EXPORTS AND ECONOMIC GROWTH: THE PAKISTAN'S EXPERIENCE

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Dedicated to my parents with love

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CHAPTER 1

INTRODUCTION

One of the most enduring questions in economics involves how a nation could accelerate the pace of its economic development. One of the most enduring answers to this question is to promote exports -- either because doing so directly influences development via encouraging production of goods for exports, or because export promotion permits accumulation of foreign exchange, which permits importation of high-quality goods and services, which can in turn be used to expand the nation's production possibilities. In either case, growth is said to be export-led. Over the last thirty years, countries such as South Korea, Hong Kong and Singapore have had sustained high growth rates and have undergone substantial economic transformations. Lucas (1993), for instance, speaks of a miracle in the case of South Korea, where between 1960 and 1988 yearly real per capita growth averaged 6.2 percent. This contrasts with a world average of 1.8 percent over the same period. All three countries are also characterized by their openness. In its 1987 classification of Developing Countries according to trade orientation, the World Bank lists only South Korea, Hong Kong and Singapore as strongly outward-oriented economies over the 1963-85 period.[1]

There has been a great deal of theoretical and empirical research on the relationship between a

[1] Ambler et al. (1996), S366 - S370.

country's trade orientation and the level of its economic development. The earliest work focused on the benefits and drawbacks of inward and outward-oriented development policies for growth and development in the Less Developed Countries (LDCs). After World War II, many developing countries followed an inward-oriented strategy because of the argument that it speeded up development by stimulating domestic industries, and by making countries less sensitive to external shocks and less dependent on the developed world.[2] Nevertheless, during the 1960s, some East Asian Countries, such as Hong Kong, South Korea, and Singapore adopted an outward-oriented policy and their economic development was based on the growth of their tradable goods sectors. Some empirical studies have supported the conclusion that countries that followed a relatively outward-oriented development strategy grew faster than those who did not.[3]

The theoretical and analytical literature has gone through several phases in dealing with the East Asian cases of successful export growth. The first phase, based on the experience up to 1973, emphasized the importance of outward orientation in explaining success. Outward orientation was defined as trade liberalization and exchange rate reform to permit domestic prices to reflect international market prices. This defines the neutral trade regime where the incentives to import are equal to the incentives to export and reflects the neoclassical economic view. In the 1980s a second strand of thought, based on the experience of the East Asian Newly Industrializing Economies (NIEs) in the late 1970s through the mid 1980s, emphasized the positive role of

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[2] For details see, Bell et al. (1984).

[3] Some of the studies in this area are: Maizels (1968), Bhagwati (1978), Krueger (1978), and Balassa (1978).

government in pushing exports through setting priorities, mobilising resources and involving private sector exporters. This interpretation fit the strategy-led, structural change interpretation and reflected the strategic trade theory (Helpman and Krugman (1989)) and the business school literature on the subject (Scott and Lodge (1985); Porter (1990)). In the late 1980s and early 1990s, the third strand of literature emphasized the role of technological innovation and human resource development in industrial up-grading and catch-up in the more recent East Asian experience.[4]

The relative merits of alternative development strategies involving either import substitution or export promotion has been a subject of considerable debate among academics and policy makers in recent years.[5] A considerable number of studies favor export promotion to economic development, because, in their view, export-led policies would lead to efficient resource allocation, greater capital utilization, exploitation of economies of scale, generate technological improvement in response to competition abroad and, contribute to increased employment. (e.g., Balassa (1978), Esfahani (1991), Emery (1967), Bhagwati (1988), Ram (1987), Feder (1983), Feder & Uy (1984), Borenzstein and Ghosh (1989), Nishimizu and Page (1991), and Pio (1994)).

Many studies have investigated the role of export expansion in the growth of LDCs (For example, Fosu (1990b), Ram (1985), Kavoussi (1984), Feder (1983), Michaeli (1977), Maizels

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[4] See Bradford and Colin (1994).

[5] See Bhagwati (1988).

(1968), and Emery (1967)). In general such studies have reported positive impacts of export on economic growth.

The notion of export-led growth, which suggests a causal link between export and output growth, has been particularly popular among policy makers in Developing and Newly Industrializing Economies (NIEs). To date, the empirical results of the single equation studies tend to favor the export-led growth hypothesis. Notable examples include Balassa (1978, 1985), Feder (1984), Ram (1987), and Tyler (1981). Giles et al. (1992), on the other hand, using New Zealand data, find support in only specific commodity groups. Others, such as Chow (1987) and Ahmad and Kwan (1991) find uni-directional causality from exports to output growth in only a small fraction of the cases considered. A number of cross-country studies confirm a strong positive association between exports and economic growth. (see for example, Michaely (1977), Balassa (1978, 1985), Krueger (1978), Tyler (1981), Feder (1983), Kavoussi (1984), Ram (1985), Chow (1987), Fosu (1990), and Atukeren (1995)).

Few studies, however, have examined the importance of export type (e.g., primary versus non primary) in the economic growth-export nexus. Such investigations are important in the light of concerns raised in the North-South debate that specialization in exporting primary commodities in which LDCs generally have a comparative advantage is unlikely to close the gap between the More Advanced Developing Countries (MDCs) and LDCs [e.g., Prebisch (1950, 1959), and Singer (1950, 1975)]. In an early study of the role of primary exports in the growth process, Syron and Walsh (1968) segmented a sample of countries on the basis of food content of exports

-- high (9 countries), moderate (10 countries), and low (16 countries). He found no effect of exports on economic growth in the first category, but a positive impact in the second, and an even higher positive effect in the third.

Chow (1987), Hsiao (1987) and Jung and Marshall (1985) have recently questioned the validity of all the studies which used a single equation. This is because the single equation (or so called "impact") studies using OLS regression are, from an econometrics perspective, mostly inadequate in addressing the issue of causality. If a bidirectional causality between these two variables (exports and output) exists, the estimation and tests used in the impact studies are inconsistent. These concerns have subsequently generated a series of new empirical work aimed directly at resolving the issue of causality between exports and output growth. Granger (1969) causality tests were carried out in later studies to examine the direction of causality.

One can find a wide variety of interpretations of export-output growth in the literature. It is attributed either to outward-oriented strategy, government intervention in export promotion, trade liberalization policies, or incentive-based commercial and industrial policies. Lucas (1993) argues that neither policies to promote investment in physical capital nor policies to promote direct investment in human capital can explain these growth rates. Instead, he stresses the importance of human capital accumulation externally in which learning is the by-product of applying labor and capital to new production process. Other studies, such as Lucas (1988) and Young (1991), have analyzed the effects of learning by doing and trade on growth. Grossman and Helpman (1991) consider the link between growth and trade in a model of learning by

research and development. Other authors, such as Rivera-Batiz and Romer (1991), have also compared growth under free trade and protection. Ambler, Cardia and Farazli (1996) have also analyzed the effects of human capital accumulation on the rates of growth by using the following model:

$$H_{t+1} = (1 - \delta_h) H_t + \eta L_{1t}^{\eta_1} H_t,$$

where H_t is the level of human capital at time t, δ_h is the rate of depreciation of human capital, L_{1t} is employment in the intermediate goods sector, and η and η_1 are parameters. They argue that human capital augments labor productivity in the production function.

More recent investigations have introduced measures of manufacturing contents of exports into the export-augmented production framework where the levels of production inputs of capital and labor are controlled (e.g., Fosu (1990a), Balassa (1985), Kavoussi (1984), and Tyler (1981)). Such studies generally find manufacturing exports to exert a positive differentiated input on GDP growth. Ahmad and Harnhirun (1996) concluded that it is domestic economic growth that causes exports to grow in all member countries of the ASEAN, rather than growth being export-led.

One particular line of research on exports and economic growth focuses on the relationship between openness and economic growth in Developing Countries. Researchers have used rank correlations, cross country production functions, causality, and cointegration techniques to investigate whether those countries with outward-looking trade regimes grow faster than the others. Studies that have used rank correlation techniques and production function estimates

provide support for a positive relationship between openness and economic growth. Causality tests have also led researchers to question the sign and the direction of the relationship between exports and economic growth. Causality tests indicate that there is only a weak causal relationship from openness (proxied by real export growth) to economic growth (proxied by per capita real output growth).[6]

In view of the importance of the subject and the wide divergence in theoretical positions, many empirical studies have been conducted to assess the role of exports in economic growth. Although the specific inferences differ somewhat, almost all empirical work seems to have concluded that exports are probably good for economic growth despite the differences in their methodologies and in the aspects emphasized.

Keeping in view the fact that Pakistan is a developing country and still relies to a large extent on primary commodities export, I also divide total exports into primary and manufactured exports and examine their relationship with output growth. The plan of the study is as follows. The theoretical framework along with various hypotheses about effects of export expansion on economic growth is discussed in section I. Section II highlights the review of empirical literature on the subject. The structure of the model, details about data and results are discussed in section III.

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[6] See Atukeren (1995).

Pakistan's Economic and Social Indicators

Indicators	1993-94	1994-95
Growth Rate (%)		
GDP	**3.80 (R)**	**4.70 (P)**
Agriculture	2.86 (R)	4.94 (P)
Manufacturing	5.39 (R)	4.41 (P)
Services Sector	3.69 (R)	4.42 (P)
Consumer Price Index (%)	11.18 (R)	12.92 (P)
Public Finance		
Total Revenue (% of GDP)	17.3	17.1 (R)
Total Expenditure (% of GDP)	23.3	22.9 (R)
Overall Deficit	5.9	5.5 (R)
Balance of Payments (% of GDP)		
Exports (fob)	12.89	13.03
Imports (fob)	16.74	16.76
Trade Deficit	3.85	3.72
Current Account Deficit	3.79	3.97
Human Resources		
Population (million)	124.45	128.01
Unemployment Rate (%)	4.74	4.74
Crude Birth Rate (per 1000 persons)	39.3	37.0
Crude Death Rate	10.1	10.1
Education		
Literacy Rate (%)	36.8	37.0
Expenditure of Education (% of GNP)	2.2	2.4

Source: Economic Survey 1994-95, Economic Advisor's Wing, Finance Division, Government of Pakistan.

