CHAPTER 3

RESEARCH METHODOLOGY

RESEARCH METHODOLOGY

3.1 The Basic Model

Since the main objective of the present study is to relate a country's external orientation to its economic growth, an `externally-linked' or `externally-oriented' model of economic growth is devaloped. The model incorporates, through various equations, all those sources of growth which flow into a country from the outside world. Besides these flows, it also includes the growth in industrial nations as a separate determinant having a significant impact on the growth of developing nations.

Traditional growth theory puts forward two basic sources of growth - capital and labour. Over a period of time, growth of any nation will be determined by the rate of growth of labour force and total capital stock in the country. Increased labour will contribute to growth through higher domestic production and thus raise incomes. Similarly, increased capital formation will enable larger investments to be made which will ultimately expand domestic production through increased productive capacity and thereby incomes. A common feature of these sources is that they both cause the developing country's transformation (production possibility) curve to shift outward over time. This simplistic traditional proposition of growth can be given a functional form as :

$$G = f(K,L)$$

where G, K,and L are Real GNP per capita, total Capital stock and Labour force respectively. In the same form, the growth rates can be shown as :

$$g = f(k, l)$$

where g, k and L are the rates of growth of real GNP per capita, capital formation and labour force respectively.

A cross-section study by Sommers and Suits (1971) made use of a 3 equation model of economic growth which was represented as :

$$GCF/GNP = I(GNP/N) \quad (a)$$

$$dN/N = P(GNP/N) \quad (b)$$

$$r = G(GCF/GNP, dN/N) \quad (c)$$

where equation (a) expresses fraction of GNP devoted to Gross Capital formation as a function of level GNP per capita. Equation (b) expresses the annual rate of population growth as a function of GNP per capita and equation (c) expresses the rate of growth (r) of GNP per capita as a function of the fraction invested and rate of population growth. An important finding of their study was that economic growth rates decline with rasing affluence. However, two major limitations of the study were that firstly, important growth factors were neglected entirely and secondly, in equation (c), the rate of growth of labour force would have been a better parameter in determining growth than rate of population growth.

In another cross-section study, Feder (1982) estimated a growth function which included, besides capital and labour, exports as a major variable explaining growth.

However, the proporents of modern theory of economic growth consider the growth of labor force as exgenous i.e. determined by domegraphic factors whereas growth of capital stock endogenous determined in the behaviour of the economic system it self with

the acts of savings and investment forming an integral part of the ecoonomic process[1].

This argument of endogeneously determined capital accumulation (or capital growth) is accepted the present study and on the same line of argument, labor growth is exchanded from the model. To put it differently, growth of labor as a variable, in the present model, is assumed to remain constant or unchanging.

On the basis of these studies, in the present study, the traditional growth model is witha capital stock is extended to incorporate the foreign inflows which help in determining the rate of growth. These foreign inflows are mainly in the form of foreign trade (commodity and foreign exchange inflow), foreign capital (capital inflow) and foreign technology (technologi in flow) Thus,

$$g = f1\ (k, ft, kf)$$

where g and k are as specified earlier,

ft = foreign trade

kf = Foreign capital inflow.

In the present study, foreign trade constitutes total exports and total imports and foreign capital inflow is mainly in the form of foreign aid and foreign borrowing. As regards technology inflow,

---

1. This view is expressed a little more succintly in Chacholiades M.,"International Economics".Mcgraw Hill International Economic series, Singapore, 1990. pp.115, and is quite convenient to accept in context of the present study.

it is assumed to be embodied in Direct foreign Investment (DFI) and import of capital goods including intermediates and raw materials[2]. The latter is automatically included in foreign trade whereas the former is identified separately.The above function can be disaggregated thus in order to capture the impact of foreign inflows on growth in a much more exact manner, i.e.

$$g = f(K,X,M,FA,DF,DFI) \qquad (A)$$

where

X = Total export value of the country.

M = Total import value of the country, including capital goods, intermediates and raw materials.

FA = Foreign Aid at current prices or all concessional borrowing including grants.

DF = Foreign Debt or foreign borrowing at current prices or all non-concessional borrowing including loans on government account

DFI = Direct Foreign Investment at current prices.

Michalopoulos and Jay (1973) in an attempt to remedy the disadvantage of omission of certain relevant variables in explaining GNP growth in terms of export growth included domestic and foreign capital as well as labour in the regression equation. They expressed foreign capital as the average current account balance during the particular period as a proportion of initial year GNP and domestic capital as the average difference between gross fixed capital formation and current account balance as a proportion of initial year GNP.

---

2. See Lall's Classification of components of foreign technology inflows in Chenery and Srinivasan (1989), Pp 1631.

In relating export growth to the growth of GNP, Balassa (1977) preferred to use incremental exports-GNP ratios rather than changes in export-GNP ratios on the ground, that the former, rather than the latter will indicate differences in the relative importance of exports in GNP across countries.

V.R. Panchmukhi (1978) in his study of India used export-GDP, import-GDP and trade balance-GDP ratios to indicate the country's degree of openness Balassa and other researchers also recognise a rise in export-to-GDP share over a period of time as an indicator of the leading role of exports in the growth process.

