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AN ECONOMETRIC ANALYSIS OF EXPORT AND IMPORT ON ECONOMIC GROWTH OF BANGLADESH

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Abstract

This paper investigates the casual relationship between exports; import and Gross Domestic Product (GDP) for Bangladesh using annul data from 1972 to 2015. All the data are expressed in logarithms in order to include the proliferate effect of time series and reduces the problem of heteroscedasticity. The paper uses time series econometric tools to investigate the relationship adding import, export and economic growth in the model. The Granger causality test and Cointegration models are employed taking care of the stochastic properties of the variables. The Cointegration analysis suggests that there is a long-run equilibrium relationship among the variables. In the long run export is positively related to GDP but import is inversely related to GDP. In this study, the method of vector autoregressive model (VAR) is adopted to estimate the causal relationship between exports, imports and economic growth. The result of Granger causality test shows that there is a causal relationship between the examined variables. The causal nexus is bidirectional from export to import and GDP, import to export and GDP and GDP to export and import.

Keywords: Economic growth, Export, Cointegration, Eigenvalue, Econometric Analysis

INTRODUCTION

The gross domestic product (GDP), export of goods and services (Export) and import of goods and services (Import) are the most vital macroeconomic indicators of a country. These indicators are the part and parcel of the total development efforts and national growth of all economies including Bangladesh. The increased level of export of goods and services can play a significant role in the development plan of Bangladesh where foreign exchange scarcity constitutes a critical bottleneck. The export can largely meet ‘foreign exchange gap’ and export growth would increase the import capacity of the country which would boost up industrialization and overall economic performance. After the business expansion and industrialization Bangladesh has been following 6.63 percent (Bangladesh Bank)of GDP growth rate which is a factor of increasing export-import and remittance, this trend can be found in the index of world bank where the ratio of total trade to GDP rose from 19% of 1990 to 42.1% of 2015 (World Bank, 2015).

In an economy the major determinants of net production and employment growth is considered to be the growth in export as it the key player in foreign export earnings which facilitates foreign exchange reserves available which in turn positively affects the production potentiality of an economy as it facilitates the import of capital goods. Moreover competitions in export cause economies of scale & acceleration of technological advancement (Ramos, 2001). However, after liberation Bangladesh was a little bit conservative in its development strategy which imposed higher tariff and quota which inversely affected export in Bangladesh. But since 1980 policy was shifted to the export promotion in the place of import substitution. That is why to accelerate export financial incentives in the form of tax reduction on exportable commodities and technological items import duty reduction was provided.

Although in Bangladesh the value of import is greater than the value of export, Bangladesh’s foreign trade remains at a satisfactory level (Bangladesh Economic Review, 2015). However, the balance of trade of Bangladesh remained in deficit. The objective of trade policy throughout the 1990‟s was to promote rapid export growth by reducing and eliminating the anti-export bias prevalent in the economy (Shahabuddin et al, 2004). Regardless of the structural limitations of the Bangladesh economy, the export sector performed well throughout the 1990s. However, in this paper we intend to investigate long run dynamic impact of exports, imports on GDP growth of Bangladesh.

LITERATURE REVIEW

Several researches have been conducted on various aspects of export, import and economic growth in Bangladesh and all over the world by renowned researchers. An attempt has been made to review the recent available literature related to export, import and economic growth. The speed of economic development of a nation poses one of the most important issues in economic debate. Many economists considered foreign trade as the engine of growth because it facilitates the specialization in the production of goods and services. Economic theories suggest that export earnings reduce the dependence on foreign aid, augment the base of industrialization, increases foreign exchange earnings, create employment opportunities, helps in the transformation of the economic structure etc.

A nation can accelerate the rate of economic growth by promoting exports of goods and services. The volume of imports is inversely related to its relative price and varies positively with aggregate demand (real GDP growth). The higher relative price leads to substitution away from imports—necessarily reducing the dollar value of imports as volumes decline. Remittances have been used in financing the import of capital goods and raw materials for industrial development. Empirical evidences support that there exist positive correlation and strong causality between foreign trade and economic growth and development of many countries (Balassa, 1978).

Tyler (1981), in his study, discussed the relationship between export and growth in the developing 55 countries with medium income and stated that in these countries in the period 1960 - 1977, there is a strong relation between export performance and growth of GDP.

Jung and Marshal (1985) studied the time series data between 1950 and 1980 for 37 developed countries by using the Granger Causality test and exhibited that there was a causal relationship between the increase in export and economic growth.

Vohra (2001) examined the relationship between the export and growth in India, Pakistan, the Philippines, Malaysia, and Thailand for 1973 to 1993. The empirical results showed that when a country has achieved some level of economic development then the exports have a positive and significant impact on economic growth.

Dritsakis, (2005) analyzed the relationship between exports and economic growth in the three of the largest exporting countries such as European Union, United States of America and Japan. Granger causality analysis based on error correction model was used. The results of causality analysis suggested that there is a "strong bilateral causal relationship" between exports and economic growth for European Union consistent with the studies in the EU. While the results for Japan suggested that there is not either a long run relationship or any causality between exports and economic growth.

Roy (1991) in his study, analyzed the determinants of export performance of Bangladesh using an econometric analysis and demonstrated that the export performance of Bangladesh is associated with greater commodity diversification of exports.

In a study over the 1962-1992 periods, Begum and Shamsuddin (1998) find that export growth significantly increases economic growth through its positive impact on total factor productivity in Bangladesh.

Mamun and Nath (2005) examined time series analysis to investigate the link between exports and economic growth in Bangladesh. Using quarterly data for a period from 1976 to 2003, the article found that industrial production and exports are co integrated. Love and

Chandra (2005) used annual data on GDP, export and import in a multivariate framework to investigate export-led growth hypothesis for Bangladesh and concluded in favor of short and long-run unidirectional causality from income to exports.

Shirazi and Manap (2005) examined the export-led growth (ELG) hypothesis for five South Asian countries including Bangladesh using co integration and multivariate Granger Causality tests. They found feedback effects between exports and GDP and imports and GDP for Bangladesh.

Mohammad Hossain and Karunaratne (2004) analysed that this article empirically verifies the export-led growth hypothesis for Bangladesh and examines whether manufacturing exports have become a new engine of the export-led growth in Bangladesh, replacing the total exports-engine, as claimed by the so called de novo hypothesis. The empirical assessment based on the vector error correction modeling (VECM) that uses quarterly data over the period 1974–1999 suggests that both total exports and manufacturing exports have had positive and statistically significant impacts both in the …

Ogid, Mulok, Ching, Lily, Ghazali and Loganathan (2011) examined the relationship between the economic growth and the import in Malaysia from 1970 to 2007. Results indicate that there is no co integration exists between economic growth and import, but there exists bilateral causality between economic growth and import.

