# IS EXPORT LED-GROWTH HYPOTHESIS VALID IN PAKISTAN? IF SO, HOW RELEVANT IS EXPORT TO EUROPE?

Najid Ahmad [a]
[a] School of Economics, Dongbei University of Finance and Economics, Dalian, P.R. China, najid_2iqbal@yahoo.com
Katarina Kostelić [b]
[b] Teacher of economics, School for tourism, hospitality and trade Pula, and project research expert at University Juraj Dobrila of Pula, katarina_kostelic@yahoo.com
Arslan Ahmad [c]
[c] Department of Economics, PU Lahore, Pakistan arslan.ahmad313@yahoo.com

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ABSTRACT

This paper investigates the validity of export-led growth hypothesis in Pakistan and its relevancy to Europe with latest technique. We use annual time series data for the period of 1977-2012. GDP per capita is treated as dependent variable and export as independent variable along with other explanatory variables i.e. FDI, exchange rate, infant mortality rate and inflation. Different unit roots tests confirm that none of variable is stationary at second difference. So, we apply ARDL model as it is an appropriate in this situation. Results show that one percent increase in export will raise GDP by 1.11% in the long run and a 1% increase in export will raise GDP around 1.34% in the short run. The other explanatory variables have expected sign. The coefficient of ECT (-1.2051) is negative and highly significant that confirms the quick convergence of the model from short run to long run. Different diagnostic tests confirm the perfectness of our model. After the confirmation of export-led growth hypothesis, we use correlation method to show how it is showing relevancy to Europe. Policy Suggestions are given for EU-Pakistan trade.

## 1. INTRODUCTION

Major concern for developed and developing countries is to avail and maintain high economic growth and development. To achieve this, different countries are using different strategies. Among them, one can be to promote export. If we look at literatures, it remains debated issue whether export is necessary for economic growth or economic growth is necessary to promote export and then this promoted export can encourage economic growth. Neo-classical economists' has viewed that export make positive and significant contribution to the growth and development. However, different economists have different views and their findings differ from each other. Some studies show mix and inclusive results (Xu et al., 2009). Many researchers are agree that there is a long run relationship between export and economic growth (see for example: Faye Ensermu, 2001; Per- Ola, 2008; Jorge M.Andraz, 2010; Ananda Jayawickrama, 2010; Kimberly, 2011; Yilmaz Akyuz, 2011; Udah, 2012; Arif Billah Dar , 2013; Biru Paksha, 2014). In this long run connection, there can be three possibilities like export-led growth, growth led export or bi-directional relation. If we look back at history, it can be seen that Germany is the first country to adopt export led growth idea in 1950s and Japan is the second (1960s) country. Till 1970s, the import substitution policy prevailed in most of the developing countries. Export led growth idea rose three decades after the World War II to replace the import-oriented strategy. World Bank and IMF are playing important role in the promotion and implementation of it since 1970s. In 1970s and 1980s, Asian Tigers (Taiwan, Singapore, South Korea and Hong Kong) adopted export led growth strategy. In 1980s and 1990s, it was followed by Malaysia, Thailand and Indonesia. In 2000s, China exemplified it. Now, exports of goods and services is considered as an important source not only for foreign exchange but also for job opportunities. Many economists support export led growth idea for different countries with different techniques, sample and variables (See, for example Tyler, 1981; Darrat, 1987; Panas and Vamvoukas, 2002; Ari Kokko, 2002; Abual-Foul; 2004) as the demand led growth strategy cannot replace the export led growth hypothesis (Lai, 2004) although it remains popular in some extent (see for example, Palley, 2011).

If we talk about Pakistan, it is not an exceptional case, the recent growth and development in Pakistan raises several questions such as (1) is there any relationship between export and economic growth in Pakistan? (2) If there is associaitonship, whether it is short run or long run. (3) Is growth led exports valid in Pakistan? (4) Is export led growth hypothesis valid in Pakistan (5) If really export led growth hypothesis is true for Pakistan, then how it is important to export to Europe? This paper answers these questions by using the advance and latest technique that has several advantages. Moreover, there are limited studies available to offer export led growth or growth led export idea in Pakistan. For example, Shujatt Abbas (2012) states that causality runs from economic growth to exports. He concludes that economic growth is necessary for export's promotion in short and long run in Pakistan. Further, Afzal and Hussain (2010) examines the relationship between export and economic growth in Pakistan by using monthly data from 1990 to 2008. The authors fails to

find any granger causality between exports and economic growth. So, he concludes that exports led growth hypothesis is invalid in case of Pakistan. Further, they added that export led growth hypothesis depends on number of other factors that are not in the favor of Pakistan. So, these factors force exports to be low and it cannot contribute to economic growth of Pakistan. Pakistan should not reply on exports as its exported products have to face cut throat competition in international market. Other studies from Pakistan state that there is no causality that runs from export to economic growth of Pakistan (See for example, Dodaro, 1993: Ahmad et al., 2000; Afzal, 2004; Afzal and Ali, 2008; Afzal and Hussain, 2010). Growth-led export hypothesis has already been rejected by most of the economists of the world. We have a lesson from Asian tigers about the importance of export for the development of the country (World Bank, 1993). Asian tigers' tremendous progress force policy makers to promote export for economic growth. Therefore, these days, focus is on export-led growth hypothesis. Ari Kakko (2012) rightly said that export is not only a single factor that can boom the economic growth but foreign direct investment and Government role is also important for growth and development of the country. So, knowing the important of other factors that can influence the economic growth, we use FDI, inflation, exchange rate and infant mortality rate to see how these variables are contributing to the economic growth and development of Pakistan. After the confirmation of the export led growth hypothesis validity in Pakistan, we move further to check how this export is relevant to Europe.

The novelty of the paper and our contribution in the existence literature can be judged in several way: for example, first we test export led growth hypothesis validity of Pakistan by using advance and latest technique that is quite popular among researchers because of its several advantages on other techniques. It is known as ARDL bound testing approach. In previous work, most of the researchers were use granger causality test as is reported by Giles and Williams (2000) who reviewed 150 papers (during 1963-1999) papers for export led growth hypothesis and find that most of the researchers are using Johansen Cointegration and in case of Pakistan most of the researchers were using Johansen Cointegration (see for example: Shujatt Abbas 2012; Afzal and Hussain, 2010; Dodaro, 1993: Ahmad et al., 2000; Afzal, 2004; Afzal and Ali, 2008). If we look back at different techniques, we know Ordinary least squares method is applicable only if all variables under investigation are stationary at level meaning that they are not showing trend with the time. Usually time series data show trend with the time. So, if variables are moving to first difference and become stationary at first difference, then we have two choices, one is Eangle and Granger (1987) and second is Johansen (1988). Eangle and Granger technique is used for two variables' relation. Johansen Cointegration (1988) is used for more than two variables. In this way, Johansen Cointegration has advantage on Eangle and Granger (1987). But it can be applied only for large sample size and second if all variables are integrated of same order i.e. I(1). It is seen in most of the time, some variables are stationary at level and some are stationary at first difference. Second, if we have small sample size. Then we cannot use the above techniques. So, ARDL bound testing introduction make many things convenient and easy. It covers all problems that was in previous techniques. For example, It can used weather all variables are stationary at level, first difference or mixture of both. It can capture the maximum number of lags in the Data Generating Process (DGP). It can be used in case of small sample size. It

removes endogneity problem by making the model dynamic. It gives short run and long run estimations separately. The error correction term shows if disturbance in the short run will occur, how much time it will take to reach to its long run equilibrium (M. H. Pesaran and B. Pesaran, 1997; M. H. Pesaran and Y. Shin, 1999; M. H. Pesaran, Y. Shin, and R. J. Smith, 2001). These features make this technique quite popular among researchers and it is widely used.

The other advantage of our paper is that using the appropriate model, variables and proper methodology can reverse the sign of the variables as is stated by Farla et al. (2014) that proper method and variables can reverse the sign. So, we were interested to see whether it is true that growth led export hypothesis is true for Pakistan as is suggested by Shujatt Abbas (2012) that causality runs from economic growth to exports and growth led export is valid in Pakistan. Further, Afzal and Hussain (2010) examines the relationship between export and economic growth in Pakistan. The authors fails to find any granger causality between exports and economic growth. So, he concludes that exports led growth hypothesis is invalid in case of Pakistan. Further, they add that export led growth hypothesis also depend on number of other factors that are not in the favor of Pakistan. Most studies from Pakistan state that there is no causality between export and economic growth of Pakistan (See for example, Shujatt Abbas, 2012; Dodaro, 1993: Ahmad et al., 2000; Afzal, 2004; Afzal and Ali, 2008). But at second side, most of the researchers, World Bank and IMF are promoting export led growth for developing countries (see for example Tyler, 1981; World Bank, 1987; Panas and Vamvoukas, 2002; Ari Kokko, 2002; Abual-Foul, 2004). So, owing this reason, we included FDI, inflation, exchange rate and infant mortality rate in order to capture the influence of other factors for the economic growth of Pakistan.

