# Exports-Led Growth Hypothesis in Pakistan: Further Evidence

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**Abstract:**
This paper examines the exports-led growth hypothesis using quarterly data from 1990 up to 2008 for Pakistan. In doing so, ARDL bounds testing approach, Error Correction Method (ECM) and Ng-Perron test for integration have been employed. The empirical findings show that exports are positively correlated with economic growth. This confirms the validity of exports-led growth hypothesis in the case of Pakistan both for short run and long span of time. Exchange rate depreciation declines economic growth while running real capital stock improves it.

**Keywords:** Exports, Economic Growth, ARDL Approach
**JEL Classifications: F10, E10, C22**

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## Introduction

The purpose of this article is to reinvestigate exports-led growth hypothesis in Pakistan after trade reforms in the period 1990-2008. The issue how an economy can attain economic growth is widely debated and is one of the crucial economic questions. Exports are often considered as an important source of economic growth. The association between exports and economic growth has been investigated in developing economies. According to international trade theory, exports can contribute to economic performance through many channels. As said by Adams Smith (1775) "international trade improves productivity by enhancing market size and enjoying economies of scale". Furthermore, David Recardo (1817) documented that international trade plays an important role in economic growth. A country can attain specialization in the production of a good through trade in which it is comparatively advantaged. This attained specialization may perk up the efficiency of resources exploitation by raising the capital formation that improves the total factor productivity (TFP).

Movements of ideas and advanced technologies across borders have become possible due to international trade. It improves the effect of growing competition and stimulates technical progress through innovations that lead to efficiency gains through productivity improvement. Increased exports are a major source of foreign exchange that helps to purchase import items for domestic use of the country. It is said that intra-industry trade can be increased through exports that integrate the country with the whole economy and help to absorb external shocks on the domestic economy as well. In such a scenario, it is concluded that exports play their role as 'an engine of economic growth'. It is free trade that enables domestic firms to have easy access to foreign inputs at cheaper cost. Increased exports also enable the firms to have access to foreign capital and advanced technology through earned foreign exchange in the country. It is a fact that nowadays Foreign Direct Investment (FDI) is concentrated to more open economies not only to expand export volume but also to lead to high economic growth and rapid economic development as well (Richard, 2001). Export-growth link is summarized by Ramos (2001) in three channels. First, growth in exports seems to lead by trade multiplier for expansion of domestic production and employment. Second, foreign exchange or foreign

reserves earned through exports growth allows the country to import the capital goods that further leads to increase production capacity of the country. Finally, increased competition and volume of exports in the international markets accelerate the technological advancement in production process that causes to obtain economies of scale. On the theoretical basis, said channels strongly support for Exports-Led Growth hypothesis in the country.

Exports oriented policies increase output, employment opportunities and domestic consumption. This causes to enhance the demand of output produced by the country. Improved exports sector widens the market share of firms that enables the firms to attain economies of scale and in resulting lower unit costs (Olorunfemi and Olowofeso, 2006). It is an exports sector that enables a country to trade with rest of the world along its lines of comparative advantage and specialization. Generally, it causes to lead the efficient allocation of domestic resources. Similarly, this efficiency can be improved by the exposure to international competition. This encourages the firms to utilize modern technology and produce quality products meeting the demand of international customers (Olorunfemi and Olowofeso, 2006). Positive externalities of exports are also pointed by Kessing (1967), Balassa (1978) and Krueger (1980) such as greater capacity utilization, economies of scale, incentives for technological improvement and well-organized management due to foreign market competition.

## II. Literature Review

Kaldor (1967) analyses the causal relationship between productivity growth and output growth, including some factors like economies of scale, learning curve effects, division of labour and new industrialization process. Further, he documents that the industrial development is worked as main determinant of output growth, in the context of productivity growth. He also investigates the causal relationship between output growth, via productivity growth to export growth. Kunst and Marin (1989) also find bidirectional causality, when productivity increases due to promotion of scale economies that causes to enhance exports. A contributory work has been done by Sharma and Dhakal (1994); Bhagwati (1988) on the relationship between exports growth and economic growth. They

argue that there is a possibility of existence for two-way causation between economic growth and economic growth. They also discuss the causality between trade and output. They come to conclusion that trade promotes output and income level which facilitates more expansion in trade volume, causes a process of a virtuous circle of growth and trade. Balassa (1984); Lucas (1990) and Sparout and Weaver (1993) seem to check the exports and output growth regression analysis based on the neoclassical growth accounting techniques of production function. They also show that high significant positive relationship between export growth variable in the growth accounting. They conclude that export growth causes output growth and no possibility of bidirectional causality between the two variables. On the other hand, Jung and Marshal (1985), Bahmani-Oskooee et al (1991) and Holman and Graves (1995) strongly support for causality between exports growth and economic growth.

The pervious work done before the eighties had not paid a serious attention on the time series characteristics of the variables such as different stationarity levels. It is commonly accepted that non stationary data set produces misleading information among the concerned variables. While, previous work on exports-led growth hypotheses (ELG) based on the cross-country comparison (Michaely 1997; Balassa 1978). These studies strongly support the exports-led growth hypotheses. In the development of causality test (Granger, 1969; Engel and Granger, 1987), correlation techniques failed to measure direction of causality. After the development of unit root tests (Dickey and Fuller, 1979) and cointegration techniques, (Phillips and Durlauf, 1986; Phillips1987; Phillips and Perron, 1988) checking for the stationarity properties of time series have become common routine to show said relationship. Thus, starting in the eighties, most of the studies seem to base on the cointegration techniques to find out the relationship between exports and economic growth. Finally, the relationship between exports and economic growth has been checked through traditional cointegration techniques and error-correction method. These types of model includes Bahamani-Oskooee and Alse (1993), Sengupta and Expana (1994), Ghatak et al (1997), Ekanayake (1999), Richards (2001)

and Ngoc et al (2003) to examine short run and long run relationship or association between exports growth and output growth[1].

In recent wave of country case studies, most empirical evidences seem support for exports-led growth hypothesis [Doyle, (1998) and Fountas, (2000) for Ireland; Ghali, (2000) for Tunisia; Hatemi-J and Irandoust (2000a) for Nordic countries; Balaguer and Cantavella-Jorda (2001) for Spain; Thungsuwan and Thompson, (2003, 2006)[2] for Thailand; Ramos, (2001) for Portugal; Howard, (2002) for Trinland and Tobago; Abdulai and Jaquet (2002) for Cote d'Ivorre; Panas and Vamvoukas (2002) for Greece; Federici and Marconi, (2002) for Italy; Ngoc, Anh and Nga, (2003) for Vietnam; Chandra (2003) for India; Abual-Foul, (2004) for Jordan; Keong, Zulkorain, and Venus, (2003, 2005); Leow, (2004)[3]; Furuoka (2007) for Malaysia; Love and Chandra, (2004) for Pakistan and India but not for Sri Lanka; Bahmani-Oskooee and Domac, (1995); Ozmen and Furten, (1998); Sharma and Panagiotidis, (2005); Siliverstovs and Herzer, (2005); Karagoz, and Sen (2005) & Ferda, (2007); Taban and Akhtar, (2008); for Turkey; Begum, and Shamsuddin, (1998); Mamun and Nath, (2005) for Bangladesh[4]; Clarke and Ralhan, (2005) for Bangladesh and Sri Lanka; Pahlavani, (2005) for Iran; Alsuwaidi and Shamsi, 1997 and Abu-Stait, (2005) for Egypt; Awokuse, (2005a) for Korea; Awokuse, (2005b) for Japan; Love and Chandra, (2005) for South Asia; Shan and Sun (1998); Mah, (2005) for China; Siliverstovs, (2005); Siliverstovs and Herzer (2006) for Chile; Jardaan and Eita, (2006) for Nambia; Amrinto, (2006) and Agbola, (2007) for Philippines; Olorunfemi and Olowofeso, (2006) for Ecowas countries[5]; Merza, (2007) for Kuwait; Darrat *et al.* (2000); Chen, (2007) for Taiwan and Ramesh and Boaz, (2007) for Kenya].

