The Dynamics of Exports, Financial Development and Economic Growth in Pakistan: New Extensions from Cointegration and Causality Analysis

Shahbaz, Muhammad and Mohammad, Mafizur Rahman

COMSATS Institute of Information Technology, Lahore, Pakistan, School of Accounting, Economics and Finance, University of Southern Queensland

15 January 2014

The Dynamics of Exports, Financial Development and Economic Growth in Pakistan: New Extensions from Cointegration and Causality Analysis

Muhammad Shahbaz*
Department of Management Sciences,
COMSATS Institute of Information Technology, Lahore, Pakistan
Email: shahbazmohd@live.com

Mohammad Mafizur Rahman
School of Accounting, Economics and Finance, University of Southern Queensland,
QLD 4350, Australia. Phone: 617- 4631 1279, Fax: 617-4631 5594,
Email: Mafiz.Rahman@usq.edu.au

Abstract: This paper explores the relationship between exports, financial development and economic growth in case of Pakistan. In doing so, the autoregressive distributed lag (ARDL) bounds testing approach to cointegration and error correction model are applied to test the long run and short run relationships, respectively. The direction of causality between the variables is investigated by the vector error correction model (VECM) Granger causality test and robustness of causality analysis is tested by applying innovative accounting approach (IAA).

The analysis confirms cointegration for the long run relation between exports, economic growth and financial development in case of Pakistan. The results indicate that economic growth and financial development spur exports growth in Pakistan. The causality analysis reveals feedback hypothesis that exists between financial development and economic growth, financial development and exports, and, exports and economic growth. This study provides new insights for policy makers to sustain exports growth by stimulating economic growth and developing financial sector in Pakistan.

Keywords: Exports, Financial Development, Economic Growth, Cointegration

JEL Classification: C22, F10, F14, O53.

- **Corresponding author**

Introduction

The relationship between export expansion and economic growth has drawn much attention of development economists until recently, and many empirical studies were conducted to examine the role of exports in the economic growth of developing countries from various perspectives (see Ullah et al. 2009; Vohra 2001; Sengupta and Espana 1994; Ram 1985, 1987; Krueger 1990; Chow 1987; Balassa 1985; Feder 1982; Tyler 1981; and Michaely 1977). Most of these studies concluded that exports have a positive and significant impact on economic growth.

A considerable literature also exists on the relationship of financial development and economic growth (see Shahbaz and Rahman 2010; Ang 2009; Choong and Lim 2009; Ljunwal and Li 2007; Hermes and Lensink 2003; and Omran and Bolbol 2003). All these studies advocate that well developed financial sector facilitates growth through various channels including export expansion.

Though export led growth is theoretically and empirically established, it can also be argued that causality runs from the growth of output to the growth of exports. In a growing economy some industries experience substantial changes in terms of learning and technological innovation; accumulation of human capital occurs; manufacturing experiences and technology transfer via foreign direct investment (FDI) are also observed. Under such a situation, output will still continue to grow even in the absence of outward-oriented policies. The growth of domestic demand will be lower than the growth of output in these prosperous industries; as a result it is likely that producers will sell their

products in foreign markets. Hence economic growth will promote export growth in a country.

In contrast to positive growth-led export, a negative growth-led export is also plausible. It is likely to occur if consumers demand more exportable and non-traded goods. In this situation, an increase in domestic demand would induce an increase in domestic output with a decrease in exports. Therefore, output growth will lead to a reduction in exports growth (Lee and Huang, 2002).

A well-developed financial sector may also play a contributory role in export growth in addition to its impact on output growth (see Hur, et al. 2006 and Shahbaz, 2009). Economies with higher level of financial development are more likely to have higher export shares in world trade.

Though literature on exports-led growth and financial development-growth nexus are substantial, literature on growth-led exports and financial development-exports nexus are still limited. This study aims to fill up this gap, and will enrich the existing literature. To the best of our knowledge, this is the first study in Pakistan as well as in South Asia with regard to the effect of economic growth and financial development on exports. The rest of the paper is organized as follows: section II provides literature review; section III presents modeling framework, estimation strategy and data collection, section IV interprets the results, and finally, section V concludes the paper and presents some policy implications.

II. Literature review

Economic Growth-Exports

Growth affects trade (Rodriguez and Rodrik 2000 cited in Won et.al 2008) and vice versa. This is known as the relation between trade regime/outward orientation and growth in the development literature (Edwards 1993). Surveying more than 150 papers Giles and Williums (2000) find that there is no obvious agreement to whether the causality dictates export-led growth or growth-led exports. Bidirectional causality between exports and growth is possible (see Wernerheim 2000).

Using seasonally unadjusted quarterly data from 1987.1 to 2002.4, Alici and Ucal (2003) found only unidirectional causality from exports to output for Turkey, but Dritsaki, Dritsaki and Adamopoulos (2004) observed bidirectional causality between real GDP and real exports for Greece. Ahmad et al. (2003) used undeflated annual data from 1972 to 2001 for Pakistan and found unidirectional causality from exports to GDP. Cuadros et al. (2004) conducted a study for Mexico, Brazil and Argentina; they used seasonally adjusted quarterly data from late 1970s to 2000. Their experience is mixed; that is, they found unidirectional causalities from real exports to real GDP in Mexico and Argentina, and unidirectional causality from real GDP to real exports in Brazil.

