CHAPTER 6

ECONOMETRIC INTERPRETATION OF THE STUDY

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As elaborately described in Chapter 3, analysis for the present study is carried out employing the ordinary least squares (OLS) method of mutliple regression analysis on a Time - Series Statistical Package (TSP). Certain a priori,specific indicators of a country's external orientation (degree of openness) are incorporated in the present model and their growth-determining strength is thereby analysed. For the purpose of specification and convenience, the model is called the`externally-oriented model' of economic growth or simply EOEG. The model is applied to the three countries chosen for the study-India, South Korea and Brazil -dividing their post-war development experiences into certain specific time-periods based on alternative development regimes that characterised a particular time-period.The equations that constitute the model seek to display the various a priori hypotheses listed in the prologue to the study and are accordingly tested in their linear forms. Wherever required and deemed necessary, the equations are also tested in their double-log (log- linear) forms, particularly so that the coeffcients could be interepreted as elasticities. The result of the entire analysis is presented in Appendix A. What follows is the econometric and empirical interpretation of the results.The interpretation is taken up separately for inward and outward-oriented development regimes in terms of each of the equations since they specify particular relationships between external orientation and economic growth.

I. THE PHASE OF INWARD-ORIENTATION

6.1.I Aggregate determinants of Growth :

The post-war development process, beginning in the 1950s, marked the initiation of an inward-looking development regime in all the three countries with focus on rehabilitation of their domestic economies.For India, the period of inward-oriented import-substitution was most evident from 1950 to 1965. The major indicators of external orientation or openness -trade, foreign capital and foreign investment-during the period, quite naturally, exhibited no strong influence on the growth pattern of the country.As a result, coefficients of none of the explanatory variables turn out to be statistically significant during the period, including domestic capital. The R^2 is quite low (0.38) and $\bar{R}^2$ even turns out to be negative which emphasise the fact that none of the externally - related variables significantly explain the growth the pattern of the country during the initial period of 1950 to 1965. The growth impetus primarily came from domestic sources.The low F-statistic of 0.93 indicates the weakness of the relationship between the dependent and the explanatory variable. The Durbin-Watson(D.W.) statistic idicates to serial autocorrelation.

Furthermore, when the x and m variables are replaced by the growth of exports (gx$) and imports (gm$) variables in, equation 2, the R^2 and $\bar{R}^2$ fall even further alongwith the F-statistic. The only difference is in the signs of the coefficients of the above variables which exhibit a normal behaviour i.e. positive for growth of exports and negative for growth of imports.

However, one can easily conclude that of the two equations, 1 has a better explanatory power and implication than equation 2. For Korea, the period of inward-orientation was similar to that of India from 1950 to 1963. During the period in equation 1, similar to India, none of the indicators of openness show any statistical significance. However, the R^2 and $\bar{R}^2$ both are high. This is explained by a single factor, domestic capital(K\$), the coefficient of which turns out to be statistically highly significant at the 1% level. The F-statistic (4.04) indicates the significance of the goodness of fit of the equation at the 5% level. The D.W. statitic shows no serial autocorelation. In equation 2, when the x and m variables are replaced with gx\$ and gm\$ variables, the signs of the coefficients once again show a normal pattern as was the case with India with no change in the statistical significance level of the coefficient of K\$. The sign of the coefficient of dfi changes to positive though without any statistical significance. However, once again comparing the F-statistic, R^2 and $\bar{R}^2$ one can easily see that equation 1 has a stronger explanatory power than equation 2. In the latter case, the F-statistic becomes in significant indicating the weakness of the relationship.

The situation is no different for Brazil. Under an inward-oriented import-substitution regime form 1950 to 1963, all the variables of external orientation turn out to be statistically insignificant in both the equations. The R^2 and $\bar{R}^2$ also exhibit low explanatory power and the the F-statistic is also non-significant. The D.W. statistic shows no serial autocorrelation. However, in this case, equation 2 exhibits a somewhat better

explanatory power (R^2) and goodness of fit (F). Nonetheless, it makes no difference to the statistical significance of the coefficients of the explantory variables.

6.2.I <u>Determinants</u> <u>of</u> <u>Gross</u> <u>Fixed</u> <u>Capital</u> :

Economic theory suggests that a country's domestic capital formation or investment is augmented through domestic savings and in the event that domestic savings fall short of the investment target,they are supplemented with foreign savings. The latter may mainly take the form of foreign capital, foreign aid, borrowing, direct foreign investment and capital goods imports. The latter two are more appropriately identified with technology inflows. For the present analysis, all the five items mentioned above are identified as the determinants of domestic capital besides domestic savings. For the inward-oriented phase of <u>1950</u> <u>to</u> <u>1965</u> for <u>India</u>, the statistically most significant determinants of capital formation turn out to be domestic savings (gds) and direct foreign investment (dfi), with both being statistically significant at the 1% level. However, the coefficients have different signs. While savings quite naturally ,contributed positively to capital formation, dfi had a negative impact on domestic capital. An important implication of the latter is that during the period of 1950-65 direct foreign investment or whatever little of it, flowed into import-substituting, domestically-protected industries which drew heavily upon domestic as well as external resources for production thus diverting them away from the process of domestic capital formation. The finding corroborates theory in that direct foreign

investment can contribute to capital formation only in a regime of liberalised imports and particularly if it flows into export-oriented production activites.The benefits of DFI can be realized only in an environment of liberalized trade rather than in a regime of domestic import-protection. The coefficients of all the other three determinants, **mk**, **fa** and **df**, show positive signs but none are significant. The R^2 and $\bar{R}^2$ indicate a very high explanatory power (10.97 and 0.96 respectively) and the F-statistic shows a strong goodness of fit at the 1% significance level (66.51). The D.W. – statistic shows no serial autocorrelation.

In the case of <u>Korea</u>, the period of <u>**1950**</u> <u>**to**</u> <u>**1963**</u> saw foreign borrowing as the most important determinant of domestic capital formation. The coefficient of the df variable turns out to be statistically significant at the 1% level. Domestic savings and capital good imports, though contributing positively to capital formation, do not turn out to be statistically significant. The coefficient of foreign aid shows a negative sign which implies a reducing effect of aid on capital formation but is nonetheless, statistically insignificant. The R^2 and $\bar{R}^2$ show a high explanatory power of 0.86 and 0.82 respectively which can be attributed solely to foreign borrowing. The F-statistic shows a strong goodness of fit of 13.51 which is significant at the 1% level. The D.W.-statistic shows no serial autocorrelation.

<u>Brazil's</u> inward-oriented phase of <u>**1950**</u> <u>**to**</u> <u>**1963**</u> was marked by three most important sources all of which contributed positively to domestic capital formation. These were domestic savings(**gds**), direct foreign investment (**dfi**) and foreign borrowing(**df**). All

these variables turn out to be highly significant—gds at the 1%
level, dfi and df at the 5% level. The R^2 and $\bar{R}^2$ show high
explanatory power of 0.93 and 0.91 respectively. The goodness of
fit F-statistic shows a significance level of 1% and the D.W.-
statistic indicates no serial correlation. An interesting
correlation worth noting is that though direct foreign investment
contributed positively and significantly to domestic capital
formation in the case of Brazil, both of these contributed
negatively to growth. Thus, it proves that though direct foreign
investment may enhance capital formation it may not necessarily
enhance growth since what is more important is not the quantity
but the quality and direction of foreign investment. Since DFI
may also be equated with technology, it may quite be the case
that the technology that flows in may be obsolete and may just
have been a case of `dumping-the-junk' in Brazil by other more
developed nations. Moreover, if DFI flows into highly capital and
import -intensive industries without the necessary know-how and
expertise it may increase capital in those industries but
the benefits may not spread over to other industries so that the
overall effect is of dampening economic growth. The argument here
as such, is not against DFI , per se but rather that it
contributes positively to growth only in an open and outward-
looking, export-led economy whereas it proves entirely wasteful
in an inward-looking, import-substituting, protected economy.