R= Revised P=Provisional

CHAPTER 2

EXPORTS AND ECONOMIC GROWTH:

A THEORETICAL FRAMEWORK

2.1 Relationship between exports and economic growth

Economists have long debated the importance of pursuing export promotion policies for stimulating economic growth. The basic argument in support of such policies has been that exports contribute positively to the economic growth both directly, as a component of aggregate output, as well as indirectly through efficient allocation of resources, greater capacity utilization, exploitation of economies of scale, generation of technological improvement in response to greater competition from abroad, capital formation, and employment creation.

Does there exist any relationship between export growth and output growth? How does export growth cause economic growth --- either through inflow of foreign exchange earnings, technological transfer, capital accumulation, international competitiveness, vast domestic industrialization or an increasing saving rate? Does export growth cause economic growth or economic growth cause exports growth? Does export growth always lead to economic growth? An appropriate number of empirical studies have been carried out to address these questions. The theoretical literature on the subject can be classified into three major categories through which exports affect the rate of growth. First, when an economy has unemployed resources and is opened up to trade, introducing a variety of incentives (credit policies, infrastructure

development, fiscal subsidies, rebates for the imports, and etc.) to create a pro-export bias can facilitate the capacity of firms to reap economies of scale and reach points on their cost curves below the world market price. These incentives are meant to enable firms to increase their export shares in foreign markets significantly. This larger scale production made possible by the introduction of export incentives would absorb idle resources (unemployed labor, unused productive capacity in input-producing firms, capital that might have otherwise been invested abroad, etc.). To meet external demand along with domestic, the economy utilizes all its available resources efficiently to meet the demand and to capture the market. A further consequence is that output increases and an inflow of foreign exchange also takes place and the economy may get a higher growth rate but in subsequent years it may fall down. This kind of effect is called the impact effect.

Second, an economy may be close to full employment level when it is opened up to trade. Now the external demand for its products may increase output, which in turn increases real income in the country. This will bring an inflow of capital in the economy. As a result, a process of capital accumulation takes place. This further improves the capital-output ratio, and consequently economic growth augments. This effect is generally called the capital accumulation effect. In this way, a pro-export bias regime may be used to achieve industrial upgrading, moving a country's productive structure up the technological scale from labor-intensive to capital-intensive, to skill- and technology-intensive industries as the country's endowment base matures. By accelerating this process through the introduction of export incentives, there are likely to be productivity gains resulting from the shift in resources from older sectors to newer ones or older technologies

to newer ones. Hence, by export expansion, an economy is potentially able both to move resources into higher productivity sectors and to utilize existing resources more fully. It, therefore, can cause a shift in the production possibility frontier displacing it further from the origin.

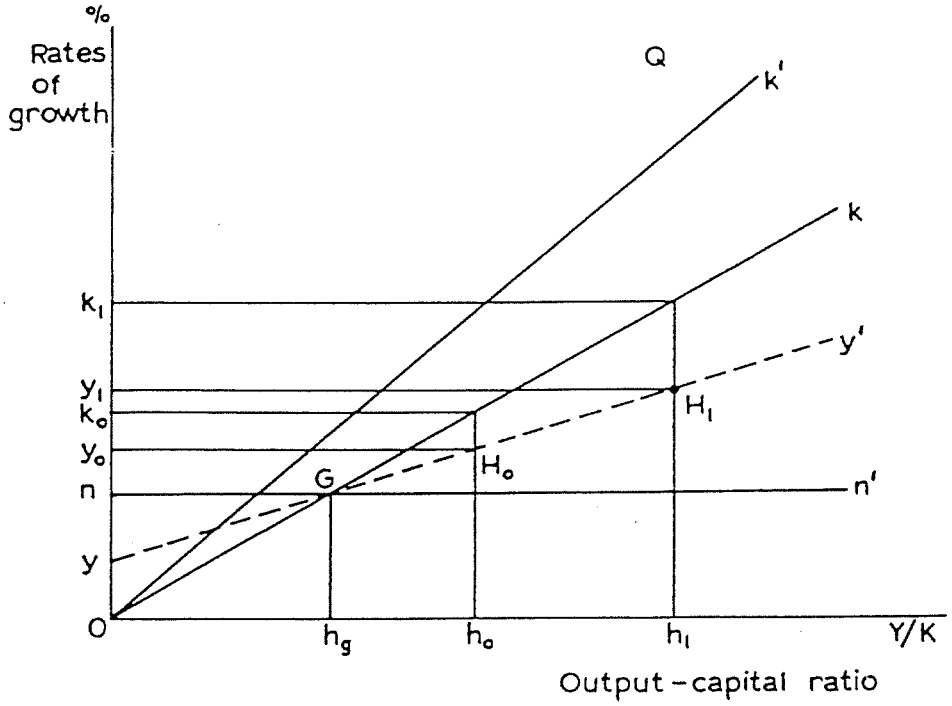
Third, there is a stage of endogenous growth. In this stage, economic growth can only take place if innovations and new technology are introduced. Otherwise, it is hard to get economic growth because of diminishing returns to capital. "Opening up trade may affect the rate of growth through 1) the 'impact' effect, 2) the effect of the gains from trade raising the rate of capital accumulation, 3) the substitution effect operating through a change in the relative price of investment goods, 4) the income distribution effect, and 5) the 'factor-weight' effect."[7] But I am interested in the first and second effects only.

Let us see graphically how exports affect economic activities in an economy. Consider a closed economy with two factors of production, labor and capital, and an aggregate constant-returns-to-scale, neoclassical production function. The growth rate of labor is given exogenously, there is no technical progress, investment is brought into equality with savings by the rate of interest, and the savings propensity is given and influenced by the level of income per head, income distribution, and the rate of interest. We also assume that in time t_0, when the economy is opened

[7] See Corden (1971).

up to trade, the rate of growth of capital is greater than the given rate of growth of labor.[8] Now in year t_0 the economy is opened up to trade. There are some static gains from trade, so that real income rises. The effect on the rate of growth may be distinguished as; i) the impact effect, and ii) the capital accumulation effect, which in turn has an immediate implication, and a steady-state implication. If by growth, we mean not growth of output (or consumption) but growth of real income or absorption,[9] then the impact effect is obviously to raise the rate of growth temporarily in year t_0 and to fall back again within the subsequent year. The economy's adjustment to trade — its reallocation of resources — is completed within the year t_0.

Fig 1[10]



[8] See Meade (1961), Solow (1956), and Swan (1956). For details, see endnote.

[9] The term absorption is used to emphasize that we are concerned not just with consumption possibilities but with possibilities of consuming or investing.

[10] For details, see Corden (1971).

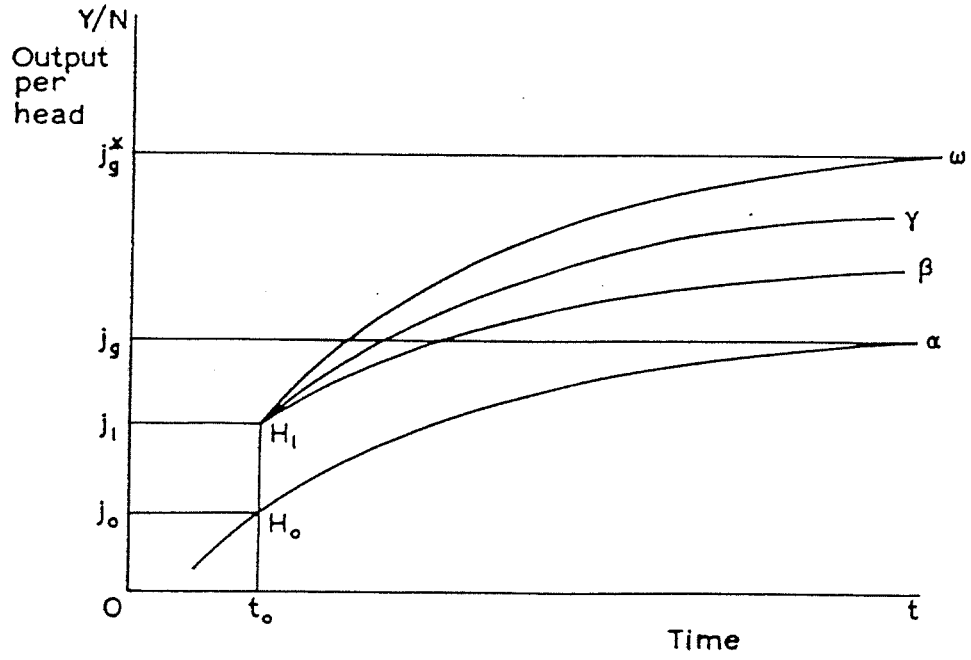
[Explanation of OK`: In the steady-state capital, output and labor would grow at the same rate, as shown by point G where OK, yy` and nn` intersect. It may also be possible that the yy` line would not intersect nn` at G but would meet OK` at a point to the right of G or meet nn` somewhere to the left of G when capital, output and labor would grow at different rates.]