Export-led growth is also confirmed by Ullah, et al. (2009) and Shirazi (2004) for Pakistan, Balaguer (2002) for Spain and Jordaan (2007) for Namibia. On the other hand, no evidence of unidirectional causality from exports to economic growth is found in Hong Kong, South Korea, Singapore and Taiwan in the study conducted by Darrat

(1986). However, the study reveals the unidirectional causality from economic growth to export growth for Taiwan. Amavilah (2003), Mah (2005) and Pazim (2009) found no significant relationship between exports and output growth. Amavilah (2003) conducted the study for Namibia using data from 1968 to 1992. Mah (2005) investigated the long-run causality between export and growth for China. Pazim (2009) tested the validity of export-led growth hypothesis for Indonesia, Malaysia, and the Philippines by using panel data analysis. Moreover, Shahbaz et al. (2011) also validated the existence of exports-led-growth in case of Pakistan.

The literature on the relationship between export and growth presented above indicate that a generalized conclusion can never be drawn. The outcome is country specific, and it depends on certain characteristics of a specific country. Also what variables/considerations are being included, and how the study is being conducted are also matters in determining the outcome. Hence the importance of current study is realized.

Financial Development-Exports

Financial sector development is considered as a potential source of comparative advantage for a country. Countries with a well developed financial sector are able to have an easier access to external finance for investment projects than those without (Hur et, al. 2004, Beck 2003, Beck et al. 2001, Rajan and Zingales 1998, Kletzer and Bardhan 1987).

Becker and Greenberg (2003) found a positive impact of financial development on exports for a given industry and country-pair. They have used accounting standards, stock market capitalization over GDP, ratio of credit to the private sector over GDP, and new issues of equity and bonds over GDP as proxies for financial development. All these variables are positively related to the level of exports. However, if financial development were proxied for comparative advantage, exports should be decreasing with the financial development of the importers.

Exporting firms face large fixed costs. Financial development helps the exporting firms to acquire these fixed costs. Melitz (2002) realized the effects of fixed costs on firm composition in exporting industries. Roberts and Tybout (1997) also noted the importance of sunk costs in a firm's exports. They find that firm's current exporting status is considerably determined by its previous export experience.

Berman and Hericourt (2010) noted that financial health had a causal positive impact on firm's export participation, but not on export share. Empirically, evidence shows that financially developed countries export relatively more in financially vulnerable sectors (see Beck 2003, Manova 2005, Svaleryd and Vlachos 2005, Hur et al. 2006).

III. Modeling Framework, Estimation Strategy and Data Collection

Following economic literature discussed above, we use log-linear specification to explore the relationship between exports, financial development and economic growth in case of

Pakistan. The log-linear modeling framework provides consistent and proficient estimates (Shahbaz, 2010). The estimable equation for empirical purpose is modeled as follows:

$$\ln E_t = \beta_1 + \beta_G \ln G_t + \beta_F \ln F_t + \varepsilon_t \qquad (1)$$

where, E_t is real exports; real GDP is denoted by G_t and used for economic growth; F_t is real domestic credit to private sector in time period t and used for financial development, and ε is residual term assumed to be independently and identically distributed. The time period of study is $1991Q_1$-$2012Q_4$.

This study uses ADF, DF-GLS and Ng-Perron unit root tests to test the order of integration of the variables. The autoregressive distributed lag (ARDL) approach to cointegration is used to investigate long run relationship between the variables[1]. The ARDL cointegration approach involves the investigation of long run relationship in the form of unrestricted error correction model as follows:

$$\Delta \ln E_t = \alpha_1 + \alpha_E \ln E_{t-1} + \alpha_F \ln F_{t-1} + \alpha_G \ln G_{t-1} + \sum_{i=0}^{n} \alpha_E \Delta \ln E_{t-i} + \sum_{j=0}^{p} \alpha_F \Delta \ln F_{t-j} + \sum_{k=0}^{q} \alpha_G \Delta \ln G_{t-k} + \mu_t \qquad (2)$$

$$\Delta \ln F_t = \phi_1 + \phi_E \ln E_{t-1} + \phi_F \ln F_{t-1} + \phi_G \ln G_{t-1} + \sum_{i=1}^{n} \phi_F \Delta \ln F_{t-i} + \sum_{j=0}^{p} \phi_G \Delta \ln G_{t-j} + \sum_{k=0}^{q} \phi_E \Delta \ln E_{t-k} + \mu_t \qquad (3)$$

[1] The ARDL bounds testing approach to cointegration has numerous advantages over the other cointegration methods like E-G (Engle-Granger, 1987) cointegration, J-J (Johansen and Juselius, 1990) cointegration and FMOLS (Fully Modified Ordinary Least Square) by Philip and Hansen (1990). Firstly, ARDL is applicable irrespective whether the variables are integrated at I(1) or I(0) or I(1)/I(0) while conventional approaches to cointegration such as J-J cointegration and FMOLS require that variables must be integrated at I(1). Secondly, the long run and short-run parameters of the model are estimated simultaneously with simple modification. Lastly, ARDL approach is free from endogeneity problem.

$$\Delta \ln G_t = \varphi_1 + \varphi_E \ln E_{t-1} + \varphi_F \ln F_{t-1} + \varphi_G \ln G_{t-1} + \sum_{i=1}^{n} \varphi_G \Delta \ln G_{t-i} + \sum_{j=0}^{p} \varphi_F \Delta \ln F_{t-j} + \sum_{k=0}^{q} \varphi_E \Delta \ln E_{t-k} + \mu_t \quad (4)$$