Usman, Ashfaq, and Mushtaq (2012) analyzed the impact of export on the economic growth in Pakistan. It was an empirical analysis of relationship of export and economic growth for 30 years (1980-2009). Results indicated that there is strongly positive and significant effect of export, Inflation and Real exchange rate on economic growth.

METHODOLOGY

In this study, the annul data of GDP, exports and imports are taken from the world Development Indicator 2016, covering the period 1972-2015 for Bangladesh. All the data are expressed in logarithms in order to include the proliferate effect of time series and reduces the problem of heteroscedasticity.

In this study, the method of vector autoregressive model (VAR) is adopted to estimate the causal relationship between exports, imports and economic growth. We use LY, LX and LM for ln(GDP), ln(export) and ln(import) respectively.

To check the stationarity in data, this paper investigates unit root test (Augmented Dickey Fuller and Phillips Perron). The ADF test is widely used due to stability of its critical values as well as its power over different sampling experiment. Perron(1989, 1990) has shown that a structural change in the mean of a stationary variable tends to bias the standard ADF tests toward non- rejection of the hypothesis of a unit root .

Therefore this study has conducted Phillips Perron (PP) unit root test along with the ADF test. The test is based on the following regression equation:

$$\Delta y_t = \alpha_1 + \alpha_{2t} + \beta_1 y_{t-1} + \sum_{i=1}^{m} p_i \Delta y_{t-1} + €_t$$

Where, $\Delta y_t = Y_t - Y_{t-1}$ and Y is the variable under consideration, m is the number of lags in the dependent variable chosen by Schwarz Information Criterion and $€_t$ is the stochastic error term. The null hypothesis of a unit root implies that the coefficient of y_{t-1} is zero.

The co-integration test is possible to carry on after accomplishing the unit root test, in order to examine the existence of a stable long-run relationship between export, import and GDP. To verify co-integrated relationship among the variables, Johansen Co-integration test (Johansen, 1988; Johansen and Juselius, 1990) has been performed only on integrated of order one, i.e. I(1) according to unit root tests, variables.

The Johansen method applies maximum likelihood procedure to determine the presence of co-integrating vectors in nonstationary time series as a vector autoregressive (VAR) framework:

$$\Delta y_t = C + \sum_{i=1}^{k} \Gamma_i \Delta y_{t-1} + \Pi y_{t-1} + \eta_t$$

Where, y_t is a vector of non-stationary variables and C is the constant term.

The information on the coefficient matrix between the levels of the Π is decomposed as $\Pi = \alpha\beta$ where the relevant elements the matrix are adjustment coefficient and the β matrix contains cointegrating vectors.

Johansen and Juselius (1990) specify two likelihood ratio test statistics to test for the number of co-integrating vectors. The first likelihood ratio statistics for the null hypothesis of exactly r co-integrating vectors against the alternative r+1 vector is the maximum eigenvalue statistic. The second statistic for the hypothesis of at most r cointegrating vectors against the alternative is the trace statistic. Critical values for both test statistics are tabulated in Johansen and Juselius (1990).

To examine the causality for GDP with export and import, Granger causality (Granger 1969, 1988) test was performed only on co-integrated variables. In the absence of any cointegrating relationship between the variables, the standard Granger causality test base on Granger (1988) method can be applied.

The Granger method (Granger, 1988) seeks to determine how much of a variable, Y, can be explained by past values of Y and whether adding lagged values of another variable, X, can improve the explanation. Once the Johansen co-integrating test is completed, this study is likely to undertake the Granger causality test to check the casual direction between Economic Growth, exports and imports in Bangladesh. The paper applied the granger causality test to check the casual direction between exports, imports and economic growth in Bangladesh. Some researchers employ first difference VAR framework for checking causality of those variables that are co-integrated (Boulila and Trabelsi, 2004).

ANALYSIS AND RESULTS

The result of unit root test based on both the Augmented Dickey Fuller (ADF) and the Phillips-Perron (PP) tests demonstrates the levels and first difference of the individual variables.

Table 1: Unit Root Test (Augmented Dickey Fuller) on export, import and GDP (Bangladesh: 1972-2015)

Variables	Augmented Dickey Fuller (Intercept)		Augmented Dickey Fuller (Trend and Intercept)		Order of integration
	Level	1st Diff.	Level	1st Diff.	
LY	-o.828014	-6.136414***	-4.237863***	-6.050827***	I(1)
LX	-1.030712	-6.124497***	-4.664500***	-6.036491***	I(1)
LM	-0.166682	-7.569889***	-2.254796	-7.494267***	I(1)

Notes: ***, ** and * indicate rejection of the null (variables are unit root/ non stationary) at the 1%, 5% and 10% level respectively

Table 2: Unit Root Test (Phillips- Perron) on export, import and GDP (Bangladesh: 1972-2015)

Variables	Phillips Perron (Intercept)		Phillips-Perron (Trend and Intercept)		order of Integration
	Level	1st Diff.	Level	1st Diff.	
LY	-0.722016	-9.473721***	-4.192464***	-9.278349***	I(1)
LX	-1.044878	-9.286815***	-4.592835***	-9.028222***	I(1)
LM	0.085606	-7.869475***	-2.207652	-8.012149***	I(1)

Notes: ***, ** and * indicate rejection of the null (variables are unit root/ non stationary) at the 1%, 5% and 10% level respectively

The results of unit root test, both ADF and PP, indicate that at first differences of the variables export, imports and GDP are statistically significant at 1% significance level. Since, first degree differentiation produces stationarity, the variables – LX (ln exports), LM (ln imports), LY (ln GDP) - are integrated of order one - I(1). Since the variables are integrated of order 1, i.e. I(1), now this paper tests whether they are co-integrated or not (Table 3). The Johanson test statistics show rejection for the null hypothesis of no co-integrating vectors under both the trace and maximal Eigen value forms of the test.

