects of
Foreign Aid: Issues and Evidence

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Abstract

This paper reviews the debate on the macroeconomic effects of foreign aid. The paper starts with an analytical review of the meaning of a foreign exchange bottleneck and of the criticisms raised against foreign aid. The review is followed by a brief survey of recent empirical work testing the criticisms raised against foreign aid. The paper concludes with a summary of simulation results designed to calculate the effects of different levels and sequences of foreign aid to Korea during the period 1963-73.

The Macroeconomic Effects of Foreign Aid: Issues and Evidence

1. Introduction

The early literature on the macroeconomics of foreign aid, reflected in the Harrod-Domar growth model, viewed investment shortage as the major bottleneck to developing countries' achievement of self-sustaining growth. When it became increasingly clear that import substituting industrialization had a greater import content than expected, foreign exchange shortage became viewed as the major bottleneck. The resulting two-gap models provided a strong rationale for foreign assistance.

In empirical terms, foreign assistance has been criticized on two grounds: (1) aid is channeled into consumption rather than investment; (2) aid may have undesirable side effects. 1/ Two-gap models were also challenged in conceptual terms towards the middle of the seventies when findings of the major studies on the foreign trade regimes of developing countries gained widespread acceptance. 2/ The essential message of these studies for the economics of foreign aid was an indirect but powerful one: overvalued exchange rates resulting from restrictive foreign trade regimes led to "distorted" relative prices between traded and nontraded activities. Furthermore, the set of incentives within tradable sectors generally fostered an anti-export (or home market) bias, because goods sold on the domestic market received greater incentives than exported goods. Relative prices and incentive-induced distortions came to the fore, along with the need to recognize a distinction between tradable and nontradable activities.

The impetus towards studying the macroeconomic effects of foreign transfers in a framework incorporating relative prices was accentuated by the shift towards supply side macroeconomics in developed countries after the oil and commodity price shocks in the early 1970s. Of course, many of the elements of supply side macroeconomics, e.g. noncompetitive imported intermediate imports, had long been incorporated in the development economist's tool kit, but the macroeconomic implications of foreign aid on relative prices had not been emphasized. ^{3/}

The usefulness of studying the macroeconomics of foreign aid was also questioned because of the increased integration of world capital markets. This integration led many to believe that if profitable investments were available in developing countries, private financial markets would finance them. ^{4/} Indeed during the 1970s, flows to developing countries of oil-recycling funds were, if anything too large and contributed to the debt crisis of the early 1980s. Though the implications of the foreign debt crisis are beyond the scope of this paper, they are relevant to the issues covered here in several respects. First many fear that private flows will not return to the levels of the 1970s, thereby suggesting that official flows will continue to be needed, even if funding at commercial terms were once more to play a large role. Second, the "debt overhang" problem also points to a greater role for official flows. The issue here is that some countries' debts are so great that they are caught in a vicious circle: they cannot restore creditworthiness (which would bring new lending) without growth, and they cannot grow until creditworthiness is restored; the result is market failure of the private capital market. Third, with protectionism in the form of non-tariff barriers (which discriminate most against semi-industrialized countries) on

the rise in developed countries, the assumption of externally determined export earnings found in the two-gap models resumes some significance.

The rest of the paper expands on this brief historical sketch by examining key developments in the literature on the macroeconomics of foreign aid. Section 2 surveys the main contributions to the debate on the role of foreign aid. I first discuss the meaning of a foreign exchange bottleneck and how it is likely to be resolved by market forces, then turn to a presentation of the criticisms of foreign aid. In Section 3, I review the findings of empirical studies of aid effectiveness. Finally in Section 4, I present results from simulation analyses of the impact of foreign aid on growth under alternative development strategies.