The next step is to calculate the F-statistics following the null hypothesis of no cointegration i.e. $H_0 : \alpha_E = \alpha_F = \alpha_G = 0$, $H_0 : \phi_E = \phi_F = \phi_E = 0$, $H_0 : \varphi_E = \varphi_F = \varphi_G = 0$ and against the alternate hypothesis of cointegration i.e. $H_a : \alpha_E \neq \alpha_F \neq \alpha_G \neq 0$, $H_a : \phi_E \neq \phi_F \neq \phi_G \neq 0$ and $H_a : \varphi_E \neq \varphi_F \neq \varphi_G \neq 0$. The distribution of F-statistic developed by Pesaran et al. (2001) is non-standard. The reason is that F-statistic is based on the assumption that variables are integrated at I(0) or I(1). If calculated F-statistic is less than lower critical bound (LCB) then decision about no cointegration may be accepted. The cointegration may be found if calculated F-statistic exceeds upper critical bound (UCB). The decision about long run relation is inconclusive if calculated F-statistic lies between lower and upper critical values. In such an environment, error correction method is an easy and suitable way to investigate cointegration between the variables.

We have used critical bounds generated by Narayan (2005) to test cointegration rather than Pesaran et al. (2001). The critical bounds generated by Pesaran et al. (2001) are suitable large sample size (T = 500 to T = 40, 000). It is pointed out by Narayan and Narayan (2004) that the critical values computed by Pesaran et al. (2001) may provide biased decision regarding cointegration between the series. The critical bounds by Pesaran et al. (2001) are significantly downwards (Narayan and Narayan, 2005). The upper and lower critical bounds computed by Narayan (2005) are more appropriate for small samples rages from T = 30 to T = 80.

Once cointegration is found then there must be causality at least from one direction. Granger pointed out that existence of cointegration between the variables means that there is information about long and short run granger causality. In doing so, VAR vector autoregression (VAR) model is used to test the direction of causality between financial development, exports and economic growth in case of Pakistan. For empirical purpose, following vector error correction model (VECM) granger approach, an error correction representation can be developed as follows:

$$(1-L)\begin{bmatrix}\ln E_t\\ \ln F_t\\ \ln E_t\end{bmatrix}=\begin{bmatrix}\phi_1\\ \phi_2\\ \phi_3\end{bmatrix}+\sum_{i=1}^{p}(1-L)\begin{bmatrix}\alpha_{11i}\alpha_{12i}\alpha_{13i}\\ \beta_{21i}\beta_{22i}\beta_{23i}\\ \delta_{31i}\delta_{32i}\delta_{33i}\end{bmatrix}+\begin{bmatrix}\theta\\ \chi\\ \xi\end{bmatrix}ECM_{t-1}+\begin{bmatrix}\eta_{1t}\\ \eta_{2t}\\ \eta_{3t}\end{bmatrix} \quad (5)$$

Where $(1-L)$ is the difference operator; ECM_{t-1} is the lagged error-correction term which is derived from the long run cointegrating relationship while η_{1t}, η_{2t} and η_{3t} are serially independent random errors with mean zero and finite covariance matrix. The existence of a significant relationship in the first differences of the variables provides evidence on the direction of the short run causality while long run causation is shown by significant *t*-statistic pertaining to the error correction term (ECM_{t-1}).

The data on real GDP for economic growth, real domestic credit to private sector for financial development[2] and real exports have been collected from the Government of

[2] There are many indicators that had been used to financial development such as M1, M2 and M3. M1, M2 and M3 are considered poor proxies for financial development because they just show size financial sector

Pakistan, GoP (2010). The study uses quarterly data for real GDP, financial development, real exports and real foreign capital inflows over the period of $1991Q_1$-$2009Q_4$.

IV. Results and its Discussions

The descriptive statistics and correlation matrices are reported in Table-1. The results show that the series of exports, financial development and economic growth are normally distributed as confirmed by Jarque-Bera test statistics. The correlation coefficient indicates significant and positive association between financial development and economic growth. Exports and economic growth are positively correlated and same inference can be drawn for financial development and exports but their correlation is weak.

We have applied ARDL bounds testing approach to cointegration to test long run relationship between exports, financial development and economic growth in case of Pakistan. So, it is pre-request to check stationarity properties of the series to make it sure that no series is integrated at I(2) or beyond that order (Ouattara, 2004). The computation process of ARDL bounds testing becomes invalid if any series is found to be stationary at I(2) although ARDL bounds testing approach to cointegration is flexible to apply if the variables integrated at I(1) or I(0) or mutually integrated.

(Khan and Sinhadji, 2000). Similarly, currency to GDP ratio shows the size of money in circulation in an economy. Furthermore, stock market capitalization implies the promotion of trading activities which is another indicator of developed financial sector. These indicators of financial development indicate the actual size of financial markets. However, we need a variable which shows the ability of financial sector to allocate funds in potential investment ventures rather than collection of savings. In this manner, domestic credit to private sector is very good proxy of financial development. It shows actual amount of funds collected from savers and distributed by banks to investors for investing in high return projects. It includes credit allocated to public sector. Actually domestic credit to private sector works better for financial development as compared to other indicators of financial deepening (Levine, 2003).

