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Muhammad, Shahbaz and Pervaz, Azeem and Ahmad, Khalil

COMSATS Institute of Information of Information Technology,  
Pakistan, GC University Faisalabad, Government Vehari College,  
Vehari, Pakistan

4 September 2011

Online at <https://mpra.ub.uni-muenchen.de/33617/>

MPRA Paper No. 33617, posted 22 Sep 2011 13:18 UTC

# Exports-Led Growth Hypothesis in Pakistan: Further Evidence

**Muhammad Shahbaz**

COMSATS Institute of Information Technology,  
Lahore Campus, Pakistan  
Email: [shahbazmohd@live.com](mailto:shahbazmohd@live.com)

**Pervaz Azeem**

GC University Faisalabad, Pakistan  
Email: [dr\\_azim@hotmail.com](mailto:dr_azim@hotmail.com)

**Khalil Ahmad**

Government Vehari College, Vehari, Pakistan  
Email: [karajpoot@hotmail.com](mailto:karajpoot@hotmail.com)

## **Abstract:**

The study considers the exports-led growth hypothesis using quarterly data over the period 1990-2008 in case of Pakistan. For this purpose, Ng-Perron unit root test, ARDL bounds testing approach to cointegration and error correction method (ECM) for short run dynamics have been applied. Our results indicate that exports are positively correlated with economic growth confirming the validity of exports-led growth hypothesis. Exchange rate depreciation decreases and real capital stock improves economic growth.

**Keywords:** Exports, Economic Growth, ARDL Approach

**JEL Classifications:** F10, E10, C22

## **Introduction**

The purpose of this study is to reinvestigate the exports-led growth hypothesis in Pakistan after implementing trade reforms i.e. 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 developed and developing economies extensively. 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 Ricardo (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 which improves the total factor productivity (TFP).

Movements of ideas and advanced technologies across borders have become possible due to international trade. This improves the effect of growing competition and stimulates technical progress through innovations that lead to efficiency gains through productivity improvements. Increased exports are a major source of foreign exchange that helps to purchase import items for domestic use. Shahbaz and Nuno (2010) pointed out that intra-industry trade can be increased through exports which integrate the country with the globe and helps to absorb external shocks on the domestic economy as well. In such a scenario, it is inferred 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. It is a fact that nowadays foreign direct investment (FDI) is concentrated to more open economies not only to expand exports volume but also to boost the rate of economic growth and rapid economic development (Richard, 2001). Exports-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 in 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.

Exports oriented policies increase output, employment opportunities and domestic consumption. This causes to enhance the demand of output produced. 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 produces 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) analyzed 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 documented that the industrial development is worked as main determinant of output growth, in the context of productivity growth. He also investigated the causal relationship between output growth, via productivity growth to exports growth. Kunst and Marin (1989) also found bidirectional causality, when productivity increases due to promotion of scale economies that causes to enhance exports. A contributory work was done by Sharma and Dhakal

(1994); Bhagwati (1988) on the relationship between exports growth and economic growth. They argued that there is a possibility of existence of bidirectional causality between exports and economic growth. They also discussed the causal relation between international trade and output and inferred 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) investigated exports and output growth regression analysis based on the neoclassical growth accounting techniques of production function and found significant and positive relationship between exports growth variable in the growth accounting. They concluded that exports growth Granger cause output growth. On the other hand, Jung and Marshal (1985), Bahmani-Oskooee et al. (1991) and Holman and Graves (1995) strongly supported for bidirectional 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. The previous work on exports-led growth hypotheses (ELG) is extensively based on the cross-country comparison (for example, Michaely, 1997 and Balassa, 1978). These studies strongly support the exports-led growth hypotheses. In the development of causality tests (Granger, 1969 and 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; Phillips, 1987 and; Phillips and Perron, 1988), checking the stationarity properties of the variables have become common routine. Thus, starting in the 1980s, most of the studies based on the cointegration techniques to find out the long run 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 and Price (1997), Ekanayake (1999), Richards

(2001) and Ngoc et al. (2003) were used to examine long-and-short runs relationship between exports growth and output growth<sup>1</sup>.

