CHAPTER III

EXPORTS AND ECONOMIC DEVELOPMENT : A STATISTICAL FRAMEWORK OF INDIA

3.1: INTRODUCTION :

The foregoing analysis of the previous chapter has suggested that while there are strong theoretical possibilities of 'export-led' growth, historically, exports have helped to generate growth in some countries and have failed to do so in some other cases. Logically, therefore, the question to be addressed in this chapter is : How far have exports helped in economic development of India ?

In recent years, there have been a few statistical studies[1] to test the relationship between exports and

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[1] R.N. Cooper, "Trade and Growth: Hypothesis about Long Term Trade," Journal of Economic History, December, 1964.

J.E. Haring, "Simple Models of Trade Expansion", The Western Economic Journal, Spring, 1964.

R.F. Emery, "The Relation of Exports and Economic Growth", Kyklos, Fasc 2, 1967.

J. Sandee, "Foreign Exchange and Industrial Growth", Econometric Annual of Indian Economic Journal, Vol.13, No.2

A.K. Senern, "Exports and Economic Growth : A Comment", Kyklos, Fasc 3, 1968.

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economic growth. These studies can broadly be classified into two groups, those studies which have tried to test the relationship directly through simple and multiple regression analysis between rates of growth of exports and that of GNP, such as that of Emery;[2] and the other studies which have tested the relationship indirectly through simple and multiple regression analysis between rates of growth of exports and of such other factors like savings and investment which have direct bearings on growth of the economy, such as those of Maizels[3] and Lee[4].

But these studies have neither followed the same methodology nor are they unanimous on the issues. For example, while Emery[5] asserts that countries eager to increase their growth rates should adopt the type of policies that will stimulate exports, Syran and Walsh[6] have pointed out

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R.M. Syran and B.M. Walsh, "The Relation of Exports and Economic Growth", Kyklos, Fasc 3, 1968.

A Maizels, "Exports and Economic Growth of Developing Countries, Cambridge, 1968.

J.K. Lee, Exports and the Propensity to save in Less Developed Countries", Economic Journal, June, 1971.

[2] op. cit.

[3] op. cit.

[4] op. cit.

[5] op. cit.

[6] op. cit.

that the relationship depends on the type of the export goods as different types of goods provide different degrees of stimulation to the domestic economy.

It is, therefore, the main purpose of the present chapter to test the relationship between exports and economic growth in India. As the various statistical studies have not followed the same methodology, section 3.2 shall survey the various methods employed by these studies; while section 3.3 shall summerise the main findings and limitations, if there be any, of the major studies. The relationship in India shall be tested through multiple regression and multiplier analyses in section 3.4. This is followed by conclusions in the last section 3.5.

3.2: STATISTICAL METHODOLOGY :

The studies have tried to examine the relationship between exports and economic growth, first, by forming direct and indirect hypotheses regarding the relationship and then by testing these hypotheses through simple and multiple regression analyses by adopting (1) time-series method; (2) cross-country method; or (3) cross-section method. These three methods are discussed below :

3.2.1: Time-series methods :

The method consists of utilizing the data of the factors under examination for as many periods, as usually years, as

possible, of the economy. To these time-series data, the statistical techniques of correlation and regression analyses are applied to find out whether the relationship between the factors exists or not. For example, in order to examine export-growth relationship for an economy, data on exports, GNP, savings and investment (either at constant or current prices) of the economy are to be collected, for as many years as possible. These absolute data are to be converted into their repsective rates. And finally, the correlation and regression analyses are to be applied to these time-series data in rates to find out the relationship between exports and economic growth of the economy. It may be noted that this method is applied for the examination of exports-growth relationship for India.

While the merit of the method is its statistical reliability of the conclusions for the economy concerned, it has limited generality since no reliable general conclusions can be drawn from a particular case study.

3.2.2: Cross-country method :

The method uses the data concerning the factors for as many countries as possible for a single period. For example, the data on rates of growth of GNP, exports, savings, and investment are to be collected for a single period for as

many countries as possible. To these cross-country series, the usual regression and correlation analyses are applied to find out the extent of the relationship between the factors. It is this method which has been applied by Sandee in his study.[7]

But it seems that this method did not find favour among the research workers in the field of the present study. This is, understandable, because, firstly, high degree of relationship between factors for a single period does not mean the same degree of relationship during all periods; and secondly, it is highly unrealiable to conclude for a particular case from a general conclusion.

