RELATIONSHIP BETWEEN EXPORT GROWTH AND ECONOMIC GROWTH : SOME EMPIRICAL EVIDENCE FROM INDIA

Dissertation submitted to the Jawaharlal Nehru University in partial fulfilment of the requirement for the award of the Degree of MASTER OF PHILOSOPHY

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DECLARATION

This dissertation titled "RELATIONSHIP BETWEEN EXPORT GROWTH AND ECONOMIC GROWTH : SOME EMPIRICAL EVIDENCE FROM INDIA" being submitted to the Centre for Economic Studies and Planning, School of Social Sciences, Jawaharlal Nehru University, by Miss Kasturi Das, in partial fulfilment of the requirements of the degree of MASTER OF PHILOSOPHY, is entirely her own work and has not been considered for the award of any other degree either at this or any other university. We recommend that the dissertation be forwarded to the examiners for evaluation.

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To

Dada, Ma, Baba and Bu

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CONTENTS AT A GLANCE

Chapter-1

Introduction

INTRODUCTION

Economists have long been interested in the role of exports in the economic growth of a country. Notwithstanding the vast enormity of the literature, both theoretical and empirical, on the subject, there still exists considerable ambiguity regarding the analytical explanation of the relationship as well as its statistical basis.

Over the years, economists have adopted divergent theoretical positions, so far as the relationship between exports and economic growth is concerned. The proponents of the so-called "export-led growth" hypothesis (e.g.the classicists and the neo-classicists) have argued that good export performance can make major contributions to economic growth, for example, by a) increasing specialisation and expanding the efficiency-raising benefits of comparative advantage, b) offering greater economies of scale due to an enlargement of the effective market size, c) affording greater capacity utilisation , d) inducing more rapid technological change etc. A diametrically opposite view has been expressed by the structuralist and the "radical" schools of thought who have projected trade, in general, and exports, in particular, as an obstacle on the path of growth and development of the peripheral (developing) countries. The structuralists' stand has been based, primarily, on their observation that there is a secular tendency for net barter terms of trade to turn against the primary product exporting peripheral countries because a) commodity and factor markets are oligopolistic in developed countries and b) demand for exports of poor countries increases at a much slower rate than their demand for imported manufactures from developed countries (DCs). The "radical", neo-Marxists and the left-leaning positions on the other hand, have suggested that trade between developing and developed countries, and, in particular, exports from the former to the latter constitute an important mechanism through which exploitation of the poorer countries occurs.

A somewhat, intermediate view has been put forward by Kravis(1970) who has described trade as a handmaiden of growth. The argument is that while trade can be regarded as one among many factors affecting economic growth, it is neither a necessary nor a sufficient condition for such growth.

In view of the importance of the subject and the wide divergence in theoretical positions, a large number of empirical studies have been conducted, using various techniques, to assess the role of exports in economic growth. The results of these studies

however have also been divergent, strengthening the ambiguity surrounding the export-growth nexus, rather than sorting it out.

Early studies found simple correlation between export performance and overall growth or non-export growth (e.g. Emery (1967); Kravis (1970); Michaely (1977); Balassa (1978) etc.). At a later stage, various authors (e.g. Michalopoulos and Jay (1973); Balassa (1978 and 1985) Feder (1983 and 1986); Ram (1985 and 1987), Rana (1988); Tyler (1981); Kavoussi (1984 and 1985) etc.) used multiple regression analysis in more sophisticated investigations. Using an aggregate production function framework, and making the strong assumption that the characteristics of such a function are common to all the countries in the sample, many of these authors found statistically significant relationships between measures of export performance and growth. These statistical associations were used by these authors to support the export-led growth hypothesis leading to the widespread prescription of export-oriented policies for developing countries as their appropriate development strategy.

A common drawback of all these correlation-regression based studies is that all of them implicitly assume that export growth is causally prior to economic growth, ignoring altogether the possibility of the existence of a reverse causation or a bi-directional causality. With the aim of finding out an answer to this causality question, more recent research in this area have applied Granger type causality tests that rely on temporal predictability as an evidence of causation. The results of these studies, however, have turned out to be mixed and sometimes contradictory. For instance, Jung and Marshall (1985), found evidence of unidirectional exports-to-growth causality only for four countries out of the entire sample of thirty seven developing countries. Examining the case of eight newly industrialising countries, Chow (1987) found support for export-to-growth causality only in case of one country, bi-directional causality for six and no causal link for one. Hsiao (1987)'s study confirmed no causal link between exports and GDP for four Asian NICs, except for Hong Kong where the unidirectional causality ran the other way from GDP to exports. So on and so forth.

As far as India is concerned, the causality question still remains inconclusive. For instance, while Nandi and Biswas (1991) have found evidence in favour of export-to-growth causality, Mallick (1996) and Marjit and Raychaudhuri (1997) have arrived at a

reverse causality (from output growth to export growth) in their studies. However, given the fact that the recent trade policy of the Government of India aims at achieving a commendable, sustained long run growth of exports as a promoter of economic growth, it becomes extremely important to identify the precise nature of the relationship between exports and economic growth in this country. The present study, therefore, aims at re-examining the nature as well as the direction of causal linkage between export growth and economic growth in India over the long-run period of 1950-51 to 1996-97 by examining a) the time series properties of the data, b) the existence of cointegration among the variables (using the Johansen's (1988) maximum likelihood approach to testing for cointegration) and finally c)the Granger Causality results.

It should be noted here that the effects of export expansion upon economic growth can be studied from various aspects e.g. its impact on the enhancement of a) national income[1], b) production of non-export goods[2], c) capital efficiency and capability to manage external shocks[3], d) the scale effects and externalities[4], e) resources reallocations[5] f) total factor productivities[6] etc. Our focus in this paper, however, will be only on the relationship between real export growth (measured in terms of growth rate of exports at constant (1980-81) prices) and real output growth (measured in terms of growth rate of GDP (at factor cost) at constant 1980-81 prices)

Although one can come across a vast empirical literature concerning the macro-level relationship between export-growth and economic growth, micro-level studies focusing on a particular industry are almost non-existent (as far as my present study of the literature suggests). Intuitively, however, it is not difficult to postulate a causal linkage between export-growth and output-growth of a particular manufacturing industry[7]. Therefore, apart from examining the export-growth nexus for the Indian economy as a whole, an attempt has also been made in the present study to throw some light on the nature of the causal relationship between export growth and output growth in three manufacturing industries of India namely a) textiles b) machinery and transport

[1] See Michaely (1977)
[2] See Heller and Porter (1978)
[3] See Balassa (1978, 1981)
[4] See Tyler (1981)
[5] See Feder (1982)
[6] See Kavoussi (1984)

equipments c) chemical and chemical products) which not only form parts of the principal exports from the country but also belonged to the high-growth category of exports at least in the recent past.

The second chapter will provide a very brief review of some of the more important theories of trade and development.

This will be followed by a survey of the empirical studies on the export-growth linkage, in Chapter 3.

Chapter 4 contains the results of the econometric exercise that have been carried out in this study. Section 4.1 provides information on data sources. This is followed by a brief discussion on some concepts of Time Series Econometrics relevant for our study (in section 4.2). Section 4.3 develops the methodology followed in the present study. The intuitive logic behind the hypothesis of a causal linkage between exports and growth (both at the micro and at the macro level) is provided in section 4.4. The next section (section 4.5) contains the result of the macro-level exercise and their interpretations while the micro-level results are discussed in Section 4.6. The final section (section 4.7) discusses some drawbacks of the present study owing to the limitations of data.

Chapter 5 provides some concluding remarks regarding the study and its outcome.

[7] The intuitive explanation behind such a linkage will be provided later.

Chapter-2

Some major theories of Trade and Development: *A brief Review*

SOME MAJOR THEORIES OF TRADE AND DEVELOPMENT : A BRIEF REVIEW

The interaction between international trade and the process of development has drawn attention of economists virtually from the earliest days of economics as a discipline. Since then a huge theoretical literature has been developed which has made an attempt to capture the relationship between trade and development from various angles. Given the enormity of theoretical works that have emerged in this area, a complete survey of the theoretical literature on trade and development would be a monumental task. No such attempt will be made in this chapter. Instead our objective here will be to discuss very briefly only some of the major theoretical works in the sphere of trade and development. This chapter will be divided into five sections. The first section will concentrate on some theories highlighting the beneficial effects of trade in the development process. In the next section (Section 2) some theoretical models on trade and growth will be discussed very briefly. In the third section we will develop the arguments for trade- pessimism and asymmetric interdependence between the so-called "Centre" and the "peripheral" countries. This will be followed by Kravis' view of trade as a handmaiden of growth (in section 4) The final section (section 5) will discuss the evolution of the debate on free trade versus protection.

SECTION 1

THEORIES REGARDING THE BENEFICIAL EFFECTS OF TRADE

1.1 The Keynesian Foreign Trade Multiplier

In its simplest form the Keynesian Model can be written as:

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

Where

$$C = \overline{C} + cY (0 < c < 1) \text{.....} (\textit{Consumption Function})$$

$$I = \bar{I} \text{.....} (\textit{Autonomous Investment})$$

$$G = \overline{G} \ldots\ldots\ldots (Autonomous\ Government\ Expenditure)$$

$$X = \overline{X} \ldots\ldots\ldots (Autonomous\ Export)$$

$$M = \overline{M} \ldots\ldots\ldots (Autonomous\ import)$$

Here 'c' is the marginal propensity to consume which is a positive fraction. In this model since exports represent an exogenous source of demand, in the sense that they do not depend on the income of the country concerned, (though of course they will be affected by its policies), so they can be used to explain the level of income. When there are under-utilised resources in an economy, an increase in autonomous exports will not only increase output by the same amount but will also have multiplier effects. This can be explained as follows .

Suppose there is an autonomous increase in exports by $\Delta\overline{X}$. This will increase the aggregate demand by the same amount and since in the Keynesian Model output is determined by the level of effective demand, output will also increase by the same amount (i.e. $\Delta\overline{X}$) and so will income . This in turn will result in an increase in induced consumption expenditure by $c\Delta\overline{X}$ amount resulting in a further increase in effective demand. As a consequence output or income will further increase by $c\Delta\overline{X}$ amount in the second round leading to a further increase in induced consumption and so on. The total increase in income will be given by:

$$\Delta Y = \Delta\overline{X} + c\Delta\overline{X} + c^2\Delta\overline{X} + \ldots\ldots$$

$$= \left(1 + c + c^2 + \ldots\ldots\right)\Delta\overline{X}$$

$$= \frac{1}{1-c}\Delta\overline{X}$$

$$\Rightarrow \frac{\Delta Y}{\Delta\overline{X}} = \frac{1}{1-c}$$

(1/1-c) is the autonomous export multiplier, which must be positive and greater than unity (given that 'c' is a positive fraction) . This multiplier shows that when exports increase e by a given amount, income will not only increase by the same amount by the direct effect but also increase by the induced effects in successive rounds.

In the same manner it can be shown that an increase in autonomous import will have a negative multiplier effect, the form of multiplier being

$$\frac{\Delta Y}{\Delta M} = -\frac{1}{1-c}$$

This is because imports represent a leakage from domestic demand. Hence for the foreign trade multiplier to have a positive impact on the domestic output and income there must be a trade surplus i.e. net exports should be positive (since this will raise the level of aggregate demand). Otherwise if trade is balanced, exports, which replace domestic production will have a negative multiplier effect exactly offsetting the positive multiplier effect of exports on domestic production. Accordingly, as noted by Kalecki, in the standard Keynesian or effective demand model (balanced) trade cannot lead to an expansion of production and utilisation of excess capacities in all trading nations simultaneously.

1.2 The Classical Theories

1.2.1 *The Ricardian Theory*

The Classical theory of trade is generally identified with the principle of comparative costs, traditionally associated with Ricardo. As a normative theory it (the comparative costs theory) argues that , in the absence of trade , there will be some goods whose opportunity costs on world markets will be lower than those from obtaining them at home , and that the country should therefore import such goods . Correspondingly it should export those goods in which it has a comparative advantage. According to this principle, when a country specialises according to its comparative advantage and trades at the international exchange ratio, it gains an increase in its real income. This crucial idea

underlies, and one could argue has dominated, much of the argument about the role of trade in developent strategies.

The Ricardian Model of trade is essentially a static model. It gives static gains from trade (GFT) with no dynamic element in it. Although Ricardo is now best known for the theory of comparative costs, originally, however, he constructed an implicit dynamic model of growth and trade linked by distribution of income in his 'Essay on the influence of a low price of corn upon the profits of stock'. His interest in the repeal of the 'Corn laws' in England was motivated not so much by the static gains from trade argument but rather by the gains from growth consideration. He argued that the repeal of agricultural protection in England would not only benefit consumers by reducing the price of food, but it would also be helpful to growth. This was because Ricardo believed that " it would redistribute incomes away from the reactionary landed gentry, who would at worst not save and at best invest in agriculture which promised diminishing returns, in favour of a progressive industrial capitalist class, who would earn more profits (given a lower corn wage) through cheap imports of wheat and invest in manufacturing which promised increasing returns. The moral of the story was that, consequent upon removal of the restrictions on trade, an increase in profits would lead to an increase in the rate of accumulation which in turn would lead to a growth in employment, income and wealth."[1] So, in Ricardo's system the emphasis was on the distribution of income between rent and profit as the medium through which the connection between foreign trade and economic growth was established. The Classical writers were, on the whole, pessimistic about long-run growth prospects for developed countries (DCs); they believed that the industrial countries would reach a point of stagnation earlier than the less developed countries (LDCs). To Ricardo international trade was the principal way in which "stationary state" could be delayed. Hence he emphasised foreign trade as an important escape mechanism from the classical "stationary state". Most of the textbook formulations of Ricardian model of trade and comparative cost doctrine, however, highlight the static GFT. As such they miss the dynamic elements in Ricardo's analysis that trade liberates the process of capital accumulation from the stationary state.

[1] Deepak Nayyar, " Themes In Trade and Industrialisation", p 3.

1.2.2 The Smithian Productivity Doctrine

Although there has been a tendency to identify the classical theory with the Comparative Cost Principle of Ricardo, that is not the whole story. There are other two major strands of the literature, both associated with the name of Adam Smith e.g. the dynamic "productivity" doctrine and the "vent for surplus" theory. Smith argued in his 'Wealth of Nations' that the return per unit of labour (i.e. productivity) depends on the extent of specialisation and the division of labour, which in turn depends on the extent of the market. The greater the size of the market, the greater the extent to which specialisation is carried, the higher the productivity. This is partly because a greater division of labour generates more skill and know-how; more expertise in turn yields more innovations and design improvements. By arguing that specialisation and division of labour is limited by the extent of the market, Smith recognised the role of demand in the growth process.

The "productivity" doctrine, in fact, looks upon international trade as a dynamic force which, by widening the extent of the market and the scope of the division of labour, raises the skill and dexterity of workmen, encourages technical innovations, overcomes technical indivisibility and generally enables the trading country to enjoy increasing returns and economic development. [2] J.S.Mill has referred to these gains as the "indirect effects" of trade. In his opinion, trade, according to comparative advantage, results in a "more efficient employment of the productive forces of the world" which may be regarded as the "direct economical advantage of foreign trade". Mill, however, emphasises that "there are, besides, indirect effects (of trade) which must be counted as benefits of high order." According to him, one of the most significant "indirect" dynamic benefits of trade is "the tendency of every extension of the market to improve the processes of production. A country which produces for a larger market than its own, can introduce a more extended division of labour, can make greater use of machinery, and is more likely to make inventions and improvements in the processes of production". Extending his doctrine to countries at " an early stage of industrial advancement" Mill argued that in such countries "people maybe in a quiescent, indolent, uncultivated state,

[2] Hla Myint (1958), p.318-19

with all their tastes either fully satisfied or entirely undeveloped, and they may fail to put forth the whole of their productive energies for want of any sufficient object of desire. The opening of foreign trade, by making them acquainted with new objects, or tempting them by the easier acquisition of things which they had not previously thought attainable, sometimes works a sort of industrial revolution in a country whose resources were previously undeveloped for want of energy and ambition in the people, inducing those who were satisfied with scanty comforts and little work, to work harder for the gratification of their new tastes, and even to save and accumulate capital for the still more complete satisfaction of those tastes at a future time".[3]

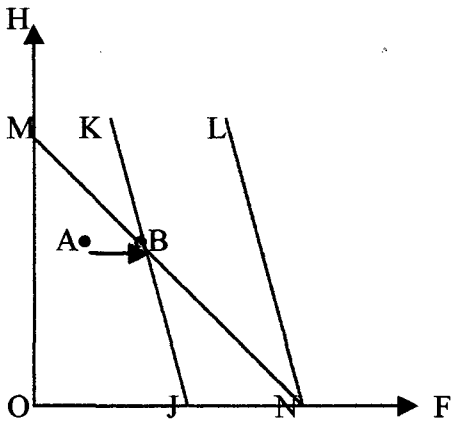
1.2.3 The "Vent for Surplus" Theory

According to the "vent for surplus" doctrine initiated by Adam Smith, international trade overcomes the narrowness of the home market and provides an outlet for the surplus product above domestic requirements. According to Smith, trade "carries out that surplus part of the produce of their (the countries participating in international trade) land and labour for which there is no demand among them, and brings back in return for it something else for which there is a demand. It gives a value to their superfluities, by exchanging them for something else, which may satisfy a part of their wants and increase their enjoyments."[4]

The Smithian "vent for surplus" argument can be illustrated in terms of Findlay's[5] formulation. Suppose, we have an underdeveloped economy producing food (F) and handicraft (H). Given constant cost, the production transformation schedule MN in figure1 is a negatively sloped straight line. The economy initially operates at a point within the transformation schedule, such as at point A, indicating existence of surplus productive capacities. The domestic relative price (P_F / P_H) is given by the absolute slope of MN. Now, if in the world market the price of food is relatively higher, as for example, given by the absolute slope of the line KJ (i.e., if each unit of food exchanges for greater units of handicrafts than before), the country finds it profitable to expand production of food and sell it in the world market. Thus trade enables the country to reach

[3] J.S.Mill. "Principles of Political Economy" (1848). Vol. II; Book III; Chapter XVII; Section 5.
[4] Adam Smith. 'Wealth of Nations' (1776); Vol. I; Cannan ed. p.413.

Fig.1



a point like B on the transformation schedule with all factors of production being fully employed. It should be noted here that neither the existence of surplus productive capacities nor the utilisation of those through trade is explained in terms of effective demand. Instead, surplus productive capacity is justified on the basis of supply-side consideration. Existence of surplus land follows directly from the assumption of a high land-labour ratio together with that of fixed coefficient technology for food production. Surplus labour, on the other hand, is justified on the assumption that a very low labour productivity in manufacture will lead to such unfavourable terms of trade for the peasants so as to induce them to choose a level of work effort far below their potential labour supply.

However, the changes in production do not stop at point B. Since even at point B the price difference persists, the country still finds it advantageous to expand production of food. But now, as the factors are fully employed, production of food expands with corresponding contraction of handicraft production, until the complete specialisation point N is reached. The movement from A to B is known as the Smithian phase, whereas the latter movement from point B to point N is called the Ricardian phase.

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[9] R.Findlay. 'Trade and Specialisation'; Harmondsworth, U.K.: Penguin Books.1970.

1.3 The Neo-classical Free Trade Doctrine

The neo-classical paradigm again emphasised the gains from trade. According to the neoclassicists, a country can derive GFT if it is cheaper for it to import a good, than to produce it at home, in terms of domestic resources used, and pay for it by exporting another good. These GFT are attainable partly due to the possibility, in the post trade situation, of exchanging goods at the international prices (assuming that costs or prices differ among countries in the autarkic situation) and partly due to international specialisation in production after trade is introduced. This can be demonstrated in terms of the following diagram :

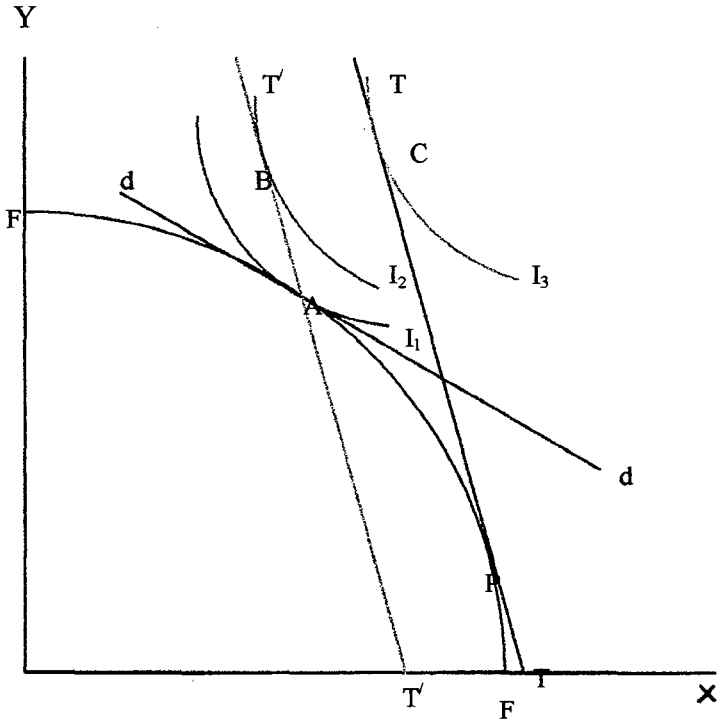

Fig. 2

In figure-2 FF is the production possibility frontier for commodities X and Y. Given the assumptions of full employment and domestic relative prices (line 'dd'), the autarkic equilibrium is at A where the social indifference curve I_1 is tangent to the PPF implying that the marginal conditions for optimality are satisfied. Now, suppose, trade opens up and the country faces the international terms of trade (TT). Given this new terms of trade production point shifts from A to P (indicating incomplete specialisation in X) while the

consumption point shifts from A to C thereby equalising again the marginal rate of transformation in production and the marginal rate of substitution in consumption. The movement from I_1 to I_3 as a result of opening up of trade represents the neo-classical gains from trade. In order to decompose these gains into gains from exchange and gains from international specialisation , we assume that the production remains fixed at the autarkic equilibrium A while the country is allowed to exchange at the international price ratio (as shown by the fictitious terms of trade line $T'T'$) . Consumption point will then shift from A to B. The movement from I_1 to I_2 represents the gains from international exchange. The rest of the gains (i.e. the movement from I_2 to I_3) are attributable to international specialisation in production.

The neo-classicists therefore argued that countries could mutually gain from trade, because, for each country, the opportunity to trade extends its choice- its frontier of consumption (and investment) possibilities. They argued that since trade is a voluntary affair for all the trading partners, the very fact that they are all participating in trade becomes proof of its mutual benefit, irrespective of how the gains from trade are distributed among the countries. The neo-classical theory of gains from trade are based on certain crucial assumptions e.g. there is perfect competition, all good and factor services pass through market, there are no distorting taxes and other interventions, and that the country cannot affect its terms of trade. Given these assumptions it was argued that free trade would enable an economy to operate with technical efficiency in production, in terms of resource allocation, and to optimise consumption through trade, in terms of utility maximisation. The net conclusion is that free trade ensures efficiency for a country and for the world as a whole.

1.4 Relaxation of The Foreign Exchange Constraint

Apart from these, the trade-optimists have pointed out various other beneficial effects of trade, in general, and export in particular. For instance, it has been argued in the literature that exports can facilitate increased capacity utilisation by relaxing foreign exchange constraint[6]. It is often observed that capacity utilisation in developing countries

[6] Theoretical formulations of the foreign exchange constraint has been developed in the " Two-Gap Literature", which will be discussed at a later stage.

depends heavily upon the availability of critically important imports-fuel, other intermediate inputs, spare parts etc. This is because these imported inputs embody technologies that are unavailable to domestic producers. Hence, these inputs are not quite substitutable with domestically produced inputs. However, when, due to the existence of a binding foreign exchange constraint, such imports cannot be financed at the levels necessary for full utilisation of capacity, labour, capital and other resources remain under-utilised. Therefore, productivity levels also remain well below possibilities. In such a situation, increased exports can finance increased import of critical inputs, thereby leading to increased overall capacity utilisation. According to this argument exports are important only as a source of foreign exchange; they permit industries to buy inputs that can be produced domestically only at a much higher cost, if at all.

