Economic Growth and Foreign Capital Inflow in Less Developed Countries : A Survey of Theoretical and Empirical Literature

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I. Introduction

Capital accumulation is found to be the most important source of economic growth in most of the less developed countries (LDCs) [Ahmad, 1986, pp. 11-25]. Furthermore "the process of economic growth and capital accumulation are closely interconnected whether there is abundant labour or not" [Cairncross, 1963, p. 244]. Thus for acceleration of economic growth in LDCs, the top priority may be attached to the accumulation of capital.

Since capital accumulates through the process of investment, to accelerate economic growth in most of the LDCs, one of the important strategies is, therefore, to increase the rate of investment.[1] But these LDCs are unable to accelerate the rate of investment due to lack of either domestic saving or foreign exchange.

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In other words, rapid economic growth cannot be achieved in these countries, because either the saving investment gap or the foreign exchange gap or both act as a constraint to investment. In such situations foreign capital inflow plays an important role in the process of capital accumulation and hence growth, being used for deficient domestic saving and/or foreign exchange earnings.

The purpose of the present article is to (a) review the planning models of dual gap analysis and empirical literature showing the relationship between the growth of GDP and foreign capital inflow in LDCs, (b) assess critically the findings with respect to major issues and (c) summarize the state of our knowledge on this topic.

II. Two-Gap Models

The most important goal in LDCs is believed to be the growth of GDP/GND [Tobin, 1964, p. 5]. Towards achieving this goal, some planning models have been developed by Chenery and his associates in the framework of the dual gap analysis. Chenery and Bruno [1962] have given a somewhat formal and empirical foundation to the "Two-Gap" theory in their study on Israel. Inspired by the same theory, Mckinnon [1964] has formulated a model to study the effects of foreign aid on the growth of LDCs. 'In recent years this theory has been further refined and formalized in the writings of Chenery and Strout [1966], Chenery and MacEwan (1966), and Chenery and Adelman (1966).

Manne's (1963) multi-sectoral aggregative investment planning model may be regarded as a two-gap

model, although it deals explicitly with only certain publicly controlled sectors of the Mexican economy, This is because of the fact that in the model foreign aid has the dual role of providing foreign exchange and supplementing domestic saving. That is, foreign aid can finance the imports of capital goods and raw materials (e. g., ferrous scrap) required for investment in these sectors and can fill the gap between investment expenditure and available domestic saving. Thus Manne's model gives importance to two categories of imports (capital goods and raw material) in the process of economic growth.

Manne's model is also intended to explore the effects of foreign capital inflow on the rate of growth of entire GNP. It is shown that a comparatively small change in the level of foreign capital inflow could make a large difference in Mexico's growth between 1960 and 1970. To increase the Mexican annual growth rate from 5.5 percent to 8.0 percent, the level of foreign loans and aid required in these key sectors in 1970 would have to be increased from $172 millions to $245 millions. At both growth rates the investment programme of the key sectors is estimated to absorb less than the gross domestic saving available for the use of these sectors. This indicates that in 1970 there would be an excess of domestic saving over investment in these sectors and excess saving cannot be invested due to shortage of imported investment goods. Thus in the model, substitution between domestic and foreign resources is absent, as it is expected in the dual gap analysis. Moreover, the effects of increments in foreign

loans and aid on the key sectoral output depends on which constraint (of the saving and foreign exchange constraints) is binding in a particular situation.

Exports of the key sector's output are considered as exogenous and do not depend upon decisions taken within Mexico. The growth of the manufactured exports is expected to be zero during the period under consideration.

Demand for investment goods is treated as endogenous for the key sectors and exogenous for other sectors. Thus by dividing the economy into two insulated parts, the possibility of substitution between investment goods of the two parts has been ruled out in production. Since GNP growth is the all-important policy goal, Manne's model stresses the importance of required imports financed by foreign capital inflow and does not consider the fact that foreign aid and loans can also finance imports of consumer goods. Again it cannot determine the foreign capital need of the entire Mexican economy to achieve a larger growth rate of GNP. It is also unable to tell us which constraint to growth is dominat for the entire Mexican economy in 1970.

Chenery and Bruno [1962] present a more comprehensive model of foreign capital inflow and development alternatives on Israel. They have tried to formulate an optimum development programme using fiscal and exchange rate policies, and foreign capital inflow. The policy goals of the model are the maximization of GDP, domestic investment and consumption, on the one hand, and the minimization of foreign capital inflow

on the other.

In their attempt they find that the balance of payments, the supply of capital (domestic saving) and labour supply would be potential limitations to the Israeli growth. This model hence allows for the possibility of labour being a scarce factor at some point of time. Foreign exchange is found to be the initial constraint to growth in Israel followed by the saving constraint. As long as the saving constraint is binding and unemployed labour exists, foreign capital inflow raising investment continues to absorb unemployed labour. Until the time comes when labour becomes a scarce factor, foreign capital inflow is shown to go entirely into investment. Since then it goes entirely into consumption. This model, therefore, assigns to foreign capital inflow the task of easing either the shortage of foreign exchange or domestic saving depending on which constraint is in fact dominant. It is also recognized by this model that foreign capital inflow is used to finance imports of consumer goods. Moreover, the productivity of foreign capital is found to be greater in the case of binding foreign exchange constraint relative to the saving constraint.

It has been noted that the entire foreign capital inflow is allocated to investment until the labour constraint becomes operative. But such allocation may not be optimal in consideration of the fact that maximization of current consumption is one of the policy goals in the model. Again the allocation of the entire foreign capital inflow to consumption may not be optimal when labour constraint is operative. It may so

happen that consumption can be effectively constrained by the availability of foreign exchange regardless of the employment situation. Moreover, in this model, the saving rate is assumed to be a controllable policy instrument. Thus this model has ignored not only the optimal use of foreign capital but also the effects of foreign capital inflow on consumption and domestic saving.

Total import demand in the model is comprised of five components : consumer goods for private consumption, consumer goods for public consumption, investment goods, replacement goods and exports. In other words, imported goods are used in five different uses. Import demand, like export supply, has been made a function of exchange rate.[2] The implication is that the price of foreign exchange in terms of domestic currency would be lowered in response to inflow of foreign capital. As a result, the imports would be relatively cheaper while exports would be relatively dearer in Israel. Thus, with inflow of foreign capital, imports would increase and exports would fall creating an incremental equivalent trade deficit. But how each component of import demand is affected by foreign capital inflow is not explicitly shown in the model.

