ECONOMIC GROWTH, EXPORTS AND IMPORTS IN PAKISTAN: GRANGER CAUSALITY ANALYSIS

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Pakistan's economy has been in a turbulent phase during the last two decades. Prior to 9/11, the Pakistani economy was in its worst condition ever. The country was going to default on its debt and was about to be declared a pariah state. The significant economic gains the country has achieved since 2002, which the government takes credit for, were a result of the impact of international post 9/11 developments. During Musharraf's era, the economic situation only appeared to be improving, because of favorable terms granted to Pakistan in the light of 9/11. These consisted of export incentives, such as greater market access to the EU, debt rescheduling, and one-time incentives, such as US grants and Saudi investments. This paper is to examine the Granger Causality between economic growth (GDP), exports and imports in Pakistan over the period 1976-2011.

Granger causality and co-integration tests were employed in the empirical analysis, using Augmented Dickey Fuller (ADF) and Phillip Perron (PP) tests. The variables proved to be integrated of the order I (1) at first difference. The Johansen and Juselius Cointegration test was used to determine the presence or otherwise of a cointegration vector in the variables. Both Trace and Max-Eigen values indicated no cointegration at 5% level of significance, indicating that the variables do not have a long-run relationship. To determine the causality between the variables at least in the short run, the Granger causality test was carried out. GDP was found to Granger cause exports (GLE) and exports (EX) does Granger cause GDP at 10% significant level. There was

bidirectional causality between GDP and exports. More interestingly, there was no significant causality between exports and import growth. The discovery of a growth-led rise in exports suggests that the growth in Pakistan's economy will help increase exports as well as providing more products to meet domestic demand. It is evident that a relationship exists between economic growth (GDP) and exports; however, worthy of note is that causality runs from economic growth to exports. This suggests that increase / growth in the economy of Pakistan by variables that may not have been considered in this study causes an increase in the level of exports.

Keywords: Granger Causality, Pakistan, VAR, Economic growth, Export, Import

1.1. INTRODUCTION

The struggle against terrorism existed in Pakistan even before 9/11 and will continue even after America's exit from Afghanistan. 9/11 did what the assassination of Franz Ferdinand of Austria did for World War One. That assassination ignited the highly inflammable fuel of long established imperialistic rivalries. Similarly in Pakistan, treacherous tracks have been ploughed for at least the last two decades, eventually leading to Pakistan becoming a harbinger of international terrorism and its sanctuaries. For better or worse, 9/11 essentially brought us to the crossroads, where the state had make a choice between supporting and abandoning militancy. During the last two decades, Pakistan lost its sovereignty over a large territory in the North West. The country faced either a direct or indirect losses to the tune of 67 billion US dollars. Economically speaking, this is a figure far too great for a developing country to afford to lose. Pakistan's becoming a harbor for domestic and international terrorists has

plunged the country into a chaotic uncertainty where the very survival of the nation is in question. Afghanistan was economically devastated, but the subsequent reduction of US presence is helping Afghanistan to recover; in contrast, there seems no exit from terrorism and state failure in sight for Pakistan.

In the course of a detailed study of Pakistan's economy, it becomes quite evident that the Pakistani regime greatly benefited from 9/11. According to the Center for Defense Information, in the three years before 9/11, Pakistan received about $9m dollars in aid. In the three years after, it received $4.7bn in military assistance alone. Before 9/11, Pakistan was going to default on its debt and was about to be declared a pariah state. Pakistan's significant economic gains since 2002, which the Musharraf government takes credit for, were a result of the impact of international post 9/11 developments. During Musharraf's era, the economic situation only appeared to be improving, because of favorable terms granted to Pakistan in the wake of 9/11. These consisted of export incentives, such as greater market access to the EU, debt rescheduling, and one-time incentives, such as US grants and Saudi investments. As Clifford May, President of the Foundation for the Defense of Democracies, puts it (May 2011):

> "Most regimes in the world are run by bad guys. Some of those bad guys are more open to American assistance and American influence than others. Part of the goal and skill of foreign policy and diplomacy is to figure out who you can work with and where you can make changes that are productive."

Pakistan faced the worst dilemma of its life. It seemed as if the Pakistani President and officials had become the sole

spokesmen for the US in threatening the Taliban and wanted to convey that our cooperation in the US-led effort was unconditional and we would not let even our national interest and integrity come in the way of this cooperation. In Musharraf's own words, 9/11 "came as a thunderbolt," presenting acute challenges as well as opportunities (Musharraf, 2006, p. 15). From September 2001 till today, that is, just within thirteen years, the US has lost much of its good will and probably all of its credibility, essentially because of its foreign policy, its imperialistic attitude of not listening to its allies and its outright disdain for international law, erosion of its moral ground and imposition of its own culture and values upon others. Botched diplomacy, imperialistic policies and brutal expression of its power have left a legacy of resentment, fear and anxiety, especially in the Muslim World (Baloch, 2006).