In recent wave of country case studies, empirical evidence supports the exports-led growth hypothesis [Doyle, (1998) and Fountas, (2000) for Ireland; Ghali, (2000) for Tunisia; Hatemi and Irandoust (2000a) for Nordic countries; Balaguer and Cantavella-Jorda (2001) for Spain; Thungsuwan and Thompson, (2003)<sup>2</sup> for Thailand; Ramos, (2001) for Portugal; Howard, (2002) for Trinidad and Tobago; Abdulai and Jaquet (2002) for Cote d'Ivoire; Panas and Vamvoukas (2002) for Greece; Federici and Marconi, (2002) for Italy; Ngoc et al. (2003) for Vietnam; Chandra (2003) for India; Abual-Foul, (2004) for Jordan; Keong et al. (2003, 2005); Leow, (2004)<sup>3</sup> and 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, (2006); Karagoz, and Sen (2005) and Taban and Akhtar, (2008) for Turkey; Begum, and Shamsuddin, (1998); Mamun and Nath, (2005) for Bangladesh<sup>4</sup>; Clarke and Ralhan, (2005) for Bangladesh and Sri Lanka; Pahlavani, (2005) for Iran; Alsuwaidi and Shamsi, (1997) 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, (2006); Siliverstovs and Herzer (2006) for Chile; Amrinto, (2006) for Philippines; Olorunfemi and Olowofeso, (2006) for Ecowas countries; Merza, (2007) for Kuwait; Darrat et al. (2000) and Chen, (2007) for Taiwan].

In the case of Pakistan, Dodaro (1993) found no relationship between exports and economic growth while Bahamani-Oskooee and Alse (1993) inferred that bidirectional causal relation is found between the both variables and same inference drawn by Anwer and Sampath (2000) and Kemal et al. (2002). Din (2004) reported long run equilibrium

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<sup>1</sup> 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 Juselius (1990).

<sup>2</sup> Ukpalo (1998) fails to find out support for export led growth in South Africa

<sup>3</sup> exports-led growth hypothesis is met short span of time

<sup>4</sup> Love and Chandra, (2005) find causality running from income to exports in the case of Bangladesh

association between exports, imports and output for Pakistan and Bangladesh but not for India, Sri Lanka and Nepal<sup>5</sup>.

Furthermore, causal relationship between exports and economic growth was also investigated by Khan and Saqib (1993); Khan and Malik (1995); Khan et al. (1995) for Pakistan and supported for bidirectional causality between exports and economic growth. On contrary, Multairi (1993) did not find any support for exports-led growth hypothesis for Pakistan over the period 1959-1991. Furthermore, Shirazi and Manap (2004) reported long run relationship between exports, imports and economic growth and documented that unidirectional causality from exports to economic growth. Similarly, Quddus and Saeed (2005) supported exports-led growth hypothesis as unidirectional causality is from exports to economic growth. Recently, Siddiqui et al. (2008) revisited exports-led growth hypothesis in case of Pakistan over the period 1971-2005. They supported exports-led growth hypothesis in long-and-short runs. They used terms of trade which is basically a ratio of real exports to real imports for external shocks. Furthermore, they included real exports and real imports as separate variables instead of terms of trade<sup>6</sup> in their model. This has created a doubt of multi-colinearity which makes results ambiguous<sup>7</sup>.

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 hypothesis. Traditional methods such as OLS, residual based Engle-Granger (1987) test<sup>8</sup>, 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

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<sup>5</sup> 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.

<sup>6</sup> Real effective exchange rate is better to check the impact of external shocks in the economy.

<sup>7</sup> 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.

<sup>8</sup> 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

integration. Furthermore, these methods do not include the information on structural break in time series data and suffer from low predicting power. We used ARDL bounds testing approach to cointegration that provides more reliable and unbiased results for long-run relationships as compared to other traditional techniques. 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 et al. 2003 and 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 reforms of trade liberalization<sup>9</sup>. For cointegration, ARDL bounds testing has been employed and error correction method (ECM) for short run dynamics.