In this model two alternative development programmes corresponding to two exchange rates have been compared. It is shown that the development programme corresponding to the higher exchange rate requires less amount of foreign capital inflow to achieve the same target growth rate of GNP. This is because of the fact that the higher exchange rate would result in a reduction of imports through inducing import

substiution and a fall in import-coefficients (Chenery and Bruno, 1962, p. 87), and expansion of exports. Curiously enough "both programmes require a substantial shift of resources from agriculture and services to mining and manufacturing. This change in the composition of output is necessitated by the limited domestic and foreign demand for agricultural products, the required reduction in the import surplus and the consequent need to expand the production of minerals and manufactured goods, particularly those that substitutes for imports or can be exported" (Chenery and Bruno, 1962, p. 98). The implication is that the composition of output should change if dependence on foreign capital inflow is to be reduced. The composition of output changes with changes in the production structure. Therefore, to reduce the dependence on foreign capital inflow, the production structure should change in a desired direction. But how the production structure, one aspect of the structural changes in the economy, would change in the presence of foreign capital inflow is not dealt with in the model.

Mckinnon's model (1964) also emphasized the implications of the foreign exchange and saving constraints for the efficacy of foreign aid. A two-input fixed coefficient production function is employed, one input is the domestically produced capital goods and the other input is the imported capital goods. Actual current output is equal to the capacity output. The policy goal is to maximize output. But output is mainly constrained by either insufficient domestic saving or insufficient export earnings, although labour-skill instead of

labour-supply may be an ultimate constraint to growth in LDCs where an abundant supply of labour exists. It is found that foreign aid has positive effects on growth but it has proportionately greater effects on the growth when the growth is constrained by foreign exchange rather than domestic saving.

If the foreign exchange constraint is dominant but there exists sufficient domestic saving in the economy, then foreign aid is useful because it contributes to the financing of imports of capital goods. Due to the fact that a fixed coefficient Leontief type production function is used in the model and that foreign exchange constraint is binding, the maximum utilization of domestic capital goods is determined by the availability of imported capital goods financed by foreign aid. The imported capital goods combined with some domestically produced capital in the fixed proportion produce current output, leaving some domestically produced capital goods unutiliged. In this situation foreign aid is exactly matched by equal increments to imports and domestic investment. In the next period output may be increased by using the unutilized domestic capital goods if additional foreign capital goods are available because of additional foreign aid.

One may be interested to know what would happen once the economy described by the model reaches a point where the unutilized domestic capital goods have been absorbed with additionally imported capital goods financed by additional foreign aid. Since no cost is specified for imports of capital goods in the model, foreign aid can still be productive. Inflow of foreign

aid is unlikely to stop at that point. If additional foreign aid is received by the economy in this situation, it would bring with it additional foreign capital goods. But this additional foreign capital goods would remain idle for two reasons. Firstly, domestic saving cannot be increased to produce more capital goods domestically, because it is assumed to be limited by the fixed maximum average propensity to save. Secondly, the model provides no scope for substitution between domestic capital goods and foreign capital goods. If the additional foreign capital goods are to be utilized in these circumstances, some resources must be shifted from consumer goods' production to domestic capital goods' production. Thus the absorption of the unutilized domestic capital goods may lead to a reduction of the availability of consumer goods in the economy.

Exports in the model are treated as a third type of commodity that is not used domestically. So export reduction would not directly increase the availability of consumer goods in the economy. Conceivably, production of exports can be curtailed to release domestic resources for the production of capital goods domestically.

If resources are shifted from consumer goods and exports to the domestic production of capital goods production of consumer goods and exports would be reduced. Assuming that the level of imported capital goods remains the same, the reduction of exports would necessitate additional foreign aid to maintain the target growth rate. Again the reduced domestic production of consumer goods must be supplemented by the imported consumer goods, otherwise the saving limit put in the

model would be exceeded. Thus the absorption of the unutilized domestic capital goods may lead to imports of consumer goods and reduction of exports.

When the saving constraint is dominant, foreign aid, as before, is used to finance imports of capital goods and causes an increase in productive investment. In the real world, it is most unlikely that the needed domestic capital goods can possibly be obtained entirely from abroad. Because of this, there would have to occur a shift in the composition of domestic output in favour of more capital goods accompanied by some imports of consumer goods if foreign capital goods are to be absorbed.

In brief, this model suggests that the full amount of the foreign aid is not used to finance imports of capital goods irrespective of whether the foreign exchange constraint or the saving constraint is binding ; and that some portion of it would be spent on imports of consumer goods. But this model does not take into account either the implications of financing imports of consumer goods by foreign aid on domestic saving or the response of imports to the inflow of foreign aid.

Mckinnon later modifies his model to include imports of replacement parts and raw materials that are said to be financed out of export earnings, whereas foreign aid continues to finance imports of capital goods. In the modified model, he argues that if foreign aid is of an insignificant amount and export earnings are not adequate to finance imports of replacement parts and raw materials, foreign aid may not have the role of easing the foreign exchange constraint to growth. In this situa-

tion, foreign aid may make a higher level of income sustainable by the required raw materials and replacement parts but capital accumulation and growth would not occur. He arrives at such conclusions due to the separation of the sources of foreign exchange.

Finally, Mckinnon sees foreign aid as a source of achieving higher growth rate in LDCs. Even if his model recognizes the importance of imports of intermediate and capital goods in the growth process in LDCs, neither an import function nor import substitution has been considered explicitly. Furthermore, for self-sustaining growth of the economy structural changes ought to take place but such consideration is absent in the model.

The study of Chenery and Adelman (1966) on Greece is intended for an econometric investigation of (i) the effects of foreign aid on growth, and (ii) the policy problems arising from dependence on foreign assistance. In analysing the role of foreign aid in the economic growth of LDCs, this model assigns the dual role of providing foreign exchange and supplementing local saving. Unlike the models of Chenery and Bruno (1962) and Mckinnon (1964), the growth of GNP in Greece is at first limited by the saving constraint followed by the foreign exchange constraint. It is shown in the model that the two gaps ex-ante are unequal and that the larger of the two limits the growth and determines the foreign capital needs of the economy. Like other two-gap models, the positive effect of foreign aid on growth is found to be greater in the foreign exchange constrained situation than that in the saving constrained situation.