3.2.3: Cross-section method :

This method is a combination of time-series and cross-country methods. It consists of applying correlation and regression analyses to time-series data for as many countries as possible. For example, the data on rates of growth of GNP and of exports (either at current or constant prices) are collected for as many years as possible for as many countries as are available. The statistical techniques consist of finding out, first, the average rates of growth of GNP and of exports of the countries from their time-series data; and then finding out the statistical rela-

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[7] op. cit.

tionship between these rates from the cross-country series through correlation and regression analyses. Such statistical techniques have been applied in Emery's study.[8] Alternatively, statistical relationship, between the factors is first found out from the time-series data of the individual country through correlation and regression analyses and then the results of these analyses are tabulated according to their frequency which will ultimately reflect the strength of the relationship between the factors. Such a procedure is applied in Lee's study.[9]

No doubt, this is the best method of arriving at reliable conclusions regarding the relationship between the factors under examination. However, great care has to be taken while selecting the periods for which the data are to be collected, for each country. This is because of the fact that different countries may be at different stages of their development during a particular period and as such may have different degree of relationship between the factors under study. Under such circumstances, statistical results from data for a uniform period for all the countries may not give reliable conclusions. Hence, it is felt that the data

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[8] op. cit.

[9] op. cit.

for the same stage of development of the countries has to be collected for statistical analysis. This involves great many difficulties. In order to overcome this methodological limitation, it is suggested that data for more than fifteen years for each country may be collected and the sample countries may be classified according to their degree of development as reflected from their international trade.

3.3: SUMMARY OF PREVIOUS STATISTICAL STUDIES :

During the last ten years many statistical studies have been made in this field but only the most outstanding ones, from the point of view of the purpose at hand, are considered below :

3.3.1: One of the most remarkable studies in the field is that of J.E. Haring,[10] assisted by J.E. Humphery, who made a statistical examination for a few countries for the period 1950-60. The data used in the study include GNP and exports at current prices for the years 1950-60. The model consists of least-square linear regression fitted to these simple data. The conclusion of the study is that these simple statistical models reveal that exports can and do act as a leading sector in some developing countries. More specifically, the author concludes, "the simple models developed

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[10] op. cit.

in the study show that export economies react immediately (using annual data) to changes in exports, adding some empirical verification to existing literary theories".[11]

3.3.2: However, R.F. Emery's[12] study in the field is the most ambitious and his conclusion is also very definite. He asserts that countries eager to increase their growth rates should adopt the type of policies that will stimulate exports. His conclusion is based on the results, summarised in Table 3.1, of a regression analysis of 10 years data (1953-63), for average growth rates of GNP per capita, of exports and of current account earnings for a sample of 50 countries, at various stages of development.

The main observations from the above table are : (i) There is a significant correlation between the growth of exports and of GNP. The correlation between current account earnings and GNP is also high. (ii) There is a high degree of reliability for coefficient of independent variables namely exports and current accounts, but not for the constant term of the equations. On the basis of these results Emery has deduced his conclusions regarding export-growth relationship mentioned earlier.

Before we go into the limitations of the studies, let us first sort out the 'reservations' pointed out by the

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[11] op.cit.

[12] op. cit.

Table 3.1

Emery's Results of correlation and Regression Analyses

Sr. No.	Comparisons	Regression equations	Multiple correlation coefficient R^2	F-ratio
(1)	(2)	(3)	(4)	(5)
1:	GNP on Exports (E)	Real GNP = 0.6630 + 0.32952 (Exports) (1.1557) (0.03316)	0.82027 R^2 = 0.67	98.722
2:	GNP on Current a/c (C)	Real GNP= 0.3884 + 0.34681 (Current)a/c) (1.3291) (0.04371)	0.75324 R^2 = 0.57	62.950
3:	GNP on Exports(E) and Current a/c (C)	Real GNP = 0.7491 + 0.37429 (E) -0.05480(C) (1.1649) (0.09511) (0.10901)	0.82134 R^2 = 0.67	48.719

Source : R.F. Emery. op. cit.

author himself. They are : (i) the data used covers only eleven years and not as large a group of countries as might be desirable; (ii) the equation used have assumed that economic growth is a function of exports and/or current account earnings, but there is a fair amount of interdependence between these variables; (iii) the calculations compare rates of change with other rates of change. The significance of the statistical results in such a case is less clear, than where the time series of the absolute data are compared; (iv) the relationship between the series may not be linear, which would have the effect of reducing the statistical significance of the correlations. It is because of these limitations that the author is careful enough to state that "while the statistical results tend to support the hypothesis, they do not completely prove it. The results are offered here only as a further step in support of the hypothesis."[13]

Besides, these 'reservations' pointed out by the author himself, the major limitation has been pointed out by R.F. Syren and B.M. Walsh.[14] According to them since different types of export goods provide different degrees of stimulation to the domestic economy, the stimulus provided by exports to

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[13] R.F. Emery. op. cit.