### **III. Model and Data Source**

Following, Bowers and Pierce (1975) and Ehrlich (1975, 1977), we used log-linear specification for empirical analysis. Ehrlich (1975, 1977) and Layson (1983) pointed out that log-linear specification provides more reliable and unbiased results as compared to simple linear modeling.

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:

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<sup>9</sup> 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.



$$\ln RGDP = \beta_1 + \beta_2 \ln REXP + \beta_3 \ln RK + \beta_4 \ln RER + \varepsilon_t \quad (1)$$

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 exports 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 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	$\ln RGDP_t$	$\ln REXP_t$	$\ln RK_t$	$\ln RER_t$
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
$\ln RGDP_t$	1.0000			
$\ln REXP_t$	0.8636	1.0000		
$\ln RK_t$	0.7821	0.8932	1.0000	
$\ln RER_t$	-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, real<sup>10</sup> gross domestic product, real exports, real effective exchange rate and domestic capital stock are used for analysis for Pakistan. 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

<sup>10</sup> 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.

into log form. Series transformation into log directly gives elasticities and solves the problem of heteroscedasticity.

#### IV. Methodological Framework

This present paper employs ARDL (advanced autoregressive distributed lag) bounds testing approach to cointegration developed by Pesaran et al. (2001) to examine the long run relationship between the variables. The ARDL bounds testing approach has several advantages. It yields consistent long-run estimators even when the right hand side variables are endogenous (Inder, 1993). By using appropriate order, it is possible to simultaneously correct for serial correlation in residuals and the problem of endogenous regressors (Pesaran and Shin, 1999). The approach is applied irrespective of whether the variables are I(0) or I(1), unlike other widely used cointegration techniques. Moreover, a dynamic unrestricted error correction model (UECM) can be derived from ARDL bounds testing through a simple linear transformation. The UECM integrates the short-run dynamics with the long-run equilibrium without losing any long-run information. The UECM is specified as follows:

$$\begin{aligned} \Delta \ln RGDP_t = & \alpha_1 + \alpha_T T + \alpha_{RGDP} \ln RGDP_{t-1} + \alpha_{REXP} \ln REXP_{t-1} + \alpha_{RK} \ln RK_{t-1} \\ & + \alpha_{RER} \ln RER_{t-1} + \sum_{i=0}^p \alpha_i \Delta \ln RGDP_{t-i} + \sum_{j=0}^q \alpha_j \Delta \ln REXP_{t-j} + \sum_{k=0}^r \alpha_k \Delta \ln RK_{t-k} \quad (2) \\ & + \sum_{l=0}^t \alpha_l \Delta \ln RER_{t-l} + \varepsilon_t \end{aligned}$$

$$\begin{aligned} \Delta \ln REXP_t = & \alpha_1 + \alpha_T T + \alpha_{RGDP} \ln RGDP_{t-1} + \alpha_{REXP} \ln REXP_{t-1} + \alpha_{RK} \ln RK_{t-1} \\ & + \alpha_{RER} \ln RER_{t-1} + \sum_{i=0}^p \beta_i \Delta \ln REXP_{t-i} + \sum_{j=0}^q \beta_j \Delta \ln RGDP_{t-j} + \sum_{k=0}^r \beta_k \Delta \ln RK_{t-k} \quad (3) \\ & + \sum_{l=0}^t \beta_l \Delta \ln RER_{t-l} + \varepsilon_t \end{aligned}$$

