Exports-Led Growth Hypothesis: Further Econometric Evidence from Pakistan

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Abstract

This paper re-investigates export-led growth hypothesis for Pakistan. The paper has employed cointegration and multivariate Granger Causality developed by Toda and Yamamoto (1995) to study the long-run and short-run dynamics among exports growth, imports growth and real output growth over the period 1960 to 2003.The empirical results strongly support a long-run relationship among import, export and output growth. The paper finds feedback effect between import and output growth, and unidirectional causality from export to output growth. Nevertheless, this paper does not find any significant causality between import and export growth.

Key Words: Export-led growth hypothesis, multivariate Granger Causality test, VAR Model, Economic Growth in Pakistan.

1 INTRODUCTION

The theoretical association between trade and economic growth has been discussed for over two centuries. However, controversy still persists regarding their real effects. The favorable arguments with respect to trade can be traced back to the classical school of economic thought that started with Adam Smith and subsequently enriched by the work of Ricardo, Torrens, James Mill and John Stuart Mill in the first part of the nineteenth century. Since then the justification for free trade and the various and indisputable benefits that international specialization brings to the productivity of nations have been widely discussed in the economic literature (see e.g. Bhagwati, 1978; Krueger, 1978).

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The suitability of trade policy- import substitution or export promotion- for growth and development has been also debated in the literature. In 1950s and 1960s, most of the developing countries followed import substitution (IS) policies for the economic growth. The proponents of the IS policy stress upon the need for developing countries (LDCs) to evolve their own style of development and to control their own destiny. This implies policies to encourage indigenous "learning by doing" in manufacturing and the development of indigenous technologies appropriate to country's resource endowments (see Todaro and Smith, 2003, p 556). Since mid-1970s, in most developing countries, there has been considerable shift towards export promotion strategy (EP)[3]. This approach postulates that export expansion leads to better resource allocation, getting economies of scale and production efficiency through technological development, capital formation, and employment creation and hence economics growth.

Theoretical agreement on export-led growth emerged among neoclassical economists after the successful story of newly industrialized countries. They argue that, for instance, Hong Kong (China), Taiwan, Singapore and the Republic of Korea, the so-called Four Tigers, have been successful in achieving high and sustained rates of economic growth since early 1960s because of their free-market, outward-oriented economies (see e.g. World Bank, 1993). However, the reality of the tigers does not support this view of how their export success was achieved. The production and composition of export was not left to the market but resulted as much from carefully planned intervention by the governments. As Amsden (1989) states that the approach behind the emergence of this new 'Asian Tiger' is a strong, interventionist state, which has willfully and abundantly provided tariff protection and subsidies, change interest and exchange rates, management investment, and controlled industry using both lucrative carrots and threatening sticks.

Nevertheless, export-led growth hypothesis has not only been widely accepted among academics (see for example, Feder, 1982 and Krueger, 1990), and evolved into a "new conventional wisdom" (Tyler, 1981; Balassa, 1985), but also has shaped the development of a number of countries and the World Bank (see World Bank development Report, 1987).

The literature, which has an extensive inventory of models that stress the importance of trade in achieving a sustainable rate of economic growth, have focused on different variables, such as degree of openness, real exchange rate, tariffs, terms of trade and export performance, to verify the hypothesis that open economies grow more rapidly than those that are closed (see e.g. Edwards, 1998). The advocates of the export-led strategy and free trade point out that most developing countries, mostly in Latin America, which followed inward-oriented policies under the import substitution strategy (IS), had poor economic achievements (Balassa, 1980).

Thereafter, many LDCs were forced to stimulate their export-led orientation, even more because most of them have to rely on multilateral organizations, to implement adjustment and stabilization programmers to correct their economic imbalances. Promoting exports would enable LDCs to correct imbalances in the external sector

[3] Pakistan, like many developing countries, has adopted export promotion strategy since last two and half decades, moving towards fewer and fewer controls and showing more openness.

and at the same time assist them in their full recovery. Consequently, numerous empirical researches have been done on the relationship between exports and growth. However, the results are not consistent for both developed and developing countries.

Generally, the empirical studies regarding the relationship between exports and output growth can be separated into two categories. The first type of empirical investigation focuses on cross-section analysis, and the second concentrates on country-specific studies.

In the cross section analysis, Kravis (1970), Michaely (1977) Bhagwati (1978), and to name a few, use the Spearman rank correlations test to explore the relationship between exports and growth, While Balassa (1978, 1985), Tyler (1981), Kavoussi (1984) Ram (1987), Heitger (1987), Fosu (1990), Lussier (1993) investigate exports and growth performance within a neoclassical framework by using ordinary least squares (OLS) on cross section data. These studies, in general, find that export is an important factor in determining economic growth. Gonclaves and Richtering (1986) conduct empirical analysis for a sample of 70 developing countries for the period 1960-1981, and find that export growth rate and change in export/GDP ratio are significantly correlated with GDP growth. Sheehey (1993) finds inconsistent evidence of higher productivity in the export sector compared with the non-export sector. While, Colombatto (1990), using OLS, with a sample of 70 countries, rejects the export- led growth hypothesis.