We did not finish our task by just confirming the export led growth hypothesis validity with latest and appropriate techniques and variables. We did analysis and extend our work to make it more novel by adding analysis and explaining if export led growth hypothesis is valid and reject the previous idea that growth led export is true in Pakistan, then how this export is showing relevance to Europe. The reason behind the checking of this relevancy is that if there is a positive connection, then Pakistan can promote its export to EU rather than focusing on some countries as Pakistan's exported products are absorbed in USA, UK, Germany, Hong Kong and Saudi Arabia. So, if there is connection of export to EU then it should be encouraged to get benefits from EU as the country's relation can be developed with EU countries and more trade can be beneficial for both parties.

All the above things make our work novel and interesting. To our knowledge, there is no study on Pakistan's economy that creates linkage between export and economic growth, along with relevant explanatory variables and with the latest techniques. This study does not only prove export led growth hypothesis but also show its relevance to Europe. Simply, if Pakistan export to EU, then how it can be beneficial for the domestic economy. So, the aim of this paper is not limited to test the validity of export-led growth hypothesis in Pakistan but to check if there is a significant export to Europe in order to formulate future policies. The rest of the paper is structured as follows: in section 2, brief literature review is given; in section 3, data collection and methods, empirical results regarding export led growth

hypothesis in Pakistan are presented. Section 4 shows the export relevancy to Europe and section 5 offers conclusion and policy implication.

## 2. BRIEF LITERATURE REVIEW FROM PREVIOUS WORK

In this section, we discuss briefly the importance of export for the economic growth from the previous work from different countries with different techniques like Titus (2010) points out that the nature of relation between export and economic growth has remained debatable in last few decades. He uses Granger Causality test and Vector Error Correction model to find the relationship with export and economic growth for Canadian's economy. He finds positive association between export and economic growth in the long run. Arif Billah Dar (2013) adds that export and growth relation is not only positive but it grows stronger with the passage of time as is the case of China whose growth is export dependent. If we look at the work of Yilmaz Akyuz (2011) who check the contribution of export in the progress of China. He thinks it difficult for China to maintain high economic growth by just depending on export. Therefore, he views that consumption should be increased for the economic growth and public spending should be encouraged. Winters et.al (2004) states that international trade is important for poverty reduction and economic growth as it provides job opportunities for local people.

Konya (2004) states that scholars and researchers are showing great interest to investigate the relation between exports and economic growth. But till now different economists have different views. Some economists believe that growth is necessary for the promotion of exports and some views that export will lead to economic growth. Renuka (2007) viewed that the relationship between exports and economic growth is debatable for policy makers. Export allows us to specialize in the specific field and this specialization increases economic growth. However, economic growth also granger cause export. We can see the example of Botswana that is highlighted in Andre's (2007) study. He finds bi-directional causal relation between exports and economic growth. Economic growth is encouraging exports and on the other hand, export is increasing economic growth. Ahmad et al., (2000) finds no significance contribution of export to economic growth when he uses the data set for 8 Asian countries in which Pakistan was included. Afzal and Ali (2008) viewed that export led growth hypothesis is not valid in Pakistan.

Giles and Williams efforts cannot be ignored while talking about export led growth hypothesis as they reviewed 150 papers that has been published between 1963-1999. They viewed that most of the researchers used granger causality tests to find export led growth hypothesis (Giles and Williams, 2000). Here is the Per Ola (2008) study who explores the relation between exports and economic growth for three countries i.e. Argentina, Brazil and Mexico by using Johansen Cointegration and Granger causality tests. Results indicate the existence of co-integration between pre and post break periods for Mexico and Argentina. He considers GDP as a leading variable that encourage export for Mexico. He concludes that export led growth hypothesis strategy should be adopted for high economic growth.

Policy makers and higher authorities focus is always on poverty reduction. It is stated that export is an important factor that can be responsible for poverty reduction and economic growth (Adetunji Babatunde, 2012). Liang Hun Shan (2015) views that export is the only factor that is responsible for economic growth. The author uses Johansen Cointegration and Granger Causality test to check the short and long run relation between exports and economic growth for Malaysia. He finds strong positive relationship between exports and economic growth in both periods. So, he proved, exports led growth hypothesis is valid for Malaysia. Yousaf (1999) also finds relation between exports and economic growth for Malaysia economy. He views that export-led growth hypothesis is true in short run while in the long run, there are other factors that can be influence the economic growth.

Faye Ensermu (2001) uses Cobb-Douglas production function to test export-led growth hypothesis for Ethiopia for the period of 1950 to 1986. Results show that export is contributing to economic growth in short and long run. Jorge M. Andraz (2010) explores the relation between exports and economic growth for Portugal. He concludes that export is necessary for the growth as there is long run relationship between exports and economic growth. In, 2007, Khan (2007) confirms the existence of export led growth hypothesis in case of Bangladesh. Biru Paksha (2014) shows the importance of trade for Bangladesh's economy as its growth is trade dependent. With the help of bound testing approach, he finds strong evidence about the export-led growth hypothesis for Bangladesh.

Udah (2012) states that export led growth hypothesis has gained much attention for growth policies. Basically, this idea is based on export expansion that will lead to economic growth. One can get lesson from the success of Asian tigers whose success is based on export led growth hypothesis. They achieved high growth by adopting free market oriented policies. Nigeria and other economies has also adopted export led growth hypothesis as they think it as a key factor for growth and development. Andras Inotai (2013) discusses about Bulgaria's economy. He states that global environment is changing and this new environment is focusing on export-oriented approaches. However, we should remember that theory of export led growth hypothesis is based on comparative and absolute advantage. He points out that global growth is the reflection of trade. In the case of Zimbabwe, Chigusiwa (2011) examines the validity of export led growth hypothesis for Zimbabwe. The author uses ARDL approach to find short and long run relation between exports and growth. The results show the existence of export-led growth hypothesis. Here is Pakistani other study from Afzal (2004) who finds insignificant relation between export and economic growth in case of Pakistan. Dodaro (1993) finds no causality between export and growth in case of Pakistan.

Tuck Cheong (2013) examines the influence of export on growth and development. He uses data for the period of 1972 to 2008 for Cambodia's economy. GDP is used as a growth indicator for the economy and other variables such as imports and exports as independent variable. Granger causality test confirms bi-directional causality between growth and exports. Growth led exports and exports led growth hypothesis are true in case of Cambodia. It means that growth can be achieved by both methods. Kimberly (2011) discusses growth policies for Mexico. He finds positive relation in short run while negative relation in the long

run. He justified this inverse relation in the long run by saying that import contents and domestic supplier have weak links with exporters. Mexico should change its strategy related to tax-free imports and exports of raw material as raw material prices are too low in international markets. Deepak finds uni-directional causality from economic growth to export (Deepak, 2007).

## 3. DATA AND METHODOLOGY

The variables GDP per capita, export, foreign direct investment, inflation, infant mortality rate and exchange rate are used in our study for the period of 1977-2012 in order to investigate the validity of export-led growth hypothesis in Pakistan. The data set is collected from World Development Indicators (WDI), Economic surveys of Pakistan and European Commission reports (EC). Real GDP per capita is measured in local currency unit and it is treated as dependent variable. Export that is measured in millions Rupees, FDI measured in millions dollars, inflation (CPI) and exchange rate (RS/$) are independent variables in our model. The explanatory variables are used in the model that have special influence on the economic growth of Pakistan and are relevant to explain the theory.

The function form of our model is given as:

$$GDP=F(EXP, IMR, INF, FDI, EXC) \quad (1.1)$$

$$LEGt = \beta 0 + \beta 1 LEXPt + \beta 2 LIMRt + \beta 3 LINFt + \beta 4 LFDIt + \beta 5 LEXCt + \varepsilon t \quad (1.2)$$

Where LEG=Ln(GDP per capita), LEXP=Ln(Export), LIMR=Ln(Infant Mortality Rate), LINF= Ln(Inflation Rate), LFDI=Ln(Foreign Direct Invest), LEXC=Ln(Exchange Rate), Where β1, β2, β3, β4, β5 are the respective parameters. $B_0$ is constant term, t is the time trend and Ɛ is the Stochastic Error term. The variables are converted into logarithmic form as log form of the data provides efficient, better and consistent results **(**Cameron, 1994; Layson, 1983; Ehrlich, 1996). The logarithmic form of the data does not only make data smooth but also reduce heteroskedasticity problem (Amine Boutabba, 2014).