1.5 Learning and Technical Progress

Myint has pointed out in a number of papers that the gains from trade effects contribute little to the explanations of the role of exports in economic growth. The main reason behind these seems to be the fact that they are based on the assumption of a given comparative advantage of trading countries. A number of authors have, therefore, tried to explain the relationship between trade and growth by invoking some dynamic effects of trade in changing the comparative advantage of countries. Lockwood (1954), for instance, explained the economic growth of Japan after Meiji Restoration by the effect of trade in introducing knowledge of new products and new techniques, and spoke of trade as a 'highway of learning'. The educative effects of foreign trade in introducing new wants, new techniques, and new forms of economic organisation were also stressed by Myint (1958). Haberler (1959) considered trade as " the most important vehicle for the transmission of technological know-how". Johnson (1977) also referred to "the educational effects of exposure to foreign competition and foreign ways of doing things".

2. GROWTH AND DEVELOPMENT IN SOME TRADE MODELS

There is another major stand of the literature on trade and development, which attempts to incorporate growth and development into theoretical trade models. In this section we will simply refer to some such theoretical models without going into a detailed discussion of the same[11].

2.1 Neo-classical Models

2.1.1 Comparative Statics of Growth and Trade

A major impetus to incorporate growth into trade theory came in the 1950s, with the consideration of the long-run dollar problem and related issues addressed in the famous Inaugural Lecture on this topic by Hicks (1953). Hicks's focus of attention in this paper was on the differential growth of productivity, both between sectors and national economies. His observation was that it was the greater dynamism of the US economy that created a "dollar shortage" for the then more sluggish rest of the world. Hicks also noted that the greater dynamism was accompanied by a bias towards the import competing sector in productivity growth that apparently reversed the outcome on the deficit or the terms of trade.

Being inspired by Hicks's paper Harry Johnson (1955) undertook another theoretical analysis which seemed to indicate that the more "dynamic" country would experience terms of trade or balance of payments difficulties as a consequence of its success, which was altogether contrary to Hicks's earlier observation.

Johnson's work further inspired a number of other contributions, which were drawn together into a taxonomic synthesis in Johnson (1959).

2.1.2 Immiserising Growth

The most remarkable result, which emerged from the work of the fifties on the comparative statics of growth and trade, was the demonstration by J. Bhagwati (1958) that growth in an open economy could be immiserising.

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[11] A more detailed discussion on these models can be found in Findlay (1984), Handbook Of International Economics ; Chapter 4.

The possibility of immiserisation, however, was anticipated long ago by Edgeworth (1894) who demonstrated how, given certain restrictive assumptions, an expansion of domestic production and exports (equal to all of domestic production in this example) can reduce national welfare.

Bhagawati, however, considered a much more general setting of the standard 2×2×2 model. Given such a setting, he demonstrated how national welfare could actually decline as a result of an export-biased growth, causing a sufficiently strong deterioration of the terms of trade that exceeded the favourable effect on welfare of the expansion at constant relative product prices.

A key role in Bhagwati's analysis is played by the "zero gain" decline in the terms of trade i.e. the amount that exactly offsets the effect of the expansion at constant relative prices. If the world excess supply of the importable at the "zero gain" level of the terms of trade is found to be negative then it can be concluded that the country is immiserised (since stability would require the terms of trade to deteriorate beyond the "zero gain" level).

It should be noted that Bhagwati's case for the immiserisation applies only if the country concerned is large in the sense that it has a monopoly-monopsony power in the international market. Moreover, it can be shown that even for a large country immiserisation can never occur in the presence of rational state intervention. Growth accompanied by optimal trade intervention to satisfy all the relevant Pareto conditions must lead to an increased national welfare.

The possibility of immiserisation in a small open economy has been demonstrated by Johnson (1967). He considers a case where the terms of trade are fixed for a two sector, two factor open economy with a tariff or similar distortionary trade restriction in place which causes the output of the import competing good to be too large and that of the exportable good to be too small. Suppose an expansion now occurs that contracts the output of the exportable and increases that of the importable at constant domestic (tariff-inclusive) prices. Johnson shows that it will result in a reduction in the national welfare if and only if the value at world prices of the reduction in the output of the exportable exceeds the value at those prices of the increase in the output of the importable. Intuitively Johnson's immiserisation occurs in this case because factor endowments

change in such a way as to expand the inefficient protected sector at the expense of the efficient export sector. Any other type of expansion that has this property could be a potential source of immiserisation.

2.1.3 Open Economy Models on Steady State Growth

The emergence of the neoclassical growth theory in the fifties had a considerable fallout in the trade theory. It can be shown that the one sector model of Solow (1956) and Swan (1956) which constitutes the core of the neo-classical growth theory can easily be adapted to the case of a small open economy.

The two sector growth model with one investment and one consumption good and the relative prices given in the world markets has also been very popular in the literature on growth and trade. Some papers in this tradition are those of Johnson (1971), Vanek (1971), Deardorff (1973) and Bertrand (1975)[8].

Bertrand demonstrated that the locus of sustainable per capita consumption possibilities in a small open economy with free trade dominates that of the same economy when it is closed.

Vanek proved that an increase in the relative price of consumption good, assumed to be the more capital-intensive of the two, will raise the steady state capital labour ratio of the small open economy.

Deardorff pointed out that a closed economy with a savings rate at the Golden Rule value would always have its steady state per capita consumption raised by entering international trade.

While the above models considered the case of two-country equilibrium in the context of small open economy. There are various other models which concentrated on the two-country equilibrium in which the terms of trade are determined endogenously. Two fundamental contributions in this area are those of Oniki and Uzawa (1965) and Bardhan (1965). Both these papers are extensions to a two-country world economy of the Uzawa (1961) two-sector growth model of a closed economy. Another important contribution in this category is the paper by Stiglitz (1970).

[8] A compact synopsis of much of this literature is provided in Smith.

One can also find some literature on dynamic two-sector neo-classical models of open economy variety. Some important contributions in this area are those of Hanson (1971), Fischer and Frenkel (1972,1974), Borts (1964), Hamada (1966), Onitsuka (1974), Hori and Stein (1977), Ruffin (1979) etc.

The relationship between money and growth, analysed in the closed economy by Tobin (1955) and others, has also given rise to some literature on the open economy. For instance Allen (1972), Frenkel (1971), Findlay (1975) Rodriguez (1982) etc.

2.2 Models of Open Dual Economy

The issues connected with the "export-led" growth have also been pursued within the framework of Lewis (1954) model of economic development with unlimited supplies of labour. Trade has been introduced into this model by various writers such as Fei and Ranis (1964), Hornby (1968), Dixit (1969), Bardhan (1970), Lefeber (1971), Paauw and Fei (1973), Findlay (1973) etc.

One set of problems that have been raised in the context of an 'open dual economy' is connected with long-run development strategy in a situation where the 'modern' sector is controlled by a planning authority while the 'traditional' sector comprises of small independent peasant producers. The issues of "primitive socialist accumulation", which was very much in debate in the Soviet Union in the twenties, and which continues to be relevant in the context of today's developing countries, have been analysed in some of the papers mentioned above (in the last paragraph).

Among some of the specific issues examined in these models are the problem of optimal 'internal' terms of trade or the rate at which the peasant sector should be taxed to finance capital accumulation in the modern sector, the optimal allocation of resource between capital goods and consumer goods in the modern sector itself and the optimal role of foreign trade in the development of the open dual economy over time. One such role is explained below.

The standard aggregative models of development planning for a dual economy incorporate two important institutional assumptions: a) the industrial sector is more or less under the direct control of the government, whereas the agricultural sector is largely under the control of private cultivators and b) the industrial real wage rate is

institutionally fixed. If it is further presumed that it is politically difficult to implement any program of substantial direct taxation of agriculture in most developing countries, the problem of ensuring sufficient marketed surplus of food becomes one of the most important problems of development. For rapid growth of the economy, the planner wants to ensure more production of industrial goods, but that involves more industrial employment and transfer of labor from the agricultural sector. Again since industrial workers at their low levels of income spend most of their wages on food, the government needs more food to feed the growing industrial labour force. Given the institutional assumptions, government can neither compulsorily procure food nor can it impose heavy direct taxation of agriculture. In such a situation, foreign trade and borrowing enable imports of food thereby relieving the food bottleneck on industrialisation.

3. THEORIES OF TRADE PESSIMISM AND ASYMMETRICAL INTERDEPENDENCE (BETWEEN THE 'CENTRE' AND THE 'PERIPHERY')

The idea that international trade is the "engine of growth", although very old (going back at least to Adam Smith), was not a very popular one during long periods in the twentieth century. The 1950s saw the development of various export pessimistic views which argued that although international trade served as a engine of growth for periphery (developing) countries in the 19th century, it cannot be counted upon to serve a similar function for the developing countries of the twentieth century. Going beyond the pessimism about the adequacy of markets for the exports of the developing economies some economists even began to recommend protectionist policies on the argument that free trade would act as an impediment to economic advance of the poor countries.

In this section we will discuss some of the more important arguments in this strand.

3.1. The Structuralist Views

3.1.1 Two- Gap Models

The export-pessimism of the 1950s led to the emergence of the so-called 'two-gap' models.[9] The early literature on development tended to emphasise domestic savings as the major constraint on the growth rate that a less developed country can achieve. This view arose from a wide spread application of Harrod- Domar model to the problems of development planning. Given the Harrod- Domar assumption of a fixed capital output ratio, a low rate of savings results in a low rate of investment, leading to a low rate of growth. Hence, there exists a savings gap, which acts as a binding constraint on the growth of LDCs. However, this is not always the case. The experience of LDCs in the 1960s has, in fact, indicated that, the BOP situation can also be a critical constraint on the rate at which capital accumulation and development can take place. This is because, domestic saving is not the sole constraint on growth, there is another gap e.g. the foreign exchange gap, which depends on the BOP position of a country. Hollis Chenery has put forward a simple framework in which he has shown how, depending on the values of a few parameters, a particular LDC can be identified as having its growth constrained by either a "domestic savings" gap or a "foreign exchange"gap. The former gap is associated with demand and supply of output (the excess of planned investment over domestic savings may exceed net foreign transfers), while the latter is associated with demand and supply of foreign exchange (import demand may exceed exports plus net foreign transfers). It is argued in this literature that domestic investment might be restrained not simply by the availability of savings plus foreign aid, but additionally and perhaps more severely by the availability of foreign exchange. This is because of the fact that domestic investment cannot be carried out without import of some essential capital equipment which are complementary to domestic resources and hence which are required to be combined with domestic resources to carry out domestic investment. Now, import of capital equipment requires foreign exchange, which can come through exports (in the absence of foreign aids). However, it is argued in the two-gap model that there is a limit on the extent to which exports of LDCs can be increased due to lack of demand from

[9] Some of the most representative papers in this two-gap literature are those of Chenery and Bruno(1962), Chenery and Strout (1966) and Mc Kinnon (1964)

DCs. Once this limit is reached, exports cannot be increased any further which in turn poses a constraint on imports of essential capital equipments. Thus, it is argued in the two-gap models that the limit on exports of LDCs makes foreign exchange gap a binding constraint on their growth. It is shown that if foreign exchange gap is the only constraint and savings gap is not, then some domestic savings will remain idle due to lack of imported inputs, which are complementary to domestic resources in the context of investment. The analysis, and the resulting policy prescription of IS, in the two-gap literature, depends crucially upon the developing country's inability to translate increased savings into the foreign exchange necessary to sustain the required level of investment.

The whole model and approach however came under fire for its assumptions of fixed coefficients, its almost complete neglect of relative prices and for its tendency to assume that the constraint on the ability of LDCs to earn foreign exchange (that they essentially need for development) is external demand and not domestic supply. The experience of the expanding world markets of the sixties and the seventies completely contradicted this ultra-pessimistic assumption about the export possibilities of the LDCs.

3.1.2 The Singer-Prebisch Thesis

The orthodox view that free trade benefits both the trading nations irrespective of how the GFT are distributed between countries has received massive attack from the structuralist school of thought who argues that the international trading structure is asymmetrical in its treatment of developed and developing countries and this biases the GFT against low-income LDCs. The best known exponents of this view are Prebisch (1950) and Singer (1950). According to them the capacity of developing countries to import goods and services expands very slowly because world demand for their exports does not grow rapidly and the net barter terms of trade (TOT) steadily moves against them. Demand for exports of poor countries is likely to grow slowly due to various reasons e.g., the shift of industrial production in DCs from low-technology, material-intensive products to high-technology, skill-intensive products; increased efficiency of industries in DCs in using material inputs; substitution of synthetics for natural raw materials; low income elasticity of demand for many agricultural commodities and simple manufactures in which LDCs enjoy a comparative advantage;

the increasing productivity of agriculture in DCs; and the protection of agriculture and labour-intensive industries in DCs. Furthermore, it is argued that there is a secular tendency for net barter TOT to turn against the primary-product exporting developing countries because (a) commodity and factor markets are oligopolistic in DCs, and (b)demand for exports of poor countries increases at a much slower rate than their demand for imported manufactures from DCs.

Structuralists have argued that free trade can act as an impediment to economic growth in developing countries mainly because of the following three reasons:

"First, because of slow growth in demand for those products in which developing countries have a comparative advantage, attempts to increase exports result in lower export prices and a transfer of income to DCs. Second, in the absence of import-restrictions because of the high income elasticity of demand for imports and the sluggish growth of exports, developing countries have to grow at a slow pace to avoid ever-worsening foreign exchange crisis. Thus the achievement of a high rate of economic growth with external balance is possible only through intervention in international trade. Third, since static comparative advantage of developing countries lies in production of primary product, free trade impedes industrialisation. Furthermore, because industrial expansion accelerates the accumulation of technical skills and fosters the development of indigenous entrepreneurial talent, specialisation in primary production inhibits growth of factor productivity."[10]

Prebisch and Singer have argued that a secular deterioration in the international prices of raw materials and primary commodities will result, in the absence of industrialisation in the LDCs, in an ever –growing widening of the gap between the rich and the poor countries. They hold that, in order to industrialise the smaller countries require (temporary) assistance in the form of protection to their newly emerging manufacturing industry. The industrial sector in LDCs should be protected from foreign competition and the pursuit of industrialisation should be based on the stategy of IS.

[10] Kavoussi(1985).p.380

3.2 The Export-lag Thesis of Nurkse

The works of Prebisch and Singer had a tremendous impact on the policy makers of many LDCs as well as on the shaping of the development strategy. Few years later, in the famous Wicksell lectures (1959), Nurkse also talked about "export lag" thesis. His main argument was that international trade served as an engine of growth for the periphery countries in the nineteenth century but that it cannot be counted upon to serve a similar function for the developing countries of the twentieth century. Studying the nineteenth century history (1815- 1914) Nurkse found that the large increases in the exports of new countries in temperate latitudes were attributable mainly to favourable demand conditions. According to him it was "the tremendous expansion of western Europe's and especially Great Britain's demand ... for food staffs and raw materials" that provided "the basic inducement that caused them (especially the United States, Canada, Argentina and Australia) to develop." "Trade in the nineteenth century... was above all an engine of growth".[11] So Nurkse did not oppose trade, as an engine of growth, in principle, but he was pessimistic about the trade prospects of the developing countries in the twentieth century. Because he observed that the world's industrial centers were no longer exporting their own growth rates to primary producing countries, owing to various factors e.g. low-income elasticity of demand, the rise of synthetics and the importance of home primary product output in the developed countries. Not only that, prospects for exports of manufactures from the peripheral countries to the industrial centers were also not very good, both because of the "formidable" obstacles to the attainment of a minimum level of efficiency in the former countries and because of unfavourable commercial policies.[12] It was his empirical observation that "growth through trade" was no longer possible that led Nurkse to prescribe balanced growth-i.e., a "linked progress in farming and manufacturing"[13] and diversification within manufacturing "enough to overcome the frustration of isolated advance".[14] "This export lag is a basic assumption without which balanced growth is untenable or pointless."[15] Nurkse's contrast between

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[11] R.Nurkse. 'Equilibrium and growth in the world economy'. G.Haberler and R.M. Stern, eds. (Cambridge, Mass., 1961). p.242-43.
[12] Op-cit.p.244, 299,308-14.
[13] Op-cit. p.315.
[14] Op-cit. p.252.
[15] Op-cit. p.279.

trading opportunities in the 19th and 20th centuries has also been regarded as justification for inward-oriented development programmes stressing IS.

3.3 Myrdal's Argument for Cumulative Causation

Myrdal went beyond Nurkse's pessimism about the adequacy of markets and claimed that free trade would be an impediment to the economic advance of the poor countries. Since it would tend to perpetuate or even create backward sectors in the UDCs. Myrdal's hypothesis of cumulative causation is basically a hypothesis of geographic dualism, applicable to nations and regions within nations, which can be put forward to explain the persistence of spatial differences in a wide variety of development indices including per-capita income, rates of growth of industrialisation and trade, employment growth rates and levels of unemployment. Myrdal first describes how the existence of (geographic) dualism in an economy not only retards the development of the backward regions but can also decelerate the development of the whole economy, through the medium of labour migration, capital movements and trade. He then goes on to extend this hypothesis of circular and cumulative causation to the international level to explain widening international differences in the level of development from similar initial conditions. Myrdal's contention is that through the means of labour migration, capital movements and trade, international inequalities are perpetuated in exactly the same way as regional inequalities within nations. He argues that through trade the developing countries have been forced to produce those products (e.g., primary products) whose demand is inelastic with respect to both price and income. This, in turn, has placed the UDCs at a grave disadvantage vis-à-vis the DCs with respect to the BOPs and the availability of foreign exchange. Moreover, since the efficiency wage (i.e. the money wage in relation to productivity) has a tendency to fall in faster growing areas compared to other areas, the developed countries have gained a cumulative competitive trading advantage, especially in manufactured commodities. Myrdal, therefore, argues that the pattern of world trade needs to be restructured completely if the unfavourable international position of the developing countries is not to be a permanent obstacle to their growth.

3.4 Some More Radical Views

The view that trade can act as an impediment to development in the peripheral countries has been further strengthened by the argument put forward by the more radical schools of thought (e.g. Dependency, Neo-Marxists etc.). These schools regard the piecemeal critique of neo-classical economical analysis and piecemeal reform of international institutions, associated with the structuralists' perspective as inadequate. They draw attention to what they see as more fundamental characteristics of social and economic processes in a global capitalist system, which causes international trade to induce a polarisation between 'core' (developed countries) and 'periphery' (underdeveloped countries).

As mentioned earlier, neo-classical economists maintain that excepting some very special cases, a trading country cannot be worse off with trade. Trade benefits all the trading partners irrespective of how the GFT is distributed. The basis of this conclusion is the presumption that trade is a voluntary affair; so, if a country participates in trade, it follows that it gains from trade, otherwise it would not have participated in trade. The radicals, however, refute the neo-classical conclusion that all the trading partners benefit from trade, because according to them, historically it is definitely not the case. Unlike the neo-classicists , these theorist believe that trade between a DC and a LDC is not voluntary. Rather, they argue that for many LDCs trade is a "forced commerce" i.e. they are forced to participate in trade. According to them "forced commerce" and "polarised development of forces of production" across the world have reinforced each other. If this is indeed the case, then it can no longer be concluded that trade is beneficial for all the trading partners. It can very well be the case that some trading countries have failed to derive any gain from trade. In fact, the more orthodox version of the radical schools of thought, maintain that in case of trade between an imperialist DC and a colonial LDC, all GFT have accrued to the DC while the LDC, which has been forced to engage in such trade, has failed to reap any gains from trade. The less orthodox version, however, holds it to be true that in cases of trade between a DC and a LDC, the DC has gained more than the LDC. But that does not mean, according to them, that the LDCs have not gained at all. They argue that historically the LDCs have also gained but that there has been an *unequal* distribution of the GFT in favour of the DCs.

3.4.1 The Concept of Unequal Exchange

In order to refute the neo-classical argument in favour of the symmetry and uniformity of exchange, Emmanuel, the famous proponent of the less orthodox version (of the radical school) has developed the concept of "unequal exchange".

Two fundamental assumptions made by Emmanuel are that international capital mobility equalises the rates of profit and that real wage rates are exogenous in each country. Suppose the North is specialised in steel and the south in coffee, with q^N the output of steel per unit of labour in the North, q^S the output of coffee per unit of labour in the South, w^N and w^S the real wages in North and South respectively, both fixed in terms of steel, p, the relative price of coffee in terms of steel, and r, the common rate of profit. It is further assumed that the production of each good takes one period with wages paid at the beginning of each period. It follows that:

$$r = \frac{q^N - w^N}{w^N} = \frac{pq^S - w^S}{w^S}$$

which implies :

$$p = \frac{w^S}{w^N} \times \frac{q^N}{q^S}$$

Here p represents the "net barter" terms of trade of the South. By equal exchange Emmanuel seems to mean a situation in which the double factoral terms of trade (i.e. the amount of foreign labour embodied in imports per unit of domestic labour embodied in exports) is equal to unity. The double factoral terms of trade, denoted by f, are related to p by the following:

$$f = \frac{pq^S}{q^N} = \frac{w^S}{w^N}$$

Thus f =1 if and only if $w^S = w^N$. According to Emmanuel there is "unequal exchange", biased against the South, because $w^S < w^N$ i.e. the South gets commodities worth less than a day's labour in the North in exchange for commodities worth a day's labour in the South .

Emmanuel thus emphasised the basic asymmetry of exchange countering the neo-classical argument in favour of the symmetry of exchange.

3.4.2 The Dependency Theories

Radical economists like Paul Baran, Dos Santos, Gunder Frank, Samir Amin etc. have developed the so-called Dependency Theories of Development. According to Santos "Dependence is a conditioning situation in which the economies of one group of countries are conditioned by the development and expansion of others. A relationship of interdependence between two or more economies or between such economies and the world trading system becomes a dependent relationship when some countries can expand through self-impulsion while others being in dependent position, can only expand as a reflection of the dominant countries, which may have positive or negative effects on their immediate development."[16]

Some of the main approaches in dependency analysis are briefly discussed below.

a) Dependency as a theory of 'inhibited' capitalist development in the periphery

Ever since the end of the nineteenth century Marxist analysis has emphasised the necessity of a 'bourgeois democratic revolution' as an essential requirement for any backward society to be able to embark in a process of capitalist development, proper. It is observed, however that the political independence of the backward nations has not been followed by such revolutions, contrary to the expectations of the 'Classics of Imperialism'. This approach to dependency analysis has made an attempt to explain why this 'bourgeois-democratic' revolution has not taken place in the third world and how this is inhibiting their process of capitalist development. Their main argument is that the process of industrialisation in the third world is contradictory not only with some internally dominant groups, but also with imperialism. As a result the ability of the incipient national bourgeoisie to develop in the post-colonial phase would depend upon their political capacity to assert themselves over both these groups. It is also argued that this double contradiction in capitalist development in the periphery would tend to be transformed into a single contradiction through the alliance of the groups in question (the so-called 'feudal-imperialist' alliance).

[16] Dos Santos, AER (1970), p 289-90.

b) Dependency as an Analysis of Concrete Process of Development

Like other approaches to dependency, this second approach also sees the peripheral economies as an integral part of the world capitalist system, in a context of its increasing industrialisation. It is argued in this approach that since the central dynamics of this system lies outside the peripheral economies, therefore the options, which lie open to them, are limited by the development of the system at the centre. What is required, therefore, is primarily an understanding of the contemporary characteristics of the world capitalist system – transformation which are occurring and have occurred in the world capitalist system, particularly the changes which became significant towards the end of the 1950s. One of the most important changes has been the emergence of the MNCs, which progressively transformed the centre-periphery relationship and relationships between the countries of the centre. As foreign capital has increasingly been directed towards manufacturing industry in the periphery, the struggle for industrialisation , in a way has become increasingly the goal of foreign capital. Thus, according to this view, dependency and industrialisation cease to be 'contradictory' and a path of dependent development becomes possible. It has been pointed out that the spectacular performance of the 'Gang of Four' demonstrates that dependency, monopoly capitalism and economic growth are not incompatible with each other.

c) Dependency as a Theory of the 'Development or Underdevelopment'

This approach is characterised by the acceptance, almost as an axiomatic truth, of the argument that no third world country can now expect to break out of a state of economic dependency and advance to an economic position closest to that of the major capitalist industrial powers. Paul Baran, the father of this approach, continues the central line of Marxist thought regarding the contradictory character of the needs of imperialism and the process of industrialisation and general economic development of the backward countries. He argues that since economic development in the underdeveloped countries is profoundly inimical to the dominant-interests in the advanced capitalist countries, to avoid such transformation the advanced capitalist countries will form an alliance with pre-capitalistic domestic elite and would thus be able to maintain the traditional modes of surplus extraction. As a result the

underdeveloped countries would not only face drastic reduction in their investible resources, but would also lose their internal multiplying effect, as capital goods have to be purchased abroad. This process would inevitably result in an economic stagnation and the only way out would be political.