On the basis of Panchmukhi's definition which is more relevant to the present study, equation (A) has been further modified accordingly in order to assess the relative importance of trade investment and capital flows in overall domestic production. Thus,

$$g = f1\ (k,x,m,fa,df,dfi) \qquad (1)$$

k = Growth rate of gross fixed capital formation

x = exports-GDP ratio i.e. G/CDP. It denotes the contribution of exports in the overall domestic production (GDP) of the country.

m = imports-GDP ratio or m/GDP i.e. contribution of imports in the total GDP. These ratios broadly reflect the relative importance or contribution of exports and imports in the GDP and the extent of a country's openness.

fa = Foreign aid as a proportion of GDP,

df = foreign debt as a proportion of GDP,

dfi = direct foreign investment as a proportion of GDP,

Further, separate functional relationships need to be specified for the determinants of k,x and m so that the model becomes complete in itself.

Economic theory emphasises the significance of foreign capital and technology inflows for the domestic country in terms of its impact on the country's capital formation. Besides domestic savings, capital formation is augmented through the inflow of foreign savings or foreign capital and foreign technology which, as the theory says and as mentioned earlier, is mainly in the form of foreign aid, foreign borrowing, direct foreign investment and import of capital goods. This theoretical proposition is given a functional form in the present study in order to empirically establish the relationship between foreign capital and domestic capital formation and the contribution of each form of foreign capital in augmenting the country's domestic capital. Thus,

KF = f2 (GDS,FA,DF,DFI,MK)

where

KF = Gross fixed capital formation at current prices.

GDS = Gross Domestic savings.

FD, DF and DFI are as defined in function (A)

MK = Import of capital goods at current prices.

Alternatively, for analysis in the present study, the above function is also expressed in terms of proportion of Gross Domestic Product. Thus,

kd = f2 (gds,fa,df,dfi,mk) (2)

where

fa,df,and dfi are as defined in function (1)

kd = Gross fixed capital formation as a proportion of GDP

gds = Gross Domestic savings as a proportion of GDP

mk = import of capital goods as a proportion of total imports

All the above ratios are incorporated as percentage in the present model.

Khan and Ross (1975) estimated a demand for imports equation in order to analyse the cyclical and secular income elasticities of imports. They used a traditional import demand equation relating quantity of imports to the ratio of import prices to domestic prices and domestic real income. The equation was estimated in a log-linear form.

Warner and Kreinin (1983) estimated, both, the import-demand as well as export-demand functions for 19 industrial countries. They identified the determinants of imports as real GNP, real import prices (import prices divided by the domestic wholesale prices), import prices in terms of foreign currency and real exchange rate and those of domestic exports as real GDP of importing countries, export prices, both, in terms of local as well as foreign currency and real exchange rate. They found that import and export prices and exchange rate were powerful determinants of imports and exports.

In a more recent study by da Costa (1990) on India's balance of payments in the 70s and 80s, the major determinants of exports as identified by him are Real Income of Industrial countries and Real Efective Exchange Rate. For imports, he identified India's real income and relative import price as the major determinants.

On the same lines of these studies, the major determinants of

exports as a proportion of GDP in the present study are identified as :

$$x = f3\ (Yic, R, Px, gd) \qquad (3)$$

where

Yic = Real Income growth of industrial countries as measured by the growth of index of GDP. It is interpreted as Real GDP growth.

R = Real Exchange Rate (Nominal Exchange Rate deflated by foreign and domestic price levels and export weighted).

Px = Unit value Index of Exports of domestic country taken as a proxy for export price and

gd = Growth rate of Real GDP of domestic country,

and the major determinants of imports as a proportion of GDP are identified as :

$$m = f4\ (gd, R, Pm/P, FER) \qquad (4)$$

where gd and R are as specified in function (3).

Pm/p = Real import price i.e. import unit value taken as a proxy for import price (domestic currency) deflated by the domestic price level.

FER = Foreign Exchange Reserves.

Thus, to sum up the entire framework of the analysis, the following main functional relationships have been established.

$$g = f1,\ (k, x, m, fa, df, dfi) \qquad (1)$$

$$kd = f2,\ (gds, fa, df, dfi, mk) \qquad (2)$$

$$x = f3,\ (Yic, R, Px, gd) \qquad (3)$$

$$m = f4,\ (gd, R, Pm/P, FER) \qquad (4)$$

Once these functional relationships are established, it becomes necessary to define the three major parameters of the study viz. economic growth, external orientation and growth in industrial countries as understood in the present study and incorporated in the model.

3.2 Identities of Major Parameters

3.2.1 Economic Growth

Economic growth, as understood here ,refers to rise in the real per capita level of income of the nation by way of a rise in Domestic Product including foreign trade and capital flows. In other words, a rise in the per capita Gross National Product (GNP) in real terms would imply economic growth. The traditional definition of GNP is accepted here which is :

$$GNP = C + I + G + (X-M)$$

where C = Consumption; I = Investment; G = Government Expenditure and X - M = Net income from abroad or the difference between exports and imports.

For the present study, economic growth, as measured by the GNP, rather than GDP, is considered to be a superior measure since it includes net factor income from abroad and also since the present study is concerned with a country's position in relationi to the rest of the world i.e. its economic performance or growth in the international context.