Unrestricted Cointegrating Rank Test (Trace)

Table 3: Output for Eigen Value Test and Trace Statistics (Bangladesh: 1972- 2015)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	P-value
None *	0.704040	60.22380	35.01090	0.0000
At most 1	0.164642	9.087492	18.39771	0.5712
At most 2	0.035817	1.531908	3.841466	0.2158

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level,

* denotes rejection of the hypothesis at the 0.05 level, **MacKinnon-Haug-Michelis (1999) p-values

In case of the trace test, the null of no co-integrating vectors is rejected since the test statistic of 60.22380 is greater than the 5% critical value of 35.01090. Moving on to test the null of at most 1 co-integrating vectors, the trace statistic is 9.087492, while the 5% critical value is 18.39771, so that the null hypothesis is not rejected at 5%. Moving on to test the null of at most 2 co-integrating vectors, the trace statistic is 1.531908 , while the 5% critical value is 3.841466, so the null hypothesis is not rejected at 5%. Finally, results indicate the existence of at least one cointegrating relationship among the variables in the series.

Table 4: Unrestricted Cointegration Rank Test (Maximum Eigen value)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistics	.05 Critical Value	P- Value
None *	0.704040	51.13630	24.25202	0.0000
At most 1	0.164642	7.555584	17.14769	0.6520
At most 2	0.035817	1.531908	3.841466	0.2158

Max-eigenvalue test indicates 1 co integrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level, **MacKinnon-Haug-Michelis (1999) p-values

In case of the maximum eigenvalue test, the null of no co-integrating vectors is rejected since the test statistic of 51.13630 is greater than the 5% critical value of 24.25202. Moving on to test the null of at most 1 co-integrating vectors, the maximum eigenvalue statistic is 7.555584, while the 5% critical value is 17.14769 that the null hypothesis is not rejected at 5%. Moving on to test the null of at most 2 co-integrating vectors, the maximum eigenvalue statistic is 1.531908 , while the 5% critical value is 3.841466 , so the null hypothesis is not rejected at 5%. Finally, max results indicate the existence of at least one cointegrating relationship among the variables in the series.

Table 5: Shows the values of the normalized cointegrating coefficients

Lon-run impact of Export and Import on GDP of Bangladesh(1972 – 2015)	
Variables	Normalized cointegrating coefficients
LX(ln export)	-33.29655
LM (ln import)	0.017134

The values of the normalized cointegrating coefficient indicate that in the long run export is positively related to GDP but import is negatively related. In the long run 1% increase in export leads to almost 33.30% increase in GDP and 1% increase in import leads to almost .017% decrease in GDP.

The existences of at least one co-integrating relationship among the variables in the series allow to run standard Granger causality test to find out any causal relationship between exports, imports and economic growth. To find out the causal relationship between the variables, which are non-stationary, the data series should be transformed into stationary (Oxley and Greasley, 1998). It has been confirmed that Granger causality test are well specified if they are applied in a standard vector autoregressive form to differenced data for non co-integrated variables (MacDonald and Kearney, 1987; Miller and Russek, 1990; Lyons and Murinde 1994). Otherwise, the inference from the F-statistics might be spurious because the test statistics will have nonstandard distributions. Therefore, it has been transformed the level data series into the first difference data series and used them for causality test.

Table 6: Granger causality test on GDP, Export and Import (Bangladesh: 1972-2015)

Null Hypothesis	K= 1		K= 2		K= 3	
	Statistics	Probability	F Statistics	Probability	Statistics	Probability
LX does not Granger Cause LY	7.51184***	0.0091	5.04948**	0.0115	2.00363	0.1320
LY does not Granger Cause LX	7.37745***	0.0097	5.01851**	0.0118	1.98584	0.1346
LM does not Granger Cause LY	7.75977***	0.0081	5.93722***	0.0058	2.56446*	0.0708
LY does not Granger Cause LM	1.89010	0.1768	8.58550***	0.0009	10.0975***	7.E-05
LM does not Granger Cause LX	8.35372***	0.0062	6.16398***	0.0049	2.56801*	0.0705
LX does not Granger Cause LM	1.36585	0.2494	8.74529***	0.0008	9.94875***	7.E-05

Notes: *, **, *** indicates rejection of the null hypothesis (no Granger Causality) at 10%, 5%, 1% significance level respectively and, K indicates the number of lag length used in the granger causality test.

Granger Causality shows a causal relationship between the examined variables. This is the test of erogeneity of dynamic terms where the null hypothesis is that the LX does not Granger cause LY, and LM does not Granger causes LY, and LM does not Granger cause LX. Three alternative lag lengths have been used to see how sensitive the causality tests to desired lag length. The result based on the Granger Causality test at 5% and 1% level of significance will help to investigate and give meaningful conclusion. To stay in the safe side, while rejecting the null of Granger causality test, higher significance level is better. It is found that export causes GDP at 1% and 5% significant level for lag length 1 and 2 and vice versa. Import does cause GDP at 1% significance level for lag length 1 and 2 but GDP causes import at 1% significance level only for lag length 2. Import causes export for lag length 1 and 2 at 1% significant level, but export causes import at 1% significance level only for lag length 2. So, in overall it is found that there is bidirectional causality among export, import and GDP.

CONCLUSION AND RECOMMENDATIONS

This paper explores the association among three important components of an economy named as exports, imports and GDP. First of all, this paper applies unit root test to find the stationarity of the data series. The results show that all the data series of the variables are not stationary at level values, but stationary at integrated order one. Then it applies Johansen procedure to test the possibility of a co-integrating relationship, which shows co-integrating relationship between exports, imports and GDP.

Export trade of Bangladesh is characterized by the dominance of a few commodities in a narrow market. Limited number of export items target at few limited markets is not suitable for economic development. The country must, therefore, aim both at product and market diversification or else our export trade will become stagnant in the near future. In Bangladesh, the value of import has always been greater than the value of export. For this reason the balance of trade is not favorable of Bangladesh. This has resulted in sustained fall in the external value of our currency, which means a steady increase in exchange rate over the whole period.

The exports policy of Bangladesh is not appropriate always for growth of development in economics. Such kind of policy like that updating and liberalizing the trade regime in accordance with the needs and requirements of the World Trade Organization and globalization; Encouraging labor-intensive export-oriented production; Ensuring availability of raw materials for manufacturing export goods; Increase productivity and diversity of products; The Import of Export and Import on Economic Growth in Bangladesh, Improving the quality of products; encouraging the use of modern, appropriate and environment-friendly technology, producing high-end products, and improving the design of the products etc. to be limited use in accurately. Natures of import Policy like as liberalize the import policy in the context of globalization and open market economy; provide facilities for introducing technological innovation to cope with expanding modern technology, Ensuring supply of qualitative and healthy product; release the embargo on import goods step by step, to facilitate the availability of raw materials of industry and to increase the competition and efficiency; enhance the indigenous exports by facilitating backward linkages for local industries and ensure the supply of essential commodities in the national interest for emergency basis are also create our achievements for development goal.