It is a consistent model of twenty-nine equations to determine twenty-nine endogenous variables. Its policy goal is the maximization of the growth of GNP although no production function has been used. To achieve a targeted growth rate of GNP, foreign aid enables Greece to raise the rate of investment supplementing domestic saving and providing foreign exchange. This indicates that there exists no scope in the model for foreign aid to finance imports of consumer goods. Thus the effects of foreign aid on consumption decisions (and hence on domestic saving) have been ignored.

In this model total imports are divided into five categories. This classification may be appropriate for the Greek economy, but in the context of the dual gap analysis of growth in LDCs to imports can be classified according to its usage. Imports can be used in LDCs satisfy (i) the consumption need ; (ii) input need for production ; (iii) investment need for creation of capacity. Accordingly, total imports may be divided into three categories : (i) consumer godds ; (ii) raw materials and intermediate products ; and (iii) capital goods. Goods improted from abroad are expected to fall into one of the three categories.

In the model, Chenery and Adelman distinguish among four categories of exports and each category is treated as an endogenous variable. Again this classification of exports may by appropriate for the Greek economy but may not be useful for typical developing economies whose growth process is conditioned by two gaps. Exports of such developing economies as Bruton [1969, p.442] argues, have some charcteristics

in common : "traditional exports" constituting a large part of total exports face quite inelastic foreign demand and newly established non-traditional exports" accounting for only a small proportion face (almost) infinitely elastic foreign demand. The classification of total exports to be appropriate for the dual gap analysis, therefore, may be "traditional" and "non-traditional" exports. In addition, it is reasonable to treat each category of exports as exogenous in the dual gap analysis because of the fact that exports are determined by demand conditions abroad, at least, in the short run.

Assuming three different development programmes for the Greek economy, they have estimated its foreign capital needs for the period 1962-71. It is assumed in the projections that the share of manufacturing in GNP would rise from 20 percent in 1960 to 28 percent in 1972. This increase in the manufacturing share would go towards reducing the trade-deficit either through reduction in imports or increased exports. Thus import substitution is taken care of in projecting the foreign capital needs but is not incorporated in the model.

The need for structural changes has also been advocated by them to reduce the dependence of the Greek economy on foreign aid once the growth process has statred. Structural change in the model has meant the changes in the composition of output towards reduction of imports through import substitution and increase of exports. By structural change we mean changes in the production structure. Even if the effect of a rise in the manufacturing share on the

foreign capital needs has been demonstrated nicely, this model fails to show how the production structure, measured by the sectoral shares in GNP/GDP, would be changed with inflow of foreign aid.

Chenery and MacEwan [1966] have constructed a two-sector model to study the optimal pattern of growth and foreign aid in Pakistan. Two sectors of the model are: (i) "regular production" sector and (ii) "trade improving" sector. Trade improving sector is one which produces either increased exports of import-substitutes. The trade gap is defined as "the excess of traditional imports over traditional exports less the output of the trade improving sector" [Chenery and MacEwan, 1966, p. 157]. Thus this model takes into account import substitution in estimating the trade gap. It also shows how domestic capital and labour can be transformed into foreign exchange by either increasing foreign exchange earnings through export expansion or saving foreign exchange through import substitution.

Since Pakistan has surplus labour and transformation of unskilled into skilled labour is assumed as a part of the investment process, total labour supply is most unlikely to be a limiting factor to growth. On the other hand, output in both sectors is constrained by the scarce factors: capital and foreign exchange. In other words, growth in Pakistan is limited by either the saving or the foreign exchange constraint. In this situation foreign aid is found to accelerate economic growth through financing a higher rate of investment and supplying additional imports.

The model is intended to investigate the benefits

and costs of using a controlled inflow of foreign capital to promote economic growth in Pakistan. In its linear social welfare function, benefits are incorporated in terms of consumption and costs, in terms of foreign capital inflow. The policy goal is to maximize the linear social welfare function for each period of time subject to some constraints. A few of these constraints are the supply conditions of foreign capital, which are specified in three forms: (i) there exists a price (r) of foreign capital at which its supply is infinitely elastic : (ii) foreign capital would be terminated after a specified period of time ; and (iii) there exists an upper limit on the total amount of foreign capital received over the entire plan period.

What is the price (r) of foreign capital in the Chenery-MacEwan model? In it inflow of foreign capital is identified with the trade gap. As a result, there is no room left for debt-servicing in the model. This suggests that foreign capital is available free of charge and hence economically a free resource (Rahman, 1967, p. 152). When the trade constraint is dominant, the productivity of foreign capital is found to be very high. In this situation, the model has demonstrated that, under the first condition, the optimum policy is to increase the inflow of foreign capital. But with this increased foreign capital inflow, it is possible to increase consumption and investment at the same time [Rahman 1967, p. 147]. Thus, there is a possibility of financing imports of consumer goods with foreign capital inflow in the case of dominant trade constraint but it has been ignored in the model.

Since the economic price of foreign capital inflow is implicitly zero, it necessitates the non-economic interpretation of the parameter (r) consistent with Chenery-MacEwan model. The non-economic interpretation of the parameter (r) is provided by Rahman [1967] in terms of "Psychic-Disutility" which is psychological in nature arising out of political reasons and/or national prestige. The recipient country wants to limit inflow of foreign aid or discontinue it after some time ; because it derives psychic-disutility from foreign aid. The index of psychic-disutlity cannot be less than unity, because in that case there would always be a net benefit in receiving any amount of foreign aid for direct consumption and consequently the second and third supply conditions of foreign capital would not be satisfied. Again the index of psychic-disutility must be greater than unity ; because in that case the second and third supply conditions of foreign capital would be satisfied, and there would always be net loss in using any part of foreign aid directly for consumption, as implied by Chenery-Mac-Ewan model. Thus using $r=2$ the model rules out the possibility of financing consumption directly and of substituting domestic saving by foreign aid. In other words, the model does not recognize the fact that foreign capital inflow can effectively influence the domestic saving of the recipient country at a particular point in time.