Cross sectional empirical investigations can explain to some extent why growth differs across a wide spectrum of countries. Nevertheless, this type of cross-section investigation has its deficiencies, which raises doubts about their usefulness. In these studies, countries in similar stages of development were grouped together. Implicitly assume a common economic structure and similar production technology across different countries. However, this assumption is most likely unrealistic. Thus the results reported in theses studies are clearly vulnerable to criticism. Moreover, cross sectional analysis ignore the shifts in the relationship between variables overtime within a country, while export growth and economic growth is a long run phenomenon, which can not be studied by using cross sectional analysis.

With recent developments in econometrics, emphasis has been given to the time series analyses to determine a long-term relationship between export and economic growth and the direction of causality, if such relationship exists. It may be pointed out that the most recent time series investigations concerning LDCs that have used the econometric methodology of cointegration have not been able to establish unequivocally that a robust relationship between these variables indeed exist in the long term, (see e.g. Islam, 1998). While, some have been able to find a long-run relationship, many others have rejected the export-led hypothesis.

Some studies also find that the effect of export on economic growth depends on the level of development of the country concern and the composition of export itself (see e.g. Tyler, 1981; Dadaro, 1991; Michaely, 1977; Singer and Gray, 1988; Watanabe, 1985 and Kavoussi, 985). Furthermore, some authors (e.g. Yanghmaian and Ghorashi, 1995) maintain that a long and complex process of structural change and economic development precedes both exports and economic growth. These studies indicate that the differential impact of exports on economic growth across different countries and

regions depend on the level of development and economic structure and are subject to a dynamic interactive process of economic development and structural change.

Jung and Marshall (1985), for instance, based on the standard Granger causality tests, analyze the relationship between export growth and economic growth using time series data for 37 developing countries and find evidence for the export-led growth hypothesis in only 4 (Indonesia, Egypt, Costa Rica, and Ecuador) out of the 37 countries included in the sample. Using causality test, Chow (1987) investigates the causal relationship between export growth and industrial development in eight newly industrialized countries (NICs). It is revealed that in most NICs (except Argentina) there is strong bi-directional causality between the export growth and industrial development. Chow's results are contrast to Jung and Marshall for four out of six countries common in the two samples, namely Brazil, Korea, Mexico and Taiwan. More specifically, as opposed to Chow's evidence of dual causality between exports and economic growth, Jung and Marshall find no significant causality in Brazil or Mexico, and causality only from output to exports in Korea and Taiwan. The contrast in empirical findings of the two studies may be partly explained by the fact that Chow uses output of the manufacturing sector as a measure of aggregate output as opposed to Jung and Marshall (1985), who utilize gross domestic product.

Darrat (1986), in a study of four Asian NICs, (Hong Kong, South Korea, Singapore, and Taiwan), finds no evidence of unidirectional causality from exports to output in all the four economies. In the case of Taiwan, however, the study detects unidirectional causality from output growth to export growth. In another study, Darrat (1987) rejects the export-led growth hypothesis in three out of four cases. He supports the case of Republic of Korea only. Likewise, Ahmad and Kwan (1991) reject the export-led growth hypothesis in their empirical study of 47 African developing countries. Bahmani-Oskooee *et al* (1991), based on a sample of 20 less-developed countries, find the support of export-led growth hypothesis only in the case of Indonesia, Korea, Taiwan and Thailand. Their study confirms the finding of Jung and Marshall (1985) for Indonesia; still two studies reach different conclusions for Korea, Taiwan and Thailand. Dodaro (1993) finds a positive causality from exports to GDP in seven out of 87 countries.

Using Error Correction Modeling (ECM) approach, Bahmani-Oskooee and Alse (1993) re-examines the relationship between export growth and economic growth for nine developing countries and find strong support for the export-led growth hypothesis for all the countries included in the sample. Likewise, Dutt and Ghosh (1996) find support for the export-led growth hypothesis about half of the 26 countries under study. Furthermore, Xu (1996) also finds support for export-led growth in 17 out of 32 developing countries included in his study.

Al-Yousif (1997) uses a multivariate model to examine the relationship in the case of Malaysia. His study supports the export-led growth theory as a short run phenomenon, while El-Sakka *et al* (2000) find mixed results regarding the direction of causality in 16 Arab countries.