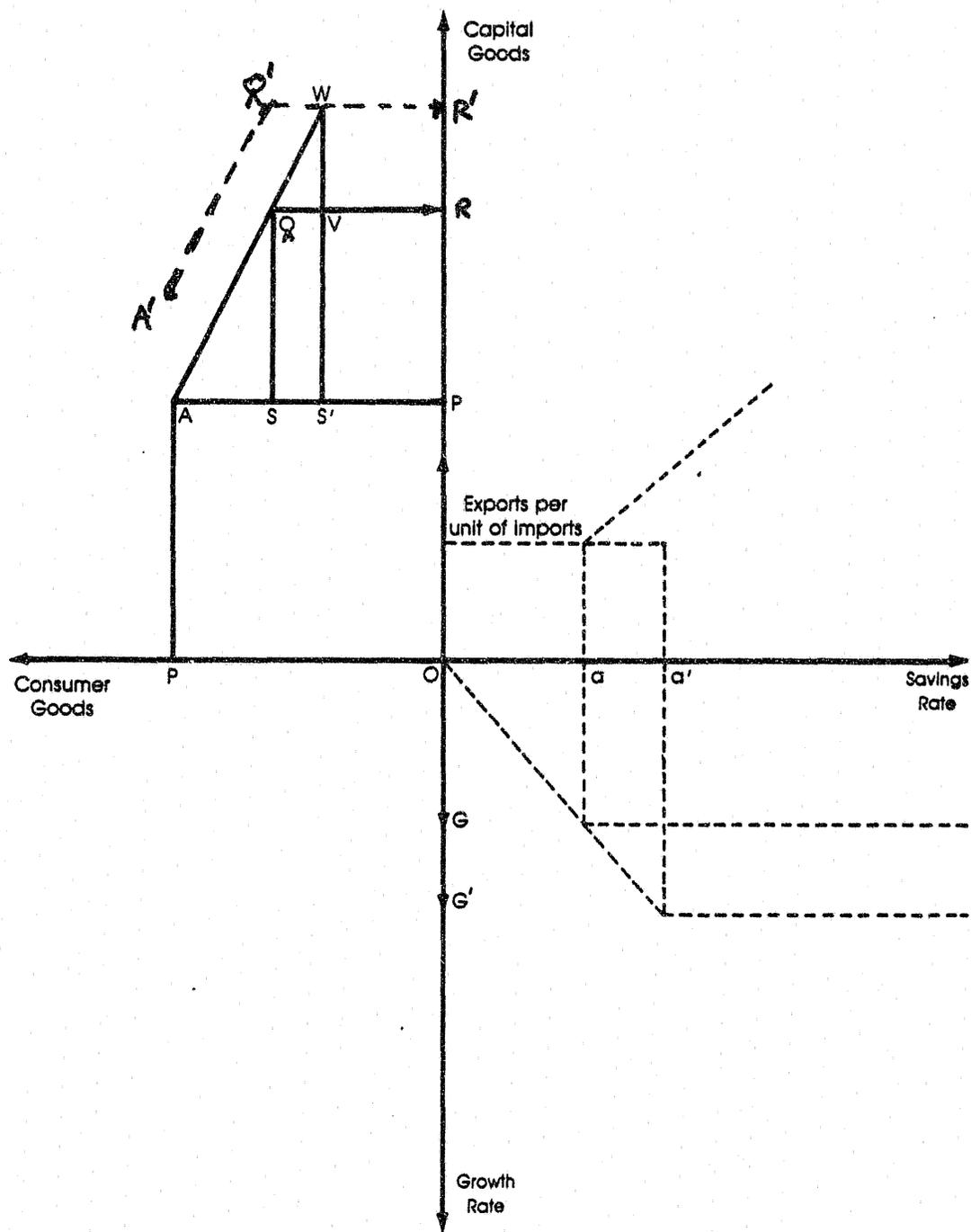
2. The Analytics of Foreign Aid

A shortage, or gap, implies that something must adjust and it is worthwhile to emphasize what adjustment is called for -- partly for clarity's sake, and partly to help interpret the numerical exercises on the macroeconomic impact of foreign aid reported in Section 3 below. Having shown that in the absence of foreign assistance the growth rate will have to be reduced through adjustment of relative foreign and domestic prices, thereby wiping out the gap, I turn to a brief exposition of the criticisms of foreign aid.

2.1. Closing the Gap between the Gaps

The classic statement of the foreign exchange bottleneck is shown in Figure 1. ^{5/} Suppose that the economy has fixed coefficient production functions for capital and consumer goods. The corresponding production possibility frontier PP is drawn in quadrant II with production at A. Domestic and foreign capital goods are perfect substitutes. This may seem a gross

Figure 1
The Foreign Exchange Gap



violation of the stylized evidence (something to which I return below, but it does not alter the conclusions. 6/

Now assume that for some unspecified reason the economy can exchange domestic goods for foreign goods at fixed terms of trade up until Q, but that beyond Q the economy faces a unitary elasticity of demand for its exports. This unitary elasticity reflects the elasticity pessimism on world markets mentioned above, and is referred to as the "structuralist view" by Bacha (1984) in his recent update of the two-gap model. The foreign offer curve facing the economy becomes AQR and it is clear that, if the economy wishes to save more than AS, it will not be able to import more machines. It is then clear that a foreign exchange bottleneck reflects the inability to transform domestic goods into foreign goods through trade. The maximum growth rate in this case is given by OG in Quadrant 4 which corresponds to the savings rate $oa = OR/OZ$ measured in terms of capital goods where Z (not drawn) is the intersection of AQ with the vertical axis. Furthermore, raising the savings rate becomes immiserizing as the terms of trade deteriorate. 7/

To raise the growth rate, foreign aid is needed. Suppose that foreign aid in the amount VW materializes and is entirely saved. This will shift vertically upwards the offer curve to A'Q'R'. The new ex-ante domestic savings rate, $oa' = OR'/OZ'$ (not drawn) can now get translated into ex-post investment, raising the economy's growth rate to OG'. It is also clear that as long as the foreign offer curve has greater than unitary elasticity, growth can always be raised by increasing the savings effort, even though this may eventually become immiserizing as the terms-of-trade deteriorate sufficiently. 8/

Introducing flexibility into the model either by recognizing that imports go into consumption as well as investment, or that a unit of capital

is composed of domestic and foreign goods that may be substituted for another does not change the essence of the argument. As shown by Findlay (1971), the maximal growth rate reaches its limit asymptotically, rather than at a fixed savings rate as in the case here. It is also clear what the mechanism of adjustment would be if one combines an exogenously given growth rate and fixed import requirements for investment along with a ceiling on foreign exchange earnings. Both demand for and supply of foreign exchange are totally inelastic, with demand exceeding supply if the growth rate is too high. In any market situation, the real income of the country would be reduced as the terms of trade shift adversely; maintenance of a fixed investment program would imply an unrealistically high propensity to save. Hence it is more realistic to assume that savings out of income are given, and that adjustment will be in the form of lower growth if foreign aid is not forthcoming.

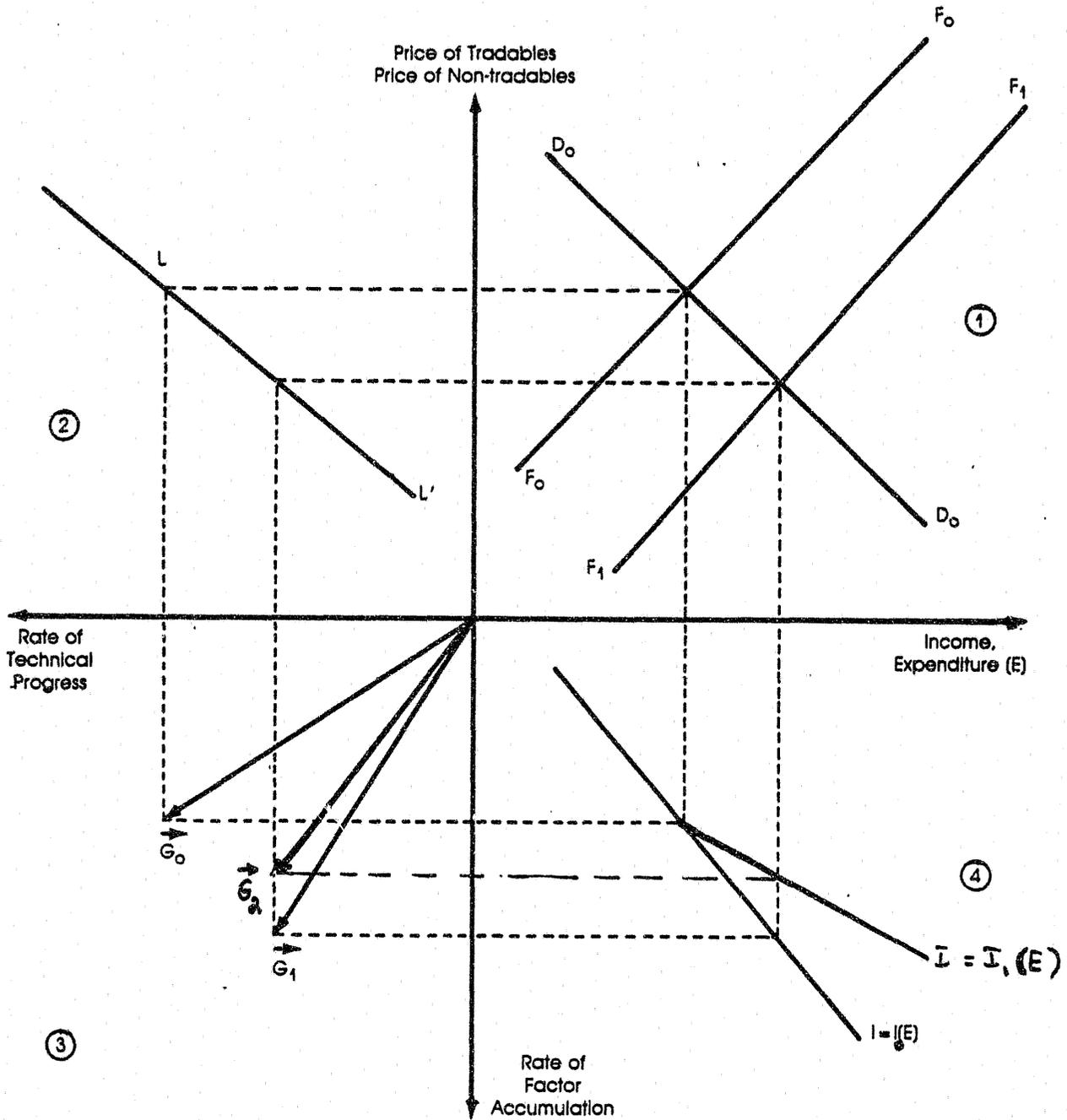
The empirical evidence shows that capital formation responds positively to the availability of foreign exchange, which supports the assumption that foreign exchange shortages impede growth. The empirical evidence also supports the view that domestic and foreign capital goods are imperfect substitutes. For non-OPEC LDCs, Marquez (1985) reports an inelastic relation of imports of capital goods to investment and a positive elasticity of investment with respect to the availability of foreign exchange reserves.^{9/} His results suggest an elasticity of substitution between domestic and foreign capital goods of about 0.6, a value close to the assumed elasticity in the simulations of Section 4.2. More importantly, his statistical tests show that developing countries cannot support their investment needs regardless of the level of foreign exchange availability.