### *3.1. Descriptive statistics*

Table 3.1 reports the descriptive Statistics for the sample of six variables under investigation. The mean Median, Maximum, Minimum, Skenewness, Kurtosis and JB values are reported. Our overall calculations indicate that export, FDI, exchange rate, inflation and infant mortality rate are normally distributed and economic growth is not normally distributed.

TABLE 3.1 – DESCRIPTIVE STATISTICS

| | LEG | LEXP | LFDI | LEXC | LINF | LIMR |
|---|---|---|---|---|---|---|
| Mean | 1.508112 | 12.35216 | 5.770458 | 3.413915 | 2.051581 | 4.437737 |
| Median | 1.589817 | 12.54797 | 5.842004 | 3.437208 | 2.145665 | 4.465842 |
| Maximum | 2.323926 | 14.7615 | 8.596042 | 4.53684 | 3.009937 | 4.751864 |
| Minimum | 0.014293 | 9.546169 | 2.370244 | 2.292535 | 1.069573 | 4.074142 |
| Std. Dev. | 0.509615 | 1.535081 | 1.588872 | 0.743499 | 0.471075 | 0.214071 |
| Skewness | -0.95975 | -0.18111 | -0.1093 | -0.14715 | -0.44757 | -0.20095 |
| Kurtosis | 3.775113 | 1.861393 | 2.320926 | 1.643973 | 2.526152 | 1.726574 |
| Jarque-Bera | 6.427966 | 2.141449 | 0.763389 | 2.888127 | 1.538715 | 2.674715 |
| Probability | 0.040196 | 0.34276 | 0.682704 | 0.235967 | 0.463311 | 0.262539 |
| Sum | 54.29203 | 444.6778 | 207.7365 | 122.9009 | 73.85693 | 159.7585 |
| Sum Sq. Dev. | 9.089766 | 82.47655 | 88.35799 | 19.34767 | 7.766923 | 1.603919 |
| Observations | 36 | 36 | 36 | 36 | 36 | 36 |

*Source: Authors' estimation using Eviews 8*.

### *3.2. Unit root testing*

A researcher has to perform several statistical tests when he/she is dealing with time series data as usually a time series data show trend with the time. Second, the nature of the data points out about the type of test (s) that can be appropriate choice to employ. So, stationary of the data should be checked before deciding about the technique (s). For this purpose, we use different statistical tests to check and confirm the unit root property of the variables under investigation. The tests that are used in our study are: Augmented Dickey fuller test (Dickey and Fuller, 1979, 1981), Phillips–Perron (1988) test and Kwiatkowski–Phillips–Schmidt–Shin (1992) test to check whether our data is stationary at level or it is showing trend with the time. Usually KPSS is used to check confirm the outcome of ADF and PP tests because KPSS has strong power (See, Kwiatkowski et al. 1992).

Three kinds of regression can be made to check the unit roots.

Having no trend and intercept

$$\Delta Y_t = \beta Y_{t-1} + \sum_{j=1}^{p} \gamma_j \Delta Y_{t-j} + \epsilon_{1t} \qquad (2.1)$$

Having intercept but no trend:

$$\Delta Y_t = \alpha + \beta Y_{t-1} + \sum_{j=1}^{p} \gamma_j \Delta Y_{t-j} + \epsilon_{2t} \quad (2.2)$$

Having both intercept and trend:

$$\Delta Y_t = \emptyset + \delta t + \beta Y_{t-1} + \sum_{j=1}^{p} \gamma_j \Delta Y_{t-j} + \epsilon_{3t} \quad (2.3)$$

Where $\Delta Y_t = Y_t - Y_{t-1}$, $p$ = Number of lags in the dependent variable and $\epsilon_{1t}$, $\epsilon_{2t}$, $\epsilon_{3t}$ are stochastic error terms.

The ADF test is based on the given hypothesis

$H_0$: $\beta = 0$; ($Y_t$ is non-stationary) Null Hypothesis

$H_1$: $\beta < 0$; ($Y_t$ is stationary) Alternative Hypothesis

The results of ADF test are reported in table 3.2 with trend and with intercept. Calculations show that economic growth, export, inflation, foreign direct investment, infant mortality rate are stationary at level where as exchange rate is non-stationary at level and become stationary at first difference.

TABLE 3.2 – AUGMENTED DICKEY – FULLER TEST WITH TREND AND WITH INTERCEPT

| Variables | Level / 1st Difference | ADF test statistic | | Conclusion |
|---|---|---|---|---|
| | | Trend | Drift | |
| LEG | Level | -3.484** | -2.282* | I (0) |
| LEXP | Level | -2.536 | -1.589** | I (0) |
| LIMR | Level | -3.605* | 0.656 | I (0) |
| LINF | Level | -2.291 | -2.309* | I (0) |
| LEXC | Level | -2.117 | -0.590 | --- |
| Δ LEXC | First Diff | -3.865* | -3.894* | I (1) |
| LFDI | Level | -1.866 | -1.448** | I (0) |

Note: * denote significance at 5% and ** denote significance at 10%.

*Source: Authors' estimation using Eviews 8*

After checking the ADF test, we use Phillips–Perron (1988) and Kwiatkowski–Phillips–Schmidt–Shin (1992) tests in order to check the stationary of the variables weather all variables are stationary at level I(0) or I(1) or the mixture of both I(0) and I(1). It is also possible that any variable will move to second difference. We can decide the technique (s) after the confirmation of the unit root property that what method can be used in our study. Because if our any variable will become stationary at second difference, we cannot use

ARDL bound testing approach until and even we use some treatments on our variable (taking difference) to make it stationary at first difference. KPSS (1992) test is commonly used to confirm the results of ADF and PP as KPSS has strong power to reject the null.

TABLE 3.3: PP test and KPSS test for stationary

| Variables | PP test. | | KPSS test |
|---|---|---|---|
| | Level | 1st difference | Level |
| | Test statistic | Test statistic | Test Statistic |
| LEG | -4.98* | | 0.11* |
| LEXP | -2.44 | -5.82* | 0.19* |
| LIMR | -2.24 | -4.67* | 0.20* |
| LINF | -2.55 | -6.13* | 0.07* |
| LEXC | -1.99 | -4.27* | 0.12* |
| LFDI | -2.17 | -5.76* | 0.08* |
| *Source: Authors' Estimation using eviews 8* | | | |

Note: PP: Phillips–Perron test. KPSS: Kwiatkowski–Phillips–Schmidt–Shin. PP null is unit root like ADF test but KPSS null is stationary. * indicate the rejection of null at 1% level of significance. ADF and PP critical values are from MacKinnon (1991). KPSS critical values are from Kwiatkowski et al. (1992).

The results of ADF, PP and KPSS show that the variables GDP, FDI, inflation, export, exchange rate and infant mortality rate are the mixture of integration i.e. I(0) and I(1) in ADF and PP while in KPSS they are stationary at level and none of our variable is stationary at second difference. So, we can use ARDL model.

## 4. Autoregressive Distributed Lag Model

Autoregressive Distributed Lag technique can be can be used if all variables are I(0) or I(1) or mixture of both. Infact, this technique has several advantages on previous techniques. Like, it can be used in any case of the variables stationary i.e. if all variables are stationary at level, stationary at first difference or the mixture of both as is stated above. It use optimal number of lags in Data Generating Process (DGP). Our study used ARDL bound test approach **(**M. H. Pesaran and B. Pesaran, 1997; M. H. Pesaran and Y. Shin, 1999; M. H. Pesaran, Y. Shin, and R. J. Smith, 2001). Second, this technique is more appropriate in small sample size than other techniques. For example, Johansen Cointegration techniques required large sample size to deal with long run Cointegration and short run VECM (Haug, 2002).

Otherwise, it invalidates the results (S. Johansen and K. Juselius, 1990; S. Ghatak and J. Siddiki, 2001). Bound testing approach provides unbiased long run estimates and it validates t-statistics even the regressors have endogenous problem. Hence, it deals with endogeneity problem (P. K. Narayan, 2005; N. M. Odhiambo, 2008; Pesaran and Shin, 1999; Pesaran et al., 2001). Further, it provides simultaneously long run and short run effects on one variable to other variable (I. Bentzen and T. Engsted, 2001). However, it is better to check any variable should not be I(2) as Ouattara (2004) states that in case of I(2) variable, the F-statistics given by Pesaran et al. (2001) will be invalid.
Basically, Autoregressive Distributed Lag technique is based on two steps to see long run associationship. (1) To check the existence of long run associationship among the variables. (2) If there exists associatonship, one need to estimate long and short term model.