[14] op. cit.

domestic economy may be lower in the underdeveloped countries than in the developed due to the weak backward linkage effect of exports in underdeveloped countries. It is quite likely, therefore, (i) that the correlation between exports and growth is less prominent in underdeveloped countries than in developed countries; and (ii) that this correlation is still less prominent in case of the underdeveloped countries, exporting agricultural products. Emery did not considered this vital points in his study.

In order to show these, these authors first divided the sample of 50 countries into two subsamples : (i) consisting of 13 developed countries; (ii) consisting of 35 underdeveloped (2 countries were dropped because of inadequate export data). GNP per person of $ 900 in 1964 was used as the line of demarcation between these two sub-samples. Then ordinary least square regression of GNP (per person) growth on growth of exports was applied to these sub-samples. The results thus obtained were compared with those of Emery's entire sample of 50 countries. After this analysis, the underdeveloped countries (35 in all) were further divided into three groups according to the proportion of foodstuff exports to total exports. These were : (a) countries with exports of foodstuffs $\geq$ 66 % of total exports; this included 9 countries; (b) countries with 66 % of exports $>$ foodstuff exports $>$ 33 % of total exports; this included

10 countries; and (c) countries with foodstuff exports $\leqslant$ 33 % of total exports, in this 16 countries were covered. The ordinary least-square regression of GNP growth on export growth was also applied to these three groups of under-developed countries. The results are summarised in Table 3.2.

Table 3.2

Results of Regression analysis from Syren and Walsh study

	Comparisons	Equations	R^2
(i)	Emery's GNP on Exports for 50 countries	GNP = 0.663 + 0.3265(E) (1.1557) (0.0332)	0.67
(ii)	GNP on Exports for 13 developed countries	GNP = -0.1599 + 0.3718(E) (0.3718) (0.0448)	0.86
(iii)	GNP on exports for 35 under-developed countries	GNP = 0.8128 + 0.3327 (E) (0.3067) (0.0447)	0.62
(iv)	GNP on exports for 9 groups (a) underdevelo-ped countries	GNP = 1.7534 - 0.1215 (E) (0.3768) (0.1305)	0.00
(v)	GNP on exports for 10 group (b) under-developed countries	GNP = 0.9655 + 0.2753 (E) (0.5225) (0.0646)	0.66
(vi)	GNP in exports for 16 group (a) under-developed countries	GNP = 0.4827 + 0.4123 (E) (0.5017) (0.0661)	0.72

Source : Syran and Walsh, op. cit.

The following observations are made from the above results :

(1) The values of R^2 in (ii) and (iii) shows that there is greater degree of correlation between exports and economic growth in the developed countries than in the less developed countries; (2) the values of B-term in (ii) and (iii) suggest that the impact of 1 % increase in exports in the developed countries may be larger than that in the less developed countries; (3) the intercept term in equation (iii) is significally great implying thereby that even in the absence of export growth, positive growth in GNP can occur in the less developed countries. (4) the values of R^2 rise from 0.0 from group A to 0.72 to group C, implying thereby that there is greater correlation between exports and economic growth as % age of foodstuff in total export decreases. (5) the relationship in group C as indicated by $R^2 = 0.72$ compares favourably with the relationship in the developed countries where $R^2 = 0.86$; (6) for group A there is no significant relationship between exports and economic growth where $R^2 = 00$; (7) the values of B-term rises from -0.1215 from group A to 0.4123 for group C. This indicates that the more dependent a country is upon food exports, the lower the impact of increase in exports upon GNP; (8) the scope of equation (vi) is greater than that of equation (ii) implying thereby that it may be possible for exports to have a greater impact on economic growth in less developed

countries than the developed countries; (9) on the other hand, the intercept term goes on increasing from 0.4827 for group C to 1.7534 for group A. This suggests that even if exports do not grow, GNP may grow in case of the countries in group A.

However, even these observations have to be taken as very tentative, as suggested by the authors. This is because : (i) the model applied is very simple; (ii) the data used in the model are also of varying reliability; (iii) number of countries included in the three groups of the underdeveloped countries is small; (iv) only 1 year data is used.