Table-1: Descriptive Statistics and Correlation Matrix

Variables	$\ln G_t$	$\ln F_t$	$\ln E_t$
Mean	13.7795	13.4441	7.0829
Median	13.7615	13.4366	7.0511
Maximum	14.2065	14.9378	7.5816
Minimum	13.2917	12.0535	6.3986
Std. Dev	0.2286	0.8250	0.3028
Skewness	0.0848	0.1831	-0.0503
Kurtosis	2.0643	2.0429	1.8925
Jarque-Bera	2.7881	3.2378	3.8127
Probability	0.2480	0.1981	0.1486
$\ln G_t$	1.0000		
$\ln F_t$	0.7803	1.0000	
$\ln E_t$	0.4513	0.2227	1.0000

So, to examine the order of exports, financial development and economic growth, we applied ADF, DF-GLS and Ng-Perron unit root tests. The results of unit root tests are detailed in Table-2. The variables of interest should be stationary at I(0) or (1). We have used unit root tests to ensure that no variable is integrated at I(2). The empirical evidence of ADF, DF-GLS and Ng-Perron unit root tests is noted in Table-2.

The empirical exercise points out that the variables have unit root problem at level with intercept and trend. At 1st difference, exports, financial development and economic growth are found to be stationary. This implies that the variables are integrated at I(1). The same level of integrating order of the series leads us to implement ARDL bounds testing to the existence of cointegration between the variables for long run relationship over the study period i.e. 1991Q1-2008Q4 in case of Pakistan.

Table-2: Estimation of Unit Root Tests

Variables	ADF Test		DF-GLS Test
	T-calculated	Prob-value	T-calculated
$\ln G_t$	-2.1713 (4)	0.4975	-1.9038(4)
$\Delta \ln G_t$	-4.2129 (3)*	0.0072	-4.3750 (2)*
$\ln E_t$	-1.6093 (4)	0.7793	-1.7571 (4)
$\Delta \ln E_t$	-4.7425 (3)*	0.0001	-4.7248 (2)*
$\ln F_t$	-1.0912 (2)	0.9230	-1.1998 (2)
$\Delta \ln F_t$	-6.5572 (2)*	0.0000	-6.2183 (2)*
Variables	Ng-Perron Test		
	MZa	MZt	MSB
$\ln G_t$	-1.9541 (4)	-0.94701	0.48463
$\Delta \ln G_t$	-17.3258 (2)**	-2.93664	0.16949

$\ln E_t$	-5.0814(3)	-1.3348	0.2627
$\Delta \ln E_t$	-27.8375(2)*	-3.7287	0.1339SS
$\ln F_t$	-3.6375(1)	-1.2951	0.3560
$\Delta \ln F_t$	-36.820(1)*	-4.2903	0.1165

Note: The asterisks * (**) denotes the significant at %1 (5%) level. The figure in the parenthesis is the optimal lag structure for ADF and DF-GLS tests; bandwidth for the PP unit root test is determined by the Schwert (1989) formula

Table-3: Lag Length Criteria

VAR Lag Order Selection Criteria						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	55.66500	NA	4.46e-05	-1.5047	-1.4083	-1.4664
1	309.5149	478.6883	4.08e-08	-8.5004	-8.1149	-8.3473
2	334.2569	44.53571	2.61e-08	-8.9501	-8.2756	-8.6822
3	354.1558	34.11241	1.92e-08	-9.2615	-8.2979	-8.8788
4	391.9692	61.58171*	8.48e-09*	-10.0848*	-8.8321*	-9.5872*

* 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

Once integrating order of the variables is confirmed, next step is to choose appropriate lag order of the variable to apply ARDL bounds testing approach to cointegration. It is necessary to find out lag order because F-statistic is very much sensitive with it. We use sequential modified LR test statistic (LR), Final Prediction Error (FPE); Akaike Information Criterion (AIC); Schwarz Information Criterion (SIC) and Hannan-Quinn Information criterion (HQ) to choose appropriate lag order but we prefer to take decision about appropriate lag following AIC. The AIC provides reliable and consistent information about lag order as compared to other criterion (Lütkepohl, 2006). The results reported in Table-3 reveal that lag 4 is appropriate choice for F-test computation to test the existence of cointegration between the variables of interest.

Table-4: The Results of Cointegration Test

Panel I: Bounds Testing to Cointegration			
Estimated Model	$F_E(\ln E / \ln G, \ln F)$	$F_G(\ln G / \ln E, \ln F)$	$F_F(\ln F / \ln E, \ln G)$
Optimal Lag Length	(4, 4, 4)	(4, 3, 3)	(2, 1, 2, 2)
F-Statistics	8.175*	2.634	4.479**
	Critical values (T = 37)[#]		
	Lower bounds $I(0)$	Upper bounds $I(1)$	
1 per cent level	4.922	6.328	
5 per cent level	3.920	4.904	
10 per cent level	3.182	4.258	

Panel II: Diagnostic tests	Statistics	Statistics	Statistics
R^2	0.7584	0.9707	0.8139
Adjusted- R^2	0.6626	0.9616	0.7506
CUSUM	Stable	Stable	Stable
CUSUMsq	Stable	Unstable	Stable

Note: The asterisks * and **denotes the significant at 1% and 5% level. The optimal lag structure is determined by AIC. # Critical values bounds computed by surface response procedure developed by Turner (2006).

The analysis of ARDL bounds testing approach to cointegration reported in Table-4 indicate that our calculated F-statistics i.e. 8.175 and 4.4798 are higher than upper critical bound (UCB) at 1 and 5 per cent level of significance once exports ($\ln E_t$) and financial development ($\ln F_t$) are treated as predicted variables. This shows that two cointegrating are found confirming the long run relationship between exports, economic growth and financial development in case of Pakistan over study period of $1991Q_1$-$2008Q_4$.