2.2. Capital Inflows and the Real Exchange

Now take the more realistic situation where the economy is atomistic in world markets, i.e., the terms of trade are given, so there is no difficulty in transforming domestic goods into foreign goods as in Section 2.1. But instead assume that some proportion of domestically produced goods is nontradable at every relevant configuration of relative prices, so that the economy can be described by the standard Australian (dependent economy) model. ^{10/} Then, if there is full employment of factors and if traded and nontraded goods are substitutes in consumption, internal balance is described by D_0D_0 and external balance by F_0F_0 in Figure 2, quadrant 1. The initial full employment equilibrium is at A_0 . Now consider the effects of an injection of foreign aid: this will shift the F_0F_0 locus rightwards to F_1F_1 by the amount of the inflow, treated here as a transfer. The new equilibrium will be at A_1 , with a lower real exchange rate reflecting the resource shift into nontradables. Substantial amounts of foreign aid will put downward pressure on the real exchange rate and in that way counteract the export promotion schemes favored by donors.

Now consider growth implications. Let the economy's production function be characterized by disembodied technical progress and assume that technical progress is higher in tradables than nontradables, or that there is learning-by-doing in tradables. Then the contribution of technical progress to growth can be related to the structure of production by the line LL' in quadrant 2. A shift of resources towards nontradables where technical progress is lower will lower the contribution of technical progress to growth. The model is closed by assuming in quadrant 4 that a constant fraction of income (inclusive of transfers) is invested. Then the rate of

Figure 2
Capital Flows, The Real Exchange Rate,
Savings and Growth



growth is measured as the vector \vec{OG}_0 in quadrant 3, and is the sum of the factor accumulation and technical progress effects. Suppose that foreign aid lowers the marginal propensity to save, and hence the marginal propensity to invest, perhaps because of a perception that wealth has increased permanently. Growth will be reduced to \vec{OG}_2 . Then, as shown in Figure 2, it might be possible for foreign aid to lead to lower growth, as critics have suggested. 11/

Growth could also be reduced because of other undesirable side effects of aid. For instance, suppose that aid leads to the undertaking of projects with higher incremental capital-output ratios (ICORs). In terms of Figure 2, this is equivalent to an upward shift of the investment schedule in quadrant 4. Another possibility is that aid might lead to rent-seeking behavior: at the extreme, if all the value of aid were dissipated in this way, there would be no growth effect.

I will now turn to the empirical evidence, first reviewing the relationship between aid and investment, then the evidence on the relationship between aid and growth.

3. Aid, Domestic Savings, and the Real Exchange Rate

The literature on aid effectiveness concentrates on two criticisms: (1) that aid is channeled into consumption rather than into investment; and (2) that aid may have undesirable side effects -- such as encouraging overly capital intensive projects (Tendler, 1975), real exchange rate appreciation (van Wijnbergen, 1985), crowding out of private foreign capital inflow (Bauer, 1981), and/or rent-seeking behavior (not to mention the possibility that aid could serve as a substitute for needed policy changes). 12/

These criticisms have several shortcomings. To begin with, not all aid is meant to be invested. Income transfers for emergency and distress relief, for example, are temporary responses to unanticipated events; they can thus be viewed as attempts to finance what is denoted as transitory consumption in the permanent income theory. If one can assume that there is a stable relationship between aid flows and past commitments, then one can approximate the permanent flow of foreign transfers by the predicted values of an estimated relation between aid flows and past commitments. Using a panel data set for 39 low income countries over the period 1968-81, Lavy (1985b) estimates a marginal propensity to consume close to one for temporary emergency transfers and a marginal propensity to consume of 35-40 percent for permanent transfers. Furthermore, as recognized by Mosley (1980), the extent to which permanent transfers are channeled into consumption depends on the recipient's inter-temporal preference.

The early empirical literature on aid effectiveness not only failed to make this distinction; it also used net capital inflow (imports minus exports) as a measure of foreign transfers. On these grounds alone, one must discount the findings of the strong negative effect of capital inflows/GDP on savings in the early literature. ^{13/} Furthermore, there are simultaneity problems in this econometric work, since it is doubtful that capital inflows can be treated exogenously in regressions of savings on capital inflows. Finally, it should also be borne in mind when interpreting these negative correlations that domestic savings are often estimated as a residual, so that accounting identities may force domestic savings down if foreign savings rise. For these reasons, it is preferable to look at the more recent evidence

where foreign transfers are only defined to include grants or loans that qualify as ODA. ^{14/}

Defining aid to be restricted to ODA, Lavy (1985b) reexamined aid effectiveness for a cross-section of 39 countries by estimating equations of the form:

$$\left(\frac{I}{Y}\right)_i = \alpha + \beta \left(\frac{S}{Y}\right)_i + \gamma \left(\frac{A}{Y}\right)_i$$

where I is gross investment, Y is GDP, S is gross domestic savings, A is ODA, and i is the country index. In his estimates, each ratio is an average for the period 1968-80. He finds estimates of γ in the range 0.77 - 0.94 depending on how countries are grouped, thus suggesting that most of aid is indeed invested. His estimates for β range between 0.8 and 0.9 and can be interpreted to suggest that most incremental saving is invested, though it could reflect other sources of correlation such as a higher rate of return. ^{15/}