Now let us turn to the most common limitations of all the above three studies. They are : (i) All the studies compared rate of growth of current GNP with that of current exports which is highly inappropriate as it requires some time to have full impact of exports on GNP. It is, therefore, essential to use lagged relationship between GNP and exports growth rates; (ii) In all the studies, the functional form is inappropriate as it did not include the impact of the extent of 'openness' of a country. The export variable should be modified by an 'openness coefficient' $\frac{X}{GNP}$; (iii) All the studies ignored one of the major roles of exports as quasi-capital goods sector. This may be done by

adding one more term $\frac{M'}{X}$ in the relationship used, where M' is the developmental (capital goods + raw materials and intermediate goods) imports.

We have so far dealt with the studies which tried to test the hypothesis directly. But there are a few other recent studies which have tried to test it indirectly with the assumption that exports play their role in economic development through stimulating savings in the domestic economy. Thus, M. Maizels[15] has argued that "variations in exports might very well result in associated variations in domestic savings." Maizels tested the hypothesis using the annual data from 11 member countries of the Overseas Sterling Area for 10 to 11 years and using the relations :

$$(1)\ S_t = a + (Y_t)$$

$$(2)\ S_t = a + b\ (Y_t - X_t) + C\ (X_t)$$

Where S = gross domestic saving;

Y = gross domestic product;

X = value of exports at constant prices.

His feeling was that equation (2) would produce larger R^2 value for each country than equation (1) and the regression coefficient of X_t would not only be statistically significant, but would also be larger than that of non-export

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[15] op. cit.

GDP. His test led him to conclude that, in all but 3 out of 11 countries, the inclusion of exports in the savings function improved the goodness of fit and that "the regression results (could be) taken as supporting the view that there is likely to be a positive association in many primary exporting countries between exports and savings."[16]

This conclusion is tested more recently by J.K. Lee[17] with the following modifications :

(i) The study included 20 less developed countries and 8 developed countries for the analysis; (ii) It covered a longer period, more than 15 years, than that of Maizels'; (iii) It tried to fit, in addition to the two relations fitted by Maizels, a third relation, namely,

$$S_t = a + b\ \Delta(Y_t - X_t) + C\ \Delta X_t.$$

His findings led him to conclude that "This study has attempted a more extensive test of the Maizels hypothesis of the association of exports with domestic savings. The results obtained from fitting Maizels' equations (and the first difference equation) to the data covering a total of 28 countries over the period of 1950-67 seem to be consistent with the Maizels hypothesis."[18]

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[16] op. cit.

[17] J.K. Lee, "Exports and Propensity to save in L.D.C's," Economic Journal, June, 1971, pp. 341-351.

[18] Ibid. p. 349.

In short, the foregoing brief discussion of a few leading statistical studies have pointed out that exports have helped in the process of economic development of underdeveloped as well as developed countries. That the impact of exports on growth is not only direct but is also indirect in the sense that exports have positively reacted in supplementing domestic savings of many primary exporting countries.

3.4: CASE STUDY OF INDIA :

It is against this methodological and statistical background that the present study shall examine the export-growth relationship in India. It may be noted at this stage that in spite of the official policy of export promotion and extensive academic discussions on export performance of India, no systematic effort has yet been made in the direction of examining export-growth relationship of India. Afterall, exports are to be increased not for its own sake but to earn scarce foreign exchange resources, so that much needed developmental goods can be imported at the initial stages of a developing economy. No doubt, exports also hasten the process of development through supplementing domestic savings and enhancing capital formation through increasing inducement to invest. It, therefore, remains the main purpose of this section to examine, how far have exports helped in the economic development of India ? And what are the possible factors

responsibke for such a role of Indian exports ?

3.4.1: METHODOLOGY OF THE STUDY :

In order to examine the relationship in India, the following modifications over the methodology of the previous studies are made, so that more reliable conclusion can be drawn from the results :-

(1) It may be noted that the previous studies have tested the relationship through the correlation and regression analyses alone. In what follows, not only these statistidal techniques shall be used but the results of these analyses shall also be checked through multiplier analysis.[19] It is through such cross-checking that the conclusions of the present study shall become more reliable.

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[19] V.K.R.V. Rao, in his "Investment, Income and the Multiplier in an underdeveloped Economy", Indian Economy", Indian Economic Review" February, 1952.

- has argued that the multiplier principle cannot be applied to developing countries like India since the assumptions under which it is working, are not valid in such countries. These assumptions are :

a) involuntary unemployment.

b) elastic supply of output.

c) excess capacity in the consumption-goods industries.

d) comparatively elastic supply of the working capital required for increased in output.