For collecting data, I faced some problems. There is no adequate facts are available in the different organizations. The main limitation of my study is appropriate and adequate data sources are not available. The primary data is rare in this study purpose. Some limitations of export and import in Bangladesh are the problems of economic growth. There are many barriers of export and import such as weakness of Infrastructure, transportation problem, lack of knowledge about foreign market, Invention of Synthetic fiber, lack of diversification of exporting product., lack of skilled manpower; lack of modern technology, administrative weakness, limitation of publicity of Product; higher production cost; black marketing; problem of storage and packaging; political instability, Lack of capital and Government control.

In the existence of any co-integrating relationship, it is possible to move for standard Granger causality test to find out possible causal relationship among the variables. The causal nexus is bidirectional from export to GDP and import, import to export and GDP, and GDP to export and import for Bangladesh. Since export is positively related to GDP, export led growth is empirically proven in Bangladesh. As import is negatively related to GDP it indicates Bangladesh imports mostly consumer durables goods not capital goods. If Bangladesh would import capital goods rather than consumer goods and if those capital goods could be utilized for the infrastructural and industrial development of the country, then import would have positive impact on GDP. Therefore, Bangladesh should import more capital goods for the welfare of the economy.

REFERENCES

Abual Foul, B. (2004). “Testing the export-led growth hypothesis: evidence from Jordan” Applied Economics Letters, Vol. 11, pp. 393-396.

Balassa, B. (1978), “Exports and Economic Growth: Further Evidence.” Journal of Development Economics, Vol. 5, pp. 181-89.

Bangladesh Economic Review. (2015), Annual Report 2005-2015, Ministry of Finance, Bangladesh.

BBS (2015) Statistical Pocket Book, Bangladesh Bureau of Statistics, Dhaka. Bangladesh.

Begum, S., and Shamsuddin, A.F.M. (1998), “Exports and economic growth in Bangladesh”. Journal of Development Studies, Vol. 35, pp. 89-114.

Chandra, R. (2003). “Re-investigating export-led growth in India using a multivariate co-integration framework”. Journal of Developing Areas, Vol. 37, Issues .1, pp. 73–86.

Darrat, A. F. and Hsu, M. K. and Zhong, M. (2000). “Testing export exogeneity in Taiwan: further evidence”, Applied Economics Letters, Vol.7, pp.563-567.

Dodaro (1993): S. Dodaro, “Exports and Growth: A Reconsideration of Causality,” The Journal of Developing Areas, 27: 535-42

Engle and Granger (1987): R. Engle and C. W. J. Granger, “Cointegreation and Error Correction: Representation, Estimation and Testing” Econometrica, 55: 251-276.

Fountas, S. (2000). “Some evidence on the export-led growth hypothesis for Ireland”, Applied Economics Letters, Vol.7, pp. 211-214.

Giles, J. A. and Williams, C. L. (2000). “Export-led growth: a survey of the empirical literature and some non-causality results”. Part 2, Journal of International Trade & Economic Development, Vol. 9, pp. 445-470.

Granger (1969): C. W. J. Granger, “Investigating Causal Relations by Econometrics Models and Cross Spectral Methods,” Econometrica, 37:434-438.

Gujarati (1995): D. N. Gujarati, Basic Econometrics, 4th edition, McGraw Hill Book Co., Singapore.

Hossain, M.A. and Karunaratne, N.D. (2004), “Exports and Economic Growth in Bangladesh: Has Manufacturing Exports Become a New Engine of Export-Led Growth?” International Trade Journal, Vol. 18 No. 4, pp. 303-334.

Johansen and Juselius (1990): S. Johansen and K. Juselius, “Maximum Likelihood Estimation and Inference on Cointegration with Applications to the Demand for Money,” Oxford Bulletin of Economics and Statistics 52: 169- 211.

Journal of Development Economics, Vol. 18, No. 1, pp. 1-12.

Jung, W. S. and Peyton, J. M. (1985), “Exports, Growth and Causality in Developing Countries.”

Kargbo, J. M. (2007), “Forecasting agricultural exports and imports in South Africa.” Applied Economics, Vol. 39, No. 16. pp. 2069-2084.

Krugman, P. R. and Obstfeld, M. (2009), “Export-oriented Industrialization: The East Asian miracle,” in: International Economics: Theory and Policy, 8th ed., Pearson: Addison Wesley, Boston.

Les Oxley and David Greasley, (1997), Convergence in GDP per capita and real wages: Some results for Australia and the UK, Mathematics and Computers in Simulation (MATCOM), 43, (3), 429-436

Mah, J. S. (2005). “Export, expansion, economic growth and causality in China”, Applied Economics Letters, vol. 12, pp.105-107

Michaely (1977): M. Michaely, “Export and Growth: An Empirical Investigation,” Journal of Development Economics, 4: 49-53.

Muhammad Usman, Saliha Ashfaq & Nabeela Mushtaq, (2012). "Relationship Of Export And Economic Growth; An Empirical Study Of Pakistan," Far East Journal of Psychology and Business, Far East Research Centre, vol. 6(1), pages 1-10, March.

Nath, H. K. & Mamun, K. (2005). “Export-led growth in Bangladesh: A time Series Analysis” Applied Economics Letters, 12(6), 361-364. doi: 10.1080/13504850500068194

Phillips, P. C., & Perron, P. (1988). “Testing for a Unit Root in Time Series Regression”. Biometrika. Vol.75(2), pp. 335-46.

Quibria, M. G. (1986). “Migrant Workers and Remittances: Issues for Asian Developing Countries”, Asian Development Review, Vol. 4, Issues. 37.

Roy, D.K. (1991). “Determinants of Export Performance of Bangladesh”. The Bangladesh Development Studies, 19(4): 27–48.

Shirazi, N. S., & Manap, T. A. A. (2005). “Export-led growth hypothesis: Further econometric evidence from South Asia”. The Developing Economies, 43(4), 472-488.

The World Bank, (2005). “Bangladesh Growth and Export Competitiveness”, Report No. 31394- BD, Poverty Reduction and Economic Management Sector Unit, South Asia Region.

Tyler, W. G. (1981), “Growth and Export Expansion in Developing Countries: Some Empirical Evidence.” Journal of Development Economics, Vol. 9, No. 1, pp. 121-130.