6.3.I Determinants of Exports :

The equation of exports and imports were tested in both
their linear as well as log-linear (double-log) forms for all the

three countries and for each of the time-period of alternative development regimes. The results of the respective regressions are exhibited in Appendix Tables A.7, A.8 and A.9.

For India, for the period of 1950 to 1965, in equation 1 of the linear form, two factors turn out to be the most important determinants of exports - price of exports i.e. unit value of exports (Px) taken as a proxy for export price and the real exchange rate (R). The coefficients of both are statistically significant at the 1% level and show positive signs implying that an increase in export price and a steady fall (depreciation) in the real exchange rate during the period stimulated further exports both through increased domestic supply and international demand respectively. This is typical of an inward-looking import-substituting regime where price and exchange rate are the major tools for stimulating exports. The coefficients of the other two variables, growth rate of real GDP of the domestic country (gd$) and real income of industrial countries (Yic) show negative signs but are statisticllay insignificant. The R^2 and $\bar{R}^2$ show high explantory power of 0.84 and 0.80 respectively with the F-statistic of 14.33 indicating a strong goodness of fit at the 1% level. The D.W. statistic indicaters no serial correlation.

In equation 2 of its linear form, when the Px variable is replaced by the Net Barter Terms of Trade(Tn) variable, the latter also turns out to be positive and statistically significant at the 5% level indicating that during the same period, an improvement in the terms of trade also induced greater exports. Improvement in a country's terms of trade implies that it has to export less in order to obtain the same amount of

imports or in other words,a much larger amount of imports could be obtained in return for the same amount of exports. Thus in an inward -looking import-starved economy, improvement in the terms of trade is an inducement for further exports which facilitates increasingly larger imports which was the case with India. Also, the statistical significance of R is retained at the 5% level. However, the R^2 and $\bar{R}^2$,reduced to 0.77 and 0.71 respectively indicating a fall in the explanatory power of the variables. Similarly, the F-statistic also falls though it continues to have a strong goodness of fit at the 1% level. Though the D.W-statistic also shows no serial correlation, equation 1 does seem to have a higher explanatory power and is a better fit as compared to equation 2.

When the same equation was tested in its log-linear form, none of the coefficients of the explanatory variables in either equation 1 or 2 turn out to be statistically significant. The R^2 and $\bar{R}^2$ and F-statistic also exhibit very low explanatory power and weakness of the equation. However, the coefficients of log Yic in equation 1 and 2 do prove the inferiority of Indian exports since the foreign-income elasticity (coefficient of log Yic) is negative. Thus, one does conclude that for India for the period 1950 to 1965 the linear form of the export function has a better explanatory power and a stronger goodness of fit than its double-log form.

The equation for Korea during 1950 to 1963 exhibit a somewhat different picture. No doubt, here too, Px and R in equation 1 and R and Tn in equation 2 turn out to be

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trade elasticity which meant that exports responded more to absolute price changes rathar then terms-of-trade or relative price changes. For Korea, export supply was independent of its terms of trade which was certainly not the situation with India where supply of exports depended on their prices relative of the price of imports.

In the case of Brazil during, the same period of 1950-63, the results are quite disappointing when compared to India and Korea. In the linear form of the export function, equation 1, none of the coefficients of the explanatory variables turn out to be significant. The R^2, $\bar{R}^2$ and F-statistic also show low explanatory powers and weak goodness of fit. However, when the Px variable is replaced by the Tn variable in equation 2, the statistical significance of R, Yic and Tn increases to the 5% level. The R^2 and $\bar{R}^2$ also show relatively higher explanatory powers of 0.62 and 0.51 respectively. The F-statistic also shows a strong goodness of fit significant at the 5% level and the D.W.-statistic shows no serial autocorrelation. When the equation is tested in its log-linear form, once again none of the coefficients show any significance in either equations except log Px in equation 1 which turns out to be significant at the 5% level. The R^2 and $\bar{R}^2$ fall in their explanatory power and the F-statistic also loses its significance. Once again it could be concluded in the case of Brazil that during the period, similar to India, the elasticities did not exert any strong influence on the proportion of exports to GDP though the foreign-income elasticity of Brazilian exports (coefficient of log Yic) is positive implying their superiority

over Indian exports, albeit the coefficients being statistically insignificant.

6.4.I Determinants of Imports :

Four major determinants of imports were identified for the three countries-GDP, Real import price (import unit value deflated by the domestic wholesale price index) , Real exchange rate and foreign exchange reserves. The effect of income terms of trade or the purchasing power of exports was, also tested by incorporating it into the equation by substituting the variable for the real real import price.

For India the 1950-63 period was marked by a committed implementation of the import-substitution strategy in consumer goods. With every increase in domestic production, India' sought to reduce dependence on imports and replace such goods with domestic production.Thus during the period, as the results in Table A.4 show, the linear form of equation 1 brings out three most important sources that determined the proportion of imports in GDP - growth rate of real GDP (gd$), real import price (Pm/P) and foreign exchange reserves(FER). The real exchange rate (R) does not turn out to be statistically significant. The coefficients of gd$ and FER show statistical significance at the 5% level but both show negative signs which implies firstly, that every increase in GDP reduced the proportion of imports in GDP which brings out clearly the predominance of the IS strategy and secondly, that India did not utilize any increased foreign exchange reserves for purchasing additional imports. Instead it chose to use the additional reserves to meet the debt obligations. The coefficients of Pm/P shows statistical

significance at the 1% level and has a positive sign implying that a rise in the real import price encouraged further imports. This could be a case of `speculative! purchasing i.e. purchasing more imports at the prevailing price in anticipation of a further rise in price. Otherwise, there seems no possible explanation for such a phenemenon. The R^2 and $\bar{R}^2$ show high explanatory powers of 0.72 and 0.65 respectively. The F-statistic shows a strong goodness of fit statistically significant at the 1% level and the D.W - statistic shows no serial autocorrelation.

When the Pm/P variable is replaced by the income terms of trade (Ti) variable in equation 2, R turns out to be significant at the 5% level but FER loses its significance. Ti also does not show any statistical significance though it has a positive sign. The coefficient of gd$ retains its sign as well as its statistical significance at the 5% level. However, the R^2 and $\bar{R}^2$ show very low explanatory powers of 0.48 and 0.35 respectively and the F-statistic also loses its significance of goodness of fit. The D.W - statistic shows no serial autocorrelation.

In their log-linear form,none of the coefficients show any statistical significance except log FER in equation 2 which turns out to be statistically significant at the 5% level with a negative sign. Nonetheless, the R^2 and $\bar{R}^2$ in both equation show reasonable explanatory powers of 0.70 and 0.63 respectively in equation 1 and 0.68 and 0.60 in equation 2. The F-statistic also shows a strong goodness of fit significant at the 1% level in both equations and the D.W. - statistic shows no serial autocorrelation In sum, as was the case for the elasticities for

exports, the elasticities for imports also do not seem to have exerted any strong influence on the proportion of imports in GDP. Only the foreign exchange reserves elasticity of imports seemed to have had some meaning. Overall, equation 1 of the linear form for the period of 1950-65 explains best the influence of gd$, Pm/P and FER on the proportion of imports in the domestic production.