Economists behind the export-led growth hypothesis consider that exports can serve as an engine of growth. Export growth is often considered to be a main determinant of the production and employment growth of an economy. This so-called hypothesis of export-led growth (ELG) is, as a rule, substantiated by the following four arguments (Ramos, 2001):

- First, export growth leads, by the foreign trade multiplier, to an expansion of production and employment.
- Second, the foreign exchange made available by export growth allows the importation of capital goods, which, in turn, increase the production potential of an economy.
- Third, the volume of and the competition in exports markets cause economies of scale and an acceleration of technical progress in production.
- Fourth, given the theoretical arguments mentioned above, the observed strong correlation of export and production growth is interpreted as empirical evidence in favor of the ELG hypothesis.

The first two arguments are based on a short-run macro model of the Keynesian type, which is by its demand orientation not suitable to explain economic growth. Economies of scale and acceleration of technical change by international trade are potentially important sources of economic growth (Ramos, 2001).

Thus, the neoclassical model with endogenous growth is of major importance. These developments are especially interesting in our context, because there are interesting links between these growth models and static models developed in the field of international trade (Helpman, 1988). On the one hand, we have to mention the growth models of Romer (1986) and Lucas (1988). The former approach postulates economies of scale, external to the firm but internal to the industry. These external economies of scale allow a compensation of the negative effect of capital accumulation on the marginal product of capital at the firm level and lead to an endogenous growth process.

The increases in the output demand of a country through the growth of exports allow the exploitation of economics of scale for an economy. The expansion in exports promotes specialization in the production of export products, which in turn boost the productivity level and cause the general level of skills to rise in the export sector. A nation could accelerate the rate of economic growth by promoting export of goods and services. The relationship between export and economic growth was an important issue among economists and many researchers tried to investigate this relationship. There are four possible propositions on a relationship between export and economic growth: export-led growth (ELG), growth-driven export (GDE), feedback relationship between export and economic growth, and finally it is possible that there is no relationship. Some of the researchers found unidirectional causality and some of them found bidirectional

causality and of course some of them could not found any evidence for causality between export and GDP.

Hatemi and Irandoust (2000) investigated the causal relationship between export growth and economic growth for the Nordic economies. The results show unidirectional Granger causality running from economic growth to export growth in Denmark and bidirectional causality in Finland, Norway and Sweden.

Hatemi (2002) studied causality between export growth and economic growth in Japan by performing augmented Granger-causality tests using the bootstrap simulation technique. The results show that the Granger-causality is bidirectional, which means the expansion of exports is an integral part of the economic growth process in Japan. However, they point to a causal relationship between international trade and exports and economic growth.

Finally and crucially, for the purpose of this paper, the strong correlations of export, import and GDP growth rates has nothing to say about a relationship between the export (import) and the GDP trend development, as it may arise from a purely short-run relationship. In order to test for the existence of a long-run relationship among GDP, exports and imports, the theory of cointegration developed by Engle and Granger (1987). Johansen (1988) and Stock and Watson (1988), among others, has to be applied. To this end, we analyze annual data for Pakistan using a vector autoregressive (VAR) framework.

These arguments by diversified researchers and their studies led the authors to explore into the economic growth or decline of Pakistan as a nation, which was further supported by following economic details. The immense change in economic indicators took place after the terrorist attacks in 2001. In the year 2001 – 2002, Pakistan had a per capita income of less than $600, $35 billion in external debt, 8% unemployment, 4% inflation (Pakistan Economic Survey 2003-04) and a 15% increase in

population since 1997 (Census Report of Pakistan 1998). Further, as a nation Pakistan required an amount between $10 billion and $15 billion to reduce the country's external debt of $35 billion and to bring the economy into the mainstream of developed nations. Considering this huge requirement, Pakistan provided the United States with logistical and military support to curb the threat of terrorism, but received, in the four years 2000 to 2003, the meager sum of only $2.4 billion in foreign aid from the United States. (The News, 2003). The Overview of the Pakistan Economic Survey 2001-02 stated:

> "The outgoing fiscal year (2001-02) has been the most difficult and challenging year for the world economy in general and Pakistan's economy in particular. This year has witnessed the world undergoing cataclysmic changes. Many epoch-making events unfolded on the international and national scene which impacted economies around the world, including Pakistan. In particular, the events of September 11 and December 13 and their aftermath, and continuation of catastrophic drought conditions adversely affected the pace of economic recovery in Pakistan."