In the case of Pakistan, Hameed et al. (2005) investigate that output growth has a positive effect on export growth in the case of Pakistan. Higher-exports-growth countries would be able to accelerate their economies through large exporting manufactured goods.

[1] It is also pointed out by Sharma and Panagiotidis (2005) that econometric methods used in most of the empirical investigations are dominated by the work of Granger (1969, 1988) Sims (1972), Engle and Granger (1987), Johansen (1988) and Johansen and juselies (1990).
[2] Ukpolo (1998) fails to find out support for export led growth in South Africa
[3] exports-led growth hypothesis is met short span of time
[4] Love and Chandra, (2005) find causality running from income to exports in the case of Bangladesh
[5] For more informations see appendix

Dodaro (1993) do not able to find out the any significant relationship between said variables in the case of Pakistan. Bahamani-Oskooee and Alse (1993) strongly support the empirical evidence of two way causality between export growth and GDP growth. Anwer and Sampath (2000) do not find any indication of causation between export growth and GDP growth. Kemal et al. (2002) reveal bidirectional causality for long run between exports and economic growth. Muslehuddin (2004) finds long run equilibrium association among export, imports and output for Pakistan and Bangladesh but not for India, Sri Lanka and Nepal[6].

Causal relationship between performance of exports and economic growth has been investigated by Khan and Saqib (1993); Khan and Afia (1995); Khan et al., (1995) for Pakistan. They support for bidirectional causality between exports performance and economic growth in the country. On contrary, Multairi (1993) does not seem to find any support for exports-led growth hypothesis for Pakistan during 1959-91. Furthermore, Shirazi and Manap (2004) find latent equilibrium among exports, imports and economic growth. They document one-way causality running from exports to output growth in the country. Similarly, Quddus and Saeed (2005) seem to support exports-led growth hypothesis through one-way causality from exports to economic growth. Recently, Sidiqui et al., (2008) revisit exports-led growth hypothesis for Pakistan using annual data (1971-2005). They support exports-led growth hypothesis in the country for long run and short span of time as well. They have used terms of trade which is basically a ratio of real exports to real imports for external shocks. Also, they have used real exports and real imports in their model instead of terms of trade[7]. This has created a doubt of multi-colinearity in the model. That's why results are not reliable. Finally, short run model is not well specified and insignificant[8].

[6] Literature reveals that exports seem to cause economic performance in the case of Pakistan. The country has sufficient domestic resources to expand exports volume but Pakistan still is relying on import items that help to boost manufacturing and industrial sectors. These sectors play key role to enhance output. To increase exports share in international market, country has to import advance technology that will further help to compete with the other countries of region. It may conclude that export orientation policies not only increase openness of an economy but also helps in having access to foreign technology. This leads the country to grow more than the other countries through export growth.

[7] Rael effective exchange rate is better to check the impact of external shocks in the economy.

[8] They have also used dummy variable to capture the impact of trade liberalization. It is not appropriate indicator to investigate impact of trade liberalization on exports performance in the country.

Literature shows mixed results about exports-led growth hypothesis generally and specifically for Pakistan. Most studies regarding Pakistan have utilized annual data to examine exports-growth relationship. Traditional methods such as OLS, residual based Engle-Granger (1987) test[9], and Maximum Likelihood based Johansen (1991, 1992) and Johansen-Juselius (1990) tests have been used to validate exports-led growth hypothesis. All these methods require that the variables in the system be integrated at equal order of integration. These methods do not include the information on structural break in time series data and suffer from low predicting power. New developed **ARDL** bounds testing is superior to other methods for analyzing the long-run relationships when the variables are having mixed order of integration, i.e., *I(0)* and *I(1).* ARDL bounds technique is also having information about structural break in the time series data. Structural break in an economy is having significant importance to analyze the macroeconomic time series. It occurs in any time series due to many reasons such as economic crises, changes in institutional arrangements, policy changes regime shift war. The structural break in the economy may provide biased results towards the erroneous non-rejection stationary hypothesis (Leybourne and Newbold 2003; Perron, 1989, 1990).

This study is good contribution in literature with respect to Pakistan. The objective of such endeavour is to investigate exports-led growth hypothesis in the country using quarterly data starting from 1990Q1 up to 2008Q4 which is also known as area of trade liberalization[10]. For cointegration, ARDL bounds testing has been employed and error correction method (ECM) for shot run dynamics.

## III. Model and Data Source

In this study log-linear modeling specification has been used. Bowers and Pierce (1975 suggest that Ehrlich's (1975) findings with a log linear specification are sensitive to

[9] The residual-based co-integration tests are inefficient and can lead to contradictory results, especially when there are more than two *I(1)* variables under consideration

[10] In 1980s Pakistan adopted managed floating exchange rate policy in order to improve the trade balance, whereas the linkage between local currency and international market was created in 1990s which was considered to be an era of flexible exchange rate.

functional form. However, Ehrlich (1977 and Layson (1983) argue on theoretical and empirical grounds that not only log linear form is superior to the linear form but also makes our results more favorable.

Exports-led growth hypothesis is re-investigated as an insightful guide in choosing variables for present paper on the determinants of Pakistan's economic growth. Present model is formulated on basis of theoretical framework of studies conducted by Riezwan et al. (1995), Al-Yousif (1999) and Keong et al. (2003). To re-visit exports-led growth hypothesis, following algebraic equation is being used:

$$LRGDP = \beta_1 + \beta_2 LREXP + \beta_3 LK + \beta_4 LREER + \varepsilon \quad (1)$$

Where,

RGDP = Real GDP, REXP = Real exports, K = Capital stock proxies by gross fixed capital formation, REER = Real effective exchange rate

According to international trade theory, there is positive correlation between exports and economic growth. Total factor productivity (TFP) can be improved through export expansion significantly. Various channels explain the positive link between exports and total factor productivity in developed economies and developing countries as well. It is explained by Balassa (1984) that "*in general, the production of export good is focused on those economic sectors of the economy which are already more efficient*". It not only leads to focus investment in said sectors of the economy but also improves total factor productivity. Furthermore, higher growth rate of capital formation and growth of exports cause the total productivity to improve in the country (Kavoussi, 1984).

Many models are developed in literature to study exports-led growth hypothesis. Neoclassical aggregate production function has been discussed for production growth link. As assumed by Hichs, neutral-technological-change-aggregate growth can be documented as growth of total factor productivity (TFP) and growth rates of factor inputs are sum of weights (Keong et al., 2003). These weights are called the elasticities of output to each input respectively having equal factor share. It is stated that increase in

input will move production function upward that leads to increase in output. It is concluded that labour and capital are two main determinants to improve production productivity (Keong et al., 2003).