For <u>Korea</u>, during its inward-oriented IS phase the of <u>1950-63</u>, referring to the <u>linearforms</u> of the equations, the most important determinant of imports turns out to be the real exchange rate (R). The coefficient of the variable is statistically significant at the 5% level with a positive sign implying that a depreciation of the real exchange rate induced further imports. This could have been possible if a fall in the exchange value of the Won generated larger export revenue which in turn allowed higher imports. Thus, there seems to have been an indirect effect of the real exchange rate deprecation in case of Korea. Even when the Pm/P variable is replaced by the Ti variable in equation 2, there is no difference in the statistical significance of the coefficients including that of R. The R^2 and $\bar{R}^2$ show the same high explanatory powers in both equations, 0.87 and 0.83 respectively. The F-statistic shows strong goodness of fit in both equations which is statistically significant at the 1% level and the D.W. - statistic indicates no serial antcorrelation.

With respect to elasticities, the <u>log-linear</u> forms of both the equations show higher explanatory powers with R^2 and $\bar{R}^2$ in both equations being 0.96 and 0.95 resp. The F-statistic also shows a

much stronger goodness of fit of 48.50 and 49.02, significant at the 1% level and the D.W. - statistic shows no serial autocorrelation. However, as regards the statistical significance of the coefficients, only the GDP-elasticity of imports (coefficient of log gd$), with a positive sign, shows a statistical significance at the 5% level. This implies that as the percentage of domestic production increased, the proportion of imports in GDP also increased. In other words, Korea's dependence on imports for increased domestic production increased during the period.

Brazil presents a somewhat different case in that during its inward-oriented phase of 1950-63 in the linear equation 1, import price (Pm) stands out as the only major determinant of imports as a proportion of GDP. The coefficient shows a statistical significance of at the 1% level with a positive sign similar to India and Korea implying its positive relationship with imports. The R^2 and $\bar{R}^2$ show high explanatory powers of 0.88 and 0.84 respectively. The F-statistic shows a strong goodness of fit significant at the 1% level and the D.W. -statistic indicates no serial autocorrelation. Replacing the Pm variable by the Ti variable in equation 2 increases the statistical significance of the coefficient of real exchange rate (R) to the 5% level. The coefficient of Ti also shows a statistical significance at the 1% level. Moreover, both show negative signs implying that a real depreciation of the cruzeiro made imports costlier and thereby reduced its proportion in GDP. Similarly an improvement in the purchasing power of exports also tended to reduce imports. Since

during the period the basic strategy was to substitute imports with domestic production of such goods, the increased export revenue was not utilized for acquiring larger imports. In fact it was quite possible that in absolute terms imports may have remained at the same level while GDP increased. However, the R^2 and $\bar{R}^2$ fall in their explanatory powers to 0.80 and 0.74 respectively as also the F-statistic which shows a strong but lower goodness of fit of 8.81 which is still significant at the 1% level. The D.W. - statistic also shows no serial autocorrelation.

With respect to elasticities during the period, none of the coefficients of the log variables show any statistical significance in either equation except that of log Pm in equation 1 which is statistically signifiacant at the 5% level and continues to have a positive sign. The R^2 and $\bar{R}^2$ in both equations show very low explanatory powers and the statistical significance of the goodness of fit F-statistic is also lost though the D.W. - statistic shows no serial autocorrelation. Thus, in sum Brazil also presents the case where during its inward-oriented phase, the elasticities were quite weak and exerted no strong influence on the proportion of imports in GDP which is almost similar to the Indian case and quite opposite to that of Korea.

II. THE PHASE OF OUTWARD - ORIENTATION :

6.1.II. Aggregate Determinants of Growth :

In all the three countries, the inward-oriented phase, in the strict sense of the term, came to an end by mid - 1960s when there was a major policy shift towards greater outward

orientation and participation in the international economy through greater integration of their economies to the world economy.

However, in the case of India, it would be fallacious to call the period of mid - 1960s and thereafter as the phase of outward orientation, again in the strict sense of the term. In fact the period from mid - 1960s to the late 80s could further be divided into two broad phases - the export-promotion phase (1966 to 1977) and the import-liberalization phase (1978 to 1989). The analysis has been carried out for both these phases separately but the interpretation that follows is taken up together for both the periods of 1966-77 and 1978-89.

The period of 1966 was marked by a downward valuation of the rupee by the Indian government specifically in order to boost up its already low and sagging export performance. Consequently, whatever pressure was felt on the BoP front due to the higher import cost was sought to be mitigated through additional foreign borrowing. The effect of such a changed scenario was undoubtedly felt during the period of 1966-77 following the devaluation. The regression results for the period seen in Table A.1, equation 1, clearly indicate the statistical significance and thus the impact of growth of physical capital , exports, imports and foreign debt as a proportion of GDP. The coefficients of all the variables are significant at the 5% level except that of exports which shows a significance at the 1% level. Coefficients of foreign aid and direct foreign investment continued to show lack of statistical significance. Morever, the coefficients of capital, exports and

debt also show positive signs implying their positive impact on growth. The coefficient of m shows a negative sign which implies its negative impact naturally due to the additional burden of its cost due to devaluation. The R^2 and $\bar{R}^2$ show high explanatory powers of 0.93 and 0.87 respective. The F-statistic shows a strong goodness of fit which is statistically significant at the 1% level and the D.W. - statistic shows no serial autocorrelation. However, when the x and m variable are replaced by the growth of exports (gX$) and imports (gM$) variables in equation 2, the statistical significance of all the coefficients is lost though the signs remain more or less the same. The explanatory powers of R^2 and $\bar{R}^2$ also fall to 0.82 and 0.65 respectively and the F-statistic also loses its statistical significance indicating the weak goodness of fit of the equation although the D.W. - statistic continues to show lack of serial autocorrelation. Thus, equation 1 turns out to be a better fit and has better explanatory powers than equation 2.

The period of late 70s was associated with the liberalization of imports from various controls to a considerable degree as compared to the earlier periods. However, the export performance failed to pick up to the levels anticipated by India. The outcome was that while, on the one hand, liberalization of imports resulted in the rise in imports, exports on the other continued to be low due to its non-competitiveness and inferior composition. Again the pressure on the BoP was met by further borrowing abroad, both on concessional as well as non-concessional basis. Thus, during the period of 1978-89, growth of capital stock, foreign debt and foreign aid as a proportion of GDP showed

a positive contribution to growth with the positive signs of the respective coefficients having statistical significanc at the 5% level. The coefficient of m continued to have a negative sign but its statistical significance increased to 1% from that of the 5% level in the earlier export-promotion period of 1966-77. The coefficient of x does not show any statistical significance either at 5% or 1% level unlike the earlier period. The additional borrowing during both the periods also resulted in increased capital formation in the form of fixed long-term investments since the coefficent of K$ also shows a positive sign and statistical significance of 5% level. The R^2 and $\bar{R}^2$ show high explanatory powers of 0.92 and 0.85 respectively. The F-statistic shows strong goodness of fit significant at the 5% level and the D.W. -statistic shows no serial autocorrelation. Once again, when the x and m variables are replaced by gX$ and gM$ variables in equation 2, only the coefficient of growth rate of export variable (gX$) shows a statistical significance at the 5% level with the coefficient showing a positive sign implying the positive impact of export growth on economic growth. However, the explanatory powers of R^2 and $\bar{R}^2$ are reduced to 0.83 and 0.69 respectively. The F-statistic also loses its statistical significance indicating the weak goodness of fit of the equation. The D.W. - statistic indicates no serial autocorrelation. Hence again equation 1 seems a better fit and has higher explanatory powers than equation 2. On the basis of better goodness of fit and higher explantory powers of R^2 and $\bar{R}^2$, one can accept the former equation in favour of the latter.