Andre Gunder Frank, another exponent of this approach, has demonstrated that since the early stages of their colonial period Latin America and other areas in the periphery have been incorporated into the world economy through an interminable metropolis-satellite chain (characterised by various modes of surplus extraction). This 'connection', however has not automatically brought about capitalist economic development, such as optimistic models (derived from Adam smith) would have predicted, by means of which the development of trade and the division of labour would inevitably bring about economic development. According to Frank, the only political solution of this development of underdevelopment is a revolution of an immediate socialist character, totally delinked from the world capitalist system, for within its context there could be no alternative to underdevelopment.

3.5 Some Other North-South Models

The literature on trade and development consists of a whole lot of theoretical work on models of asymmetric interdependence which emphasise the fact that the centre and the periphery of the world economic system are chracterised by fundamental asymmetries in the structure and performance of their economies.[17]

Bacha (1978), for instance, developed a simple neo-Ricardian Model with exogenous wages in both regions and profit rates equated by capital mobility. Though Bacha's model is not a dynamic one, his comparative static exercise involve technical progress thereby capturing some flavour of a dynamic model.

Krugman (1982) has developed a model based on a cumulative causation type reasoning. Given identical tastes and technology, in his model, the region that initially has the higher capital stock, assuming equal sizes of the labour force, will have the lower unit cost in manufactures and hence a higher rate of profit. This in turn

[17] Here we choose only to mention some of these theoretical works. A more detailed survey of this literature can be found in Findlay(Chapter 4), "Handbook Of International Economics"

will result in a higher rate of growth (given classical savings behavior). Hence the advantage will become cumulative over time in a manner described by Myrdal. The lagging country, on the other hand, will find its manufacturing becoming less competitive in a correspondingly cumulative way.

Dixit (1982) considers asymmetry in the market structure for export products. In this model while the South exports an essential raw materials under perfect competition, the North exports differentiated goods under monopolistic competition. He finds that greater variety can compensate the South for worsened terms of trade in face of increased exports and that a high price elasticity of demand by the North is helpful in this regard, as far as the effect on the South's welfare is concerned.

In his North-South model Chichilnisky (1981) has ended up with a surprising result. It is claimed that a shift in the composition of the North's demand in favour of the South's exports can worsen the terms of trade of the South. This proposition has, however, been proved to be self-contradictory since either this proposition can hold or the condition of Walrasian stability. The latter is a characteristic of this model. Hence, it is argued that, the result cannot be true.

Another significant distinction between North and South is with respect to generation of technical progress since it is the North that generates various products and process innovations while the South simply borrows these innovations. Veblen, Gerschenkron, etc. have argued that the borrower can increase productivity much faster, given appropriate conditions, when there is a backlog of innovations available. Findlay (1978) has combined this "relative backwardness" hypothesis with the idea of direct foreign investment as a vehicle of technological diffusion . Some other important papers in this area are those of Koizumi and Kopecky (1977), Magee(1977) and Carlos Rodriguez (1981) .

There are various other theoretical North-South Models. For instance, models of Lewis (1954), Sarkar (1989), Ricardo (1951) etc. which investigate static gains for the South and models developed by Findlay (1980), Darity (1988), and Dutt (1988) which investigate dynamic gains.

4. TRADE AS A HANDMAIDEN OF GROWTH

So far we have discussed two polar opposite views regarding the role of trade in the growth and development process of developing countries. While one view regards trade as an engine of growth the other regards it as an obstacle to growth. There is also a third somewhat intermediate view developed by Kravis (1970) which is that trade is a handmaiden of growth.

As discussed earlier Nurkse developed his case for balanced growth on the ground that trade acted as an engine of growth in the nineteenth century and that this trade engine was not available to the developing countries of the twentieth century. Kravis in his 1970 paper raised considerable doubts regarding the validity of both these arguments. In order to examine the engine of growth hypothesis he considered the historical records of three groups of countries - those new countries that experienced rapid growth, those periphery countries whose per capita income did not rise rapidly and the centre countries. His conclusion was that export expansion did not serve in the nineteenth century to differentiate successful from unsuccessful countries. Growth, where it occurred was mainly the consequence of favourable internal factors. External demand only represented an additional stimulus, which varied in importance from country to country and period to period. It was not to deny that it is helpful to a developing country to have a strong external demand for a commodity in which it has a comparative advantage. However it was not to deny that the presence of such a demand is a necessary or sufficient condition for growth or even for trade to play a helpful role in growth. Trade, according to Kravis, is one among many factors affecting growth and it may very well fail to become the dominant factor in many instances. Hence a more warranted metaphor that, according to him, would be more generally applicable to describe trade expansion as a handmaiden of successful growth rather than as an autonomous engine of growth.

Kravis's study also did not find any evidence to support Nurkse's argument that external conditions for the developing countries of the twentieth century are less favourable than nineteenth-century markets were for the periphery

countries of that time. Hence Kravis's conclusion was that " In today's world, trade can still play the handmaiden role in the growth of developing countries."[18]

5. FREE-TRADE, PROTECTION AND THE THEORY OF SECOND BEST

The issue of free-trade versus protection has been a debatable issue both in the realm of theory as well as in practice. As far as the evolution of economic thoughts about tariffs and other trade-restricting devices is concerned, one can identify various stages.

In the first stage, which is associated with the names of Smith, Ricardo and Mill, the gains from trade, more specifically, the benefits from completely free trade, came to be appreciated (mainly on the basis of the law of comparative costs). Smith (1776) enunciated the principle of absolute advantage to demonstrate that there were gains from trade, by extending his concept of the division of labour between men to a division of labour between countries. Ricardo (1812) developed his theory of comparative advantage to develop an explicit argument against protection and an implicit argument for free trade. At a later stage, neo-classical theorists also promoted the free trade doctrine and claimed that free-trade ensures efficiency for a country and for the world as a whole.

At the first stage the case for free-trade was simply one dimension of the argument for laissez-faire. Gradually, however, more and more reasons were pointed out why laissez-faire may not lead to an optimum for a country. Perfect competition may not prevail, there may not be full employment, and so on. Parallel with such qualifications to laissez-faire, various qualifications to the case for complete free-trade were developed resulting in numerous arguments for protection. This marked the second stage of the thought. The beginning of this stage can be traced back to the era of classical political economy when it was first recognised that unless two crucial assumptions (e.g. the assumption that market prices reflect social costs and the small country assumption) are satisfied, free-trade cannot ensure an efficient outcome. Market failure provided the basis of the infant industry argument[19], recognising that

[18] Kravis (1970), p 851.

[19] This is one of the oldest and the most popular argument for protection. The argument is that some industries (individually or in group) in the LDCs are initially uncompetitive (internationally), but in the

free-trade may prevent an economy from realising its comparative advantage in manufacturing activities. Monopoly power in trade, on the other hand, provided the basis of the optimum tariff argument recognising that restricting the volume of trade may enable an economy to increase its real income at the expense of the rest of the world. None less than Mill (1848) accepted these arguments as valid exceptions to the rule thereby laying down the analytical foundation for legitimate departures from free- trade.

More than a century later, the free-trade doctrine once again came under massive attack when the infant industry argument was generalised into the infant-manufacturing sector argument[20], on the basis of market failure. During the 1950s the case for free-trade was at a discount in most of the less-developed countries. Since laissez-faire had failed to develop them, it was argued that hence free-trade had failed. These countries, therefore, opted for import substituting industrialisation strategy based on protection of domestic industries from foreign competition.

In such a scenario of disbelief in free-trade, the orthodox economists developed a two-fold argument. On the one hand they "accepted the infant industry argument or the optimum tariff argument as the basis of justifiable departures from free-trade but reduced the validity of such arguments to a very demanding sets of conditions"[21]. On the other hand they resurrected a (modified) free-trade case, by reference to the so-called principles of optimal interventions. It was argued that if market prices do not reflect social costs due to distortions arising out of either market failure or government intervention, the optimum (the "first–best") policy intervention would be one which is applied at the point at which the distortion arises. Intervention in the form of trade policies would only be sub-optimal in these cases. However, if for some reason, the first best ways of correcting the distortions are not used, or cannot be used, then trade interventions may still be better than nothing. Thus the theory of domestic distortions sought to strengthen the case for free trade by

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longer run and after temporary protection they might come up with a comparative advantage. In such a situation if free trade is allowed, it may prevent such an economy from realising its potential comparative advantage in manufacturing activities.

[20] This was based on two arguments. First that any process of industrialisation was characterised by significant positive externalities, which were difficult to identify, and second those factor market imperfections would pre-empt the realisation of potential comparative advantages in manufacturing.

accepting that there may be market failure, but arguing that even then protection is not the best corrective.

This marked the third stage of thought when the link between the case for free trade and the case for laissez-faire was broken. The implication is that one can believe that there are many reasons for the government to intervene in the economy (e.g. to maintain full employment, to achieve desirable distribution of income and so on) and yet one can also believe that, broadly, "free-trade is best".

In recent years the free-trade doctrine has once again been criticised in the literature of strategic trade policy, which can be regarded as the fourth stage of thought. The observation of the strategic trade theory that trade flows are driven by increasing returns rather than comparative advantage in international markets which are characterised by imperfect competition, has led to the formulation of two arguments against free-trade: The first is the strategic trade policy argument which supports government intervention in order to enable domestic firms to capture oligopolistic profit by deterring entry of foreign firms. The second is the argument that government should encourage activities that yield positive externalities.

These arguments have been criticised by the orthodox economists on three grounds: "a) it is difficult to model imperfect markets and thus impossible to formulate appropriate policies for intervention; b) potential gains from intervention would be dissipated by the entry of rent-seeking firms; and c) in a general equilibrium world, the benefits from explicit promotion of one sector may be less than the cost of implicit discrimination against other sectors." [22] In face of this criticism the new theorising has withdrawn on the basis of the following arguments: first, successful intervention might have a beggar-thy-neighbour impact resulting in retaliation by trading partners leaving everyone worse off; second, intervention may be manipulated by vested interests to appropriate economic gains.

Hence, there is still a (new) case for free trade. However, this is not the old argument that free trade is optimal because markets are efficient. Instead it is a sadder

[21] Deepak Nayyar, " Themes in Trade and Industrialisation". p 5.
[22] Deepak Nayyar, op.cit. p 6-7

but wiser argument for free-trade as a rule of thumb in a world whose politics is as imperfect as its markets. So, free-trade is not passe - but it is not what it once was."

Conclusion

From the above discussion it seems that the relationship between foreign trade and economic growth is quite ambiguous. In order to classify the relationships between trade and growth Kindleberger has, in fact, distinguished three broad models where trade acts as a leading, a balancing or a lagging sector of the economy. In his first model, the stimulus to economic development comes from abroad. Exports rise and provide an incentive to the establishment and expansion of other related activities. In the model, where trade acts as a lagging sector, the stimulus to development originates from internal factors and trade may slow down growth. In the intermediate case, where trade acts as a balancing sector, adjustment of trade keeps pace with domestic transformation. Kindleberger's conclusion was that "The impact of foreign trade on growth is then indeterminate over a wide range. Trade can stimulate growth, when the demand is right abroad and the supply is right at home. It can inhibit it when the demand is wrong abroad and the supply is wrong at home. In the two intermediate cases we do not know."[23]

So, it seems that the relationship between foreign trade and economic growth must ultimately be an empirical issue and we will come to this in the next chapter.

[23] Kindleberger. 'Foreign trade and national economy'. Chapter-12. p.211.

Chapter-3

Trade Policy, Exports and Growth : Some Issues and Empirical evidence

TRADE POLICY, EXPORTS AND GROWTH: SOME ISSUES AND EMPIRICAL EVIDENCE

The ambiguity surrounding the relationship between trade and growth has inspired economists from time to time to undertake empirical investigations of the relationship. In this chapter we will discuss some such empirical studies.

Modern empirical studies on trade policy and growth can be classified into two broad and distinct categories: (a) large-scale multi-country studies that have investigated in detail the experiences of a group of countries with trade policy reform and (b) econometric studies that have investigated the relationship between the pace of export expansion and aggregate economic growth.

Since the focus of the present study is on the relationship between export expansion and economic growth and not on outward-orientation and economic growth, which though a related, but not the same question, so we have not undertaken an elaborate study of the empirical literature on trade policy and growth. Section 3.2 provides only a brief discussion on this literature.

Section 3.3 provides a survey of some of the more important econometric studies on export-growth linkage.

Before entering into a survey of the literature, we have made a brief discussion on the evolution of thinking on openness, intervention and growth in section 3.1.

3.1 OPENNESS, INTERVENTION AND GROWTH: FROM THE DEVELOPMENT CONSENSUS TO THE WASHINGTON CONSENSUS

The degree of openness vis-a-vis the world economy and the degree of intervention by the state in the market have remained highly debated issues throughout the last five decades.

The development consensus that emerged in the early 1950s recommended the so-called import substituting (IS) industrialisation strategies, for the under-developed countries, with a leading role for the state in the process of economic development. These strategies, which had their origin in the Singer-Prebisch Thesis (SPT), were based on two

fundamental premises: (a) a secular deterioration in the international price of raw materials and commodities would result, in the absence of industrialisation in the LDCs, in an ever-growing widening of the gap between rich and poor countries; and (2) in order to industrialise, the smaller countries require (temporary) assistance in the form of protection to their newly emerging manufacturing sector.

As a direct influence of SPT, until the early 1980s, IS was the dominant industrialisation strategy, particularly in the larger countries in Latin America (e.g. Brazil and Argentina) and Asia (e.g. the Philippines, India) which were subsequently followed by smaller economies in Africa (e.g. Nigeria, Kenya), Latin America and South-east Asia. It was, however, a means to an end, rather than the end in itself. The success or desirability of this strategy, therefore, depended on its consequences for industrialisation, growth, employment, BOP etc. The perceived failure of the countries following IS to achieve these objectives created a disenchantment with IS, leading to an increasing number of LDCs, from the mid-1960s onwards, to adopt more outward-looking export promotion (EP) policies. Countries such as Korea, Taiwan, Singapore and Hongkong led the way and were joined later by a number of larger semi-industrialised LDCs. (This group of countries, which adopted EP policies during the 1960s, subsequently became known as the newly industrialising countries (NICs)).

By the early 1970s a small group of economists also embarked on major empirical investigations aiming at accessing the consequences of alternative trade regimes. Using different approaches, which ranged from the historical to the statistical, these researchers argued that there was abundant evidence suggesting that more open and outward oriented economics had outperformed those pursuing protectionist strategies.

The origin of this literature can be traced back to Little, Scitovsky and Scott (1970), which attempted to evaluate the industrialisation experience in selected developing countries to question the development consensus. It was followed by various other country studies e.g. Bhagwati and Desai (1970), Bhagwati and Srinivasan (1975), Bhagwati (1970), Krueger (1970) etc. The basic object of these studies was an evaluation of import substitution strategies and the economic efficiency of industrialisation from a neo-classical perspective. "The main conclusion was that - industralisation policies, which protected domestic industries from foreign competition and led to excessive or

inappropriate state intervention in the market, were responsible for the high cost and the low growth in these economies. Inward looking policies, particularly in the sphere of trade, were seen as the prime culprit. The prescription followed from the critique. More openness and less intervention would impart both efficiency and dynamism to the growth process. And outward-looking policies, particularly in the sphere of trade, were seen as the prime saviour. Thus, trade policies were perceived as critical in the process of industrialistion and development".[1]

This neo-classical view which was unpopular in trade-policy circles in the 1960s, and 1970s, gathered considerable momentum during the 1980s owing to certain reasons. For instance, the debt crisis, which unleashed in 1982, played an important role in reshaping policy views regarding development strategies, growth policy and long-term growth.

The miraculous performance of the newly industrialising countries of East Asia almost in all fronts provided a sharp contrast to the poor performance of the Latin American countries, most of which had followed IS almost with a religious zeal. The orthodox explanation for the miraculous performance of NICs was that they adopted the right policies-they reduced the bias against exports by reducing import protection and providing incentives to exports, they adopted appropriate exchange rate policies, and they had factor prices which allowed specialisation according to genuine comparative advantage. This neo-classical interpretation has been strongly criticised on various grounds.[2] For instance it is argued that "the characterisation of the success stories of economies, which approximated to free trade and laissez-faire, was partial if not caricature history, for their export orientation was not the equivalent of free trade just as the visible hand of the state was more in evidence than the invisible hand of the market".[3]

Inspite of such criticisms, however, in the 1980s, influenced by the neo-classical interpretation of the East Asian miracle, economists dealing with poorer nations began to recommend, with increasing insistence, development strategies based on market oriented reforms that included, as a fundamental component, the reduction of trade b

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[1] Deepak Nayyar, 'Themes in Trade and industrialisation', p. 9.
[2] There is a vast literature on the interpretations of East Asian success stories. A detailed discussion on this, however, is outside the focus of our study.
[3] Nayyar, op.cit., p. 10.

barriers and the opening of international trade to foreign competition. International bodies like the World Bank, IMF etc. routinely insisted the developing countries to go for trade liberalisation and outward orientation as a precondition for receiving financial assistance.

Finally, the collapse of the Central and Eastern Europe in the late 1980s and early 1990s, which represented the failure of planned economies, completed the disillusionment with the development consensus paving the way for the emergence of the so called Washington consensus. Given that the Washington consensus provided the basis of policy reform advocated by the IMF and the World Bank in their stabilisation and structural adjustment programmes, economic policies and development strategies in much of the developing world and the former socialist bloc are now shaped by this consensus which emphasises more openness and less (state) intervention. "There is, however, more to openness than trade. It extends to investment flows, technology flows and financial flows. Similarly, reduced state intervention extends beyond deregulation and liberalisation. It suggests rolling back the government in every sphere."[4]

3.2. MULTI-COUNTRY STUDIES ON TRADE POLICY AND GROWTH

This group of studies has typically been sponsored by multilateral institutions. The typical strategy of these projects has been to engage a number of researchers to undertake detailed, many times book length, individual country studies. The project co-ordinator provides, at the end, a synthesis where both the similarities as well as differences across countries are highlighted and where some general conclusions are offered.

Some of the most important cross-country studies on trade policy in LDCs are those coordinated by Little, Scitovsky and Scott (1970), Balassa (1971), Bhagwati (1978) , Krueger(1978) etc.[5]

Although these cross-country investigations have unearthed significant information on trade practices in a score of countries, they have been subject to some

[4] Nayyar, op.cit, p. 10.

[5] Since the focus of our present study is on the relationship between exports and growth and not trade-policy and growth, a detailed discussion on the latter group of studies is not attempted here. For a vivid survey of this literature upto the late 1980s, see Edwards (1993).

limitations. First, invariably the authors have found it extremely difficult to compute satisfactory indices of protection and trade orientation. Second, these studies have not been able to provide a fully convincing theoretical framework that links commercial policy, trade orientation and growth. Third, although these studies have provided very detailed information on trade policy practices in LDCs, their coverage has been small since in each of them only a handful of countries have actually been analysed. In an effort to broaden the scope of the enquiry a number of authors have used large cross-country data set to analyse econometrically the relationship between trade orientation and growth.[6]

Before entering into a discussion of these cross-country studies we would like to shed some light on the more recent studies on trade policy and growth.

Partially because of the concerns related to the data quality, the recent literature on openness and growth has resorted to various innovative empirical strategies. These strategies include: (a) constructing alternative indicators of openness (Dollar (1992); Sachs and Warner (1995)); (b) testing robustness by using a wide range of measures of openness including subjective indicators (Edwards (1992 and 1998)); and (c) comparing convergence experience among groups of liberalising and non-liberalising countries (Ben David (1993)). The recent round of empirical research is generally credited for having yielded stronger and more convincing results on the beneficial effects of openness than the previous, largely case-based literature. Indeed, the cumulative evidence that have emerged from such studies provides the foundation for the consensus on the growth-promoting effects of trade[7].

Rodriguez and Rodrik (1999), however have expressed considerable doubts about the reliability of the results arising out of these studies. According to them methodological problems with the empirical strategies employed in these literature leaves the results open to diverse interpretations. In many cases, the indicators of 'openness' used by the researchers are poor measures of trade barriers or are highly correlated with other sources of bad economic performance. In other cases the methods used to ascertain the link between trade policy and growth have serious shortcomings. Reviewing some

[6] Edwards (1993). p.1361 & 1379.
[7] Rodriguez and Rodrik (1999), p2.

recent studies in this category they have found little evidence that open trade policies (in the sense of lower tariff and non-tariff barriers to trade) are significantly associated with economic growth . Hence they conclude: "Our bottomline is that the nature of the relationship between trade policy and economic growth remains very much an open question. The issue is far from having been settled on empirical grounds. We are in fact sceptical that there is a general, unambiguous relationship between trade openness and growth waiting to be discovered. We suspect that the relationship is a contingent one, dependent on a host of country and external characteristics. Research aimed at ascertaining the circumstances under which open trade policies are conducive to growth (as well as those under which they may not be) and at scrutinising the channels through which trade policies influence economic performance is likely to prove more productive."[8]

3.3 SOME ECONOMETRIC STUDIES ON EXPORT AND GROWTH: A SURVEY

Most cross-country econometric works on the relationship between trade orientation and growth have (implicitly or explicitly) followed a two-stage methodology: in the first stage it is assumed (rather than tested) that more liberalised economies experience faster growth of exports. In the second stage it is tested whether countries with faster growth of exports have experienced a more rapid rate of growth of GDP.A positive answer to this second narrower question is then interpreted as providing an evidence supporting the broader proposition that outward orientation and liberalisation foster growth.[9]

This section reviews some of the most important works in this category.

3.3.1 Studies based on correlation and regressions.

Emery (1967) made an attempt to empirically investigate the relationship between a country's exports and its economic growth at a time when not much statistical studies

[8] Rodriguez and Rodrik (1999) , p4.
[9] Op-cit. p.1389-90.

had been undertaken to test this relationship. Although, Emery recognised the possibility of a two-way causal relationship between exports and economic growth, he assumed that it is mainly the rise in exports that stimulates an increase in aggregate economic growth rather than vice versa, without providing any reason whatsoever behind such an assumption.

In order to test the aforesaid hypothesis Emery has calculated multiple correlation and simple least-squares regression equations for a group of 50 countries using the data on average rates of growth of per-capita real GNP, of exports and of current-account earnings for the period 1953-63.

The most significant correlation is found between exports and GNP. Assuming that only the export data is variable and the GNP data is not, the latter is regressed on the former. On the basis of the opposite assumption exports are again regressed on GNP. Given the possibility of a two-way causation between exports and economic growth, Emery, however, observes that rather than either of these two assumptions, it will be more realistic to assume that there is equal variability for each of the two series. This third assumption has been incorporated by calculating an orthogonal regression using the previous two regression equations. This derived equation indicates that for each 1% rise in exports, GNP would increase by 0.4 % and to increase GNP by 1%, exports should be raised by 2.5%. This last relationship is found to have a high degree of statistical reliability. Emery, therefore, concludes that in order to increase its growth rate, a country should adopt policies that stimulate exports.

Like Emery, ***Michaely (1977)*** has also attempted to test the role of export growth behind output growth of an economy by looking at the correlation between these two magnitudes of economic performance. However, instead of using multiple correlation, he uses simple rank correlation on a sample of 41 LDCs for the years 1950-73.

Michaely is of the opinion that all the previous studies (including Emery's) in this field have made a common mistake by correlating growth, measured by the change in the national product with the change in exports. This is the case because, since exports themselves are part of the national product, an autocorrelation must exist which would

inevitably result in a positive correlation between the two variables, whatever their true relationship. In order to avoid such spurious results Michaely has focussed on the rate of growth of exports, shares of GNP and their relation with the rate of growth of per capita GNP.

He has found that the Spearman rank correlation coefficient between the two variables is significantly positive (0.38) on the basis of which he accepts the hypothesis that a rapid growth of exports accelerates the economies' growth, altogether ignoring the possibility of a reverse or a both way causation between the two.

Michaely notes that the correlation of the two variables is particularly strong among countries with the most successful growth experience. He has also made an attempt to investigate whether the export-growth relationship is affected by the level of development. This part of his paper will be discussed at a later stage.

To investigate this issue further, i.e., to re-examine the effects of exports on economic growth ***Balassa (1978)*** again has used the rank co-relation methodology using data on 11 such countries which have already had an established industrial base. Basically he was trying to test the hypothesis that export oriented policies lead to better growth performance than import substitution policies. In order to do this he has taken inter country differences in the growth of exports as an indication of the extent of export orientation and has calculated the correlation between different measures of the rate of growth of exports and output growth in his 11-country sample for the period 1960-73. He has also examined the relationship between manufactured exports and manufacturing output. In order to incorporate the policy changes that had occurred in the mid-60s in most of the countries included in his sample, Balassa has also calculated separate rank-correlation for the two sub-periods e.g., 1960–66 and 1966-73.