The capital accumulation effect results in a permanent rise in real income or absorption. With a constant savings propensity, some part of the increase will then be saved and invested. Thus the absolute amount of investment in year t_0 and all subsequent years will rise above what it would have been otherwise. Opening up of trade leads to a rise in the rate of growth of capital and this will pull up with it the rate of growth of output. The figure 1 shows rates of growth of real income, and labor on the vertical axis and the output-capital ratio (Y/K) on the horizontal. The horizontal line nn` shows the given labor growth rate. For a given savings propensity, the straight line through the origin OK shows the rate of growth of capital at various levels of Y/K. The rate of growth of output is given by the line yy`. At time t_0 in the closed economy, Y/K is h_0 and hence the rate of growth of output is y_0. The system would tend towards the steady state at G where Y/K is h_g and the rate of growth is n. Because the constant-returns-to-scale assumption means that when capital and labor are growing at the same rate, output must also grow at that rate, so that all three lines intersect at G.

The opening-up of trade in time t_0 displaces Y/K to the right, to h_1. Temporarily — just in that year and with a given amount of investment — it raises the rate of growth to some point, such as Q, shown in the diagram vertically above h_1 (This is only possible temporarily, or in short run. It

cannot be sustained for a longer period). This is called impact effect. In case of capital accumulation effect. the rate of growth of capital will increase from k_0 to k_1 simply because Y/K has risen while the savings propensity has remained constant. And this pulls up the rate of growth of output (real income) to y_1. If there were not diminishing returns to capital because capital is growing faster than labor. it would stay at that level. But in fact, with the capital-labor ratio steadily rising. and hence the output-capital ratio (Y/K) steadily falling, the economy will tend to the steady state at G, moving this time not from H_0 to G, as in the closed economy, but from H_1 to G. In the steady state Y/K will be the same as in the closed economy. This is a growth-oriented diagram and it shows that the gains from trade eventually disappear. But this would be misleading as becomes clear from the Figure 2.

Fig 2[11]



[11] See Corden (1971), 117 - 143.

The vertical axis in Figure 2 shows output or real income per head (Y/L), and the horizontal axis, time t. At time t_0, Y/L is y_0 (in Fig 1). In the closed economy Y/L would rise, since, with capital growing faster than labor, output would also be growing faster than labor. It would approach the steady state Y/K, namely j_g, which is uniquely related by the production function to the steady state Y/K, namely h_g. Thus the closed economy path of Y/L is given by the line $H_0\alpha$. Now the economy is opened-up to trade in time t_0, thus raising real income or absorption per head to j_i . The vertical distance H_0H_1 represents the static gains from trade. It yields impact effect on the rate of growth. If this gain did not grow with the economy and there were no change in capital accumulation as a result of the opening-up of trade it would simply be carried forward overtime, Y/L in every subsequent year being greater than otherwise by the amount H_0H_1. The path of Y/L would then be $H_1\beta$. But in fact it will grow with the economy. That will pull up the growth path to $H_1\gamma$, which is a constant proportion above $H_0\alpha$. The effect of the opening-up of trade is to raise the rate of capital accumulation, which, in turn, raises the rate of growth above what it would be otherwise. Hence Y/L grows faster than indicated by $H_1\gamma$. The path of Y/L is now given by $H_1\omega$. The steady-state real income per head will now be j_g*. This should be compared with the steady-state income per head in the closed economy, j_g. Both are associated with a Y/K of h_g. But in the open economy it is possible to have a higher income per head for any given Y/K than in the closed economy since the economy has, in fact, become more productive.

In summary, the gains from exports growth (or opening-up) the economy at any time can now be broken down into three elements. First are the static gains from trade H_0H_1 Second is the growth of static gains over time; its growth is measured by the vertical distance between $H_1\beta$ and $H_1\gamma$.

Third, there is a rise in the rate of growth caused by the increase in capital accumulation and might be described as the "growth gains". It is measured by the vertical distance between $H_1\gamma$ and $H_1\omega$. The growth gain results when parts of the static gains are invested. It thus represents a particular allocation of the static gain — an allocation which raises real income in the future rather than consumption now.

2.2 Exports and economic growth: various hypothesis

There are a variety of arguments in the literature in support of an outward-oriented development strategy from different perspectives. A few of them are as follows:

[Bhagwati (1988)] There should be fewer distortions in an economy than if it were to use an import-substituting strategy, because an outward-oriented strategy does not discriminate between the domestic and the export sector. Thus an export-led strategy leads to an improved resource allocation through getting the price right, and reduces the potential for welfare losses from unproductive activities under an import-substitution regime.

[Emery (1967) and Ram (1987)] Exports generally originate from the most efficient sectors of the economy, i.e., where the country has a comparative advantage. Relocating the factors of production from the inefficient sectors to more efficient sectors along with other factors increases factor productivity in the economy, thus, leading to higher rate of economic growth. "In addition to direct benefits of providing part of the wherewithal for economic development, and

stimulating more efficient use of resources, a dynamic export sector also produces substantial secondary benefits. These include investment, consumption and the flow of technology".[12] (Ram (1987)) used the following type of production function:

$$Y = F(K, L, X), \qquad \text{--------} (1)$$

where Y is aggregate real output, L and K are the labor and capital inputs respectively, and X denotes the level of exports. Taking total differentials on both sides and manipulating the expression, one can get a growth equation of the form:

$$\dot{Y} = \beta_L \dot{L} + \alpha_K (I/Y) + \beta_X \dot{X}, \quad \text{-------} (2)$$

where $\alpha_k = \partial F / \partial K$, $\beta_L = F_L L / Y$, and $I = dK$.

Here a dot over the variable indicates its rate of growth and I/Y is the investment-output ratio. Addition of a constant term and a stochastic component to (2) yields the econometric specification:

$$\dot{Y} = \beta_0 + \beta_L \dot{L} + \alpha_K (I/Y) + \beta_X \dot{X} + u. \quad \text{-----} (3)$$

In this equation, the coefficients are approximately constant. However, if we consider a production function of Cobb-Douglas nature, then these coefficients will be equal to one. And finally Ram estimated the following growth equation:

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[12] Emery (1967), 471.

$$\dot{Y} = a_0 + b_L \dot{L} + a_K (I/Y) + (\delta /1+ \delta \ + MP_X) \dot{X} (X/Y) + v , \quad \text{-------} (4)$$

where δ denotes the intersectoral relative factor productivity differential, and MPx indicates the marginal externality effect of the export sector output on the rest of the economy. There are two mechanisms in this equation through which the growth of exports may influence the rate of economic growth favorably, namely a) higher input productivity in the export sector and b) positive externality effect of the level of the export sector output on the rest of the economy.

[Bruton (1967)] There are gains from economies of scale. The size of the domestic market may not be sufficient for a firm to produce at the minimum efficient scale. Thus, the international market added to the domestic market may permit more efficient modes of production, resulting in increased factor productivity. Alternatively, producing for the international markets may lead to increase in capital utilization rates, if the firms formerly operated with excess capacity. In this way, growth in exports enhances economic growth. [Emery (1967)] also supported this hypothesis.

[Esfahani (1991)] Under a binding foreign exchange constraint, export revenue may play an important role in relaxing the constraint. This allows for capital and intermediate goods imports, thus leading to higher growth. Export promotion is particularly important for countries that cannot obtain sufficient foreign aid or capital. In evaluating the role of export expansion in the growth performance of Semi-Industrialized Countries (SICs), the first and foremost purpose of exports (i.e. provision of foreign exchange for imports) has been neglected and too much

emphasis has been placed on the externality effects of competing in world markets, in the view of some scholars. While the latter effects may carry some weight of their own, he has found that the major contribution of exports to the GDP growth is to relieve the import shortage that many SICs confront. Once the import supply effect of exports has been taken into account, there does not seem to be any significant externality effect left.

Even though exports do not appear to have had much direct externality effect on the GDP of SICs, export promotion policies in these countries can be quite valuable in supplying foreign exchange, which relieves import shortages and permits output expansion. Although in this role exports may be temporarily replaced by foreign assistance, the long-term growth of any developing country ultimately depends on the steady and strong expansion of its export sector.

[Feder (1983)] The firms in the export sector need to remain competitive in international markets. This induces the flow of new technologies through innovation or imitation, increases their adaptability and leads to a more efficient management of firm resources, among other benefits. Feder provides evidence supporting the view that the success of economies which adopt export-oriented policies is due, at least partially, to the fact that such policies bring the economy closer to an optimal allocation of resources. The estimates show that there are, on average, substantial differences in marginal factor productivity between the export and non-export sectors. These differences drive in part from the failure of entrepreneurs to equate marginal factor productivity to price ratios and in part due to externalities. The latter are generated because the export sector confers positive effects on the productivity in the other sector, but these are not

reflected in market prices. The results are such that social marginal productivity is higher in the export sector and economies which shift resources into exports will gain more than inward-oriented economies. The empirical findings suggest that even when entrepreneurs optimize resource allocation, given the prices they face, there are substantial gains to be made due to the external effects. "A growing export sector also encourages an increased flow of technological and market innovations, as well as managerial skills. Under the pressure of competition and the desire to continue expanding foreign sales, foreign techniques and methods are imported to further improve productivity and quality. This is beneficial for both the domestic exporter and the foreign importer." [13] [Emery (1967) and Feder (1983)] The domestic sector benefits from a more efficient export sector through learning, transfer of technology, increased competition, and mobility of factors of production between the two sectors. These effects are called intersectoral spillovers or externalities, where an increase in factor productivity in the export sector also leads to an improvement in efficiency and productivity of the domestic goods sector. This transfer of technology to domestic sector is only possible through opening up of the economy. [Leibenstein (1978)] also presented the same idea in X-efficiency theory. He says that the inputs can be used with various degrees of effectiveness within the firm. The more effectively they are used, the greater the output. When an input is not used effectively, the difference between the actual output and the maximum output attributable to that input is a measure of the degree of X-inefficiency. In this context, X-efficiency is to be contrasted with allocative efficiency, the latter being the form of efficiency commonly considered in neoclassical economics.