Korea's outward-oriented phase, 1964 onwards was a result of complete overhaul of earlier policies associated with an import-substitution strategy. Korea too, like India, devalued the Won in 1964 and changed its incentive structure which was now geared towards enhancing exports and greater participation in the international division of labor. However, the results are a little different from those obtained for India. For the period of 1964-89, in equation 1, the statistically most significant determinants of growth, both at 5% and 1% levels, turn out to be growth of domestic capital, imports as a proportion of GDP and foreign aid. Surprisingly, the coefficients of exports as a proportion of GDP does not show any statistical significance. Morever, the coefficient of foreign aid (fa) shows a negative sign which implies that during the period, aid contributed negatively to growth . The R^2 and R^{-2} show high explanatory powers of 0.85 and 0.81 respectively and the F-statistic indicates a strong goodness of fit at the 1% significance level. The D.W. - statistic does not show any serial autocorrelation.

In equation 2 for the same period, the results turn out to be better. The coefficients of capital (K$), foreign debt (df) and aid (fa) show a statistical significance at the 5% level and the latter two coefficients continue to show negative signs implying their reducing effect on growth. The coefficient of growth of exports (gX$) shows a statistical significance at the 1% level and is positive. The implication is strong enough to suggest that during Korea's outward-oriented phase, export growth rather than exports as a proportion of GDP, was one of the most significant determinants of economic growth. The R^2 and R^{-2} also

show high explanatory powers of 0.86 and 0.83 respectively and the F-statistic also indicates a stronger goodness of fit which is also statistically significant at the 1% level. The D.W. – statistic shows no serial autocorrelation. Thus, for Korea, unlike India, equation 2 turns out to be a better fit and has better explanatory powers than equation 1 which is rejected in favour of the former.

Brazil shifted to an outward-oriented strategy of growth with industrialization in 1964 after about a decade and a half of import substitution. However, the results obtained from the regression analysis are not very clear regarding the benefits of such a shift. During the decade-long period of outward-orientation, 1964-73, none of the coefficients of the external indicators of openness show any statistical significance except that of growth of domestic capital which is significant at the 5% level in equation 1. During the period,Brazil was suddenly exposed to external forces to a greater extent than the earlier period which increased its vulnerability to external shocks. Nonetheless, during the same period, Brazil had achieved spectacular success in achieving very high growth rate. Going by the results, it becomes dubious as to how far such success could be attributed solely to domestic capital formation since the R^2 and $\bar{R}^2$ show high explanatory powers of 0.93 and 0.87 respectively. The F-statistic also shows a statistically significant goodness of fit at the 5% level and the D.W. – statistic shows no serial autocorrelation.

Replacing x and m by gX$ and gM$ does not help either. The

results remain more or less the same except that the statistical significance of K\$ increases to the 1% level. The R^2 and R^{-2} show similar high explanatory powers of 0.92 and 0.86 and the F-statistic also shows a 5% significance level. The D.W. - statistic shows no serial autocorrelation. Once again, like India, for Brazil too, equation 1 shows somewhat better explanatory powers and is a better fit than equation 2.

Around late mid-70s, specifically 1974, after a decade of outward-orientation, Brazil reverted back to its previous policy stance of inward-oriented import-substitution. During the period 1974-88 the results indicate a better performance as compared to the earlier phase of 1950-64. Yet how far this was a `spill - over' effect of the earlier policy shift of outward-orientation remains questionable. Also, in a more general sense, how far would such frequent shifts prove beneficial to a country, particularly like India, too seems debatable. Although Brazil's case emphasises a timely shift from an imward-looking to an outward-looking development regime and thereby reap the benefits of a favourable world economic environment, any reversal back to the old regime indicates a non-committed and fickle-minded polity of the economy and all such benefits may remain short-lived. Over a long-term perspective, frequent policy shifts entail continued structural adjustments and thus in turn, a possible reversal to a low-level growth trap. Brazil's case may seem an exception in that it was able to build on the benefits of the previous outward-oriented phase but may not necesarily be generalised for similar developing economies.

In equation 1, domestic capital growth (K$) and proportion of exports in GDP (x) turn out to be the most significant determinants of growth of GNP per capita with statistical significance levels of the coefficients at 1% and 5% respectively. Moreover, the coefficient of x shows a negative sign implying that as more and more resources were diverted towards exporting, which were otherwise required for the domestic economy, growth was reduced. The R^2 and R^{-2} show explanatory powers of 0.92 and 0.88 respectively. The F-statistic indicates a goodness of fit at the 1% level and the D.W. -statistic shows no serial autocorrelation.

In equation 2, the coefficients of gM$ and dfi show statistical significance at 5% levels with K$ retaining the 5% significnace level but x losing its statistical significance. Also, the coefficient of gM$ and dfi show positive signs. A strong implication is that growth of imports and increasing proportion of DFI in GDP both contributed to growth of per capita GNP to a large extent. Unlike the earlier period of 1964-73, here equation 2 has somewhat higher explanatory powers and a stronger goodness of fit as seen by the high R^2 and R^{-2} of 0.93 and 0.89 respectively and the F-statistic of 10.46 which is statistically significant at the 1% level. The D.W. - statistic also indicates no serial autocorrelation.

6.2.II Determinants of Domestic Capital :

During the post-devaluation export-promotion period of 1966-77 in India, the proportion of domestic capital in GDP was positively determined solely by the proportion of domestic savings in GDP. The coefficient of the variable (gds) during the

period shows a statistical significance at the 5% level. None of
the other coefficients show any statistical significance.
However, the R^2 and R^{-2} show low explanatory powers of 0.71 and
0.55, and the F-statistic also shows a weak goodness of fit of
2.95 which is non-significant though the D.W. -statistic shows no
serial autocorrelation.

During the import-liberalization phase of 1978-89 for the
same country, only the coefficient of foreign debt as a
proportion of GDP (df) turns out to be significant at the 5%
level. All other coefficients including that of gds show no
statistical significance. Morever, the sign of the coefficient of
df is negative which implies that all the foreign borrowing
incurred during the period to mitigate the adverse BoP position
generated by the sudden expansion in imports following the
liberalization was ultimately meant for maintaining current
levels of consumption with very little of it going towards
generation of long-term capital investments. At the same time,
the two oil price increases of 1973 and 1979 served to accentuate
the rude BoP shock to the economy with imports, in value terms
having risen as much as four-fold. This had the obvious effect of
reducing the proportion of capital in GDP as the proportion of
debt in GDP increased. For the period, the R^2 and R^{-2} show high
explanatory powers of 0.92 and 0.87 and the F-statistic also
shows a 1% statistically significant goodness of fit. The D.W. -
statistic shows no serial autocorrelation.

During Korea's outward-orientation phase of 1964-83, the
most important determinants of domestic capital turn out to be

domestic savings (gds), capital goods imports(mk) and foreign aid (fa) with the coefficients of the former two showing positive signs and statistical significance at the 1% level. This implies that besides savings, increased import of capital goods also enhanced capital formation. The point of difference between India and Korea in this respect is that while India absorbed its capital imports mainly in domestic import-substituting industries with the sole purpose of substituting imports with domestic production, Korea utilized its capital imports to create further capital and build on its long-term capital investments thereby serving towards enhanced capital formation. On the other hand, the coefficient of fa shows a statistical significance at the 5% level with a negative sign implying that like India, all the concessional aid that Korea received, in fact, had a reducing effect on capital formation during the period. The R^2 and $\bar{R}^2$ show high explanatory powers of 0.85 and 0.82. The F-statistic shows a statistical significance at the 1% level indicating the strong goodness of fit of the equation and the D.W. -statistic shows no serial autocorrelation.