The link between exports and output is not direct and simple to understand. The relationship may be affected by price variability, international market and political intervention. Exchange rate has been included in the model to check the impact of price competitiveness in the internal market and its effect on economic growth through exports growth channel (Al-Yousif, 1999, Keong et al., 2003). Mostly, in developing economies, exports depend on world demand that depend on prices of exported goods and income of buyers in the international market. Thus, changes in exchange rate is important for an emerging economy like Pakistan. Exchange rate is also affected by changes in world prices. This shows that exchange rate is included in the model to check the impact of external shocks in the economy. It is expected that depreciation in Pak rupee will raise competitiveness of domestic goods. This will raise exports in the country.

**Table-1 Correlation Matrix and Descriptive Statistics**

| Variables | LRGDP | LREXP | LRK | LREER |
|---|---|---|---|---|
| **Mean** | 13.7795 | 7.4326 | 7.5530 | 4.62082 |
| **Median** | 13.7615 | 7.3092 | 7.4278 | 4.5986 |
| **Maximum** | 14.2065 | 8.1642 | 8.4894 | 4.7608 |
| **Minimum** | 13.2917 | 6.9624 | 7.0697 | 4.4951 |
| **Std. Dev.** | 0.2286 | 0.3805 | 0.3338 | 0.0784 |
| **Skewness** | 0.0848 | 0.8225 | 1.5492 | 0.1655 |
| **Kurtosis** | 2.0643 | 2.2548 | 4.3928 | 1.5855 |
| **Sum** | 1019.688 | 550.018 | 558.929 | 341.940 |
| **Sum Sq. Dev.** | 3.81671 | 10.5721 | 8.1376 | 0.4491 |
| **LRGDP** | 1.0000 | | | |
| **LREXP** | 0.8636 | 1.0000 | | |
| **LRK** | 0.7821 | 0.8932 | 1.0000 | |
| **LREER** | -0.8154 | -0.6517 | -0.4817 | 1.0000 |

Table-1 explains descriptive statistics and correlation matrix; there is positive correlation among real GDP, real exports and real domestic capital stock proxies by real gross fixed capital formation. Similarly, exports and real gross fixed capital formation are correlated positively. Real effective exchange rate and real GDP are inversely associated. In this

paper, Pakistan's real[11] gross domestic product, real exports, real effective exchange arte and domestic capital stock are under study. Data for the variables such as exports, gross domestic product, gross fixed capital formation and imports have been obtained from monthly statistical bulletins of the State Bank of Pakistan. Real effective exchange rate and consumer price index have been combed from International Financial Statistics (IFS) as a base year (2000=100). All series for said variables are transformed into log form. Series transformation into log directly gives elasticities and solves the problem of heteroscedasticity.

## IV. Methodological Framework

This present paper employs advanced autoregressive distributed lag (ARDL) approach proposed by [(Pesaran and Shin, (1999); Pesaran et al., (1996); Pesaran et al. (2001)]. Recent research in social sciences has indicated that the ARDL approach to co-integration is more superior and has many advantages to other conventional cointegration approaches such as Engle and Granger (1987), Johansen and Juselius (1990) and Johansen, (1991, 1992). First advantage of ARDL approach is that if variables are integrated at *I(0)*, *I(1)* or *I(0) /I(1).* The estimation method under this approach is same to *Wald or F-statistic* in a generalized Dickey-Fuller type regression. This is simply used to check the significance of lagged levels of the variables which are considered in a conditional unrestricted equilibrium error correction model (Pesaran, et al. 2001). Secondly, ARDL is more dynamic and provides better results for small sample sizes than traditional techniques in the literature.

The ARDL approach involves estimating the conditional error correction version of the ARDL model for variable under estimation. The equation of extended ARDL ( $p, q_1, q_2, .....q_k$ ) is being modeled as given below (Pesaran and Pesaran, 1997; Pesaran and Shin, 2001):

$$\alpha(L,p)\,y_t = \alpha_\circ + \sum_{i=1}^{k} \beta_i(L,p)\,x_{it} + \lambda' w_t + \varepsilon_t \qquad (2)$$

[11] To obtain series in real form we have deflated the inflation and due unavailability of quarterly data for labor participation rate, this variable has been dropped from our model.

$$\forall t = 1,.....,n$$

where

$$\alpha(L,p) = 1 - \alpha_1 L - \alpha_2 L^2 - ..... - \alpha_p L^p$$
$$\beta_i(L,q_i) = \beta_{i\circ} + \beta_{i1} L + \beta_{i2} L^2 + ..... + \beta_{iq_i} L^{q_i} \forall_i = 1,2...,k$$

$y_t$ is an independent variable, $\alpha_\circ$ is the constant term, $L$ is the lag operator such that $Ly_t = y_t - 1, w_t$ is $s \times 1$ vector of deterministic variables such as intercept term, time trends, or exogenous variables with fixed lags.

The long-term elasticities are estimated by:

$$\phi_i = \frac{\hat{\beta}_i(1,\hat{q})}{\alpha(1,\hat{p})} = \frac{\hat{\beta}_{i\circ} + \hat{\beta}_{i1} + ..... + \hat{\beta}_{i\hat{q}}}{1 - \hat{\alpha}_1 - \hat{\alpha}_2 - ... - \hat{\alpha}_p} \quad \forall i = 1,2,...,k \quad (3)$$

Where $\hat{p} and \hat{q}_i$, $i = 1,2,...k$ are the selected (estimated) values of $\hat{p} and \hat{q}_i$, $i = 1,2,...k$.

The long run coefficients are estimated by:

$$\pi = \frac{\hat{\lambda}(\hat{p},\hat{q}_1,\hat{q}_2,...,\hat{q}_k)}{1 - \hat{\alpha}_1 - \hat{\alpha}_2 - ... - \hat{\alpha}_p} \quad (4)$$

Where $\hat{\lambda}(\hat{p},\hat{q}_1,\hat{q}_2,....\hat{q}_k)$ denotes the OLS estimates of $\lambda$ in the equation (2) for the selected ARDL model.

The error correction model (ECM) of the ARDL version $(\hat{p},\hat{q}_1,\hat{q}_2,....\hat{q}_k)$ is being obtained from equation (2) in terms of lagged levels and the first difference of $y_t, x_{1t}, x_{2t},..., x_{kt}$ and $w_t$:

$$\Delta y_t = \Delta\alpha_\circ - \alpha(1,\hat{p})EC_{t-1} + \sum_{i=1}^{k}\beta_{i\circ}\Delta x_{it} + \lambda'\Delta w_t - \sum_{j=1}^{\hat{p}-1}\alpha^{\bullet} j\Delta y_{t-1} - \sum_{i=1}^{k}\sum_{j=1}^{\hat{q}_{t-1}}\beta_{ij}\Delta x_{i,t-j} + \varepsilon_t \quad (5)$$

where ECM is the error correction model and it is defined as follows:

$$ECM_t = y_t - \alpha - \sum \hat{\beta}_i x_{it} - \lambda' w_t \quad (6)$$

$x_t$ is the *k*- dimensional forcing variables which are not co-integrated among themselves. $\varepsilon_t$ is a vector of stochastic error terms, with zero means and constant variance-covariance.