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[13] Emery (1967), 472.

[Feder and Uy (1984) & Borenzstein and Ghosh (1989)] An economy with outward-oriented strategy, ceteris paribus, is likely to have a higher international creditworthiness. As a result, those LDCs which pursue outward-oriented development strategies may have easier access to international capital markets and enjoy a more relaxed foreign exchange constraint than those who do not. The effect on economic growth is similar to the case of "exports as a source of foreign exchange." "Relatively modest increases in export growth can bring about a substantial favorable effect in creditworthiness. If reasonable levels of GDP growth are to be maintained, foreign capital will be required over a long period and creditworthiness for commercial finance sources has to be maintained. The acceleration of export growth is, therefore, necessary for sustained GDP growth." (Borenzstein and Ghosh (1989), 11.) The beneficial effects of outward-oriented policies would add to the positive creditworthiness effects of export orientation, in the view of some scholars.

[Shaw (1992) & Nishimizu and Page (1991)] An endogenous growth theory brings another perspective into the relationship between a country's outward-oriented strategy and economic growth. An important implication of the theory is that increasing returns to scale, capital accumulation, and human capital formation are fundamental to economic growth. Because human capital displays increasing marginal productivity, the production of goods from increased and improved knowledge demonstrates increasing returns. Thus, countries with greater stocks of human capital experience more variety of commodities and greater production of new goods. International competition and the associated economies of scale result in increased capacity utilization and reduced managerial slack, and further induce the introduction of new technologies

capital of a country. LDCs also gain from outward-oriented policies because they can now draw upon the stock of world knowledge. In addition, a policy of openness may compel better quality intermediate goods to be imported, thereby allowing quality and standard improvements in existing products.

[Pio (1994) & Grossman and Helpman (1991)] Endogenous growth theory suggests that the exports of a county can enhance economic growth by allowing for the importation of better quality intermediate and capital goods, and can increase factor productivity. Endogenous growth theory also suggests that gains from outward-oriented strategy will be greater if economic integration leads to economies of scale, and also will be greater the larger the differences in the stock of knowledge among countries. If, on the other hand, a country can not compete in terms of quality, standards and marketing ability, then the country loses market share and diseconomies of scale may arise. Endogenous growth theory, therefore, places great emphasis on the sectoral specialization of trading partners.

[Feenstra (1996)] There are two ways by which export growth accelerate economic growth. First, a country which is growing faster than abroad will experience a more rapid increase in its real wages, which means that the level of income will be increased, which in turn increases savings, which leads to a lower real interest rate. This in turn will stimulate higher investment and more rapid creation of new inputs, leading to faster growth. Thus, there is a causation between higher growth, wage inflation, lower real interest rates, and more growth. Second, the country which can achieve the higher growth in equilibrium is precisely the one which is able to put more resources

achieve the higher growth in equilibrium is precisely the one which is able to put more resources into the creation of inputs -- the endowment of skilled labor (measured in R&D efficiency units) determines which country grows faster. The initial number of inputs and stock of knowledge in each economy will affect the future growth of output, for a time, but not its long-run growth rate.

In short, export growth (or an outward-oriented strategy) can lead to both static and dynamic benefits. The static benefits are due to improved technical and/or allocative efficiency, increased foreign exchange inflow, and a less distorted domestic resource allocation. The dynamic efficiency gains come from increased factor productivity, an increased flow of technology and market innovations, foreign investment, economies of scale due to external markets, increased managerial skills and knowledge, and increased product variety and quality. The dynamic gains can be represented by continuing outward shifts in the production possibility frontier.

CHAPTER 3

A REVIEW OF THE EMPIRICAL LITERATURE

The empirical studies of the export-output growth relationship evolved through the following five approaches.

1) Rank correlation approach;

2) Cross-section production function approach;

3) Time series estimates of production function;

4) Granger-Sims causality test; and

5) Cointegration and error correction modeling of the relationship between an export variable and output.

Let us succinctly discuss each of these approaches and the results achieved by using these techniques.

3.1 Rank correlation approach

This approach was extensively used in the 1970s and early 1980s. In this approach, the idea is to test whether those countries ranking high (low) in terms of their export growth also rank high (low) in their output growth. Some of the influential studies on this methodology are: Michaely (1977), Balassa (1978), Heller and Porter (1978), Tyler (1981) and Kavoussi (1984). These

studies concluded that there exists a positive rank correlation between export growth and output growth. Results from these studies do not indicate anything further than a linear association between exports growth and output growth. The results from such analyses, therefore, can at best be suggestive as to the ex-post nature of the relationship.

3.2 Estimation of cross-section production functions

This approach is based on a neoclassical production function. In this approach, exports are considered a factor of production through their higher productivity, economies of scale, and externality effects on the domestic sector. There are two versions of this approach. The first version uses the following specification.

$$\Delta Y/Y = \alpha + \beta_1*(I/Y) + \beta_2*(\Delta L/L) + \beta_3*(\Delta X/X) + u,$$

where

$\Delta Y/Y$ is the growth rate of output,

I/Y is the share of investment in GDP,

$\Delta L/L$ is the growth rate of the labor force, and

$\Delta X/X$ is the growth rate of exports.

In this equation, the impact of export growth on the output growth is estimated. Michalopoulos and Jay (1973), Krueger (1978), Balassa (1978), Tyler (1981), Kavoussi (1984), and Ram (1985,

1987) used the above equation or a variation of it in their studies. In general, all of these authors found a positive and significant coefficient for the export growth variable in the production function.

The second version of this framework is due to Feder (1983). He divides the economy into two sectors, non-export and export. To derive a testable hypothesis, the export sector's production is assumed to affect the non-export sector's production. That is:

$$N = F(K_n, L_n, X) \quad (1)$$

$$X = G(K_x, L_x), \quad (2)$$

where

N = non-exports,

X = exports,

K_n, K_x = respective sector capital stocks,

L_n, L_x = respective sector labor forces.

The respective marginal factor productivities between the two sectors are assumed to deviate from units by a factor δ:

$$(G_K/F_K) = (G_L/F_L) = 1 + \delta. \quad (3)$$

Taking the total differential of equations (1) and (2), we get:

$$dN = F_K I_n + F_L\, dL_n + F_x dX, \quad (4)$$

$$dX = G_K I_x + G_L dL_x, \quad (5)$$

Where I_n and I_x are respective sectoral gross investments, dL_n and dL_x are sectoral changes in labor force, and F_x describes the marginal externality effect of exports on the output of non-

exports. Since

$$Y = N + X,$$

one can also derive $dY = dN + dX.$ (6)

Substituting (4) and (5) into (6), we get:

$$dY = F_K In + F_L dLn + F_x dx + G_K Ix + G_L dLx \quad (7)$$

From (3) we have,

$$G_K = (1+\delta)\, F_K \quad \text{and}$$

$$G_L = (1+\delta)\, F_L$$

Thus by rearranging (7) we get:

$$dY = F_K In + F_L dLn + F_X dx + (1+\delta)F_K Ix + (1+\delta)F_L dLx \quad (8)$$

Or

$$dY = F_K (In + Ix) + F_L (dLn + dLx) + F_X dx + \delta (F_K I_X + F_L dLx) \quad (9)$$

Total investment and the change in the total labor force can be written as $I = In + Ix$ and $dL = dLn + dLx$, respectively.

From (3) and (5) we have:

$$F_K Ix + F_L dLx = 1/1+\delta\ (G_K Ix + G_L dLx) = dx/1+\delta \quad (10)$$

Combining (9) and (10) and using the above identities, we have:

$$dY = F_K I + F_L dL + (\delta\ /1+\delta + Fx)dx. \quad (11)$$

Feder also specifies a linear relationship between the marginal productivity of labor in a given sector and average output per labor in the economy as (an implicit Cobb-Douglas technology):

$$F_L = \beta\ (Y/L) \quad (12)$$

Dividing both sides of (11) by Y, denoting $F_K = \alpha$, and writing

$$dx/Y = (dx/x)\,(x/Y),$$

Feder obtains the following estimable equation, which forms a basis for his empirical results:

$$dY/Y = \alpha\,(I/Y) + \beta\,(dL/L) + (\delta/1+\delta + Fx)\,(dx/x)\,(x/Y) \qquad (13)$$

He attempted to identify the externality and higher productivity effects of export expansion in a sources-of-growth model. The estimated equation (Feder's equation (11)) is the following:

$$\Delta Y/Y = \alpha * (I/Y) + \beta*(\Delta L/L) + [\delta/(1+\delta) + FX]* (\Delta X/X) *(X/Y),$$

where δ is a measure of marginal factor productivity difference between the non-export and the export sectors, FX is a measure of inter-sectoral externalities, α is the marginal productivity of capital in the non-export sector, and β is the marginal product of labor in the non-export sector. Feder referred $[\delta/(1+\delta) + FX]$ as the social marginal productivity of investment in exports. He rewrites the above equation as:

$$\Delta Y/Y = \text{constant} + \alpha^* (I/Y) + \beta^*(\Delta L/L) + \gamma^* (\Delta X/X) *(X/Y) + \epsilon\,,$$

where

$\gamma = [\delta/(1+\delta) + FX]$, and

ϵ is a disturbance term.

Feder used the above equation to examine the impact of export growth on output.