The Chenery-MacEwan model produces "optimum" growth path where foreign capital is in fact minimized and domistic saving is at its maximum. In this optimization, the growth process of Pakistan during the pers-

pective plan period (1970-85) is shown to pass through three regimes. The analysis of the characteristics of the regimes reveals that at the beginning of the third regime, the economy of Pakistan would experience self-sustained growth through increased saving, expansion of exports, reduction of imports through import substitution, etc. The implication is that the production structure of the Pakistan economy would have been transformed and adapted in such a manner that its dependence on foreign capital inflow for further growth is eliminated. But how the production structure would change with foreign capital inflow has not been incorporated in the model.

Chenery and Strour's work (1966) is the most comprehensive study of the two-gap models. It has outlined a theoretical framework to analyse the process of economic growth with inflow of foreign capital, and to evaluate the current performance of some developing economies receiving foreign capital and to assess their future foreign capital needs.

The policy goal of the model is to achieve a target growth rate of GNP. But growth performance in LDCs, as argued in the model, is subject to three major constraints : (i) the "skill limit" involving "the skill formation required of managers, skilled labour, and civil servants to increase productive investment" (Chenery and Strout, 1966, p. 686) ; (ii) the "saving limit" which is "designed to include not only the marginal propensity to save but the government's ability to increase total saving by changes in the tax structure and by other policies" (Chenery and Strout, 1966, p. 686) ; and (iii)

the "trade limit" which is basically determined by the growth rate of exports and the marginal import rate. Easing these constraints foreign capital inflow is seen to accelerate growth throug more use of domestic resources. Like other two-gap models, foreign capital inflow here also performs a dual role : it supplements domestic saving and provides foreign exchange to finance the required imports.

Growth in the model is explained as a three-phase process through which a developing economy can proceed towards achieving the goal of self-sustained growth. Phase I and II make up investment-limited growth and the operative constraints in these two phases are the "skill-limit" and the "saving limit" respectively. Phase III is characterized by the "trade-limited" growth reflecting one country's inability to change its production structure to meet the changing patterns of internal demand associated with rising level of income, and rate of investment as well as the external demand. Such phase analysis of growth certainly highlights major strategic factors that shape the growth process over time and no doubt suggest broad policy guidelines to scope with changing problems of development, but there exists nothing universal about the "skill-limit" in Phase I and nothing automatic or of logical necessity about the sequence of Phase II and Phase III. Of course, Chenery and Strout elsewhere[3] have explained that the sequence of Phase II and III as given in the model is not universal but may follow each other in any order.

The Chenery-Strout model attaches importance to "minimum imports" arising from the lack of their

domestic supply and their necessity in production. These imports are in inelastic demand in LDCs for sustaining a target growth rate of GNP. Minimum imports include two categories of imports, namely, intermediate goods and capital goods. However, actual imports may be greater than the minimum imports. By what amount the actual imports exceed this minimum depends on the "minimum marginal import ratio (MMIR)". In the model the MMIR has been taken as the average of the incremental ratios for different components of demand, which has been estimated by using the input-output models where import substitution has been incorporated on sectoral basis (Chenery and Strout, 1966, p. 689). Thus the basic Chenery-Strout model incorporates import substitution to evaluate current growth performance and to make five to ten year projections of the foreign capital needs for some LDCs.

They have also developed a supplementary model for longer periods. This model has introduced a variable measuring import substitution in the import demand function [Chenery and Strout, 1966, p. 698]. Thus it also takes care of net reduction in the required imports through import substitution in estimating the foreign capital needs. This model has considered imports substitution in aggregate terms, but it may be studied on a disaggregative basis, namely import substitution in imports of consumer goods, imports of intermediate products and imports of capital goods.

In the model, the growth of exports has been considered as exogenous variable. When it is said that "since export earnings for primary products are largely

determined by demand conditions, a rapid increase in exports typically requires the development of new export products, which is limited by productive capacity as well as organizational and institutional factors" [Chenery and Strout, 1966, pp. 689-690], it is like Bruton [1969] referred to "traditional exports" constituting a large portion of total exports which faces inelastic foreign demand and to "non-traditional exports" constituting a small proportion of total exports whose foreign demand elasticity is almost infinitely elastic. So this model is essentially talking of these two categories of exports, traditional and non-traditional.

The Chenery-Strout model has seen foreign capital inflow as a separate foctor of production and its role in relieving the binding constraint to growth in LDCs. When growth proceeds with inflow of foreign capital through the three phases, each economy, as demonstrated by the growth experience of Israel, Greece, and Taiwan, has substantially increased its ability to sustain further growth from its internal resources [Chenery and Strout, 1966, p. 680]. One of the models implications is that foreign capital inflow is associated with increases in domestic saving, expansion of exports, reduction in imports through import substitution, etc. What all these indicate is that the production structure has been changed in the desired direction to reduce dependence on foreign capital. This model remains vague about the process of changes in the production structure of the recipient country and the impact of foreign capital inflow on that process.

Traditionally, one of the functions performed by

foreign capital inflow is to supplement domestic saving and increase investment in the economy by its full amount leaving no scope for it to finance imports of consumer goods. In the dual gap analysis, the additional role assigned to it is to provide foreign exchange financing the required imports which excludes the imports of consumer goods. Chenery and Strout argue, on the basis of the assumptions[4] made in the model, that "there is no incentive to build excess capacity or to increase aid by reducing saving" (Chenery and Strout, 1966, p. 687). But this does not necessarily follow from the two assumptions of the model, because there remains a possibility for using foreign aid to increase consumption after securing some rise in GNP. In practice, foreign aid/foreign capital inflow can increase consumption through financing imports of consumer goods.

The fact that foreign aid may also enable the recipient country to achieve a desired rate of growth and to enjoy a higher level of consumption has been revealed by Rahman (1967, p. 147). In his model foreign aid is allocated initially to investment, but once the growth target has been realized, additional aid goes into current consumption. Thus a positive consumption effect of foreign aid as shown in Rahman's model, may be regarded as indicative of its substitute nature in accordance with the "Haavelmo Hypothesis". So the Chenery Strout model, postulating domestic saving as a function of GNP alone, fails to analyse the direct effcts of foreign capital inflow on domestic saving decisions.