In this study a significant positive correlation is found to exist between different measures of export growth and output growth for the entire period. It is also observed that the statistical significance of the estimates generally improves between the first and the second sub-periods. Balassa has obtained a weaker relationship in regard to the indirect as compared to the total effects of exports, although the former effect also has turned out to be important. With one exception, the observed correlation in regard to total effects of

exports were found to be higher for GNP than for manufacturing output. The opposite result was found, however in regard to the indirect effects of exports.

Balassa's sample, however, consists of only 11 developing countries, each with an established industrial base and it includes, as noted by ***Tyler(1981)***, obvious high performers like Taiwan and Korea and such poor performers as India and Chile.

In order to check whether Balassa's result would hold for a wider, less restrictive sample of developing countries, Tyler again has applied Pearson and Spearman rank correlation methodology to a sample of 55 middle income developing countries for the period 1960-77. He, however, concentrates on the correlation of GDP growth, not only with export growth, but also with the growth of several other economic indicators e.g.the growth rates of manufacturing output, gross domestic investment, manufacturing export earning, direct foreign private investment and finally the change in net barter terms of trade(NBTT).

Excepting the change in NBTT, which is found to have no significant relationship with GDP growth, the growth rates of all other variables turn out to be significantly correlated with the growth rate of GDP.

Although Tyler's sample is larger than that of Balassa (1978), it, however, excludes low-income developing countries since it is assumed (by Tyler) that a minimum level of development is necessary to reap the benefits of export orientation. ***Kavoussi (1984)*** has adopted an even broader approach in that he goes on to examine the positive correlation in exports and growth for a large sample which includes both low-and-middle-income countries, in general and for the less-advanced developing countries, in particular. He has also focussed on the effects of commodity composition on the export-growth relationship.

Kavoussi has calculated Spearman rank correlation coefficient between export growth and GNP growth during 1960-78 for the entire sample of 73 countries as well as for its various sub-samples.

A significant and positive correlation is found to exist between export growth and GNP growth even in such a large and heterogeneous sample of developing countries. Kavoussi's study also reveals that the positive correlation between exports and growth is

not confined to middle-income countries alone, contrary to the assumption made by Tyler (1981). We leave further discussion on this part of his paper for a later stage.

One drawback of the rank correlation approach used by Michaely and others is that it does not make any attempt to distinguish between endogenous and exogenous variables. If the rank correlation is found to be significantly positive, it is concluded that export growth causes output growth ignoring the possibility that the causality may exist in the reverse direction or in both the directions.

Moreover, by looking at the correlation coefficient, the (possible) role of other factors on output growth has also been ignored in this approach.[10] Hence this kind of two-variable approach also suffers from the risk of yielding biases due to omitted variables resulting in spurious correlation.

3.3.2 Studies based on neo-classical production functions.

As an improvement over the rank correlation approach various authors have used a production function approach in which exports have been introduced as an additional factor of production in a neo-classical type production function: $q = f(K,L,X)$. This approach assumes that exports contribute to GDP in two fundamental ways. Firstly, exports generate positive externalities on non-exports sectors through more efficient management styles, better production techniques etc. Secondly, it is argued that marginal productivities are higher in the export sector than in the non-export sector. Hence, given the labour force and capital stock, an expansion of exports at the cost of other sectors will have a positive net effect on GDP. Some such studies will be discussed below:

In order to explain inter country differences in GDP growth rates ***Michalopoulos and Jay (1973)*** (MJ) used domestic and foreign investments and labour as explanatory variables along with exports in an inter country regression. In this study they used data for 39 developing countries for the period 1960 –1966.

It was observed that inter country differences in domestic investments, foreign capital and labour growth explained 53% of inter country variation in GNP growth rates. However, when export was included as an additional explanatory variable in the inter-

[10] Although Tyler (1981) calculated the rank correlation of GDP growth with several other variables, such correlation showed only bivariate associations i.e. while calculating the rank correlation of GDP growth with the growth rate of any other variable, say exports, the effect of all other variables on GDP growth were ignored. Hence, this cannot be regarded as a rigorous approach to explain GDP growth.

country regression, the coefficient of determination went upto 0.71. The regression coefficient of the export variable was found to be 0.04 implying that a 1% increase in the rate of growth of exports was associated with a 0.04 of 1% increase in the rate of growth of GNP.

Balassa (1978) in his paper applied the same method, which was adopted by M.J (1973), to a pooled data of 10 countries (which had an established industrial base) for the period 1960-66 and 1966-73. In this exercise, the inclusion of exports as an additional regressor raised the coefficient of determination from 0.58 (as compared to 0.53 in M.J.) to 0.77(as compared to 0.71 in M.J.). Balassa found the same value (0.04) for the regression coefficient of the export variable as in M.J. However, the coefficient of foreign capital and labour variables turned out to be higher, while the coefficient of domestic investment was lower than those in M.J.

Since it was observed that export growth favourably affected the rate of economic growth over and above the contributions of domestic and foreign capital and labour, Balassa concluded that it was an evidence of the benefits of export orientation as compared to policies favouring import substitutions.

In his study of 55 middle-income developing countries for the period 1960-77, ***Tyler(1981)*** also included export as an additional regressor in a Cobb-Douglas production function which consisted of the country's capital stock and labour force as other two explanatory variables. He then went on to estimate various estimable forms of this function.

The study revealed that for the entire sample of middle-income countries both capital formation and exports played significant roles in contributing to GDP growth. While a good fit was obtained with capital formation and labour force growth as regressors, the coefficient of determination improved (from 0.661 to 0.685) with the inclusion of export growth. It was observed that the coefficient of export growth was statistically significant and that a 1% increase in the rate of growth of total exports was associated with an increase of 0.057of 1% in GDP growth. This indicated the important role played by exports in contributing to economic growth. Replacing total exports by manufactured exports did not alter the results much. Technological progress also turned out to be an important factor in middle-income developing countries.

Although various authors adopted a production function type framework, ***Feder(1983)*** was the first to provide a formal model on this approach. A serious drawback of the simple one sector model formulation (in which exports entered the production function as an additional factor of production) used by earlier authors was that it did not specify the channels through which exports were supposed to affect GDP. To overcome this deficiency, Feder developed an analytical framework consisting of an exports sector and a non-export sector in which two ideas were formalised e.g., (a) exports sector generates positive externalities on non- exports sector and (b) there is a productivity differential in favour of the exports sector. Adopting a supply side description of changes in aggregate output, Feder followed a framework within which (a) aggregate growth was related to changes in capital and labour through an underlying production function and (b) a formal rationalisation was provided for the incorporation of the exports variable in the sources of growth equation.

Feder then used the data on a sample of 31 semi-industrialised countries for the period 1964-73 to estimate his growth equation using OLS.

His findings strongly supported the hypothesis that the marginal factor productivities in export sector are higher than those in the non-export sector. Although both exports-productivity and exports externality effects were found to exist, export externalities turned out to be relatively more important as compared to productivity differentials.

On the basis of his quantitative results Feder concluded that since social marginal productivities were higher in the export sector than in the non-export sector, economies which shifted resources into exports would gain more than the inward-oriented economies.

The publication of Feder's influential paper generated significant additional research aiming at expanding his analysis in various directions. While some researcher used a Feder type two-sector formulation, other still confined them to the simple one sector formulation.

Kavoussi (1984), for instance, used a simple one-sector production function framework to examine whether export growth affects output growth through its effect on total factor productivity.

He started with a simple production function with capital and labour as the factors of production. The hypothesis that export expansion generates the growth of total factor productivity was incorporated in the production function by assuming that the rate of technical change is a linear function of the growth of exports (RX). Kavoussi estimated his model using data from 73 developing countries for the period 1960-78.

For the entire sample the addition of Rx in the regression equation increased the coefficient of determination from 0.49 to 0.57. The Coefficient of RX was found to be positive and highly significant indicating that export expansion enhances the growth of total factor productivity.

Kavoussi divided his entire sample into two categories: low and middle-income countries to examine whether the level of development affects the influence of export growth on total factor productivity. This matter will be discussed later on.

Esfahani (1991) used a Feder type two sector model in order to investigate the function of exports in semi-industrialised countries (SICs) as main source of foreign exchange for the much needed imports of intermediate and capital goods.[11]

Esfahani pointed out that the results of the one-sector production model (in which exports entered as an additional input, with capital and labour in the GDP production function) are likely to suffer from simultaneity bias, since export growth itself may be a function of output supplies. In order to avoid such bias he specified in his model a second equation that related export growth to output increases as well as to shifts in the determination of the export-GDP ratio. He also specified a similar equation for import growth and then estimated the three equation-system of GDP, export and import growth model simultaneously.

Following Feder Esfahani assumed two sectors: domestic goods sector and export sector. To capture the export activity's potential externality effects, the productivity of capital and labour used in the production of domestic goods was assumed to depend on the level of exports. It was further assumed that her exists a productivity differential in favour of export sector. To allow for the effects of shortages in the supply of imported intermediate goods, an intermediate good was also added to the list of ingredients necessary for production of each product.

[11] This particular function of exports has so far been neglected in the literature.

He used data on 31 SICs for the period 1960-73,1973-81 and 1980-86,i.e the periods, which correspond to the three different phases of the world economy sinoe 1960. Esfahani estimated his model with the cross-sectional data for these periods to test its robustness and also to examine any possible structural changes as a result of external shock in the 1970s and the 1980s.

Esfahani's study revealed that the major contribution of export to the growth rate of GDP was to release the import shortage that many SICs confront. Once the import supply effect of exports had been taken into account, no significant externality effects seemed to be left. Contrary to many previous studies (see for example Kavoussi (1984), Balassa (1985)) increase the share of manufactured goods among exports did not seem to help the export-externality effect.

On the basis of his result Esfahani also tried to provide an alternative explanation of the variations in export externality effects through time and across samples found by different authors. This part of the paper will be discussed at a later stage.

3.3.3 *Exports, Growth and the Level of Development*

Apart from the relationship between export expansion and economic growth, a related issue which has been addressed in the literature, by various authors, is whether there exists a certain threshold level of development below and above which the relationship between export growth and economic growth differs.

In order to investigate this issue ***Michaely (1977)*** divided his sample of 41 LDCs into 'more developed' and 'less developed' ones. Countries with 1972 per capita income of above 300 dollars were included in the first category and the rest were included in the second and then rank correlations were calculated separately for these two categories. Since a significant positive correlation (0.523) was found for the former and practically zero correlation (-0.04) was observed for the latter, Michaely concluded that growth seemed to be affected by export performances only once countries achieved some minimum level of development.

Michaely's view was adopted by Tyler (1981) who omitted the poorest countries from his study on the ground that some basic level of development is necessary for a country to reap the benefits of export-oriented growth.

Kavoussi (1984) however has gone on to investigate whether positive correlation between export and growth will hold for a large sample which includes both low-and middle-income countries, in general, and for the less advanced countries in particular.

Kavoussi has divided his entire sample of 73 developing countries in two categories: the 'low-income' and 'middle-income', treating per capita income of 360 dollars (in 1978$) as the benchmark. The Spearman rank correlation coefficients have been calculated separately for both these groups. A positive and highly significant correlation has been found for both the low and middle-income countries. Although the correlation has turned out to be higher for the middle income countries, it has not been very weak in the low income countries as well .

Examining the effect of the commodity composition of exports on the relationship between exports and growth, Kavoussi has found that primary exports can play an important role in the growth process of both the low and middle-income countries. However in the more advanced developing countries export of manufactured goods tend to strengthen the favourable effects of export expansion.

Using a production function model Kavoussi has also demonstrated that in both low and middle-income countries an important cause of the positive association between export growth and GNP growth is the rise in productivity resulting from export expansion.

Export expansion has been found to enhance the growth of total factor productivity regardless of the composition of exports in low-income countries. However in the more advanced developing countries the effects of export expansion on the growth of total factor productivity have been observed to be highly sensitive to the share of manufactured goods in total exports. The favourable effects of exports on productivity have been found to be significant only in those middle-income countries that have shifted to export of manufactured goods.

These studies have used a common methodology. First, the sample has been divided into two groups on the basis of some ad-hoc level of per capita income. Then the postulated relationship has been estimated separately for each group and the two sets of estimates have been compared in terms of their magnitudes. As pointed out by ***Moschos (1989)***, the results of such studies are likely to be sensitive to the choice of per capita

income that has been used as the critical level of development. Hence the results may be misleading.

Rather than choosing arbitrarily Moschos has made an attempt to search and test for the existence of a critical or threshold level of development below and above which there are significant differences in the responses of output growth to export expansion and possibly to other sources of growth, using a production function type model. In order to allow the data determine the critical level he has adopted a switching regression framework.

Within the framework the results obtained on the basis of cross-section data on 71 developing countries for the 1970-80, do not support the view that the positive effect of export expansion on economic growth is limited to 'more advanced' developing countries and is non-existent among 'less-advanced' developing countries.

In less advanced developing countries output growth has been found to be unaffected by labour growth whereas in more advanced developing countries labour force growth seems to have a significant effect on output growth. Although capital formation has appeared to play a significant and positive role in both group of countries, it has been stronger in more advanced countries.

Under both regimes the coefficients of export variables have turned out to be positive and significant. However it has been stronger under the 'low-income' regime than in 'high-income' regime. Hence contrary to the widely held view, low-income countries have been found to benefit most from export-oriented growth.

As an alternative to dividing countries into different groups according to the stage of development, ***Kohli and Singh (1989)*** have divided countries by a 'minimum critical threshold' related to the trade structure itself, rather than to the income per capita. They have divided their sample of 41 countries into two groups – 'outward-oriented' and 'inward-oriented'. Countries with a rate of growth of exports exceeding 6% per annum or with a share of exports to GNP larger than 17% have been put together in the first category and the rest have been included in the second category.

Using Feder's analytical formulation, the coefficients of export growth have been found to be positive and significant for both categories of countries, for the period 1960-70. However, it has turned out to be significantly larger for the 'outward-oriented'

countries. For more recent periods, however, these coefficients have been found to be positive but often insignificant for both 'outward-oriented' and 'non- outward oriented' countries.

In a nutshell, these studies have shown that the importance and significance of export growth as a promoter of economic growth varies across groups of countries. This raises the question as to whether it is at all desirable to club together all these nations (at different levels of development) while carrying out some econometric analysis.

3.3.4 Exports growth, GDP growth and World Market Conditions

Whatever may be the differences in approach or in methodology, a common conclusion shared by all the studies discussed so far has been that there exists a positive and significant correlation between export expansion and economic growth which has led these authors to recommend outward-oriented policies for promoting economic growth in developing countries. However, the proponents of the alternative school of thought which supports inward-orientation have argued that export-orientation need not necessarily be conducive to growth because unfavourable world market conditions can exert constraining influences. It has been suggested that while export-orientation brings benefits during the period of rapid world economic growth, such will not be the case once the world economic environment deteriorates as higher export (and import) shares magnifies the effects of external shocks[5].

A number of authors have reacted to this criticism by analysing whether the favourable effects of exports on growth hold under alternative world market conditions. Most of these studies have adopted a simplistic approach of casually comparing the results of cross-country growth equations for the two or more periods (most of them taking the 1973-oil shock as the breaking point). As observed by Edwards[6], most of these studies have followed very simple econometric techniques with no effort to test for structural breaks or to deal with problems related to measurement-error and simultaneity.

Here we will discuss some of these studies in brief.

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[5] Balassa (1985). p.24.
[6] Edwards(1993).p. 1383

Balassa (1985) has gone on to examine whether the export-economic growth relationship which he earlier found to exist in the pre-1973-oil shock period, continues to hold in the period of external shock after 1973. For this purpose he has re-estimated the Michalopoulos and Jay (MJ) production function (which he estimated earlier in his 1978 paper, for the period 1960-73) for the 1973-79 period. He also has used estimates made by him on policy responses to external shocks [7]to analyse the effects of alternative policies on economic growth. Finally, he has combined the procedures applied in a single estimating equation.

His study includes 43 developing countries (covering the entire spectrum of developing countries from the LDCs to the newly industrialising countries) which had been affected by the external shocks after 1973.

Balassa's study has revealed that the rate of growth of exports has continued to affect the rate of economic growth even in the post-oil shock period and that the numerical magnitude of this effect has increased compared to the earlier period. This result contrasts with the view of the export pessimists who maintain that exports will have less of an effect on economic growth after 1973 due to unfavourable world market conditions.

It has also been observed from Balassa's study that the policies adopted have importantly influenced the rate of economic growth in developing countries. The rate of GNP growth has been found to be higher, the greater the extent of outward-orientation at the beginning of the period of external shock under consideration and the greater the extent of reliance on export promotion in response to the external shocks of the period. Balassa's results have further indicated the possibilities for low-income countries to accelerate their economic growth through the application of modern technology in an appropriate policy framework. The study has also revealed the advantages of relying on manufactured exports.

Rati Ram (1985) has applied a simple one-sector production model using the data on 73 LDCs for the periods 1960-70 and 1970-77, in order to examine whether the importance of exports for economic growth has increased over the 1970s. He has also

[7] See Balassa (1981), Balassa (1984b), Balassa (1984c).

looked at the differential effects of exports on economic growth in the low-income and middle-income LDCs, for both periods.

Export performance has not only been found to be important for economic growth, its impact has also been observed to be stronger in 1970-77than in 1960-70. While the impact of export performance on growth has been found to be smaller in the low-income LDCs during 1960-70, the impact differential has almost vanished in 1970-77.Durng this latter period, the favourable impact of exports on economic growth seems to be quite large and of almost equal magnitude for the two groups.

Kavoussi (1985) in his paper has made an attempt to examine the roles played by external demand and commercial policy in export performance of developing countries. Taking again the 1973-oil shock as the breaking point he has divided his entire time period of study (1967-77) into two sub-periods e.g. 1967-73 and 1973-77. His sample consists of 53 developing countries in the first sub-period and 51 in the second.

In order to analyse the effects of trade policy and external demand on export performance, Kavoussi has used a decomposition method in which, firstly, exports of each country have been divided into two groups of traditional and non-traditional commodities and, then, for each of the two sub-periods under consideration the increase in export earnings of a country has been divided into three parts: the world –demand factor, the competitiveness factor and the diversification factor. Kavoussi has used the world-market factor as an index of the impact of external demand on export earnings and the growth of exports due to competitiveness and diversification as an indicator of the effect of trade policy.

Kavoussi's results have shown that for the first period (1967-73), when the world market conditions were generally favourable, a strong positive correlation exists between export-orientation and economic growth. However contrary to Balassa (1985), Kavoussi has found that for the post-oil shock period when the world market conditions became unfavourable, the correlation is weaker and doubtfully significant. So it has been concluded that whenever the world market condition is unfavourable, superior export performance is seen to be difficult to achieve even if the country concerned follows an export-oriented policy. However, Kavoussi's study has also shown that if trade policies are restrictive, export earnings are not likely to grow very rapidly even when external

conditions are highly favourable. So it has been inferred that rapid growth of exports requires both favourable external demand and outward-oriented commercial policies. Kavoussi's study has also revealed that free trade seems to enhance growth only when external demand is favourable. In a situation of an unfavourable foreign market, the association of the economy's growth with export-orientation seems to be quite weak.

Prior to the publication of Rati Ram's 1987 paper [***Rati Ram (1987)***], every study in the field of export-growth nexus has been based on cross-section data covering various groups of developing countries for different time-periods. Ram (1987), in his paper, has made the first attempt to investigate the export-growth nexus in each country separately on the basis of annual time-series data. He has estimated two models of the export-growth linkage for 88 countries on the basis of annual time series data for each, for the period 1960-82. Assuming a structural break in 1973(due to the oil-shock), Ram has divided his sample period between two sub-periods 1960-72 and 1973-82 and also has provided estimates for several inter-country cross-sections for these two sub-periods separately. One of his models has been based on the simple one-sector production model, while the other has been derived from the framework proposed by Feder (1983).

The fits of the models have been found to be good in most cases and inspite of much parametric variations across countries, the role of exports in growth seems to be predominantly positive. However, there is much diversity with regard to the strength of the export- growth nexus in the sample countries. The cross-section results of the study have reinforced the time –series results about the export-growth nexus. Ram has found evidence in favour of the structural change from the first period (1960-72) to the second (1973-82). Not only that, the impact of exports on growth seems to have increased over the latter period, supporting the earlier findings by Balassa(1985), Ram(1985) etc. Ram (1987) has also noted that the structural change has been more dramatic in respect of low-income LDCs for which export seems to have acquired much greater importance over the 1970s.

In his 1985 article [Balassa (1985)] Balassa has investigated whether the relationship between export-orientation and economic-growth has changed significantly in the post-1973 period as compared to the pre-1973 period. As discussed earlier, he has

found not only a positive but also a stronger relationship between export growth and output growth in the post-oil shock period.

Rana (1988), however, has pointed out that Balassa's regression for the pre-1973 and post-1973 period which he undertook in his 1978 and 1985 papers respectively are not strictly comparable mainly due to the heterogeneity of his samples. Rana commented: "while his (Balassa's) pre- 1973 samples comprised pooled data (for the period 1960-66 and 1966-73) from 11 semi-industrialized countries his post-1973 sample is much broader and comprises cross-sectional data from 43 low- and middle-income countries. It is unrealistic to assume that the production function in his pre-1973 sample was homogeneous across such a wide range of countries and over different time-periods, and so the results of his pre- post comparison could be misleading[8].

Using the pooled data on the same 43-country sample [as was used by Balassa (1985)], Rana has done three things: 1. He has re-estimated the MJ production function [used in Balassa (1985)] for the pre and post-1973 period. 2. He has used the estimation technique developed by Fuller and Batesse (1974) 3. He has undertaken the pre-and post-comparison by using the Feder model.

Although in Rana's study the export growth coefficients are found to be significantly positive, for both sub-samples, the point estimates for the post-1973 period are smaller than those for the pre-1973 period, which is contrary to findings of Balassa (1985). Since the decline is statistically significant, it supports the view followed by the export-pessimists that exports will have less effect on growth in situations of unfavourable world environment.

Esfahani (1991) however has noted that in the 1980s when the world environment was even more unfavourable for exports than in the 1970s, the coefficient of export expansion in the relevant GDP growth equation has increased. He has therefore argued that the sources of these changes should be traced back not to changes in the world market conditions as such but to the changes in the availability of foreign exchange for semi-industrialised countries during these periods. This is because, as pointed out by Esfahani, in the 1970s, the shortage of foreign exchange for SICs was reduced as a result of the increased supply of petro-dollars following the export price hikes, while in the

[8] Rana (1988). p.262.

1980s, the world recession and the debt-crisis tightened the external constraint for most SICs [9].

Singer and Gray (1988)(SG) have used Kavoussi (1985)'s data and methodology to (1) extend Kavoussi's analysis (carried out for two periods 1967-73 and 1973-77) to the more recent period 1977-83 during which the world market conditions became even worse; (2) add a regional analysis of the relationship between export-orientation and economic growth for the two periods: 1967-73 and 1977-83; (3) divide Kavoussi's sample into upper and lower per capita income categories and correlate trade policies with GNP growth for the two periods separately for the two categories of countries.

In line with Kavoussi's results [Kavoussi (1985)], SG have found that even in the period 1977-83, when internal demand conditions were unfavourable, both inward-oriented and outward-oriented countries have experienced negative growth rates of export earnings. Countries have been observed to achieve high growth rates of export-earnings only when external demand conditions are favourable. These results have been found to apply equally to exporters of manufactured goods and primary products. However, industry-oriented countries seemed to have performed better in terms of export earnings benefiting from stronger world-demand relative to primary-oriented countries. The correlation between export and growth has appeared to be strong only under favourable market conditions and has been weaker for low-income countries for all periods. SG have concluded on the basis of these results that "... outward orientation cannot be considered as a universal recommendation for all conditions and for all types of countries". [10]

Although these studies have not provided any conclusive answer to the question of how world demand conditions affect the relationship between export expansion and economic growth, it can safely be asserted that world business cycles have some influence on this relationship.

[9] Esfahani(1991).p113.
[10] Singer and Gray (1988). p.401.