Five years later, the Overview of the Pakistan Economic Survey 2006-07 stated:

> "Pakistan's economy continues to gain traction as it experiences the longest spell of its strongest growth in years. The outcomes of the outgoing fiscal year indicate that Pakistan's upbeat economic momentum remains on track. Economic growth

> accelerates to 7.0 percent in 2006-07 at the back of robust growth in agriculture, manufacturing and services. Pakistan's growth performance over the last five years has been striking. Average real GDP growth during 2003-07 was the best performance since many decades, and it now seems that Pakistan has decisively broken out of the low growth rut that it was in for more than one decade. Economic growth has been notably stable and resilient. With economic growth at 7.0 percent in 2006-07, Pakistan's real GDP has grown at an average rate of 7.0 percent per annum during the last five years (2003-07) and over 7.5 percent in the last four year (2004-07) in running. Compared with other emerging economies in Asia, this puts Pakistan as one of the fastest growing economies in the region along with China, India, and Vietnam. The good performance has resulted from a combination of generally sound economic policies, on-going structural reforms and a benign international economic environment. Based on the performance of half-a-decade of strong, stable, resilient and broad-based economic growth it appears that Pakistan's economy will continue to be a high mean, low variance economy over the medium-term."

The economic situation in the country too was not that attractive. Pakistan averaged 3.1% growth in real GDP in the years 2001-2003, almost three percentage points below target and much below the "boom period" of the 1980s, which averaged 6.1%

growth (Pakistan Economic Survey 2003-04).[1] The Pakistan Economic Survey 2001-03 states that Foreign Direct Investment (FDI) decreased by 66.5% in 2001, then staggered to grow for the next few years. In just the first three months after the terrorist attacks (October-December 2001), billions of rupees were lost in Pakistani export and import orders that increased unemployment and deteriorated capital and current account deficits (Khan, 2001). To overcome the economic situations, more US aid was required in the form of military compensation and economic grants, to put the economy on a solid footing.

On the whole, the study mainly looked into the economic growth, exports and imports in Pakistan through Granger Causality Analysis, which was much evident from the literatures and statistical examinations, explained in the next sections.

The paper is organized in the following manner: the first section is related to the introduction to the details of the study, followed by the review of related literatures as section two. Section three highlights the methodology employed in the study and the sources of data. Empirical results and analysis are detailed in the fourth section, while the conclusions are presented in section five.

1.2. LITERATURE REVIEW

In any study of the aggregate economy, one of the key elements is the aggregate amount of goods and services produced over a certain period of time. The measure is called the nominal gross domestic product (the GDP). This is the market value of the

[1] The annual *Economic Surveys* from 2006-07 through 2013-14 are available at http://www.finance.gov.pk.

total quantity of final goods and services produced over the specified time period. The GDP is actually measured quarterly, but the number is then multiplied by four, so that the amount is in annual terms (Mankiw, 2011).

The components of this measure of GDP are Consumption(C), Investment (I), Government Expenditure (G) and Net Exports (NX). Net exports represents the money value of domestically produced goods that are sold outside the country (*i.e.*, our exports) minus the purchase of goods and services produced in other countries (*i.e.*, our imports). Our exports are part of our domestic production, so obviously must be included. Our imports are subtracted here, because they are goods and services produced by foreign countries, but they have already been included in our consumption, investment and government expenditures. If imports increase, but all other parts of the GDP remain the same, the GDP will not change, because the imports are first included in the calculation of C + I + G, and then they are subtracted out. Thus, Y = C + I + G + NX.

A large number of studies tested the Export Led Growth (ELG) hypothesis, using different econometric procedures, ranging from simple OLS to multivariate cointegration, but previous empirical studies have produced mixed and conflicting results on the nature and direction of the causal relationship between export growth and output growth.

Chow (1987) found strong bidirectional causality between export growth and industrial development. Theoretical agreement on export-led growth emerged among neoclassical economists due to the success of the free-market and outward-oriented policies of the East Asian Tigers (World Bank 1993). Ghatak and Price (1997) conclude that export growth is caused by output growth in India. Khan *et al*. (1995) find strong evidence of bi-directional causality between export growth and economic growth for

Pakistan. Love and Chandra (2005) show both short and long-run unidirectional causality from income to exports in Bangladesh.