Two gaps ex-ante map be different but two gaps

ex-post are identical because of the national income accounting procedure. But how would the smaller gap adjust to the larger gap which determines the foreign capital needs. When the saving-investment gap is greater than the foreign exchange gap, adjustment would take place through an increase in imports in excess of the specified minimum level required for growth or reducing exports from the level of the assumed maximum (Chenery and Strout, 1966, p, 690). If the foreign exchange gap is the larger, for adjustment either domestic saving would fall below the maximum saving potential or less productive investment would take place (Chenery and Strout, 1966, p. 690).

This adjustment of the gaps in the Chenery-Strout model takes place on the assumption that actual foreign capital inflow equals the foreign capital needs. But the amount of foreign capital demanded by LDCs far exceeds its total availability from DCs (Rahman. 1967, p, 150. Chenery and MacEwan, 1966, p.152). This may be true even if each LDC uses a minimum of foreign capital and a maximum of domestic saving. Therfore a situation which is more likely to occur in the real world arises when the actual foreign capital inflow is less than the foreign capital needs. In this case, a developing economy is forced to adjust via lower imports, higher exports, and higher domestic saving if the targeted growth rate is to be achieved. Such adjustments are, no doubt, difficult. The Chenery Strout model does not deal with this more realistic type of adjustment to disequilibrium which seems to be a basic weakness in their analysis of demand for

foreign capital (Fei and Ranis, 1961, p. 905).

The existing two-gap models have some inadequacies. Firstly, the two-gap models concentrate on how foreign capital inflow has a favourable impact on the economic growth of a LDC removing the binding constraint. In reality, the growth of output is not only affected by foreign capital inflow but also by changes in such strategic variables as domestic saving, imports, exports, production structure of the economy. None of the two gap models focuses on the influences that foreign capital inflow has on these strategic variables. Secondly, all the two-gap models attach importance to the required imports which consist of intermediate and capital good imports. In such models, foreign capital inflow is seen to finance the required imports. But in reality, in many, LDCs a significant portion of foreign capital inflow is found to finance imports of consumer goods. Consequently, the additive hypothesis that the sum of foreign capital inflow and domestic saving equals investment becomes questionable. Furthermore the financing of consumer goods imports with foreign capital inflow has divergent effects on growth of output, domestic saving, required imports and production structure. To take care of these effects, imports, should be considered in disaggregated form (consumer, intermediate and capita good imports) as distinct to the aggregative form used in most of the two-gap models. Thirdly, per capita income rises with the growth of an economy. With the increase in the per capita income, the demand for final consumer goods increases and so does the input requirements

for production. Again a rise in the per capita income would be accompanied by changes in the production. structure. If this changed production structure is unable to meet the demand for final consumer goods and input requirements, imports would increase. So import demand arises not only due to the level of income but also due to inability of the domestic production structure to match the domestic demand. Thus to explain the import demand, production structure should also be taken into consideration. Hardly any two-gap model has done this. Fourthly, the two-gap models claim that foreign capital inflow can promote sustained economic growth through favourable changes in the production structure. Again changes in the production structure in response to internal and external demand are likely to change exports and imports. Hence they are expected to affect domestic saving, saving of foreign exchange and growth. Therefore, growth process and production structure are interdependent, but production structure is not explicitly included in any of the two-gap models. Finally, the variables involved, explicitly or implicitly, in the dual gap analysis are growth of output, domestic saving, investment, imports, exports, production structure, which are themselves interdependent. Moreover, foreign capital inflow directly affect not only the growth of output, but also indirectly affect other variables because of interdependence among them. To take into account of the interdependence among the variables and to find out the total effect of foreign capital inflow on economic growth, a simultaneous equal model is required. Unfor-

tunately none of the two-gap models falls in this category. However, Ahmad (1986) developed a two-gap model making up the above inadequacies.

In sum, the two-gap models have concluded that foreign capital inflow accelerates economic growth in LDCs by making possible fuller use of domestic resources through relieving the constraint to growth.[5] The effect of foreign capital inflow on growth precisely depends on which constraint is in fact dominant. It is found to be greater in the case of binding foreign exchange constraint in comparison with the case of binding saving constraint.

The above conclusion of the two-gap models follows from two important propositions, namely (i) that the entire amount of foreign capital inflow is used to finance capital formation and (ii) that the overall incremental capital output ratio (ICOR) remains unchanged when the inflow of foreign capital takes place in a LDC. Both the propositions have been criticized by various authors.

Griffin [1970, pp. 103-105] argues that, given a welfare function which includes current consumption and future consumption (i.e., investment) among its arguments, optimal allocation of foreign aid requires some portion of it to be allocated to the current consumption and the rest to investment. This argument has been supported by the empirical findings of Areskoug [1976a]. He has shown that in the 1950s and 1960s foreign capital inflow in most LDCs has been allocated to both current consumption and via investment to future consumption [Areskoug, 1976, p. 480].

Griffin [1970, pp. 108-110] has mentioned various reasons why increases in foreign aid have tended to increase the overall incremental capital-output ratio (ICOR) in LDCs. The main reasons for higher ICOR with inflow of foreign capital may be stated as fllows. Firstly, the donor countries use the economic aid for the achievement of a variety of other objectives,[6] besides the economic development of the receiving country. Secondly, they have some ideological bias against the government ownership of productive activities in the recipient country. Such ideological bias tends to alter the pattern of investment in favour of social overhead capital and economic infrastructure. Thirdly, they have greater administrative advantage in investing in a few large projects rather than many small ones. Such consideration leads to changes in the composition of investment in the recipient country. Fourthly, they have also a bias towards project assistance. Again in project selection and design the recipient country has a bias towards foreign exchange intensive projects. Fifthly, sometimes the tying of aid leads to increases in the cost of investment. Sixthly, Hazari (1976) argues that foreign aid accentuates the income inequalities in the aid receiving country. With widening income inequalities, the consumption of the upper income groups through the "international demonstration effect" and that of the lower income groups through the "domestic demonstration effect" tends to consist of more and more capital intensive commodities (Hazari, 1976. p. 204). If it is true, the production structure of the aid receiving country tends to become more and more capital

intensive in response to the domestic demand pattern. Finally, the technology brought by foreign private investment in LDCS tends to be again biased towards capital intensity.

Because of the fact that some portion of the foreign capital inflow goes to current consumption and the rest to investment, and that the inflow of foreign capital can be associated with an increase in overall ICOR, it is possible, as Griffin [1970, p. 108] has argued, that the positive effect of foreign capital inflow on investment may be more than offset by an increase in the overall ICOR, and consequently the growth rate of the recipient country may actually fall.