$$\begin{aligned}
\Delta \ln RK_t = & \alpha_1 + \alpha_T T + \alpha_{RGDP} \ln RGDP_{t-1} + \alpha_{REXP} \ln REXP_{t-1} + \alpha_{RK} \ln RK_{t-1} \\
& + \alpha_{RER} \ln RER_{t-1} + \sum_{i=0}^p \delta_i \Delta \ln RK_{t-i} + \sum_{j=0}^q \delta_j \Delta \ln RGDP_{t-j} + \sum_{k=0}^r \delta_k \Delta \ln REXP_{t-k} \quad (4) \\
& + \sum_{l=0}^t \delta_l \Delta \ln RER_{t-l} + \varepsilon_t
\end{aligned}$$

$$\begin{aligned}
\Delta \ln RER_t = & \alpha_1 + \alpha_T T + \alpha_{RGDP} \ln RGDP_{t-1} + \alpha_{REXP} \ln REXP_{t-1} + \alpha_{RK} \ln RK_{t-1} \\
& + \alpha_{RER} \ln RER_{t-1} + \sum_{i=0}^p \gamma_i \Delta \ln RER_{t-i} + \sum_{j=0}^q \gamma_j \Delta \ln RGDP_{t-j} + \sum_{k=0}^r \gamma_k \Delta \ln REXP_{t-k} \quad (5) \\
& + \sum_{l=0}^t \gamma_l \Delta \ln RK_{t-l} + \varepsilon_t
\end{aligned}$$

Where  $\Delta$  is the first difference operator and  $\mu_t$  is the error term. The optimal lag structure of the first difference regression is selected based on Akaike Information Criteria (AIC). The lags is induced when noise in the error term. Pesaran et al. (2001) suggested F-test for joint significance of the coefficients of the lagged level of the variables. For example, the null hypothesis of no long-run relationship between the variables is  $H_0 : \alpha_{RGDP} = \alpha_{REXP} = \alpha_{RK} = \alpha_{RER} = 0$  against the alternative hypothesis of cointegration  $H_a : \alpha_{RGDP} \neq \alpha_{REXP} \neq \alpha_{RK} \neq \alpha_{RER} \neq 0$ .

Two asymptotic critical bounds are used to test for cointegration. If the order of integration for all series is one, the decision is made based on the upper bound. Similarly, if all series are  $I(0)$ , then the decision is based on the lower bound. If the F-statistic exceeds the upper critical value, we conclude the favor of long-run relationship. If the F-statistic falls below the lower critical value, we cannot reject the null hypothesis of no cointegration. However, if the F-statistic lies between the two bounds, inference is inconclusive.

## V. Interpretations of Empirical Evidence

We have used DF-GLS and Ng-Perron unit root tests to test order of integration of real GDP, real exports, real capital and real effective exchange rate. The Table-2 presents the results of DF-GLS and Ng-Perron unit tests. The results of DF-GLS and Ng-Perron tests indicate that real GDP, real exports and real domestic capital stock are not integrated at

I(0) while real effective exchange rate is found to stationary at I(0). At 1<sup>st</sup> difference, real GDP, real exports and real domestic capital stock are stationary. The dissimilarity of stationarity level of the variables presents a rational to apply ARDL bounds testing approach cointegration to investigate long run relationship among the variables.

**Table-2: Unit Root Estimation**

Variables	DF-GLS Test at Level		DF-GLS Test at 1 <sup>st</sup> Difference	
	T-values	Lags	T-values	Lags
$\ln RGDP_t$	-1.9038	4	-4.3750*	2
$\ln REXP_t$	-1.4203	4	-4.0010*	3
$\ln RER_t$	-3.7270*	1	-9.0853	1
$\ln RK_t$	-0.8374	2	-3.8385*	2
Ng-Perron at Level				
Variables	MZa	MZt	MSB	MPT
$\ln RGDP_t$	-1.9541	-0.9470	0.4846	43.9782
$\ln REXP_t$	-5.3946	-1.5891	0.2945	16.7267
$\ln RER_t$	-19.4180**	-3.0732	0.1582	4.9543
$\ln RK_t$	0.3155	0.1937	0.6140	86.4212
Ng-Perron at 1 <sup>st</sup> Difference				
Variables	MZa	MZt	MSB	MPT
$\ln RGDP_t$	-20.5408**	-3.1986	0.1557	4.4738
$\ln REXP_t$	-34.4585*	-4.1482	0.1203	2.6588
$\ln RER_t$	-75.6694	-6.1502	0.0812	1.2074
$\ln RK_t$	-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 used the PSS (2001) ARDL bounds testing approach to cointegration once integrating order of real GDP, real exports, real imports, real domestic capital stock and real effective exchange rate is tested. The results of ARDL bounds testing approach are reported in Table-4. The empirical evidence indicates that PSS F-statistics is 7.431 is high than upper critical bound (UCB) at 1<sup>st</sup> level of significance when real GDP, real capital and real effective exchange rate are used as forcing variables at lag 4. The empirical evidence implies that real GDP, real exports, real imports, real domestic capital stock and real effective exchange rate are cointegrated for long run relationship.