It is commonly accepted that many East Asian countries have achieved higher rates of economic growth through export-led industrialization; however, the empirical evidence is generally mixed. Ghartey (1993), using a vector auto-regressive model for

Taiwan, USA and Japan, finds export-led growth in Taiwan, economic growth Granger-causes export growth in the USA, and a feedback causal relationship exists in the case of Japan. On the contrary, Kwan et al. (1996) find mixed results for Taiwan, while Boltho (1996) finds that domestic forces rather than foreign demand propelled longer run growth in Japan. Ahmed and Harnhirun (1996) find no support for the export-led growth hypothesis for 5 ASEAN economies. Gupta (1985) finds bi-directional association between exports and economic growth for Israel and South Korea.

Nandi (1991) and Bhat (1995), for example, find evidence of export-led growth hypothesis for India. while Ghatak and Wheatley (1997) finds that export growth is Granger-caused by output growth in India. On the other hand, Xu (1996) rejects the export-led growth hypothesis for India for the period 1960-1990.

Some studies have been carried out in the recent past on Pakistan. Khan and Saqib (1993), use a simultaneous equation model and find a strong relationship between export performance and economic growth in Pakistan. Mutairi (1993) finds no support for the period 1959-91, while Khan *et al* (1995) find strong evidence of bi-directional causality between export growth and economic growth for Pakistan.

Rana (1985) estimates an export-augmented production function for 14 Asian developing countries including Pakistan. The evidence supports that exports contribute positively to economic growth. Anwar and Sampath (2000) examine the export led growth hypothesis for 97 countries including Pakistan for the period 1960-1992. They find unidirectional causality in the case of Pakistan. Ahmed *et al* (2000) investigate the relationship between exports, economic growth and foreign debt for Bangladesh, India, Pakistan Sri Lanka and four South East Asian countries using a trivariate causality framework. The study rejects the export-led growth hypothesis for all the countries (except for Bangladesh) included in the sample. Kemal *et al* (2002) investigate export-led hypothesis for five South Asian Countries including Pakistan. The study finds no evidence of causation in the short run for Pakistan in either direction. However, they find a strong support for long-run causality from export to GDP for Pakistan.

Though, results of these studies are mixed, they suggest, in general, that the level of development is an important factor in determining the export-economic growth relationship. The above-citied studies, implicitly assume that such economies are rich in resources and homogenous in the export structure and can implement the export expansion policies at a sufficiently fast rate. Developing economies, such as Pakistan, where domestic resource are sufficient, export expansion still need to import some goods that do not exist in domestic market but play a key role in the manufacturing of the export driven goods[4]. It still needs to locate and import some necessary technology in order to have a competitive position. This can be seen from Figure 1 where the growth of import and export move in a uniform way. This seems that import as well as export plays vital role in economic growth. In other words, if we study the long run relationship and causality structure without including import will

[4] Pakistan's imports are mainly consist of machinery, petroleum and petroleum products, chemicals, transport equipments, edible oil, iron and steel, fertilizer and tee. Appendix 1 depicts the trend in the composition of the exports and imports.

lead to invalid inference. It may be noted that the approach of using a simple two-variable framework in the causality test without considering the effects of other variable such as import in the case of Pakistan are subject to a possible specification bias.

It is established in the literature of econometrics that causality tests are sensitive to model selection and function form (Gujarati, 1995). Riezman, Whiteman and Summers (1996) point out that omitting the important variables in the VAR estimation process can result in both type I and Type II errors, that is, spurious rejection of one causality as well as spurious detection of it. Lutkepohl (1982) and more recently Caporale and Pittis (1997) have shown the sensitivity of causality inference between the variables of the incomplete system. Moreover, Caporale, Hassapis, and Pittis (1998) show that the omission of an important variable results in invalid inferences about the causality structure of the system, unless causality is in the direction of the omitted variable but not vice versa**.**

With this spirit, the paper attempts to reinvestigate not only the existence of a long-run relationship among economic growth and exports and imports by using cointegration techniques, but also to explore the short run causal relationship between economic growth, import and export in Pakistan by employing the multivariate Granger causality methodology developed by Toda and Yamamoto (1995). To the best of our knowledge, no study has been done to examine existence and nature of any causal relationship between output, import and export by employing multivariate Granger causality procedure over the period 1960 to 2003 in Pakistan.

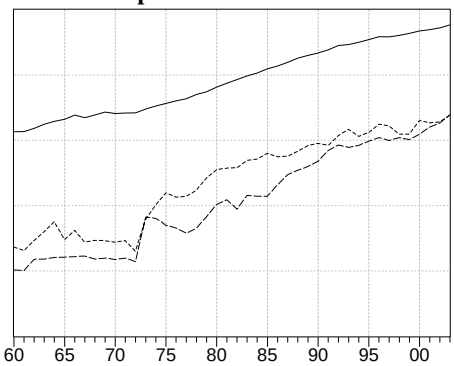
After introduction, the rest of the paper is organized as follows. Section 2 deals with the data and methodological issues. Section 3 presents empirical findings, while, section 4 concludes the paper.