This view of Griffin has come under attack by Kennedy and Thirlwall [1971] and Stewart [1971]. They argue that the ICOR for an aid financed project may increase because of the reasons cited by Griffin and others; but it is not logical to say that the overall ICOR for the economy would be increased due to an increase in the ICOR for a project. The rationale for this is that the overall ICOR is the average of the sectoral ICORS weighted by the share of the increase in output and a very high ICOR for a particular sector is most unlikely to affect the overall ICOR to a significant extent (Stewart, 1971, p. 145). Furthermore, even if the aid financed projects are relatively capital-intensive, it may be quite possible for the overall ICOR to fall because of two reasons: firstly, the greater availability of foreign exchange with increased inflow of foreign capital may enable a more productive and fuller use of domestic resources; and secondly, the aid financed projects may

have external effects (in the form of external economies) on the output of the other sectors of the economy (Kennedy and Thirlwall, 1971, p. 137).

However, in a developing economy investment projects may be grouped into three categories : (i) projects financed by only domestic resources; (ii) projects financed by combination of domestic and foreign resourecs; (iii) projects financed by foreign resources alone. It is quite possible that the ICOR in sectors consisting of projects in categories (ii) and (iii) may increase because their selection and design are not free from influences exerted by the donor countries. The ICOR in the sectors consisting of projects in category (i) is expected to remain unaffected unless the country concerned adopts inappropriate technology imported from abroad. Hence, on balance the overall ICOR for the economy is likely to in crease. But whether the increase in the overall ICOR is significant or not depends on the size of the different sectors of the economy and the composition of investment in those sectors.

Therefore, the statement that foreign capital inflow increases the overall ICOR is controversial. It depends mainly on the size of the different sectors of the recipient economy, the size and composition of investment in them, the influences of the donor countries in projects selection and design, and externalities generated by those projects.

III. Some Empirical Findings on the Relationship Between Economic Growth and Foreign Capital Inflow

On the basis of the preceding theoretical discussion

one cannot generalize that foreign capital inflow always promotes economic growth in LDCs. This is because of the fact that foreign capital may exert either favourable or unfavourable effects on it. Moreover, this effect may vary from country to country for LDCs in general and from time to time for an individual LDC depending on the dominant constraint to its growth.

Attempts have been made in the dual gap analysis to establish a positive relationship between economic growth and foreign capital inflow, but this relationship has not been empirically tested by regressing economic growth on foreign capital inflow. However, a few empirical studies on this relationship are available. The findings of these are presented below.

Cohen (1968) has tried to find out the relative effects of exports and foreign capital on the economic development of some LDCs. For this purpose he has tested two hypotheses : (i) do exports and foreign capital affect economic growth positively ? ; and (ii) has one unit of foreign exchange earned from exports the same effect on growth as one unit of foreign exchange obtained from foreign capital ?

Due to non-availability of long time series for individual LDCs, he has examined the postulated relationship using cross section data from 27 countries over the period 1955-60 and 41 countries over the period 1960-65. The former period is characterized, as he has mentioned, by stagnated exports and consequeutly increased inflow of foreign capital in LDCs, while the latter period has the characteristics of exports from and conseqent decreased inflow of foreign

capital in LDCs. His estimated equations (Cohen, 1968 p.284) for the two periods are :

$$\triangle Y/Y = 0.194 + 0.621\ \triangle E/Y + 0.130\ F/Y \quad (1955-60)$$
$$(9.27)\quad (4.69\qquad (5.37)$$

$$\triangle Y/Y = 0.243 + 0.215\ \triangle E/Y + 0.101\ F/Y \quad (1960-65)$$
$$(8.77)\quad (2.15)\qquad (3.47)$$

whre Y = GNP at 1965 dollar prices, $\triangle Y$ = change in GNP during the six-year period, $\triangle E$ increase in export earnings over the six-year period, F = net foreign investment defined as the cumulative trade balance over the six-year period, t-ratios are in parentheses.

The estimated equations suggest that exports and foreign capital have positive effects on growth of GNP for both the periods. The regression co-efficients of increased exports are larger than the coefficients of foreign capital indicating that in the past the contribution of an extra dollar of exports to growth of GNP is greater than that for an extra dollar of foreign investment. Since foreign capital in the study is measured by the deficit in the trade balance, it is most likely to be underestimated, because the relevant measurement for the foreign capital inflow affecting economic growth should be the deficit in the current account of the balance of payments which includes the balance on trade, services and factor payments. Consequently, its effects on growth may also be understated. Even if he mentioned some characteristics of the two periods, these do not tell us anything about the binding constraint to growth in those countries.

Griffin and Enos (1970) have estimated the relationship between foreign aid and economic growth

of LDCs. Using United Nations data for fifteen Asian and African countries covering the period 1962-64 they have obtained :

$$Y = 4.8 + 0.18\ A/y$$

where Y = average rate of growth of GNP, A = amount of foreign aid received. The coefficient of foreign aid is statistically insignificant indicating that there is no close association between the average growth rate of GNP and the amount of foreign aid received (Griffin and Enons, 1970, p. 317)

They have also empirically tested this relationship making use of data from twelve LACs for the period 1957-1964. Their estimated equation is :

$$y = 42.97 - 6.78\ A/y$$

The regression coefficient of foreign aid shows that the average rate of growth of GNP is inversely related to the ratio of foreign aid to GNP. The implication is that the greater the inflow of foreign capital, the lower the rate of growth of the recipient country (Griffin and Enos. 1970, p. 318).

A similar relationship is also estimated for Turkey using time series data for the period 1951-1961. The estimated equation for Turkey is :

$$Q_{t+1} = 12.5 - 0.047 A_t$$

where Q = percentage change in GNP per capita. The relation between percentage change in per capita GNP and foreign aid received is found to be negative (Griffin and Enos, 1970, p. 318). In this relation one-year lag is assumed. They haye also tried for different lags and different specifications of the relationships but found no significant change in the relationship.

Voivodas (1973) has postulated a positive relation between growth of output and foreign capital inflow in the framework of the two-gap model where either constraint to growth is assumed to be dominant. His postulate is based on the two propositions of the two-gap models, namely, (i) the entire amount of foreign capital is allocated to domestic capital formation and (ii) the overall ICOR does not change with inflow of foreign capital.