Usman M. Ashfaq S. and Mushtaq N. (2012) “Relationship of Export and Economic Growth: An Empirical Study of Pakistan” Far East Journal of Psychology and Business, 2012, vol. 6 No 3 Paper 1 March, issue 1, 1-10

Williamson (1978): R. B. Williamson, “The Role of Exports and Foreign Capital in Latin American Economic Growth,” Southern Economic Journal, 45: 410- 20.

World Bank (2011), World Development Indicators 2015, World Bank, Washington, D.C.

World Development Indicators. (2013). Retrieved from the World Bank website:

APPENDICES

Null Hypothesis: LNGDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.828014	0.8009
Test critical values:	1% level	-3.592462	
	5% level	-2.931404	
	10% level	-2.603944	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNGDP)
Method: Least Squares
Date: 09/18/16 Time: 13:07
Sample (adjusted): 1973 2015
Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDP(-1)	-0.024355	0.029413	-0.828014	0.4125
C	0.671521	0.714942	0.939267	0.3531

R-squared	0.016447	Mean dependent var	0.079877
Adjusted R-squared	-0.007542	S.D. dependent var	0.157824
S.E. of regression	0.158418	Akaike info criterion	-0.801759
Sum squared resid	1.028952	Schwarz criterion	-0.719843
Log likelihood	19.23782	Hannan-Quinn criter.	-0.771551
F-statistic	0.685608	Durbin-Watson stat	1.866506
Prob(F-statistic)	0.412456		

Null Hypothesis: D(LNGDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.136414	0.0000
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNGDP,2)
Method: Least Squares
Date: 09/18/16 Time: 13:06

Sample (adjusted): 1974 2015
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDP(-1))	-0.955990	0.155790	-6.136414	0.0000
C	0.072317	0.027471	2.632506	0.0120

R-squared	0.484905	Mean dependent var	-0.003114
Adjusted R-squared	0.472028	S.D. dependent var	0.219117
S.E. of regression	0.159214	Akaike info criterion	-0.790686
Sum squared resid	1.013965	Schwarz criterion	-0.707940
Log likelihood	18.60441	Hannan-Quinn criter.	-0.760356
F-statistic	37.65558	Durbin-Watson stat	1.959620
Prob(F-statistic)	0.000000		

Null Hypothesis: LNGDP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.237863	0.0088
Test critical values:	1% level	-4.186481	
	5% level	-3.518090	
	10% level	-3.189732	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNGDP)
Method: Least Squares
Date: 09/18/16 Time: 13:10
Sample (adjusted): 1973 2015
Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDP(-1)	-0.581493	0.137214	-4.237863	0.0001
C	13.38098	3.137112	4.265382	0.0001
@TREND(1972)	0.037499	0.009082	4.129120	0.0002

R-squared	0.310388	Mean dependent var	0.079877
Adjusted R-squared	0.275907	S.D. dependent var	0.157824
S.E. of regression	0.134298	Akaike info criterion	-1.110290
Sum squared resid	0.721443	Schwarz criterion	-0.987415
Log likelihood	26.87122	Hannan-Quinn criter.	-1.064977
F-statistic	9.001811	Durbin-Watson stat	1.610122
Prob(F-statistic)	0.000592		

Null Hypothesis: D(LNGDP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.050827	0.0001
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNGDP,2)
Method: Least Squares
Date: 09/18/16 Time: 13:11
Sample (adjusted): 1974 2015
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDP(-1))	-0.955232	0.157868	-6.050827	0.0000
C	0.066654	0.054361	1.226138	0.2275
@TREND(1972)	0.000249	0.002054	0.121264	0.9041

R-squared	0.485099	Mean dependent var	-0.003114
Adjusted R-squared	0.458694	S.D. dependent var	0.219117
S.E. of regression	0.161212	Akaike info criterion	-0.743444
Sum squared resid	1.013583	Schwarz criterion	-0.619325
Log likelihood	18.61233	Hannan-Quinn criter.	-0.697949
F-statistic	18.37137	Durbin-Watson stat	1.961467
Prob(F-statistic)	0.000002		

Null Hypothesis: LNGDP has a unit root
Exogenous: Constant
Bandwidth: 33 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.722016	0.8303
Test critical values:	1% level	-3.592462	
	5% level	-2.931404	
	10% level	-2.603944	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.023929
HAC corrected variance (Bartlett kernel)	0.007368

Phillips-Perron Test Equation
Dependent Variable: D(LNGDP)
Method: Least Squares
Date: 09/18/16 Time: 13:13
Sample (adjusted): 1973 2015
Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDP(-1)	-0.024355	0.029413	-0.828014	0.4125
C	0.671521	0.714942	0.939267	0.3531

R-squared	0.016447	Mean dependent var	0.079877
Adjusted R-squared	-0.007542	S.D. dependent var	0.157824
S.E. of regression	0.158418	Akaike info criterion	-0.801759
Sum squared resid	1.028952	Schwarz criterion	-0.719843
Log likelihood	19.23782	Hannan-Quinn criter.	-0.771551
F-statistic	0.685608	Durbin-Watson stat	1.866506
Prob(F-statistic)	0.412456		

Null Hypothesis: D(LNGDP) has a unit root
Exogenous: Constant
Bandwidth: 31 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.473721	0.0000
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.024142
HAC corrected variance (Bartlett kernel)	0.003002

Phillips-Perron Test Equation
Dependent Variable: D(LNGDP,2)
Method: Least Squares
Date: 09/18/16 Time: 13:13 Sample (adjusted): 1974 2015
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDP(-1))	-0.955990	0.155790	-6.136414	0.0000
C	0.072317	0.027471	2.632506	0.0120

R-squared	0.484905	Mean dependent var	-0.003114
Adjusted R-squared	0.472028	S.D. dependent var	0.219117
S.E. of regression	0.159214	Akaike info criterion	-0.790686
Sum squared resid	1.013965	Schwarz criterion	-0.707940
Log likelihood	18.60441	Hannan-Quinn criter.	-0.760356
F-statistic	37.65558	Durbin-Watson stat	1.959620
Prob(F-statistic)	0.000000		

Null Hypothesis: LNEXPORT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.030712	0.7338
Test critical values:	1% level	-3.592462	
	5% level	-2.931404	
	10% level	-2.603944	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNEXPORT)
Method: Least Squares
Date: 09/18/16 Time: 13:15
Sample (adjusted): 1973 2015
Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNEXPORT(-1)	-0.031323	0.030390	-1.030712	0.3087
C	0.103203	0.096936	1.064650	0.2933