2 DATA AND METHODOLOGICAL ISSUES

2.1 Data

Annual data on real GDP, real exports and real imports are retrieved from IMF's International Financial Statistics (CD-ROM) for the year 1960 to 2003. All the time series are transformed into logarithms. Plot of the logarithms of the three time series are shown in Figure 1. Figure1 shows that the logarithms of real GDP, 'y' the real export, 'x' and the real imports, 'm' exhibit strong upward trends. This provides anecdotal evidence that the three series tend to move together.

Figure 1: Economic Growth, Import and Export in Pakistan 1960 - 2003.



2.2 The Methodological Issues

2.2.1 Cointegration

One of our objectives is to investigate the long-run dynamics relationship among the three variables i.e., Imports and Exports. The system can be represented as follows:

$$y_t = \beta_0 + \beta_1 x_t + \beta_2 m_t + \varepsilon_t \tag{2-1}$$

Where the vector (y, x and m) represent real output growth, exports growth and imports growth respectively. The coefficients $\beta_1$and β_2 are expected to be positive.

In implementing the tests for cointegration we use the likelihood ratio test due to Johansen (1988) and Johansen and Juselius (1990). The method involves estimating the following unrestricted vector autoregressive (VAR) model:

$$Y_t = A_o + \sum_{j=1}^{p} A_j Y_{t-j} + \varepsilon_t \tag{2-2}$$

Where Y_t is an n × 1 vector of non-stationary I(1) variables, in our case $Y_t \equiv$(y, x and m), *n* is the number of variables in the system, three in this case. A_0 is a 3 × 1 vector of constants, p is the number of lags, A_j is a 3 × 3 matrix of estimable parameters, and ε_t is a 3 × 1 vector of independent and identically distributed innovations. If *Yt* is cointegrated, it can be generated by a vector error correction model (VECM):

$$\Delta Y_t = A_0 + \sum_{j=1}^{p-1} \Gamma_j \Delta Y_{t-j} + \Pi Y_{t-1} + \varepsilon_t \tag{2-3}$$

Where

$$\Gamma_j = -\sum_{i=j+1}^{p} A_i \quad \text{and} \quad \Pi = \sum_{j=1}^{p} A_j - I,$$

Δ is the difference operator, and I is an n × n identity matrix.

The rank of the matrix Π determines the number of cointegrating vectors since the rank of Π is equal to the number of independent cointegrating vectors. Thus, if the rank of Π equals 0, the matrix is null and equation (5) becomes the usual VAR model in first differences. If the rank of Π is r where r < n, then there exist r cointegrating relationships in the above model. In this case, the matrix Π can be rewritten as $\Pi = \alpha\beta'$ where α and β are n × r matrices of rank r. Here, β is the matrix of cointegrating parameters and α is the matrix of weights with which each cointegrating vector enters the above VAR model. Johansen provides two different test statistics that can be used to test the hypothesis of the existence of r cointegrating vectors, namely, the trace test and the maximum eigenvalue test. The trace test statistic tests the null hypothesis that

the number of distinct cointegrating relationships is less than or equal to r against the alternative hypothesis of more than r cointegrating relationships, and is defined as:

$$\lambda_{trace}(r) = -T \sum_{j=r+1}^{p} \ln(1-\hat{\lambda}_j), \tag{2-4}$$

Where T is the number of observations and the λs are the eigenvalues of Π in equation (2-3). The maximum eigenvalue test statistic tests the null hypothesis that the number of cointegrating relationships is less than or equal to r against the alternative of r+1 cointegrating relationships, is defined as:

$$\lambda_{\max}(r, r+1) = -T(\ln(1-\hat{\lambda}_{r+1}) \tag{2-5}$$

One of the critical parts of the Johansen and Juselius approach is to determine the rank of matrix Π, since the approach depends primarily upon a well-specified regression model. Therefore, before any attempt to determine this rank or to present any estimation, the empirical analysis begins with specification and misspecification test. The specification and misspecification test based on the OLS residuals of the unrestricted model in equation (2-2) for the vector Y_t. We use, the most recommended, the Akaike Information Criterion (AIC) and the Schwarz Bayesian Criterion (SBC) to select the lag length of the VAR system, which is achieved by minimizing the AIC and SBC.

2.2 Multivariate Granger causality tests

Apart from the examination of the long-run co-movements of the three variable of interest, we will explore the short-run dynamics by performing Granger causality tests for cointegrating systems. Such an exercise will provide an understanding of the interactions amongst the variables in the system and will shed light on the directions of the causality.