Brazil's outward-oriented decade of 1964-73 saw remarkable progress in economic growth. But as seen in the previous section, domestic capital formation was the single factor which contributed to this high growth. In turn, the proportion of domestic capital in GDP was largely determined by the proportion of capital good imports in total imports and that of direct foreign investment in GDP. As the results indicate, the coefficient of domestic savings (gds) and foreign debt (df) show no statistical significance whereas that of capital good imports

(mk) is significant at the 1% level and that of direct foreign investment (dfi) at the 5% level with both showing positive signs implying their increasing effect on domestic capital. The R^2 and R^{-2} show high explanatory powers of 0.96 and 0.93 respectively. The F-statistic shows a strong goodness of fit significant at the 1% level and the D.W. – statistic shows no serial autocorrelation. Thus, it could be inferred that though capital good imports and particularly, direct foreign investment may not have shown any direct influence on Brazil's economic growth during its phase of outward orientation, the same factors were indirectly responsible for augmenting domestic capital formation by creating long-term capital assets (investment) which in turn, enhanced growth.

During Brazil's reversal phase of import substitution of 1974-88 none of the coefficients of external indicators including domestic savings turn out to be significant. The R^2 and R^{-2} also show low explanatory powers of 0.56 and 0.38 and the F-statistic also shows a weak goodness of fit of 2.26 which is non-significant though the D.W. – statistic shows no serial autocorrelation. This may lead us to infer that during the period there would not have been any significant increase in capital formation and whatever growth was experienced was a 'spill-over' effect of the earlier shift to an outward-oriented development regime. In other words, capital formation as a proportion of GDP exhibited a declining trend form 1974 onwards, contrary to the previous decade of 1964-73, although in absolute terms capital stock increased.

6.3.II Determinants of Exports :

GDP growth (gd$), export price (Px), real
exchange rate (R) and terms of trade (Tn) turn out to be the most
important determinants of the proportion exports in GDP during
India's post-devaluation export-promotion period of 1966-77. In
equation 1 of the linear form, the coefficient of Px shows a
statistical significance at the 1% level and that of R at the 5%
level with both having positive signs implying that during the
period a higher export price and a real devaluation of the rupee
induced higher exports. This would be a natural consequence of
any policy shift with a view to promote exports since the two
variables are the major instruments for immediate manoeuvre. The R^2
and R^{-2} show high explanatory powers of 0.97 and 0.96
respectively with the F-statistic showing a 1% level of
significance of the goodness of fit and the D.W. – statistic
showing no serial autocorrelation.

In equation 2 of the same linear form, the coefficients of
gd$,R and Tn all show statistical significance at the 5% level
with the coefficients of gd$ and R having positive signs while
that of Tn having a negative sign. This implies that as domestic
production increased, the proportion of exports or tradeble goods
in the production also increased. On the other hand, an
improvement in the terms of trade or increase in export price
relative to import price discouraged exports. This could be so
when the terms of trade are strongly related to the external
demand for the domestic country's exports and when such demand
falls due to increase in the price of exports, the overall effect
would be to reduce the domestic country's exports. A negative Tn

coefficient would also imply that with a deterioration in the terms of trade, India had to export more in order to maintain the same level of imports and vice-versa. Thus the inverse relationship between terms of trade and exports as a proportion of GDP. However the R^2 and R^{-2} decrease in their explanatory powers to 0.89 and 0.85 respectively. The F-statistic also reduces to 14.43 but retains the 1% significance level and the D.W. -statistic continues to show no serial autocorrelation.

In the log-linear form of the equations during the same period, all the four elasticities of domestic production (log gd$), export price (log Px), real exchange rate (log R) and foreign demand (log Yic) show statistical significance at the 1% (log Px and log R) and (log gd$ and log Yic) levels with all having positive signs in equation 1. The R^2 and R^{-2} also show explanatory powers of 0.98 and 0.97. The F-statistic continues to show strong goodness of fit at the 1% significance level and the D.W. - statistic shows no serial autocorrelation. However, in equation 2, only the coefficients of log gd$ and log Tn show statistical significance at the 5% level with the rest losing their significance. The coefficient of log Tn continues to show a negative sign as was the case in the linear form. Looking at the R^2 and R^{-2} which show reduced explanatory powers of 0.87 and 0.82 and F-statistic of 11.61 though significant at the 1% level, one can conclude that in both the linear as well as log-linear forms of the equations, dropping the Px variable and introducing the Tn variable reduced the explanatory powers of goodness of fit of the equations and

therefore equation 1 in both the forms with the Px variable is
the best-fit equation.

During the import-liberalization phase of 1978-89, the
coefficients of both the Px as well as Tn variables turn out. to
be significant at the 1% level in equation 1 and 2 respectively
of the linear form. All other coefficients are statistically non-
significant. Morever, the above coefficients have negative signs
which is mutually consistent. This implies that a rise in export
price or improvement in terms of trade had an indirect effect. of
reducing exports through a fall in the foreign demand for such
exports.However, a similar observation as in the earlier period
is also seen here. The R^2 and R^{-2} show higher explanatory powers
in equation 1 with the Px variable as compared to equation 2 with
the Tn variable - 0.77 and 0.68 respectively for the former and
0.70 and 0.59 respectively for the latter. The F-statistic also
shows a stronger goodness of fit for the former (5.93) as against
the latter (4.10) though both are statistically significant at
the 5% level. The D.W. - statistic show no serial autocorrelation
in either equation.

In the log-linear form of the equation, the coefficients of
log gd$, log Px (eqn. 1) and log Tn (eqn. 2) show statistical
significanceat at the 1% level with the coefficient of log gd$
having a positive sign in both equations and those of log Px and
log Tn retaining the negative signs.This proves that the domestic
production elasticity was positive during the period whereas the
export-price and terms-of-trade elasticities were negative.The
pattern of explanatory powers of R^2 and R^{-2} and F-statistic
remains similar. For equation 1, the R^2 and R^{-2} are 0.86 and 0.81

with the F-statistic of 10.45 significant at the 1% level. For equation 2, the R^2 and R^{-2} reduce to 0.83 and 0.77 and F-statistic to 8.43, though still significant at the 1% level. The D.W. statistic in either equation shows no serial autocorrelation. Thus, for the 1978-89 period, too, one can reject equation 2 in both forms, linear and log-linear, on the grounds of the reduced R^2 and R^{-2} and F-statistic. However, an interesting observation is that during India's import-liberalization period, the elasticities were not as strong as they were during the export-promotion period except for the production elasticity. This is immediately observed when one compares the log-linear forms of the equations for both the periods 1966-77 and 1978-89 with respect to individual t-values of the variables as well as R^2 and R^{-2} and F-statistic. The outcome of such a behaviour of the elasticities was that during the 1966-77 export-promotion period due to a strong influence of the production, price, exchange rate, income and terms-of-trade elasticities, exports could grow on an average annual rate of 3.4 percent for the period in dollar terms whereas during the 1978-89 import-liberalization period with all the elasticities exerting a weaker influence, the average annual growth rate of exports for the period fell to 1.7 percent, half of that of the previous period.