ARDL equation can be written as follows:

$$\Delta L(EG)_t = \beta_0 + \beta_1 L(EG)_{t-1} + \beta_2 L(EXP)_{t-1} + \beta_3 L(IMR)_{t-1} + \beta_4 L(INF)_{t-1} + \beta_5 L(FDI)_{t-1} + \beta_6 L(EXC)_{t-1} + \sum_{i=1}^{n} \delta_i \Delta L(EG)_{t-i} + \sum_{i=0}^{n} \theta_i \Delta L(EXP)_{t-i} + \sum_{i=0}^{n} \eta_i \Delta L(IMR)_{t-i} + \sum_{i=0}^{n} \gamma_i \Delta L(INF)_{t-i} + \sum_{i=0}^{n} \varphi_i \Delta L(FDI)_{t-i} + \sum_{i=0}^{n} \omega_i \Delta L(EXC)_{t-i} + U_t \quad (3)$$

In equation three, $\beta_1$, $\beta_2$, $\beta_3$, $\beta_4$, $\beta_5$ *and* $\beta_6$ are long run coefficients while others are short-run coefficients.

The null and alternative hypotheses are as follows:

Null hypothesis can be written as:

$$H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0 \quad \text{(No long run relationship exist)}$$

Alternative hypothesis:

$$H_1 : \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq 0 \quad \text{(long run relationship exist)}$$

The error correction equation is used to find speed of adjustment towards equilibrium from short run to long run. ECM equation is as follows:

$$\Delta L(EG)_t = \beta_0 + \sum_{i=1}^{n} \delta_i \Delta L(EG)_{t-i} + \sum_{i=1}^{n} \theta_i \Delta L(EXP)_{t-i} + \sum_{i=1}^{n} \eta_i \Delta L(IMR)_{t-i} + \sum_{i=1}^{n} \gamma_i \Delta L(INF)_{t-i} + \sum_{i=1}^{n} \varphi_i \Delta L(FDI)_{t-i} + \sum_{i=1}^{n} \omega_i \Delta L(EXC)_{t-i} + \lambda (ECM)_{t-1} + U_t \quad (4)$$

The equation 4 indicates the short run relationship among variables. However, ECM is the first lag of error term. Moreover, the co-efficient (λ) represents speed of adjustment.

TABLE 3.4 – AUTOREGRESSIVE DISTRIBUTED LAG ESTIMATES

| Dynamic ARDL(1,0,0,0,0,1) selected based on AIC with Dependent variable LEG | | | | |
|---|---|---|---|---|
| Variable | Coefficient | Std. Error | T-Statistic | Prob. |
| LEG(-1) | -0.2051 | 0.1576 | -1.3015 | [0.204] |
| LEXP | 1.3349 | 0.4563 | 2.9254 | [0.007] |
| LIMR | -4.5523 | 1.9974 | -2.2791 | [0.031] |
| LINF | -0.4414 | 0.2080 | -2.1219 | [0.043] |
| LFDI | 0.2248 | 0.1490 | 1.5082 | [0.143] |
| LFDI(-1) | -0.4034 | 0.1825 | -2.2107 | [0.036] |
| LEXC | -3.9536 | 0.9708 | -4.0727 | [0.000] |
| C | 20.9104 | 11.9012 | 1.7570 | [0.090] |
| R-Squared 0.6065 | | | R-Bar-Squared 0.5045 | |
| DW-statistic 2.1521 | | | F-Stat. F(7,27) 5.9459 [0.000] | |
| AIC -17.7098 | | | SBC -23.9312 | |

*Source: Authors' estimation using Microfit 5.0*

TABLE 3.5 – F – TEST FOR THE EXISTENCE OF LONG RUN RELATIONSHIP

| F-statistic Value | Significance Level | Bound Critical Values | |
|---|---|---|---|
| | | I(0) | I(1) |
| 7.1044 | 5% | 3.0301 | 4.4242 |
| | 10% | 2.5175 | 3.7320 |

*Source: Authors' estimation using Microfit 5.0*

Dynamic analysis for selected ARDL (1,0,0,0,0,1) technique is based on AIC. It is reported in table 3.4. Here F-statistic shows that overall model is significance. Coefficient of determination ($R^2$) is 0.6065 that means 61 % variations in the dependent variable are due to independent variables and other 39 percent variations are due to error term. DW is 2.1521 that is good sign for our model. Based on this dynamic analysis, we find the F-statistic (table 3.5) that allow us to move further for long run and short run coefficient estimations along with speed of adjustment (ECT) to show how disturbance in the short run mechanism will be adjusted in long run.

F-statistic proposed by Pesaran et al. (2001) is reported in table 3.5 that confirm the existence of long-run relationship among variables as F-statistic is higher than the upper

bound. Our null hypothesis states that coefficient on lagged levels are equal to zero and alternative hypothesis states that they are not equal to zero meaning that there is long run relationship among the variables. F. Statistic provides lower and upper bound critical value. Lower bound value assumed that all variables are integrated of order zero I(0) and upper bound critical values suggest that variables are integrated of order one I(1). If F-statistic is greater than the upper bound, it means that there is a long run Cointegration and in this way, null of no Cointegration can be rejected. However, if F-statistic is lower than the upper bound and higher than the lower bound, then the results would be inconclusive. If F-statistic is less than the lower bound, then there would be no long run cointegration. In our case, it is found that calculated value of F-statistic=7.1044 is greater than the upper bound at 5 % level of significance. Hence, long-run relationship exists among the variables. Our findings are parallel to Faye Ensermu, 2001; Per- Ola, 2008; Jorge M.Andraz, 2010; Ananda Jayawickrama, 2010; Kimberly, 2011; Yilmaz Akyuz, 2011; Udah, 2012; Arif Billah Dar , 2013 and Biru Paksha, 2014 who viewed that there is long run relationship between export and economic growth. We can proceed to check for long run coefficients and error correction term (speed of adjustment) along with short run results.

TABLE 3.6– LONG RUN COEFFICIENTS USING ARDL APPROACH

Estimated Long Run Coefficients using ARDL(1,0,0,0,0,1) selected based on AIC

Dependent variable is LEG

| Variable | Coefficient | Std. Error | T-Statistic | Prob. |
|---|---|---|---|---|
| LEXP | 1.1078 | 0.3726 | 2.9733 | [0.006] |
| LIMR | -3.7776 | 1.6231 | -2.3275 | [0.028] |
| LINF | -0.3663 | 0.1672 | -2.1906 | [0.037] |
| LFDI | -0.1482 | 0.1382 | -1.0724 | [0.293] |
| LEXC | -3.2808 | 0.7145 | -4.5915 | [0.000] |
| C | 17.3521 | 9.6952 | 1.7898 | [0.085] |

*Source: Authors' estimation using Microfit 5.0*

Table 3.6 reports the result of long-run coefficients. Export has positive and significant relation with economic growth in the long run. Coefficient of export is 1.1078 meaning that one percent increase in export will encourage economic growth around 1.11 percent in the long run. Our results are opposite to Kimberly (2011) who states that export and growth have negative relation in the long run. However, these results consistent to Ensermu (2001), Khan (2007), Jorge M. Andraz (2010), Chigusiwa (2011), Udah (2012) and Biru Paksha (2014) findings. Our results are opposite to Shujatt Abbas (2012) who states that growth-led export

hypothesis is valid in case of Pakistan. Afzal and Hussain (2010) examines the relationship between export and economic growth in Pakistan with the monthly data from 1990 to 2008. The authors fails to find any granger causality between exports and economic growth. So, he concludes that exports led growth hypothesis is invalid in Pakistan. There are other studies available that state that export led growth hypothesis is invalid in Pakistan (Dodaro, 1993: Ahmad et al., 2000; Afzal, 2004; Afzal and Ali, 2008). Further, our results shows that foreign direct investment has negative and insignificant relationship with economic growth in thelong run. It shows that FDI is not contributing to the economic growth of Pakistan. So, Pakistan should give more focus on export policy in order to get high economic growth. We find negative impact of inflation on the economic growth of Pakistan. It shows that one percent increase in inflation will decrease the economic growth by 0.37 percent. For the economic growth of Pakistan, it is necessary to decrease the inflation as inflation means the rise in the general price level. So, the consumer side would be affected. The coefficient of infant mortality rate suggests that one percent increase in infant mortality rate will decrease growth. Better health care facilities and public investment on hospital and medical facilities can reduce the infant mortality rate. Usually in developing countries, infant mortality rate remains higher than the developed countries as developed economies share specific budget share for health care facilities. But in developing countries like Pakistan, its budget share is less than 1% on Public health care facility. There is need to care about health facilities as this sector has key role. Robert Barro (1996) views that life expectancy significantly correlates with economic growth. David Bloom (2004) rightly states that better health has great contribution to economic growth. He views that one percent increase in life expectancy will encourage growth around 4%. Exchange rate has negative and statistically significant effects on economic growth of Pakistan. It is consistent with the work of Danson Musyoki (2012) who points out that there is inverse impact of real exchange rate volatility on GDP growth.