From the national accounts identities, $S_d \equiv I - (M - X) + FY - A - OFT$ where FY is foreign income and OFT is foreign transfers other than ODA. It is clear that the problem of estimating an identity remains if $FY \approx OFT \approx 0$ and the trade balance $(M - X)$ does not vary much. While the problems is less severe than in earlier studies where foreign aid was usually defined as the deficit in the current account, such estimates would be more reliable if, as pointed out by Bartels (1975), the major components of savings were estimated independently and not as a residual from the national accounts. Even when each ratio is taken as an average over a number of years, coefficient estimates are likely to be quite sensitive to sample coverage and errors in the measurement of variables. Coefficient estimates are also likely to be influenced by omitted variable bias. These problems, which are apparent in Mosley (1980) and

Kormendi, Lavy and Meguire (1986), would be attenuated in a time-series analysis.

These inconclusive results should also be questioned on other grounds. Indeed, a broader view of foreign assistance has emerged in which foreign assistance is considered as a "bundle" rather than in terms of financial flows only. In appraising this broader view, the problem lies in isolating the effects of aid on total factor productivity (TFP) growth (assuming that one can obtain reliable estimates for TFP growth for a large enough sample of countries). More conclusive evidence on the overall effectiveness of aid must await for an analysis of its relationship with TFP growth.

Is foreign assistance likely to lead to sustained real exchange rate appreciation? Gross of technical assistance, the average aid ratio (to GDP) for the period 1974-80, when it was higher than during 1968-73, was a maximum 7.4 percent for African countries. Countries that received sizable capital inflows in a short period (e.g. Chile between 1977 and 1981) have experienced significant real exchange rate appreciation. ^{16/} Thus sizeable aid flows may cause real exchange rate appreciation. However, it is a commonly held view that most of foreign aid leaks abroad in the form of purchase of equipment and other imports, and in part because aid is tied. In addition, aid ratios to GDP do not vary much from year to year so I do not believe this effect is likely to be significant in practice. ^{17/} Nevertheless, this does not detract from the observation that foreign assistance has allowed some countries to maintain overvalued exchange rates and on occasion has served as a substitute for needed policy changes. But this criticism has to be

addressed in an even broader framework, in which aid effectiveness is appraised in the light of its interaction with policy reforms.

4. Optimal Aid Patterns and The Impact of Foreign Aid Under Alternative Development Strategies: Suggestions from Korea's Experience ^{18/}

I conclude with a summary of what model-based calculations indicate about the likely magnitude of aid on growth. The early development of models to study optimal aid patterns were undertaken in an economywide framework. These early models reflected the views held at the time, however, and were also limited by computational developments. They were typically couched in a linear programming framework where the objective function was to maximize some discounted sum of consumption, subject to suitable terminal constraints and other constraints to prevent the tendency towards corner solutions frequent in programming models. What these early models illustrated was that the marginal productivity of foreign aid decreased as its quantity increased, because the use of external resources for investment purposes had to be postponed owing to limited absorptive capacity. These early studies also showed that early disbursement of foreign assistance leads to higher growth than more gradually timed assistance. ^{19/} In these exercises there is a terminal year capital stock constraint, imports enter into consumption and investment demand with fixed coefficients, and exports are assumed to grow exogenously. ^{20/} More recent exercises reach similar conclusions, but they embody more flexible forms and are able to link macroeconomic performance with incentives and hence with the distortions inherent under different development strategies. I report calculations from two recent exercises below.

Since the parameters in these simulations are given rather than subject to hypothesis testing, the information content of these exercises

rests entirely on whether the assumptions built into the models represent or are consistent with actual developments. It is therefore instructive to illustrate how foreign aid interacts with macroeconomic performance in a concrete example. I take the case of South Korea where it is widely held that the combination of foreign aid and good macroeconomic management were the causes of its success. 21/

Korea's remarkable achievement is well known. It owes much to the aggressive, export-led development strategy that took shape following the implementation of wide-ranging reforms starting around 1960. I refer to Korea's strategy as an EP strategy. By maintaining the exchange rate near the free trade level and by granting exporters free access to imported inputs as well as explicit export subsidies, the government provided, on average, roughly equal incentives to production for export and for domestic sales within the manufacturing sector, i.e. there was no home market bias in the incentive system. Periodic devaluations to correct for the differential between domestic and world inflation rates maintained a nearly constant value for purchasing power parity adjusted effective exchange rates for exports and imports. 22/ Thus, in contrast to many other developing countries, Korea was successful in avoiding the adverse effects of high domestic inflation on the relative incentives between production for export markets and production for domestic import substitution. 23/ This is the first, and best known, stylized fact about Korea.

Other factors also contributed to the success of the EP strategy that Korea pursued after 1965, making Korea's experience less generalizable. First Korea benefited from unusually high levels of official foreign assistance, which were supplemented by substantial private foreign capital inflows

Table 1

Korean Major Economic Indicators: 1960-1975

| | 1960 | 1965 | 1970 | 1975 |
|---|---------|---------|---------|------|
| <u>Ratios to Real GDP (Percent, 1970 prices):</u> | | | | |
| Gross investment | 8.6 | 12.9 | 27.2 | 26.3 |
| Total exports | 2.4 | 5.2 | 14.7 | 28.3 |
| Total imports | 10.4 | 9.8 | 24.8 | 27.2 |
| <u>Ratios to Nominal GDP (Percent, current prices):</u> | | | | |
| Government revenue | 19.8 | 16.1 | 20.1 | 19.7 |
| Government savings | 4.1 | 5.7 | 7.5 | 3.6 |
| Total domestic savings | 1.6 | 7.7 | 17.1 | 17.7 |
| Gross investment | 10.9 | 15.1 | 27.2 | 27.1 |
| Total exports | 3.3 | 8.3 | 14.7 | 30.2 |
| Total imports | 12.6 | 15.9 | 24.8 | 39.0 |
| <u>Annual Growth Rates (Percent)</u> | | | | |
| | 1960-65 | 1965-70 | 1970-75 | |
| Real GNP (1970 prices) | 6.2 | 11.1 | 9.7 | |
| Index of manufacturing output | 9.5 | 24.2 | 23.2 | |
| Real exports (1970 prices) | 24.0 | 36.5 | 25.0 | |

Source: Kubo et al (1983, Table 3.1).

beginning in the mid 1960s. This is the second stylized fact: substantial aid flows on the eve of the EP strategy. Consequently, between 1960 and 1975, about 40 percent of total investment was financed by foreign sources. 24/