3.3 Time-series estimation of production function

Some economists also estimated time-series aggregate production functions for individual developing countries. Two important studies are by Ram (1987) and Greenaway and Sapsford (1994b). Ram (1987) estimated time-series production function for 88 countries for the period 1960-82. His findings suggested a positive sign for the export variables, but with large variations across the countries. Greenaway and Sapsford (1994b) estimated the link between exports and economic growth for 19 countries which experienced periods of trade liberalization between 1950 and 1984. Their results showed that there is generally a positive link between trade liberalization and exports growth and that the link between export growth and output growth is ambiguous. Harrigan and Mosley (1991) also obtained similar results.

3.4 Granger-Sims causality tests

A positive correlation between export growth and output growth can also arise if output growth causes export growth. The rank correlation approach does not provide insights on this matter. The production function approaches assume that export growth causes output growth and there is no simultaneity. As Granger-Sims is a bidirectional causality test, it has four important features. First, there is no true instantaneous causality or simultaneous causality. The cause precedes the effect. Second, the future can not "cause" the present. Third, for a variable X to be a Granger-Sims cause of another variable Y, X should contain unique information about Y that is not available elsewhere. Fourth, the qualification "prima facie" should be added to any causal inference, since the information set used for such inferences contains considerably less

information than is available in the universe.

In applied research, the above definitions of Granger-causality are formulated in the following parametrically testable form:

$$Y_t = \alpha_1 + \sum_{j=1}^{p} \beta_{1j} Y_{t-j} + \sum_{j=1}^{q} \delta_{1j} X_{t-j} + \varepsilon_{1t}$$

$$X_t = \alpha_2 + \sum_{j=1}^{r} \beta_{2j} Y_{t-j} + \sum_{j=1}^{s} \delta_{2j} X_{t-j} + \varepsilon_{2t}$$

If $\delta_{1j} = 0$ and $\beta_{2j} = 0$ for all j, there is no Granger-Causality in any direction.

If $\delta_{1j} \neq 0$ and $\beta_{2j} = 0$, for all j, X Granger-Causes Y unilaterally.

If $\delta_{1j} = 0$ and $\beta_{2j} \neq 0$, for all j, Y Granger-Causes X unilaterally.

If $\delta_{1j} \neq 0$ and $\beta_{2j} \neq 0$, for all j, there is a feedback between X and Y.

Kravis (1970) performed Granger-type causality tests in the export-output growth framework. He concluded that "if growth was dominated by external demand, we should expect to find an association between the timing of changes in exports and in GNP with the latter following the former. Jung and Marshall (1985) performed Granger-causality tests for exports growth and output growth for 37 countries. They concluded that there existed a causal links between export growth to output growth only in four cases. In the cases of South Korea and Taiwan, they found

"export-reducing growth"[14] and, "internally-generated exports"[15] respectively.

Chow (1987) used total exports and manufactured output as his variable to examine the link between export growth and output growth. His sample consisted of eight countries with data from the 1960s to 1980s. His results showed no causality in the case of Argentina, unidirectional causality from exports to manufactured output in Mexico, and feedback between the two in all other countries. He concluded that "depending on the size of the domestic market, export growth can cause industrialization, either unidirectional, or bidirectionally by influencing the development of manufacturing industries."[16]

Bahmani-Oskooee, Mohtadi, and Shabsigh (1991) performed a Granger-Causality test for 20 countries. Their results showed the following causal links from export growth to output growth: i) unidirectional positive causality for 2 countries; ii) unidirectional negative causality in 3 countries; iii) positive feedback between the two in 2 countries; iv) internally-generated exports for one country; v) no causality in 10 countries; vi) positive causality from exports to growth but negative causality from growth to exports in one country. However, the authors concluded that this study supports in favor of the export-led growth hypothesis.

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[14] The export-reducing growth hypothesis means that producers supply the home market first in the face of economic growth in the domestic economy.

[15] In this case, one still observes the positive correlation between export growth and output growth, but the direction of causality runs from output growth to export growth.

[16] Chow (1987), 54.

Kunst and Marin (1989) tested for the causal relationship between export growth and productivity growth. Their results indicated a unilateral causality from productivity growth in the case of Austrian manufacturing sector. Marin (1992) performed the same methodology of Kunst and Marin (1989) for Germany, the U.K., the U.S., and Japan. In all four countries, exports were found to Granger-cause productivity, in contrast to Kunst and Marin (1989).

3.5 Cointegration tests

Some of the influential studies in this approach are as follows: Giles, Giles and McCann (1992), Bahmani-Oskooee and Alse (1993), Dutt and Ghosh (1994), and Van den Berg and Schmidt (1994).

Bahmani-Oskooee and Alse (1993) argued that the previously conducted Granger-Sims tests for export-output causality should be re-examined. Their reasoning is as follows; "None of the studies have checked for the cointegrating properties of the time series involved. Standard Granger-Sims tests are only valid if the original time series from which growth rates are generated are not cointegrated ..... If a country's exports and output data are found to be cointegrated, then the conclusions reached by previous studies using the simple Granger test are all nullified." [17] When exports and output are cointegrated, an error correction model should be constructed in order not to lose the long-run information in the series.

Giles, Giles and McCann (1992) examined the relationship between exports and economic

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[17] Bahmani-Oskooee and Alse (1993), 407.

growth in New Zealand by using cointegration, error-correction, and vector autoregressive models. Their findings rejected the export-led growth hypothesis at the aggregate level, but not when disaggregated data are used. Accordingly, they found that the exports of live animals and meat, minerals, chemicals, plastics, manufactured goods, and metals have contributed positively to economic growth in New Zealand.

Dutt and Ghosh (1994) examined only whether exports and GDP are cointegrated or not. Their findings showed that cointegration of the series exist in many cases.

The five approaches discussed above have been used in different periods of time to examine the effect of export growth on output. Rank Correlation approach was widely used till early 1980s. Cross-section and time series estimation of production functions approaches were popular in 80s. The Granger-Sims approach was developed in 70s, but it has been used in 80s and 90s along with other approaches . Since the above approaches do not take into consideration cointegrating properties of time series used in the analysis, it is, therefore, considered that all the approaches will be inappropriate if a country's export and output data are cointegrated. Therefore, the cointegration and error correction approach is considered as the most appropriate approach, because it evaluates stationarity of the time series data. (Atukeren (1995)) adopted a multiple time series analysis of the causal relationships between exports, imports and economic growth in 32 developing countries. The study used the Augmented-Dickey-Fuller and Phillips-Perron tests to test whether exports, imports and per capita real GDP are cointegrated. The study also used unit roots, breaking trends, and error correction models, where applicable. The results show that,

with the exception of Pakistan and Thailand, no further support can be given to the export-led growth hypothesis. I do not use either of them; rather, I use simultaneous method to determine the affect of export growth on output in case of Pakistan. The reason is that equation (7) of my model provides me a simultaneous equations system. However, the result I obtained from 2SLS looks better than that of 3SLS.

3.6 Empirical studies of exports and economic growth: a summary

The following tables provide a summary of empirical studies on relationship between exports and economic growth by using different techniques. The following tables are adopted from Atukeren (1995) with little modifications.

Table - I: A Summary of Correlation and Production Function Studies of Exports and Output Growth Relationship

Study	Data Set	Economic Growth	Export Growth	Estimation Technique	Other Variables	Conclusion
Michaely (1977)	Cross-Section, 41 Countries, 1950-73	Per Capita GNP Growth	Growth in the Share of Exports in GDP	Spearman's Rank Correlation	None	Support for EOG Hypothesis
Balassa (1978)	Cross-Section, 10 Countries, 1956-67, and 1967-73	GNP Growth	Export Growth or Real Export Growth	Rank Correlation, Production Functions	L, I, and FI	Support for EOG Hypothesis
Williamson (1978)	Cross-Section, 22 Countries, 1960-74	Changes in GDP	Lagged Exports	OLS, Linear Models	Country Dummies, Direct I, and other Foreign Capital	Support for EOG Hypothesis
Fajana (1979)	Time-Series, Nigeria, 1954-74	GDP Growth	Export Shares or Export Change/Output	OLS	Trade Balance, Current Account	Support for EOG Hypothesis
Tyler (1981)	Cross-Section, 55 Countries	GDP Growth	Export Growth or Export Change/Output	OLS	L, I	Support for EOG Hypothesis
Feder (1983)	Cross-Section, 31 Countries	GDP Growth	Export Growth or Export Change/Output	OLS	L, I	Support for EOG Hypothesis
Kavoussi (1984)	Cross-Section, 73 Countries	GDP Growth	Export Growth	Rank Correlation, Production Function (OLS)	L, I	Support for EOG Hypothesis
Balassa (1985)	Cross-Section, 10 Countries	GNP Growth	Export Growth	OLS, Production Function	L, I	Support for EOG Hypothesis

(Continued)

Ram (1985)	Cross-Section, 73 Countries, 1960-69, and 1970-77	Real GDP Growth	Real Export Growth	OLS, Tests for Heteroskedasticity and Specification Bias (Hausman)	L, I	Support for EOG Hypothesis
Esfahani (1991)	Cross-Section	Real GDP Growth	Real Export Growth	2SLS	Intermediate Imports	Support for EOG Hypothesis
Salvatore and Hatcher (1991)	Time-Series, 26 Countries in 4 Groups by Trade Policy Orientation, 1963-73, and 1973-85	Real GDP Growth	Real Export Growth	OLS, Production Function	L, I Growth in Industrial Production	Support for EOG Hypothesis
Edwards (1992)	Cross-Section, 30 Countries, 1970-82	Real GDP per Capita	Openness, and Government Intervention Indices	OLS, Tests for Measurement Errors, Endogeneity and Outliers	Human Capital, Political Instability, and Govt. Size	Support for +tive Robust Relationship between Openness and Growth
Levine and Renelt (1992)	Cross-Section	Real GDP Growth	Real Exports	OLS, Extreme Bounds Tests for Robustness	L, I Imports, Trade Volume	No Support for EOG Hypothesis
Ukpolo (1994)	Time-Series, 8 African Countries, 1969-88	Real GDP Growth	Real Exports (fuel, non-fuel primary and manufactured exports)	OLS with Cochrane-Orcutt	Investment, Labor, Private and Public Investment	Support for EOG Hypothesis in the case of Non-Fuel Primary Exports
Greenaway and Sapsford (1994a)	Cross-Section, 104 Countries, 1960-73, 1973-80, and 1980-88	Real GDP Growth	Growth in Exports to Output Ratio	OLS, Tests for Heteroskedasticity	None	Support for EOG Hypothesis
Greenaway and Sapsford (1994b)	Time-Series, 19 Countries	Real GDP Growth	Real Export Growth	OLS	I, L	No Support for EOG Hypothesis

Source: Greenaway and Sapsford (1994b) With little modifications. L stands for the growth in Labor Input. I stands for the growth in Capital Input. FI stands for Foreign Investment. EOG is for "Export-Oriented Growth".