3.3.5 Studies based on Causality Tests

Most of the studies discussed so far, have implicitly or explicitly assumed that export growth is causally prior to output growth.[11] The general approach has been to regress a growth variable on a contemporaneous export growth variable and to infer support for the proposition that export-growth causes output growth (which implies that export promotion is a desirable strategy for developing countries) from the significance of export growth coefficient. However although output growth and export growth are likely to be correlated, it will be inappropriate, as noted by Jung and Marshall[12] to characterise this situation as one in which export promotion has induced growth. Because, while export growth may lead to output growth, an equally plausible hypothesis is that the output growth causes export growth. Ordinary regression, however, can only reveal the presence (or lack) of statistical correlation between export and economic growth, but has no bearing on the causal link between these two variables. In order to overcome this shortcoming, various authors have used a more sophisticated technique of carrying out causality tests, which go beyond mere correlation and address the issue of the direction of causation. The Granger method of causality provides an improved method to test the hypothesis that export promotion is an effective development strategy. Here we discuss some of the studies based on causality tests.

Jung and Marshall (1984) (JM) have used annual data on 37 countries for the period 1950-81 , to perform Granger causality tests .

According to Granger's simple notion of causality developed in Granger (1969) , a variable x is said to cause another variable y , if knowledge of past x reduces the variance of error in forecasting y as compared to the variance of errors that would be made from knowledge of past y alone . Using this notion of causality, JM have regressed, for each country, the output growth on past values of itself, on past values of export growth rate and on a constant. The export growth rate has also been regressed on the same variables.

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[11] an exception is Esfahani (1991) who has taken note of the simultaneity problem and have tackled it by formulating and estimating a three-equation model of growth, exports and imports. When his growth equation has been estimated by using 2 SLS, the estimated coefficient of $(X/Y)(X^*/X)$ has turned out to be insignificant casting some doubt on the appropriateness of the exports externalities approach.

[12] Jung and Marshall (1985). p.4.

It has not been possible to establish unequivocally the direction of causality in case of 22 out of 37 countries. Evidences in favour of export promotion have been found only in case of four countries: Indonesia, Egypt, Costa-Rica and Ecuador. Their study has suggested that the statistical evidence in favour of export promotion is at least not as unanimous as it seems to be on the basis of earlier studies, using less sophisticated techniques.

Darrat(1987) has re-examined the export-led growth hypothesis by applying the causality test proposed by White(1980) on time series data over the period 1955-82 on four most successful NICs e.g. Hong-Kong, Korea, Taiwan and Singapore.

The results of the study have generally been at odds with the causality implication of the export-led growth hypothesis. Evidence in favour of causality running from export growth to economic growth has been found only in Korea. In the remaining three samples the causality implication of the export-led growth hypothesis has been rejected.

Although some authors have tried to investigate the effect of commodity composition of exports on the export-growth nexus, perhaps it is ***Chow (1987)*** who has, for the first time, made an attempt to empirically establish the causal relationship between the growth of export of manufactured goods and development of manufacturing industries. With this aim in view he has conducted the causality test applying the Sims' technique [Sims (1972)] using the annual data on exports and manufacturing production from eight most successful export-oriented NICs [including the Gang of Four studied by Darrat (1987)] for the decades of 1960s and 1970s.

According to Sims, one can regress Y on past and future values of X and 'if causality runs from X to Y only, future values of X in the regression should have coefficients insignificantly different from zero, as a group'[12].

Chow's study has shown that for most of the small open economies like Hong Kong , Israel , Korea, Singapore and Taiwan there is a reciprocal causal relationship between the development of manufacturing industries and export growth. Even in Brazil, which has a relatively larger domestic market, a bi-directional causality has been observed. In Mexico, however, causality is unidirectional from export-growth to industrialisation, which implies that export expansion has accelerated industrialisation in

[12] Sims (1972), p 545.

Mexico, yet industrialisation has not contributed to export growth. The only exception is Argentina, where no causal relationship has been found between export growth and industrialisation. Unlike Darrat's, Chow's results have further confirmed the advantage of export-led growth strategy for small open economies.

In order to investigate the causal relationship between export and economic growth in African continent ***Ahmed and Kwan (1991)***(AK) have performed Granger causality tests using different measures of real GDP and real exports on the basis of data on 47 African countries for the period 1981-87. In order to examine whether causality and its direction are liable to vary with the stage of development of countries as proxied by their per capita income, AK have divided the entire sample of 47 countries into two subsets: one comprising 30 low-income countries and the other consisting of 17 high and middle income countries and have performed causality tests separately for these two sub-sets.

For the entire sample of 47 countries, no causality has been found between exports and economic growth. For the low-income countries the real GDP has been found to Granger cause real exports at the 10% level of significance. For the middle and high income countries, the hypothesis that the growth of real income Granger causes real exports, when measured as a ratio of manufactured exports to total exports has been found to be statistically significant only at 10% level. So, if at all, some sub-sets of sample countries have provided only weak support in favour of causation running from economic growth to exports. So this study has failed to provide support for the export-led growth hypothesis in the African countries. This result is however in conformity with the earlier findings of Jung and Marshall (1985) in which out of the four sub- Saharan countries included in the sample, only Kenya has shown a statistically significant causal link running from economic growth to exports.

Thorton (1996) has attempted to explore the causal link between exports and economic-growth in Mexico, using the data on real-exports and real-GDP for the period 1895-1992.

His methodology is to consider the relationship between cointegration and causality and to use tests of cointegration as a pre-tests strategy for Granger tests of causality between the two variables. The testing procedure involves tree steps: 1. To test

the order of integration of the natural logarithms of the levels of the real exports and real GDP using the ADF test, 2. Depending on the outcome of the above test the next step is to test for cointegration using the Johansen (1988) maximum likelihood approach, 3. If cointegration is found to exist, the third step is to carry out a standard Granger- causality test augmented with an appropriate error-correction term derived from the long-run cointegrating relationship.

The results of Thorton's study suggest the existence of a significant and positive Granger causal relationship running from exports to economic growth in Mexico over the long run, thereby supporting the export-led growth hypothesis in the context of the country.

3.3.6 Export-Growth Nexus in India: Findings from Some Prior Research

As far as India is concerned, various authors have examined the export-growth nexus in this country as part of their studies based on different cross-sections of countries. See for instance, Emery (1967), Balassa (1985), Kavoussi (1985), Jung and Marshall (1985), Esfahani (1991) etc. Apart from these cross-sectional studies, several authors have also concentrated their research on India, in particular, in order to investigate the relationship between export expansion and economic growth. Here some such studies will be discussed in brief.

In order to investigate the relationship between export expansion and economic growth in India, for the period 1950-51 to 1980-81, Smriti ***Mukherjee (1987)*** in her paper has tested two variants of the hypothesis. Firstly, she has found out the annual percentage changes in income and exports and then has calculated correlation-regression coefficients. Secondly, she has checked whether periods of higher export-growth have been associated with periods of higher income growth, using Pearson and Spearman rank correlation coefficients.

No matter how the export growth and the income growth variables have been represented and no matter what technique has been followed, it has become evident from Mukherjee's study that in the case of the Indian economy a higher growth rate of exports

has led to a fall in the growth rate of income during the period (1950-51 to 1980-81) under consideration.

She has attempted to provide two alternative explanations for this unexpected relationship and has also tried to examine whether those explanations are valid.

The first hypothesis, which Mukherjee has examined, is that imports being quite substantial in India for the period under study, there is a possibility that the relationship between export growth and economic growth may get distorted. However, her results have shown that even if a rough adjustment is made for import substitution, the inverse relationship between export growth and GNP growth continues to remain. So it has been concluded that the negative sign is not due to the policy of import -substitution being followed in India ever since the plan period.

The second explanation, being proposed and checked by Mukherjee is that the specification of the relationship may have been improper in the sense that instead of looking at the nexus between growth rate of exports and the growth rate of GNP, one should attempt to find out a relation between the growth rate of exports and non-export components of GNP. When this hypothesis is incorporated in her study, the desired (positive) relationship between export and economic growth is observed to exist although it is not statistically significant. However, using Pearson and Spearman correlation coefficients it is found that the periods of higher growth rate in exports are not the periods of higher growth rates in GNP net of exports.

To sum up, the empirical findings by Mukherjee have failed to accept in a decisive manner, the hypothesis that an increase in the growth rate of exports will lead to higher growth rate in national income. So, she has concluded that "as far as the long- run objective of stimulating the growth rate of the Indian economy is concerned, exports do not seem to have a positive role."[13]

Nandi and Biswas (1991) have investigated the causality between export growth and income growth in the Indian economy for the period 1960-85, using the Sims test of causality.

[13] Smriti Mukherjee (1987). p.58

Their study has provided evidence in favour of unidirectional causality running from export growth to the growth of national income thereby supporting the export-led growth hypothesis contrary to the findings of Smriti Mukherjee.

In his 1996 paper ***Mallick (1996)*** has further made an attempt to inquire into the long and short run relationship between income growth and exports growth in India, for the period 1950-51 to 1991-92 in the context of a cointegration-based error-correction modeling.

The results of his study have shown a strong cointegration and Granger feedback between income and exports growth. The error-correction models have further provided consistent evidence in favour of an unidirectional causation running from income-growth to export-growth This is again contrary to the results obtained by Nandi and Biswas (1991).

As noted by Mallick, most of his sample period consists of the period prior to economic liberalisation in India, when external trade formed only a small fraction of income. He, therefore, has not ruled out the possibility of finding a causal linkage running from export-growth to output growth, in the post-liberalisation period when external trade has assumed much more importance.

Marjit and Ray Chaudhuri (1997) have further carried out the Granger causality tests between the GDP at market price and exports at market price, (both in terms of rupees), using the annual data for the years 1951 to 1994.

Instead of using any criteria for choosing the optimum lag length, however, they have opted for a three period lag length for the test.

The 'results of their exercise provide evidence in favour of strong unidirectional causality running from GDP to exports.

CONCLUDING OBSERVATION

This survey of the empirical literature on export-growth nexus, though not complete, clearly reveals the fact that this empirical evidence on the relationship is not at all free from ambiguity.

As far as India is concerned, the export-growth relationship is far from conclusive. So there is still scope for further research. The present study is an attempt in this direction.

Chapter-4

Export-Growth Nexus in India : The Present Study

EXPORT-GROWTH NEXUS IN INDIA : THE PRESENT STUDY

Introduction

This chapter is the outcome of the present study. Our hypothesis is that either export growth may cause output growth or output growth may cause export growth or causality may run both ways. The intuitive logic behind this hypothesis will be discussed in Section 4.4. The results of our macro-level exercise and their interpretations will be discussed in Section 4.5. The next Section (4.6) will contain the results of the industry level exercise carried out in the study and their interpretations. In the final Section (4.7), some limitations of present study will be mentioned.

Before entering into the actual exercise, however, the chapter starts with the technical part of it. Section 4.1 provides the information about the sources of data used in the study. The next Section (4.2) briefly discusses some concepts of time-series analysis relevant for our study. This is followed by the description of methodology in Section 4.3.

4.1 DATA SOURCES

All data used in this study are annual.

While examining the causality between export growth and economic growth, the latter has been measured by the growth rate of GDP at factor cost (at constant 1980-81 prices). For this purpose data on GDP (at factor cost) at current prices (for 1950-51 to 1996-97), GDP at constant 1970-71 prices (for 1950-51 to 1985-86) and GDP at constant 1980-81 prices (for 1985-86 to 1996-97) have been collected from various issues of Economic Survey; published annually by the Government of India. On the basis of these data the series of GDP (at factor cost) at constant 1980-81 prices has been constructed.

For calculating the growth rates of exports at constant 1980-81 prices, data on (a) exports (including re-exports) at current prices and (b) unit value index of exports (Base 1978-79=100) from 1950-51 to 1996-97 have been collected from various issues of Economic Survey. Using the technique of base-shifting the unit value indices with base 1980-81 have been calculated from the series (b) giving the series (c) and the values in series (a) have been deflated by the corresponding values in series (c) to construct the series of exports at constant 1980-81 prices.

For 1) Textiles and 2) Chemical and Chemical products, we have used the growth rates in Index of Industrial Production (base 1980-81=100) as a proxy for growth rate of output for the purpose of constructing a long time series since data on value of output for such a long period (1960-61 to 1995-96) were not readily available. For this purpose data on IIP for the years 1960-61 to 1985-86 have been collected from India Database published by H. L. Chandok and the Policy Group, 1990. Data on IIP for the rest of the years have been collected from various issues of Economic Survey.

For Machinery and Transport equipment, however, we have constructed the series of the values of output at constant 1980-81 prices. For this purpose, data on the value of output at current prices have been collected from The Annual Survey Of Industries, various issues. Data on wholesale price indices at constant 1980-81 prices have been collected from 'Index Number of wholesale prices of India'.

In order to calculate the growth rates of exports (at constant 1980-81 prices) for all the three industries data on exports at current prices for the years 1960-61 to 1985-86 have been collected from India Database and the remaining data have been taken from various issues of Economic Survey. Data on unit value index have been collected from various issues of Report on Currency and Finance, Vol.II, published by the Reserve Bank of India .

4.2 SOME CONCEPTS OF TIME SERIES ANALYSIS AT A GLANCE

Before explaining the methodology that has been used in this study, a brief discussion on some of the concepts of Time Series Analysis that are relevant to our exercise, would be useful. This section is basically devoted to this purpose.

1. What is Time Series?

A time series is a sequence of numerical data in which each item is associated with a particular instant in time. One can quote numerous examples: monthly

unemployment, weekly measures of money supply, M1 and M2, daily closing price of stock indices and so on.

2. Stochastic Process

From a theoretical point of view a Time Series is a collection of random variables $\{X_t\}$. Such a collection of random variables when ordered in time is called a stochastic process. The random variables $\{X_t\}$ are, in general, not independent. Moreover for each random variable we have a single realisation i.e. for each random variable we have a single observation and in no way it is possible to enlarge the sample size. These two features – a) dependence and b) lack of replication compel us to specify some highly restrictive models for the statistical structure of the stochastic process.

3. Stationary and Non-stationary Time Series

Strong Stationarity

A process is called strictly stationary when the joint distribution of $X(t_1)$, $X(t_2)$, ..., $X(t_n)$ is exactly the same as that of $X(t_{1+k})$, $X(t_{2+k})$,....., $X(t_{n+k})$ for all n and k i.e. the joint distribution is dependent on 'n' and 'k' but is independent of 't'. Since it is very complicated to be checked, an implication of this independence is generally used for verification purposes i.e. " independence of t" property of the joint distribution. This implies that:

$$E[X(t)] = \mu(t) = \mu \quad \forall t$$
$$V[X(t)] = \sigma^2(t) = \sigma^2 \quad \forall t$$
$$Cov[X(t), X(t+k)] = \nu(t, t+k) = \nu(k) \quad \forall t$$

Thus the moments of a stationary time series are dependent on lag length but independent of time.

Obviously $\nu(0) = \sigma^2$ and $\nu(k)$ is called the auto-covariance function (acvf). To make it unit free, more popularly used function is the autocorrelation function.

$$\rho(k) = \frac{\nu(k)}{\nu(0)} \rightarrow acf$$

Weak Stationarity

In practice strict stationarity is a very strong assumption and it is useful to define stationarity in a less restrictive way. This definition is in terms of the first and second moments only.

A time series is said to be weakly stationary if its mean is constant and its avcf depends only on the lag, that is,

$$E[X(t)] = \mu \quad \text{and} \quad \text{Cov}[X(t), X(t+k)] = \nu(k)$$

No assumptions are made about higher-order moments. Alternative terms used for this weakly stationary time series are wide-sense stationary, covariance stationary or second order stationary.

Non-Stationarity

A time series is said to be non-stationary if its mean and variance depend on time and they tend to depart ever further from any given values as time goes on.

Suppose that a variable y_t is generated by the following first order auto-regressive process:

$$y_t = \rho y_{t-1} + u_t \ldots\ldots\ldots (1)$$

Thus the current value of the variable y_t , depend on last period's value, y_{t-1}, plus a stochastic disturbance term u_t . It is assumed that this disturbance term comprises n random numbers drawn from a normal distribution with mean equal to 0 and variance σ^2. The variable y_t will be stationary if

$$|\rho| < 1$$

If, however,

$$|\rho| = 1$$

then y_t will be non-stationary. A stationary series tends to return to its mean value and fluctuate around it within a more or less constant range (i.e. it has a finite variance), while a non-stationary series has a different mean at different points in time (and thus the concept of the mean is not really applicable) and its variance increases with sample size.

4. Unit Roots and Stationarity

A non-stationary variable becomes stationary after it is differenced (although not necessarily just by first differencing - it can be shown that the number of times a variable needs to be differenced in order to induce stationarity depends on the number of unit roots it contains).

The question of whether a variable is stationary depends on whether it has a unit root. To see this (1) can be re-written as:

$$(1 - \rho L)y_t = u_t \text{.....(2)}$$

where L is the lag operator (i.e. $Ly_t = y_{t-1}$, while $L^2y_t = y_{t-2}$ etc.) . Forming a characteristic equation (i.e. $(1 - \rho L)=0$), if the roots of this equation are all greater than unity in absolute value then y_t is stationary. In our example there is only one root ($L= 1/\rho$), thus stationarity requires that:

$$|\rho| < 1$$

5.Cointegration

If a series must be differenced d times before it becomes stationary then it contains d unit roots and is said to be integrated of order d, denoted by I(d) . Consider two time series y_t and x_t, which are both I(d). In general, any linear combination of the two series will also be I(d) ; for example the residuals obtained from regressing y_t on x_t are I(d). If, however there exists a vector β, such that the disturbance term from the regression ($u_t = y_t - \beta x_t$) is of a lower order of integration, I(d-b) , where b > 0, then Engle and Granger (1987) defined yt and xt as cointegrated of order (d, b). Thus if y_t and x_t were both I(1) , and u_t ~I(0), then the two series would be cointegrated of order CI(1,1).

The economic interpretation of cointegration is that if two (or more) series are linked to form an equilibrium relationship spanning the long-run, then even though the series themselves may contain stochastic trends (i.e. be non-stationary) they will nevertheless move closely together over time and the difference between them will be stable (i.e. stationary). Thus the concept of cointegration mimics the existence of a long-run equilibrium to which an economic system converges over time, and u_t defined above can be interpreted as the disequilibrium error (i.e. the distance the system is away from equilibrium at time t)

Johansen's Maximum Likelihood Approach for Testing Cointegration

Given a group of non-stationary series one may be interested in determining whether the series are cointegrated, and if they are, in identifying the cointegrating (long-run equilibrium) relationship. To illustrate this we now examine a method for the estimation of cointegrating vector(s) in a multivariate framework proposed by Johansen (1991, 1995).

In order to explain the Variance Autoregresion (VAR) based Johansen's cointegration test let us begin with a simple VAR of order p:

$$y_t = A_i y_{t-i} + A_2 y_{t-2} t..... + A_p y_{t-p} + \varepsilon_t$$

Where y_t is a k-vector of non-stationary 1(1) variables., $A_i,\ldots,A_p$ are matrices of coefficients associated with the endogenous vectors and ε_t is a vector of innovations that

may be contemporaneously correlated with each other but are uncorrelated with their own lagged values.

This VAR can be alternatively rewritten as :

$$\Delta y_t = \Pi y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-1} + \varepsilon_t$$

where

$$\Pi = \sum_{i=1}^{p} A_i - I,$$

$$\Gamma_i = -\sum_{j=i+1}^{p} A_j$$

I is the identity matrix.

It should be noticed that as the Δy_t and Δy_{t-i} variables are I(0) and y_{t-1} is I(1), the system is 'balanced' (in terms of the degree of integration on the L.H.S. and the R.H.S. variables respectively) only if $\Pi = 0$, in which case the Y variables are not cointegrated, as there is no long-run relationship between them, or if the parameters of Π are such that Πy_{t-1} is also I(0). The latter case applies when the Y variables are cointegrated. This in turn implies that the rank, r, of the matrix Π should be less than k, the number of variables of the vector y (i.e., that the matrix Π should not be of full rank). This is because there are atmost (k – 1) linearly independent cointegrating vectors which could be chosen from the matrix Π. The rank 'r' is also known as the order of cointegration (or the cointegrating rank) and is equal to the number of distinct cointegrating vectors linking the variables in y. It k=2, then there can be atmost one i.e. a unique cointegrating vector. The same is not the case, however, where k > 2.

It is useful at this stage to consider the Granger's Representation Theorem which asserts that if Π has a reduced rank r < k, then there exist k × r matrices α and β each with rank 'r' such that '$\Pi = \alpha \beta'$' and $\beta' y_t$ in stationary. This represents basically that 'r' is the number of cointegrating relations (the cointegrating rank) and each column of β is a cointegrating vector. 'α' represents the matrix of weights with which each cointegrating vector enters each of the Δy_t equations.

Unfortunately, it is not possible to estimate, 'β' and 'α' directly using standard estimation methods, but Johansen (1988, 1989) developed a Maximum Likelihood (ML) procedure to estimate these matrices. One additional advantage of Johansen's procedure is that it suggests Likelihood Ratio Test which enables us to test for the order of cointegration, 'r' and to test for restrictions on individual elements of the cointegrating vector.

To carry out the Johansen's test we first formulate the VAR.

$$y_t = \Gamma_1 y_{t-1} + \Gamma_2 y_{t-2} + \ldots\ldots\ldots + \Gamma_p y_{t-p} + \varepsilon_{t-p}$$

The order of the model p must be determined in advance. Now let z_t denotes the vector of k (p-1) variables:

$$z_t = \Delta y_{t-1}, \Delta y_{t-2}, \ldots\ldots\ldots \Delta y_{t-p+1}$$

that is z_t, contains the lags 1 to p-1 of the first differences of all k variables. Now, using the total number of available observations say 'T' we obtain two (T x k) matrices of least squares residual:

R_{ot} = the residuals in the regression of Δy_t on z_t

R_{pt} = the residuals in the regression of y_{t-p} on z_t

The fitted residuals :

$$\hat{R}_{ot} and \hat{R}_{pt}$$

are then used to construct the following product moment matrices:

$$S_{ij} = (1/T).\sum_{t=1}^{T} \hat{R}_{it}\hat{R}_{jt}$$

$$(i, j = 0, k)$$

These product moment matrices are then used to find the cointegrating vectors. This is done by solving the determinant.

$$\left|\lambda S_{kk} - S_{k0}S_{00}^{-1}S_{0k}\right| = 0$$

This yield the 'n' estimated eigen values

$$\hat{\lambda} = (\hat{\lambda}_1, \hat{\lambda}_2, \ldots\ldots, \hat{\lambda}_n)$$

and the 'n' estimated eigen-vectors :

$$\hat{\beta} = (\hat{v}_1, \hat{v}_2, \ldots\ldots \hat{v}_r)$$

which are normalised such that

$$\hat{V}' S_{kk} \hat{V} = I$$

where $\hat{V}$

is the matrix of estimated eigenvectors.

The 'r' cointegrating vectors are given by the r 'most significant' eigenvectors i.e.

$$(\hat{v}_1, \hat{v}_2, \ldots\ldots \hat{v}_r)$$

Now, the problem is of determining which (and how many) of the eigenvectors in fact represent significant cointegrating relationship. In effect, what one is looking for is those $\hat{\beta}$ vectors which have the largest partial correlation with the stationary variables Δy_t, conditional on the lags of Δy_t. Thus, we chose those eigenvectors, which correspond to the 'r' largest eigenvalues, and in order to find the value of 'r', we can employ the following statistics, suggested by Johansen (1998, 1980):

$$Q_r = -T \sum_{i=q+1}^{k} \log(1 - \hat{\lambda}_i)$$

Where q = 0, 1, ..., (x-1), and $\hat{\lambda}_i$ is the i^{th} largest eigenvalue. Q_r is the so-called Trace Statistic and tests the null hypothesis that $r \leq q$ against a general alternative.

6. Granger Causality

The Concept

The concept of causality as developed by Granger rests on two crucial premises: a) direction of causation is only possible in case of stochastic (as opposed to deterministic) processes and b) since time is irreversible so it is the past and the present that can only cause the future.

According to Granger's simple definition of causality X is said to cause Y if knowledge of past X reduces the variance of the errors in forecasting Y as compared to the variance of the errors that would be made from knowledge of past Y alone.

The question asked by Granger is whether a scalar X can help forecast another scalar Y. If it cannot, then we say that X does not Granger-cause Y. More formally, X fails to Granger cause Y if for all $s > 0$, the mean squared error of a forecast of y_{t+s} based on (y_t, y_{t-1}, ...) is the same as the mean squared error of a forecast of y_{t+s} that uses both (y_t, y_{t-1}, ...) and (x_t, x_{t-1},.......).