Korea's outward-oriented phase of 1964-89 was stronger than India's in almost every respect. In equation 1 of the linear form, the coefficient of Px shows a statistical significance at the 1% level with a positive sign and that of Yic is significant

at the 5% level with a negative sign. This means that though, on the one hand, a higher export price did induce increased export supply from the domestic country, a rise in real income of industrial countries on the other hand, reduced the demand for Korean exports. This could be because Korean exports were more labour-intensive during the period and also not price-competitive as compared to its competitors. The R^2 and R^{-2} show high explanatory powers of 0.85 and 0.82 and the F-statistic of 29.76 is significant at the 1% level. The D.W. - statistic shows no serial autocorrelation. Replacing Px with Tn in equation 2 increases the significance of the coefficients of gd$ and R to the 1% and 5% levels respectively with positive signs. The coefficient of Tn also shows a 1% significance level with a negative sign. This implies that higher domestic production and a real devaluation increased the proportion of exports in GDP whereas an improvement in the terms of trade had a reducing effect on exports. However the R^2 and R^{-2} are reduced to 0.75 and 0.72 and the goodness of fit F-statistic, though still significant at the 1% level, is also reduced to 15.89. The D.W. - statistic continues to show no serial autocorrelation.

In the log-linear form of the equations, the coefficients of log gd$ and log Px show significance at the 1% level with positive signs and that of log Yic at the 5% level with a negative sign. The R^2 and R^{-2} have high explanatory powers of 0.96 and 0.95 respectively and the F-statistic shows a very strong goodness of fit of 120.09 which is statistically highly significant at the 1% level. The D.W. - statistic shows no serial autocorrelation. In equation 2, the coefficient of log gd$ retains

its significance level of 1% whereas that of log Yic loses its significance. The terms-of-trade elasticity (log Tn) shows a negative sign with a significance level also of 1%. Again, the implication is similar to that of India in that terms of trade deterioration compelled more exports for the same amount of imports or improvement in the terms of trade reduced the amount of exports required to maintain the same level of imports. The R^2 and R^{-2} are slightly reduced to 0.94 and 0.93 though they are still high. Similarly, though the F-statistic is also reduced to 84.69 it is still statistically significant at the 1% level.The D.W. -statistic continues to show no serial autocorrelation. Thus, it is observed that Korea's overall performance during its outwaard-oriented regime was much stronger and better as compared to that of India's during its two phases of export promotion and import liberalization.

In the case of Brazil, its export performance during the decade of outward-orientation, 1964-73 was much better than that of India and perhaps even Korea.In the linear form in equation 1 the coefficients of Px and R both show statistical significance at the 5% level with both having positive signs implying that higher export price and a real depreciation of the exchange rate induced further exports. None of the other coefficients show any statistical significance.The R^2 and R^{-2} show high explanatory powers of 0.92 and 0.88 and the F-statistic shows a strong goodness of fit with a 1% significance level. In equation 2, replacing Px with Tn, increases the significance of gd$ to the 5% level. The coefficients of R as well as Tn also show statistical

significance at the 5% level with all having positive signs. This is consistent with the Px variable in equation 1 implying that an improvement in the terms of trade induced further exports since higher exports would consequently enable higher imports. The R^2 and R^{-2} also increase in their explanatory powers to 0.96 and 0.94 as also the F-statistic to 29.23 significant at the 1% level. The D.W. -statistic in both equations shows no serial autocorrelation.

In the <u>log-linear</u> form, only the coefficients of log gd$ and log R show statistical significance at the 1% and 5% levels respectively with both having positive signs. The R^2 and R^{-2} both show very high explanatory powers of 0.99. The F-statistic also shows an extremely strong goodness of fit of 164.34 with a 1% significance level. By replacing Px with Tn in equation 2,the significance of log R is lost. The significance of log gd$ is maintained at the 1% level whereas that of log Tn is significant at the 5% level. Again both the elasticities are positive. There is no change in the explanatory power R^2 and R^{-2} whereas the F-statistic increases to 188.89, significant at the 1% level. The D.W. - statistic once again shows us serial autocorrelation.

Looking at the results one can conclude that during Brazil's outward-oriented phase, the elasticities were strong enough to exert influnance on its export performance. However, one difference noted is that unlike India and Korea, in the case of Brazil, equation 2 in both linear as well as log. forms with the Tn variable, turns out to be the best-fit equation since replacing Px with Tn increases the explanatory power of R^2 and R^{-2} as also the goodness of fit of the F-statistic.

The results for the period <u>1974-88</u>, when compared with those of the 1964-73 decade, exhibit a weaker performance as a consequence of Brazil's reversal to its earlier policy stance of import-substitution.In the <u>linear</u> form, the coefficients of gd$ and R show statistical significance at the 1% and 5% respectively with both having negative signs implying that higher domestic production reduced the proportion of exports in GDP as resources were diverted away from exports to domestic production.Similarly, a real depreciation of the exchange rate also reduced exports. Such a development was a fallout of the earlier decade when exports had become highly import-intensive so that during the present period when costly imports had to be curtailed due to the real depreciation and overall policy regime of import substitition, exports were, quite naturally, adversely affected. The R^2 and R^{-2} show relatively low explanatory powers of 0.66 and 0.57 and the F-statistic shows a 5% significance level while the D.W. - statistic shows no serial autocorrelation. Introduction of the Tn variable as a replacement to the Px variable in equation 2, reduces the significance of the gd$ coefficient from 1% to the 5% level. The significance of the R coefficient remains as it is and the negative signs of both the coefficients are also retained. None of the other coefficients in either equation are significant.The R^2 and R^{-2} show almost the same explanatory powers as in equation 1 and so does the F-statistic. The D.W. - statistic indicates no serial autocorrelation.

In the <u>log-linear</u> form in both equation 1 and 2 only the production elasticity (coefficient of log gd$) shows statistical

significance at the 1% level. All other elasticities are non-significant. The R^2 and R^{-2} in both equations show high explanatory powers of 0.87 and 0.84 respectively. The F-statistic is also significant at the 1% level in both equations indicating the strong goodness of fit. The D.W. – statistic in either equation shows no serial autocorrelation.Thus, though the elasticities during the 1974-88 period were strong enough, when compared with the earlier period, they were weaker. Looking at the results of the linear forms of the equation also, the superiority of the results of the earlier period of outward orientation is immediately observed.

6.4.II   Determinants of Imports :

The devaluation of 1966 by India was intended to make exports more competitive and profitable in the international market and at the same time curb non-essential imports, particularly consumer goods. Apart from controls and restrictions on imports, the exchange rate also became an effective tool in pursuing the objective. The results obtained for the post – devaluation period of 1966-67 for India seem to be consistent with the policy objective. In equation 1 of the linear form, the coefficients of gd$ and Pm/P (real import price) turn out to be statistically significant at the 1% and 5% levels with negative and positive signs respectively. This implies that increase in domestic production reduced the proportion of imports in GDP since such imports were sought to be substituted with domestic production.However, the positive sign of the Pm/P coefficient is is inexplicable. There would be no ground on which to argue that a higher real import price would induce higher imports unless

there is a `speculative' demand for such goods in anticipation of a further rise in import price. The R^2 and R^{-2} show satisfactory explanatory powers of 0.83 and 0.77. The F-statistic of 8.66 is statistically significant at the 1% level and the D.W. - statistic shows no serial autocorrelation. In equation 2, when the Pm/P variable is replaced by the income terms of trade (Ti) variable, only the significance of the gd$ coefficient is retained though reduced to the 5% level with all other coefficients becoming non-significant. The negative sign is also retained. The R^2 and R^{-2} are slignitly reduced to 0.81 and 0.74 and the F-statistic is also reduced from 1% to the 5% significance level though the D.W. - statistic shows no serial autocorrelation.