The third stylized fact is seen from the figures in Table 1 and relates to the significant increase in the share of total domestic savings in GNP. Here there is no evidence of the negative impact of aid on savings hypothesized by the critics of aid. This increase in Korea's private domestic savings at least partially reflected the spectacular rise in estimated rates of return to capital (from 26 percent in 1962-66 to 42 percent in 1972-76) resulting from the increase in investment demand. 25/

Yet, in comparison with other countries, the Korean domestic savings rate is not particularly high. This is the fourth stylized observation. Why is this so? There seem to be several interlinked reasons. First, there was a "crowding out" effect of private savings by high foreign investment and high government savings. Thus, while the domestic savings rate was low, the investment rate was much higher and rose rapidly. Second, Korea has experienced one of the highest sustained rates of total factor productivity growth in the world, estimated at 4.1 percent per annum over the period 1960-73. 26/ Among modern developing nations, only Japan's 4.5 percent growth rate was higher. Third, the substantial decline in the relative price of capital goods raised the quantum of real investment resulting from a given nominal level of savings. Between 1962-75, an index of the relative price of investment goods fell from 102.4 to 60.3. 27/ Again, many observers would agree that high productivity growth and favorable developments in the price of capital from the point of view of investment demand are probably consistent

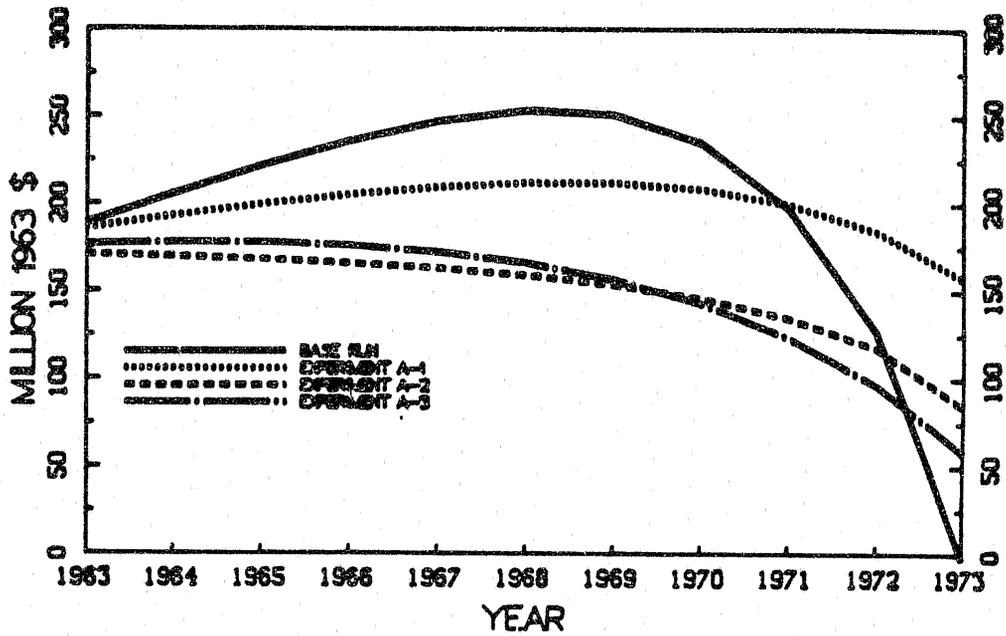
with Korea's EP strategy. As a consequence, compared with other semi-industrial countries, Korea's ICOR is low.

I take these stylized observations and interpretations at face value and incorporate them in the exercises below, which illustrate how one can simulate the linkages between foreign aid and choice of development strategy so as draw the macroeconomic implications of these interactions. The first illustration comes from an exercise with a dynamic input-output model. The exercise illustrates how the time profile of foreign aid enters crucially in the choice of development strategy. The second exercise comes from a computable general equilibrium (CGE) model in which variations in foreign aid interact directly with the choice of development strategy. The model meets the objections raised in Section 2 about the extreme assumptions of early two-gap models. ^{28/} But, even though cumulative foreign aid is also controlled, the timing of aid is not endogenously determined as in the dynamic input-output model.

4.1. The Timing of Aid: Macroeconomic Implications

In the dynamic input-output model, the only factor of production which is assumed to limit growth is capital. Domestic and foreign capital goods are perfect substitutes. Thus, in many respects the dynamic input-output model is nothing but a multi-sector extension of the Harrod-Domar model. Each sector has a fixed ICOR and the sectoral composition of capital goods is given by fixed shares that vary across sectors. Given the desired consumption growth, these assumptions permit the determination of investment by sector of destination and its translation into demand for investment goods by sector of origin. Investment is treated separately from consumption, and

Figure 3
Foreign Capital Inflow Profile



Source: Kubo et al. (1983, Table 4.1)

a/ See Table 2 for definition of experiments.

is determined endogenously in the dynamic model as a function of the change in output in the period; cumulative investment over the entire plan period is constrained to be equal to an exogenously specified level, however. ^{29/} This effectively implies that there is a terminal year capital stock constraint, as in the earlier simulations mentioned above. Likewise, the cumulative balance of trade over the plan period is set exogenously in real terms. As stated, the model is entirely demand driven and can be viewed as a multi-sector, multi-period, version of the model presented in Figure 1 with fixed terms of trade throughout.

As stated above, the dynamic input-output model is not recursive in time. The target equilibrium in a particular year cannot, except in very special cases, be expressed as a function only of variables from past years. Thus, the growth of production and investment is endogenously determined, even though the impetus for growth is given by the growth of sectoral consumption and exports. ^{30/}

Since domestically produced goods and imports are perfect substitutes in the input-output model, there is no cost involved in changing import ratios. But the fourth stylized fact about the EP strategy suggests the opposite, namely that there are increasing domestic resource costs (DRCs) when import substitution is pushed too far. This stylized observation is built into the dynamic input-output model by assuming that the sectoral capital-output ratios are an increasing function of the overall degree of import substitution. The higher is the average import ratio in the terminal year (and hence in all intervening years) relative to its historical value, the higher is the capital-output ratio in all sectors. In addition, sectors that are more dependent on intermediate imports (i.e., ones which have higher

ratios of imported to total intermediate inputs) are assumed to be more severely affected by increased overall import substitution. 31/

Suppose now that Korea had not followed an EP strategy and had exported a smaller share of output. Such a scenario and its macroeconomic implications are summarized in Table 2. In the first experiment, the economy is forced to adjust to the change in export growth only through import substitution, with no changes in cumulative investment or foreign capital inflow. In experiment A-2, cumulative foreign capital inflow is cut by 25 percent to reflect the fact that, with slower export growth, Korea would not have been able to borrow as much abroad. In experiment A-3, part of the adjustment to slower growth is allowed to occur through reduced cumulative investment. This final experiment is the most realistic scenario.