He has tested the postulated relation with 198 observations obtained by pooling the time series and cross-section data from a sample of 22 LDCs. His estimated equation is :

$$dQ_t/Q_t = a - \underset{(0.201)}{0.013}\ F_t/Q_t$$

Where Q = real GDP, F = the balance on goods and services account of the balance of payments deflated by an index of import prices ; dQ = change in Q, t = time period, a = dummy variable for individual country to allow for inter-country differences in growth experiences, the figure in the parentheses is a t—ratio.

The coefficient of foreign capital inflow is found to be insignificant at the 5 percent level suggesting that there exists no significant relationship between the two variables. He has also tested the second proposition and found that foreign capital inflow is associated with a higher overall ICOR. So the increase in the overall ICOR may not be sufficient to ensure a negative relationship between growth of output and foreign capital inflow. His conclusion is that "the ordinarily beneficial effect of foreign capital inflow on domestic growht

tends to be neutralized either by a substantial spillover of foreign capital inflow to consumption or a pronounced increase in the incremental capital output ratio or both" (Voivodas, 1973, p. 347).

Foreign capital inflow is defined as the deficit in the trade balance ; so it may be underestimated. Nothing is menioned about which constraint to growth is dominant in individual LDCs during the data period. If countries were classified into two groups-one group for the saving constraint and the other group for the foreign exchange constraint depending on their dominance-the estimated equation for the two groups of LDCs could be different and hence different conclusions might be drawn.

Besides, he has also undertaken a time series study for South Korea to estimate the same relationship under the condition of binding foreign exchange constraint over the period 1962-68 (Voivodas, 1974a, pp. 483-484) He has obtained the following result :

$$dQ/Q = 3.74 + 0{,}92\ F/Q$$
$$(t = 2.01)$$

It shows that a positive and significant relationship exists between the growth of output and the proportion of foreign capital inflow to output. In addition, he has observed an inverse relationship between the overall ICOR and foreign capital inflow in South Korea, just opposite of the prediction of Griffin (1970).

Papanek (1973b) has examined the relationship between growth of GDP and foreign capital inflow in 85 LDCs. Since different components of foreign capital inflow are expected to have different effects on growth

Papanek, 1972, p. 939), he has divided foreign capital inflow into three components : (i) foreign aid (A) ; (ii) foreign private investment (P) ; and (iii) other inflows (T). He has estimated the following equation using the cross-section data from 34 LDCs for the 1950s and 51 LDCs for the 1960s :

$$dQ/Q = 1.5 + 0.20S + 0.39A + 0.17P + 0.19T$$
$$(2.5)\ (6.0)\ (5.8)\ (2.5)\ 2.1)$$

where S = gross domestic saving, Q = GDP, figures in the parentheses are t—ratios.

It is observed that each component of foreign capital inflow has a positive effect on growth of GDP. Of the three components, foreign aid has the more significant larger effect on growth. This is because foreign aid is expected to be specifically designed to foster economic growth in LDCs and is biased toward countries with balance-of-payments constraints (Papanek 1973b, p.122), The combined effect of foreign capital on growth is seen to be larger than that of domestic saving. This may be accounted for by the fact that unlike domestic saving, foreign capital inflow performs the dual role. namely, supplementing domestic saving and providing foreign exchange to finance the required imports.

Stoneman (1975), like Papanek (1973b), has tested the relationship between growth of GDP on the one hand, domestic saving and different foreign capital inflows, on the other. Of the different foreign capital inflows, he has considered net direct investment (X_3) net foreign inflows (X_4), and stock of foreign direct investment (X_5). He has estimated the following equation

using cross-section data from the sub-samples which are obtained on the basis of (i) the time period and (ii) geographical region :

$$\triangle Q/Q \quad c + b_2 s + b_3 x_3 + b_4 x_4 + b_5 x_5$$

and the results are shown in Table 3.1.

He has obtained a positive and significant relationship between growth of GDP and net foreign inflows. Net foreign inflows here are composed of... foreign aid and other long-term inflows. The coefficients of the net foreign inflows are larger than that of domestic saving. This difference may be accounted for by the fact that aided projects are more likely to be specifically designed for economic growth than average investment financed by domestic saving, some of which are undertaken mainly by shortterm profit considerations (Stoneman, 1975, p.). He has also found a significantly negative relationship between growth of GDP and the stock of foreign direct investment. This negative effect is termed as "structural effect".

His results indicate that foreign aid has a favourable effect on growth but the negative structural effect associated with the stock of foreign direct investment retards it.

All the empirical studies discussed so far have used the SEM to estimate the relationship between growth and foreign capital inflow or its different components. This estimation method provides only the direct and immediate effect of foreign capital inflow on growth. In practice, foreign capital inflow may also indirectly influence growth through its effects on other variables. To obtain the total effects (both direct and indirect) of

foreign capital inflow on it a simultaneous equation method should be used for estimation.

An attempt has been made in this direction by Gupta [1975]. At first he has estimated the direct Effect of foreign capital inflow on growth of GDP using cross-section data from 40 LDCs in the sixties and obtained the following result [Gupta, 1975, p. 363] by the SEM:

$$\Delta Q/Q = 3.1193 + 0.09582\ S/Q + 0.26582F$$
$$(1.691) \qquad (3.735)$$

Following Papanek (1973b), he has also disaggregated the foreign capital inflow into three components and obtained the result (Gupta, 1975, p. 364) using the SEM:

$$\Delta Q/Q = 3.5708 + 0.08398\ S/Q + 0.15553A$$
$$(1.415) \qquad (2.671)$$
$$+0.19531P \qquad +0.29783T$$
$$(1.362) \qquad (2.097)$$

The single equation results indicate that direct effect of foreign capital inflow or its different components on growth is positive.

To obtain the total effects of foreign capital inflow on growth of GDP in the 40 LDCs he has used the simultaneous equation method and had the following results[7]

$$\Delta Q/Q = 5.4703 + 0.1146A + 0.0905P + 0.2669T$$

The simultaneous equation result suggests that total effects of each component of foreign capital inflow on growth is also positive. But the total effects of each component is smaller than the direct effects. This may be attributable to negative indirect effects that work through the unfavourable effects of foreign capital inflow (or its different components) on domestic saving.