In the log-linear form of the equations, none of the elasticities turn out to be statistically significant except the real exchange rate (log R) in equation 2 at the 5% level with a positive sign implying that a real depreciaton of the currency increased the proportion of imports is GDP. However, the R^2 and R^{-2} show very low explanatory powers of 0.60 and 0.45 in equation 1 and 0.55 and 0.38 in equation 2. The F-statistic in either equation shows a weak goodness of fit and is statistically non-significant. The D.W. - statistic shows no serial autocorrelation in both the equation. Thus one can conclude that for the 1966-77 period for India the linear form of the import equation with the Pm/P variable instead of the Ti variable is the best-fit equation with the highest explanatory powers. The

proportion of imports in GDP.

The results for the 1978-89 import-liberalization period are opposite to those of the earlier period. In the linear form, none of the coefficients show any statistical significance in either equation. The explanatory powers of R^2 and R^{-2} are higher for equation 2 than equation 1 - 0.72 and 0.62 for the former as against 0.47 and 0.27 respectively for the latter. However, the F-statistic shows no statistical significance in either equation though the D.W. - statistic shows no serial autocorrelation. In the log-linear form, only the production elasticity (coefficient of log gd$) shows a 5% significance level with a positive sign in both equations implying that with an increase in domestic production, the proportion of imports in GDP or the average propensity to import also increased. In other words, increased domestic production was possible only via increased imports. None of the other elasticities are statistically significant. The R^2 and R^{-2} show low explanatory powers of 0.62 and 0.48 respectively in equation 1 and 0.66 and 0.53 respectively in equation 2. The F-statistic continues to be non-significant as in the linear form and the D.W. - statistic shows no serial autocorrelation in either equation. Thus one can conclude that liberalization of imports did have an effect of increasing imports for domestic production and that equation 2 in both linear and log-linear forms is relatively the best-fit equation.

Korea's shift to an outward-oriented strategy of development was intended not merely to boost export-led growth but also to pursue the objective of import substitution and thus adopt a balanced pattern of development. The objective was more or less

achieved and during the period of <u>1964-89</u> in the <u>linear</u> form of the import equations 1 and 2, the only significant determinants of imports turn out to be Pm/P and Ti with their respective coefficients showing statistical significance at the 1% and 5% levels in equation 1 and 2 respectively and having positive signs. The positive coefficient of Ti in equation 2 implies that Korea utilized the increased export revenue to purchase additional imports through rise in the income terms of trade and thereby increased the proportion of imports in GDP. The R^2 and $\bar{R}^2$ in equation 1 show very low explanatory powers of 0.40 and 0.32 respectively and the F-statistic of 3.56 is significant at the 5% level. The D.W. -statistic shows in serial autocorrelation. Replacing Pm/P with Ti in equation 2 reduces the R^2 and $\bar{R}^2$ to 0.27 and 0.17 and F-statistic to 1.95 which is no longer statistically significant though the D.W. - statistic continues to show no serial autocorrelation.

In the <u>log-linear</u> forms of the equations the elasticities turn and to be quite steong in determining the proportion of imports in GDP. In equation 1 only the domestic production (GDP) elasticity (0.76) shows a significance level of 5% with a positive sign which implies that every increase in domestic production increased the proportion of imports in GDP. In other words the increased production was dependent on additional imports. The R^2 and $\bar{R}^2$ show high explanatory powers of 0.95 and 0.94. The F-statistic of goodness of fit of 100.43 is significant at the 1% level and the D.W. - statistic shows no serial autocorrelation. In equation 2, when Pm/P is replaced with Ti

there is no difference in the sign and statistical significance of the GDP-elasticity. Moreover, the income terms-of-trade elasticity (log Ti) also shows a statistical significance at the 1% level with a positive sign. The R^2 and $\bar{R}^2$ slightly increase to 0.96 and 0.95 as also the F-statistic to 134.69 which is also statistically significant at the 1% level. The D.W. -statistic continues to show lack of serial autocorrelation. Thus, it could be easily inferred that unlike India, Korea took full advantage of its increased openness in the sense that it could pursue its objective of a balanced development strategy of boosting exports alongwith substituting imports with domestic production.

Brazil's outward-oriented decade of 1964-73 was the most fruitful in terms of the results obtained for the period. In the linear forms of the import equations, the coefficients of gd$ (-0.06), R (-0.13) and FER (0.83) turn out to be statistically most significant with the former two at the 5% and the latter at the 1% level. The negative sign of the gd$ coefficient implies that with an increase in domestic production , the proportion of imports fell and vice -versa. This was the result of Brazil's deliberate policy of substituting imports with domestic production of such goods. In other words, dependence on imports decreased with every increase in domestic production as such imports began to be domestically produced which was made possible by Brazil's increased openness. The negative coefficient of R implies that a real depreciation of the domestic currency reduced further imports as they became costlier whereas an appreciation induced further imports as they became cheaper. This is consistent with the a priori expectation of the sign. The

positive sign of the FER coefficient is quite straightforward implying that a rise in the purchasing power in terms of greater foreign exchange reserves, enabled further imports. The R^2 and $\bar{R}^2$ show high explanatory powers of 0.91 and 0.87. The F-statistic indicates a strong goodness of fit of 13.15 which is significant at the 1 % level and the D.W. -statistic shows no serial autocorrelation. In equation 2, none of the coefficients show any statistical significance when the import price (Pm) is replaced by the income terms of trade (Ti). The R^2 and $\bar{R}^2$ show no change whatsoever in their explanatory powers nor does the F-statistic. The D.W. -statistic continues to show no serial autocorrelation.

In the log-linear forms, only the GDP-elasticity in equation 1 shows a statistical significance at the 1 % level. None of the other elasticities are significant in either equation. However, the R^2 and $\bar{R}^2$ in equation 1 show very high explanatory powers of 0.99 and 0.98 and the F-statistic of 105.15 also is significaant at the 1% level. In equation 2, by introducing the Ti variable the R^2 and $\bar{R}^2$ are reduced to 0.86 and 0.79 as does the F-static from the 1 % to the 5% significance level. The D.W. - statistic in either equation shows no serial autocorrelation. Looking at such results, one can conclude that equation 1 in both its linear as well as log-linear forms is the best-fit equation for the 1964-73 period for Brazil.

The 1974-88 period of Brazil's reversal to import substitution show expected results particularly in terms of the explanatory powers of R^2 and $\bar{R}^2$. In equation 1 of the linear form, the coefficient of gd$ shows a positive sign and is

significant at the 5 % level. The positive sign implies that every 1% increase in GDP was associated with an increase in the proportion of imports by 0.09%. In other words, as the domestic production increased, the dependence on imports also increased. This is a natural consequence of an inward-looking regime where substituting imports by curtailing them becomes virtually impossible since producing certain imports domestically, especially capital goods, would increase the requirement of other additional capital imports. A fall in the proportion of imports in GDP is a direct reflection of the success of the IS strategy which was seen in Brazil's earlier decade of outward orientation through the negative gd$ coefficient and which is not seen during the 1974-88 period since the coefficient is positive. The positive R coefficient with a 1% significance level also implies that a real depreciation induced further imports whereas an appreciation reduced the proportion of imports in GDP. This is also a natural consequence of an inward-looking regime of import substitution. The R^2 and R^{-2} show low explanatory powers of 0.68 and 0.59. The F-statistic of 5.19 is statistically significant at the 5% level. The D.W. -statistic in both equations shows no serial autocorrelation.