3.2.2 External Orientation

By external orientation, is meant a country's position in the international economy-its links with the outside world with respect to trade, capital and technology flows. It is hypothesised that growth in the industrial countries will trickle down to the developing nations via these flows in the form of greater access to exports, imports, aid, borrowing and investment and ultimately enhance growth in developing nations. External

orientation as understood in the present study also means the extent to which a country has opened itself to the outside world and successfully integrated itself into the international economy with respect to trade, capital, investment and technology. The degree of openness and external orientation of a country is measured with respect to terms of trade as a proportion of GDP or share of foreign trade (exports plus imports) in GDP, share of direct foreign investment in GDP, terms of trade, level of foreign exchange reserves and level of external debt.

Thus, a link is sought to be established between growth in industrial economies and the developing ones, the link being the developing country's external position with respect to trade, foreign capital and tecnhology inflows.

3.2.3 Growth In Industrial Nations

Growth in industrial nations would imply a rise in their real Gross Domestic Product (GDP) which would in turn imply growth in real income. It is implicitly assumed that growth in any form, especially real GDP, in the industrial countries would raise the level of aggregate demand (through rise in incomes) in these countries and also raise supply (through rise in domestic production). Increased demand would benefit the developing nations by way of increased exports. Similarly, increased supply would mean greater access to goods, services, capital and technology for the developing nations which would have a backward linkage and raise domestic production and incomes in these countries. Thus, in this manner, benefits of growth in industrial nations would ultimately, over time, `trickle down' to the developing nations through increased demand and supply in the

developed nations and increased production and incomes in the developing ones.

3.3 Conceptualization of Variables, Equational Forms and Expected Signs

This section expresses the basic functional framework in its actual equational forms. These equations incorporate the various hypotheses of the study which shall be the basis of the empirical investigations of the study. Alongwith the equations, the expected signs of the coefficients and a brief explanation of the variables used in the model and their significance in the study is also presented.

To begin with, a concise list of all the variables used in the model follows (all variables are expressed in US dollars) :

pgn = growth rate of real GNP per capita.

kd = Gross fixed capital formation as a proportion of GDP (percentage)

x = exports as a proportion of GDP or export-GDP ratio (percentage)

gx$ = Growth rate of real exports

m = imports as a proportion of GDP or import-GDP (percentage)

gm$ = Growth rate of real imports

mk = Capital Goods imports as a proportion to total imports (percentage)

R = Real Exchange Rate (1980=100)

Px = Export unit value index (domestic currency) taken as a proxy for export price (1980=100)

Pm/P = Real import unit value index i.e.import unit value (domestic currency) deflated by domestic price level taken as a proxy for real import prices (1980=100).

Y = Growth rate of Real GDP (constant prices) of domestic country (1980=100).

Yic = Growth rate of real GDP of industrial countries measured by percentage change in index of GDP at constant prices; interpreted simply as growth in industrial countries (1980=100).

Tn = Net Barter Terms of Trade (1980=100).

Ti = Income Terms of Trade (1980=100).

FER = Foreign Exchange Reserves.

DFI = Direct foreign Investment at current prices.

dfi = Direct Fpreign investment as a proportion of GDP (percentage).

FA = Foreign Aid at current prices-concessional foreign borrowing on government account

fa = Foreign Aid as a proportion of GNP (percentage).

DF = Foreign Debt at current prices, non-concessional foreign borrowing on government account

df = Foreign Debt as a proportion of GNP (percentage).

A brief conceptualization of the variables as defined in the present study follows [3] :

Gross National Product (GNP) and Gross Domestic Product (GDP)

Gross National Product (GNP) measures the total domestic and foreign value added claimed by residents. It comprises (a) Gross Domestic Product (GDP), which measures total output of goods and services for final use produced by residents and non-residents irrespective of allocation to domestic and foreign claims plus (b) net factor income from abroad which is income residents receive from abroad for factor services (labour & capital) less similar payments made to non-residents who contribute to the

---

3. The definitions of most of the major variables are based on those interpreted by World Bank in their World Development Reports (refer `technical notes' of the same).

domestic economy. It may also be interpreted as GDP plus net export surplus (net receipts) or less net import surplus (net payments).

Thus, GNP = GDP + (X-M) where X and M are exports and imports respectively. A positive value for (X - M) indicates net export suplus while a negative sign denotes net import surplus.

Real GNP per capita is calculated by divlding Real GNP by the mid-year population estimates and is defined as the average income accruing to each individual of the nation or average income per head.

Gross fixed Capital Formation (k)

This is interpreted as addition made to the total capital stock of the nation in a particular year mainly in the form of productive fixed assets like plants, machinery, land, factory buildings etc. In other words, it can also be interpreted as investment in real income generating goods and services.

Exports and Imports as a proportion of GDP (x and m)

These are merchandise exports and imports covering international movements of goods across customs border. Trade in services is not included. Exports are valued at f.o.b. (free on board) prices and imports at c.i.f. (cost,insurance & freight) prices.

The values are expressed as percentage of GDP in real or constant terms which are obtained by dividing the real values of exports and imports at constant prices by the real GDP values at constant prices and multiplied by 100 to get the percentage values. The real export and import values are obtained by deflating the current values by the appropriate domestic price index of the country the Wholesale Price Index in the present study.