These simulations suggest several points. First, when we move away from the stylized EP strategy, the investment effort rises because of the built-in increased DRCs from import substitution. The figures give an idea of how high the cost of an inward-looking strategy are likely to be. With increased DRCs only, consumption growth is cut from 7.2 percent to 4.9 percent. When cumulative aid is lowered by 30 percent, consumption growth falls to 1.3 percent. (This is why we designed the third experiment A-3 to show the more realistic scenario in which the investment effort is the same as in the EP strategy.)

It may be objected that this exercise reflects unrealistically high import substitution costs. This is not entirely so, as shown by the economywide ICOR calculated with base-year weights, which eliminates the effect of increasing costs of import-substitution. An inward looking strategy leads to increased production in the intermediate and capital goods sectors which are

Table 2

Dynamic Input-Output Experiments: Selected Exogenous Variables
(Ratio to Base Run, percent)

| Feature | Base Run | Experiments | | |
|---|----------|-------------|----------|----------|
| | | Exp. A-1 | Exp. A-2 | Exp. A-3 |
| Export growth rates | 100 | 50 | 50 | 50 |
| Cumulative investment | 100 | 100 | 100 | 70 |
| Cumulative foreign capital inflow | 100 | 100 | 75 | 75 |
| Macroeconomic Implications: (1963-73) | | | | |
| <u>Economywide Average ICOR</u> ^{a/} | | | | |
| Initial-year weights | 1.17 | 1.74 | 1.89 | 1.74 |
| Current weights | 0.97 | 1.51 | 1.67 | 1.49 |
| <u>Real Growth Rates (percent)</u> | | | | |
| Consumption | 7.2 | 4.9 | 1.3 | 3.6 |
| Investment | 15.8 | 18.2 | 27.6 | 16.2 |
| Exports | 35.3 | 17.7 | 17.7 | 17.7 |
| Imports | 15.5 | 5.6 | 4.3 | 3.1 |
| GDP | 10.6 | 8.5 | 7.6 | 6.9 |

^{a/} Defined for gross output.

Source: Kubo et al. (1983, Tables 4.1 and 4.3)

the most import dependent sectors. Thus we illustrate numerically the observation that an import substitution strategy involves high import dependence.

Consider now the time profile of capital inflows in Figure 3. Compared with the path Korea actually followed, an import substitution strategy would have accommodated a much flatter capital inflow profile. The high export growth of an EP strategy required large capital inflows in the early years. This is to be expected in simulations that impose a terminal year capital stock constraint. With the export growth rates cut in half in the experiments, the economy spreads its use of foreign capital more evenly. To sum up, foreign aid can be instrumental in achieving an EP strategy, but the experience of Korea and its stylized representation suggests that the success of an EP strategy may depend crucially on concentrated capital flows in the early stages.

4.2. The Marginal Productivity of Aid under Different Development Strategies

The second numerical exercise with the CGE model corresponds quite closely to the framework that overcomes the criticisms raised about the capital-constraint-only view of development and the extreme rigidity of two-gap analysis. Not only is there substitution in production and demand relationships, with agents responding to the incentive framework they face through optimization, but we move away from the extreme version of demand-led growth (i.e. exogenously specified cumulative investment) of the dynamic input-output model. The mix of domestic and imported capital goods is responsive to changes in their relative prices. In the simulations the mix changes most under an import-substitution (IS) strategy when foreign exchange rationing raises the user cost of imported capital goods. Here the balance between

Table 3

Representative Trade Strategies and Macroeconomic Indicators

| Components | Import Substitution (IS) | Balanced (B) | Export Promotion (EP) |
|---|---------------------------------------|--|--|
| <u>Trade policy</u> | | | |
| Sectoral trends (i.e. exogenous variation in trade shares) | Low/falling | Constant | Rising |
| Policy instruments | Tariffs/import rationing <u>a/</u> | Real exchange rate adjust <u>b/</u> | Real exchange rate adjust <u>b/</u> |
| Indirect effects Productivity growth | Low/intermediate | Intermediate | High |
| <u>Macroeconomic Indicators</u> <u>c/</u> | | | |
| Average ratio of capital inflow to GDP | 4.5 | 4.4 | 4.1 |
| Ratio of imports to GDP, terminal period | 10.7 | 18.1 | 24.0 |
| Incremental capital-out put ratio, terminal period | 3.26 | 3.02 | 2.95 |
| Export growth rate | 7.9 | 10.3 | 14.1 |
| Import growth rate | 4.5 | 6.4 | 9.3 |
| GDP growth rate | 5.7 | 6.2 | 6.5 |
| Bias of the trade <u>d/</u> regime in terminal year <u>e/</u> | 200 | 100 | 95 |
| Relative price of capital goods in terminal year <u>d/</u> | 120 | 105 | 95 |

Source: Chenery et al (1986, Chp. 4)

a/ Import rationing implies that ex-ante excess demand for foreign exchange is eliminated by endogenously determining the premium on foreign exchange.

b/ No rationing of imports

c/ Level of cumulative capital inflow is 1,900 million 1964 dollars.

d/ Index = 100 in initial year

e/ The bias of the trade regime is defined as $B = EER_M/EER_x$, where EER is the effective exchange rate (inclusive of tariffs, subsidies and premia on foreign exchange) and subscripts refer to imports and exports respectively.

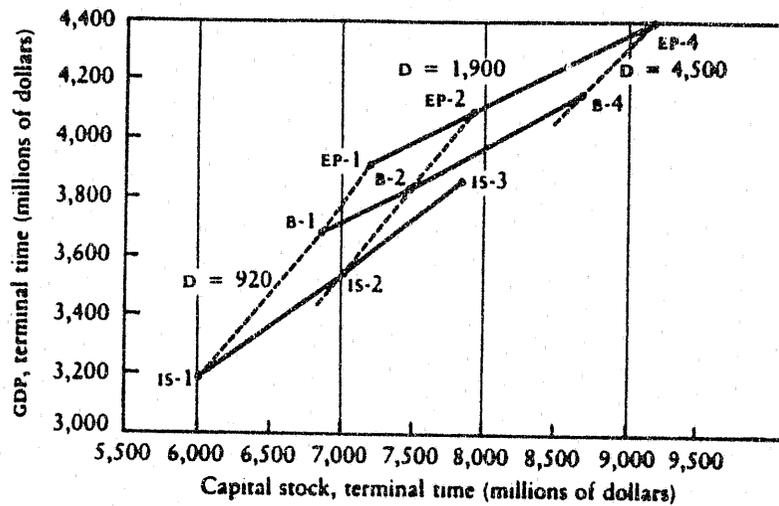
savings and investment is achieved by making total investment equal to the sum of domestic and foreign savings. Growth is determined by the combination of exogenous TFP growth and savings-determined investment. Although domestic and foreign goods are imperfect substitutes, so that the model falls between the structuralist and neoclassicist extremes, terms-of-trade are exogenous. Thus the mechanisms affecting growth are those discussed in the context of Figure 2.