TABLE 3.7 – ERROR CORRECTION MODEL REPRESENTATION FOR SELECTED ARDL MODEL

ECM for selected ARDL(1,0,0,0,0,1)selected based on AIC

Dependent variable is ΔLEG

| Variable | Coefficient | Std. Error | T-Statistic | Prob. |
|---|---|---|---|---|
| ΔLEXP | 1.3349 | 0.4563 | 2.9254 | [0.007] |
| ΔLIMR | -4.5523 | 1.9974 | -2.2791 | [0.030] |
| ΔLINF | -0.4414 | 0.2080 | -2.1219 | [0.043] |
| ΔLEXC | -3.9536 | 0.9708 | -4.0727 | [0.000] |
| ΔLFDI | 0.2248 | 0.1490 | 1.5082 | [0.143] |
| ΔC | 20.9104 | 11.9012 | 1.7570 | [0.090] |
| ECM(-1) | -1.2051 | 0.1576 | -7.6479 | [0.000] |
| | R-Squared 0.7236 | | R-Bar-Squared 0.6519 | |
| | DW-statistic 2.1521 | | F-stat. F(6,28) 11.7822 | [0.000] |

*Source: Authors' estimation using Microfit 5.0*

Short-run results are presented in table 3.7. In the short-run, export, exchange rate and infant mortality rate have statically significant impact on economic growth of Pakistan. The results show that one percent increase in export will raise economic growth around 1.34% in the short run. These results are similar to Yousaf (1999) and Kimberly (2011) who views that export has positive effects on economic growth in short run. If we look back the long run coefficient, it has low coefficient than that of short run as we move from short run to long run, the exports goes down as Pakistan exports raw materials etc. So, because of their low price, return is less than that of shot run. In the short run, final products export is possible. Infant mortality rate has negative and statistically significant coefficient in the short run, showing the negative relation with economic growth. Foreign direct investment has positive but insignificant relation with economic growth of Pakistan in short run. Inflation has negative and significant relation with economic growth of Pakistan in the short run. The coefficient of inflation shows that 1% increase in inflation will decrease economic growth around 0.44. One percent increase in exchange rate will decrease economic growth by 3.95 percent. These results are showing consistency with long run results. It is good sign for our model that from short run to long run, economic fluctuations are not very high. The coefficient of error correction term (-1.21)) is negative and highly significant. It is good sign for the model. The coefficient is showing quick convergence to the long run equilibrium path from short run in case of disturbance in the short run. As Bannerjee et al. (1998) state that highly significant error correction term verifies the existence of a stable long-run relationship. We check different diagnostic tests and report with LM and F Version. These

tests confirm that there is no serial correlation and hetroskadascity in the model. The functional form is normal and acceptable. Residuals are normally distributed and our model is structurally stable (See appendix Appendix-A).

## 5. EXPORT LED GROWTH HYPOTHESIS IN PAKISTAN AND EU RELEVANCE

Given that it is proved that Export Led Growth hypothesis is valid in Pakistan, it remains to determine whether this export is relevant to Europe (or can be relevant) to Pakistan' economic growth and development. To do that, first, we consider export regarding regions, as shown in APPENDIX C, Table 4.2 and Table 4.3. There are 19 missing observations regarding the export to Europe. We fail to find enough historical data to make a proper model, but statistical summary is provided in the APPENDIX C, Table 4.2. In addition, possible correlations are shown in the Table 4.3. It is interesting to notice that there is a positive correlation of export to Europe and Central Asia to the lneg that is economic growth. Correlation has been established even with the lack of data.

There are significant trade agreements signed between EU and Pakistan:

- **The Cooperation Agreement from 2004**
- **EU-Pakistan 5-year Engagement Plan from 2012**
- **Generalized Scheme of Preferences (GSP) from 2014**

According to European Commission report, EU-Pakistan trade increased by almost 4.7% annually between 2007 and 2011. In addition, according to the same report, 21.2% Pakistan's total export goes to EU. From this increasing trade, Pakistan can get more benefits and economic growth and development. Given the lack of the data regarding Pakistan export to European Union, in order to draw some conclusions, we use reciprocal data: EU import from Pakistan is in Table 8.

TABLE 4.1 – EU IMPORTS FROM PAKISTAN

| Period | value | growth | share in extra EU |
|---|---|---|---|
| 2003 | 3.149 | N/a | 0.3 |
| 2004 | 3.402 | 8.0 | 0.3 |
| 2005 | 3.103 | -8.8 | 0.3 |
| 2006 | 3.319 | 7.0 | 0.2 |
| 2007 | 3.474 | 4.7 | 0.2 |
| 2008 | 3.651 | 5.1 | 0.2 |
| 2009 | 3.349 | -8.3 | 0.3 |
| 2010 | 3.879 | 15.9 | 0.3 |
| 2011 | 4.672 | 20.4 | 0.3 |
| 2012 | 4.137 | -11.5 | 0.2 |
| 2013 | 4.534 | 9.6 | 0.3 |

*Source: European Commission*

Given the data, a positive trend can be spoted. There is 9.6 annual growth rate of EU import from Pakistan in period 2012 – 2013, and 7.9 annual growth rate in period 2009 – 2013. This increasing trend shows, EU-Pakistan relation are beneficial for the Pakistan' economic growth and development. So, the hypothesis of the relevance of Pakistan export to EU for Pakistan's economy growth cannot be rejected. There is a correlation of Pakistan export to EU to economy growth and data points out a positive trend.

## 6. CONCLUSION AND POLICY IMPLICATION

The objective of this paper was to find the validity of export led growth hypothesis in Pakistan with the appropriate variables and latest techniques. Further, if we confirm the validity of export led growth in Pakistan, how it is relevant for Europe. In previous research, different researchers were supporting export led growth hypothesis for developing countries while others were contradicting and pointing different factors are responsible to influence growth and development of the country. To check the validity of export led growth hypothesis in Pakistan, a time series data is used for the period of 1977-2012. GDP per capita is taken as a dependent variable. Export, inflation, exchange rate, FDI and infant mortality rate are treated as independent variables. ADF, PP and KPSS tests are applied to check stationary of the data. It is necessary to check the stationary of the variables before deciding the techniques as it enables to use appropriate technique (s) for the model. These tests confirm us that none of the variable is stationary at second difference. So, we apply the latest and appropriate technique, Autoregressive Distributed Lag (ARDL) bound test that is quite popular among researchers from 2001 to till now as it has several advantages on other techniques. ARDL bound testing confirm the existence of long-run relation among variables as calculated F-statistic (7.1044) was higher than upper bound at 5 % level of significance

that confirms the long run cointegration among the variables. So, we proceed further to check long run and short run relationship among the variables under the investigation in our study. The results show that one percent increase in export will raise GDP growth by 1.11 percent in the long run and 1% increase in export will raise GDP by 1.34 percent in the short run. The coefficient of speed of adjustment is negative and statistically significant that shows the long run convergence in the model. Error correction term coefficient is -1.2051 that show quick convergence of our model to long run. It means disturbance in the equilibrium in short run will be corrected within first year. Bannerjee et al. (1998) states that highly significant error correction term verifies the existence of a stable long-run relationship. Diagnostic tests confirmed that there is no hetroskadasicity and serial correlation in our model. Residuals are normally distributed and functional form is satisfactory. The CUSUM and CUSUMSQ show that our model is structurally stable. So, export led growth hypothesis is valid in case of Pakistan if we use appropriate techniques and variables.

After the confirmation of Export led growth hypothesis, we check its relevance to Europe. To do so, first, we consider export regarding regions. There were missing observations regarding the export to Europe. We fail to find enough historical data to make a proper model, but statistical summary. In addition, the possible correlations show that there is a positive correlation of export to Europe and Central Asia to the lneg that is economic growth. Correlation has been established even with the lack of data. We find that there is correlation between exports to EU. Our results have twofold policy. At one side, we confirm the export led growth hypothesis validity in Pakistan. At second side, this export is relevant to Europe.

Export expansion strategy can encourage productivity and large economies of scale can be achieved. It encourages specialization that is based on comparative advantage. Trade can introduce new technologies in Pakistan from different countries particularly from European countries as they have much advance technologies. In this way, export encourages capital accumulation. However, economic conditions can vary from period to period because of internal and external crisis. Terrorism, crime and fluctuating prices are the hindrance for Pakistan to meet its export targets in global market. Further, depreciation of Pakistani rupee against dollar and increasing prices of goods and services lead to the reduction of economic growth. Moreover, the effect of FDI on economic growth is insignificant as foreign investors reluctant to invest in Pakistan. In this situation, Pakistan has best solution to make economic growth by encouraging industrial sector. As Pakistan's exported products are absorbed in USA, UK, Germany, Hong Kong and Saudi Arabia. Pakistan should not focus on just few countries for its export but it should search different markets for its products as high export with few commodities and fewer markets can lead to instability. Possible solution is to establish trade with an economic association, or political-economic association such as European Union. Government of Pakistan should take initiatives in order to increase the volume of exports. Research and Development programs should be encouraged to produce quality products related to textile and agri. products. Second, Pakistan has different trade Agreement with different countries of the world like EU. In this situation, it is expected that

Pakistan will make tremendous progress in the near future by creating favorable environment for its exports. EU-Pakistan trade cooperation will be beneficial for both countries.