3.7 Summary of the studies testing for causality and cointegration between exports and real output growth

Table - II: Summary of the Studies Testing for Causality and Cointegration Between Exports and Real Output Growth

Study	Data Set	Economic Growth	Export Growth	Estimation Technique	Other Variables	Conclusion
Jung and Marshall (1985)	37 LDCs, 1950-81	Real GDP	Real Exports	Granger's Test with Fixed Lags 2	None	Limited Support for EOG Hypothesis (4 out of 37)
Chow (1987)	8 LDCs, 1960-84	Real Manufacturing GDP	Real Manufacturing Exports	Sims's Test	None	Strong Support for EOG Hypothesis (Except for Argentina)
Darrat (1987)	Hong-Kong, S.Korea, Singapore, and Taiwan, 1955-82	Real GDP/GNP	Real Exports	White's Exogeneity Test	None	EOG Support for S. Korea only
Kunst and Marin (1989)	Austria, 1956-82	Productivity (Manufacturing)	Manufactured Exports	Granger's Test	TOT, OECD GDP	No Support for EOG
Chan, Clark and Davis (1990)	Taiwan, 1952-87	Real GNP	Real Exports	Granger's Test, Lags up to 4	FI, Govt. Expenditures	No Support for EOG. Real GDP Causes Real Exports
Ahmad and Kwan (1991)	47 African Countries, 1981-87	Real GDP, Real GDP per Capita	Total Exports, Manufactured Exports	Granger's Test	None	No Support for EOG. Real GDP may cause Exports
Kovacic and Djukic (1991)	Yugoslavia, 1952-87	Real GDP, Manufacturing Real GDP	Real Exports, Manufactured Real Exports	Tests for Cointegration, Granger's Test - Lags up to 4	None	Support for EOG. Manufacturing GDP causes Manufactured Exports
Sharma, Norris and Cheung (1991)	Germany, Italy, Japan, U.K., and U.S.A., 1960-87	Real GDP/GNP (Y)	Real Exports (X)	Granger's Test	K, L	X Causes Y in Germany and Japan, Y causes X in USA and UK.

(Continued)

Afxentiou and Serletis (1991)	16 DCs, 1950-85	Real GNP/GDP (Y)	Real Exports (X)	Tests for Cointegration, Granger's Test	None	Feedback between Y and X in the USA, Y causes X in Norway, Canada, and Japan. No Support for EOG Hypothesis
Bahmani-Oskooee, Mohtadi, Shabsigh (1991)	20 LDCs, 1951-86	Real GDP (Y)	Real Exports (X)	Granger's Test	None	Weak Support for EOG Hypothesis. X causes Y in 3 cases. 2 cases of +tive feedback
Kugler (1991)	USA, Japan, Switzerland, Germany, and France, 1970-87 (Quarterly data)	Real GDP/GNP	Real Exports	Tests for Cointegration, and Granger's Test	C, I	Weak Support for EOG. Export cointegrate with the other variables only in France and Germany.
Serletis (1992)	Canada, 1970-85	Real GNP (Y)	Real Exports (X)	Tests for Cointegration, and Granger's Test	Real Imports (M)	X causes Y, M causes Y, and X causes M. Support for EOG Hypothesis
Marin (1992)	Germany, UK, USA, and Japan, 1960-87 (Quarterly data)	Productivity (Y)	Manufacturing Exports (X)	Tests for Cointegration, Granger's Test, and Error Correction Models	TOT, OECD GDP	X causes Y in all Countries except UK. Strong Support for EOG Hypothesis
Oxley (1993)	Portugal, 1965-85	Real GDP (Y)	Real Exports (X)	Tests for Cointegration, Granger's Tests, and Error Correction Models	None	Y causes X. No Support for EOG Hypothesis
Gordon and Sakyibekoe (1993)	Ghana, 1955-87	Real GDP (Y)	Real Exports (X)	Sensitivity of Causal Findings using 5 Techniques	I	Results are sensitive to the Tests used. Granger's Test yields: Y causes X. Holmes and Hutton's Test yields X causes Y
Dodaro (1993)	87 Countries, 1967-86	Real GDP/GNP (Y)	Real Exports (X)	Granger's Test with 2 Lags	None	In 4 cases, X causes Y, in 10 cases Y causes X, 2 cases of feedback (+tive)

(Continued)

Kugler and Dridi (1993)	11 LDCs, 1960-89	Real GDP/GNP (Y)	Real Exports (X)	Tests for Cointegration	C, I	X is Cointegrated with the other Variables in 7 cases. Support for EOG Hypothesis
Bahmani-Oskooee and Alse (1993)	9 LDCs, 1973-88 (Quarterly data)	Real GDP/GNP (Y)	Real Exports (X)	Tests for Cointegration, and Error Correction Models	None	Strong Support for X causes Y and Vice Versa
Dutt and Ghosh (1994)	26 LDCs, 1953-91	Real GDP (Y)	Real Exports (X)	Various Cointegration Tests	None	20 out of 26 cases are Cointegrated
Van den Berg and Schmidt (1994)	17 Latin American Countries, 1960-87	Real GDP (Y)	Real Exports (X)	Various Cointegration Tests	I, L	Cointegration between Y and X in many cases (Results are sensitive to the Tests)
Giles, Giles, and McCann (1992)	New Zealand, 1963-91	Real GDP (Y)	Real Exports (X) (Aggregated and Disaggregated)	Cointegration, Error Correction, and Autoregressive	None	No Support for X causes Y in the aggregate data, some Support for X causes Y in dissegregated.
Salomon et al. (1994)	South Korea, 1967-89	Real Manufacturing GDP (MY)	Real Exports (X)	Granger's Test, and Vector Autoregressive Models	The level of Financial Development (FD), measured by the ratio of Currency to Money Supply	X causes MY indirectly via FD

Source: Atukeren, Erdal (1995); **Exports, Imports, and Economic Growth in Developing Countries: Multi variate Time-Series Evidence,** Ph.D. Dissertation. University of Ottawa, 51-53.

TOT stands for Terms of Trade . C stands for Consumption. Other variables are same as that of Table 1.

CHAPTER 4

THE MODEL[18] AND DATA DESCRIPTION

Since the main objective of this study is to examine the relationship between exports and economic growth, we need equations for these two variables. Following Balassa (1978), Tyler (1981) and Khan and Saqib (1993), I specify an export-augmented Cobb-Douglas production function as:

$$y = A\, L^{\alpha 1}\ K^{\alpha 2}\, X^{\alpha 3}\ e^{u}\ , \qquad (1)$$

where

y = Gross domestic product

L = Employed labor force

K= Capital stock

X = Real value of exports

A = Efficiency parameter

In addition to labor and capital, exports are included in the production function for the following reasons. First, export expansion allows the home country to concentrate investment in those sectors where it enjoys a comparative advantage. This results in specialization, which is likely to

[18] See Balassa ed. al. (1989), Esfahani (1991), Goldstein and Khan (1978) and, Khan and Saqib (1993).

augment overall productivity. Second, production for the larger international market permits economies of scale to be realized in the export sector. Third, it generates technological improvement in response to competition abroad, which is likely to reduce inefficiencies in the overall traded-goods sector. Finally, export expansion would enhance a country's ability to import more physical and human capital, including advanced technologies in production and management. Due to these reasons, exports as production input are intended to reflect the above mentioned factors that influence productivity but are not captured in labor (L) and capital (K).[19] The efficiency parameter represents a certain level of output with given inputs. If a technology is efficient, then more output can be produced with available inputs. The efficiency parameter is considered as given in exogenous growth models, while it is determined endogenously in endogenous growth models. Taking a logarithmic transformation to linearize equation (1), we get;

$$\ln y = \ln A + \alpha_1 \ln L + \alpha_2 \ln K + \alpha_3 \ln X + u \,. \qquad \text{----- (2)}$$

In recent years, some studies on the subject have been done by specifying an export demand or export supply function. Goldstein and Khan (1978) have argued in favor of specifying export demand and export supply functions simultaneously on the grounds that the relationship between quantities and prices is simultaneous. They used full information maximum likelihood method to get this result. Balassa, et al. (1989) have, in fact, estimated export demand and export supply

[19] See Goldstein and Khan (1985) and, Khan and Saqib (1993).

functions together for a few developing countries by using a Granger causality test. Khan and Saqib (1993) have also estimated export demand and supply functions simultaneously.

