

## Causality between Exports and Economic Growth: Investigating Suitable Trade Policy for Pakistan

Shujaat ABBAS \*

### **Abstract**

*This study investigates causal relationship between GDP and exports for the period of 1975 to 2010. The aim of this study is to check affectivity of export promotion policy adopted by Pakistan during 1990s. Johansen test of Cointegration and Granger Causality employed to determine short run and long run causality. The result of Cointegration reveals existence of one positive cointegrating equation. The result of Causality test show short run and long run causality run from GDP to exports. The result concludes that both in short and long run only growth in production cause exports growth. Government should attempt to develop production side, which in long run develop trade and economy.*

**Keywords:** *Export Led Growth Hypothesis, Granger Causality, Economic Growth.*

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\* Department of Economics, University of Karachi, Pakistan. E-mail: [Shujaat.abbass@gmail.com](mailto:Shujaat.abbass@gmail.com)  
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## 1. Introduction

The foreign trade of Pakistan depicts persistent deficit since its inception due to poor trade performance. Exports were comprised of low value added agricultural products. In order to increase share of manufactured goods Pakistan adopted Import substitution industrialization policies during 1950 - 1960. Several import substitution industries are developed and protected from foreign competitions. Domestic demand of foreign goods is, shifted towards domestically produced ones. These policies resulted development of many important and productive industrial units. The economy as a result observes phenomenal growth in 1960s. These inward oriented trade policies successfully laid foundation of industrialization.

Many developing economies, which adopted import substitution policies during, face sluggish economic performance and adopted export promotion policies. Many of these economies significantly achieved high economic growth rate. Pakistan inspired by phenomenal growth these dynamic economies agreed to liberalize its economy in 1975s, however maintained its protective policies until late 1990. These protective policies gradually destroy competitiveness of domestic production units i.e. food groups and textile.

Formation of world trade organization (WTO) in 1995 and its rectification by majority of world economies changed the pattern of world trade. Pakistan adopted export led growth strategy during early 2000s and opened its economy for international competition without achievement of significant competitiveness in any production sector. The economy as a results observe significant increase in trade deficit. The success of export led growth strategy depends on level of specialization in production of goods having comparative advantage. Those economies, which competitively develop its production side, observe significant economic prosperity. The protective policies resulted in destruction of competitiveness, which in turn resulted in significant distortion of trade and economic growth during post liberalization era.

Export led growth hypothesis rectified by many studies in Pakistan give relatively larger weight of economic growth to exports. This study investigates whether export cause or growth cause economic prosperity in short and long run. This study will provide policy for long run economic prosperity of Pakistan.

The rest of this paper is, organized in following order; Section 2 presents review of literature. Section 3, presents data, methodology and results, whereas Section 4 concludes the study.

## 2. Review of Literature

Export led growth hypothesis is empirically investigated for determination of impact of exports on economic growth. There are generally two types of empirical studies i.e. Cross-sectional studies, which determine export impact on group on countries, and cross-country time series studies, which individually investigate export impact economic prosperity of single country.

## 2.1. Cross-Sectional Studies

Sharma and Dhakal (1994) investigate causal relationship between exports and economic growth in 30 developing economies for the period of 1960-1988. The results conform mixed impact of exports on these developing countries. In some countries, they observed export led growth while in some growth led export, whereas no causal relationship is, observed in remaining countries.

Ekanayake (1999) explores causal relationship between export and economic growth in eight Asian developing countries, using annual time series data of 1960-1997. Results conform validity of export led growth hypothesis for all countries except Malaysia.

Safdari et al. (2011) explores causal relationship between export and economic growth for 13 developing countries, for period of 1988-2008, using panel VECM. There result depicts unidirectional reverse causality running from economic growth to exports.

Parida and Shahoo (2007) examines export led growth hypothesis for four developing countries of South Asia like India, Pakistan, Bangladesh and Sri Lanka, using Pedroni's panel cointegration technique. The results conform validity of export led growth hypothesis. Cross-sectional studies conform mixed behavior of exports on economic growth.

## 2.2. Country Specific Studies

Thornton (1997) examines validity of export led growth for six European countries, from mid 19<sup>th</sup> century to 1913, using cointegration and granger causality. The results show mixed behavior: Unidirectional running from export to GDP in Italy, Norway, and Sweden, Causality running from GNP to Exports in UK, while bidirectional causality is, observe in Denmark and Germany.

Ukpolo (1998) employs Granger causality test to determine the relationship between exports and economic growth in South Africa for the period of 1964-1993. The results fail to validate export led growth as reverse causality is observed.

Ramos (2001) Investigates causal relationship between exports, imports, and economic growth in Portugal, for the period of 1865-1998, using Johansen cointegration and Granger causality test. The result shows no causality in any run.

Hatemi-j (2002) examines causal relationship between export growth and economic growth in Japan by augmenting Granger causality test, by bootstrap technique for period of 1960-1999. The estimation result depicts bi-directional causality run.