**Table-4: ARDL Bunds Testing Analysis**

Dependent Variable		F-Statistic		
		Lag Order 4		
ln $RGDP_t$		4.482		
ln $REXP_t$		7.431*		
ln $RER_t$		4.021		
ln $RK_t$		2.384		
Critical Value	Pesaran et al. (2001)		Narayan (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
<b><u>Sensitivity Analysis</u></b>				
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

Long run affects of real exports, real capital and real effective exchange arte on economic growth is reported in Table-5. The analysis confirms the validity of exports-led growth hypothesis in Pakistan after the implementation of trade reforms. A 10 percent increase in exports leads to cause economic growth by 1.672 percent. Devaluation of local currency

has negative effect on economic growth. It implies that devaluations of local currency are contractionary in the case of Pakistan. The findings are consistent with previous study by Shahbaz et al. (2011). Devaluation-based adjustment policies may not achieve desirable effects of improvement in the trade balance due to losing the competitiveness in international market<sup>11</sup>. Working capital stock is also positively associated with economic growth which is a main contributing factor in economic growth.

**Table-5: Long Run Analysis**

<b>Dependent Variable = <math>\ln RGDP_t</math></b>				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>T-Statistic</b>	<b>Prob.</b>
Constant	17.6121	0.9540	18.4598	0.0000
$\ln REXP_t$	0.1672	0.0688	2.4298	0.0177
$\ln RER_t$	-0.1431	0.1713	-8.3524	0.0000
$\ln RK_t$	0.2033	0.0679	2.9942	0.0038
R-squared = 0.8729 Adjusted R-squared = 0.8675 S.E. of regression = 0.0832 Akaike info criterion = -2.0821 Schwarz criterion = -1.9576 F-statistic = 160.374 Prob(F-statistic) = 0.00000 Durbin-Watson stat = 1.6806				

**Table-6: Short Run Analysis**

<b>Dependent Variable: <math>\Delta \ln RGDP_t</math></b>				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>T-Statistic</b>	<b>Prob.</b>
<b>Constant</b>	-0.0027	0.0082	-0.3319	0.7410
$\Delta \ln REXP_t$	0.1794	0.1011	1.7739	0.0805
$\Delta \ln RER_t$	-0.8703	0.2692	-3.2328	0.0019
$\Delta \ln RK_t$	0.5283	0.1015	5.2020	0.0000
$ECM_{t-1}$	-0.7889	0.1035	-7.6204	0.0000

<sup>11</sup> Depreciation increases the exports by making exports relatively cheaper and discourages the imports by making imports relatively more, thus improving trade balance.