R-squared	0.025257	Mean dependent var	0.003295
Adjusted R-squared	0.001483	S.D. dependent var	0.006750
S.E. of regression	0.006745	Akaike info criterion	-7.114528
Sum squared resid	0.001865	Schwarz criterion	-7.032611
Log likelihood	154.9623	Hannan-Quinn criter.	-7.084319
F-statistic	1.062368	Durbin-Watson stat	1.858726
Prob(F-statistic)	0.308718		

Null Hypothesis: D(LNEXPORT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.124497	0.0000
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNEXPORT,2)
Method: Least Squares
Date: 09/18/16 Time: 13:18
Sample (adjusted): 1974 2015
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNEXPORT(-1))	-0.951844	0.155416	-6.124497	0.0000
C	0.002953	0.001165	2.535040	0.0153

R-squared	0.483934	Mean dependent var	-0.000153
Adjusted R-squared	0.471032	S.D. dependent var	0.009344
S.E. of regression	0.006796	Akaike info criterion	-7.098616
Sum squared resid	0.001847	Schwarz criterion	-7.015869
Log likelihood	151.0709	Hannan-Quinn criter.	-7.068286
F-statistic	37.50947	Durbin-Watson stat	1.960616
Prob(F-statistic)	0.000000		

Null Hypothesis: LNEXPORT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.664500	0.0028
Test critical values:	1% level	-4.186481	
	5% level	-3.518090	
	10% level	-3.189732	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNEXPORT)
Method: Least Squares
Date: 09/18/16 Time: 13:20
Sample (adjusted): 1973 2015
Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNEXPORT(-1)	-0.630733	0.135220	-4.664500	0.0000
C	1.978483	0.423328	4.673642	0.0000
@TREND(1972)	0.001664	0.000369	4.510928	0.0001

R-squared	0.353924	Mean dependent var	0.003295
Adjusted R-squared	0.321620	S.D. dependent var	0.006750
S.E. of regression	0.005560	Akaike info criterion	-7.479272
Sum squared resid	0.001236	Schwarz criterion	-7.356398
Log likelihood	163.8043	Hannan-Quinn criter.	-7.433960
F-statistic	10.95609	Durbin-Watson stat	1.655364
Prob(F-statistic)	0.000161		

Null Hypothesis: D(LNEXPORT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.036491	0.0001
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNEXPORT,2)
Method: Least Squares
Date: 09/18/16 Time: 13:22
Sample (adjusted): 1974 2015
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNEXPORT(-1))	-0.951851	0.157683	-6.036491	0.0000
C	0.002954	0.002327	1.269534	0.2118
@TREND(1972)	-6.64E-08	8.78E-05	-0.000757	0.9994

R-squared	0.483934	Mean dependent var	-0.000153
Adjusted R-squared	0.457469	S.D. dependent var	0.009344
S.E. of regression	0.006882	Akaike info criterion	-7.050997
Sum squared resid	0.001847	Schwarz criterion	-6.926877
Log likelihood	151.0709	Hannan-Quinn criter.	-7.005502
F-statistic	18.28586	Durbin-Watson stat	1.960606
Prob(F-statistic)	0.000002		

Null Hypothesis: LNEXPORT has a unit root
Exogenous: Constant
Bandwidth: 32 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.044878	0.7286
Test critical values:	1% level	-3.592462	
	5% level	-2.931404	
	10% level	-2.603944	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	4.34E-05
HAC corrected variance (Bartlett kernel)	1.48E-05

Phillips-Perron Test Equation
Dependent Variable: D(LNEXPORT)
Method: Least Squares
Date: 09/18/16
Time: 13:23
Sample (adjusted): 1973 2015
Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNEXPORT(-1)	-0.031323	0.030390	-1.030712	0.3087
C	0.103203	0.096936	1.064650	0.2933

R-squared	0.025257	Mean dependent var	0.003295
Adjusted R-squared	0.001483	S.D. dependent var	0.006750
S.E. of regression	0.006745	Akaike info criterion	-7.114528
Sum squared resid	0.001865	Schwarz criterion	-7.032611
Log likelihood	154.9623	Hannan-Quinn criter.	-7.084319
F-statistic	1.062368	Durbin-Watson stat	1.858726
Prob(F-statistic)	0.308718		

Null Hypothesis: D(LNEXPORT) has a unit root
Exogenous: Constant
Bandwidth: 27 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.286815	0.0000
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	4.40E-05
HAC corrected variance (Bartlett kernel)	5.74E-06

Phillips-Perron Test Equation
Dependent Variable: D(LNEXPORT,2)
Method: Least Squares
Date: 09/18/16 Time: 13:24
Sample (adjusted): 1974 2015
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNEXPORT(-1))	-0.951844	0.155416	-6.124497	0.0000
C	0.002953	0.001165	2.535040	0.0153

R-squared	0.483934	Mean dependent var	-0.000153
Adjusted R-squared	0.471032	S.D. dependent var	0.009344
S.E. of regression	0.006796	Akaike info criterion	-7.098616
Sum squared resid	0.001847	Schwarz criterion	-7.015869
Log likelihood	151.0709	Hannan-Quinn criter.	-7.068286
F-statistic	37.50947	Durbin-Watson stat	1.960616
Prob(F-statistic)	0.000000		

Null Hypothesis: LNEXPORT has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.592835	0.0034
Test critical values:	1% level	-4.186481	
	5% level	-3.518090	
	10% level	-3.189732	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	2.88E-05
HAC corrected variance (Bartlett kernel)	2.35E-05

Phillips-Perron Test Equation
Dependent Variable: D(LNEXPORT)
Method: Least Squares
Date: 09/18/16 Time: 13:25
Sample (adjusted): 1973 2015
Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNEXPORT(-1)	-0.630733	0.135220	-4.664500	0.0000
C	1.978483	0.423328	4.673642	0.0000
@TREND(1972)	0.001664	0.000369	4.510928	0.0001

R-squared	0.353924	Mean dependent var	0.003295
Adjusted R-squared	0.321620	S.D. dependent var	0.006750
S.E. of regression	0.005560	Akaike info criterion	-7.479272

Sum squared resid	0.001236	Schwarz criterion	-7.356398
Log likelihood	163.8043	Hannan-Quinn criter.	-7.433960
F-statistic	10.95609	Durbin-Watson stat	1.655364
Prob(F-statistic)	0.000161		