This may be true for the underorganized sectors but not for the foreign sector of a developing country which is usually well developed and more organized and as such it is assumed that the above assumptions may not hold good for such a sector of the economy.

So far as the statistical analysis is concerned the modifications are :

(2) The statistical analysis shall further be carried out at two levels as have been done by the previous studies, direct and indirect. In the direct analysis, the hypothesis to be tested is : rate of growth of exports has helped to generate economic growth of Indian economy. So far as indirect analysis is concerned instead of testing only exports-savings hypothesis, viz., growth of exports stimulates domestic savings, an additional exports-investment hypothesis, namely, export growth helps the process of capital formation shall also be tested.

(3) It may be recalled that the most ambitious study, that of Emery, used cross-section method by taking ten-year average rates of growth of GNP and of exports which is a very short period. The present study shall use time-series method by taking twenty-years (1948-49 to 1968-69) data.

(4) In order to test the direct hypothesis, the following three modification shall be made in the functional relationship between exports and GNP:

a) Emery's export variable shall be modified by 'openness' coefficient in order to take care of the possible impact of the degree of openness on the relationship.

b) A few other operationally significant variables like, investment, level of foreign aid and short-run fluctuations in exports shall be added as independent variables to the functional relationship in order to observe the relative impacts of exports growth and of the variables on the growth of ~~exports~~ GNP.

c) The study has used lagged relationship between exports and GNP as it is assumed that it requires some time, at least a year, to have full impact of ~~expirt~~ exports on GNP.

Taking into consideration all these three modifications, the study has used the following linear lagged functional equations to test the diredt hypothesis :

a: $\bar{Y}_{t+1} = a + b\bar{X}_t$

b: $\bar{Y}_{t+1} = a + \bar{X}_t \cdot \frac{X}{GNP}$

c: $\bar{Y}_{t+1} = a + b\left(\bar{X}_t \cdot \frac{X}{GNP}\right) + cE_t$

d: $Q_{t+1} = a + b\bar{I}_t + cA_t + d\bar{X}_t + eE_t$

Where,

$\bar{Y}_{t+1}$ = Growth rate of gross nation product (GNP)

Q_{t+1} = Change in per capita GNP at time t+1

$\bar{X}_t$ = Growth rate of exports of goods and services at time t.

$\bar{I}_t$ = Growth rate of investment of time t.

A_t = Foreign aid at time t.

E_t = Short-run fluctuations in exports of time t.

B_t = Balance of payments on current account at time t.

(5) As regards, indirect exports-savings hypothesis is concerned, the functional relations of M. Maizels[20] and J.K. Lee[21] are used to test the hypothesis.

a: $S_t = a + bY_t$

b: $S_t = a + b(Y_t - X_t) + c(X_t)$

c: $S_t = a + b(\Delta Y_t - \Delta X_t) + c\ \Delta X_t$

Where, S = gross domestic savings;

Y = gross domestic product;

X = value of exports at current prices.

(6) In order to test the indirect exports-investment hypothesis, the following three linear functions are used:

a: $I_{f(t+1)} = a + b\bar{X}_t$

b: $(I/Y)_t = a + b\bar{X}_t$

c: $(I/Y)_t = a + b(A/Y)_t + c\bar{X}_t + aE_t + e\bar{F}_t$

Where, $I_{f(t+1)}$ = Fixed investment of time t+1.

$(I/Y)_t$ = Investment - GNP ratio at time t.

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[20] op. cit.

[21] op. cit.

$\bar{X}_t$ = Growth of exports of goods and services at time t.

E_t = Short-run fluctions in Exports at time t.

F_t = Rate of growth of foreign exchange reserves at time t.

(6) Finally, in order to find out the multiplier of the export growth, the multiplier formula stated in chapter II is slightly modified in order to suit the availability of Indian data. Thus, instead of taking total imports to be equal to input content of exports plus import content of investment plus import content of consumption, i.e. $M=M_x+M_i+M_c$, the present study has taken, $M = M_i + M_c$. With this modification the multiplier formula used in the study are:

$$Y = \frac{1}{1-c'} X + \frac{1 - \frac{M_i}{I}}{1 - c'} I = a_1 X + b_1 I \quad \ldots \quad \ldots \quad (1)$$

$$\Delta Y = \frac{1}{1 - c'_m} \Delta X + \frac{1 - \frac{M_i}{I}}{1 - c'_m} \Delta I = a_2 \Delta X + b_2 \Delta I \quad \ldots \quad (2)$$