An error-correction term among co-integrated variables shows the changes in dependant variable. These changes are not only the function of both the levels of dis-equilibrium in the co-integration relationship but also in the other explanatory variables. This indicates the divergence in dependant variable from short span of time to long run equilibrium relationship (Masih and Masih, 1997). The advanced ARDL approach can be employed by two steps to estimate long run link. First step leads to estimate the existence of long run association among the variables through under considered equation. In the second step, we estimate the coefficients both long run and short run relationships from same equation. If there is long run link among variables is found then we proceed to second step (Narayan et. al., 2004).

The ARDL approach involves two steps for estimating long run relationship (Pesaran et. el., 2001). The first step is to investigate the existence of long run relationship among all variables in the equation under estimation. The second step is estimate the long run and short run coefficients of the same equation. We run second step only if we find a long run relationship in the first step (Narayan and Smyth 2004). This study uses a more general formula of ECM with the both unrestricted intercept and trends (Pesaran et. al., 2001):

$$\Delta y_t = c_\circ + c_1 t + \pi_{yy} y_{t-1} + \pi_{yx.x} x_{t-1} + \sum_{i=1}^{p-1} \psi'_i \Delta z_{t-1} + w' \Delta X_t + \mu_t \quad (7)$$

where $c_\circ \neq 0$ and $c_1 \neq 0$. The Wald test (F-statistics) for the null hypothesis $H_\circ^{\pi_{yy}} : \pi_{yy} = 0, H_\circ^{\pi_{yx.x}} : \pi_{yx.x} = 0'$, and alternative hypothesis $H_1^{\pi_{yy}} : \pi_{yy} \neq 0, H^{\pi_{yx.x}} : \pi_{yx.x} \neq 0'$. Hence the joint null hypothesis of the

interest in above equation is given by: $H_{\circ} = H_{\circ}^{\pi_{yy}} \bigcap H_{\circ}^{\pi_{yx.x}}$, and alternative hypothesis is correspondingly stated as: $H_{\circ} = H_1^{\pi_{yy}} \bigcap H_1^{\pi_{yx.x}}$.

F-statistics' asymptotic distributions are non-standard having null hypothesis of no cointegration correlation among the variables either variables are integrated at *I(0)* or *I(1)* , or mutually co-integrated. These are also called the assumptions of ARDL approach. Pesaran and Pesaran (1997) have generated two series of asymptotic critical values. First series is generated for *I(0)* variables while second is for *I(1)* variables. Null hypothesis of no cointegration is rejected if the calculated of *F-statistics* is higher than the upper bound critical value. This leads to conclude that there exists steady state equilibrium among the variables. Null hypothesis is accepted (no cointegration among variables) if calculated *F-statistics* is lower than the critical value of lower bound. The results are inconclusive if value of calculated *F-statistics* falls between the lower and upper critical values. In such case, error correction method is appropriate approach to determine the cointegration [Kremers, et al. (1992) and Bannerjee et al. (1998)}. In this case, following Kremers, et al. (1992) and Bannerjee et al. (1998), the error correction term will be a useful way of establishing cointegration.

## V. Interpretations of Empirical Evidence

DF-GLS and Ng-Perron unit root tests are used to find out stationarity problem of the macroeconomic variables at level and then at 1st difference of each series. The results of DF-GLS and Ng-Perron[12] tests are reported in Table-2. The results of DF-GLS and Ng-Perron tests indicate that real GDP, real exports and real domestic capital stock are not stationary at their level but real effective exchange rate is stationary at level form. The ambiguities in the order of integration of the series give a support to the use of ARDL bounds testing rather than one of the alternative co-integration tests.

[12] Theoretical back ground of Ng-Perron test has been in Appendix.

**Table-2 Unit Root Estimation**

| Variables | DF-GLS Test at Level | | DF-GLS Test at 1st Difference | |
|---|---|---|---|---|
| | T-values | Lags | T-values | Lags |
| LRGDP | -1.9038 | 4 | -4.3750* | 2 |
| LREXP | -1.4203 | 4 | -4.0010* | 3 |
| LREER | -3.7270* | 1 | -9.0853 | 1 |
| LRK | -0.8374 | 2 | -3.8385* | 2 |
| Ng-Perron at Level | | | | |
| Variables | MZa | MZt | MSB | MPT |
| LRGDP | -1.9541 | -0.9470 | 0.4846 | 43.9782 |
| LREXP | -5.3946 | -1.5891 | 0.2945 | 16.7267 |
| LREER | -19.4180** | -3.0732 | 0.1582 | 4.9543 |
| LRK | 0.3155 | 0.1937 | 0.6140 | 86.4212 |
| Ng-Perron at 1st Difference | | | | |
| Variables | MZa | MZt | MSB | MPT |
| LRGDP | -20.5408** | -3.1986 | 0.1557 | 4.4738 |
| LREXP | -34.4585* | -4.1482 | 0.1203 | 2.6588 |
| LREER | -75.6694 | -6.1502 | 0.0812 | 1.2074 |
| LRK | -21.9870** | -3.3102 | 0.1505 | 4.1777 |

Note: * (**) show significance at 1% (5%) level respectively

**Table-3 VAR Lag Order Selection Criteria**

| Lag | LogL | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | 190.2222 | NA | 5.75e-08 | -5.3206 | -5.1921 | -5.2695 |
| 1 | 383.1909 | 358.3704 | 3.66e-10 | -10.3768 | -9.7344 | -10.1217 |
| 2 | 423.4544 | 70.1736 | 1.84e-10 | -11.0701 | -9.9137 | -10.6108 |
| 3 | 456.5513 | 53.9006 | 1.14e-10 | -11.5586 | -9.8882 | -10.8951 |
| 4 | 515.1122 | 88.6779* | 3.46e-11* | -12.7746* | -10.5903* | -11.9070* |

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

We employ the **PSS** (2001) ARDL cointegration approach after having a look on order of integration of real GDP, real exports, real imports, real domestic capital stock and real effective exchange rate in the model. This procedure is used to investigate the cointegration among the variables. Table-4 explains whole picture of empirical

estimation for **PSS** F-statistics. **PSS** F-statistics is 7.431 while lag order is 4. In such small a sample data, AIC does not allow us to take lag more than 4 due to the problem of degree of freedom. **PSS** F-statistics is higher than lower and upper critical bounds at one percent level of significance. It is concluded that empirical evidence confirms the existence of cointegration between real GDP, real exports, real imports, real domestic capital stock and real effective exchange rate.