Dodaro (1993) shows mixed results. Nandi and Basuded (1991), working on India, find evidence of unidirectional causality from export growth to economic growth. Bhat (1995) re-examines the export-economic growth nexus for India and finds evidence of bi-directional causality between export growth and economic growth.

Ghatak and Price (1997) test the ELG hypothesis for India for the period 1960-1992, using exports as regressors and measure of GDP that nets out exports, along with exports and imports as additional variables. Their cointegration tests confirm the long-run nature of this relationship. However, imports do not appear to be important for the case of India.

Asafu-Adjaye *et al.* (1999) consider three variables: exports, real output and imports (for the period 1960-1994). They do not find any evidence of the existence of a causal relationship between these variables for the case of India and no support for the ELG hypothesis, which is not too surprising given India's economic history and trade policies.

Ramos (2001) investigates the Granger-causality between exports, imports, and economic growth in Portugal over the period 1865-1998. His empirical results do not confirm a unidirectional causality between the variables considered. There is a feedback effect between exports output growth and imports output growth.

Nidugala (2001) finds evidence in support of the ELG hypothesis for the case of India, particularly in the 1980s. He finds that export growth had a significant impact on GDP growth. Further, his study reveals that growth of manufactured exports had a significant positive relationship with GDP growth, while the growth of primary exports had no such influence.

Kahn (2001) studies the economic performance and the impact of September 11 and short-term economic outlook of Pakistan. Pakistan averaged a 3.1% growth in real GDP in the three years 2001 to2003, almost three percentage points below target and much below the "boom period" of the 1980s that averaged 6.1% growth (Pakistan Economic Survey 2003-04). The Pakistan Economic Survey 2001-2003 states that Foreign Direct Investment (FDI) decreased by 66.5% in 2001, and has since staggered to grow. In just the first three months after the terrorist attacks (October-December 2001), billions of rupees were lost in Pakistani export and import orders that increased unemployment and deteriorated capital and current account deficits. Just three months after the terrorist attacks and the public announcement of allying with the United States by the Pakistani President, Pakistan had incurred a loss of $1.8 billion, which included decline in net exports and reduction in overall business optimism (Khan 2001). This included a trade balance deterioration of $500 million as the country was put on war watch from its trade partners, followed by increases in trade insurance and transportation costs.

Kemal *et al*. (2002) find a positive association between exports and economic growth for India as well as for other economies of South Asia. Awokuse (2003) concluded that the empirical results suggested that a long-run steady state exists among the model's six variables and that Granger causality runs unidirectionally from real exports to real GDP.

Mullick (2004) in his study examines the correlation between GDP growth and US foreign aid. The focus is on real GDP growth as the dependent variable, with total investment, foreign reserves, economic aid from the US, trade deficit, budgetary deficit financing, inflation, unemployment, development expenditure, health expenditure, stock market and poverty as the independent variables. Data analysis of these variables shows that, although many sectors of the economy are relatively growing after

the financial support granted by the US, the cost of fighting terrorism is much higher. International and domestic political instability requires the US to provide more foreign aid. From the results of the study, it is clear that this study accepts both hypotheses. The first alternative hypothesis, US-FAID has a positive correlation with GDP growth in Pakistan from 1980-2003, is not rejected. The second hypothesis, Economic growth will be sustained by increasing US-FAID, is also not rejected. The study shows that US-FAID has indeed a positive correlation with GDP growth, and more US-FAID will promote GDP growth and sustainable development in Pakistan. Moreover, it suggests that US-FAID, though a small determinant of GDP growth, can play a significant role in GDP growth, due to a multiplier effect on overall economic growth.

Wong (2007) examined the nexus of exports, domestic demand and economic growth in the Middle East countries, namely Bahrain, Iran, Oman, Qatar, Saudi Arabia, Syria and Jordan. The results of the Granger causality test show that there is a tendency for exports to have a stronger impact on economic growth when a country has a higher ratio of openness to international trade. Therefore, economic growth will increase exports and domestic demand.

Wong (2008) examines the importance of exports and domestic demand to economic growth in ASEAN-5, namely Indonesia, Malaysia, the Philippines, Singapore and Thailand before the Asia financial crisis of 1997-1998. The results of the Granger causality test show some evidence of bidirectional Granger causality between exports and economic growth and between private consumption and economic growth. The relationship between investment and economic growth and also between government consumption and economic growth is less conclusive. A successful sustained economic growth requires

growth in both exports and domestic demand. Moreover, economic growth will increase domestic demand and exports. There is no strong evidence to suggest that the export-led growth (ELG) strategy is a main cause of the Asia financial crisis.