Therefore,

$$\frac{\Delta Y}{Y} = \frac{(2)}{(1)} = \frac{a_2 \Delta X}{a_1 X + b_1 I} + \frac{b_2 \Delta I}{a_1 X + b_1 I}$$

$$= \frac{a_2}{a_1 + b_1 (I/X)} \frac{\Delta X}{X} + \frac{b_2}{a_1 + b_1 (I/X)} \frac{\Delta I}{I}$$

$$= a_3 \frac{\Delta X}{X} + b_3 \frac{\Delta I}{I} \quad \ldots \quad \ldots \quad (3)$$

In the formula (3), the coefficient of $\frac{\Delta X}{X}$, namely, (a_3), is the multiplier of export growth, while (a_1) and (a_2)

in formulee(1) and (2) are the average and marginal export multipliers respectively. The various notations in the above formulee are :

Y = Gross National Product

C = Consumption

I = Gross Investment

X = Total exports

M = Total Imports

$c' = c(1 - \frac{M_c}{C})$ Where c is the average propensity to consume.

$c'_m = c_m (1 - \frac{M_c}{C})$ Where c_m is the marginal propensity to consume.

It will be easy to see that the value of multipliers a_1, a_2, or a_3, show what the values of Y, ΔY or $\frac{\Delta Y}{Y}$ would be when the values of X, ΔX or $\frac{\Delta X}{X}$ is multiplied by the multipliers a_1, a_2 and a_3 respectively. In other words, if a_1, a_2 or a_3 be .5 then every unit of X, ΔX or $\frac{\Delta X}{X}$ will contribute 1 X .5 = .5 unit in Y, ΔY or $\frac{\Delta Y}{Y}$.

3.4.2: MAIN FINDING OF THE STATISTICAL AND THE MULTIPLIER ANALYSES :

With the above methodological modifications, the export-growth relationship in India has been examined first by the statistical analysis and then by the multiplier analysis. The main findings of these analyses are discussed below :

3.4.2.2: Statistical Analysis :

It may be recalled, in brief, that the three hypotheses mentioned in (2) of 3.4.1 have been tested through time-series method by taking 18 to 20 years data whenever possible. The functional equations mentioned in (4) and (5) of 3.4.1 have been used for correlation and regression analyses. The results of the analyses are shown in Table 3.9.

Before commenting on the results of the analyses, it is pertinent to note some of its limitations: Firstly, the functional relations used are linear. In actual circumstances, they may not be linear. This would reduce the statistical significance of the whole analyses. Secondly, in the estimations, the rates of growth of exports are compared with rates of growth of GNP. The significance of the statistical results in such cases is less pronounced than where the time series of the absolute data are compared.[22] Finally, the

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[22] When the time series method is applied to absolute data, the following significant results have been obtained:-

i) $Y_t = -6306.79+27.25\ X_t$ $R^2 = .8609$ D-W=1.0196 Co.of V.93.8

ii) $Y_t = -4048.97+3.08\ I_t+9.46E_t+14.17X_t-.04A_{t-1}$
$R^2 = .9775$ D-W = 1.3862 Co.of V. 163.8

Table 3.3

Results of correlation and regression analysis for exports-growth relationship in India

Group No.	Sr. No.	Period	Regression equation	R^2	D.-W.	Coe.of V. (%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)	(i)	1948-49 to 1968-69	$\overline{Y}_{t+1} = 5.75 + .26\ \overline{X}_t$ (1.816)	0.1327	2.2296	96.82
	(ii)	1948-49 to 1968-69	$\overline{Y}_{t+1} = 5.82 + 4.70\ (\overline{X}_t \cdot \frac{X_t}{Y_t})$ (1.757)	0.1221	2.2099	97.41
	(iii)	1948-49 to 1968-69	$\overline{Y}_{t+1} = 3.16 + 2.78\ (\overline{X}_t \cdot \frac{X_t}{Y_t}) - .01\ B_t$ (.947) (-1.385)	0.1761	2.649	94.36
	(iv)	1951-52 to 1967-68	$Q_{t+1} = 1.86 + .07\overline{I}_t + .001A_t + .35\overline{X}_t + .01E_t$ (.550) (.578) (2.357) (.549)	0.1021	2.612	141.62
(2)	(v)	1951-52 to 1968-69	$S_t = -298.50 + .11\ Y_t$ (9.550)	0.8574	1.0214	18.54
	(vi)	1951-52 to 1968-69	$S_t = 220.36 + .16\ Y_t - 1.53\ X_t$ (5.788) (-1.959)	0.8852	1.2438	16.63
	(vii)	1951-52 to 1968-69	$S_{t+1} = 969.62 + .31(\Delta Y_t - \Delta X_t) + .29\ \Delta X_t$ (2.651) (1.918)	0.5248	1.5851	33.84