As suggested by the stylized observations above, domestic savings is modeled as a rising function of real GDP, so that a higher growth rate is associated with an increase in the domestic savings effort. This specification of foreign savings reflects empirical evidence that the propensity to save out of foreign capital inflows is less than one. In the simulations, we assume that 40 percent of the inflow goes directly into savings. Given that a portion of the remaining inflow is saved, the net effect is that the overall marginal savings rate from the external resources is about 0.6, a value similar to that estimated by Chenery and Syrquin (1975) and in line with the more recent estimates reported in Section 3.

Table 3 shows how the stylized facts from Korea's experience are built into the simulations of alternative strategies. As before, the EP simulation is intended to be representative of a Korea-like development strategy over a twenty year period starting around 1963. The balanced (B) strategy is meant to be representative of countries like Thailand and Greece which selected a middle of the road foreign trade regime (i.e. some but not excessive bias against exports). Finally the IS simulations are meant to be representative of countries that decidedly chose an import-substitution development strategy. The macroeconomic results in Table 3 for the three

Figure 4

Marginal Productivity of Foreign Capital under
Alternative Development Strategies



Source: Chenery et al (1986, Figure 11-4)

Notes: The points on the dashed line indicate terminal-time GDP and capital stocks under different strategies (IS, B, EP) for a given level of cumulative capital inflow, D. For IS -3, D = 3,000. The slopes of the solid lines indicate the marginal productivity of capital under each strategy.

strategies hold cumulative aid constant across strategies. This translates into a level of capital inflow ranging from an average of 4.1 percent of GDP for the EP strategy to 4.5 percent for the IS strategy.

The macroeconomic implications of varying capital inflows under each strategy are summarized in Figure 4. Note again the higher output-capital ratios of the EP and B strategies, compared with the inward strategy, IS. Because the IS strategy becomes increasingly inefficient at low import levels, the marginal productivity of external resources is correspondingly higher, as indicated by the steeper slope of the IS curve starting from the low inflow of IS-1.

It is instructive to trace the sources and magnitudes of inefficiency. These come from the different values of the trade regime bias and the relative cost of a unit of capital (see Table 3 indicators). The higher cost of capital under the IS strategy reflects the fact that import rationing raises the cost of imported machinery (40 percent is imported in the initial year), which can be only partly substituted by domestically produced machinery. In terms of Figure 2, the effect of rationing under the IS strategy results in an upward shift of the investment schedule in quadrant 4.

To sum up, two lessons are suggested by the results of the simulations summarized here. First, the simulations from the dynamic input-output model suggest that an export-oriented development strategy should be accompanied by early disbursement of foreign aid if a target capacity level is to be attained at a specified date. The second set of simulations from the CGE model show that the marginal productivity of foreign capital is highest in an inefficient regime, precisely because there the premium on foreign exchange (indicated by the bias of the trade regime) is greatest. It remains true that

the overall effectiveness of a given level of foreign inflow is greatest when accompanied by a set of relatively neutral incentives, as under balanced (and, a fortiori, under export promotion) strategies. The simulations illustrate that the benefits from foreign aid are maximized when a given amount of assistance is accompanied by the selection of an unbiased development strategy. 32/

5. Conclusions

Received wisdom on foreign aid has evolved considerably since the early emphasis on the capacity enhancing aspects of foreign assistance. Not only is it now generally accepted that fairly neutral and stable incentives across activities are a necessary pre-condition for successful foreign assistance, but also the concept of such assistance is viewed in a much broader perspective, in which capital flows are only a component of a foreign aid package that includes knowledge transfer and technical assistance. The implication of this broader perspective is that the evaluation of foreign assistance must go beyond the traditional statistical correlations of domestic savings and foreign aid ratios.

The early literature on foreign aid emphasized that foreign exchange shortages were the main constraint on growth. The issue then becomes why a foreign exchange shortage might exist in the first place. The early consensus was that its existence was caused by stagnant demand for developing country exports. While this view may be gaining relevance again today under the combined influence of industrialized countries' protectionism and the simultaneous attempt by the heavily indebted countries to sustain current account surpluses to service their debt, it is no longer considered that

developing countries face an external constraint in commodity exchange. Rather, it is generally agreed that sustained foreign exchange shortages have mostly occurred because of the choice of development strategies.

Nevertheless, the evidence does show that, over the short run foreign exchange shortfalls delay investment plans and the speed with which the capital stock adjusts to its desired level, thereby providing an argument for foreign assistance for adjustment as well as for long run developmental purposes.

The recent statistical evidence on the relationship between foreign aid ratios and domestic resource mobilization efforts should dispel earlier concerns that foreign aid was consumed rather than invested. When foreign aid is defined in terms of ODA rather than by the trade account deficit of the balance of payments, the evidence suggests that most of foreign aid is invested. Unfortunately, there is no conclusive cross-country evidence as yet on the relationship between aid and growth. As argued in the paper, this is probably due to our inability to measure the impact of foreign assistance on factor productivity growth.

Finally I summarize results from macroeconomic simulations of alternative levels of foreign assistance under different development strategies. The simulations are representative of the stylized outcomes of Korea's development strategy over the last twenty years. Two conclusions emerge. First, other things being equal, the early disbursement of foreign aid at the time of the selection of development strategy is preferable to a more even disbursement pattern over time. This conclusion holds strongly if capital accumulation is the only constraint on growth and an outward-oriented strategy is chosen. The second conclusion is that the overall effectiveness of a given level of foreign assistance is greatest when accompanied by a set of relative-

ly neutral incentives between sales on domestic and on foreign markets. Over a twenty year horizon, a foreign assistance level equal to four percent of GDP can result in close to a one percentage point higher growth under an outward-oriented strategy than under an inward-oriented one.