Ullah and Asif (2009) investigated export-led-growth by time series econometric techniques (Unit root test, Co-integration and Granger causality through Vector Error Correction Model) over the period of 1970 to 2008 for Pakistan. In this paper, the results reveal that export expansion leads to economic growth. They also checked whether there is unidirectional or bidirectional causality between economic growth, real exports, real imports, real gross fixed capital formation and real per capita income. The traditional Granger causality test suggests that there is unidirectional causality between economic growth, exports and imports. On the other hand, Granger causality through vector error correction was checked with the help of F-value of the model and t-value of the error correction term, which partially reconciles the traditional Granger causality test.

Furuoka and Qaiser (2010) chose Singapore as a case study to examine the relationship between the origins of the East Asian export and the economic growth. The empirical findings indicate that, despite a negative long run relationship between export and economic growth, Singapore's heavy reliance on exports does not seem to have produced negative effects on the nation's economic growth. This was because the increase in export dependency was an effect, and not a cause, of the country's output expansion.

Tang and Lai (2011) examined the validity of export-led growth hypothesis for Asia's four little dragons, employing exports and GDP models. The results show that ELG is valid only for the case of Hong Kong and Singapore.

1.3. DATA AND METHODOLOGY

1.3.1 The Data

The data are annual Pakistan observations expressed by natural logarithms for the sample period running from 1976 to 2011. Data were sources from World Development Indicators (WDI), which includes GDP measure of economic growth, exports of goods and services (in Current US$) and imports of goods and services (in Current US$).

1.3.2. The Model

The empirical model is used to test whether exports cause GDP, whether GDP cause exports or whether a two way causal relationship exist between exports and GDP. In this paper we apply the Vector Autoregressive model (VAR) to identify the relationship between Economic growth, Exports and Imports.

1.3.3. Unit Root (Integration) Test

The first step of the strategy of our empirical analysis involves determining the order of integration of the series used in the analysis by applying the stationarity (or unit root test). The objective of test for unit roots enables researchers to distinguish between the difference processes and trend stationary processes. The augmented Dickey-fuller (ADF) test (Dickey and Fuller; 1979, 1981) is performed to test for unit root for the period 1976-2011. The maximum lag length is chosen based on the minimum AIC criterion. The Perron unit root (PP) test (Perron, 1989) is also performed due to the possibility of the existence of structural breaks which result in the ADF test wrongly indicating non-stationarity in what is actually a stationary series. The ADF test relies on rejecting a null hypothesis H_N of unit root (the series non-stationary) in favor of the alternative hypothesis (H_A) of

stationarity. The test is conducted with and without trend (t) for each of the series. The general form of ADF test is estimated by the following regression:

$$\Delta Y_t = \alpha + \beta Y_{t-1} + \sum_{i=1}^{n} \beta_1 \Delta Y_i + \varepsilon_t \quad \text{----------} \quad (1.1)$$

Where: Y is a time series is a linear time trend, Δ is the first difference operator, α is a constant, n is the optimum number of lags in the dependent variable and ε is the random error term.

Hypothesis:

H_N: Variable is not stationary or has a unit root (so here we have to reject H_N, and accept H_A to be stationary)

H_A: Variable is Stationary

a) When the p-value is < 0.05, then we reject H_N, meaning that the particular variable is stationary.
b) But if the p-value is > 0.05, then we accept H_N, meaning that we cannot reject H_N; the variable is not stationary.

Phillips and Perron's test statistics (named after Peter C. B. Phillips and Pierre Perron) is a unit test (Phillips& Perron, 1988). That is, it is used in time series analysis to test the null hypothesis that a time series is integrated of order 1. It builds on the Dickey–Fuller test of the null hypothesis Δ= 0 in:

$$\Delta y_t = \Delta y_{t-1} + \varepsilon_t \quad (1.2)$$

Where Δ is the first difference operator.

Like the augmented Dickey–Fuller test, the Phillips–Perron test addresses the issue that the process generating data for y_t might have a higher order of autocorrelation than is admitted in the test

equation-making y_{t-1} endogenous and thus invalidating the Dickey–Fuller t-test. Whilst the augmented Dickey–Fuller test addresses this issue by introducing lags of Δy_t as regressors in the test equation, the Phillips–Perron test makes a non-parametric correction to the t-test statistic. The test is robust with respect to unspecified autocorrelation and heteroscedasticity in the disturbance process of the test equation.