The concept of causality was initially defined by Granger (1969). Broadly speaking, in a bivariate framework, a time series x_{1t} Granger-causes another time series x_{2t} if series x_{2t} can be predicted with better accuracy by using past values of x_{1t} rather than by not doing so, other information is being identical. Testing causal relations between two series x_{1t} and x_{2t} (in bivariate case) can be tested on the following vector autoregressive process of order p.

$$\begin{bmatrix} x_{1t} \\ x_{2t} \end{bmatrix} = \begin{bmatrix} A_{10} \\ A_{20} \end{bmatrix} + \begin{bmatrix} A_{11}(L) & A_{12}(L) \\ A_{21}(L) & A_{22}(L) \end{bmatrix} \begin{bmatrix} x_{1t-1} \\ x_{2t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \tag{2-6}$$

Where A_{i0} are the parameters representing intercept terms and $A_{ij}(L)$ the polynomials in the lag operator. And $\varepsilon_t = (\varepsilon_{1t}, \varepsilon_{2t})$ is an independently and identically distributed bivariate white noise process with zero mean and non-singular covariance matrix. In this process, if $A_{12}(L)$ s are statistically significantly different from zero, either in individual coefficient or a subset of coefficients but $A_{21}(L)$ not, then it is said that x_{2t} is unidirectional Granger casual to x_{1t}. On the other hand, if $A_{21}(L)$ s are statistically

significantly different from zero, either in individual coefficient or a subset of coefficients, but $A_{12}(L)$ not, then it is said that x_{1t} is unidirectional Granger casual to x_{2t}. If both $A_{12}(L)$ and $A_{21}(L)$ are statistically significantly different from zero, either in individual coefficient or a subset of coefficients in their respective equations, then it is bi-directional causality (feedback effect) between these two variables.

It may be mentioned that the above test is applicable to stationary series. In reality, however, underlying series may be non-stationary. In such cases, one has to transform the original series into stationary series and causality tests would be performed based on transformed stationary series. A special class of non-stationary process is the I(1) process (i.e. the process possessing a unit root). An I(1) process may be transformed into a stationary one by taking first order differencing. Thus, while dealing with two I(1) process for causality, equations (2-6) must be expressed in terms of differenced-series. However, if underlying I (1) processes are cointegrated; the specifications so obtained must be modified by inserting the lagged-value of the cointegration relation (i.e. error-correction term)[5] as an additional explanatory variable (Engle and Granger, 1987). According to Johansen's (1988), this evidence of cointegration among the variables rules out spurious correlations and also implies at least one direction of Granger causality.

However , Toda and Phillips (1993) provide evidence that the Granger causality tests in ECMs still contain the possibility of incorrect inference. They also suffer from nuisance parameter dependency asymptotically in some cases (see Toda and Phillips, 1993 for details). Therefore, their results are unreliable.[6] All of these indicate that there may be no satisfactory statistical basis for using Granger causality tests in levels or in difference VAR system or even in ECM. The sequential Wald tests of Toda and Phillips (1993) are designed to avoid these problems. Asymptotic theory indicates that their limiting distributions are standard and free of nuisance. For this reason, we apply the Multivariate Granger causality methodology developed by Toda and Yamamoto (1995)[7] to test the causality among the variables in this paper.

The Advantage of using Toda and Yamamoto's techniques of testing for granger causality lies in its simplicity and the ability to overcome many shortcomings of alternative econometric procedures.

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[5]This methodology involves transforming the suggested relationship into an Error Correction model (ECM) and identifies the parameters associated with causality. If the case involves more than two cointegration vectors, this is not easy work.

[6] Further, there is growing concern among applied researchers that the cointegration likelihood ratio (LR) test of Johansen (1998) and Johansen and Juselius (1990) have often not provide the degree of empirical support that might reasonably have been expected for a long run relationship. Furthermore, using a Monte Carlo experiment, Bewley and Yang (1996) argue that the power of LR tests is high only when the correlation between the shocks that generate the stationary and non-stationary components of typical macroeconomic series is sufficiently large and also that the power of LR tests deteriorates rapidly with over-specification of lag length. This concern has also been supported by the simulation studies of Ho and Sorensen (1996).

[7] However, this procedure does not replace the conventional hypothesis testing of unit roots and cointegration ranks. It should be considers as complementary the pre-testing method that may suffer inference biases (Toda and Yamamota (1995).

Toda and Yamamoto (1995) proposed a simple procedure requiring the estimation of an 'augmented' VAR, even when there is cointegration, which guarantees the asymptotic distribution of the MWald statistic. All one needs to do is to determine the maximal order of integration $d_{\max}$ (where $d_{\max}$ is the maximal order of integration suspected to occur in the system), which we expect to occur in the model and construct a VAR in their levels with a total of (k $+d_{\max}$) lags. Toda and Yamamoto point out that, for d=1, the lag selection procedure is always valid, at least asymptotically, since k > =1=d. If d=2, then the procedure is valid unless k=1. Moreover, according to Toda and Yamamoto, the MWald statistic is valid regardless whether a series is I (0), I (1) or I (2), non-cointegrated or cointegrated of an arbitrary order.