R-squared = 0.7174
Adjusted R-squared = 0.7008
Akaike info criterion = -2.4357
Schwarz criterion = -2.2789
F-statistic = 43.1529
Durbin-Watson = 1.623
Prob(F-statistic) = 0.000

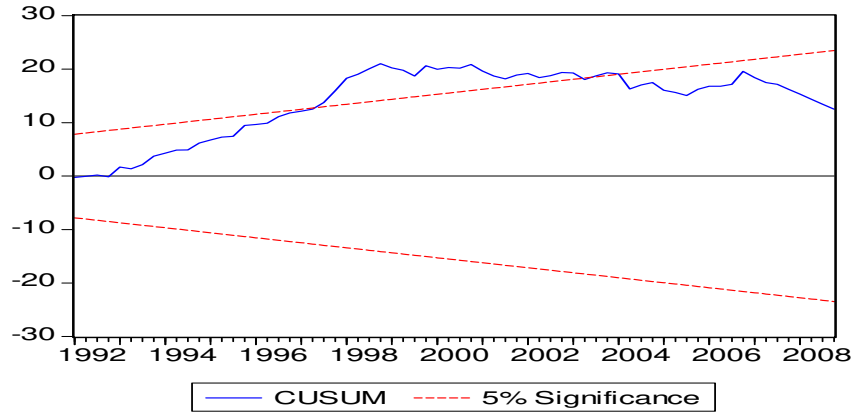
Table-6 reports the short-run coefficient estimates obtained from the ECM version of ARDL model. In short run, exports-led growth hypothesis is also valid for Pakistan. Devaluation of local currency seems to benefit economic growth in the country. Like long run impact working domestic capital stock is also major factor of economic growth and has stronger and positive impact on economic growth than long run.

The significance of error correction term with negative sign indicates the speed of adjustment from short run towards long run. It is argued by Bannerjee et al. (1998) that *“a highly significant error correction term is further proof of the existence of stable long run relationship”*. So, coefficient of  $ECM_{t-1}$  confirms our established long run relationship. Furthermore, deviations from short term economic growth towards long run are corrected by 78.89 percent as coefficient of  $ECM_{t-1}$  is equal to -0.7889. The SBC is used to select appropriate lag order for short run model. The short run model seems to pass all diagnostic tests against heteroscedasticity, autoregressive conditional heteroscedasticity while error term is normally distributed but serial correlation exists. We applied cumulative sum and cumulative sum of squares tests to test the stability of ARDL parameters.

**Figure 1**

**Plot of Cumulative Sum of Recursive Residuals**

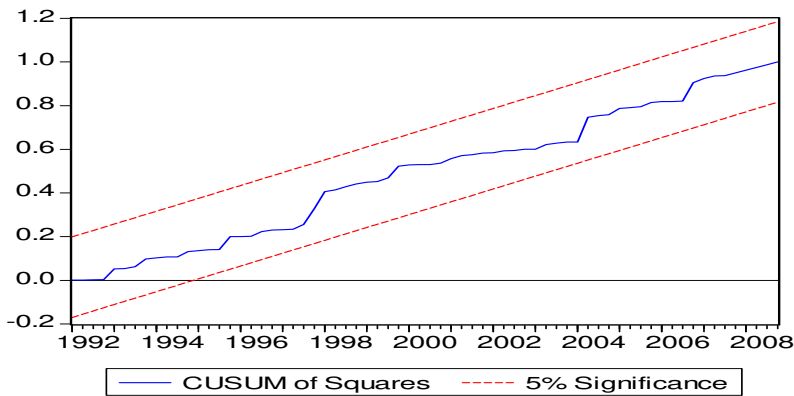




The straight lines represent critical bounds at 5% significance level.

**Figure 2**

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



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

Figure 1 indicates that blue line of CUSUM test crosses the critical bounds at 5 percent confidence interval. It implies that ARDL parameters are unstable. Parameter instability is around the year 1997-2003 in CUSUM test but graph of CUSUMsq test do lie within critical bounds at 5 percent confidence interval. 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**

<b>Chow Forecast Test: Forecast from 1997Q1 to 2008Q4</b>			
F-statistic	1.3907	Probability	0.2127

Log likelihood ratio	107.1197	Probability	0.0002
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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 for 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 positively associated with economic growth in the country.

On the 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 cost i.e. low rate of interest to agriculture sector. The most important is that government must give its attentions to support prices to inputs and generate research & development activities to improve performance of agriculture sector.

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