Null Hypothesis: D(LNEXPORT) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 27 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.028222	0.0000
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	4.40E-05
HAC corrected variance (Bartlett kernel)	5.74E-06

Phillips-Perron Test Equation
Dependent Variable: D(LNEXPORT,2)
Method: Least Squares
Date: 09/18/16 Time: 13:26
Sample (adjusted): 1974 2015
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNEXPORT(-1))	-0.951851	0.157683	-6.036491	0.0000
C	0.002954	0.002327	1.269534	0.2118
@TREND(1972)	-6.64E-08	8.78E-05	-0.000757	0.9994

R-squared	0.483934	Mean dependent var	-0.000153
Adjusted R-squared	0.457469	S.D. dependent var	0.009344
S.E. of regression	0.006882	Akaike info criterion	-7.050997
Sum squared resid	0.001847	Schwarz criterion	-6.926877
Log likelihood	151.0709	Hannan-Quinn criter.	-7.005502
F-statistic	18.28586	Durbin-Watson stat	1.960606
Prob(F-statistic)	0.000002		

Null Hypothesis: LNIMPORT has a unit root
Exogenous: Constant
Bandwidth: 11 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.085606	0.9609
Test critical values:	1% level	-3.592462	
	5% level	-2.931404	
	10% level	-2.603944	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.023228
HAC corrected variance (Bartlett kernel)	0.012091

Phillips-Perron Test Equation
Dependent Variable: D(LNIMPORT)
Method: Least Squares
Date: 09/18/16 Time: 13:28
Sample (adjusted): 1973 2015
Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNIMPORT(-1)	-0.003783	0.022696	-0.166682	0.8684
C	0.178548	0.510340	0.349860	0.7282

R-squared	0.000677	Mean dependent var	0.093576
Adjusted R-squared	-0.023697	S.D. dependent var	0.154263
S.E. of regression	0.156080	Akaike info criterion	-0.831503
Sum squared resid	0.998798	Schwarz criterion	-0.749587
Log likelihood	19.87731	Hannan-Quinn criter.	-0.801295
F-statistic	0.027783	Durbin-Watson stat	2.348098
Prob(F-statistic)	0.868439		

Null Hypothesis: D(LNIMPORT) has a unit root
Exogenous: Constant
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.869475	0.0000
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.023042
HAC corrected variance (Bartlett kernel)	0.016584

Phillips-Perron Test Equation
Dependent Variable: D(LNIMPORT,2)
Method: Least Squares
Date: 09/18/16
Time: 13:29
Sample (adjusted): 1974 2015
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNIMPORT(-1))	-1.177773	0.155587	-7.569889	0.0000
C	0.109965	0.028079	3.916322	0.0003

R-squared	0.588914	Mean dependent var	-0.000348
Adjusted R-squared	0.578637	S.D. dependent var	0.239622
S.E. of regression	0.155545	Akaike info criterion	-0.837320
Sum squared resid	0.967765	Schwarz criterion	-0.754574
Log likelihood	19.58373	Hannan-Quinn criter.	-0.806991
F-statistic	57.30322	Durbin-Watson stat	1.963550
Prob(F-statistic)	0.000000		

Null Hypothesis: LNIMPORT has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.207652	0.4734
Test critical values:	1% level	-4.186481	
	5% level	-3.518090	
	10% level	-3.189732	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.020586
HAC corrected variance (Bartlett kernel)	0.019719

Phillips-Perron Test Equation
Dependent Variable: D(LNIMPORT)
Method: Least Squares
Date: 09/18/16
Time: 13:30
Sample (adjusted): 1973 2015
Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNIMPORT(-1)	-0.243124	0.107825	-2.254796	0.0297
C	5.100370	2.226039	2.291231	0.0273
@TREND(1972)	0.020647	0.009112	2.265774	0.0289

R-squared	0.114345	Mean dependent var	0.093576
Adjusted R-squared	0.070062	S.D. dependent var	0.154263
S.E. of regression	0.148761	Akaike info criterion	-0.905742
Sum squared resid	0.885190	Schwarz criterion	-0.782867
Log likelihood	22.47345	Hannan-Quinn criter.	-0.860429
F-statistic	2.582159	Durbin-Watson stat	2.079776
Prob(F-statistic)	0.088164		

Null Hypothesis: D(LNIMPORT) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 9 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-8.012149	0.0000
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.022971
HAC corrected variance (Bartlett kernel)	0.013938

Phillips-Perron Test Equation
Dependent Variable: D(LNIMPORT,2)
Method: Least Squares
Date: 09/18/16
Time: 13:31
Sample (adjusted): 1974 2015
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNIMPORT(-1))	-1.180216	0.157483	-7.494267	0.0000
C	0.094528	0.052733	1.792567	0.0808
@TREND(1972)	0.000696	0.002004	0.347388	0.7302

R-squared	0.590182	Mean dependent var	-0.000348
Adjusted R-squared	0.569166	S.D. dependent var	0.239622
S.E. of regression	0.157283	Akaike info criterion	-0.792791
Sum squared resid	0.964780	Schwarz criterion	-0.668672
Log likelihood	19.64861	Hannan-Quinn criter.	-0.747296
F-statistic	28.08210	Durbin-Watson stat	1.965109
Prob(F-statistic)	0.000000		

Null Hypothesis: LNIMPORT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.166682	0.9349
Test critical values:	1% level	-3.592462	
	5% level	-2.931404	
	10% level	-2.603944	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNIMPORT)
Method: Least Squares
Date: 09/18/16 Time: 13:32
Sample (adjusted): 1973 2015
Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNIMPORT(-1)	-0.003783	0.022696	-0.166682	0.8684
C	0.178548	0.510340	0.349860	0.7282

R-squared	0.000677	Mean dependent var	0.093576
Adjusted R-squared	-0.023697	S.D. dependent var	0.154263
S.E. of regression	0.156080	Akaike info criterion	-0.831503
Sum squared resid	0.998798	Schwarz criterion	-0.749587
Log likelihood	19.87731	Hannan-Quinn criter.	-0.801295
F-statistic	0.027783	Durbin-Watson stat	2.348098
Prob(F-statistic)	0.868439		

Null Hypothesis: D(LNIMPORT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.569889	0.0000
Test critical values:	1% level	-3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNIMPORT,2)
Method: Least Squares
Date: 09/18/16 Time: 13:33
Sample (adjusted): 1974 2015
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNIMPORT(-1))	-1.177773	0.155587	-7.569889	0.0000
C	0.109965	0.028079	3.916322	0.0003