Granger Test

The test procedure developed by Granger is based on the axiom that only the past causes the future. In testing the direction of causation between the two variables X and Y, the test involves estimation of the following regression:

$Y_t = f(Y_{t-1}, Y_{t-2}, \ldots\ldots, Y_{t-k})$..............................(1)

$Y_t = f(Y_{t-1}, Y_{t-2}, \ldots\ldots, Y_{t-k}, X_{t-1}, \ldots\ldots, X_{t-k})$..........(2)

$X_t = f(X_{t-1}, X_{t-2} \ldots\ldots, X_{t-k})$..............................(3)

$X_t = f(X_{t-1}, \ldots\ldots, X_{t-k}, Y_{t-1}, Y_{t-2}, \ldots\ldots, Y_{t-k})$..........(4)

where k is a suitably chosen lag-length. Equations (1) and (3) are restricted regression while (2) and (4) are the unrestricted versions.

Whether the causation runs from X to Y is determined on the basis of equations (1) and (2). In principle, X is said to cause Y if the lagged values of X are jointly

significant in explaining variations in Y or equivalently the coefficients of all the explanatory X-variables are statistically significant as a group (in equation (2)).

Whether Y causes X is examined in exactly analogous manner on the basis of equations (3) and (4).

Assuming linearity, the model proposed by Granger can be written as:

$$Y_t = a_0 + \sum_{i=1}^{k} a_i Y_{t-i} + \sum_{i=1}^{k} b_i X_{t-i} + u_t \ldots\ldots\ldots(5)$$

$$X_t = c_0 + \sum_{i=1}^{k} c_i X_{t-i} + \sum_{i=1}^{k} d_i Y_{t-i} + v_t \ldots\ldots\ldots(6)$$

where X_t and Y_t are stationary time series and u_t and v_t are uncorrelated error terms.

On the basis of equations (5) and (6) three types of causal relations can easily be detected. Unidirectional Causality from X to Y requires at least some b_i in equation (5) is significantly different from zero. Unidirectional Causality from Y to X requires that at least some d_i in equation (6) are significantly different from zero. Bi-directional causality implies that $b_i \neq 0$ and $d_i \neq 0$ at least for some 'i's. If all the b_i in equation (5) and all the d_i in equation (6) are statistically insignificant then X and Y are said to be causally independent.

4.3 METHODOLOGY

4.3.1 The logic behind the Methodology

Suppose we have two time series y_t and x_t, both integrated of order one i.e. $y_t \sim I(1)$ and $x_t \sim I(1)$. Then, as we have discussed earlier, y_t and x_t will be said to be cointegrated if there exists a 'β' such that $y_t - \beta x_t$ is I (0). What this means is that the regression equation:

$$y_t = \beta x_t + u_t$$

make sense because there exists a long-run equilibrium relationship between them, If there exists no long-run relationship between them then the relationship between y_t and x_t that we obtain by regressing y_t on x_t is spurious. This is why the concept of cointegration assumes importance when we are dealing with non-stationary series.

Engle and Granger (1987) show that, if two series are integrated of order one i.e. I (1), then Granger Causality must exist in at least one direction, in at least the I (0) variables. Cointegration per se however reveals nothing about the direction of the causality for which we have to go for the Granger causality.

Given this logic, for testing the causal linkage between two series y_t and x_t, we have basically followed a three-step procedure:

1) Unit Root Test

In the first step we have tested the order of integration of the natural logarithm of the levels of x_t and y_t (henceforth denoted by x_t and y_t) using the Dickey-Fuller or Augmented Dickey-Fuller test.

This is because the concept of cointegration is applicable only when the time series under consideration is non-stationary.

2) Test for Cointegration

If both y_t and x_t are found to be integrated of order one i.e I(1) , then we have tested for the existence of cointegration between them using Johansen's (1988) Maximum Likelihood Approach.

3) Test for causality

If y_t and x_t are found to be cointegrated, then and only then we have examined the existence of causality between the I(0) variables Δx_t and Δy_t using the Granger causality test.[1]

[1] Here one should remember that in order to run Granger causality test between two series, both of them must be stationary i.e. I(0).

4.3.2Description of the Methodology

Breusch-Godfrey Serial CorrelationLM Test

The Dickey –Fuller Tests for unit roots are based on testing the null-hypothesis, Ho: $\rho = 1$ against the alternative that $H_1 : \rho < 1$ in the following equation:

$$\Delta y_t = \alpha + \beta t + (\rho - 1) y_{t-1} + u_t \ldots\ldots\ldots\ldots\ldots (1)$$

where $u_t \sim IID\ (0, \sigma^2)$

Here u_t's are assumed to be white noise errors.

Now if the simple AR(1) DF model, specified in equation (1) is used , when in fact y_t follows an AR(p) process , then the error term will be auto-correlated to compensate for the mis-specification of the dynamic structure of y_t. Autocorrelated errors will invalidate the use of the DF distributions, which are based on the assumptions, that u_t is 'white noise' and in that case the Augmented Dickey Fuller (ADF) model will be appropriate.

Given this logic, in order to decide whether DF or ADF test is appropriate for a particular series , say y_t , we first run OLS on the DF model (1) and get the estimated residuals '$\hat{u}_t$'

In the next step we check for the existence of autocorrelation in the estimated residuals using the Breusch-Godfrey Serial Correlation LM Test. (henceforth LM Test).[2]

The null hypothesis (Ho) of this test is that there is no serial correlation upto lag orders p, where p is a pre-specified integer.

Rule for the rejection Ho in LM test is as follows:

If one is conducting the test at the 1% (5%) level then a probability value lower than 0.01 (0.05) is taken as evidence to reject the Ho

[2] The LM test is a test for checking serial correlation in the errors. Unlike the D-W statistic for AR(1) errors, the LM Test may be used to test for higher order ARMA errors and is applicable whether or not there are lagged dependent variables

For each time series under consideration, we have run the LM test with different number of lags .

Now the acceptance of Ho of LM test, in our case implies that the estimated residuals of the DF model (1) are white-noise implying that the DF test (and not ADF Test) is the appropriate test for testing for unit root in the series under consideration. Therefore if for a particular series, Ho of the LM Test cannot be rejected, then we have gone for a DF test to test for unit roots in that particular series.

If, however the results of the LM Test reject the Ho of "no serial correlation upto lag order p". then that implies that the estimated residuals of he DF model (1) are auto-correlated which in turn implies that DF Test cannot be conducted . Hence we go for ADF test to test for unit root in a series for which the Ho of the LM test is rejected.

DF / ADF test

We run the DF test using the general model specified earlier i.e.

$$\Delta yt = \alpha + \beta t + (\rho - 1)y_{t-1} + u_t \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

where $u_t \sim$ IID $(0, \sigma^2)$

The Null Hypothesis of DF test is Ho: $\rho=1$ against the one-sided alternative H_1: $\rho < 1$ which implies that there is no unit root (stationarity). The advantage of specifying the model in the form of (1) is that: given this form, the test is equivalent to testing Ho: $\nu=0$ against the alternative H_1: $\nu < 0$ where $\nu = \rho - 1$.

In case ADF is found to be the appropriate unit root test we undertake the ADF tests using the following model

$$\Delta y_t = \alpha + \beta t + \nu y_{t-1} + \sum_{i=1}^{p-1} \delta_i \Delta y_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

where $\varepsilon_t \sim$ IID $(0, \sigma^2)$

Here p indicates minimum number of lags required to generate white-noise residuals, as obtained from the LM test. Hence ε_t is white noise.

Once the lag structure is determined, this augmented specification (2) is then used to test the hypothesis: Ho: $v=0$ (unit root) against H_1: $v< 0$ (stationarity)

The rule for the rejection of Ho in DF/ ADF Tests:

In the DF test, the Ho of the unit root is rejected against the one-sided alternative if the t-statistic is less than (lies to the left of) the critical value.

Since the t-statistic under the null hypothesis of a unit root does not have the conventional t-distribution, we cannot, use the critical values for the standard t-test. Here we have used the Mac Kinnon (1991) critical values for rejection of hypothesis of a unit root .[3]

Comparing the value of the statistic (for a series y_t) with the Mac Kinnon Critical value if we fail to reject the Ho of a unit root then it implies that the level of the series is non-stationary. Accordingly we re-run the unit root test on the first differenced data i.e. Δy_t. If now the results reject the null hypothesis of a unit root then it is concluded that in the level form the series is I (1), but in the first difference form it is I(0) (which implies stationarity)

In our study all the series have turned out to be I(1) in level form, and therefore I(0) in its first difference form.

If we are examining the relation between series say 'log of real GDP' (y_t) and 'log of real exports' (x_t), then if both x_t and y_t are found to be I (1) according to the results of the DF tests, then we go to the next step of testing for cointegration between the two series.

Johansen's maximum Likelihood approach for testing cointegration

In order to carry out the Johansen test we should first ensure that the series with which we are working are non-stationary and integrated of the same order.

[3] Dickey&Fuller (1979) showed that the distribution under the null hypothesis of a unit root is non-standard and simulated the critical values for selected sample sizes. More recently Mac Kinnon (1991) has implemented a much larger set of simulations than those tabulated by Dickey and Fuller. In addition Mac

Secondly, we have to specify our model for Cointegration Test. In other words, this means that we have to choose from a set of five assumptions regarding the presence of deterministic trend in the data. These five assumptions are:

1) Series 'y' have no deterministic trend and the cointegrating equations do not have intercepts.
2) Series 'y' have no deterministic trend and the cointegrating equations have intercepts.
3) Series 'y' have linear trends but the cointegrating equations have only intercepts.
4) Both series 'y' and the cointegrating equations have linear trends
5) Series 'y' have quadratic trends and the cointegrating equations have linear trend.

The package Econometric Views 3 which has been used gives a summary of the cointegration tests under all five models .The output displays the log-likelihood and two information criteria (Akaike Information Criterion and Scwartz Criterion). These information criteria can be used for model selection. The smaller the value of the information criteria, the 'better' the model.

As far as the data which have been used are concerned, the value of AIC have been found to be minimum for the second model where the series y_t have no deterministic trend and the cointegrating equations have intercepts. In fact, the line graph of the series also indicates the absence of any deterministic trend in the data and thus strengthened our choice.

The next problem, which one faces, is that of specification of lags. It is to be noted here that in contrast to some other statistical packages, E-Views-3 specifies the lags as lags of first differenced terms and not in terms of levels. For example the choice of lag (1 4) implies that the test VAR regresses Δy_t on Δy_{t-1} , Δy_{t-2}, Δy_{t-3} and Δy_{t-4}. We have chosen the default lag in E-Views, which is specified as (1 1).

In all our tests we have dealt with two-variable system namely:

1) log(RGDP) : log (Real GDP)
   log (RX) : log (Real Exports)

2) log(IIP) : log (Index of Industrial Production)

Kinnon estimates the response surface using the simulation result permitting the calculation of Dickey Fuller Critical values for any sample size and any number of right hand variables.

log (RX) : log (Real Exports)

3) log (RO) : log (Real Output)
log (RX) : log (Real Exports)

The results for the cointegration test performed with the aforesaid groups are presented in Summary tables. The summary table contains the null hypothesis on the first column, the value of the LR test statistic on the second, the Critical values at 5 % and 1% level of significance in the third and fourth column respectively. The first row of the table tests the hypothesis of no-cointegration and the second row tests the hypothesis of atmost one cointegrating relation. If the value of the LR test statistic exceeds the critical value, then the null hypothesis is rejected, otherwise accepted.

The LR Statistic has been found out as:

$$Q_r = -T \sum_{i=r+1}^{k} \log(1-\lambda_i)$$

For r = 0, ..., k-1. where λ_i is the ith largest eigen value (for a discussion on the statistic see the theory) , Q_r is the so-called Trace Statistic.

Granger Causality Test

If two series y_t and x_t are found to be cointegrated then we run the Granger Causality tests on Δy_t and Δx_t (since they are stationary and the Granger-Causality test requires the variables under consideration to be stationary)

The regression equation used in the Granger causality test is of the following form:

$$\Delta y_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i \Delta y_{t-i} + \sum_{i=1}^{p} \beta_i \Delta x_{t-i} + \varepsilon_t \text{.....(2)}$$

(where Δy_t and Δx_t are stationary time series) and ε_t is white noise errors . Because the results from Granger Causality tests are sensitive to the selection of lag-length, the

formula suggested by Schwert (1989) i.e lag-length = int $(12(T / 100)^{1/4})$ has been used to determine the appropriate lag length.

The Null Hypothesis (Ho) of the Granger Test is the joint hypothesis

Ho: $\beta_1 = \beta_2 = \ldots\ldots\ldots = \beta_p = 0$

which implies that " Δx does not Granger Cause Δy"

The rule for the rejection of Ho:

If you are conducting the test at the 1% (5%) level, then a probability value lower than 0.01(0.05) is taken as evidence to reject the Ho at 1% (5%) level of significance.

In order to test the causal linkage between two I(0) variables Δy_t and Δx_t we have carried out Granger test of the form stated in (2) (where Ho is that " Δx does not Granger cause Δy") and also of the form:

$$\Delta x_t = \nu_0 + \sum_{i=1}^{p} \nu_i \Delta x_{t-i} + \sum_{i=1}^{p} \delta_i \Delta y_{t-i} + \varepsilon_t \ldots\ldots\ldots (3)$$

with Ho: $\delta_1 = \delta_2 = \ldots\ldots\ldots = \delta_3 = 0$

which implies that "Δy does not Granger cause Δx"

4.4 INTUITIVE LOGIC BEHIND THE HYPOTHESES

There can be three types of causal relationships between real export-growth and real output growth: a) export growth may cause output growth, or, b) output growth may cause export growth, or c) the causality may run both ways.

One can think of various reasons why export growth may lead to growth of output. For instance, in an economy characterised by underutilised resources exports can represent an increase in demand for the country's output and thus serve to increase the real output through direct effect as well as through induced (multiplier) effects.[4] At the micro –level also exports can act as a vent for surplus productive capacity of a particular manufacturing industry and result in output growth.

[4] This effect has been discussed in detail in Chapter 2, p

Secondly, an increase in exports of a country may relax a binding foreign exchange constraint and allow increases in productive intermediate imports resulting in growth of output of the economy.[5]

At the industry level, when imports of critically important inputs (such as fuel, other intermediate inputs, spare parts etc.) cannot be financed at the levels necessary for full utilisation of capacity, due to the presence of a binding foreign exchange constraint, exports can finance imports of such inputs resulting in greater capacity utilisation and greater output.

If in a particular industry exports are profitable and are expanding, they may tend to stimulate additional investment, both domestic and foreign.

At the macro level, such expansion of exports of a particular industry may not only stimulate additional investment in that industry but may also encourage investment in other ancillary industries. Higher investment will then lead to higher capital formation, resulting in higher growth.

Apart from these, export growth may facilitate output growth (both at the micro and macro levels) by stimulating more efficient use of resources. There may be several sources of enhanced efficiency. For instance, contacts with foreign competitors that arise from exporting may lead to more rapid technical change. In addition, the necessity of remaining competitive in the international market is likely to maintain pressure on the export industries to keep costs low, to constantly strive for more efficient operation and also to improve the quality of export products.

One can postulate various reasons why causality may run from output–growth to export-growth An explanation as to how output growth of a manufacturing industry can lead to export growth may be put forward in terms of Verdoorn's Law.

In its simplest form the Verdoorn's Law states that there is a positive relationship between the long-run growth of manufacturing productivity and that of manufacturing output. It suggests that a substantial part of productivity growth is endogenous to the growth process in the sense that it is determined by the rate of expansion of output.

[5] For a detailed discussion see Ch-2

Box 4.1. MORE ABOUT VERDOORN'S LAW

The Verdoorn's Law is specified as either:

1) $p_m = a_1 + b_1 q_m$ *or*

2) $e_m = -a_1 + (1-b_1) q_m$

where p_m, q_m *and* e_m *are the exponential growth rates of manufacturing productivity, output and employment respectively. These are the two different ways of looking at the same relationship, since one is a mirror image of the other. The regression coefficients of the two equations add up to unity and the two constants (but for a small discrepancy caused by rounding) add up to zero.*

Kaldor undertook a case-study of the manufacturing industry of the twelve countries for the period 1953-54 to 1963-64 which shows for each country the growth rates of production, productivity and employment. In this Kaldor found the following estimates for the coefficients of equations (1) and (2).

$$1)' \; p_m = 1.035 + \underset{(0.070)}{0.484} q_m, \quad R^2 = 0.826$$

$$2)' \; e_m = -1.028 + \underset{(0.070)}{0.516} q_m, \quad R^2 = 0.844$$

By the usual tests, the relationships were found to be highly significant. This study suggested that apart from an 'autonomous' rate of productivity growth of around 1% a year, the latter is a function of the growth in total output: each percentage addition to the growth of output requires a 0.5 % increase in the growth of employment in terms of man-hours and is associated with a 0.5 % increase in the growth of productivity. These coefficients are very close to those found by Verdoorn and other investigators.

The existence of Verdoorn type relationship is justified by the fact that if there exists economies of scale or increasing returns, it causes productivity to increase in response to or as a by-product of the increase in total output. The Classical economists maintain that manufacturing activities are subject to the 'law of increasing returns'. Adam Smith argued in the 'Wealth of Nations' that the return per unit of labour (i.e. productivity) depends on the extent of specialisation and the division of labour which in turn depends on the extent of the market. The greater the market, the greater the extent to which differentiation and specialisation is carried, the higher the productivity. This is partly because a greater division of labour generates more skill and know-how: more expertise in turn yields more innovations and design improvements.

Box 4.1 continued

Adam Smith emphasised the interplay of static and dynamic factors causing returns to increase with the increase in the scale of the industrial activities. The static economies of scale are a function of the volume of the output and the gains in productivity from this source are reversible in the sense that if output contracts, the benefits of the scale will be lost. Dynamic returns to scale, on the other hand, flows from such factors as 'learning by doing' and are usually ascribed to the rate of growth of output (Learning is a product of the experience which means, as Arrow has shown, that productivity tends to grow the faster, the faster output expands; it also implies that the level of productivity is a function of cumulative output (from the beginning) rather than of the rate of output per unit of time). These gains in productivity represent the acquisition of knowledge concerning more efficient methods of production and as such are irreversible. Substantial gains in productivity have been found to arise from this source even in the absence of any gross investment. However, one cannot isolate the influence of those economies of large-scale production which arise out of various kinds of indivisibilities (and which are, in principle, reversible) from those changes in technology which are associated with expansion of output (and which are irreversible). According to Kaldor the existence of economies of scale, both static as well as dynamic, is the basic reason behind the empirical relationship between the rate of growth of productivity and that of output which has come to be known as the "Verdoorn's Law" in recognition of P.J. Verdoorn's early investigations published in 1949. Kaldor holds that this law is basically a dynamic rather than a static relationship between the rates of change in productivity and that of output, rather than between the level of productivity and the scale of output primarily because technological progress enters into it. Hence it is not just a reflection of the economies of large-scale production.

There are some economists who admit that the statistical relationship between productivity-growth and output growth but argue that the direction of causation could be from faster productivity growth to faster output-growth, rather than the other way round. This is because faster productivity growth causes demand to expand faster via its effect on relative costs and prices. This alternative view implies that productivity growth in each industry and in each country is a fully autonomous factor. However, if this autonomous growth in productivity were to be explained by the progress of knowledge in science and technology, (as is done usually), argues Kaldor , how can one explain large differences in productivity growth in same industries over the same period in different countries.

.Because Kaldor pointed out that in the period 1954-80, productivity in the German motor car industry increased at 7% a year and in Britain only 2.7% a year, inspite of the fact that large segments of the car industry in both countries were controlled by the same American firms which implies that they must have had the same access to the improvements in knowledge and know-how.

The reverse causation argument would also be a denial of the existence of dynamic scale economies and increasing returns which are known to be important factors of the manufacturing industry.

If the Verdoorn's Law indeed holds, then a faster growth of output causes a faster growth of productivity. Now, if all the gains in productivity are not absorbed by increase in real wages, costs of production will fall and the country concerned will be able to supply the good at a lower price in the international market. Given that price is one of the most important factors affecting competitiveness[6], this, in turn will improve the competitiveness of the country (in this particular product) in the international market resulting in an expansion of exports.

Here it should be mentioned that the mechanism through which price affects competitiveness varies according to the nature of the product. In case of a homogeneous product there is a single world price, and a particular country's export competitiveness depends on its ability to export at that price, which in turn depends directly on its cost of production.

Consider a situation when the cost of production of a particular homogeneous good, say X, is so high in a country that it cannot export. Now, suppose output growth leads to a reduction in the cost of production (through the mechanism discussed above) to such an extent that the country concerned becomes able to supply the good at the prevailing international price. Output growth can thus lead to export growth of a homogeneous product by improving its competitiveness in the international market.

Most products, particularly, manufactured products, however, fall into the category of heterogeneous product. In all such differentiated products relative prices, in the international market, are determined by the export prices of the individual countries and the prices of competing commodities in the world market. In such a situation export prices quoted by an individual country have a direct impact on its competitiveness. So, in case of heterogeneous products output growth is likely to have a more significant impact on the competitiveness of the country, resulting in export growth.

One can think of another reason why output growth may lead to export growth. Suppose that output of a particular manufacturing industry is growing for some reason or the other (such as technical progress). Now, if the domestic demand for the product does

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[6] Competitiveness depends on various factors such as a) changes in export prices relative to those of competitors in the world market, b) changes in trade policies adopted by the government and c) the effect of non-price factors. For a detailed discussion see Deepak Nayyar, "India's Export and Export Policies". () p 9-15.

not increase as rapidly as its output, then the producers would probably turn to the export market and as a result, higher the output growth, higher would be the export growth.

Here it is assumed that the producers regard exports as the end products, rather than the beginning i.e. they primarily concentrate on the domestic market and tend to export only the residual that remains when the domestic market is saturated. Hence exports are determined as a residual. The argument also assumes implicitly that the country concerned is a small country in the world market for a particular product. This assumption is important for the following reason.

In a situation where the world market demand is given, any attempt on the part of a country to increase its exports of a particular product is tantamount to an attempt to increase its (the country's) relative share of the given world demand (for that particular commodity) .The country can do it successfully only when it is a small or marginal supplier of that particular export commodity in the world market. Because, in case it is a large and important supplier, any attempt on its part to increase its relative share of the world market is likely to induce retaliatory action from the competing countries. Hence it may not succeed.

To understand the causal relationship from output growth to export growth we can start with the following basic relationship:

$$Y = X + D \quad \ldots\ldots\ldots (*)$$

where Y is the GNP, X is total exports and D is the domestic demand or domestic component of aggregate demand.

Now, given this relationship, it is clear that in a supply-constrained economy, where Y is more or less determined from the supply side, X and D would be inversely related, an increase in D will force X to come down and vice versa. This matches with the micro-level explanation that exports are determined as residuals.

Suppose we have a growing economy where learning and technical progress are proceeding rapidly in a few industries. The learning and technical changes that are taking place may have very little to do with any conscious government policy to promote exports or even to promote production in those industries. It may be more related to the accumulation of human capital, cumulative production experience, technology transfer

from abroad through licensing or direct investment, or physical capital accumulation. In other words, important causal factors behind this unbalanced growth may be unrelated to any export promoting incentives and may foster growth even in the absence of such incentives.

Now, given such a situation of unbalanced growth, it is highly unlikely that demand for the products of these booming industries will grow as rapidly as their production. If this is the case, then producers, who are left with unsold outputs are likely to turn to the foreign markets to sell the same . Thus output growth may lead to export growth.[7]

It should be noted here that the supply-constrained model, in which exports act as a residual, is the exact opposite of the Keynesian model. In the latter, output is determined by the level of aggregate demand, rather than by supply-side factors. In such a demand-constrained model exports can act as a driving force (rather than as a residual) resulting in higher output through direct as well as multiplier effects.

[7] This argument has been put forward by Jung and Marshall(1985), p 4

4.5 FINDINGS FROM THE MACRO-LEVEL EXERCISE

4.5.1 The Results Reported

Table-1
Results of Breusch Godfrey Serial Correlation LM Test
(at the macro-level)

Series	No. of Lags chosen(p)	Obs*R-squared Statistic	Probability
log (RGDP)	4	9.814**	0.044
log (RX)	4	0.337	0.987

Note: 1)RX and RGDP denote Real exports and Real GDP respectively
2)Ho of the test is : ' There is no serial correlation upto lag order p' where p is a pre-specified integer
3)** denotes rejection of Ho at 5% level of significance

Table-1 reports the results of the Breusch-Godfrey Serial Correlation LM tests conducted for 'log of real GDP (RGDP)' and 'log of real exports' (RX).