In order to clarify the principle, consider the simple example of a bivarite model, with one lag (k=1). That is,

$$\begin{bmatrix} x_{1t} \\ x_{2t} \end{bmatrix} = \begin{bmatrix} A_{10} \\ A_{20} \end{bmatrix} + \begin{bmatrix} A_{11}{}^{(1)} & A_{12}{}^{(1)} \\ A_{21}{}^{(1)} & A_{22}{}^{(1)} \end{bmatrix} \begin{bmatrix} x_{1t-1} \\ x_{2t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \tag{2-7}$$

Here A_{i0} are the parameters representing intercept terms and $\boldsymbol{\varepsilon}_t = (\boldsymbol{\varepsilon}_{1t}, \boldsymbol{\varepsilon}_{2t})$ is n independently and identically distributed bivariate white noise process with zero mean and non-singular covariance matrix.

To test that x_2 does not Granger cause x_1, we will test the parameter restriction $A_{12}^{(1)}$ =0. If now we assume that x_{1t} and x_{2t} are I (1), a standard t-test is not valid. We test $A_{12}^{(1)}$ =0 by constructing the usual Wald test based on least squares estimates in the augmented model:

$$\begin{bmatrix} x_{1t} \\ x_{2t} \end{bmatrix} = \begin{bmatrix} A_{10} \\ A_{20} \end{bmatrix} + \begin{bmatrix} A_{11}{}^{(1)} & A_{12}{}^{(1)} \\ A_{21}{}^{(1)} & A_{22}{}^{(1)} \end{bmatrix} \begin{bmatrix} x_{1t-1} \\ x_{2t-1} \end{bmatrix} + \begin{bmatrix} A_{11}^{(2)} & A_{12}^{(2)} \\ A_{21}^{(2)} & A_{22}^{(2)} \end{bmatrix} \begin{bmatrix} x_{1t-2} \\ x_{2t-2} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \tag{2-8}$$

The Wald statistic will be asymptotically distributed as a Chi Square (χ^2), with degrees of freedom equal to the number of "zero restrictions", irrespective of I (0), I (1) or I (2), non-cointegrated or cointegrated of an arbitrary order.

3 Empirical Findings

3.1 Order of Integration

Before testing for cointegration we tested for unit roots in order to investigate the stationarity properties of the data, Dickey-Fuller (ADF) t-tests (Dickey and Fuller, 1979) and (PP) Phillips and Perron (1988) test are used to each of the three time series real GDP, real exports and real imports testing for the presence of a unit root. The lag length for the ADF tests was selected to ensure that the residuals were white noise.

The results of the Augmented Dickey Fuller (ADF) test with and without trend as recommended by Engle and Granger (1987) and the Phillips and Perron (1988) test again with and without trend are reported in Table1.

Table 1 shows that the null of unit root can not be rejected for any of the three level variables. However, the null of unit root is rejected for first differenced variables, indicating that all variables are first differenced stationary or integrated of order one, I(1).

TABLE 1

Stationary Test of Each variables using ADF, PP

	ADF		PP	
Variables	Without Trend	With Trend	Without Trend	With Trend
LE	-0.106	-3.185	0.502	-3.143
LM	-0.665	-2.253	-0.548	-2.305
LY	-0.138	-3.573*	0.1456	-1.748
ΔLE	-7.041***	-6.986***	-8.684***	-8.802***
ΔLM	-7.047***	-6.975***	-7.152***	-7.076***
ΔLE	-5.880***	-5.798***	-6.045***	-5.978***

Note:
1. *** and * denotes significance at the 1% and 10% levels, respectively.

3.2 Testing for Cointegration

Having established that all variables in the study are integrated of order one I (1), we proceed to test for cointegration between the variables on levels.

Two time series are cointegrated when a linear combination of the time series is stationary, even though each series may individually be non-stationary. Since non-stationary time series do not return to their long-run average values following a disturbance, it is important to convert them to stationary processes; otherwise regressing one non-stationary process on another non-stationary process can generate spurious results.

Before we formally use the Johansen (1991) procedure to test for cointegration, we have used the Engle-Granger test and CRDW test (see Sargan and Bhargava, 1983) initially to test whether there exist a long-run relationship among the variables of interest. This is just a complementary test.

3.2.1 The EG and CRDE test

In this section, we have used the Engle-Granger test and CRDW test (see Sargan and Bhargava, 1983) to investigate whether the variables under question are cointegrated or not. In doing so, we estimate equation (2-1) in levels through OLS and check whether the residuals from the regression is stationary, i.e. I(0). The results are shown as follows:

$$ly = 1.8235 + 0.5644\exp ort + 0.1324import$$

Adjusted R^2= 0.9771 CRDW=0.9308 ADF (0) =-3.6304***

Notes: *** significant at 1% level.