Real Exchange Rate (R)

R is real exchange rate export-weighted. It is the weighted average of the nominal exchange rate deflated by the foreign and domestic price levels (inflation adjusted). Since continuous time-series data on R are not readily available for the entire time - period of the persent study, the values are calculated using the following formula as used by Krueger (1978) for Korea and da Costa (1990) for India with base year in the present study updated to 1980.

$$R = \sum_{i=1}^{n} \left| \frac{Wi.Pi}{Pd} \right| Wti$$

where

R = Real Exchange Rate.

i = Major trading partners of the domestic country.

Wi = Nominal exchange rate of domestic country vis-a vis currency of the trading partner (i.e. domestic currency per unit of foreign currency),in indexed form (1980 =100).

Pi = Wholesale Price Index of the trading partner (1980=100).

Pd = Wholesale Price Index of the domestic country (1980=100).

Wti = Weight assigned to the trading partner on the basis of its respective average share in the domestic country's exports.

It must be pointed out here that there is practice of using the price index ratios inversely i.e. domestic price index in the numerator and foreign price index in the denominator. The only major difference it makes is that while in such a case an increase in R implies appreciation of the real exchange rate and a decrease implies depreciation, with the method used in the present study (with foreign price index in the numerator and

domestic price index in the denominator) an increase in R implies a depreciation of the real exchange rate and a decrease implies appreciation.

The major trading partners of India are the United States, Great Britain, Japan and Germany whose average shares in India's exports for the entire time-period 1950-90 are 35%, 20%, 28% and 17% respectively. These been given weights accordingly as[4]

Similarly, Korea's major trading parters are USA and Japan which have been assigned weights as .555 and .445 respectively according to their respective average shares in Korea's exports for the entire time-period sample of the study[5].

Brazil's Real exchange Rate is not self-calculated but are obtained from various statistical publications and studies on the country. The figures are converted into 1980 base year data for the purpose of comparability by simple mathematical manipulation[6].

Foreign Exchange Reserves (FER)

FER constitutes all foreign currency assets held by the nation excluding Gold and SDRs. In other words, these are purely the foreign currency monetary reserves (dollars) held by the nation indicating the nation's overall capacity to import or the purchasing power of the nation.

---

4. The same shares were also calculated by Joshi V.(1984) for India in his study.

5. The same shares, for Korea, were calculated by Hasan P. (1979) in his World Bank study on Korea.

6. See also section on `Data Sources' at the end of chapter.

Net Barter Terms of Trade (Tn)

Also called commodity terms of trade, Tn measures the relative movement of export prices against import prices. It is calculated as the ratio of a country's index of average export price to its average import price index and shows the changes over the base year in the level of export prices as a percentage of import prices. Since comprehensive data on export and import prices are absent, their unit value indices, considered to be the second best alternative, are taken as proxies. Thus,

$$Tn = \frac{\text{Unit value of index of exports}}{\text{Unit value of index of imports}} \times 100$$

Income Terms of Trade (Ti)

While Tn explains the gains from trade due to change in export and import prices, Ti explains the volume or production changes of trade in addition to price changes. It is an index of export gains from trade or of total gains from trade. Ti is calculated by multiplying Tn with the index of volume of exports (QX) i.e.

$$Ti = \frac{\text{Unit value index of exports} \times \text{Quantum index of exports}}{\text{Unit value of imports}}$$

OR

$$Ti = \frac{Tn \times Qx}{100}$$

In effect, the income terms of trade measure the purchasing power of exports in terms of imports, or the nation's capacity to import based on export revenue.

This variable has been included mainly because it is considered to be a better indicator of change in welfare associated with a given change in trade than net barter terms of trade and moreover it is necessary to consider the volume changes in addition to

price changes for the purpose of evaluating a welfare change. In other words, they take account of both, the changes in price as well as the changes in production.

Foreign Aid (FA)

Essentially, FA received by the nation is mainly in the form of grants, technical assistance and food aid which, for most developing nations, tends to make current account deficits smaller than required to be financied. For the present study,aid is interpreted as government finance mainly in the form of concessional grants from foreign governments and international development institutions. FA is expressed in percentage and is obtained by dividing FA by GNP at current prices. Since this capital inflow is mainly for development purposes and has a direct impact on the country's development process, the variable is taken separately and individually and excluded from the country's offical external debt.

Foreign Debt (DF)

Total Foreign debt outstanding is the non-concessional borrowing incurred by the government solely from foreign sources mainly foreign governments and offical lending agencies such as the IMF and World Bank. DF does not include concessional aid and grants which is taken as a separate variable as noted previously. It also excludes all borrowing by all agents other then the central government and the NRI deposits. The figures for DF are directly taken from International Financial Statistics Yearbooks by the IMF which report figures on foreign debt the manner just described. DF is also expressed as percentage and is obtained in the same manner as FA.

Direct Foreign Investment (DFI)

DFI is the investment made to acquire a lasting interest in an enterprise operating in a country other than that of the investor (defined according to residence), the investor's purpose being an effective voice in the management of the enterprise[7].

The equations that follow are presented in their linear forms and tested accordingly. Equations (3) and (4) are also tested in their log-linear (double-log) forms so that the coefficients so obtained can be interpreted as elasticities. Alongwith the expected signs, a brief explanation of the rationale behind the use of the variables is also given. These equations are fitted to time-series data for the entire sample period of 1950-1989 and also to those of the sub-periods for India ,S.Korea and Brazil. The ordinary least squares (OLS) technique of multiple regression analysis is employed and fitted to the equations in the present study.