**Table-4 ARDL Estimation for Cointegration**

| **Dependent Variable** | | | **Wald F-Statistic** | |
|---|---|---|---|---|
| | | | **Lag Order 4** | |
| **LRGDP** | | | 4.482 | |
| **LREXP** | | | 7.431* | |
| **LREER** | | | 4.021 | |
| **LRK** | | | 2.384 | |
| **Critical Value** | **Pesaran, et. al, (2001)** | | **Narayan P (2005)** | |
| | Lower Bound Value | Upper Bound Value | Lower Bound Value | Upper Bound Value |
| 1 % | 4.40 | 5.72 | 4.932 | 6.224 |
| 5 % | 3.47 | 4.57 | 3.724 | 4.880 |
| 10 % | 3.03 | 4.06 | 3.182 | 4.248 |
| **Sensitivity Analysis** | | | | |
| Serial Correlation Test = 10.246 (0.0026) | | | | |
| ARCH Test = 0.085 (0.9177) | | | | |
| Heteroscedisticity Test = 0.760 (0.6385) | | | | |
| Normality J-B Value = 1.404 (0.4955) | | | | |

Note: * indicates one cointegrating vector among variables

**Table-5 Johansen First Information Maximum Likelihood Test for Cointegration**

| Hypotheses | Trace - test | 5 % critical value | Prob-value** | Hypotheses | Max-Eigen Statistic | 5 % critical value | Prob-value |
|---|---|---|---|---|---|---|---|
| *R = 0* | 84.3803 | 63.8761 | 0.0004 | *R = 0* | 42.5401 | 32.1183s | 0.0019 |
| *R ≤ 1* | 41.8402 | 42.9152 | 0.0638 | *R= 1* | 19.7207 | 25.8232 | 0.2595 |
| *R ≤ 2* | 22.1194 | 25.8721 | 0.1367 | *R = 2* | 18.6892 | 19.3870 | 0.0629 |
| *R ≤ 3* | 3.43015 | 12.5179 | 0.8220 | *R = 3* | 3.4301 | 12.5179 | 0.8220 |

**MacKinnon-Haug-Michelis (1999) p-values

To check the robustness of long run results, Maximum Likelihood Test for cointegration has also been used. Trace test and Maximum Eigen values also confirm the existence of one cointegrating vector among the variables. This indicates the long run relationship among real GDP, real exports, real imports, real domestic capital stock and real effective exchange rate. It is concluded that long run relationship among variables is robust.

Long run marginal impact of independent variables is explained in Table-5. The results show that exports-led growth hypothesis exists in the country after the implementation of trade reforms. 10 percent increase in exports leads to cause economic growth by 1.672 percent. Devaluation of local currency seems to have a negative impact on economic growth. It is concluded that devaluations of local currency are contractionry in the case of Pakistan. The findings are consistent with previous study by Shahbaz et al., (2009). Devaluation-based adjustment policies may not achieve desirable effects of improvement in the trade balance without other related issues[13]. Working capital stock is also positively associated with economic growth and main contributing factor in economic growth.

**Table-5 Long Run Elasticities**

| **Dependent Variable = LRGDP** | | | | |
|---|---|---|---|---|
| **Variable** | **Coefficient** | **Std. Error** | **T-Statistic** | **Prob.** |
| **Constant** | 17.6121 | 0.9540 | 18.4598 | 0.0000 |
| **LREXP** | 0.1672 | 0.0688 | 2.4298 | 0.0177 |
| **LREER** | -0.1431 | 0.1713 | -8.3524 | 0.0000 |
| **LRK** | 0.2033 | 0.0679 | 2.9942 | 0.0038 |
| R-squared = 0.8729<br>Adjusted R-squared = 0.8675<br>S.E. of regression = 0.0832<br>Akaike info criterion = -2.0821<br>Schwarz criterion = -1.9576<br>F-statistic = 160.374<br>Prob(F-statistic) = 0.00000<br>Durbin-Watson stat = 1.6806 | | | | |

Table 5 reports the short-run coefficient estimates obtained from the ECM version of ARDL model. In short run, exports-led growth hypothesis is also valid for Pakistan.

[13] Depreciation increases the exports by making exports relatively cheaper and discourages the imports by making imports relatively more, thus improving trade balance.

Devaluation of local currency severely hits economic growth in the country. Like long run impact working domestic capital stock is also major factor of economic growth and has stronger and positive impact on economic growth than long run.

**Table-6 Short Run Results**

| **Dependent Variable: ΔRGDP** | | | | |
|---|---|---|---|---|
| **Variable** | **Coefficient** | **Std. Error** | **T-Statistic** | **Prob.** |
| **Constant** | -0.0027 | 0.0082 | -0.3319 | 0.7410 |
| **ΔLREXP** | 0.1794 | 0.1011 | 1.7739 | 0.0805 |
| **ΔLREER** | -0.8703 | 0.2692 | -3.2328 | 0.0019 |
| **ΔLRK** | 0.5283 | 0.1015 | 5.2020 | 0.0000 |
| **$ecm_{t-1}$** | -0.7889 | 0.1035 | -7.6204 | 0.0000 |
| R-squared = 0.7174<br>Adjusted R-squared = 0.7008<br>Akaike info criterion =-2.4357<br>Schwarz criterion = -2.2789<br>F-statistic = 43.1529<br>Durbin-Watson stat = 1.623<br>Prob(F-statistic) = 0.000 | | | | |

The existence of an error-correction term among a number of co-integrated variables implies that changes in dependant variable are a function of both the levels of disequilibrium in the co-integration relationship (represented by the ECM) and the changes in the other explanatory variables. This tells us that any deviation from the long run equilibrium will feed back on the changes in the dependant variable in order to force the movement towards the long run equilibrium (Masih and Masih, 2002).

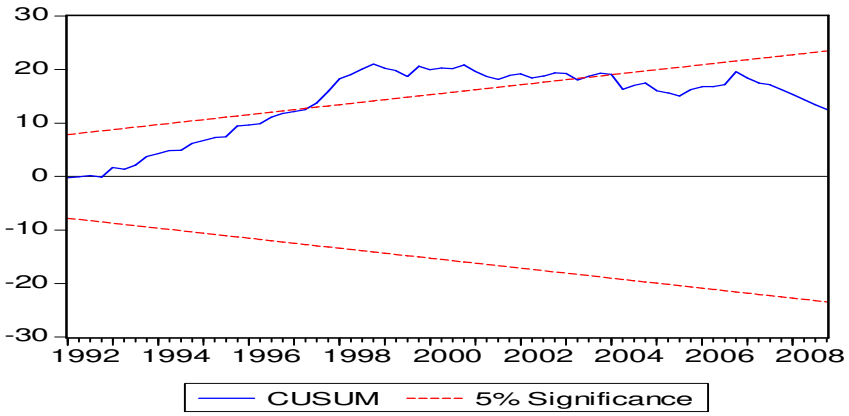
The **$ecm_{t-1}$** coefficient shows speed of adjustment from short run to long span of time and it should have a statistically significant estimate with negative sign. Bannerjee et al., (1998) holds that "*a highly significant error correction term is further proof of the existence of stable long run relationship*". The coefficient of $ecm_{t-1}$ is equal to (-0.7889) for short run model respectively and implies that deviation from the long-term economic growth is corrected by (78.89) percent over the each quarter of year. The lag length of short run model is selected on basis of Schwartz Bayesian Criteria.

The regression specification tests remarkably well and passes the sensitivity analysis against non-normality of error term, heteroscedisticity, autoregressive heteroscedisticity.

The short run could not pass serial correlation test. The stability of error correction model is investigated through employment of cumulative sum and cumulative sum of squares test on the recursive residuals.