Footnotes

- 1/ See Krueger (1986) for a broader view of foreign aid where aid is viewed as a "bundle" and criticisms of aid are spelled out.
- 2/ The results of these studies are summarized in the volumes by Little, Scitovsky, Scott (1970), Balassa and Associates (1971), Bhagwati (1978), Krueger (1978).
- 3/ An exception is Findlay (1971).
- 4/ Even if aid is nothing more than a capital inflow and capital markets are integrated, an argument for concessional assistance remains because the gestation period of projects, or their investment time frame, is too long and the investor cannot fully capture the stream of returns. See Krueger (1986). In this paper the case for concessional assistance is taken as a given.
- 5/ This diagram combines the presentations in Findlay (1971) and Desai and Bhagwati (1979).
- 6/ Findlay (1971) shows that the same result obtains when domestic and imported inputs are used in fixed proportions.
- 7/ Brecher and Diaz-Alejandro (1977) show that immiserizing capital inflows can also occur even if there is no foreign exchange bottleneck but instead the economy is initially in a distorted situation. This second best situation is not considered here. Neither do I consider the implications of aid for fiscal policy. On this, see Kimbrough (1986).
- 8/ This situation would correspond to what Bacha (1984) refers to as the "programming view".
- 9/ His results are thus consistent with the two-gap literature. Depending on his choice of measure for foreign exchange availability, his long run marginal propensity to invest (with respect to foreign exchange reserves) is in the range 0.04-0.16, and his estimate of the elasticity of substitution between domestic and imported investment goods is 0.6. His results thus provide empirical support for the simulations that will be reported in Section 4.2.
- 10/ See Dornbusch (1980) for a recent exposition. I do not consider the alternative of a fix-price disequilibrium model. Gunning (1980), Waelbroeck (1984) and van Wijnbergen (1986) analyze the impact of aid in a disequilibrium model. The fix-price disequilibrium model is subject to the same criticism as the two-gap model, namely what mechanisms allow for persistent disequilibria. Michaely (1981) inspired by the sizable foreign aid to Israel also analyzes the impact of foreign aid on economic structure in a similar framework, though his focus is different. For most

economies, about 40% of GNP falls in the category of nontradable activities.

- 11/ The evidence on these effects is summarized in Section 4. de Melo and Dervis (1977) show numerically that small differences in TFP growth across sectors have strong growth implications.
- 12/ Some of these criticism have themselves been challenged. For example Marsden and Roe (1977) argue that aid serves as a catalyst for private foreign investment by enhancing creditworthiness. This would certainly appear to be the case for Korea and Taiwan, though not necessarily for Sri Lanka.
- 13/ For example, Griffin and Enos (1970). The same definition of aid is used by Weisskopf (1972), who also estimated (from a panel data set for 17 countries) that 23 percent of capital inflows were offset by declines in domestic savings. Papanek (1972) surveys results from these early studies.
- 14/ Data on ODA flows is available since 1968. A loan qualifies as ODA if its grant element is 25 percent or above. Leipziger (1983) explains and criticizes the currently used methods to calculate the grant element of official loans.
- 15/ Lavy also finds support for the hypothesis that the more developed the economy the higher is the share of aid receipts that is invested, a result also found by Mosley (1980) for a cross-section of 83 countries over the period 1969-77.
- 16/ In the case of Chile a 12 percent real exchange rate appreciation occurred between 1977 and 1980, when the current account deficit (as a percentage of GDP) increased by 7.2 percentage points to 11.2 percent.
- 17/ This was confirmed with simulation experiments of the kind reported in Section 4.2. Note however that, for a group of African countries, van Wijnbergen (1985) finds a positive correlation between aid flows and real exchange rate appreciation.
- 18/ The simulations reported here draw on my co-authored work reported in Kubo, et al. (1983) and Chenery, et al. (1986).
- 19/ Examples are the classic papers by Chenery and Bruno (1962), Chenery and MacEwan (1966), and Bruno (1966).
- 20/ In Chenery's terminology, these models would reflect extreme structuralist views. See Chenery (1975). These models were limited in other dimensions as well, because they were not suited to study the effects of distortions since the shadow prices of linear programming models usually do not reflect market prices). This critique was first elaborated by Taylor (1975) in his survey of programming models. However, see Ginsburg and Waelbroeck (1981) for a formulation in an activity analysis framework that remedies these criticisms.

- 21/ The experiences of South Korea and Taiwan are very similar (see de Melo, 1985) and the stylized outcomes summarized below would apply to Taiwan as well.
- 22/ The effective exchange rate is the number of units of local currency actually paid or received for a one-dollar transaction; the purchasing power parity adjusted effective exchange rate (PPP-EER) is the effective exchange rate multiplied by the ratio of the foreign price level to the domestic level.
- 23/ Over the period 1965-75 (excluding 1973), the PPP-EER for exports varied between 250 and 285 and the PPP-EER for imports varied between 250 and 290 1965 won per dollar (Westphal (1978), Table 2).
- 24/ Students of the Korean experience (e.g. Westphal (1978), Mason et al. (1980)) agree that foreign direct investment (and probably foreign aid) would have been much less if there had been economic mis-management.
- 25/ Williamson (1979), Table 2.
- 26/ Christensen and Cummings (1981), Table 10, p. 298.
- 27/ Kim and Roemer (1979), Table 37, p. 73, using 1962-65 and 1972-75 averages.
- 28/ The structure of CGEs is described in Dervis, de Melo and Robinson (1981, chp. 5), and the particular version of the dynamic input-output model used here is described in Dervis, de Melo and Robinson (1981, chp. 3).
- 29/ Since depreciation is ignored in the present analysis, this restriction is equivalent to requiring that the economy deliver, at the close of the period, a certain pre-specified amount of productive capacity to the next generation. This constraint on terminal capital stock is very common and permits comparisons of different scenarios in which aggregate investment performance is held constant, or is controlled.
- 30/ The imposition of the aggregate constraints discussed above does not really change the essential demand-driven characteristics of the model, although satisfying these constraints requires that additional variables related to aggregate demand be set endogenously. In order to satisfy the constraint that initial-year production in the model be close to actual production, the model varies the level of aggregate consumption in the initial year endogenously. In order to satisfy the constraint that cumulative aggregate investment over time equal an exogenously specified value, the model varies the level of aggregate consumption in the terminal year endogenously. Finally, in order to satisfy the constraint that the cumulative foreign capital inflow equal the available total inflow, the model varies the average ratio in the terminal year endogenously.

31/ Formally, the function is:

$$k_{i,T} = k_{i,T}^0 (\hat{\mu})^{-\alpha m_{i,T}^0}$$

$k_{i,T}^0$ = the actual incremental capital-output ratio for sector i in the terminal year,

$m_{i,T}^0$ = the actual ratio of imported to total intermediate inputs in sector i in the terminal year,

$1-\hat{\mu}$ = import substitution expressed as a fractional reduction in all terminal-year import coefficients,

α = a response parameter, and

$k_{i,T}$ = terminal year incremental capital-output ratio for sector i .

32/ Too much foreign assistance can be forthcoming and lead to a controversial choice of investment projects, as in the well-known case of the Mahaweli investment in Sri Lanka. Levy (1985) shows how the interaction of the preferences of donor bureaucracies and Sri Lankan politics led to this capital intensive project that absorbed close to half of foreign aid between 1979 and 1981 and 45 percent of public investment expenditures between 1982 and 1984.

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