The results detailed in Table-5 reveal the long-and-short runs impacts of financial development and economic growth on exports in case of Pakistan. The empirical evidence shows that economic growth is the main determinant of exports growth and it is statistical significant at 1 per cent level. All else is same, a 1 per cent rise in economic growth is linked with 0.60 per cent increase in exports growth. The effect of financial development is also positive and statistically significant at 1 per cent level. A 1 per cent increase in financial development contributes to exports growth by 0.18 per cent keeping

all other is constant. Economic growth has a strong contribution to exports growth in case of Pakistan.

Table-5: Long-and-Short Runs Analysis

Long Run Analysis			
Dependent Variable = $\ln E_t$			
Variable	Coefficient	Std. Error	T-Statistic
Constant	-3.5142	2.0217	-1.7382***
$\ln G_t$	0.5967	0.1960	3.0434*
$\ln F_t$	0.1765	0.0543	3.2490*
Short Run Analysis			
Constant	0.0077	0.0190	0.4063
$\ln G_t$	0.4717	0.1189	3.9644*
$\ln F_t$	0.0253	0.3370	0.0753
ECM_{t-1}	-0.5920	0.1156	-5.1196*
R^2	0.4216		
Adj- R^2	0.3661		
F-statistic	16.5270		
D. W Test	1.9514		
Diagnostic Tests		**Statistics**	
J-B Normality test		0.4956 [0.7805]	
Breusch-Godfrey LM test		1.3102 [0.2767]	
ARCH LM test		1.7365 [0.1919]	

White Heteroscedisticity	31488 [0.0303]
Ramsey RESET	1.6015 [0.2093]
CUSUM	Stable**
CUSUMsq	Stable**

Note: * and ** (***) denote significance at the 1% and 5% (10%) levels respectively.

The short run results are also according to our expectations reported in Table-6. The empirical evidence reveals that economic growth has positive effect on exports. The impact of financial development on exports is positive but statically insignificant. The sign of estimate of lagged error term i.e. ECM_{t-1} is negative and it is statistically significant at 1% significance level. This validates our established long run relationship between the variables. It indicates the process of monotonic convergence to the equilibrium path of exports in case of Pakistan. The coefficient value of estimate of ECM_{t-1} is -0.5920 implying that changes from short run to long span of time run is corrected by 59% over each quarter. The diagnostic tests show that error term is normally distributed and serially uncorrelated. There is no evidence of autoregressive conditional heteroskedasticity, but the model could not pass white heteroskedasticity. This may be due to quarter frequency of data used in the study. The model is well specified as confirmed by Ramsey reset test statistic.

The existence of cointegration between financial development, economic growth and exports leads us to investigate the causal relationship between the variables using VECM framework to make clear picture for policy makers to design comprehensive policy to

boost exports by stimulating economic growth and making the domestic financial sector more strong and sound. The results regarding VECM granger causality test are reported in Table-6. Since the variables are cointegrated, causality can be divided into long-and-short runs. The significance of coefficient of ECM_{t-1} indicates long run granger causality using t-statistic. The short run granger causality is indicated by joint significance of the LR test.

Table-6: The Results of Granger Causality

Dependent variable	Type of Granger Causality						
	Short-run			Long-run	Joint (short- and long-run)		
	$\Delta \ln E_t$	$\Delta \ln G_t$	$\Delta \ln F_t$	ECT_{t-1}	$\Delta \ln E_t, ECT_{t-1}$	$\Delta \ln G_t, ECT_{t-1}$	$\Delta \ln F_t, ECT_{t-1}$
	F-statistics [p-values]			[T-statistics]	F-statistics [p-values]		
$\Delta \ln E_t$	–	4.9447** [0.0010]	1.3922* [0.2558]	-0.6527* [-4.3669]	–	8.3037* [0.0001]	8.0412* [0.0001]
$\Delta \ln G_t$	18.9780* [0.0000]	–	32.1154 [0.0000]	-0.4825* [-3.4183]	16.6909* [0.0000]	–	36.3915** [0.0000]
$\Delta \ln F_t$	2.2923)*** [0.1091]	50.2327* [0.0000]	–	-0.0478** [-2.1913]	3.5889** [0.0182]	34.1945** [0.0000]	–

Note: The asterisks *, ** and *** denote the significance at the 1, 5 and 10 per cent levels, respectively.

In the long run, VECM analysis shows that feedback hypothesis is found between economic growth and exports, financial development and economic growth, and, exports and financial development. There is also bidirectional causality relation between financial

development and economic growth, economic growth and exports, and financial development and exports in the short run. The *F*-statistics indicate the significance of combined short-run and long-run effects. The joint i.e. short- run and long-run significance also confirms our findings and conclude that short run and long run results are consistent and robust.

Granger causality tests cannot provide us information about the relative strength of causality beyond the chosen time span (Wolde-Rufael, 2009). The tests do not tell us anything about the magnitude of the feedback from one variable to the other. The Innovative Accounting Approach (IAA) can help us in this regard (Shan, 2005)**.** Applying the method, we find that 76.12% exports volume is explained by its own innovative shocks, 21.25% by economic growth, and 2.62% by financial development. Exports explain a sizeable part of economic growth through the innovative shocks till the 13th time horizon and increases after the 14th innovative shocks. The contribution of financial development to economic growth is negligible.