R-squared	0.588914	Mean dependent var	-0.000348
Adjusted R-squared	0.578637	S.D. dependent var	0.239622
S.E. of regression	0.155545	Akaike info criterion	-0.837320
Sum squared resid	0.967765	Schwarz criterion	-0.754574
Log likelihood	19.58373	Hannan-Quinn criter.	-0.806991
F-statistic	57.30322	Durbin-Watson stat	1.963550
Prob(F-statistic)	0.000000		

Null Hypothesis: LNIMPORT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.254796	0.4485
Test critical values:	1% level	-4.186481	
	5% level	-3.518090	
	10% level	-3.189732	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNIMPORT)
Method: Least Squares
Date: 09/18/16 Time: 13:34
Sample (adjusted): 1973 2015
Included observations: 43 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNIMPORT(-1)	-0.243124	0.107825	-2.254796	0.0297
C	5.100370	2.226039	2.291231	0.0273
@TREND(1972)	0.020647	0.009112	2.265774	0.0289

R-squared	0.114345	Mean dependent var	0.093576
Adjusted R-squared	0.070062	S.D. dependent var	0.154263
S.E. of regression	0.148761	Akaike info criterion	-0.905742
Sum squared resid	0.885190	Schwarz criterion	-0.782867
Log likelihood	22.47345	Hannan-Quinn criter.	-0.860429
F-statistic	2.582159	Durbin-Watson stat	2.079776
Prob(F-statistic)	0.088164		

Null Hypothesis: D(LNIMPORT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.494267	0.0000
Test critical values:	1% level	-4.192337	
	5% level	-3.520787	
	10% level	-3.191277	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(LNIMPORT,2)
Method: Least Squares
Date: 09/18/16 Time: 13:34
Sample (adjusted): 1974 2015
Included observations: 42 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNIMPORT(-1))	-1.180216	0.157483	-7.494267	0.0000
C	0.094528	0.052733	1.792567	0.0808
@TREND(1972)	0.000696	0.002004	0.347388	0.7302

R-squared	0.590182	Mean dependent var	-0.000348
Adjusted R-squared	0.569166	S.D. dependent var	0.239622
S.E. of regression	0.157283	Akaike info criterion	-0.792791
Sum squared resid	0.964780	Schwarz criterion	-0.668672
Log likelihood	19.64861	Hannan-Quinn criter.	-0.747296
F-statistic	28.08210	Durbin-Watson stat	1.965109
Prob(F-statistic)	0.000000		

Date: 09/18/16 Time: 13:38
Sample (adjusted): 1974 2015
Included observations: 42 after adjustments
Trend assumption: Quadratic deterministic trend
Series: LNGDP LNEXPORT LNIMPORT
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.704040	60.22380	35.01090	0.0000
At most 1	0.164642	9.087492	18.39771	0.5712
At most 2	0.035817	1.531908	3.841466	0.2158

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.704040	51.13630	24.25202	0.0000
At most 1	0.164642	7.555584	17.14769	0.6520
At most 2	0.035817	1.531908	3.841466	0.2158

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LNGDP	LNEXPORT	LNIMPORT
-23.55795	784.3985	-0.403641
-16.96900	312.1013	7.309604
-96.93608	2149.169	5.126088

Unrestricted Adjustment Coefficients (alpha):

D(LNGDP)	-0.112353	0.025441	-0.000861
D(LNEXPORT)	-0.004809	0.001064	-2.11E-05
D(LNIMPORT)	-0.070553	-0.023946	-0.013141

1 Cointegrating Equation(s): Log likelihood 405.8358

Normalized cointegrating coefficients (standard error in parentheses)

LNGDP	LNEXPORT	LNIMPORT
1.000000	-33.29655	0.017134
	(1.21602)	(0.03020)

Adjustment coefficients (standard error in parentheses)

D(LNGDP)	2.646807
	(0.37779)
D(LNEXPORT)	0.113295
	(0.01600)
D(LNIMPORT)	1.662079
	(0.40034)

2 Cointegrating Equation(s): Log likelihood 409.6136

Normalized cointegrating coefficients (standard error in parentheses)

LNGDP	LNEXPORT	LNIMPORT
1.000000	0.000000	-0.983489
		(0.28311)
0.000000	1.000000	-0.030052
		(0.00863)

Adjustment coefficients (standard error in parentheses)

D(LNGDP)	2.215103	-80.18946
	(0.44903)	(13.0565)
D(LNEXPORT)	0.095248	-3.440401
	(0.01903)	(0.55348)
D(LNIMPORT)	2.068418	-62.81507
	(0.47959)	(13.9451)

Pairwise Granger Causality Tests
Date: 09/18/16 Time: 13:40
Sample: 1972 2015
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
LNEXPORT does not Granger Cause LNGDP	43	7.51184	0.0091
LNGDP does not Granger Cause LNEXPORT		7.37745	0.0097
LNIMPORT does not Granger Cause LNGDP	43	7.75977	0.0081
LNGDP does not Granger Cause LNIMPORT		1.89010	0.1768
LNIMPORT does not Granger Cause LNEXPORT	43	8.35372	0.0062
LNEXPORT does not Granger Cause LNIMPORT		1.36585	0.2494

Pairwise Granger Causality Tests
Date: 09/18/16 Time: 13:41
Sample: 1972 2015
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LNEXPORT does not Granger Cause LNGDP	42	5.04948	0.0115
LNGDP does not Granger Cause LNEXPORT		5.01851	0.0118
LNIMPORT does not Granger Cause LNGDP	42	5.93722	0.0058
LNGDP does not Granger Cause LNIMPORT		8.58550	0.0009
LNIMPORT does not Granger Cause LNEXPORT	42	6.16398	0.0049
LNEXPORT does not Granger Cause LNIMPORT		8.74529	0.0008

Pairwise Granger Causality Tests
Date: 09/18/16 Time: 13:41
Sample: 1972 2015
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Prob.
LNEXPORT does not Granger Cause LNGDP	41	2.00363	0.1320
LNGDP does not Granger Cause LNEXPORT		1.98584	0.1346
LNIMPORT does not Granger Cause LNGDP	41	2.56446	0.0708
LNGDP does not Granger Cause LNIMPORT		10.0975	7.E-05
LNIMPORT does not Granger Cause LNEXPORT	41	2.56801	0.0705
LNEXPORT does not Granger Cause LNIMPORT		9.94875	7.E-05