Table 3. 1 : Coefficients and t—Statistics (In Parentheses) for Regression equations of Stoneman (1975)

Sample	N	c	b_2	b_3	b_4	b_5
Basic	188	1.088	0.252	0.076	0.318	-0.029
		(2.29)	(9.27)	(1.37)	(8·57)	(3.41)
Extended	211	2.012	0.190	0,009	0.260	-0.022
		(4.50)	(8,42)	(0.16)	(7.02)	(2.66)
Restricted	138	I.902	0.204	0.199	0.262	-0.027
		(2.64)	(4.88)	(1.47)	(4.67)	(1.60)
Latin America	78	1,545	0.199	0.168	0.309	-0.013
		(2.23)	(4.78)	(1.61)	(3.46)	(1.17)
Africa	24	2,101	0.132	0.102	0.228	+0.020
		(2.06)	(1.72)	(0.67)	(1.80)	(0.61)
Asia	40	0.642	0.275	1.142	0.501	+0.018
		(0.71)	(6.81)	(2.58)	(4.11)	(0.91)

Mediterranean Countries	46	-0.427	0.327	0.032	0.389	-0.059
		(0.25)	(3.59)	(0.27)	(4.02)	(1.61)
Late Sixties	65	0.700	0.306	0.183	0.311	-0.042
		(0.84)	(6.93)	(2.12)	(5.14)	(3.38)
Late Fifties	41	0.158	0.226	0.227	0.320	-0.026
		(0.16)	(3.67)	(1.58)	(3.76)	(1.68)
Early Fifties	27	3.530	0.132	-0.472	0.283	0.075
		(2.88)	(1.80)	(2.71)	(3.35)	(2.65)

Where Nt = he number of observations

cc = constant term in the regression equation

b_2 = the coeffient of GDS as a proportion of GDP

b_3t = he coefficient of net direct investment as a proportion of GDP

b_4th = e coefficient of net foreign inflows as a proportion ofGDP

b_5 = the coefficient of stock of foreign direct investment as a proportiou of GDP

Source : Stoneman (1975, p. 17)

Ahmad (1986) has built a simultaneous equation model in the framework of dual gap analysis for the Bangladesh economy. He has estimated the following equation using the SEM :

$$\Delta Q_t/Q_t = 0.18\ S_t/Q_t + 0.18\ F_t/Q_t + 0.18\ M^k_t/Q_t$$
$$(2.01) \quad (2.01) \quad (2,01)$$

The single equation result suggests that the direct effect of foreign capital inflow on growth of GDP is significantly positive. To obtain the total effect, he has estimated the same equation/model using three stage least squares (3SLS) method :

$$\Delta Q_t/Q_t = 0.15\ S_t/Q_t + 0.15\ F_t/Q_t + 0.15\ M^k_t/Q_t$$
$$(1.79) \quad (1.79) \quad (1.76)$$

The simultaneous equation result shows the significant positive total effect of foreign capital inflow on growth of GDP, but the total effect is less than the direct effect. This suggests that the indirect effect of foreign capital inflow on growth of GDP is negative. The indirect effect is negative because foreign capital inflow has exerted a negative effect on gross domestic saving in the Bangladesh economy during the period 1960/61-1979/80.

IV. Conclusion

The two-gap models have seen foreign capital inflow as a factor promoting economic growth in LDCs. The actual effect of foreign capital inflow on growth is expected to be greater with the binding foreign exchange constraint than that with the dominant saving constraint.

The empirical studies, based on the SEM, have

demonstrated that foreign capital inflow can affect growth either favourably or unfavourably. But this is only its direct effect on growth. In addition, other variables in the economy, some of which are the determinants of growth, may be affected by inflow of foreign capital. As a result, foreign capital inflow can influence growth through its effects on other determinants of growth. This is its indirect effect which may be either positive or negative.

Therefore, the total effect, being comprised of both the direct and indirect effects, of foreign capital inflow, can be obtained by using a simultaneous-equation model. It may again be positive or negative in an individual LDC indicating that the hypothesis that foreign capital always promotes economic growth is not universally true. However, most of the studies have found that foreign capital inflow positively affects the rate of economic growth in LDCs.

Notes

1. Similar views have long been maintained by many development economists. For instance, Rostow(1960) has defined the process of "take off" into sustained growth in terms of a minimum ration (10 percent) of net investment to GDP. Lewis (1955) has also maintained that the process of development is one of transforming an economy from being a 5 percent saver and investor to 12 percent saver and investor.
2. How effective would be devaluation, in the absence of foreign capital inflow, to close up the foreign exchange gap in a two gap model where export supply and import demand are postulated as function of exchange rate ? In such a situation devaluation is normally expected to increase exports and reduce imports. Since the foreign exchange gap is defined as

the difference between import minimum and export maximum, devaluation may cause imports to fall below the minimum resulting in a fall in the growth rate. A fall in the growth rate may result in reduction of production of exportables. Thus the effect of devaluation on exports depends on two opposing forces : Likely increase of exports due to devaluation and decrease of exports due to reduction of imports below the minimum. So it is theoretically indeterminate. consequently, the effectiveness of devaluation in closing up the foreign exchange gap is also uncertain in the twogap situation.

3. See Cheney and Strout (1968, p. 914).
4. The assumptions are : (i) "aid is sufficiently limited-or expensive to make the recipient unwilling or unable to increase aid merely to increase consumption without also securing some rise in GNP" ; (ii) "the country tries to maximize consumption until the target growth rate is attained."
5. Similar conclusions have been reached by Rosensten-Rodan (1961), Ball (1962), Massel (1964), Fei and Paauw (1965). Sengupta (1968) and Bacha (1974). While Rosensten-Rodam, Ball, Massel, Fei and Paauw have found a positive relationship between foreign capital inflow and growth on the implicit assumption of the saving constrained cases, Sengupta and Bacha have also observed the similar relationship between the two variables when either constraint is binding to growth.
6. For details of the objectives of the donor countries for providing foreign aid, see Little and Clifford (1966, pp. 78-92).
7. This result is presented from Gupta (1975, p. 369, Table I). We have omitted other exogenous variables in presenting this equation simply because here we are not interested in those variables.

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