Table-7: Variance Decomposition Method (VDM)

Time	**Variance Decomposition of** $\ln E_t$			**Variance Decomposition of** $\ln G_t$			**Variance Decomposition** $\ln F_t$		
	$\ln E_t$	$\ln G_t$	$\ln F_t$	$\ln E_t$	$\ln G_t$	$\ln F_t$	$\ln E_t$	$\ln G_t$	$\ln F_t$
1	100.0000	0.0000	0.0000	25.6911	74.3088	0.0000	6.0641	43.4286	50.5071
2	89.9036	10.0079	0.0883	34.7574	62.0341	3.2084	3.3699	28.1982	68.4318
3	79.3793	20.4689	0.1517	46.3289	50.4847	3.1862	11.7215	18.9642	69.3142
4	78.6103	20.7213	0.6682	46.1947	49.9683	3.8369	14.7841	16.3483	68.8675

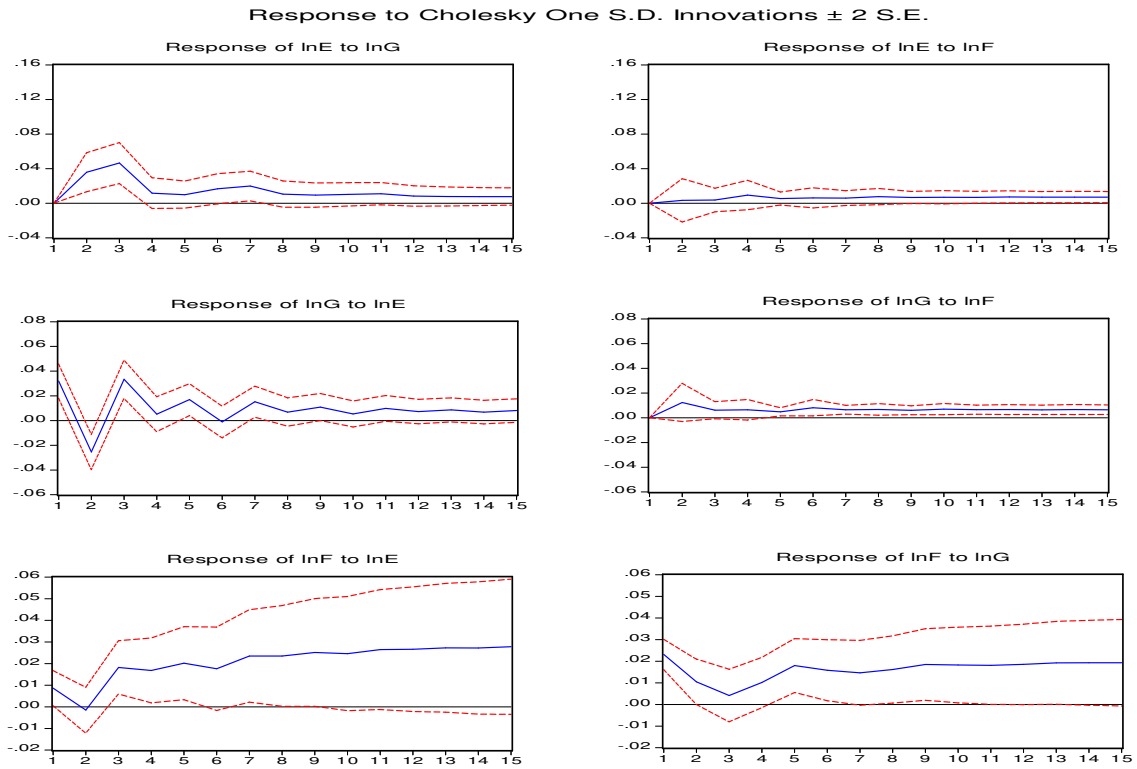
5	80.0463	19.1969	0.7567	46.1001	50.0828	3.8170	17.7983	17.6233	64.5783
6	79.1990	19.8795	0.9214	45.4167	49.8525	4.7306	18.6645	17.7365	63.5989
7	78.1428	20.8088	1.0483	46.8802	47.9884	5.1313	21.5645	17.0728	61.3626
8	77.7231	20.9696	1.3071	46.8075	47.5165	5.6759	23.5587	16.9917	59.4495
9	77.7056	20.8193	1.4749	46.9583	47.0438	5.9977	25.3865	17.3893	57.2241
10	77.3806	20.9520	1.6673	46.6523	46.7877	6.5598	26.6385	17.6630	55.6984
11	77.0425	21.1148	1.8425	46.9197	46.1059	6.9743	28.0837	17.7633	54.1529
12	76.7667	21.1789	2.0543	46.8683	45.7040	7.4275	29.2594	17.9154	52.8250
13	76.5817	21.1761	2.2421	46.9028	45.2966	7.8005	30.3214	18.1270	51.5515
14	76.3484	21.2149	2.4366	46.7911	44.9778	8.2309	31.1902	18.3120	50.4976
15	76.1201	21.2564	2.6234	46.8257	44.5636	8.6106	32.0246	18.4517	49.5236

The innovative shocks stemming in exports contribute to financial development by 32.02% and economic growth attributes to financial development by 18.45% and rest is explained by innovative shocks of financial development itself.

The impulse response function is a mirror of variance decomposition method and indicates responsiveness of the regressands to shocks to each series within the vector autoregressive (VAR) model. The figure-1 shows that exports show a positive response due to a unit standard deviation shock in economic growth and financial development. The response of exports due to a unit standard deviation in financial development dies out till the 3rd time horizon and then goes up but negligible. The response of economic growth is positive and then goes negative in the 2nd but again goes positive after the 2nd

time horizon and stabilizes after the 5th time horizon. A unit standard deviation in financial development contributes economic growth but its effect is minimal. Financial development responds positively to shocks in exports and economic growth.