In the log-linear forms of both equation 1 and 2 with the Pm and Ti variables respectively, only the production elasticity (log gd$) and exchange-rate elasticity (log R) show statistical significance at the 1% and 5% levels respectively with both having positive signs. The implication of the signs of the elasticities remains the same as in the linear form. The R^2 and R^{-2} however, exhibit relatively higher explanation powers of 0.73

and 0.66 in equation 1 and 0.71 and 0.63 in equation 2. The F-statistic in both equations, 6.85 and 6.08, is also statistically significant at the 1% level. The D.W. - statistic, in both equations, once again indicates no serial autocorrelation. Thus , on the whole , for the 1974-88 period, though the partial coefficients are statistically more significant than for the earlier 1964-73 decade, the explanatory powers of R^2 and R^{-2} are lower as also the F-statistic . In other words, the inward-looking import-substitution phase exhibits poor results than those of the outward -looking development phase.

III. Highlights of the Results : 1950-89

From the ample regressions carried out for the three countries and the results obtained thereby , certain concrete inferences can be made regarding the role of a particular development strategy in enhancing growth in a particular country. The regression results obtained for the entire period of four decades of development 1950-89, for India, South Korea and Brazil, facilitate in commenting on the validity of the various hypotheses put forward at the beginning of the study (refer Prologue - Objective of the study). The major inferences that have been drawn as highlights of the present study are presented below :

1. In all the three countries which adopted alternative development regimes of inward or outward orientation some time or the other in the four decades of their development from 1950 to 1989, domestic capital formation has turned out to be the strongest and most important positive direct determinant of

growth of real GNP per capita.

2.   Foreign capital in the form of non-concessional loans, over the past forty years of development has had a negative influence on growth in India and Brazil and a positive influence in Korea, though during Brazil's `miracle decade' of 1964-73, foreign debt did have a positive influence on growth. On the other hand foreign aid and concessional grants over the entire period have served to enhanced growth in Korea and Brazil but has had a negative influence in India though the coefficient is not as significant as that of debt in either country. Nonetheless, the signs of the two coefficients corroborate **Hypotheses 1** that **"foreign capital in the form of loans and aid will have a positive impact on the borrower country's growth under an outward-looking development regime and negative impact under an inward-looking one."**

3. The above hypotheses is once again corroborated by the results obtained for the domestic capital determinants. Under an outward-oriented development regime such as that of Korea where foreign debt and aid turn out to be highly significant positive determinants of capital formation, a large part of foreign borrowing was utilized for long-term capital investments thereby enhancing domestic capital formation whereas under an inward-oriented development regime, such as in India and Brazil, foreign borrowing was utilized mainly for maintaining current levels of consumption and growth and overcome short-term BoP imbalances so that its contribution towards creation of long-term capital investments was non-significant.

4. Hypotheses 2 regarding the contribution of direct foreign investment (DFI) is corroborated once again by the same results for aggregate growth and domestic capital. The results for . India and Brazil present two contrasting influences of DFI. For the former, the contribution of DFI in enhancing domestic capital formation over the entire forty-year development period turns out to be significantly negative. This proves that in a protection-induced inward-looking economy where restriction on imports abound, DFI earns a negative return and reduces growth since all such investments are technology and import-intensive which they are deprived of. On the other hand, for Brazil, DFI turns out to be a significantly positive determinant of domestic capital formation and thereby an indirect positive determinant of growth. This has been the result of Brazil's `open-door' policy of welcoming DFI right from the beginning of the post-World War II development era. It has welcomed the technology and imports required by such investments and at the same time pursued its objective of substituting imports of consumer goods. Thus Brazil exemplifies a balanced development pattern of import substitution with an `open-door' for DFI. Korea's pattern of DFI has been the result of its deliberate policy choice of reduced dependence on foreign investment. It chose instead to depend heavily on foreign aid and debt. However, at the same time, a superior export performance helped Korea mitigate its high level of external debt and thereby avoid becoming heavily indebted in terms of debt-servicing unlike Brazil. As a result, for Korea, DFI comes across as a non-significant determinant of capital formation, therby having an overall negative influence on growth.

5. Import of capital goods in all the three countries has had a highly significant positive influence in enhancing domestic capital formation over the forty years. Same is the case with domestic savings.

6. In all the three countries an increase in the proportion of exports in GDP in the initial stages of development has had a reducing effect on growth. This is a natural consequence in any country, be it India, Brazil or South Korea, which is beginning to develop after a spell of any natural calamity such as the Second World War or independence from colonial rule. In such initial stages, the resources have to be utilized increasingly for domestic production and diverted towards the domestic economy away from exports. Any attempt to divert resources towards export production will deprive the domestic economy of the scarce resources which would otherwise have been utilized self-productively. Moreover, the foreign exchange earned through exports fall much short of that spent on imports in a developing economy which begins as a primary exporter and manufactured or capital goods importer. Thus **Hypotheses 3 that "increase in the proportion of exports in GDP in the initial stages of development entials a net loss of growth to the economy"** is corroborated by the negative coefficients of exports as a proportion of GDP obtained for the initial period of development, 1950s to mid-60s. Moreover, the statistical non-significance of the coefficient proves that at such initial stages the contubution of exports in enhancing growth is negligible though for the entire period of 1950-89, growth of exports did have a positive and

significant   influence on growth particulrly for India and   South
Korea.

7. Growth in the developed world, particularly in the 1960s,   did
result   in greater access to imports, foreign capital, foreign
investment and technology flows to the developing world but· only
for those countries that were relatively more open to the outside
world and were able to take advantage of and exploit such a
favourable development in the world economy to enhance their own
growth. On the other hand, the benefits of developed countries'
growth could not reach those developing countries which remained
more or less inward and closed to trade, capital and technology
flows. Thus, one sees the timely switch-over to more open and
outward-orinted policies by Korea and Brazil around mid-1960s.
One also witnesses the high and remarkable growth achieved by
both these then developing countries during the same period.
India, during the same period, continued with its inward-looking
policies and chose not to open up lest it becomes vulnerable to
external shocks. As a result of such a policy stance adpoted by
India, today it lags far behind Korea and Brazil in terms of
growth, trade and technology whereas even after Brazil reverted
back to the import-substitution strategy after 1973 it had by
that time, already placed itself on the high- growth path owing
to its previous timely shift to outward-orientation. No doubt,
the 1973 oil shock which forced Brazil to revert back and depend
on heavy external borrowing to tide over the BoP crisis, has also
earned Brazil the dubious `honor' of being the most heavily-
indebted nation. But then today, both India as well as Korea are
much in a similar position, sharing the same `honor' for one

reason or the other. The difference is that where Korea and Brazil used foreign capital and DFI respectively to generate additional long-term capital assets, India took no such advantage and countinued to spend beyond its needs and means without earning anything substantial in return by way of exports.

At the same time, none of the three countries benefitted from the growth of income in the developed world since foreign-income elasticity of demand for the exports of all the three countries over the entire period has been negative as implied by the negative coefficient of **log Yic**. In other words it could be concluded that with an increase in income, the developed world chose to demand goods from its own group of advanced countries and reduce demand for imports from countries like India and the NICs proving the relative inferiority of such goods. Thus, finally, **Hypothesis 4** of the `trickle -down' effect of industrial countries' growth is corroborated by the outward-oriented NICs in terms of higher growth through access to imports, capital, investment and superior technology whereas the same hypothesis is rejected for a relatively more inward-oriented India which comparatively did not experience any remarkable or spectacular growth during its forty years of development.