For log (RGDP), the results reject Ho of 'no serial correlation upto lag order 4' at 5 % level of significance implying that ADF is the appropriate unit root test.

For log (RX), however, Ho cannot be rejected implying that DF is the appropriate unit root test.

Here it should be mentioned that the LM test has been conducted with different lag-lengths. Since results are similar to those with lag 4, so here we chose to report only these results.

Table-2
Results of Unit Root Test
(at the macro level)

Series	DF/ADF Test Statistic (level)	DF/ADF Test Statistic (First difference)
log (RGDP)	0.929(4)	-4.559(4)*
Log (RX)	-0.962	-8.216*

Note: 1)* indicates the rejection of null hypothesis of unit root at 1% level of significance
2) The no.in the paranthesis indicates the Minimum no. of lags chosen to generate White noise residuals

Table-2 reports results of the unit root tests conducted for log (RGDP) and log(RX), both at levels and at first differences.

For 'level of log (RGDP)' the ADF test fails to reject the Ho of a unit root, but for 'first difference of log (RGDP)' the ADF test rejects the Ho of a unit root at 1 % level of significance. Thus log (RGDP) is found to be I(1). For 'level of log (RX)' the DF test fails to reject the Ho of a unit root, but for 'first difference of log (RX)' the test rejects the Ho of a unit root at 1 % level of significance. Thus log (RX) is also I(1).

Table-3
Results of cointegration Test between Real Exports and Real GDP
(at the macro-level)

Test Assumption : No deterministic trend in the data Lag interval : 1 to 1 (2-lags in the level)					
Series	Ho	H_1	LR Statistic	5% Critical value	1% Critical value
log (RX)- log(RGDP)	r = 0	r > =1	36.812*	19.96	24.60
	r < = 1	r =2	4.599	9.24	12.97

Note: 1) * denotes rejection of the null hypothesis at 5% and 1% level of significance respectively

2)RX and RGDP denote Real exports and Real GDP respectively and 'r' represents the Hypothesised Number of Cointegrating Vectors.

Table-3 reports the results of Johansen's Cointegration Test for log (RGDP) and log (RX). The first row in the table which tests the hypothesis of no-cointegration indicates that the null hypothesis may be rejected at 5% and 1% level of significance respectively as the value of the LR test statistic exceeds the critical value in both cases. The second row in the table, which tests the hypothesis of atmost one cointegrating relationship, may be accepted. Thus the series log (RGDP) and log (RX) could be taken as cointegrated.

Table-4

Results from Granger Causality Tests
(at the macro level)

Null Hypothesis	Schwert Lag	F-Statistic	Probability
ΔLRGDP does not Granger-cause ΔLRX	9	1.544	0.206
ΔLRX does not Granger-cause ΔLRGDP	9	2.049*	0.093

Note: 1) ΔLRGDP and ΔLRX are the first difference forms of the series 'log of real GDP' and 'log of real exports respectively
2) * indicates rejection of Ho at 10 % level of significance

Table-4 shows the results of Granger causality results between the first difference (ΔLRGDP and ΔLRX) of the aforesaid two series.

The results reject the Ho of 'no-Granger causality from ΔLRX to ΔLRGDP' at 10 % level of significance, but fails to reject the Ho of no reverse causality.

Thus the results of the study provide evidence in favour of the existence of *'weak'* unidirectional causality running from real export growth to real GDP growth.

4.5.2 Interpretation of the Causality Results

The results of our macro economic exercise show that the null hypothesis of "no Granger causality from exports growth to GDP growth" is rejected only at 10% level of significance. This implies that although export growth acts as a causing factor behind output growth in the Indian economy, this causal linkage is not very significant. The inability on the part of exports to influence the Gross Domestic Product (at factor cost) to any significant extent can be justified by the following arguments :

1) Since exports constitute only a small proportion of national income in India (as shown in Col.3 of Table-5), it seems plausible to argue that the impact of the export multiplier may not be large.[8]
2) Insofar as there are binding supply constraints in the Indian economy, the export multiplier may work with respect to money income rather than real income.
3) In case of the Indian economy percentage change in imports owing to one percent change in income is quite high.[9] Since imports are looked upon as leakage from the income stream, it can be argued that the expansionary effect of income, brought about by export growth is partially lost in this high import spending.
4) Above all, it can be argued that in case of India export growth failed to cause output growth to any significant extent because the complementary condition of high investment-GDP ratio was not quite fulfilled (The analytical framework behind this reasoning has been discussed in Box 4.2). This is clearly visible in Table-5 (see col.4 and col.6), which shows that in India, over the long-run, high values of export growth rate did not quite coincide with high values of investment-GDP ratio. This lack of synchronisation become even more evident if one looks at the rates of changes in these two series from one period to another (as shown in col.5 and col.7). For instance, between period (2) and period (3) while the rate of growth of exports increased magnificently by more than 303%, the rate of growth in the investment-GDP ratio was merely 6.89%. Similarly a big jump in the growth rate of exports between period (3) and period (4) remained unmatched by the rate of growth in the investment-GDP ratio.

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[8] Here one should also note that in the successful exporting countries of Asia , exports constituted significantly higher proportion of national income, as compared to India.

[9] Smriti Mukherjee (1987) found it to be 0.55% over the period 1950-51 to 1980-81. This value was also statistically significant.

Table -5

Exports and Investment and their Growth Rates

1	2	3	4	5	6	7
Period	Year	Exports as a % of GDP (annual average)	Growth rate of Exports (annual average)	Percentage change in Avg. Gr. Rate of exports	Investment as a % of GDP (annual average)	Percentage change in Avg. Investment/ GDP ratio
1	1951-52 to 1955-56	6.0	1.04		10.6	
2	1956-57 to 1960-61	4.4	1.22	17.30	14.5	36.79
3	1961-62 to 1965-66	3.5	4.92	303.27	15.5	6.89
4	1966-67 to 1970-71	3.6	14.48	194.30	16.0	3.22
5	1971-72 to 1975-76	4.2	21.7	49.86	17.9	11.87
6	1976-77 to 1980-81	5.5	11.04	-49.12	21.5	20.11
7	1981-82 to 1985-86	4.8	10.62	-3.8	20.8	-3.25
8	1986-87 to 1990-91	5.2	24.74	132.95	24.2	16.34
9	1991-92 to 1996-97	8.0	24.31	-1.73	24.4	0.82

Source: Economic Survey; Government of India, various issues

A similar tendency is observed between period (7) and period (8), when the rate of growth of exports registered a significantly high growth rate of around 133%, but the rate of growth in the investment-GDP ratio was not quite remarkable (16.34 %). On the contrary, between period (1) and period (2), when export growth rate did not increase significantly, the investment-GDP ratio registered a very high growth rate (higher than all other periods). More noticeably between period (5) and

period (6) significantly high negative growth rate of the export growth series is corresponded by sufficiently high positive rate of growth in the investment-GDP ratio.

Moreover, comparing the Indian case with some of the successful exporting nations namely the Asian Tigers, it is observed that unlike India they have been able to achieve phenomenal growth in the rate of investment over the last couple of decades and have also been able to maintain a very high proportion of GDP going into investment.

As is shown in Table-6, between 1970 and 1993, not only growth rates of exports of all the NICs of Asia were significantly higher than that of India, but the growth rates of investment were also higher. Moreover in all these countries which managed to maintain exceptionally high rates of growth over the last few decades, investment-GDP ratios are observed to be significantly higher than that of India.

Given the above four arguments, the weak causal linkage from export growth to output growth in India, shown by our econometric exercise, does not seem to be unreasonable.

Box 4.2: Exports, Investment and Growth: A Note

There exists an important nexus between exports, investment and growth at the macro-level. This nexus has been clearly explored in Nayyar (1994; p 441). To quote from there, " Exports provide an external market on the demand side and enforce a cost discipline on the supply side, whereas investment creates a domestic market on the demand side and transforms the industrial structure on the supply side. Hence there is a possible cumulative causation that arises from the interaction between the effects of foreign trade multiplier and of capacity creation combined with industrial cost efficiency. On the demand side high investment and high exports together induce market expansion and may be conducive to high growth. On the supply side, a hig or rising proportion of investment in GDP may provide flexibility through more rapid supply side adjustment, while a high or rising proportion of exports in GDP may provide discipline by enforcing cost-efficiency".

Such cumulative causation "may lead to a virtuous circle if the increase in investment coincides with an increase in exports, while there is no neutralising

Box 4.2 continued

Marjit and Raychowdhury (1997: Ch.5, p 159-160) have developed the following analytical framework in the line of a simple Keynesian model to capture the impact of the investment function on the export multiplier.

They consider an economy with excess capacity where savings and imports are given by the following specifications:

$S = sY$; $0<s<1$.....(1)

$M = mY$, $0<m<1$.....(2)

Exports are determined exogenously by the demand world wide:

$$X = \bar{X} \text{ .....(3)}$$

Investment demand function is assumed is assumed to take the following form:

$$I = \bar{I} \quad \text{for } Y \leq \hat{Y} \text{ .....(4)}$$
$$= \alpha(Y).Y \text{ for } Y > \hat{Y}$$
$$\alpha' > 0,\ \alpha'' < 0$$

The Investment function here retains the basic feature of a simple Keynesian framework, but modifies it by an accelerator relationship since it is assumed that once Y goes beyond the threshold level $\hat{Y}$, investment demand starts responding to output. Since it is a Keynesian framework, all the action is taking place away from and below the full capacity output level. If $\hat{Y}$ is the ful employment level of output, then it is contemplated that as Y approaches $\hat{Y}$, incentive to invest diminishes. For stability it is assumed that:

$$\alpha'(Y) \text{ at } Y=\hat{Y} < s+m \text{ .....(5)}$$

Given this framework, the equilibrium level of income Y is given by:

$$Ye = \frac{\bar{I} + \bar{X}}{s+m} \text{ if } Ye \leq \hat{Y} \text{ .....(6)}$$

and

$$Ye = \frac{\bar{I} + \bar{X}}{s+m-\alpha(Ye)} \text{ for } Ye \geq \hat{Y} \text{ .....(7)}$$

The above equilibrium solution imply that when $Ye<\hat{Y}$, an increase in $\bar{X}$ alters Ye by $\frac{\Delta\bar{X}}{(s+m)}$ provided the new Ye is also lower than $\hat{Y}$. On the other hand, if $Ye>\hat{Y}$, an increase in $\bar{X}$ would be responded to by a greater increase in Ye since the multiplier is changed to $\frac{1}{s+m-\alpha(Ye)}$. This is because in the latter case (when $Ye>\hat{Y}$), a boom in exports induces a second-round increase in the level of investment.

From the above exposition it is clear that in a Keynesian framework the

Box 4.2 continued

The effect of export expansion depends heavily on the nature of th investment function. If a rise in exports induces further expansion in investment demand, output response would be much stronger than when no such investment boom is induced (by export boom).

Table-6
Exports and Investment in some Asian Countries

(percentage)

Countries	Average Annual Growth rate of exports	Average annual growth rate of gross domestic investment	Investment / GDP ratio
India	6.5	5.0	15.0
China	10.0	9.0	35.0
Hong Kong	13.0	8.5	24.0
Singapore	12.7	6.5	41.0
Thailand	12.0	9.3	33.0
South Korea	17.5	13.0	29.0

Source: Marjit and Ray Chaudhuri (1997); Table-5.1

4.6 Results from the Industry–level Exercise

Table-7
Results of Breusch Godfrey Serial Correlation LM Test
(at the industry level)

Industry	Series	No. of Lags chosen(p)	Obs*R-squared Statistic	Probability
1.Textiles	log (IIP)	4	3.259	0.516
	log (RX)	4	2.154	0.707
2.Machinery and Transport Equipments	log (RO)	4	9.235**	0.056
	log (RX)	4	5.057	0.281
3.Chemical and Chemical Products	log (IIP)	4	4.242	0.374
	log (RX)	4	1.288	0.863

Note: 1) IIP , RX and RO denote Index of Industrial production , Real exports and Real Output respectively
2) Ho of the Test is ' no serial correlation upto lag-order p' ,where p is a pre-specified integer
3) ** denotes rejection of Ho at 5% level of significance

Table-8
Results of Unit Root Test
(at the industry-level)

Industry	Series	DF/ADF Test Statistic (level)	DF/ADF Test Statistic (first difference)
1.Textiles	log (IIP)	0.194	-5.694*
	log (RX)	-3.115	-5.494*
2.Machinery and Transport equipments	log (RO)	-1.414(4)	-4.006(4)**
	log (RX)	-1.608	-5.389*
3.Chemical and Chemical Products	log (IIP)	-2.519	-5.0421*
	log (RX)	-3.252	-6.924*

Note: 1)* and ** indicates the rejection of null hypothesis of unit root at 1% and 5% level of significance respectively
2) The no. the parenthesis indicates the minimum no. of lags chosen to generate white noise residuals

Table-9
Results of cointegration Tests
(at the industry level)

Test Assumption : No deterministic trend in the data **Lag interval : 1 to 1 (2-lags in the level)**						
Industry	**Series**	**Ho**	**H1**	**LR Statistic**	**5% Critical value**	**1% Critical value**
1. Textiles	Log (IIP) - log (RX)	r = 0	r > =1	22.774*	19.96	24.60
		r< = 1	r =2	2.366	9.24	12.97
2. Machinery and Transport	Log (RO) - log (RX)	r = 0	r > =1	32.121**	19.96	24.60
		r< = 1	r =2	14.071**	9.24	12.97
3. Chemical	Log (IIP) - log (RX)	r = 0	r > =1	23.080*	19.96	24.60
		r < = 1	r =2	9.000	9.24	12.97

Note: 1) * and ** denote rejection of the null hypothesis at 5% and 1% level of significance Respectively

2)IIP , RX and RO denote Index of Industrial production , Real exports and Real Output respectively and 'r' represents the Hypothesised Number of Cointegrating Equations .

Table-10
Results from Granger causality Tests at the industry-level

Industry	Null Hypothesis	Schwert Lag	F-Statistic	Probability
1.Textiles	ΔLIIP does not Granger cause ΔLRX	9	1.371	0.346
	ΔLRX does not Granger cause ΔLIIP	9	3.652**	0.051
2. Machinery and Transport Equipments	ΔLRO does not Granger cause ΔLRX	7	0.514	0.789
	ΔLRX does not Granger cause ΔLRO	7	2.057*	0.092
3. Chemical and Chemical products	ΔLIIP does not Granger cause ΔLRX	9	4.696**	0.027
	ΔLRX does not Granger cause ΔLIIP	9	1.645	0.262

Note: 1) ΔLIIP, ΔLRO, ΔLRX are the first difference forms of the series ' log of IIP', 'log of real output'and 'log of real exports' respectively

2) **, * denote rejection of Ho of 'no-Granger causality' at 5% and 10% level respectively.

4.6.1 Textiles

Description of the Tables

Panel (1) of Table-7 reports results of LM tests conducted for 'log of index of industrial production' (i.e log (IIP)) and 'log of real exports (log(RX)) for the textile industry of India .

For both the series the results fail to reject Ho of 'no serial correlation upto lag order 4'[10] at 5 % level of significance implying that for both the series DF is the appropriate unit root test.

Panel (1) of Table–8 shows results of DF tests for log (IIP) and log(RX) both at levels and at first differences.

For 'level of log (IIP)' the DF test fails to reject the Ho of a unit root, but for 'first difference of log (IIP)' the DF test rejects the Ho of a unit root at 1 % level of significance. Thus log (IIP) is found to be I(1). For 'level of log (RX)' the DF test fails to reject the Ho of a unit root, but for 'first difference of log (RX)' the test rejects the Ho of a unit root at 1 % level of significance. Thus log (RX) is also I(1).

Panel (1) of Table–9 reports the results of Johansen's Cointegration Test for log (IIP) and log (RX). The first row in the panel which tests the hypothesis of no-cointegration indicates that the null hypothesis may be rejected at 5% and 1% level of significance respectively as the value of the LR test statistic exceeds the critical value in both cases. The second row in the panel, which tests the hypothesis of atmost one cointegrating relation, indicates that it may be accepted. Thus the series log (IIP) and log (RX) could be taken as cointegrated.

Panel (1) of Table–10 reports the Granger Causality results between the first difference (ΔLIIP and ΔLRX) of the aforesaid two series.

The results reject the Ho of 'no-Granger causality from ΔLRX to ΔLIIP' at 5% (approximately) level of significance, but fails to reject the Ho of no reverse causality.

Thus the results provide evidence in favour of unidirectional causality running from real export growth to real output growth (since IIP is a proxy for real output in our study) in Textile industry of India.

[10] At the industry level also, for each series, LM tests have been carried out for different lag lengths. Since similar results have been found , so results have been reported only for lag-length 4.

Interpretation of the Causality Results

A possible explanation of the result obtained in our study could be found if one observes the developments that have taken place in the Indian textile industry over the years.

There can be little disagreement on the proposition that textile is a demand-determined industry. Until recently, however, perhaps the most important problem faced by the Indian textile industry was that of deficiency of household as well as per capita demand. This was because, as calculated by Goswami (1984), during the long period 1961-84, there has been a secular decline in the per capita domestic consumption of textiles at a rate of 0.61 % per annum[11]. Household sector being the largest buyer of clothing in India, this resulted in the existence of considerable excess capacities in the textile industry (in the absence of any supply-side bottlenecks)[12].

It can be argued that during this period of declining domestic demand, exports might have acted as a vent for surplus productive capacity in the Indian textile industry, thereby resulting in output growth. However export growth is unlikely to have played a very significant role as a driving force behind output growth during this period. This is because under the inward-oriented policy followed by the government of India after the 1960s (until 1985), textiles export failed to grow at its full potential and constituted only a small proportion of domestic production[13]

Our result of an export driven growth, however, seems to be strongly supported by the developments that have taken place in the Indian Textile industry in the post-1985 period.

After a long period of protection the macro-economic regime allowed some extent of globalisation , for the first time, in the Textile Policy of 1985, which encouraged exports[14].This tendency was further reinforced by the economic reforms

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[11] According to the estimate by the Economic Survey, however, the trend rate of decline during 1961-86 was 0.5% per annum.

[12] According to Sushil Khanna (1989), " It is possible to argue that the potential output can be 60%-100% higher without major additions to capacity".

[13] From shortly after independence until 1985, one of the few overwhelming objectives pursued by the textiles policies of the government of India, was protection of handlooms. With this objective in view, during this period, the macro-economic regime in force progressively reduced the textile industry's contact with the world market, both as a buyer of cheap and good quality inputs and as a seller of yarn, cloth or apparel.

[14] There were two important shifts. Firstly, the macro-economic regime encouraged export of textiles, import of equipment and import of generic intermediates. As a result costs of resources and costs of acquiring new capability came down from what they were in a protected market. Secondly, de-regulation removed barriers to expansion and restructuring of mills and powerlooms. Both these

of 1991-92 . The net result was that " Weakly after 1985, and strongly after 1992[15], an industry notorious for its efficiency began to play a key role in exports and export-led industrial growth and was in principle allowed to re-equip itself to sustain and enhance competitiveness"[16]. This tendency is clearly visible from Table-11 (See next page), which shows that in meterage, export share in final demand for cloth increased from about 12 % in 1985-86 to 30 % in 1995-96.

Table -11

Consumption and Export of Cloth per Capita

(meters)

Year	Consumption	Export	Final Demand	Export Share in Final Demand (%)
1985-86	20.33	2.59	22.92	11.3
1986-87	19.85	3.53	23.39	15.1
1987-88	18.39	4.54	22.93	19.8
1988-89	20.55	4.48	25.02	17.9
1989-90	19.64	5.57	25.21	22.1
1990-91	21.48	5.98	27.46	21.8
1991-92	19.57	6.94	26.51	26.2
1992-93	21.04	7.81	28.85	27.1
1993-94	21.98	9.10	31.08	29.3
1994-95	21.18	10.13	31.31	32.3
1995-96	24.70	9.64	34.34	28.1

Source: Tirthankar Roy (1998), Table-1 [17].

changes were initiated by the 1985 Textile policy, reiterated in the 1993 Textile (Control) Order, and became general in the 1992 round of reforms.

[15] In 1992-96, reforms seem to have affected the textile sector more deeply than in 1985-90, though the broad direction of policy was similar in both periods.

[16] Tirthankar Roy (1998) p 2173

[17] 'Consumption' in this table means home consumption of cloth, whether bought as cloth or as garments. 'Export' means export of cloth and garments (converted into meters of cloth). 'Final Demand' is defined to mean consumption plus export. Since here import and inventory are zero, Production of cloth =consumption of cloth and garments +Export of cloth and garments =Final

This phenomenal export-led growth in the post-1985 period might have a significant impact on results of our Granger-causality test leading to the outcome of a one way causality running from export growth to output growth, even if it is assumed that exports did not play much significant role in the pre-1985 period.

4.6.2 Machinery and Transport Equipments

Description Of the Results

Panel (2) of Table-7 reports results of LM tests conducted for 'log of Real Output' (i.e log (RO)) and 'log of real exports (log (RX))'of the Machinery and Transport Equipments industry of India.

For log (RO), the results reject Ho of 'no serial correlation upto lag order 4' at 5% level of significance implying that ADF is the appropriate unit root test.

For log (RX), however, Ho cannot be rejected implying that DF is the appropriate unit root test.

Panel (2) of Table–8 reports results of the unit root tests conducted for log (RO) and log(RX), both at levels and at first differences.

For 'level of log (RO)' the ADF test fails to reject the Ho of a unit root, but for 'first difference of log (RO)' the ADF test rejects the Ho of a unit root at 1 % level of significance. Thus log (RO) is found to be I(1). For 'level of log (RX)' the DF test fails to reject the Ho of a unit root, but for 'first difference of log (RX)' the test rejects the Ho of a unit root at 1 % level of significance. Thus log (RX) is also I(1).

Panel (2) of Table–9 reports the results of Johansen's Cointegration Test for log (RO) and log (RX). The first row in the panel which tests the hypothesis of no-cointegration indicates that the null hypothesis may be rejected at 5% and 1% level of significance respectively as the value of the LR test statistic exceeds the critical value in both cases. The second row in the panel, which tests the hypothesis of atmost one cointegrating relation, also indicates that it may be rejected at 1% and 5% level of significance and thus there is a possibility of atmost two cointegrating equations. In other words the series log (IIP) and log (RX) could be taken as cointegrated.

Demand for cloth and garments. It should also be noted that figures in this table refer to cloth alone and do not include the value of yarn.

Panel (2) of Table–10 reports Granger Causality results between the first difference (ΔLRO and ΔLRX) of the aforesaid two series.

The results reject the Ho of 'no-Granger causality from ΔLRX to ΔLRO at. 10% level of significance, but fails to reject the Ho of no reverse causality.

Thus the results provide evidence in favour of a 'weak' unidirectional causality running from real export growth to real output growth in Machinery and Transport industry of India.

Interpretation of the Causality Results

Capital goods (including machinery and transport equipments) form the third most important category of India's exports, next only to textiles and gems and jewellery. They also belong to the high growth category of exports. Especially, from mid-eighties onwards, the sector has secured significant growth rates in exports, exceeding 50% in 1987-88. Moreover, the share of exports in total domestic production has shown a rising tendency (barring some fluctuations).

Now if output of the capital goods industry is determined from the demand side, which it is generally believed to be[18], then it seems plausible to argue that export (given the above observation regarding its performance) by generating additional demand, can promote output growth. Our study, however, rejects the null hypothesis of "No Granger Causality" from export growth to output growth only at 10% level of significance, which seems to indicate that export growth is not a very significant causal factor behind output growth. The inability of the export growth to influence output growth, may tentatively, be explained by the fact that it is domestic demand rather than the export demand which seems to be the most important determining factor, so far as the output performance of the Indian capital goods industry is concerned.

It will not be difficult to find support in favour of the above argument if one concentrates on various studies on the capital goods industry of India. For instance, studying the growth path of the capital goods industry Mundle and Mukhopadhyay (1992) concluded : "during the Mahalanobis period (i.e. 1955-56 to 1965-66), when domestic capital goods production recorded that highest rates of growth, it was driven

[18] See for instance Ramana (1984), Mundle and Mukhopadhyay (1992), Chandrasekhar (1987), each of which has tried to explain growth pattern of capital goods industry in terms of the demand conditions facing the industry.

by both a high rate of growth of fixed investment and by import substitution. In the stagnation period (i.e. 1965-66 to 1974-75) there was a sharp decline in the growth of fixed capital formation, especially in the public sector, leading to a distinct fall in the growth of domestic capital goods production. But the fall was partly cushioned by continuing import substitution. In the final recovery phase (i.e. 1974-75 to 1988-89) even though the rate of growth of fixed capital formation had fully recovered, the reinforcing effect of import substitution had been exhausted. Consequently, the recovery of growth in domestic capital goods production has remained partial".