Like other studies, our work is not free from limitations. Additional research is necessary for modeling the relation (EU-Pakistan).

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**REFERENCES**

**Abbas, Shujaat**. 2012. "Causality between Exports and Economic Growth: Investigating Suitable Trade Policy for Pakistan." *Eurasian Journal of Business and Economics* 5 (10): 91–98.

**Abual-Foul, B**. (2004), "Testing export-led growth hypothesis: evidence from Jordan", *Applied Economics Letters*, 11: 393-396.

**Afzal, M.** (2004), "Exports-Economic Growth Nexus: Pakistan's Experience", *Indian Journal of Business and Economics*, 3: 315-340.

**Ahmad, Q.M., M.S. Butt, and S.Alam** (2000), "Economic Growth, Export and External Debt Causality: The Case of Asian Countries", *The Pakistan Development Review*, 39: 591-608.

**Dodaro** (1993), "Exports and Growth: A Reconsideration of Causality", *The Journal of Developing Areas*, 27, 237-244.

**Afzal, M. and Karamat Ali** (2008), "An Historical Evaluation of "Export-led Growth" Policy in Pakistan", *Lahore Journal of Policy Studies*, 2(1), 69-82.

**Afzal, Mohammad, and Ijaz Hussain**. 2010. "EXPORT-LED GROWTH HYPOTHESIS : EVIDENCE FROM PAKISTAN. Journal of Quantitative Economics, 8 (1), 131-147.

**Adetunji Babatunde, M., Olugboyega A. Oyeranti, Abiodun S. Bankole, and E. Olawale Ogunkola**. 2012. "Exports Trade, Employment and Poverty Reduction in Nigeria." *International Journal of Social Economics* 39 (11): 875–99. doi:10.1108/03068291211263916.

**Akyüz, Yilmaz**. 2011. "Export Dependence and Sustainability of Growth in China." *China & World Economy* 19 (1): 1–23.

**Andraz, Jorge M., and Paulo M.M. Rodrigues**. 2010. "What Causes Economic Growth in Portugal: Exports or Inward FDI?" *Journal of Economic Studies* 37 (3): 267–87. doi:10.1108/01443581011061276.

**Chigusiwa, Lloyd, Samuel Bindu, Victoria Mudavanhu, Lazarus Muchabaiwa, and D. Mazambani**. 2011. "Export-Led Growth Hypothesis in Zimbabwe: Does Export Composition Matter?" *International Journal of Economic Research* 2 (4): 111–29.

**Dar, Arif Billah, Niyati Bhanja, Amaresh Samantaraya, and Aviral Kumar Tiwari**. 2013. "Export Led Growth or Growth Led Export Hypothesis in India: Evidence Based on Time-Frequency Approach." *Asian Economic and Financial Review* 3 (7): 869–80.

**Darrat, A.F.** (1987), "Are exports an engine of growth? Another lock at the evidence". *Applied Economics*, 19: 277-283.

**Dickey, D.A. and W.A. Fuller** (1979), "Distribution of the estimators for autoregressive time series with a unit root", *Journal of American Statistical Association*, 74: 427-431.

**Dickey, D.A. and W.A. Fuller** (1981), "The likelihood ratio statistics for autoregressive time series with a unit root". *Econometrica*, 49: 1057-1072.

**Phillips P.C.B, Perron P**., 1988. Testing for a Unit Root in a Time Series Regression. Biometrica. 75, 335-346.

**Kwiatkowski D., Phillips P.C.B., Schmidt P., Shin Y**., 1992. Testing the null hypothesis of stationary against the alternative of a unit root. How sure are we that economic time series have a unit root? Journal of Econometrics. 54, 159-178.

**Engle, R.F. and C.W.J. Granger** (1987), "Co-integration and error-correction: representation, estimation, and testing". *Econometrica*, 55: 251-276.

**Giles, J.A. and Williams, C.L**.(2000a). "Export-Led Growth: A Survey of the Empirical Literature and Some Non-Causality Results, Part 1". *Journal of International Trade and Economic Development*, vol. 9, pp.261-337.

**Giles, J.A. and Williams, C.L**.(2000b). "Export-Led Growth: A Survey of the Empirical Literature and Some Non-Causality Results, Part 2". *Journal of International Trade and Economic Development*, vol. 9, pp.445-470.

**I. Bentzen and T. Engsted**, "A revival of the autoregressive distributed lag model in estimating energy demand relationships," *Energy*, vol. 26, pp. 45-55, 2001.

**Inotai, András**. 2013. "Sustainable Growth Based on Export-Oriented Economic Strategy."http://www.fes.bg/files/custom/library/2013/Berichte%20und%20Analysen/Sustainable_Growth_Based_on_Export_Oriented_Economic_Strategy.pdf.

**Jayawickrama, Ananda, and Shandre M. Thangavelu**. 2010. "Trade Linkages between China, India and Singapore: Changing Comparative Advantage of Industrial Products." *Journal of Economic Studies* 37 (3): 248–66. doi:10.1108/01443581011061267.

**Jordaan, André C., and Joel Hinaunye Eita**. 2009. "Testing the Export-Led Growth Hypothesis for Botswana: A Causality Analysis." *Botswana Journal of Economics* 6 (10): 2–14.

**Khan, A.R**. (2007), "Growth, employment and poverty: an analysis of the vital nexus based on some recent UNDP and ILO/SIDA studies", DESA Working Paper No. 49, July.

**Kokko, Ari, and others**. 2002. *Export-Led Growth in East Asia: Lessons for Europe's Transition Economies*. National Europe Centre, Australian National University. http://www2.hhs.se/eijswp/142.PDF.

**Konya, Laszlo**. 2004. "Export-Led Growth, Growth-Driven Export, Both or None? Granger Causality Analysis on OECD Countries." *Granger Causality Analysis on OECD Countries (August 17, 2008). Applied Econometrics and International Development* 4 (1). http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1231926.

**M. H. Pesaran and B. Pesaran**, *Working with Microfit 4.0: Interactive Econometric Analysis*, Oxford University Press, 1997.

**M. H. Pesaran and Y. Shin** (1999) "An autoregressive distributed lag modeling approach to cointegration analysis," in *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial*

**M. H. Pesaran, Y. Shin, and R. J. Smith**, "Bounds testing approaches to the analysis of level relationships," *Journal of Applied Econometrics*, vol. 16, pp. 289-326, 2001.

**Mahadevan, Renuka**. 2007. "New Evidence on the Export-Led Growth Nexus: A Case Study of Malaysia." *The World Economy* 30 (7): 1069–83. doi:10.1111/j.1467-9701.2007.01030.x.

**N. M. Odhiambo**, "Energy consumption and economic growth nexus in Tanzania: An ARDL bounds testing approach," *Energy Policy*, vol. 37, no. 2, pp. 617-622, 2008.

**P. K. Narayan**, "The saving and investment nexus for China: evidence from cointegration Tests," *Applied Economics*, vol. 37, no. 17, pp. 1979-1990, 2005.

**Palley, Thomas I**. 2011. "The Rise and Fall of Export-Led Growth." *Levy Economics Institute of Bard College Working Paper*, no. 675. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1889167.

**Panas, E. and Vamvoukas, G.** (2002) Further evidence on the export-led growth hypothesis, *Applied Economics Letters*, 9, 731-5.

**Paul, Biru Paksha**. 2014. "Testing Export-Led Growth in Bangladesh: An ARDL Bounds Test Approach." *International Journal of Trade, Economics and Finance*, 1–5. doi:10.7763/IJTEF.2014.V5.331.

**S. Ghatak and J. Siddiki**, "The use of ARDL approach in estimating virtual exchange rates in India," *Journal of Applied Statistics*, vol. 28, pp. 573-583, 2001.

**S. Johansen and K. Juselius**, "Maximum likelihood estimation and inference on cointegration with application to the demand for money," *Oxford Bulletin of Economics and Statistics*, vol. 52, pp. 169-209, 1990.

**Shan, Liang Hung, and Zuradi Jusoh**. 2015. "IS THE EXPORT-LED GROWTH HYPOTHESIS VALID FOR MALAYSIA?" Accessed March 29. http://www.statistics.gov.my/portal/download_journals/files/2012/Volume2/02Hypothesis.pdf.