Lorde (2011) investigates validity of export led growth hypothesis for Mexico, using cointegration and Granger causality for the period of 1960-2003. The empirically result reveals only short run causality from export to growth. In long run, he observes inverse causality running from economic growth to exports.

Pistoresi and Rinaldi (2012) investigate relationship between real exports, imports and GDP in Italy from 1863 to 2004, using cointegration and causality tests. The results conform existence of cointegration but the direction of causality varies over time. Period prior to the First World War import growth led GDP growth, which turned into GDP-led export growth. Bidirectional causality is, observed in post-Second World War period.

Sharazi and Manap (2004) determine impact of export on economic growth of Pakistan, using multivariate Granger causality for the period of 1960 to 2003. There result conform validity of export lead growth hypothesis for economy of Pakistan.

The countries specific analysis reveals variations regarding impact of export led growth among countries. The studies in Pakistan depicting strong effect of exports on economic growth and suggest policies only to expand exports for long run economic prosperity. This study therefore aims to check their suppositions.

### 3. Data, Methodology and Results

This studies aims to investigate long run associations between exports and economic growth of Pakistan for the period of 1975-2010. The data of GDP is, taken from world development indicators (WDI) publish by The World Bank whereas data of exports is, taken from various issues of Statistical Year Book of Pakistan; publish by Government of Pakistan Finance Division. The collected data is transform into million of constant 2,000 USD.

Johansen and Juselius (1990) maximum likelihood estimation technique is, employed to determine existence of cointegrating equation. This cointegration technique only determines only existence and fails to tell any thing about direction of causality. Granger Causality and VECM is, employed for determination of direction of causality both in short and long run. Basic estimation model is, mathematically presented as:

$$\text{LnGDP}_t = \beta_0 + \beta_1 \text{LnExport}_t + \varepsilon_t$$

Where coefficient  $\beta_1$  is, expected to positively determine economic growth in both long run and short run.

The Johansen and Juselius (1990) 'Maximum Likelihood' test of cointegration, requires same order of integration I(1) of all the variables. Augmented Dickey Fuller (ADF) and Phillips Perrons (PP) unit root tests are, employed for determination of unit root. ADF test check serial correlation by adding lagged values of explanatory variables, represented as:

$$\Delta Y_t = \beta_0 + \gamma_t + \beta_1 Y_{t-1} + \sum_{i=1}^n \delta_i \Delta Y_{t-i} + \varepsilon_t$$

Where:  $\varepsilon_t$  = white noise error term while  $\Delta Y = Y_t - Y_{t-1}$

Phillips Perron Unit root test use non-parametric method, to take care of serial correlation in error term, without adding lagged difference term.

$$\Delta Y_t = \beta_0 + \beta_1 Y_{t-1} + \epsilon_t$$

The PP test estimates modify t-value associated with the estimated coefficient, so that serial correlation does not affect asymptotic t distribution. The estimated results of both the tests are, presented in table 1 below.

The results reveals existence of unit root at their level, however first difference of both variables are stationary. The unit root analysis found same order of integration I(1), which encourage for further econometric estimation using Johansen and Juselius (1990) of long run relationship.

If two non-stationary time series regressions results in stationary residuals, than both the variables are said to be cointegrated or having long run association.

**Table 1: Result of Unit Root Test**

Variable	ADF		PP	
	Level	1 <sup>st</sup> difference	Level	1 <sup>st</sup> difference
GDP	-0.98	-6.13*	-2.15	-6.05*
Export	-1.64	-4.73*	-1.36	-4.73*

\*, \*\* Indicate significance at 1 and 5 Percent respectively

Source: Authors Estimation

Lag length for VAR system is, selected based on minimum Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC). The estimation of cointegration using this method, involves estimation of following unrestricted VAR model

$$Y_t = A_0 + \sum_{i=1}^n A_i Y_{t-i} + \epsilon_t$$

Where:  $Y_t$  is  $n \times 1$  vector of non stationary I (1) variables, in this study  $Y =$  GDP and Exports hence  $A_0$  is  $3 \times 1$  vector of constant.  $n$  is no of lags  $A_i$  is  $3 \times 3$  matrix of estimated parameters.  $\epsilon_t$  is  $3 \times 1$  independent error term. In order to determine existence of co-integration of  $Y_t$  unrestricted VAR is converted in to Vector Error Correction (VECM).

$$\Delta Y_t = A_0 + \sum_{i=1}^{n-1} \phi_i \Delta Y_{t-i} + \beta Y_{t-1} + \epsilon_t$$

Where:

$$\phi_i = - \sum_{i=1}^{n-1} A_i \quad \text{and} \quad \beta = \sum_{i=1}^n A_i - I$$

$I$  is identity matrix ( $n \times n$ ) and  $\Delta$  is difference operator

Johansen and Juselius (1990) have derived two tests for cointegration i.e. Trace test and Maximum Eigen value. The null hypothesis of no cointegration between export and economic growth is, tested against alternative hypothesis of existence of cointegration. Result of cointegration between export and economic growth is, presented in table 2 below.