Figure-1: Impulse Response Function (IRF)



V. Conclusion and Policy Implications

In this study, we empirically investigated that exports is function of economic growth and financial development in the case of Pakistan. We applied autoregressive distributive lag modeling approach, known as ARDL bounds testing approach, to cointegration for the long run relationship between exports, economic growth and financial development. The error correction method is used to examine the short run dynamics. The direction of causal relationship was investigated by applying VECM Granger causality approach.

Our analysis confirmed cointegration between exports, economic growth and financial development. This implies that exports, economic growth and financial development move in the same direction i.e. trending upward. The results postulate that economic growth and financial contribute spur the exports of Pakistan. The VECM Granger causality analysis validates feedback effect between economic growth and exports, financial development and economic growth, and exports and financial development.

Based on the findings of this research it may be suggested that the government of Pakistan should endeavor to accelerate the country's economic growth. The government must create a good macroeconomic environment, develop infrastructure, and reduce/eliminate all sorts of trade barriers. These will increase local production and exports, and generate competition and efficiency in the economy. The private sector should be encouraged by providing different incentive packages to take more active part in development activities. The State Bank of Pakistan should be directed to launch loose monetary policy to enhance capitalization in the country which not only promotes exports volume of the country but also contributes to economic growth. A quick action is required to make financial sector transparent. Entrepreneurs should be supported with easy and available funds from banks and other financial institutions which in turn will increase the country's business and development activities including exports.

References:

1. Ahmad, H., Ala, S., Butt, M. S., (2003). Foreign direct investment, exports and domestic output in Pakistan. The Pakistan Development Review, 42, 715-723.
2. Alici, A. A., Ucal, M. S., (2003). Foreign direct investment, exports and output growth of Turkey: causality analysis. Paper presented at the European Trade Study Group (ETSG) Fifth Annual Conference. Universidad Carlos III de Madrid, Madrid.
3. Amavilah, V. H., (2003). Exports and economic growth in Namibia, 1968-1992. EconWPA.
4. Ang, J., (2009). Foreign direct investment and its impact on the Thai economy: the role of financial development. Journal of Economic and Finance, 33, 316-323.
5. Balaguer, J., manuel cantavella-jordá, 2002. Structural change in exports and economic growth: cointegration and causality analysis for Spain (1961-2000). WP-EC 2002-22.
6. Balassa, B., (1985). Exports, policy choices, and economic growth in Developing countries after the 1973 oil shock. Journal of Development Economics 18, 23-35.
7. Beck, T., (2003). Financial dependence and international trade: is there a link? Review of International Economics 11, 296-316.
8. Beck, T., Demirgüç-Kunt, A., Levine, R., (2011). The financial structure database" in Demirgüç-Kunt, Asli, and Ross Levine, eds. Financial Structure and Economic Growth – A Cross-Country Comparison of Banks, Markets and Development, 2001, MIT Press, Cambridge, Massachusetts.
9. Becker, B. and Greenberg, D. 2003. The real effects of finance: evidence from exports, Working Paper, University of Chicago, USA.
10. Berman, N. and Hericourt, J., (2010). Financial constraints and the margins of trade: evidence from cross-country firm-level data. Journal of Development, 93, 206-217.
11. Choong, C. K and Lim, K. P., (2009). Foreign direct investment, financial development, and economic growth: the case of Malaysia. Macroeconomics and Finance in Emerging Market Economies, 2, 13-30.
12. Chow, P. C. Y., (1987). Causality between export growth and industrial development. Journal of Development Economics, 26, 55-63.
13. Cuadros, A., Orts, V and Alguacil, M., (2004). Openness and growth: re-examining foreign direct investment, trade and output linkages in Latin America. The Journal of Development Studies, 40, 167-192.
14. Darrat, A., (1986). Trade and development: the Asian experience", Cato Journal, 6, 695-699.
15. Dritsaki, M., Dritsaki, C and Adamopoulos, A., (2004). A causal relationship between trade, foreign direct investment, and economic growth for Greece. American Journal of Applied Sciences, 1, 230-235.
16. Edwards, S., (1993). Openness, trade liberalization, and growth in developing countries. Journal of Economic Literature, 32, 1358-1393.
17. Engle, R. F and Granger, C.W. J., (1987). Cointegration and error correction representation: estimation and testing. Econometrica, 55, 251-276.
18. Feder, G., (1982). On exports and economic growth. Journal of Development Economics, 12, 59-73.