**Srivastava, Deepak K., and Garima Kapoor**. 2007. "Test of Export-Led Growth and Growth-Led Export Hypotheses in Indian Context: An Econometric Analysis for the Period of 1951-2004." *Asia Pacific Management Review* 12 (2): 113.

**Tang, Tuck Cheong, Chea Ravin, and others**. 2013. *Export-Led Growth in Cambodia: An Empirical Study*. Monash University, Department of Economics.

http://www.buseco.monash.edu.au/eco/research/papers/2013/0313exportcambodiatangravin.pdf.

**Tyler, W**. (1981), "Growth and export expansion in developing countries", *Journal of Development Economics*, 9: 121-30.

**Udah, E. B**. 2012. "Export-Growth Hypothesis: An Econometric Analysis of the Nigerian Case." *Interdisciplinary Journal of Research in Business* 2 (4): 39–49.

**Waithe, Kimberly, Troy Lorde, and Brian Francis**. 2011. "Export-Led Growth: A Case Study of Mexico." *International Journal of Business, Humanities and Technology* 1 (1): 33–44.

**Winters, L.A., McCulloch, N. and McKay, A**. (2004), "Trade liberalisation and poverty: the evidence so far", Journal of Economic Literature, Vol. 42, pp. 72-115.

**World Bank** (1993), The Asian Miracle: Economic Growth and Public Policy, Oxford: Oxford University Press.

**World Bank** (2014). World Development Indicators, World Bank.

**Haug, A**.,2002.Temporal aggregation and the power of co-integration tests: A Monte Carlo study.Oxf.Bull.Econ.Stat.64,399–412.

**Ouattara, B.**, 2004. Foreign Aid and Fiscal Policy in Senegal. Mimeo University of Manchester.

**Bannerjee, A., J. W. Dolado, and R. Mestre** (1998) Error-Correction Mechanism Tests for Cointegration in Single Equation Framework. *Journal of Time Series Analysis* 19, 267–283.

**Ehrlich I.** Crime, punishment and the market for offences. J Econ Perspect 1996;10:43–67.

**Cameron S.** A review of the econometric evidence on the effects of capital punishment. J Socio-econ 1994;23:197–214.

**Layson S.** Homicide and deterrence: another view of the Canadian time series evidence. Can J Econ 1983;16:52–73.

**Boutabba, Mohamed Amine.** 2014. "The Impact of Financial Development, Income, Energy and Trade on Carbon Emissions: Evidence from the Indian Economy." *Economic Modelling* 40. Elsevier B.V.: 33–41. doi:10.1016/j.econmod.2014.03.005.

**David E. Bloom, D. C**. (2004). The Effect of Health on Economic Growth:A Production Function Approach. *World Development* , 01-13. doi:10.1016/j.worlddev.2003.07.002

**Barro, R. J.** (1996). Health and economic growth. Paper presented at the "Senior Policy Seminar on Health, Human Capital and Economic Growth: Theory, Evidence and Policies". Washington, DC: Pan American Health Organization and Inter-American Development Bank.

**Danson Musyoki, G. P.** (2012). The impact of real exchange rate volatility on economic growth: Kenyan evidence. *Business and Economic Horizons* , 59-75.

**Xu, D-q., Ljungwall, C., Xin, L.,** 2009. The Road to End Poverty: A Comparison of Development Strategies between China and India. China Mechanic Press, Beijing.

**Al-Yousif, Yousif. K.** 1999. "On the Role of Exports in the Economic Growth of Malaysia: A Multivariate Analysis." *International Economic Journal*. doi:10.1080/10168739900080022.

**Awokuse, Titus.** 2010. "Is the Export-Led Growth Hypothesis Valid for Canada ?, The Canadian Jouranal Of Economics" 36 (1): 126–36.

**Chemeda, Faye Ensermu**. 2001. "REFERENCE TO ETHIOPIAN COUNTRY BY : Ethio-Italian Cooperation Arsi-Bale Rural Development Project Paper Prepared for the Conference on " Annual Meeting of the American," no. May.

**Jordaan, André C**. 2007. "Testing the Export-Led Growth Hypothesis for Botswana : A Causality Analysis Joel Hinaunye Eita Department of Economics University of Pretoria Department of Economics University of Pretoria."

**Maneschiöld, Per-ola**. 2008. "A Note on the Export-Led Growth Hypothesis : A Time Series Approach *." *Cuadernos de Economía* 45 (Vol. 45 (Noviembre)): 293–302.

**MacKinnon, J.G.**, 1991. Critical Values for Co-Integration Tests. In: Engle, R.F., Granger, C.W.J. (Eds.), Long-Run Economic Relationships. Oxford University Press, pp. 267–276.
**Lai, Y.W.**, 2004. The role of domestic demand in the economic growth of Malaysia: A cointegration analysis. Int. Econ. J. 18, 337–352.

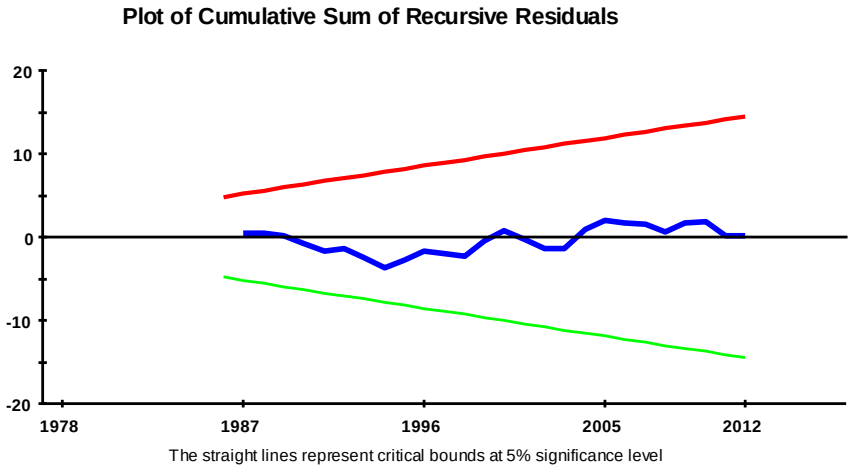
## APENDIX A

TABLE A-1 – DIAGNOSTIC TESTS

| Test Statistics | LM Version | F Version |
|---|---|---|
| Serial correlation | 0.4721 [0.492] | 0.3555 [0.556] |
| Functional Form | 4.4686 [0.035] | 3.8053 [0.062] |
| Normality | 1.3700 [0.504] | --- |
| Heteroscedasticity | 3.7160 [0.054] | 3.9198 [0.056] |
| P-values are in parenthesis [] | | |

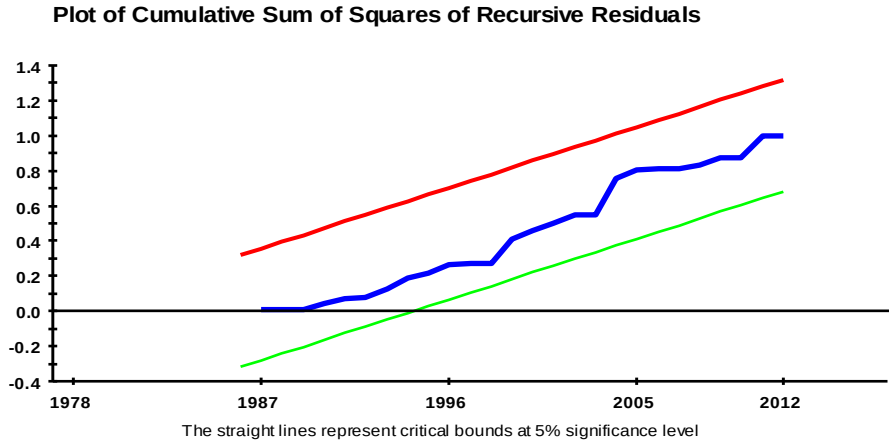
*Source: Authors' estimation*

FIGURE 3.1. PLOT OF CUMULATIVE SUM OF RECURSIVE RESIDUALS




*Source: Authors*

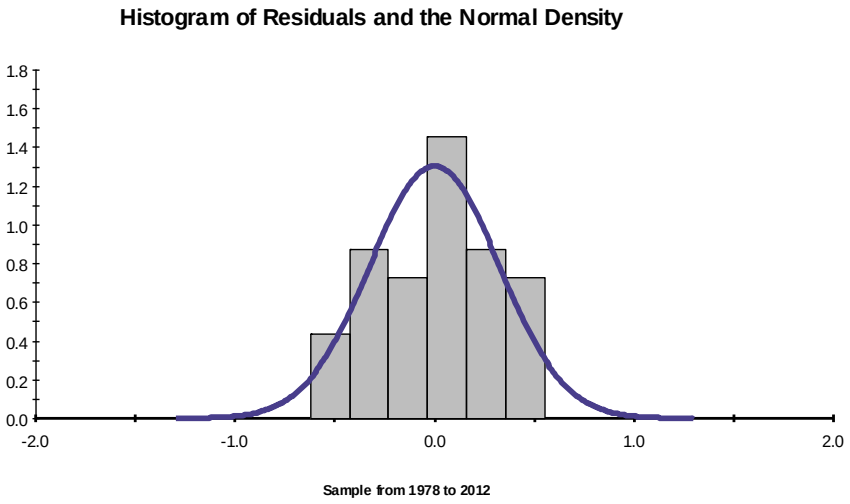
FIGURE 3.2. PLOT OF CUMULATIVE SUM OF SQUARES OF RECURSIVE RESIDUALS




*Source: Authors'*

Cumulative sum (CUSUM) and cumulative sum of square (CUSUMSQ) stay within the 5 % of critical bounds. It means our model is structurally stable.