The result shows that Trace statistic is above the 5% critical values, hence it rejects null hypothesis of no cointegration in favor of one cointegrating vector. Similarly, Maximum Eigen Value test statistic is also above then 5% critical values, which reject null hypothesis of no cointegration. The result thus suggests that there exists long run stable relationship between GDP and Exports.

**Table 2: Results of Johansen Juslius Cointegration**

Trace			
Ho	H1	Statistic	Critical Value
r = 0	r ≥ 1	30.57	20.26
Eigen Max			
Ho	H1	Statistic	Critical Value
r = 0	r ≥ 1	22.087	15.89

Source: Authors Estimation

Since Johansen and Juselius cointegration only indicates existence of cointegration but did not tell any thing about causality run.

Grange causality test is, employed to determine direction of causation. Clive Granger presents this test in 1960 to help time series forecasting. If a variable Y is granger cause U then it mean that past value of Y are useful in forecasting value of U, without considering past values of U, similarly if Y Granger cause U it means the past value of U are useful in forecasting value of Y, without considering past values of Y.

$$\Delta LGDP_t = \sum_{i=1}^n \beta_{11} LGDP_{t-1} + \sum_{j=1}^n \beta_{12} LnExports_{t-j} + \epsilon_{1t}$$

$$\Delta Exports_t = \sum_{j=1}^n \beta_{21} LnExports_{t-1} + \sum_{i=1}^n \beta_{22} LnGDP_{t-j} + \epsilon_{2t}$$

Where: “i” and “j” represents lag length.

Engel and Granger (1969) suggest that if co-integration exists between two variables than proper statistical inference is, obtained only by analyzing causality based on error correction model (ECM). The VECM is, employed to determine short run and long-run causality between export and economic growth. The VECM is estimation is, performed by following VAR framework.

$$GDP_t = \sum_{i=1}^n \phi_i GDP_{t-i} + \sum_{i=1}^n \beta_i \Delta Export_{t-i} + \delta_1 \epsilon_{t-1} + \mu_t$$

$$Export_t = \sum_{j=1}^p \phi_j Export_{t-j} + \sum_{j=1}^p \beta_j \Delta GDP_{t-1} + \delta_2 \epsilon_{t-1} + \mu_t$$

Where error correction terms  $\epsilon_{t-1}$  and  $\epsilon_{t-1}$  are derived from Long run co-integration relationship and measures magnitude of past disequilibrium. The coefficient  $\delta$  of error term represents deviation of dependent variable from the long run equilibrium. Type of Granger Causality is, obtained using normal F Wald

test for joint significance of coefficients. If the estimated coefficients are non-zero then their short run causality exists and if Error correct models are negative and significant it indicates existence of long run causality.

**Table 3: Long Run Causality**

Causality	ECM <sub>t-1</sub>	T-Statistic	P-Value
Long run causality from export to GDP	-0.066	-1.76	0.087
Long run Causality from GDP to export	-0.412	-2.35	0.025
ARCH F stat. 0.33 Prob. (0.56) LM test 0.20 F- Stat 0.81			

Source: Authors Estimation

The result of long run Granger causality shows that both coefficients have expected negative value, however the corresponding probability of export cause growth is insignificant at 5 percent significant level. The growth cause export is significant at 5 percent indicating economic growth cause exports growth.

The Wald test employed to check the short run between export and economic growth. Results are, presented in table 4 below.

**Table 4: Short Run Causality**

Coefficients	X <sup>2</sup> -Statistic	P-Value
D(LnGDP(-1))	0.323	5.21
D(LnExports(-1))	0.038	0.021
ARCH F stat. 0.33 Prob. (0.56) LM test 0.20 F- Stat 0.81		

Source: Authors Estimations

The estimated results show that exports has no short run causal effect on economic growth of Pakistan however economic growth is, found to have short run causal effect on export growth. The accuracy of estimated results is, validated by performing several diagnostic tests like test of serial correlation (LM) test of Heteroskedasticity test (ARCH) show validity of estimated results.

#### 4. Conclusion and Implications

Export promotion policies adopted by Pakistan during post liberalization era, resulted further distortion of trade and economic growth. Distorting trade and growth condition created ambiguity regarding impact of exports on its economic growth. This study therefore aims to investigate; whether export led growth or growth led export policy is suitable for short and long run economic prosperity. Previously empirical studies strongly suggest export led growth strategy by giving full weight to exports for achievement of long run economic prosperity. The persistently sluggish growth behavior after acceptance of export led growth strategy motivate to reinvestigate the causal relationship, using Johansen test of cointegration and Granger Causality test for the period of 1975 to 2010. The result of cointegration conform existence of one cointegrating vector between GDP and economic growth. The Granger causality shows unidirectional causality run from GDP to exports in both long run and short run. Pakistan should attempt to develop domestic production units besides export promotion strategies. Domestic

production units needs special government attention and can be promote by making macro environment investment friendly.

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