A great advantage of Phillips-Perron test is that it is non-parametric, *i.e.*, it does not require selecting the level of serial correlation as in ADF. It rather takes the same estimation scheme as in the DF test, but adjusts the statistic to correct for autocorrelations and heteroscedasticity. Another advantage of the PP tests over the ADF tests is that the PP tests are robust to general forms of heteroscedasticity in the error term ε_t. and the user does not have to specify a lag length for the test regression.

1.3.4. VAR Cointegration Test

The results of the integration tests are then pursued by cointegration tests. The existence of long-run equilibrium (stationary) relationships among economic variables is referred to in the literature as cointegration. The Johansen procedure will be employed to examine the question of cointegration and provide not only an estimation methodology but also explicit procedures for testing for the number of cointegrating vectors as well as for restrictions suggested by economic theory in a multivariate setting. Engel and Granger (1987) pointed out that a linear combination of two or more non-stationary variables may be stationary. If such a stationary combination exists, then the non-stationary time series are said to be cointegrated. The VAR-based cointegration test using the methodology developed in Johansen (1991, 1995) is described below:

Consider a VAR of order p

$$Y_t = \mu + \Delta_t Y_{t-1} + ------ + \Delta_P Y_{t-p} + \varepsilon_t ---------- \quad (1.3)$$

Where y_t is a k-vector of non-stationary I(1) variable, x_t is a d-vector of deterministic variables and ε_t is a vector of innovations.

If the economic variables are not cointegrated, we can proceed to use the Vector Auto-regression (VAR) representation. This VAR can be rewritten as follows:

$$\Delta Y_t = \mu + \eta_{Y\,t-1} + \sum_{i=1}^{p-1} \tau_1 \Delta Y_{t-1} + \varepsilon_t ----------(1.4)$$

Johansen and Juselius (1992), using maximum likelihood, have developed two statistics to test the null hypothesis of no cointegration. These statistics are the Trace statistic and the Maximal Eigenvalue statistic (Max-L), computed as follows.

1.3.5. VAR and Granger Causality

Granger causality tests are conducted to determine whether the current and lagged values of one variable affect another. One implication of Granger is that if two variables, say X_t and Y_t, are co-integrated and each is individually 1(1), then either X_t must Granger-cause Y_t or Y_t must Granger-cause X_t. This causality of co-integrated variables is captured in Vector Error Correction Model (VECM). In a VECM, long and short-run parameters are separated. In the present study, linear combinations of non-stationary variables are not found stationary, that is, the variables are not co-integrated. In the absence of cointegration, the unrestricted VAR in first difference is estimated, which takes the following form:

$$\Delta GDP_t = \sum_{i=1}^{n} \beta_{1t} \Delta GDP_{t-1} + \sum_{i=1}^{n} C_1 \Delta Exp_{t-1} + \sum_{i=1}^{n} d_{1t} \Delta \mathrm{Im} p_{t-1} + \varepsilon_{2t} \ldots (1.5)$$

$$\Delta Exp_t = \sum_{i=1}^{n} \beta_{3t} \Delta GDP_{t-1} + \sum_{i=1}^{n} C_{3t} \Delta Exp_{t-1} + \sum_{i=1}^{n} d_{3t} \Delta \mathrm{Im} p_{t-1} + \varepsilon_{3t} \ldots . (1.6)$$

$$\Delta \mathrm{Im} p_t = \sum_{i=1}^{n} \beta_{3t} \Delta GDP_{t-1} + \sum_{i=1}^{n} C_{3t} \Delta Exp_{t-1} + \sum_{i=1}^{n} d_{3t} \Delta \mathrm{Im} p_{t-1} + \varepsilon_{3t} \ldots . (1.7)$$

1.4. EMPIRICAL ANALYSIS

In order to investigate the stationarity properties of the data, a univariate analysis of each of the three time series (GDP, exports, and imports) was carried out by testing for the presence of a unit root. Augmented Dickey Fuller (ADF) *t*-tests (Dickey and Fuller, 1979) and Phillips and Perron (1988) tests for the individual time series and their first differences are shown in Table 1.1 and Table 1.2. For the Augmented Dickey-Fuller test, the lag length is based on the Schwarz Information Criterion (SIC), while for the Phillips-Perron Unit Root Test, bandwidth selection is based on Newey-West. The lag length for the ADF tests was selected to ensure that the residuals were white noise. The result shows that all the variables were not stationary in levels. This can be seen by comparing the observed values (in absolute terms) of both the ADF and PP test statistics with the critical values (also in absolute terms) of the test statistics at the 1%, 5% and 10% level of significance. The result provides strong evidence of non-stationarity. Therefore, the null hypothesis is accepted and it is sufficient to conclude that there is a presence of unit root in the variables at levels, following from the above result. All the variables were differenced once the ADF and PP test were conducted on them; the result reveals that all the variables became stationary at first difference except for imports. On the basis of this, the null hypothesis of non-stationarity is rejected in case of

GDP and exports and it is safe to conclude that the variables are stationary except for Import. This implies that the variables are integrated of order one, I(1).