FIGURE 3.4. ERROR TERM (Ɛt) OF THE MODEL IS NORMALLY DISTRIBUTED




*Source:Authors'*

**APENDIX C**

TABLE 4.2 – DESCRIPTIVE STATISTICS

Summary Statistics, using the observations 1977 - 2014
(missing values were skipped)

| Variable number | Mean | Median | Minimum | Maximum | Std. Dev. | C.V. | Skewness | Ex. kurtosis | 5% Perc. | 95% Perc. | IQ range | Miss-ing obs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.56E+09 | 8.03E+09 | 1.21E+09 | 2.54E+10 | 7.17E+09 | 0.7502 | 0.893275 | -0.32749 | 1.59E+09 | 2.52E+10 | 1.15E+10 | 1 |
| 2 | 15.3019 | 15.2143 | 8.33104 | 24.6491 | 4.43619 | 0.289911 | 0.387675 | -0.75992 | 8.42948 | 23.3396 | 6.60776 | 1 |
| 3 | 72.0843 | 76.3896 | 56.0896 | 82.8691 | 8.4858 | 0.11772 | -0.46961 | -1.23407 | 57.2837 | 81.733 | 14.8999 | 1 |
| 4 | 18.9775 | 15.8103 | 8.72499 | 35.1892 | 7.16137 | 0.377361 | 0.649537 | -0.83422 | 10.1158 | 32.1817 | 12.2912 | 1 |
| 5 | 6.03563 | 5.01811 | 2.40444 | 14.6734 | 2.90686 | 0.481618 | 1.38023 | 1.43786 | 2.81716 | 13.8227 | 2.91502 | 1 |
| 6 | 2.36945 | 2.27329 | 0.966576 | 3.92532 | 0.797925 | 0.336756 | 0.307833 | -0.49665 | undefined | 3.92532 | 1.24857 | 19 |
| 7 | 1.10481 | 1.31178 | 0.061359 | 1.9647 | 0.619927 | 0.561117 | -0.38406 | -1.12207 | 0.086331 | 1.94851 | 1.13607 | 1 |
| 8 | 4.58838 | 2.61414 | 1.31886 | 17.2731 | 4.14176 | 0.902664 | 1.68216 | 1.78703 | 1.43139 | 15.3265 | 2.92698 | 1 |
| 9 | 6.67197 | 5.76471 | 2.71359 | 12.8987 | 3.41244 | 0.511459 | 0.778846 | -0.89435 | 2.82345 | 12.5466 | 5.45311 | 1 |
| 10 | 4.2724 | 4.29916 | 1.86675 | 7.76445 | 1.53178 | 0.358529 | 0.276123 | -0.42292 | 1.92144 | 7.49696 | 2.16396 | 1 |
| 11 | 9.63E+09 | 7.99E+09 | 1.17E+09 | 2.62E+10 | 7.41E+09 | 0.768956 | 0.937588 | -0.24559 | 1.46E+09 | 2.57E+10 | 1.14E+10 | 1 |
| 12 | 6.67197 | 5.76471 | 2.71359 | 12.8987 | 3.41244 | 0.511459 | 0.778846 | -0.89435 | 2.82345 | 12.5466 | 5.45311 | 1 |
| 13 | 113.423 | 93.6928 | 26.547 | 281.153 | 78.4355 | 0.691532 | 0.845482 | -0.44962 | 27.889 | 279.221 | 131.105 | 4 |
| 14 | 983.72 | 66 | 0 | 5593 | 1707.03 | 1.73528 | 1.72508 | 1.66416 | 3.6 | 5533.9 | 1245.5 | 13 |
| 15 | 0.049894 | 0.040182 | 0.026529 | 0.102029 | 0.026353 | 0.528177 | 0.981096 | -0.39897 | undefined | undefined | 0.042941 | 29 |
| 16 | 6.40E+12 | 6.52E+12 | 4.85E+12 | 7.31E+12 | 8.72E+11 | 0.13637 | -0.52467 | -1.00842 | undefined | undefined | 1.59E+12 | 29 |
| 17 | 1.50811 | 1.58982 | 0.014293 | 2.32393 | 0.509615 | 0.337916 | -0.95975 | 0.775113 | 0.399509 | 2.12126 | 0.620585 | 2 |

1 - Merchandise exports (current US$), 2 - Merchandise exports to economies in the Arab World (% of total merchandise export), s3 - Merchandise exports to high-income economies (% of total merchandise exports), 4 -Merchandise exports to developing economies outside region (% of total merchandise exports), 5 - Merchandise exports to developing economies in East Asia & Pacific (% of total merchandise exports), 6 - Merchandise exports to developing economies in Europe & Central Asia (% of total merchandise exports), 7 - Merchandise exports to developing economies in Latin America & the Caribbean (% of total merchandise exports), 8 - Merchandise exports to developing economies in Middle East & North Africa (% of total merchandise exports), 9 - Merchandise exports to developing economies in South Asia (% of total merchandise exports), 10 - Merchandise exports to developing economies in Sub-Saharan Africa (% of total merchandise exports), 11 - Merchandise exports by the reporting economy, residual (% of total merchandise exports), 12 - Merchandise exports by the reporting economy (current US$), 13 - Merchandise exports to developing economies within region (% of total merchandise exports), 14 - Export value index (2000 = 100), 15 - Battle-related deaths (number of people), 16 - Foreign direct investment, net outflows (% of GDP), 17 – lneg

*Source: Authors' using Gretl*

TABLE 4.3 – CORRELATION COEFFICIENTS FOR EXPORT PER REGION AND LNGDP

Correlation coefficients, using the observations 1977 - 2014
(missing values were skipped)
5% critical value (two-tailed) = 0.3202 for n = 38

| Arab | HighIncome | DevelopedRegion | EastAsia Pacific | Europe Central Asia | LatinAmerica Caribbean | Middle East NorthAfrica | SouthAsia | SubSaharanAfrica | DevRegion | FDI%GDP | lneg | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | -0.72 | 0.798 | 0.2634 | 0.4509 | 0.1043 | 0.7535 | 0.3594 | 0.7518 | 0.3594 | -0.227 | 0.1502 | Arab |
| | 1 | -0.946 | -0.714 | -0.777 | -0.253 | -0.657 | -0.694 | -0.732 | -0.694 | -0.12 | -0.225 | HighIncome |
| | | 1 | 0.5981 | 0.7182 | 0.1016 | 0.827 | 0.4609 | 0.7613 | 0.4609 | 0.1559 | 0.28 | DevelopedRegion |
| | | | 1 | 0.5242 | 0.3701 | 0.1419 | 0.6485 | 0.3214 | 0.6485 | 0.3257 | 0.0918 | EastAsia Pacific |
| | | | | 1 | 0.6554 | 0.6522 | 0.7491 | 0.5643 | 0.7491 | -0.401 | 0.109 | Europe Central Asia |
| | | | | | 1 | -0.263 | 0.6164 | 0.291 | 0.6164 | 0.0146 | -0.452 | LatinAmerica Caribbean |
| | | | | | | 1 | 0.0011 | 0.5219 | 0.0011 | 0.1155 | 0.2971 | Middle East NorthAfrica |
| | | | | | | | 1 | 0.5465 | 1 | 0.0913 | 0.0089 | SouthAsia |
| | | | | | | | | 1 | 0.5465 | -0.6 | 0.2212 | SubSaharanAfrica |
| | | | | | | | | | 1 | 0.0913 | 0.0089 | DevRegion |
| | | | | | | | | | | 1 | 0.2879 | FDI%GDP |
| | | | | | | | | | | | 1 | lneg |

*Source: Authors' using Gretl*