The export demand function depends upon foreign income and relative price variables. The world GDP index (y_w) is used to represent foreign income while the relative price variable is defined as the ratio of the index of domestic export prices [Px($)] to world export prices [P_w($)], both expressed in terms of U.S. dollars. The export demand function is as follows:

$$X^d = C\, y_w^{\beta 1}\, [P_x(\$)/\, P_w\,(\$)]^{\beta 2}\, e^v, \qquad \text{----- (3)}$$

where

X^d = Real value of exports demanded

C = Efficiency parameter .

Taking a logarithmic transformation to linearize equation (3), we get:

$$\ln X^d = \ln C + \beta_1 \ln y_w + \beta_2 \ln [P_x(\$) / P_w\,(\$)] + V\,, \qquad \text{------ (4)}$$

where

β_1 = Foreign income elasticity

β_2 = Relative price elasticity

where, $\beta_1 > 0$ and $\beta_2 < 0$.

The export supply function depends upon domestic production of exportables and a relative price variable:

$$X^s = Z\, y^{\gamma 1}\, [(P_x(\$).\, e^R)/P_g\,]^{\gamma 2}\, e^w, \qquad \text{-------} \quad (5)$$

where

y = Gross domestic product and is used to represent domestic production of exportables

$[P_x(\$)]$ = Domestic export prices (incorporating changes in the dollar prices of exports, the exchange rate and export subsidies)

P_g = Domestic price level

X^s = Real export supply

e^R = Index of effective exchange rate

Z = Efficiency parameter .

Taking a logarithmic transformation of equation (5), we have:

$$\ln X^s = \ln Z + \gamma_1 \ln y + \gamma_2 \ln [(P_x(\$).\, e^R)/\, P_g\,] + W\,, \qquad \text{-----} \quad (6)$$

where

γ_1 = Domestic income elasticity

γ_2 = Relative price elasticity

where $\gamma_1 \succ 0$ and $\gamma_2 \succ 0$.

Assuming equilibrium in the export sector, we have:

$$X^d = X^s = X . \qquad \text{----- (7)}$$

The equations (2), (4), (6) and (7) form a system of simultaneous equations which are to be estimated simultaneously to examine the relationship between export growth and income growth. I also disaggregate total exports into primary and manufactured exports and measure their relations with economic growth using the above equations which form a simultaneous equation system.

Most of the studies are carried out on this subject by using Ordinary Least Square (OLS) or Two Stage Least Squares (2SLS). Because the equations (2), (4), (6) and (7) give a simultaneous equation system, I, therefore, use a system approach to examine the relationship between exports growth and output growth. Hence I use the method of Three-Stage Least Squares (3SLS) — a full information and system method, which determines all the coefficients simultaneously. This method yields unbiased, and efficient estimates. 3SLS is relatively more efficient than other methods if the model is correctly specified because it uses information on the correlation of the stochastic disturbance terms of the structural equations to improve asymptotic efficiency. To check specification of the model, I performed Hausman (1978) test for testing the hypothesis of no mis-specification in the model.[20] I also estimated my model by 2SLS to compare my results

[20] For details, see endnote.

with that of 3SLS . These results are from a model of a static nature.

A few words about the data and their sources are in order. The data on Gross Domestic Product at current prices are taken from the Statistical Supplement: Pakistan Economic Survey 1995-96, Table 2.4, pages 34-35, published by the Economic Advisor's Wing, Ministry of Finance, Government of Pakistan. These are then deflated by the GDP Price Index at the 1969-70 base period to get the real GDP. The GDP Price Index is constructed by taking the ratio of GDP at current and constant prices. GDP at constant price is taken from the above mentioned source, Table 2.1 from pages 31-32. The data on exports are taken from the same source, Table 11.4, page 217. These are converted to the real value of exports by dividing through unit value index of exports, which is also taken from the same source, Table 11.5, pages 218-219. Data on Labor Force Employed are taken from the above source, Table 1.10, page 22. Finally the data regarding Capital Stock are taken from the same source, Table 2.3 (with some changes), page 34. The data for the Index of World GDP, Index of Dollar Export Prices of Pakistan as well as of the World and Effective Exchange Rate are taken from the International Financial Statistics Year Book (various issues), International Monetary Fund, Washington, D.C The sample period is 1960-88.

CHAPTER 5

RESULTS

Earlier studies have used export demand and supply functions in determining the relationship between exports and economic growth [see Esfahani (1991), Balassa et. al (1989), Goldstein and Khan (1978), and Khan and Saqib (1993)]. But all these and related studies estimated the relationship between exports and economic growth by means of Ordinary Least Squares (OLS) or Two Stage Least Squares (2SLS) method. The earlier studies used limited information methods to examine the relationship. I attempt to perform full information and system methods to obtain unbiased, and efficient estimates. All the models mentioned above including which I used are of static nature. Because of similar nature of the models, the results are similar too.

First of all, I estimate my equation (2), which is a kind of export-augmented production function, to see the relationship between exports and output by using OLS. I estimated equation (2) by OLS to compare my results with earlier studies on the subject. This was done because the earlier studies estimated this relationship by means of OLS. The results corresponding to the impact of total, manufactured, and primary exports on economic growth are given in Table 1.

Table 1 - OLS Estimates of Equation (2) - (1960-88)

ln y	= 3.18	+ 0.58 ln L	+ 0.49 ln K	+ 0.64 ln X
	(6.73)*	(2.54)*	(5.64)*	(1.87)*
R^2 = 0.99,	DW = 1.36,		SSE= 0.02	
ln y	= 3.49	+ 0.40 ln L	+ 0.54 ln K	+ 0.22 ln Xm
	(4.91)*	(1.73)*	(5.73)*	(1.67)*
R^2= 0.99,	DW= 1.21,		SSE = 0.02	
ln y	= 3.63	+ 0.44 ln L	+ 0.51 ln K	+ 0.41 ln Xp
	(6.20)*	(2.01)*	(5.73)*	(1.64)*
R^2 = 0.99,	DW= 1.21,		SSE = 0.02	

Xm= Manufactured goods exports Xp= Primary goods exports

T-statistics in parentheses. * denotes significance at 5 percent level.

It can be observed from the table that the size of the regression coefficient of exports varies from 0.22 to 0.64, with 0.41 for primary exports and 0.22 for manufactured exports, while that of total exports is 0.64. These coefficients are relatively higher to the ones reported by Balassa (0.04), Krueger (0.06), Tyler (0.057) and, Khan and Saqib (0.04). The reasons of the higher coefficients may be due to the difference in the period of estimation, 1960-88. However, my results are in consistent with the earlier studies in terms of positive sign and statistical significance by using the almost same estimation technique as used by those studies.

I also estimated my equation (2) by using 2SLS. The results for total, primary and manufactured exports are given in Table 2.

Table 2 - 2SLS Estimates of Equation (2) - (1960-88)

ln y	= 0.53	+ 0.64 ln L	+ 0.80 ln K	+ 0.69 ln X
	(2.55)*	(2.35)*	(8.45)*	(1.72)*
$R^2 = 0.99$				
ln y	= 0.61	+ 0.49 ln L	+ 0.90 ln K	+0.93lnXm
	(1.79)*	(1.79)*	(11.10)*	(1.84)*
$R^2 = 0.99$				
ln y	= 0.60	+ 0.48 ln L	+ 0.89 ln K	+ 0.14lnXp
	(1.79)*	(1.81)*	(10.75)*	(1.77)*
$R^2 = 0.99$				

Xm= Manufactured goods exports Xp= Primary goods exports

T-statistics in parentheses. * denotes significance at 5 percent level.

It can be observed from the above table that the size of the regression coefficient of exports varies from 0.14 to 0.93. The estimated coefficient of total exports by 2SLS is almost same as that from OLS. While that of manufactured exports is much bigger (0.93) in this case as compared to OLS. However, the estimated coefficient for primary exports (0.14) is much smaller than OLS.

Afterwards, I used the Three Stage Least Squares (3SLS) method of estimation to examine the relationship between export and economic growth. Before estimating this system, I checked

identification process. The results are reported in Table 3.

Table 3 — Estimates of Relationship Between Total Exports and Economic Growth: Results from 3SLS - (1960-88)

Variables	Total Exports		
	Equation (2)	Equation (4)	Equation (6)
Intercept Term	3.90 (16.02)*	- 1.15 (2.64)*	- 6.00 (7.67)*
Labor (L)	0.36 (1.74)**		
Capital (K)	0.12 (1.71)**		
Exports (X)	0.56 (11.26)*	1	1
World GDP Index (Yw)		2.05 (20.05)*	
Relative Price $[P_x(\$)/P_w(\$)]$		- 0.11 (1.84)*	
GDP (Y)	1		1.28 (15.39)*
Relative Price $[P_x(\$).e^R]/P_g$			0.14 (2.16)*
R^2	0.96	0.94	0.93
DW	1.67	1.23	1.31

Some of DW lie in the zone of indecision, but are greater than lower limit of Durbin-Watson d statistic. Nevertheless, DW of equation (2) shows rejection of the hypothesis of both positive and negative auto correlation. T-statistics in parentheses * denotes significance at 5 percent level.

As shown in the above table, all the coefficients of the three equations have expected sign and are also statistically significant at the 5 percent level of significance. The regression coefficient of the export variable in equation (2) is relatively lower (0.56) as opposed to (0.64) with OLS and has a positive sign, indicating some positive relationship between exports and economic growth. It is also statistically significant at 5 percent level. The coefficient of export variable shows a fairly large response of GDP growth to changes in exports expansion. This finding

implies that there is a strong association between exports performance and GDP growth in the case of Pakistan.