Figure 1

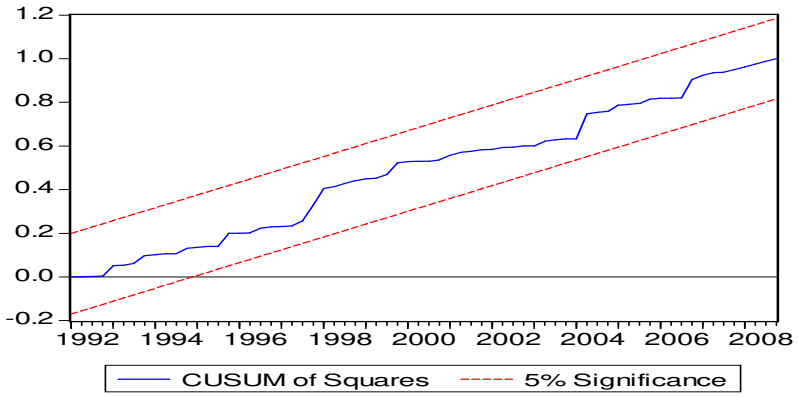
**Plot of Cumulative Sum of Recursive Residuals**




The straight lines represent critical bounds at 5% significance level.

Figure 2

**Plot of Cumulative Sum of Squares of Recursive Residuals**




The straight lines represent critical bounds at 5% significance level.

As argued by Brown et al., (1998) cumulative sum test detects systematic changes from regression coefficients where as cumulative sum of squares test is able to detect sudden changes from constancy of regression coefficients. Figure 1 shows that Cumulative sum

statistics does lie within the 5% confidence interval bands. This indicates the instability of parameters. Parameter instability is around the year 1997-2003 in Cumulative test but not in Cumulative Squares test. The break point in the economy can be detected and linked to atomic explosion in 1998, military coup in 1999 and 9/11 in U.S.A.

**Table-7 Chow Forecast Test**

| **Chow Forecast Test: Forecast from 1997Q1 to 2008Q4** | | | |
|---|---|---|---|
| F-statistic | 1.3907 | Probability | 0.2127 |
| Log likelihood ratio | 107.1197 | Probability | 0.0002 |

Furthermore, we employ Chow forecast test to examine the significance structural break points in the economy for the period 1997-2003. F-statistics computed in Table-7 is reported. It indicates no structural break in the economy. Chow forecast test is more reliable and preferable than graphs. Graphs mostly seem to mislead the results (Leow, 2004). It is documented that there is no sign of structural break in sample period of the study.

## VI. Conclusion and Policy Recommendation

Economic growth plays an important role for the development of the economy. There are so many internal and external source of economic growth. Classical and Neo-classical school of economic thoughts seem to support the view that "*trade improves the economic efficiency through its spillover effects*". During the eighties Balassa and Bahmani-Oskooee has started a particular direction in economic development by analyzing the Exports-led growth hypotheses.

This paper presents a comprehensive literature on exports-led growth hypothesis not only for cross-sectional but also time series studies. To examine exports-led growth hypothesis in Pakistan, we have used quarterly data. In doing so, ARDL approach has been employed to find out cointegration among variables. The empirical findings show positive correlation between exports and economic growth. This evidence confirms the validity of exports-led growth hypothesis in Pakistan during trade liberalization regime. Working real capital stock is a major determinant of economic

growth. Finally, depreciation of exchange is negatively associated with economic growth in the country.

On basis of empirical findings some policy implications are recommended. Exports increase the economic growth so government authorities should focus more on the value added exports through exports oriented policies in the country. It is generally accepted that final goods in exports are more income elastic under the free trade regime. In the case of Pakistan, more than sixty percent share of exports is based on the textile items. Textile sector's performance is based on the availability of agriculture raw material. So, there is a huge need to create harmony between textile industry and agriculture output stability through agricultural reforms like availability of credit on cheaper rate to agriculture sector, support prices to inputs and research & development to improve performance of agriculture sector.

**Reference**


- Abdulai. A and Jaquet. P, (2002), "Exports and Economic Growth: Cointegration and Causality Evidence for Cote d'Ivoire" African Development Review, pp: 1-14.
- Abual-Foul, B. (2004), "Testing the Export-Led Growth Hypothesis: Evidence from Jordan", Applied Economics Letters, pp: 393-396.
- Agbola, (2007), "Testing for Export-Led Growth Hypothesis in the Philippines using a Multivariate VAR Framework" mimeo.
- Alsuwaidi and Shamsi, (1997), "Exports and Economic Growth in Egypt: Evidence from Cointegration Analysis" Journal of King Saud University, pp"99-106.
- Al-Yousif, Y. K. (1999). On the Role of Exports in the Economic Growth of Malaysia: A multivariate analysis. International Economic Journal, pp: 67–75.
- Amrinto. L. (2006), "A Semi Parametric Assessment of Export-Led Growth in The Philippines" Master Dissertation, The Department of Agricultural Economics and Agribusiness, Louisiana State University.
- Anwar, Muhammad S. and R. K. Sampath, (2000), "Exports and Economic Growth." Indian Economic Journal, pp: 79-88.
- Awokuse, T. O. (2005a), "Exports, Economic Growth and Causality in Korea", Applied Economics Letters, pp: 693-696.
- Awokuse, T. O. (2005b) Export-Led Growth and the Japanese Economy: Evidence from VAR and Directed Acyclic Draphs, Applied Economics Letters, pp: 849-858.

- Bahmani-Oskooee, M. and Alse, J. (1993), "Export Growth and Economic Growth: an Application of Cointegration and Error Correction Modeling", The Journal of Developing Areas, pp: 535–42.
- Bahmani-Oskooee, M. and Domac, I. (1995), "Export Growth and Economic Growth in Turkey: Evidence from Cointegration Analysis", Middle East Technical University Studies in Development, pp: 67–77.
- Bahmani-Oskooee, M., Mohtad, H. and Shabsigh, G. (1991) 'Exports, growth and causality in LDCs: A Reexamination'. Journal of Development Economics, pp: 405–15.
- Balaguer, J. and Cantavella-Jorda, M. (2001), "Examining the Export-led Growth Hypothesis for Spain in the Last Century, Applied Economics Letters, pp: 681-685.
- Balassa, B. (1978), "Exports and Economic Growth: Further Evidence'. Journal of Development Economics, pp: 181–9.
- Balassa, B. (1984), "Adjustment to External Shocks in Developing Economies". World Bank Staff Working Paper 472. Washington, DC: The World Bank.
- Bannerjee, A., J. Dolado and R. Mestre (1998), "Error-correction Mechanism Tests for Cointegration in Single Equation Framework. Journal of Time Series Analysis, Volume, pp. 267-283.
- Begum, S. and Shamsuddin, A. F. M., 1998, "Exports and Economic Growth in Bangladesh." Journal of Development Studies, Vol. 35, 1 : 89-114.
- Bhagwati, J. (1978), "Anatomy and Consequences of Exchange Control Regimes: Liberalisation Attempts and Consequences. Cambridge, MA: Ballinger. Bhat, Sham K. (1995) Export and Economic Growth in India. Artha Vijana 37:4 350–358.
- Borensztein, E., De Gregorio, J., J.W. Lee, (1998), "How Does Foreign Investment Affect Growth? Journal of International Economics, p: 115-135.
- Bowers, W. and Pierce, G., (1975), "The Illusion of Deterrence in Isaac Ehrlich's Work on the Deterrent Effect of Capital Punishment", Yale Law Journal, pp: 187-208.
- Chandra, R. (2003), "Reinvestigation Export-Led Growth in India Using a Multivariate Cointegration Framework", Journal of Developing Areas, pp: 73-86.
- Chen, Shyh-Wei, (2007), "Exactly what is the Link between Export and Growth in Taiwan? New Evidence from the Granger Causality Test" Economics Bulletin, pp: 1-10.
- Clarke, J and Ralhan, M, (2005), "Direct and Indirect Causality between Exports and Economic Output for Bangladesh and Sri Lanka: Horizon Matters" Econometrics Working Paper EWP05012, Department of Economics, University of Victoria, Victoria, B.C., Canada V8W 2Y2, July, 2005.
- Darrat, A. F., Hsu, M. K. and Zhong, M. (2000), "Testing Export Exogeneity in Taiwan: further evidence", Applied Economics Letters, pp: 563-567.
- Dickey, D. A., and W. A. Fuller (1979), "Distribution of the Estimation for Autoregressive Time Series with a Unit Root", Journal of American Statistical Association, pp: 355–367.