Ramana's (1984) study has also emphasised the influences of particular patterns of import substitution and investment in the economy, on the trends in output and capacity of the capital goods sector.

In order to explain the sharp deceleration in the growth of the capital goods sector after the mid 1960s, Chandrasekhar (1987), however, has emphasised a) the overall deceleration of growth in the industrial sector and b) the gradual process of liberalisation of capital goods imports, which has resulted in an increase in the share of imported equipment purchased by the domestic producers.

Whatever may be their differences in opinion regarding the reasons behind the deceleration in the capital goods industry after mid-sixties, one common emphasis of all these studies has been on domestic demand conditions as the determining factor behind output performance of the Indian Capital goods industry.

Now, if domestic demand is the most important determinant of output, in this industry, then it is unlikely that export growth will have a very significant influence on output growth. Hence our result of weak export-to-output causality does not seem to be unreasonable.

4.6.3 Chemical and Chemical Products

Description Of the Results

Panel (3) of Table-7 reports results of LM tests conducted for 'log of index of industrial production' (i.e log (IIP)) and 'log of real exports (log(RX)) for the chemical and chemical products industry of India .

For both the series the tests fail to reject Ho of 'no serial correlation upto lag order 4' at 5 % level of significance implying that for both the series DF is the appropriate unit root test.

Panel (3) of Table–8 shows results of DF tests for log (IIP) and log (RX) both at levels and at first differences.

For 'level of log (IIP)' the DF test fails to reject the Ho of a unit root, but for 'first difference of log (IIP)' the DF test rejects the Ho of a unit root at 1 % level of significance. Thus log (IIP) is found to be I(1). For 'level of log (RX)' the DF test fails to reject the Ho of a unit root, but for 'first difference of log (RX)' the test rejects the Ho of a unit root at 1 % level of significance. Thus log (RX) is also I(1).

Panel (3) of Table–9 reports the results of Johansen's Cointegration Test for log (IIP) and log (RX). The first row in the panel which tests the hypothesis of no-cointegration indicates that the null hypothesis may be rejected at 5% and 1% level of significance respectively as the value of the LR test statistic exceeds the critical value in both cases. The second row in the panel, which tests the hypothesis of atmost one cointegrating relation, indicates that it may be accepted. Thus the series log (IIP) and log (RX) could be taken as cointegrated.

Panel (3) of Table–10 reports the Granger Causality Results between the first difference (ΔLIIP and ΔLRX) of the aforesaid two series.

The results reject the Ho of 'no-Granger causality from ΔLIIP to ΔLRX' at 5% level of significance, but fails to reject the Ho of no reverse causality.

Thus the results provide evidence in favour of unidirectional causality running from real output growth (since IIP is a proxy for real output in our study) to real export growth in Chemical and Chemical products industry of India.

Interpretation of the Causality Results

From the information, that we have been able to gather from secondary sources, on the chemical and chemical products industry of India, it seems that this is an industry, an overwhelming proportion of whose output is consumed in the home market. Exports are the end rather than the beginning, of the typical market expansion path of the firms in this industry. If this is indeed the case, then it is quite obvious that the size of the exportable surplus will depend on the demand and supply conditions in the home market. So, it seems plausible to argue that the variations in the level of output will, depending on the variations in the domestic demand, determine the variations in the level of export, rather than the other way round. This reasoning, however, implicitly assumes that the level of output is determined from the supply side. If one goes through the study of this industry undertaken by Deepak Nayyar (1976), then one can find evidence as to how shortages of raw materials and intermediates acted as a bottleneck on the chemical industry in the 1960s. However, the import-liberalisation of the mid-eighties is likely to relax this supply-side bottleneck, by allowing import of raw materials and intermediates.

It is indeed observed that in the post-liberalisation period the chemical industry is undertaking huge imports. In such a situation, to what extent the chemical industry is still operating under supply-side constraints is an open question. On the basis of the information that we have been able to collect from secondary sources, no conclusive answer can be given to this question. Hence the explanation of the causality results developed here can at best be regarded as tentative.

4.7 CAVEATS

Before ending this chapter a discussion on some of the major limitations of the analysis arising mainly out of the limitations inherent in the data used in this study, should be mentioned.

As far as the macro-level exercise is concerned, our data on exports (including re-exports) cover only the productive sectors of the economy, while GDP includes services also. Hence these two series are not quite at par.

The data limitations, however, are more severe for the industry-level exercise undertaken in this study.

As far as the IIP is concerned, the series have been revised regularly over the years by shifting the base year in order to cover a larger number of items and to improve the methodology of constructing the index. The classification has also undergone major changes when the new series with 1980-81 as base adopted the National Industrial Classification (1970) instead of the Annual Survey of Industries (ASI) classification followed in the earlier series.

Given these changes, it is clearly seen that for any particular industry the long time series data on IIP with different base periods are not quite consistent with each other.

The same is true also for WPI and UVI, for each of which the base-periods, classifications as well as coverage have undergone massive changes.

Apart from these, there are also problems of comparability between production and trade data[19]. This is because the production data used here captures only the registered segment of an industry excluding the unregistered segment as well as the small-scale sector. Export data, on the other hand, include not only registered and unregistered segments, but also the small-scale segment, which is often found to be more export-intensive. Thus export data refer to a broader category compared to production data and are not quite comparable.

This problem is most acute for textiles where small sector contributes a significant proportion of exports, but not that acute for machinery and transport equipments and chemical and chemical products since the existence of small scale sector is rather modest in these industries.

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[19] See Sinha Roy

Here it should also be mentioned that the econometric techniques used in the present study are far from foolproof. They have their own limitations.

Given all these weaknesses inherent in the present study one has to be very cautious in drawing inferences. The results obtained from such a study can at best be regarded as tentative, but in no way conclusive.

It should also be mentioned here that the interpretations of the industry level causality results provided in Section 6 of this chapter are based entirely on information collected from secondary sources. Since the object of our industry level exercise was only to shed some light on the export-growth linkage in these industries on the basis of an econometric exercise, no attempt has been made to undertake an in-depth study of the industries, on a first hand basis, to interpret the results. Hence these interpretations may not be free from drawbacks and therefore, can at best be regarded as tentative.

Chapter-5

Conclusion and Policy Implications

CONCLUSION AND POLICY IMPLICATIONS:

Notwithstanding the vast theoretical and empirical literature on the subject, there still exists considerable ambiguity surrounding the relationship between exports and economic growth. In the present study an attempt has been made to empirically re-investigate the relationship in the context of the Indian economy, with the help of rigorous econometric testing procedures (namely Dickey-Fuller Test for unit root, Johansen's cointegration test and Granger-causality test).

Our empirical exercise is divided into two parts. In the first part we have investigated the causal linkage between growth in exports (at constant 1980-81 prices) and growth in GDP at factor cost (at constant 1980-81 prices) for the period 1950-51 to 1996-97. The results of our causality tests provide only some weak support for causation running from export growth to GDP growth, but no indication whatsoever of any reverse causality.

In the second part of our empirical exercise, an attempt has been made to shed some light on the relationship between export growth and output growth in three major export industries of India: a) Textiles, b) Machinery and Transport equipments and c) Chemical and Chemical products.

In case of Textiles we have found strong evidence of unidirectional export-to-growth causality.

The results of the Machinery and Transport equipments industry provide only some limited support for causality running from exports to output growth, and no evidence of any reverse causality.

However, so far as Chemical and Chemical products industry is concerned, it seems that it is output growth which causes export growth, rather than the other way round.

It should be mentioned here that since the econometric techniques used in this study are far from foolproof one should not go too far in making inferences from these test results. Moreover, considering the limitations inherent in the data used in this study, the results obtained can at best be regarded as tentative and should be interpreted with caution.

However, to the extent the findings of this study can be regarded as indicative, even though not conclusive, some discussion on their policy implications seems to be warranted. In the remaining part of this chapter an attempt is made in this direction.

As is well known now, after maintaining a protectionist regime for a long period since independence, the Indian economy is now progressively moving towards import liberalisation and export promotion, which first started in the mid-1980s and gathered momentum in the mid-1991 (as part of the liberalisation-cum-structural adjustment programme). Trade policy reforms embodied in the EXIM Policies since 1992 have sought to address the tasks of phasing out various impediments to trade and providing an environment conducive for increased exports. The EXIM Policy 1997-2002, while building upon the gains made earlier, has continued the process of trade liberalisation and procedural simplifications. While incentives for export production have been enhanced on the one hand, exports themselves are being seen as an integral part of industrial and development policies on the other. In fact export growth is not the end to which the export-promotion measures are aiming at, rather it is a means to achieve the broader end of a sustainable and rapid economic growth.

The lack of support (though not conclusive) for a 'strong' causal linkage between export growth and economic growth in India over the long-run, as found in our study, however, casts some doubt on the efficacy of policies designed to enhance economic growth by pushing the export sector. The main argument put forward in this study is that export growth has failed to influence output growth to any significant extent in India, because in case of this country the complementary condition of a high investment–GDP ratio has not been quite fulfilled[1]. If it is indeed the case, then even in future also growth of exports per se may fail to affect the overall growth rate significantly if the rate of investment does not undergo major structural shift. So it seems that rather than putting too much emphasis on export growth as a means to raise the economy's growth rate, policies should also attempt to enhance the investment-GDP ratio as a complementary condition for achieving export-led growth.

[1] For a detailed discussion see chapter 4 , section 5.

Let us now concentrate on our micro-level results. As far as Textiles is concerned, it seems to be the industry that has benefited most from the recent trade policy reforms. The New Trade Policy has encouraged export of textiles, import of equipment and import of generic intermediates. The result is a phenomenal growth in exports (particularly after 1992) and massive export-led growth. The results of our Granger causality exercise also suggest a strong export-to-growth causality in the textile industry of India. So it can be recommended that the government should continue and strengthen the export promoting and import liberalising measures for achieving sustained export-led growth in textiles.

It should also be noted here that in the next decade the textile scenario would change drastically as a result of the phasing out of the Multi-Fibre-Agreement. Under this progressive liberalisation of world trade, competition will increase for a country like India which is now dependent on quota markets; market size should also increase for countries with resource-costs similar to India's, since there will be retreat of several conventional suppliers, unduly favoured in the quota-regime. So far, there is no well informed and convincing assessment of whether the Indian textile industry will, on average, be better off or worse-off. However, it can safely be asserted that with the increase in global competition quality will play an important role vis-à-vis cost. So if Indian textile industry is to remain competitive in the world market, measures should be adopted to promote technological upgradation and heavy investments should be made in modern machinery, on an urgent basis. Hence government policy should aim at fulfilling these necessary conditions for maintaining global competitiveness.

The Machinery and Transport equipments industry of India also seems to have been affected by the trade policy reforms initiated in the mid-1980s, since after that the export performance of this industry has significantly improved. Our empirical exercise, however, indicates that export growth is not a very strong determining factor of output growth in the machinery and transport equipments industry of India. One can also find evidence showing that over the years the growth path of this industry has more or less followed the movements in domestic demand. So, it seems unlikely that the present policy emphasis on export promotion will be able to increase the growth rate of this capital goods industry to a highly significant extent.

Given that the demand for the capital goods is a derived demand, which can be regarded as a function of the rate of modernisation and investments in the economy, any policy aimed at modernisation and stepping up investment in the economy would lead to greater orders on domestic capital goods manufacturers and will soften the demand constraint which has afflicted some sub-sectors of this industry.

So, it can be argued that rather than overemphasising exports as a means to achieve sustained growth of the capital goods industry, government policy should also innovate new strategies that will promote domestic demand for domestic technology.

Coming to Chemical and Chemical products, it is observed that this sector has been one of the fastest growing sectors in the economy. The export performance in the post-liberalisation period (after mid 1980s) has also been quite impressive. The results of our empirical study, however, indicate that it is output growth, which is causing export growth in the chemical and chemical products industry, rather than the other way round. If this is indeed the case, then policies aiming at stimulating exports are unlikely to result in higher growth of output. So it seems plausible to argue that rather than concentrating only on export growth, policy should also focus on other factors that are more likely to affect the output performance of this industry.

Before ending the discussion a final word of caution is warranted. The focus of the present study has been to investigate the relationship between real export growth and real output growth. It has nothing to do with the impact of export orientation on output growth which although is a related, but conceptually distinct question. Trade policies do affect the volume of trade but there is no strong reason to expect their effects on growth to be quantitatively (or even qualitatively) similar to the consequences of changes in the volume of trade. Given this distinction, the above discussion on the policy implications of the present study will be valid only to the extent that export-oriented policies do result in expansion in actual exports.

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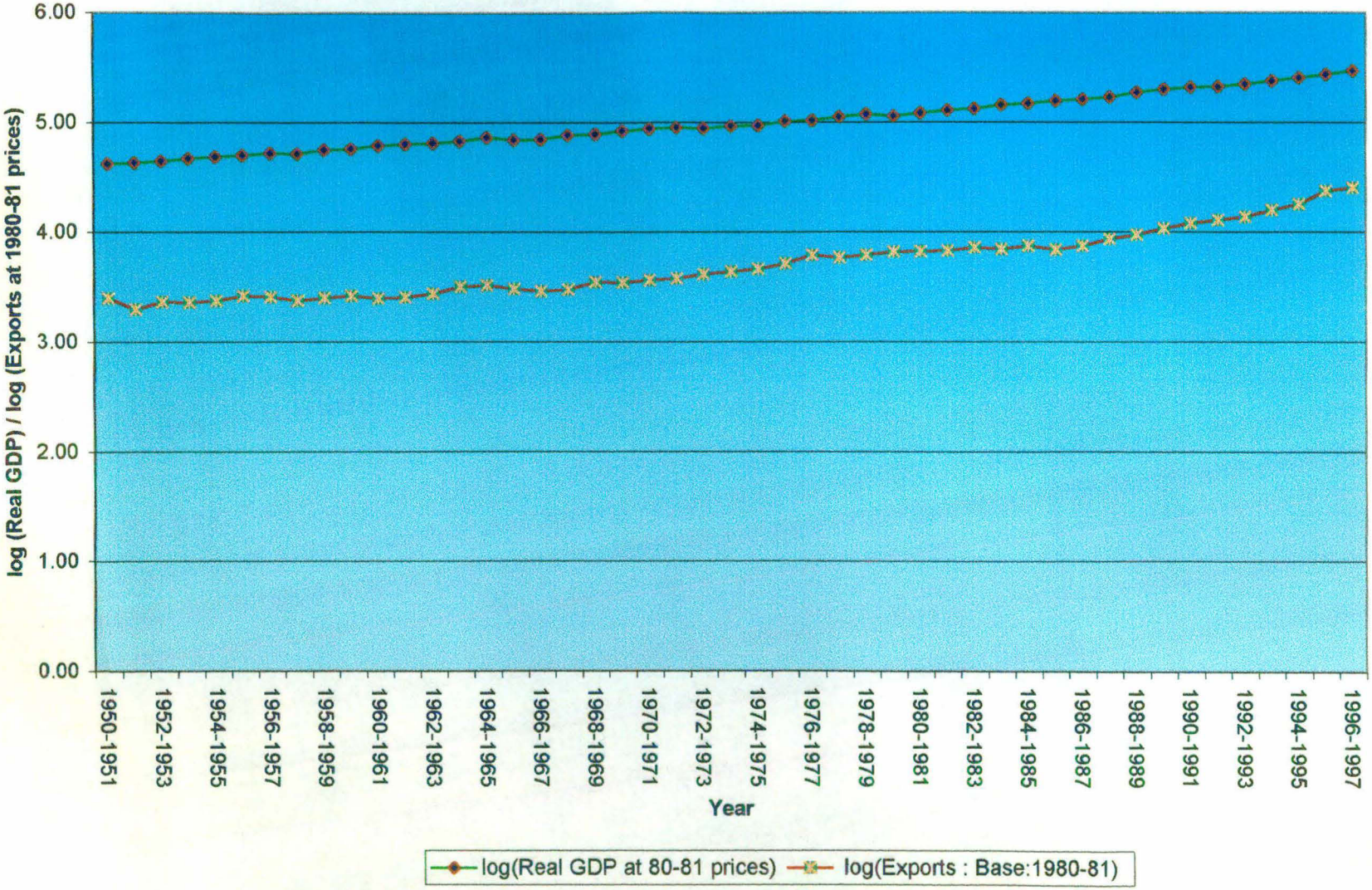
Annexure

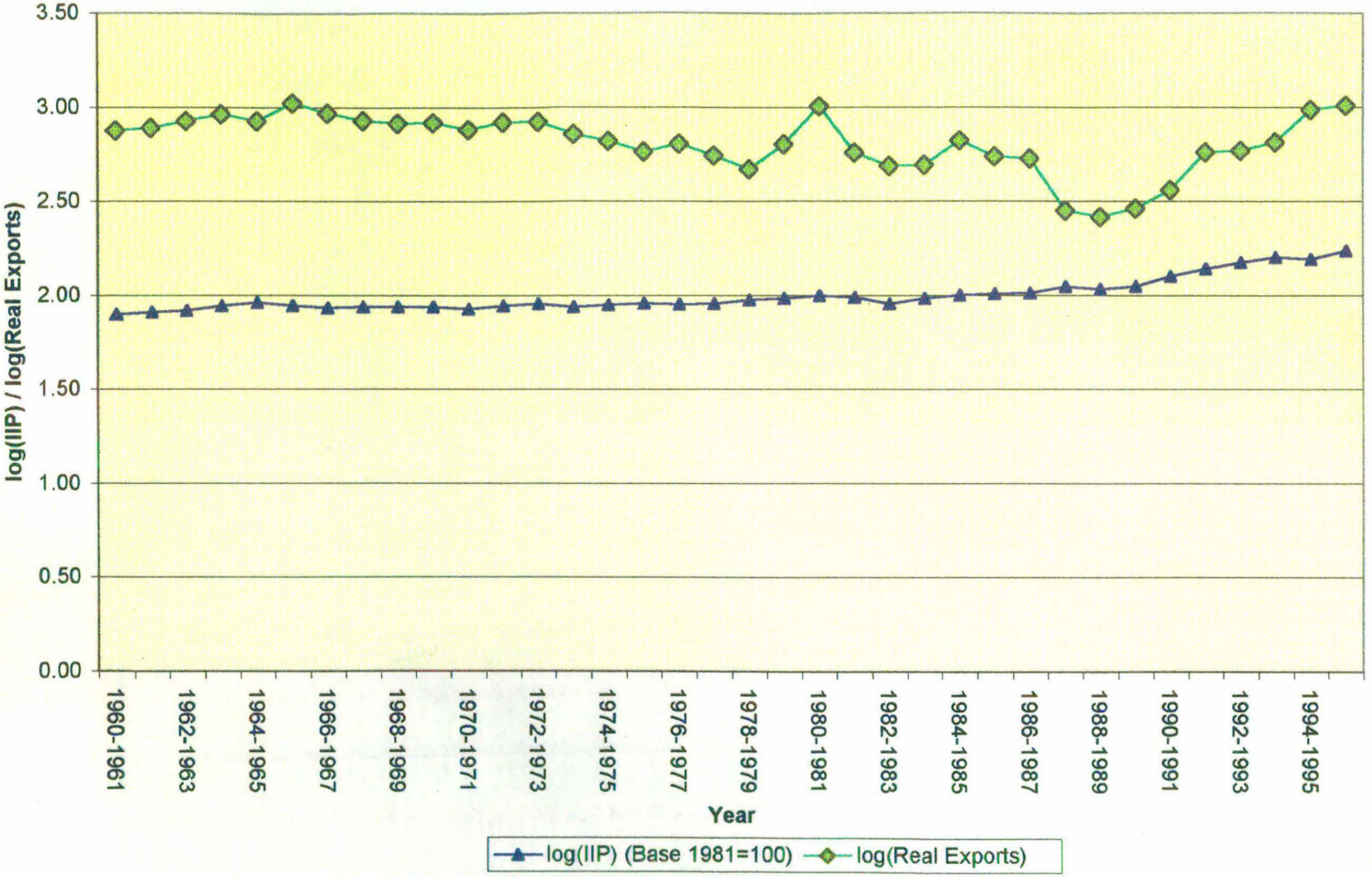
Graphs at the Macro and Industry level

Movements in log(Real GDP) and log(Exports at 1980-81 prices)



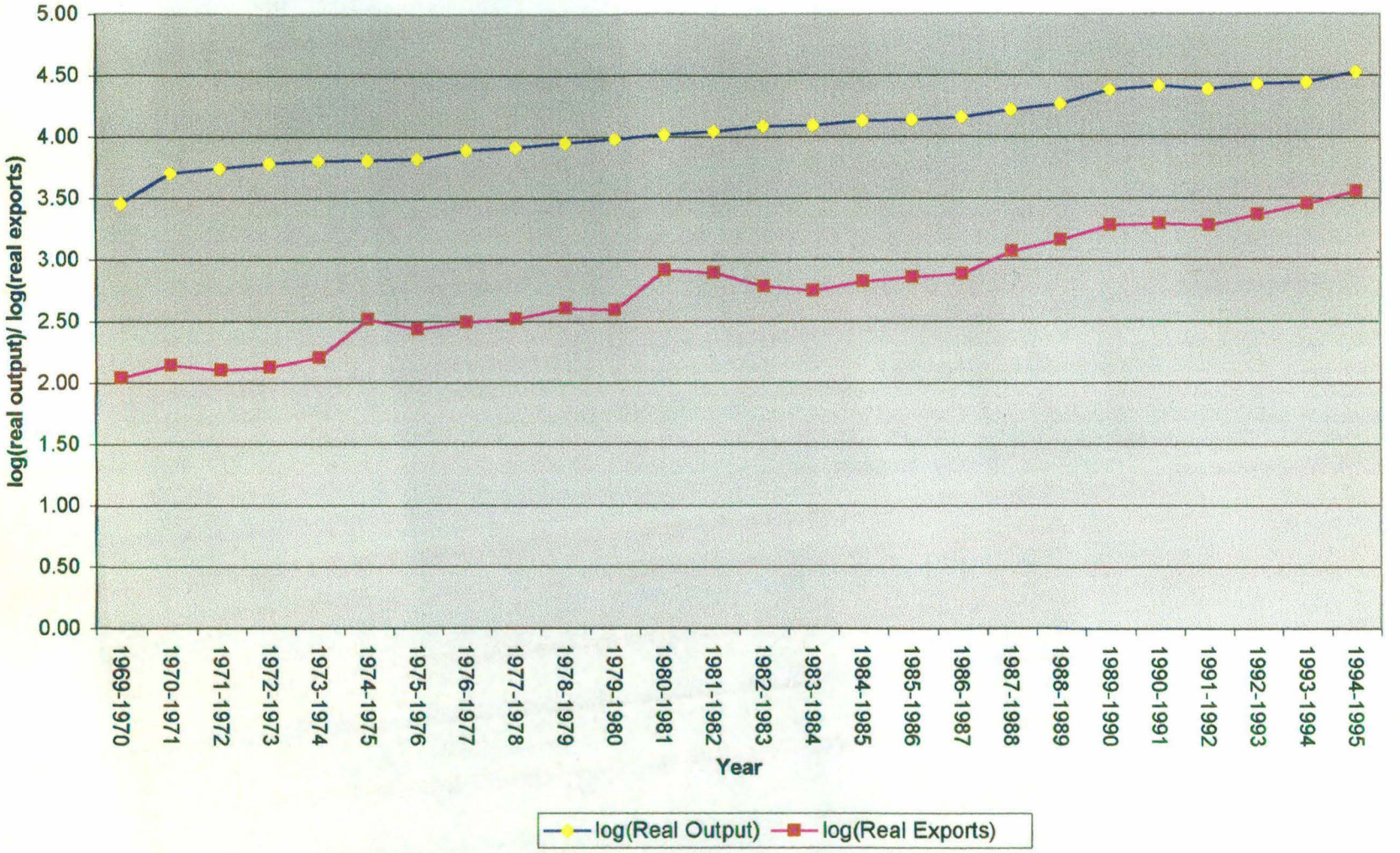
G1

Movements in log(IIP) and log (Real Exports):
Textile Industry



G2

Movements in log(Real Output) and log(Real Exports):
Machinery and Transport Equipments Industry



G3

Movements in log(IIP) and log(Real Exports):
Chemical and Chemical Products Industry