Beginning with the initial aggregate growth function specified in the preceding section which includes, besides domestic capital, trade and foreign capital also. The specific equation form alongwith the disturbance item (u) is given thus :

$$pgn = L0 + L1k + L2x + L3m + L4fa + L5df + L6dfi + u \qquad (1)$$

where

$$L1, L2, L6 > 0 \; ; \; L5 < 0 \text{ and } L3, L4 > < 0$$

---

7. The definition is adapted from World Bank, World Development Report 1991,Pp 283, which is based on the original definition by IMF (1985).

It is generally accepted that an increase in capital. exports and direct foreign investment as a proportion of GDP will have a positive impact on a country's income and lead to an increase in GNP. An increase in these ratios would mean that the growth rate of these variables is faster than the growth rate of GDP. Based on this hypothesis the coefficients of these variables, L1,L2, and L6 are expected to have a positive sign . On the other hand, it is hypothesised that as foreign debt as a proportion of GNP increases, the net level of GNP that accrues to the individuals of the nation would decline. It would imply heavy borrowing form aboard for which the debt servicing obligations would have to be met from either export earnings or in its absence, the national income. If exports are not sufficiently high to service debts, the burden is a additionally borne by nation income. In other words, as the share of borrowing in the country's income increases, its income, gross as well as per capita, reduces by the amount of foreign borrowing which in principle, goes towards debt servicing in the absence of simultaneous increase in exports.Therefore, a priori,L5 is expected to have a negative sign . As regards, L3 and L4, these can have either a positive or a negative sign. For these variables, it is hypothesised that increased imports as a proportion of GDP would mean increasingly higher imports for every increase in GDP. Without a corresponding increase in export earnings to meet the foreign exchange needs for imports the increased imports entail a net loss of foreign exchange and income to the country .This would, in one way or the other, reduce the net income of the nation. On the other hand, the level of GNP would actually increase if imports, especially

of capital goods, are utilized productively so that the rate of capital formation is increased and domestic production is expanded by way of increased productive investments. Also, it would imply a greater inflow of foreign technology into the country which is expected to improve productivity, competitiveness and quality and ultimately reduce costs of production so that profits increase and thus work as an incentive to further production. Similarly foreign aid, if utilized productively to enhance production, as was the case with Korea in the initial years of its development process, will increase the level of GNP and if utilized unproductively in badly implemented and unprofitable investments with long gestation periods, will increase costs and reduce the rates of return. Thus, either a positive or negative sign for L3 and L4.

The second function is the capital formation function which is estimated essentially to establish the significance and assess the contribution of foreign capital in enchancing the domestic capital stock and in turn, growth of a country.

The linear equation is :

$$kd = b0 + b1fa + b2df + b3dfi + b4mk + u \qquad (2)$$

In the above equation, b1, b3 and b4 are expected to have positive signs (i.e.b1,b3,b4 > 0). All three sources, foreign aid, foreign direct investment and capital goods imports will, quite naturally, add to the domestic capital and thereby speed up the rate of capital formation by way of capital and technical know-how flowing into the country. Domestic savings are augmented by the flow of foreign savings and investment will

expand. The coefficients are expected to have positive signs, since all the three sources are hypothesised to be positively related to domestic capital. However, b2, the coefficient of foreign debt is expected to have either a positive or a negative sign. In fact, the situation is the same as in the case of foreign aid. On the one hand, foreign debt indicates the liability of the domestic country which has to be repaid alongwith interest. This servicing of the debt is to be made from either the export revenue or the national income generated by the economy. Hence, that part of the export earnings or income which could have been otherwise invested and thereby augmented capital formation, flows out of the country in the form of debt and interest payment. This will have a negative impact on the total capital stock of the nation which gets reduced by that much amount. In such a case, b2 is expected to be negative. On the other hand, if the accumulated debt is utilized productively and channelized toward further productive investment so that domestic capital pormation is augmented, it may have a positive impact on the domestic capital stock thereby contributed indirectly towards increase in incomes . Here, b2 is expected to have a positive sign. Thus, depending upon the net impact of foreign debt and whether the returns to the debt are higher or lower then the rate of interest on the debt, b2 could either be positive or negative. The <u>third</u> function is the ratio of exports-to-GDP function which expressed in its linear as well as log-linear equational form as :

linear $$x = B0 + B1Yic + B2R + B3Px + B4gd + u \qquad (3)$$

log-linear $$\log x = B0 + B1\log Yic + B2\log R + B3\log Px + B4\log gd + u \qquad (3a)$$

expand. The coefficients are expected to have positive signs, since all the three sources are hypothesised to be positively related to domestic capital. However, b2, the coefficient of foreign debt is expected to have either a positive or a negative sign. In fact, the situation is the same as in the case of foreign aid. On the one hand, foreign debt indicates the liability of the domestic country which has to be repaid alongwith interest. This servicing of the debt is to be made from either the export revenue or the national income generated by the economy. Hence, that part of the export earnings or income which could have been otherwise invested and thereby augmented capital formation, flows out of the country in the form of debt and interest payment. This will have a negative impact on the total capital stock of the nation which gets reduced by that much amount. In such a case, b2 is expected to be negative. On the other hand, if the accumulated debt is utilized productively and channelized toward further productive investment so that domestic capital pormation is augmented, it may have a positive impact on the domestic capital stock thereby contributed indirectly towards increase in incomes . Here, b2 is expected to have a positive sign. Thus, depending upon the net impact of foreign debt and whether the returns to the debt are higher or lower then the rate of interest on the debt, b2 could either be positive or negative. The <u>third</u> function is the ratio of exports-to-GDP function which expressed in its linear as well as log-linear equational form as :

linear $$x = B0 + B1Yic + B2R + B3Px + B4gd + u \qquad (3)$$

log-linear $$\log x = B0 + B1\log Yic + B2\log R + B3\log Px + B4\log gd + u \qquad (3a)$$