- Dodaro, S., 1993, "Exports and Growth: A Reconsideration of Causality", Journal of Developing Areas, pp: 227-244.
- Doyle, E. (1998), "Export-Output Causality: The Irish Case, 1953–1993", Atlantic Economic Journal, pp.147–162.
- Ehrlich, I., (1975), "The Deterrent Effect of Capital Punishment – A Question of Life and Death", American Economic Review, pp: 397-417.
- Ehrlich, I., (1977), "The Deterrent Effect of Capital Punishment Reply", American Economic Review, pp: 452-58.
- Ekanayake, E. M. (1999), "Exports and Economic Growth in Asian Developing Countries: Cointegration and Error-Correction Models", Journal of Economic Development, pp: 43–56.
- Engle, R. F. and Granger, C. W. J. (1987). "Co-integration and Error Correction: Representation, Estimation and Testing", Econometrica, pp: 251-76.
- Federici and Marconi, (2002), "On Exports and Economic Growth: The Case of Italy", Journal of International Trade & Economic Development, pp: 323-340.
- Ferda, (2007), "A Multivariate Causality Analysis of Export and Growth for Turkey", MPRA Paper-3565.
- Fountas, S. (2000), "Some Evidence on the Export-led Growth Hypothesis for Ireland", Applied Economics Letters, pp: 211-214.
- Fuad A-Stait (2005), "Are Exports the Engine of Economics Growth? An Application of Co-integration and Causality Analysis for Egypt". Economic Research working paper series no 76 (July 2005).
- Furuoka, Fumitaka, (2007), "Do Exports Act as "Engine" of Growth? Evidences from Malaysia". Economic Bulletin, pp. 1-14.
- Ghali, H, K. (2000), "Export Growth and Economic Growth: The Tunisian Experience" J. King Saud University Vol. 12, Admin. Sci. pp.127-140.
- Ghatak, S., and Price, S. W., (1997), "Export Composition and Economic Growth: Co-Integration and Causality Evidence for India." Review of World Economics, pp. 538-553.
- Granger, C.W.J. (1969), "Investigating Causal Relations by Econometric and Cross- Spectral Method," *Econometrica*, pp: 424-438.
- Granger, C.W.J. (1988), "Some Recent Developments in a Concept of Causality," *Journal of Econometrics*, pp: 199-211.
- Hatemi-J, A. and Irandoust, M. (2000), "Export Performance and Economic Growth Causality: An Empirical Analysis, Atlantic Economic Journal, pp: 412-426.
- Holman, J.A. and Graves, P.E. (1995), "Korean Exports Economic Growth: An Econometric Reassessment", Journal of Economic Development, pp: 45–56.
- Howard, M. (2002), "Causality between Exports, Imports and Income in Trinida and Tobago". International Economic Journal pp: 97-106.
- Johansen, S. (1988), "Statistical Analysis of Cointegration Vectors", Journal of Economic Dynamics and Control, pp: 231–54.
- Johansen, S. and Juselius, K. (1990), "Maximum Likelihood Estimation and Inference in Cointegration – With Application to the Demand for Money" Oxford Bulletin of Economics and Statistics pp: 169–210.

- Jordaan and Eita, (2006), "Export and Economic Growth in Namibia: A Granger Causality Analysis" mimeo.
- Jung, W. S. and Marshall, P. J. (1985). "Exports, growth and causality in developing countries", Journal of Development Economics, pp: 1-12.
- Kaldor N (1967), "Strategic Factors in Economic Development", New York State School of Industrial and Labor Relations, Cornell University, Ithaca, NY.
- Karagoz, and Sen (2005), "Exports and Economic Growth of Turkey: Co-integration and Error Correction Analysis", Elektronik Sosyal Bilimler Dergisi, pp: 1-14.
- Kavoussi, R. M. (1984), "Export Expansion and Economic Growth: Further empirical evidence", Journal of Development Economics, pp: 241-250.
- Kemal, A. R., Musleh ud Din, Usman Qadir, Lloyd, F. and Sirimevan, S. Colombage, (2002), "Exports and Economic Growth in South Asia." A Study Prepared for the South Asia Network of Economic Research Institutions.
- Keong, C. Zulkorain, Y and Venus, L. K (2003), "Export-led Growth Hypothesis in Malaysia: An Application of Two- Stage Least Square Technique", International finance.
- Keong, C. Zulkorain, Y and Venus, L. K (2005), "Export-Led Growth Hypothesis in Malaysia: An Investigation Using Bounds Test". Sunway Academic journal, pp13-22.
- Kessing, (1967),"Out-ward Looking Policies and Economic Growth", Economic journal, pp: 303-320.
- Khan, A and Afia, (1995), "Export Growth and Causality: An Application of Co-Integration and ECM Model." The Pakistan Development Review, pp: 145-161.
- Khan, A. H. and N. Saqib, (1993), "Exports and Economic Growth: The Pakistan Experience." International Economic Journal, pp: 53-64.
- Khan, A. H., A. Malik, and L. Hassan, (1995), "Exports, Growth and Causality: An Application of Co-Integration and Error-Correction Modeling." Paper presented at the Eleventh Annual General Meeting of the Pakistan Society of Development Economists. April 18-21. PIDE, Islamabad.
- Kremers, J. J. M., N. E. Ericsson and J. J. Dolado (1992), "The Power of Cointegration Tests. Oxford Bulletin of Economics and Statistics, pp. 325-348.
- Krueger, A. O., (1978), "Foreign Trade Regimes and Economic Development: Liberalization Attempts and Consequences", Cambridge, MA: Ballinger.
- Kunst RM, Marin D (1989), "On exports and productivity: A causal analysis. Review of Economics and Statistics, pp: 699–703.
- Layson, S., (1983), "Homicide and Deterrence: Another View of the Canadian Time Series Evidence", Canadian Journal of Economics, pp: 52-73.
- Leow, Y G. (2004), "A Reexamination of the Exports in Malaysia's Economic Growth: After Asian Asian Financial Crisis, 1970-2000". International journal of Management Sciences. 11 (Spacil Issue), 79-204.
- Leybourne, S., Kim, T.-H, Smith, V. and Newbold, P. (2003), "Tests for a Change in Persistence against the null of Difference Stationary", Econometrics Journal, pp", 290-310.