Regarding export demand function [equation (4)], the foreign income elasticity of the demand for exports is 2.05, which reflects the fact that Pakistan's exports are highly responsive to changes in the world GDP index. As world GDP index is used as proxy to foreign income, this suggests that the higher the foreign income, more the demand for Pakistan's exports abroad. The price elasticity of export demand is (- 0.11), which shows the role for relative prices in determining the world demand for Pakistan's exports. This further suggests that more competitive the prices of Pakistan's exports in terms of foreign prices, greater the chances of enhancement in its exports. In case of export supply function [equation (6)], both the coefficients for domestic income elasticity and relative price are positive, indicating a positive relationship between export supply, domestic income elasticity and relative price level. The domestic income elasticity in the export supply function is slightly higher than unity. A comparison of two income elasticities suggest that Pakistan's exports are more dependent on world (foreign income) rather than on domestic economic activity.

The results corresponding to the relationship between primary exports and economic growth are reported in table 4.

Table 4 — Estimates of Relationship Between Primary Exports and Economic Growth: Results from 3SLS - (1960-88)

Variables	Primary Exports		
	Equation (2)	Equation (4)	Equation (6)
Intercept Term	4.81 (15.15)*	- 15.03 (13.73)*	- 21.91 (12.37)*
Labor (L)	0.29 (1.72)**		
Capital (K)	0.38 (4.49)*		
Exports (X)	0.12 (7.27)*	1	1
World GDP Index (Yw)		5.29 (20.72)*	
Relative Price $[P_x(\$)/P_w(\$)]$		- 0.32 (1.90)*	
GDP (Y)	1		1.28 (4.31)*
Relative Price $[P_x(\$).e^R]/P_g$			2.50 (11.73)*
R^2	0.97	0.93	0.96
DW	1.68	1.36	1.55

DW of equation (2) lies in the range du to 4-du.

T-statistics in parentheses * denotes significance at 5 percent level.

As shown in table 4, all the coefficients have expected signs and are also statistically significant at 5 percent level of significance. The coefficient of primary exports in the production function [equation (2)] bears a positive sign and is statistically significant, indicating a positive causal relationship between primary exports growth and GDP growth. The foreign income elasticity is 5.29, higher than the domestic income elasticity (1.28), reflecting, the observation that Pakistan's

primary exports are highly responsive to changes in the world GDP index. The relative price elasticity of demand in case of primary exports is - 0.32, higher in absolute value than that of price elasticity in total exports (0.11), showing the lesser sensitivity of manufactured exports to price changes. The domestic income elasticity of the supply of primary exports is 1.28, which is exactly equal to the one reported for total exports (1.28). A comparison of two income elasticities (foreign and domestic) suggests that Pakistan's primary exports are more responsive to foreign rather than domestic income.

The results showing relationship between manufactured exports and economic growth are reported in table 5.

Table 5 ---- Estimates of Relationship Between Manufactured Exports and Economic Growth: Results from 3SLS - (1960-88)

Variables	Manufactured Exports		
	Equation (2)	Equation (4)	Equation (6)
Intercept Term	4.85 (11.14)*	- 13.01 (12.47)*	- 21.09 (18.96)*
Labor (L)	0.30 (1.73)**		
Capital (K)	0.35 (3.89)*		
Exports (X)	(0.14) (5.31)*	1	1
World GDP Index (Yw)		4.99 (20.51)*	
Relative Price $[P_x(\$)/P_w(\$)]$		- 0.27 (1.94)*	
GDP (Y)	1		2.58 (19.67)*
Relative Price $[P_x(\$).e^R]/P_g$			0.89 (4.93)*
R^2	0.97	0.92	0.97
DW	1.66	1.34	1.91

T-statistics in parentheses * denotes significance at 5 percent level.

Once again, the estimated coefficients have expected signs and are statistically significant at 5 percent level of significance. The coefficient of manufactured exports in equation (2) is reasonably high (0.14), which implies a fairly high response of GDP to changes in manufactured exports. The coefficient of manufactured exports (0.14) is almost equal to primary exports (0.12), indicating that Pakistan's economy relies equally on primary and manufactured exports. Alternatively, primary exports play as significant role as manufactured exports towards economic growth. This may be due to the reason that Pakistan relied both on primary as well as manufactured exports during the period of this study. The foreign income elasticity for manufactured exports look quite higher than domestic income elasticity of supply of exports.

CHAPTER 6

CONCLUSIONS AND FURTHER AVENUES OF RESEARCH

The purpose of this study has been to examine the relationship between exports growth and economic growth by using a simultaneous equation framework (equations 2, 4, 6 and 7). The influence of exports on economic growth is measured by means of an export-augmented neoclassical production function. Besides total exports, I have also tried to analyze the effects of manufactured and primary exports on economic growth of Pakistan. The Three Stage Least Squares (3SLS) method has been employed to estimate the system of simultaneous equations.

The results show that there is a positive relationship between exports growth and economic growth (impact effect) in case of Pakistan. This result is in consistent with earlier studies [e.g., see Balassa (1985), Krueger (1978), Tyler (1981), Khan and Saqib (1993)]. This association between exports and economic growth is also valid for manufactured and primary exports. The foreign income elasticity of demand for exports is found to be much higher (2.05) than domestic income elasticity (1.28) of supply of exports. This indicates that Pakistan's exports are more responsive to changes in foreign income.

Furthermore, the foreign income elasticity of the demand for primary exports is found to be higher than the demand for manufactured goods exports. It is, therefore, suggested that Pakistan should concentrate and provide more resources towards primary goods exports to improve its

balance of trade. It is also evident from the findings of a strong association between exports and economic growth that an export-oriented strategy rather than import-substitution should be advocated.

The following areas seem interesting as topics for further research. The role of structural adjustment policies particularly in relation to the linkages between exports and economic growth by using time series or cross section data. Especially one might wish to examine the relationship before and after the start of the structural adjustment program. Other variables like devaluation and the balance of payments can also be introduced to reach a more decisive conclusion. Moreover, it would be interesting to compare the trends between the countries that underwent a structural adjustment program and those that did not.

It would also be interesting to extend the present analysis (simultaneous equations framework) to the Newly Industrializing Countries such as the "four little tigers" (Hong Kong, South Korea, Singapore, and Taiwan), which are often used as evidence in support of the export-led growth hypothesis.

ENDNOTES.

8. See Meade (1961), Solow (1956), and Swan (1956). Net investment is then just the rate of increase of this capital stock dk/dt or $\dot{K}$, so;

$$\dot{K} = sY \qquad (1)$$

Technological possibilities are represented by a production function.

$$Y = F(K, L) \qquad (2)$$

Production function is homogenous of first degree. Inserting (2) in (1) we get

$$\dot{K} = sF(K, L) \qquad (3)$$

As a result of exogenous population growth, the labor force increases at a constant relative rate n. In the absence of technological change n is Harrod's natural rate of growth. Thus;

$$L_i = L_0 e^{nt} \qquad (4)$$

Where L = available supply of labor. Insert (4) in (3), we get,

$$\dot{K} = sF(K, L_0 e^{nt}) \qquad (5)$$

This equation determines the time path of capital accumulation that must be followed if all available labor is to be employed. To see if there is always a capital accumulation path consistent with any rate of growth of the labor force, we introduce a new variable r = K/L, the ratio of capital to labor.

Hence we have $K = rL = r L_0 e^{nt}$

Differentiating with respect to time, we get,

$$\dot{K} = L_0 e^{nt} \dot{r} + nr L_0 e^{nt}$$

Substituting this in (5), we get

$$(\dot{r} + nr) L_0 e^{nt} = s F(K, L_0 e^{nt})$$

Because of constant returns to scale we can divide both variables in F by $L = L_0 e^{nt}$ provided we multiply F by the same factor. Thus

$$(\dot{r} + nr) L_0 e^{nt} = s L_0 e^{nt} F(K/L_0 e^{nt}, 1)$$

and dividing out the common factor we arrive at

$$\dot{r} = s F(r,1) - nr$$

Since r = K/L, the relative rate of change of r is the difference between the relative rates of change of K and L. That is:

$$\dot{r} / r = \dot{K} / K - \dot{L} / L$$

$$\dot{L} / L = n ,$$

and $\dot{K} = s F(K,L)$.

Making these substitutions, we get

$$\dot{r} = r\, sF(K,L)/K - nr$$

Now divide L out of F as before, (as L/K = 1/r) and we get again

$$\dot{r} = sF(r, 1) - nr \qquad (6)$$

Where F(r, 1) is total product curve as varying amounts r of capital are employed with one unit of labor. Alternatively, it gives output per worker as a function of capital per worker. Thus (6) states that the rate of change of the capital-labor ratio is the difference of two terms, one representing the increment of capital and one the increment of labor.

20. If $y_t = \beta_1 + \beta_2 Z_t + e_t$

H_0 : plim $1/T\ \Sigma(Z_t - \bar{Z})e_t = 0$

H_1 : plim $1/T\ \Sigma(Z_t - \bar{Z}) e_t \neq 0$

This test is designed to test whether the ordinary least square estimator b_2 yields a value that is significantly different from that produced by the 3SLS estimator $\hat{\beta}_2$ (3SLS). If H_0 is true, then both are consistent estimators for β_2. The test statistic has a large sample chi-square distribution and is as follows:

$$m = (\hat{\beta}_2 (3SLS) - b_2)^2 / \hat{var} (\hat{\beta}_2 (3SLS) - \hat{var} (b_2))$$

In the present case, let H_0 denote that there is no mispecification of the model and let H_1 denote the alternative hypothesis that there is mispecification of the model. By substituting the values into the above formula, I get the Hausman test as 0.89114. The value of χ^2 at 5 percent level of significance with k = 3 is 7.81473. In this way, the result supports the null hypothesis and I may accept H_0.

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