Growth in industrial countries (Yic) will imply an increase in the purchasing power of these countries. This, in turn, implies increased demand for goods and services. This would lead to an increase in the demand for imports of the industrial countries which means an increase in the exports of the developing nations. Thus, a priori, it is hypothesised that Yic will have a positive impact on x and B1 is expected to have a positive sign.Similarly, an increase in the real exchange rate implying a real depreciation of the exchange rate will increase the profitability of exports and thereby the volume of exports and vice-versa. Real GDP growth in the domestic country will also have a positive impact on exports since a priori higher GDP growth will imply greater domestion production of which the proportion of exports is also expected to increase. As such B2 and B4 are also expected to have positive signs. At the same time, a rise in the export price will reduce the quantam of exports as they become dearer in the international market while a lower export price will increase the demand for exports as they become more competitive in the international market so that, a priori , B3 is expected to have a negative sign.

The same function can be slightly modified and tested accordingly by dropping the Px variable and replacing it by the Net Barter Terms of Trade (Tn) variable in order to find out how far the country's overall terms of trade affect its exports. The modified equation is estimated as follows :

linear $$x = B0 + B1Yic + B2R + C3Tn + B4gd + u \qquad (3.1)$$

log-linear $$\log x = B0 + B1\log Yic + B2\log R + C3\log Tn + B4\log gd + u \qquad (3a.1)$$

The coefficient of Tn (C3) in equation 3.1 is expected to carry a negative sign. This is because traditional trade theory hypothesises that with a deterioration in the terms of trade (net barter), a country has to export a larger amount of commodities in return for the same ammount for imports or conversely, for the same amount of exports, lesser amount of imports would be afforded where as an improvement implies a lesser amount of exports in return for the same amount of imports or conversely, a larger amount of imports for the same amount of exports.

Finally, the fourth function which relates the imports-to-GDP ratio (m) to its determinants is given its equational forms as :

linear $$m = a0 + a1gd + a2R + a3Pm/P + a4FER + u \quad (4)$$

log-linear $$\log m = a0 + a1\log gd + a2\log R + a3\log Pm/P + a4\log FER + u \quad (4a)$$

A further modification of the above function can be made by replacing the Pm/P variable by the income terms of trade (Ti) variable. Ti is interpreted as the purchasing power of exports. This is to find the impact of the purchasing power of exports on the volume of imports as a proportion of GDP.

The modified equation would be :

linear $$m = a0 + a1gd + a2R + W3Ti + a4FER + u \quad (4.1)$$

log-linear $$\log m = a0 + a1\log gd + a2\log R + W3\log Ti + a4\log FER + u \quad (4a.1)$$

A rise in real GDP will mean, on the one hand, higher domestic production which may reduce the need for further imports. This would be true particularly for an import substituting economy

(like, say, India) where imports are substituted by domestic production of such goods and thereby reduce imports with every increase in domestic production of importables. In such a case, a1 will have a negative sign. On the other hand, if higher domestic production is assumed to mean higher income, it implies greater demand for imports as the country's purchasing power increases. Here, a1 will have a positive sign. Hence, a1 can either have a positive or a negative sign. An appreciation (depreciation) of the real exchange rate indicated by a fall (rise) in R will mean imports becoming cheaper (dearer) inducing greater (lower) demand for imports so that the volume of imports increase (decrease). Similarly, a higher real import price (Pm/P) will have a negative impact and reduce the quantum of imports. Hence, a2 and a3 are expected to have negative signs. An increase in foreign exchange reserves (which has always been a major constraint for low-income developing countries) will imply larger amount of foreign currency with which to purchase larger amount of imports and as such would serve to increase the quantum of imports. Hence a4 is expected to have positive sign.

In equation 4.1 the coeffieient of Ti, W3 is also expected to have a positive sign. This is because with an improvement in the income terms of trade, the capacity to import also increases so that the country is able to import a larger volume of commodities. Similarly, with a deterloration in Ti, the capacity to import falls and as such the volume of imports would also fall.

Thus, to summarize, the model adopts five major equations, which would be estimated in order to analyse all those foreign

sources which determine a country's economic growth. These foreign sources will determine the country's position in the international economy - its degree of external orientation. These sources will also determine as to how far a country is integrated and needs to be further integrated with the international economy.