19. Giles, J. A and Williams, C. L., (2000). Export-led growth: a survey of the empirical literature and some non-causality results, Part I. Journal of International Trade and Economic Development. 9, 261-337.
20. Hermes, N and Lensink, R., (2003). Foreign direct investment, financial development and economic growth. Journal of Development Studies, 40, 142-163.
21. Hur, J., Raj, M and Riyanto, Y., (2004). The impact of financial development and asset tangibility on export. Working Paper, Department of Economics, National University of Singapore, Singapore.
22. Hur, J., Raj, M and Riyanto, Y., (2006). Finance and trade: a cross-country empirical analysis on the impact of financial development and asset tangibility on international trade. World Development, 34, 1728-1741.
23. Johansen, S., and Juselius, K., (1990). Maximum likelihood estimation and inference on cointegration with applications to the demand for money. Oxford Bulletin of Economics & Statistics, 52, 169-210.
24. Jordaan, A. C and Eita, J. H., (2007). Export and economic growth in Namibia: a granger causality analysis. South African Journal of Economics, 75, 540-547..
25. Khan, M. S., Senhadji, A. S., (2000). Financial development and economic growth: an overview. IMF Working Paper, WP/00/209.
26. Kletzer, K and Bardhan, P., (1987). Credit markets and patterns of international trade. Journal of Development Economics, 27, 57-70.
27. Krueger, A., (1990). Asian trade and growth lessons. American Economic Association Papers and Proceedings, 80, 108- 112.
28. Lee, C. H and Huang, B. N., (2002). The relationship between exports and economic growth in East Asian countries: a multivariate threshold autoregressive approach. Journal of Economic Development, 27, 45-68.
29. Levine, R., (2003). More on finance and growth: more finance, more growth? Review, Federal Reserve Bank of St. Louis, 31-46.
30. Ljunwal, C and Li, (2007). Financial sector development, FDI and economic growth in China. OCER Working Paper-E2007005, Perking University.
31. Mah, J. S., (2005). Export expansion, economic growth and causality in China. Applied Economics Letters, 12, 105-107.
32. Manova, K., (2005). Credit constraints in trade: financial development and export composition. Harvard University, mimeo.
33. Melitz, M. J., (1990). The impact of trade on intra-industry reallocations and aggregate industry productivity. Working Paper, 2002. 108-12.
34. Michaely, M., (1977). Exports and growth: an empirical investigation. Journal of Development Economics, 4, 49-53.
35. Narayan, P. K., (2005). The savings and investment nexus for China: evidence from co-integration tests. Applied Economics, 37, 1979-1990.
36. Narayan, P. K and Narayan, S., (2005). Estimating income and price elasticities of imports for Fiji in a cointegration framework. Economic Modelling 22, 423–438.
37. Omran, M and Bolbol, A., (2003). Foreign direct investment, financial development, and economic growth: evidence from the Arab countries. Review of Middle East Economics and Finance, 3, 231-249.
38. Ouattara, B., (2004). Foreign aid and fiscal policy in Senegal. University of Manchester, Manchester, UK.

39. Pazim, K. H., (2009). Panel data analysis of “export-led" growth hypothesis in BIMP-EAGA countries. MPRA, paper# 13264.
40. Pesaran, M. H., Shin, Y. and R. J. Smith, (2001), ‘Bounds testing approaches to the analysis of long run relationships. Journal of Applied Econometrics, 16, 289-326.
41. Phillips, P. C. B and Hansen, B. E., (1990). Statistical inference in instrumental variable regression with I (1) processes. Review of Economics Studies, 57, 99-125.
42. Rajan, R and Zingales, L., (1998). Financial dependence and growth. American Economic Review, 88, 559-586.
43. Ram, R., (1987). Exports and economic growth in developing countries: evidence from time series and cross-section data. Economic Development and Cultural Change, 36, 51-72.
44. Roberts, M. J and Tybout, J. R., (1997). The decision to export in Colombia: an empirical model of entry with sunk costs. The American Economic Review, 87, 545 - 564.
45. Rodriguez, F and Rodrik, D., (2000). Trade policy and economic growth: a Skeptic’s guide to the cross-national evidence. In B. Bernanke and K. Rogoff eds. 2000. *Macroeconomics Annual*. Cambridge, MA: MIT Press.
46. Sengupta, J and Espana, J., (1994). Exports and economic growth in Asian NICs: an econometric analysis for Korea. Applied Economics, 26, 41-51.
47. Shahbaz, M., (2009). A reassessment of finance-growth nexus for Pakistan: under the investigation of FMOLS and DOLS techniques. Journal of Applied Economics, 1, 65-80.
48. Shahbaz, M., (2010). Income inequality-economic growth and non-linearity: a case of Pakistan. International Journal of Social Economics, 37, 613-736.
49. Shahbaz, M and Rahman, M. M., (2010). Foreign capital inflows-growth nexus and role of domestic financial sector: an ARDL co-integration approach for Pakistan. Journal of Economic Research, 15, 207-231.
50. Shahbaz, M., Azim, P and Ahmad, K., (2011). Exports-led growth hypothesis in Pakistan: further evidence. Asian Economic and Financial Review, 1, 182-197.
51. Shan, J., (2005). Does financial development ‘lead’ economic growth? a vector auto-regression appraisal. Applied Economics, 37, 1353-1367.
52. Shirazi, N. S and Manap, T. A. A., (2004). Export-led growth hypothesis: further econometric evidence from Pakistan. The Pakistan Development Review, 43.
53. Svaleryd, H and Vlachos, J., (2005). Financial markets, the patterns of industrial specialization and comparative advantage: evidence from OECD countries. European Economic Review, 49, 113-144.
54. Tyler, W., (1981). Growth and export expansion in developing countries. Journal of Development Economics, 9, 121-130.
55. Ullah, S. Zaman, B., Farooq, M., and Javid, A., (2009). Cointegration and causality between exports and economic growth in Pakistan. European Journal of Social Sciences, 10, 264-272.
56. Vohra, R., (2001). Export and economic growth: further time series evidence from less developed countries. International Advances in Economic Research.
57. Wernerheim, C. M., (2000). Cointegration and causality in the exports-GDP nexus: the Postwar evidence for Canada. Empirical Economics, 25, 111-125.

58. Wolde-Rufael, Y., (2009). Re-examining the financial development and economic growth nexus in Kenya. Economic Modeling, 26, 1140-1146.
59. Won, Y., Hsiao, F. S. S. T., Yang, D. Y., (2008). FDI Inflows, Exports and Economic Growth in First and Second Generation ANIEs: Panel Data Causality Analyses, KIEP working Paper 08-02.