- Love, J and Chandra, R, (2004), "Testing Export-Led Growth in India, Pakistan and Sri Lanka Using a Multivariate Framework", Journal of the Manchester School, pp: 483-496.
- Love, J. and Chandra, R. (2005), "Testing Export-Led Growth in Bangladesh in a Multivarate VAR Framework", Journal of Asian Economics, pp: 1155-1168.
- Love, J. and Chandra, R. (2005), "Testing export-led growth in South Asia", Journal of Economic Studies, pp: 132-145.
- Love, J. and R. Chandra. 2005. "Testing Export-led Growth in South Asia."Journal of Economic Studies, pp: 132–145.
- Lucas, R.E. (1990), "Why does not capital flow from rich to poor countries", American Economic Review, 80, 92-6.
- Mah, J. S. (2005), "Export, Expansion, Economic Growth and Causality in China", Applied Economics Letters, pp: 105-107.
- Mamum K. A. and H. K. Nath (2005), "Expor-led Growth in Bangladesh: a time series analysis" Applied Economics Letters, 12, 361-364.
- Masih, A. M. M., and R. Masih R., (1996), "Energy Consumption, Real Income and Temporal Causality: Results from a Multi-Country Study based on Co-Integration and Error Correction Modeling Techniques." Energy Economics, pp: 165-183.
- Merza, M. (2007), "Oil Exports, Non-Oil Exports and Economic Growth: Time Series Analysis for Kuwait (1970-2004)", PhD Dissertation, Kansas State University, Manhattan, Kansas.
- Michaely, M. (1977). "Exports and Growth: An Empirical Investigation", Journal of Development Economics, pp: 49-53.
- Musleh ud Din, (2004), "Exports, Imports, and Economic Growth in South Asia: Evidence Using a Multivariate Time-Series Framework." The Pakistan Development Review, pp: 105-124.
- Mutairi, Naief (1993), "Exports and Pakistan's Economic Development." Pakistan Economic and Social Review, pp: 134-146.
- Ngoc, P.M.; N. T. Phuong Anh and P.T. Nga (2003), "Exports and Long-Run Growth in Vietnam, 1976-2001" ASEAN Economic Bulletin, pp: 1-25.
- Olorunfemi and Olorunsola (2006), "Time Series of Export and Growth in the Economic Growth in the Ecowas Countries". The Social Sciences, pp: 344-350.
- Ozmen, E. and Furten, G. (1998), "Export Led-growth Hypothesis and The Turkish Data: An Empirical Investigation, METU Studies in Development, pp**:** 491-503.
- Pahlavani Mosayeb (2005), "The Relationship between Trade and Economic Growth in Iran: An Application of a New Co-integration Technique in the Presence of Structural Breaks", Economic Working paper Series.
- Panas, E. and Vamvoukas, G. (2002), "Further Evidence on the Export-led Growth Hypothesis," Applied Economic Letters, pp: 731–745.
- Paresh Kumar Narayan and Seema Narayan, (2007), "Is Devaluation Expansionary or Contractionary? Empirical Evidence from Fiji?", Applied Economics, pp: 2589-98.

- Perron, P. (1989), "The Great Crash, the Oil Price Shock and the Unit Root Hypothesis", Econometrica, pp: 1361-1401.
- Perron, P. (1990), "Testing for a Unit Root in Time Series with a Changing Mean", Journal of Business and Economic Statistics, pp: 153-162.
- Pesaran, M. H., Pesaran, B. (1997), "Working with Microfit 4.0: Interactive Econometric Analysis", Oxford: Oxford University Press.
- Pesaran, M. H., Shin, Y. and Smith, R. J. (2001), "Bounds Testing Approaches to the Analysis of Level Relationships", Journal of Applied Econometrics, pp: 289–326.
- Phillips, P.C.B, and P. Perron (1988) "Testing for a Unit Root in Time Series Regressions" Biometrika, pp: 335-346.
- Phillips, P.C.B., (1987), "Time Series Regression with a Unit Root" Econometrica 55, 277-301.
- Phillips, P.C.B., and S.N. Durlauf (1986), "Multiple Time Series Regressions with Integrated Processes" Review of Economic Studies, pp: 473-495.
- Quddus, Muhammad A. and Ikram Saeed, (2005), "An Analysis of Export and Growth in Pakistan." The Pakistan Development Review, pp : 921-937.
- Ramesh and Boaz, (2007)," Testing Export-led Growth Hypothesis in Kenya: An ADRL Bounds Test Approach", MPRA paper no.5582.
- Ramos, (2001), "Exports, Imports and Economic Growth in Portugal: Evidence from Causality and Cointegration Analysis" Economic Modeling, pp: 613-23.
- Richard, D.G. (2001), "Exports as a Determinant of Long-Run Growth in Paraguay: 1966-1996" Journal of Development Studies, pp: 128-146.
- Riezman, R. & Whiteman, C. & Summers, P.M., (1995), "The Engine of Growth or Its Handmaiden? A Time Series Assessment of Export-Led Growth", Working Papers 95-16, University of Iowa, Department of Economics.
- Sengupta, J.K. and Espana, J.R., (1994), "Exports and Economic growth in Asian NICs: an Econometric analysis for Korea", Applied Economics, pp: 45-51.
- Shan, J. and Sun F., (1998), "On the Export-Led Growth Hypothesis: The Econometric Evidence from China." Applied Economics, pp: 1055-65.
- Sharma, A. and T. Panagiotidis (2005), "An Analysis of Exports and Growth in India: Co integration and Causality Evidence (1971-2001)" Review of Development Economics, pp: 232-248.
- Sharma, U. C. and D. Dhakal., (1994), "Causal Analysis between Exports and Economic Growth in Developing Countries." Applied Economics, pp: 1145-1157.
- Shirazi, Nasim Shah and Manap, Turkhan Ali Abdul, (2004), "Export-Led Growth Hypothesis: Further Econometric Evidence from South Asia." The Developing Economies, pp: 472-488.
- Siddiqui. S, Zehra. S, Majeed. S, Butt. M. S, (2008), "Export-Led Growth Hypothesis in Pakistan: A Reinvestigation Using the Bounds Test" Lahore Journal of Economics, pp: 59-80.
- Siliverstovs, B. and Herzer, D. (2006), "Export-led Growth Hypothesis: Evidence for Chile", Applied Economics Letters, pp: 319-324.

- Silivertovs, B. (2005), "Export-led Growth Hypothesis Evidence for Chile. Ibero-America Instituet for Economic Research (IAI). http://www.iau.wiwi.uni-goettingen.de.
- Sprout, R.V.A., and J.H. Weaver (1993), "Exports and Economic Growth in a Simultaneous Equations Model," Journal of Developing Areas, pp: 289-306.
- Taban, S and Akhtar, I, (2008), "An Empirical Examination of the Export Led-Growth Hypotheses in Turkey", Journal of Yasar University, pp: 549-564.
- Thungsuwan and Thompson, (2006), "Exports and Economic Growth in Thialand: An Empirical Analysis" BU Academic Review, pp: 10-20.
- Thungsuwan, S. and Thompasn (2003), "Exports and Economic Growth in Thailand: An Empirical Analysis" BU Academic Review. Pp: 10-20.
- Ukpolo, V. (1994), "Export Composition and Growth of Selected Low-Income African Countries: Evidence from Time-Series Data," Applied Economics, pp: 445-449.
- Ahmad. A, Chaudhary. M and Khan, (2005), "The Growth Impact of Exports in South Asian Countries", The Pakistan Development Review, pp: 901–919.