It is noted from the above that the CRDW clearly exceeds the value of 0.89, which is the approximate critical value for *n*=50 at the 0.05 level of significance. Therefore, the CRDW test is in the position to reject the null hypothesis that the variables are not cointegrated. At the same time, the EG cointegration test also rejected the null hypothesis at the 1% significance level. Thus, the residuals estimated suggest that the output, exports and imports have a long run relationship for the 1960 to 2003 period.

However, although both CRDW and the EG procedure have distinct advantages and in spite of the positive results mentioned earlier, both tests have several important defects[8]. Thus, before making any kind of judgment, we are proceeding to employ more powerful test, Johansen Maximum likelihood techniques, to verify the existence of cointegration in the following sub-section.

3.2.2 Johansen Maximum likelihood techniques

Before we run cointegration test, using the Akaike Information Criterion (AIC) and the Schwarz Bayesian Criterion (SBC), the lag length for the VAR system is determined. Both criteria suggest the use of 2 lags in the VAR. Moreover, since the data are of annual periodicity, an inspection of the results suggests that serial correlation is not a problem when we set the order of the VAR at 2. The results of their λ-max and trace tests to identify the number of cointegrating vectors are reported in Table 2.

Note that Reinsel and Ahn (1992) argue that in model with a limited number of observations, the likelihood ratio tests can be biased toward finding cointegration too often. Thus they suggest multiplying the LR test statistics (λ-max and trace) by a factor (T-nk)/T, where T is the effective number of observations, n is the number of variables in the model, and k is the order of VAR, to obtain the adjusted estimates. Table 2 reports these adjusted statistics.

Table 2

Johansen and Juselius Cointegration Test Results

(Variables: GDP, EXPORTS and IMPORTS)

Null	Alternative	λ-Max Statistics	Critical Value		Trace Statistics	Critical Value	
			95%	99%		95%	99%
r=0	r=1	32.60**	22.00	26.81	49.42**	34.91	41.07
r≤1	r=2	12.75	15.67	20.20	16.82	19.96	24.60
r≤2	r=3	4.06	9.24	12.97	4.06	9.24	12.97

Note: ** Indicate significance at 5% level.

[8] This issue emerged after several Monte Carlo studies that considered the robustness of these tests showed that in general the most standard tests are not powerful. Moreover, most of the studies come to the conclusion that no one test predominates over the others. In fact, in cases where the sample size is finite, the estimations conducted through the EG procedure are sensitive to the imposition of normalization and it assumes only one cointegration vector and does not allow for potential feedback effects (Enders, 1995).

Table 2 shows that the null of no cointegration is rejected using either statistics because both statistics are greater than their critical values. However, the null of at most one cointegrating vector cannot be rejected in favor of r=2.Thus The empirical support for one cointegration vector implies that all three variables, namely, import, export and economic growth, are cointegrated and follow a common long-run path. This is consistent with our "a priory" expectation that import, export and economic growth are inter-connected. Therefore, the cointegration analysis provides a justification for the inclusion of imports in the analysis of export-led growth hypothesis for Pakistan.

Since all of above tests confirm cointegration among these variables under study, therefore, the standard Granger causality test is no longer valid in this case. Hence, we have used multivariate Granger Causality developed by Toda and Yamamoto (1995) to study short-run dynamics among exports growth, imports growth and real output growth.

3.3 Multivariate Granger Causality Test

The results from Table 1 clearly suggest that none of the variables are stationary in level. However, the first differences of these series are stationary. This means that $d_{\max}$=1 in our case. We then proceed in estimating the lag structure of a system of VAR in levels and our results indicate that the optimal lag length based on Akaike's FPE is 2, that is, k=2. We then estimate a system of VAR in levels with a total of ($d_{\max}$+k=2+1) =3 lags.

Using these information, the system of equations is jointly estimated as a "Seemingly Unrelated Regression Equations" (SURE) model by Maximum Likelihood and computes the MWALD test statistic as shown in Table 3.

Table: 3 Granger Causality Test (TY Augmented Lags Methods)

Dependent Variable	Sources of Causation		
	GDP	***EXPORT***	***IMPORT***
	$\chi^2(5)$	$\chi^2(5)$	$\chi^2(5)$
GDP	-	17.08***	16.35***
EXPORT	5.959	-	6.71
IMPORT	9.90*	8.429	-

Notes: *** and * Indicate significance at the 1% and 10 % respectively.

Table 3 shows that the null hypothesis that 'Granger no-causality from export to growth 'can be rejected at 1% level of significance. However, there is no evidence to support the converse. This indicates that there is a unidirectional causality running from exports to output growth. This confirms the ELG hypothesis for Pakistan. Exports boost the growth of economy through access to the wide world market and

hence the economies of scale. It earns foreign exchange and also supports the employment in the export sectors of the economy.