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continued Table 3.3

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(3)	(viii)	1951-52 to 1967-68	$I_{f(t+1)} = -2226.94 + 4.82\ \bar{X}_t$ (4.956)	0.6110	0.8906	33.71
	(ix)	1951-52 to 1967-68	$(\frac{I}{Y})_t = 0.14 + .0005\ \bar{X}_t$ (1.114)	0.0158	0.7270	14.84
	(x)	1951-52 to 1967-68	$(\frac{I}{Y})_t = 0.13 + .13(\frac{\Delta}{Y})_t + 0.001\bar{X}_t + .00004E_t - .0004\bar{F}_t$ (1.317) (2.246) (0.471) (-1.658)	0.1120	1.4856	14.10

Source : Estimated from Tables I to VI from the Appendix.

Note : (1) The figures in the brackets under the coefficients of the variables in the equations are 't' ratios. 't' score of 1.75 or above is good.

(2) R^2 is 'adjusted' multiple correlation coefficient.

(3) D.-W. means Durbin-Watson statistics which shows whether serial correlation of disturbances are present or not.

(4) Coe. of V. (%) is defined as $100 \times \frac{\text{Standard error of the estimate}}{\text{mean of dependent variables}}$. Generally less less the coefficient of variance, the better is the fit.

relations used have assumed one-way relationship, but there is a fair amount of two-way relationship between exports and growth. This may reduce the significance of the results.

It is against these limitations of the results that the following observations may be drawn from Table 3.3. It may be noted from the table that three groups of equation are presented, one group for each of the above three hypotheses regarding export-growth relationship in India. From these groups of equations, the following observations may be made.

It may be observed from the equations in group (1) that Firstly, the values of the co-efficients of b-term, which shows the impact of exports on growth, in all the four equations are positive and significant as shown by 't' score in the brackets below them; Secondly, the values of the constant term of the equations goes on decreasing as we go on adding independent variables in the equations; and Finally, the multiple regression equation (iv) in the group suggests that with 1 % growth in exports, GNP grows by .35 %. This means that exports do contribute to Indian economic growth.

This conclusion of the direct analysis is reinforced by the indirect analysis, as can be observed from the groups of equations (2) and (3) in the table. On the one hand, the

values of the coefficient of b-term, which shows the impact of exports on savings in equations (v) and (vi) of group (2) are negative implying negative relationship between exports and savings. But, on the other hand, theoretically equation (vii) shows a better savings function than the equations (v) and (vi) in group (2). Further, the coefficient of the exports terms (ΔX_t) is also significant as shown by the 't' score below the term. Hence, it is better to consider, theoretically and statistically, the equation (vii) for our conclusion. As such, the equation suggests that with every 1 % increase in exports, savings of the Indian economy increase by 1.29 %.

Finally, the value of b-term in equation (viii) in group (3), is positive and significant. It shows that exports have helped in the process of fixed capital formation in the Indian economy and as such played the role of quasi-capital goods sector of the economy. While equation (ix) has yielded a positive and significant (as shown by 't' score) coefficient of the export, term. The value and the significance of the coefficient of the term has improved considerably by adding three more independent variables as shown by equation (x) in group (3). This has also gained support to the hypothesis that Indian exports have also helped the process of capital formation of the economy.

In short, both the direct and indirect tests through statistical analysis have revealed that Indian exports have played a positive role in Indian economic growth. This conclusion of the statistical analysis has to taken with due regard$ to the various limitations of the analysis mentioned earlier.

3.4.2.2: Multiplier Analysis :

Now coming to the multiplier analysis, it may be noted that the data for the period, 1951-52 to 1968-69, are used to calculate the export multipliers a_1, a_2 and a_3 of the formula as referred to in (6). The values of these multipliers in different periods are shown in Table 3.4.

Table 3.4

Values of Export Multipliers of India

Period	Average Export Multiplier a_1	Marginal Export Multiplier a_2	Multiplier of Export Growth a_3
(1)	(2)	(3)	(4)
Ist Plan	09.70	02.13	0.039
IInd Plan	10.30	13.16	0.0460
IIIrd Plan	13.70	52.63	1.500
1966-71 3 Annual Plans	09.50	05.92	0.308
IVth Plan 1951-1969	10.60	15.33	0.453

Source : Calculated from Table I and II from the Appendix.