1.4.2. Cointegration Test Result

Table 1.3 shows the result of the cointegration test. In the table, both trace statistic and maximum Eigenvalue statistic indicate no cointegration at the 5 percent level of significance, meaning that the null hypothesis cannot be rejected at the 5% significance level. This means that there is no cointegrating relation between the variables so tested; this implies that exports, imports and economic growth have no long-run relationship.

The Johansen procedure, like many others, requires estimation of various structural and nuisance parameters. For example, a vector autoregressive (VAR) lag order must be specified and then the lag parameters are estimated.

1.4.3. Granger Causality Test Result

To investigate the causality between GDP and exports, on the one hand, and GDP and imports, on the other, a simple Granger causality test has been performed, by estimating the bivariate autoregressive processes for GDP, exports, and imports. The objective of this exercise is to test the GDP, exports and imports hypothesis for Pakistan empirically.

The results of causality between economic growth (GDP), export (EX) and import (IM) are contained in Table 1.4. The results based on the Granger Causality test at 5% and 10% level of significance will help to investigate and give meaningful conclusions.

Table 1.1: Tests for Unit Root: ADF

		ADF Level with constant only		ADF First Difference with constant only		
Variable	C.V	T-Statistic	Probability	C.V	T-Statistic	Probability
LGDP 1% level 5% level 10% level	-3.788030 -3.012363 -2.646119	0.975492	0.9945	-3.808546 -3.020686 -2.650413	3.772912	0.0108
LEXP 1% level 5% level 10% level	-3.788030 -3.012363 -2.646119	-0.636991	0.8419	-3.808546 -3.020686 -2.650413	-3.367188	0.0251
LIMP 1% level 5% level 10% level	-3.808546 -3.020686 -2.650413	0.758991	0.9904	-3.808546 -3.020686 -2.650413	-2.352593	0.1666

Table 1.2: Tests for Unit root (PP)

		PP Level with constant only		PP First Difference with constant only		
Variable	C.V	T-Statistic	Probability	C.V	T-Statistic	Probability
LGDP 1% level 5% level 10% level	 -3.788030 -3.012363 -2.646119	0.955124	0.9942	-3.808546 -3.020686 -2.650413	-3.75272	0.0107
LEXP 1% level 5% level 10% level	-3.788030 -3.012363 -2.646119	-3.350700	0.0259	-3.808546 -3.020686 -2.650413	-3.350700	0.0259
LIMP 1% level 5% level 10% level	-3.808546 -3.020686 -2.650413	-2.352593	0.1666	-3.808546 -3.020686 -2.650413	-2.352593	0.1666

Table 1.3 Cointegration Test

Included observations: 20 after adjustments				
Trend assumption: Linear deterministic trend				
Series: LGDP LEXP LIMP				
Lags interval (in first differences): 1 to 1				
Unrestricted Cointegration Rank Test (Trace)				
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.460444	19.37883	29.79707	0.4659
At most 1	0.290964	7.038654	15.49471	0.5731
At most 2	0.008051	0.161663	3.841466	0.6876
Trace test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.460444	12.34018	21.13162	0.5144
At most 1	0.290964	6.876991	14.26460	0.5038
At most 2	0.008051	0.161663	3.841466	0.6876
Max-eigenvalue test indicates no cointegration at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
1 Cointegrating Equation(s):		Log likelihood	98.07290	
Normalized cointegrating coefficients (standard error in parentheses)				
LY	LX	LM		
1.000000	-1.169873	-0.048220		
	(0.13730)	(0.09846)		

The evidence in this section does not provide any support for the causality relationship between imports and (GDP) and imports and exports. There is weak evidence suggesting that the direction of causality runs from imports to exports and from imports to GDP for the case of Pakistan.