Our results also show that the null hypothesis that ‘ Granger no-causality from imports to growth ‘ can be rejected at 1% level of significance and the null hypothesis that ‘ Granger no-causality from growth to imports ‘ can be rejected at 10% level of significance, showing a feedback effects between imports and output growth. This indicates that in the process of development, it is crucial for Pakistan to import some needed technology and input material to expand capacity to boost output. It is fact that in the process of growth, imports play important role through different channels. Imports of raw material increase the value added products and import of necessary technology increase the productive capacity and productivity, which further enhances the growth rate of the economy. Imports generate employment especially in the handling and transportation sectors. It also creates employment indirectly in the wholesale and retail sectors, which positively effects the growth of the economy. Moreover, it also provides cheap products to consumers and unrestricted access to imports also supports by reducing the prices of essential production inputs. The overall effect of this is to increase growth which supports the increase demand of the imports. However, excessive imports of finished goods may replace the domestic output and displace the workers. How much employment will be effected is an empirical question which needs to be investigated. Our Results do not show any significant causality between import and export growth.

Our results are in contrast to those of Akbar and Naqvi (2000) and Ahmed, Butt and Alam (2000). Their results do not support the ELG hypothesis for Pakistan. Akbar and Naqvi (2000) find that imports do not play any role in the output growth relationship, while Ahmed et al (2000) conclude that both the export driven output growth and output growth-led export promotion hypotheses are not being supported in all cases. The contradictory results of these studies may be due to the standard granger causality test, which is an oversimplified approach. Our study confirms the long run results of Kemal *et al* (2002), while it contradicts the short run results for Pakistan.

4 CONCLUSION

The importance of international trade and economic growth has been debated over the decades. The suitability of trade policy- import substitution or export promotion- for growth and development has been also debated in the literature. In 1950s and 1960s, most of the developing countries followed import substitution (IS) policy for their economic growth. Since mid-1970s, in most developing countries, there has been considerable shift towards export promotion strategy (EP). This approach postulates that export expansion leads to better resource allocation, getting economies of scale and production efficiency through technological development, capital formation, and employment creation and hence economics growth. The export-led growth has been focus of the economic debate. However, results are found to be contradictory. Moreover, findings of the recent studies, which are conducted with reference to Pakistan, are also contradictory.

This paper re-investigated the export-led growth hypothesis. A vector autoregression (VAR) model applying the multivariate Granger causality procedure, developed by

Toda and Yamamoto (1995), instead the traditional error correction mode (ECM) has been used to improve the Standard F-statistics in the causality test process and to test the causal link between the exports growth and the real output growth in Pakistan over the period 1960 to2003. The time series data for the said period were retrieved from IFS.

The empirical results strongly support a long-run relationship among the three variables. Our results show a feedback effect between import and output growth.

Though export growth causes output growth, but converse is not true. More interestingly, there is no significant causality between import and export growth.

It is fact that in the process of growth, imports play important role through different channels. Imports of raw material increase the value added products and import of necessary technology increase the productive capacity and productivity, which further enhances the growth rate of the economy. Imports generate employment especially in the handling and transportation sectors directly and indirectly in the wholesale and retail sectors, which positively effects the growth of the economy. Moreover, unrestricted access to imports also supports by reducing the prices of essential production inputs. The overall effect of this is to increase growth which supports the increase demand of the imports. However, excessive imports of finished goods may replace the domestic output and displace the workers. Exports boost the growth of economy through access to the wide world market and hence the economies of scale. It earns foreign exchange and also supports the employment in the export sectors of the economy. Pakistan may continue with the imports of necessary raw material for value addition and needed technology to expand capacity and improve productivity and give full attention to boost up the exports.

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APPENDIX 1

COMPOSITION OF EXPORTS

Year	primary commodities	semi-manufactured goods	manufactured
	(% share)	(% share)	(% share)
1970-71	33	24	44
1980-81	44	11	45
1990-91	19	24	57
2000-01	13	15	72
2002-03*	12	11	77

Source: Figures for the years 1970 and 1980 are reported from Pakistan (1987), Economic Survey 1986-87 and others from Pakistan (2003) Economic Survey 2002-03. (* provisional).

COMPOSITION OF IMPORTS

Year	capital goods	Raw material for		Consumer goods
		Capital goods	consumer goods	
1970-71	52	11	26	11
1980-81	28	8	50	15
1990-91	33	7	38	13
2000-01	25	6	55	14
2002-03*	29	6	55	10

Source: Figures for the years 1970 and 1980 are reported from Pakistan (1987), Economic Survey 1986-87 and others from Pakistan (2003) Economic Survey 2002-03. (* provisional).