3.4 Summary of The Model

In summary, all equations used in the model are concisely listed below :

Equation 1 : AGGREGATE GROWTH FUNCTION

$$pgn = L0 + L1k + L2x + L3m + L4fa + L5df + L6dfi + u$$

Equation 2 : CAPITAL FUNCTION

$$kd = b0 + b1fa + b2df + b3dfi + b4mk + u$$

Equation 3 : EXPORT FUNCTIONS

linear $x = B0 + B1Yic + B2R + B3Px + B4gd + u$

log-linear $\log x = B0 + B1\log Yic + B2\log R + B3\log Px + B4\log gd + u$

Equation 3.1 :

linear $x = B0 + B1Yic + B2R + C3Tn + B4gd + u$

log-linear $\log x = B0 + B1\log Yic + B2\log R + C3\log Tn + B4\log gd + u$

Equation 4 : IMPORT FUNCTIONS

linear $m = a0 + A1Y + a2R + A3Pm/P + a4FER + u$

log-linear $\log m = a0 + a1\log gd + a2\log R + a3\log Pm/P + a4\log FER + u$

Equation 4.1

linear $m = a0 + a1Y + a2R + W3Ti + a4FER + u$

log-linear $\log m = a0 + a1\log gd + a2\log R + W3\log Ti + a4\log FER + u$

3.5 Time Period Of The Study and Countries Selected

Since the entire study deals with a country's orientation to the outside world, its trade orientation is taken as the framework within which the study is carried out. Moreover, external orientation under both the kinds of trade strategies is comparatively analysed so as to arrive at substantial conclusions and policy inferences for similar developing nations. For the purpose of such a comparative analysis two NICs are selected - South Korea, an outward-oriented open economy and Brazil, an ideal example of a successful import substitution strategy as comparative indicators for India, an example of a failed import substitution strategy.

The reasons behind the countries' selection are obvious ; firstly, South Korea is one of the four `Asian Tigers', as the NICs are often identified, and the largest in size and market amongst them. Secondly, as per World Bank Classification (World Development Report 1987 Ch. 5), out of all the NICs, South Korea is the ideal example of a strongly outward-oriented trade strategy. Thirdly, and more significantly, both India and South Korea began their development process around the same period - late 1940s - when they attained independence - South Korea in 1948 and India in 1947. Also, their actual formulation of economic policies began in early 50s with both adopting a five-year plan strategy. Fourthly, closely relevant to the present study, immediate to their independence, both the nations adopted inward-looking strategies based on import-substitution. But while South Korea shifted to outward-oriented export-promotion strategy upon the completion of the first phase of import-substitution in

consumer goods, India continued with its inward-looking strategy extending it to manufacturing and heavy industry capital goods. Lastly, and most importantly, data for all major variables of the present study are readily available for South Korea in the major international statistical publication for the entire time-period of the study which is not the case with other East Asian `tigers'.

Brazil, as per original OECD classification, has also begun to be identified as a Newly Industrilized country. Similar to India, Brazil also followed an import-substitution strategy from the 1950s to the mid-1960s. Around 1964, it shifted to an outward-oriented strategy which continued for a decade after which, around mid-1970s, there was a sharp retreat to the intial policy stance of import substitution. Thus, the time periods of policy shifts in Brazil are similar to those for India.

Thus, for all these specific reasons, South Korea and Brazil become much more appropriate and interesting comparative indicators amongst the NICs.

The entire study and empirical analysis is carried out for the time period 1950-1989. As such, it studies the entire forty-year path and process of development of the three countries right from its initiation till date. Further, to also analyse the impact of any changes in policies of the three countries on their growth-especially changes in policies relating to the external sector-the entire time-period sample is broken up into two or three sub-periods depending upon the prevalence of a particular policy stance in the countries. For the purpose, the entire time period

of India, 1950-1989 is divided into three major sub-periods. The first sub-period stretches from 1950-66 when India began with an inward looking import-substitution strategy immediately after Independence. It studies the behaviour of the external linkages at the initial stage of its development process. The terminal year for the sub-period is 1966 when India devalued its currency and changed some of its policy measures apparantly with the objective of promoting exports though continuing with the basic strategy of inward-orientation. In order to analyse the effect of these changes on the external orientation and growth of the Indian economy, the second sub-period stretches from 1966-78. It was in the late seventies aspecially after 1978 that India attempted to usher in a new wave of liberalization. Thus, the third sub-period extends from 1978-89 to study the impact of this policy shift in terms of changes in the external position of India and in turn, its impact on the growth performance of the economy.

For South Korea, the sample is divided into two major sub-periods. The first extends from 1950-64 when Korea started its development process based on an inward-looking approach of import-substitution in consumer goods. In 1964, Korea's currence, Won, was devalued and the policy emphasis was shifted from import-substitution to export-promotion with a goal to achieve what is called an `export-led' growth. Thus, the second sub-period extends from 1964-89. Korea's external position and the behaviour of its external linkages is studied under these two major sub-periods.

The sub-periods for Brazil are divided into (a) 1950-1964, the initial policy orientation of import substitution. (b) 1965-

1974, the shift to an outward oriented policy regime and (c) 1974-1988, the period of reversal to the initial policy stance of inward-orientation though somewhat mixed with a certain degree of openness.