Before commenting on the results of the analysis, it is worthwhile to note the following points: Firstly, as noted earlier the multiplier principle cannot be applied to a developing economy like India since the assumptions under which it is working, are not valid in such a country. However, it is assumed that the foreign sector of a developing economy is usually well developed and organised and as such the assumptions on which the principle is working may hold good for such a sector of the economy. Secondly, the values of the various variable used are at current prices and not at constant prices. As such the multipliers are not in real terms but are in money terms. Thirdly, the values of the multipliers are calculated by taking $M = M_c + M$; and not $M = M_c + M_i + M_x$. This has inflated the values of the various multipliers.

With these limitations of the results, the following observations may be made from Table 3.4. Firstly, the multiplier of export growth is relatively higher during the Third Plan than that of the previous plans and of the planning period 1951-69. This is because, as can be observed from the table, the marginal multiplier is much greater than the average multiplier during the Third Plan. This, in turn, is due to $c'_m > c'$ during the plan because of the larger value of the marginal propensity to consume (c) than that of the average propensity to consume during

the plan. Secondly, the multiplier of export growth during 1951-1969 is 0.453. This means that with 1 % growth in exports, the growth in GNP will be 0.453 %. Considering the third limitation mentioned above, this is in consonance with the conclusion from the statistical analysis, where the value of the coefficient of growth rate of exports has been 0.35 (equation (iv) of group (1) in Table 3.3).

3.4.2.3: Suggestive explanation for the positive impact of exports on Indian economic growth:

In short, both the statistical and multiplier analyses have suggested that Indian exports have positively reacted on Indian economic development. But, then, what should be the possible explanations for such a reaction ?

The possible clue to such a reaction has been provided by the indirect evidences of the statistical analysis itself. The analysis has revealed that exports have stimulated domestic savings and have also enhanced the process of capital formation of the Indian economy. They have played the latter role through acting as a quasi-capital goods sector, enabling India to import much needed developmental goods which include capital goods also. This can very well be observed from Table 3.5.

Table 3.5

Financing Developmental Imports through Export Earnings (1951-52 to 1969-70)

Period	% of Imports financed through exports of goods	
	Developmental Imports	Total Imports
(1)	(2)	(3)
Ist Plan	121.06	86.15
IInd Plan	80.19	57.38
IIIrd Plan	78.95	61.77
Three Year Annual Plans and First Year of the Fourth Plan	98.74	70.46

Source : As per Table I and VI from the Appendix.

The table clearly brings out a fact that while import financing through export earnings has increased from plan to plans, there has been always a gap between imports and exports and as such India had to depend on other methods of financing its imports during the whole of the planning period. This has been well brought out in Chapter I.

3.5: SUMMARY AND CONCLUSION :

In the foregoing discussion, two questions have been posed: How far have exports helped in economic development of India ? And what are the possible factors responsible

for such a role of Indian exports ?

In recent years, there have been a few statistical studies to test the relationship between exports and economic growth. Some of the studies have tried to test the relationship directly, while other studies have tested the relationship indirectly. However, these studies have not used the same methodology. The methods that have been used by the studies are : (1) time-series method; (2) cross-country method; and (3) Cross-section method. The present study has applied time-series method for the examination of export-gorwth relationship of India.

While examining the results of a few leading studies, it was revealed that exports have helped in the process of economic development of developing as well as developed countries. Further, the impact of exports on growth is not only direct but is also indirect in the sense that exports have positively reacted in supplementing domestic savings of many primary producing countries.

It is against this methodological and statistical backgrouhd that the present study has examined the export-growth relationship of India. The study has used both the statistical and multiplier analyses for cross-checking the results and as such the conclusions have became more reliable

Both these analyses have revealed that Indian exports have positively helped the process of economic development. The possible factors responsible for such a role have been revealed by the indirect evidences that Indian exports have supplemented domestic savings and have also enhanced the process of capital formation of Indian economy through importing much needed developmental imports.

It is against these conclusions that the present Government policy of export promotion measures is to be viewed. But the Government should be more selective in promoting exports of goods. This is because different types of export goods provide different degrees of stimulation to the domestic economy through their forward and backward linkage effects. The present policy of encouraging exports of manufactured and engineering goods could be further analysed in this light.