The Granger causality test of equation 1.1 shows a bidirectional relationship between economic growth(GDP) and Exports(EXP). It may be noted that the null hypothesis that Economic growth Granger causes Import is rejected (LGDP does not Granger Cause LIMP). In equation 1.2, there existed no statistically discernible relationship between Economic Growth

Table 1.4 Pairwise Granger Causality Tests

Pairwise Granger Causality Tests			
Sample: 1990 2011			
Lags: 5			
Null Hypothesis:	**Obs**	**F-Statistic**	**Probability**
LEXP does not Granger Cause LGDP	17	3.55353	0.07716**
LGDP does not Granger Cause LEXP		18.4881	0.00139*
LIMP does not Granger Cause LGDP	17	1.08193	0.45444
LGDP does not Granger Cause LIMP		0.37920	0.84670
LIMP does not Granger Cause LEXP	17	0.61266	0.69633
LEXP does not Granger Cause LIMP		1.51107	0.31262

Note: * and ** denotes statistically significant at 5% and 10% significance level, respectively.

and Imports (LGDP→LIMP) and in equation 1.3, there existed no statistically discernible relationship between Imports and Exports (LIMP→LEXP).

Generally, it may be noted that there is evidence of a relationship existing between economic growth (GDP) and exports; however, worthy of note is that causality run from economic growth to exports. This means that there may be increased growth in the economy of Pakistan caused by variables not taken note of in this study.

1.5 Conclusion

This study examines the Granger causality relationship between exports, imports and economic growth in Pakistan over the period 1976-2011. The relationship between exports and economic growth has long been a subject of great interest in the development literature. The theoretical consensus on export-led growth emerged in the 1970s and 1980s, after the successful performance of the East-Asian economies. Many studies have found exports affecting economic growth favourably in different countries and regions. This paper provides a Granger causality and cointegration test employed in the empirical analysis using Augmented Dickey Fuller (ADF) and Phillips Perron (PP) stationarity test.

The variable proved to be integrated of the order one I(1) at first difference. The Johansen and Juselius cointegration test was used to determine the presence or otherwise of a cointegrating vector in the variables. Both Trace and Maximum Eigenvalue indicated no cointegration at 5% level of significance, pointing to the fact that the variables do not have a long-run relationship.

To determine the direction of causality among the variables, at least in the short run, the Pairwise Granger Causality was carried out. Economic growth was found to Granger cause

Exports at 5% significance level, and from EX to Economic growth at 10% significant level which supports a bidirectional relationship between economic growth and Exports; thus Exports does Granger cause economic growth.

Conclusively, though a long-term relationship was found not to exist among the variables used in this study, they were found to have a dynamic relationship. The discovery of a growth-led Exports suggests that the growth in Pakistan's economy will help increase exports as well as providing more products to meet domestic demand.

The Granger causality test of equation 1.1 shows a bidirectional relationship between economic growth (GDP) and Exports (EXP); therefore, the null hypothesis that Economic growth Granger causes Imports is rejected (LGDP does not Granger Cause LIMP). In equation 1.2, there existed no statistically discernible relationship between Economic growth and Imports (LGDP→LIMP) In equation 1.3, there existed no statistically discernible relationship between Imports and Exports (LIMP→LEXP).

Generally, it may be noted that a relationship exists among economic growth (GDP) and exports; however, worthy of note is that causality runs from economic growth to exports and vice versa at 10% level of significance. The evidence does not provide any support for the causality relationship between imports and GDP and imports and exports. There is weak evidence suggesting that the direction of causality runs from imports to exports and from imports to GDP for the case of Pakistan. This means that increase / growth in the economy of Pakistan may be caused by variables that have not been taken note of in this study.

During the last two decades, Pakistan faced the worst dilemma since its founding. Over a period of time, Pakistani regimes have become the sole spokesmen for the US in threatening the Taliban and want to convey that our cooperation in the US-led

effort is unconditional and that we would not let even our national interest and integrity come in the way of this cooperation. Quoting the then President Musharraf's own words, 9/11 "came as a thunderbolt" (Musharraf, 2006, p. 15), presenting acute challenges as well as opportunities.

It can be considered that Pakistan is the single Muslim nation that is forced to have an ongoing military operation against its own people. The nation has brought the anti-Taliban war into Pakistan, which placed the armed forces on the wrong side of the people. The sovereignty of the nation is being violated with impunity. The freedom of action in the country's interest is questioned and undermined. A proxy war is being fought in the nation itself. Pakistan has had to accept responsibility for crimes it has not committed. Pakistan's problems were further exacerbated by the complex regional configuration, with American presence in Afghanistan, the new Indo-US nexus and India's increasing influence in Afghanistan. The domestic failures have seriously constricted the nation's foreign policy options.

The study on a whole on the economic growth through exports and imports in Pakistan leads to an understanding that the problems faced are mainly domestic or internal and not specifically external. The country is in need of domestic consolidation, politically, economically and socially.

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