3.6 Limitations Of The Model

The present study is an aggregate analysis of a country's economic performance as determined by the extent of its integration into the international economy. The underlying idea behind the study is that a country's integration with the outside world is determined by the extent to which it is open to the external economy with respect to trade, capital and technology flows. Since the main emphasis of the study is on the externally-related sources of growth, the domestic or internal sources other than capital which may have contributed to growth are ignored. Neglecting and omitting these domestic variables may prove to be a significant limitation of the model and may undermine the overall impact of external orienation. Secondly, though the analysis stretches for four decades from 1950-89, data on some variables especially for South Korea and Brazil are not readily available for some initial years. Wherever they are available, they are not comparable to the later years. As such the data becomes scattered and analysis for such years has to be taken up separately. Such scattered data could again become a limitation when the behaviour of foreign sources is to be analysed over a period of forth years since there can be a break in a continuous link. Thirdly, the present study,being a macro-analysis, ignores the impact or behaviour of variables at the micro or sectoral

level. The analysis does not extend to the disaggregated level which would give a clearer pitcure of the country's position in the international economy and make policy inferences much more accurate. Fourthly, as argued by various researchers in past literature, it may not prove to be worthwhile to compare countries which completely differ in size - rhose with large domestic market to satisfy (India & Brazil) and another having a tiny domestic market to depend upon (South Korea) so that it has to rely on the international world to sustain its growth which makes it highly vulnerable to external shocks as compared to the larger countries. Fifthly, since Brazil's inflation rate is beyond comparison to the other two countries, the analysis for the country is in current prices unadjusted for inflation and not in real or constant prices. And finally,GNP per capita, as recognised in traditional litereture, by itself may not be the perfact measure of welfare and development since it ignores the income distribution aspect and various other factors that determine growth whichare qualitative nature and may not be correctly quantified. Nonetheless, assuming all such factors to be constant and at rest, as is implicitly done in the present study,it is perhaps the closest measure of average standard of living and economic growth accepted so far.

Nonetheless, apart from these limitations ,it is to be kept in mind that the present study is more of a comparative analysis of inward vs. outward external orientation of which India, South Korea and Brazil are taken to be representatives of development experiences under either kind of external orientation. The emphasis is on the behaviour of externally-linked sources and

their impact on growth under alternative development regimes of inward and outward orientation.

3.7 Data Source

The major source of data for the present study is the International Financial Statistics (IFS) Yearbooks of various years from 1978 to 1990. The IFS Yearbooks is an international statisticla publication published annually by the International Monetary Fund (IMF). Most of the data for the major variables of the study for India, South Korea as well as Brazil are taken from this source. As such, the Yearbooks are the major data source for the present study.

The IFS Yearbooks report annual time-series data on Gross Domestic Product (GDP), Gross National Product (GNP), total export values, total import values, unit value and quantum indices for exports and imports, Wholesale Price Index (WPI), foreign exchange reserves, government financing through foreign aid, foreign debt,nominal exchange rate, gross fixed capital formation and direct foreign investment.

The figures reported are in respective national currency at current prices except direct foreign investment which is reported in US dollars. For all other major variables, figures in US dollars are obtained by converting the domestic currency figures into US dollars at the year-end official exchange rate (for foreign aid and debt) and period-average official exchange rate (for all other variables). Both kinds of exchange rates are reported in the IFS yearbooks. Figures in real (constant) terms are obtained by deflating the current dollar values by the

domestic Wholesale Price Index .The reason behind using WPI and not the consumer price index (CPI) or GDP deflator is that WPI includes the prices of a certain basket of goods that are internationally traded which is not the case with other price indices. All indices are specifically those reported with base year 1980 in order to maintain comparability. Figures with base year other than 1980 for certain years are converted to 1980 base by simple mathematical manipulation of common year base figures. Besides the above major data source, other official publications and reports are also availed of for data on certain variables for particular years. In this respect for India, Economic Survey, (Govt. of India publication). Reserve Bank of India Report on Currency and Finance and Monthly Bulletins,. Basic Statistics relating to Indian Economy (CMIE publication) are worth mention. For South Korea and Brazil ,IMF International Trade Statistics, are also made use of especially for percentage share of capital goods imports. For India, data for the same variable are obtained from India Database, an annual time-series data publication by H.L. Chandok and the Policy Group. Figures for foreign debt for all three countries are obtained, besides IFS Yearbooks, also from IMF Government Financial Statistics.

Since comprehensive and continuous time-series data on Real Exchange Rates for 1950 to 1989 are not available for either country in major national and international statistical publications, these are calculated using the formula mentioned earlier in the chapter. In this respect, export shares vis-a-vis the trading partners for India are obtained from India Database (refered above) and for South Korea, from IMF Direction of Trade

Statistics (various issues). Help has also been taken from other studies carried out by Indian and World Bank researchers for India and Korea respectively.

As regards Brazil, as noted earlier, figures for real exchange rate are obtained mainly from World Bank country studies on Brazil [esp. World Bank (1984)] and are available only for certain years and not for the entire time period of study. In this sense, the figures for Brazil are not self-calculated. The only point of difference is that the figures are converted to 1980 base-year series wherever necessary by the same technique mentioned earlier and for the same purpose of maintaining comparability.

It is worth mentioning that wherever required and necessary, besides the above mentioned sources, help has also been taken from miscellaneous other statistical publications-national and international-like World Bank World Development Reports, United Nations, Yearbooks on Trade, World Debt Tables IMF Government Financial Statistics etc. Nonetheless, a few data constraints do remain due to non-availability, inconsistency and non-comparability.

As mentioned earlier, all figures are converted to US dollars to facilitate international inter-country comparison of the results of the three countries.