

Export and Economic Growth in Select South Asian Countries: Causality Analysis Based on Granger Test & VECM

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Abstract

Over the past thirty years, many developing countries have adopted export promotion as their development policy. The export-led growth approach encouraged countries to focus on production for exports. After the miraculous performance of the East and South East Asian countries, the South Asian countries also shifted their strategy in favour of export oriented policies. The present study analyzed the export-led growth hypothesis in select South Asian countries namely Bangladesh, India, Pakistan, and Sri Lanka by using unit root, cointegration, vector error correction model, and Granger causality test. Time series data for exports and imports of goods & services and gross domestic product (GDP) per capita were taken for the period from 1980-2012 from The World Bank's world development indicators. The study concluded that export-led growth hypothesis was valid for Bangladesh and Sri Lanka only in the long run. For India, the study found evidence of export-led growth hypothesis, particularly for the short run. No short run and long run relationship was found for Pakistan. The VECM results for imports and GDP per capita showed that imports significantly caused GDP per capita only in Bangladesh, but no long run causal relationship was found from GDP per capita to imports. The results of the Granger causality test do not show any causal relationship between imports and GDP per capita except for Pakistan, in case of which there is unidirectional causality from GDP per capita to imports.

Keywords: exports, economic growth, cointegration, causality, VECM

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The export-growth nexus has been an interesting issue of discussion among researchers in the last three decades. Export-led growth hypothesis (ELGH) has highlighted the importance of exports as a factor in economic growth. The relationship between exports and economic growth has long been stressed upon, starting with classical economists like Adam Smith, David Ricardo, and John Stuart Mill. Despite post World War II enthusiasm for inward looking policies in many countries of Asia and Latin America, it was realized by late 1970s and 1980s that export promotion is an essential ingredient of a viable and sustainable growth policy (Balassa, 1985 ; Tyler, 1981). Export growth helps in realization of external economies, employment growth, and in attaining higher levels of productivity via specialization. Export-led growth also permits efficiency gains due to access to better technologies, competition, and learning by doing, and so forth. Exports growth also enables imports of essential raw materials, intermediate goods, and technology, which further promote capital accumulation and output growth.

There is a vast empirical work on ELGH, which can be categorized into three groups. The first group of studies

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used cross-country rank correlation coefficients method, for example, Michaely (1977), Balassa (1978), Heller and Porter (1978), Tyler (1981), and so forth. The second group which applied cross-sectional regression analysis includes Feder (1982), Balassa (1985), Ram (1987), and Sprout and Weaver (1993), and so forth. The third group comprises of more contemporary research based on time series techniques for country and inter-country analysis. The main studies in this area include the ones conducted by Dodaro (1993), Nandi and Biswas (1991), Bahmani - Oskooee and Alse (1993), Bhat (1995), Dutt and Ghosh (1996), Al-Yousif (1997), Ghatak and Price (1997), Anwer and Sampath (2000), Abou-Stait (2005), and Abbas (2012).

Most of the studies of the third group are based on the concept of Granger causality, Johansen cointegration, VECM, and VAR. The main limitation of the first group of studies is that a high degree of positive correlation between the variables was used as evidence of ELGH. The second group of studies was criticized on the basis that it did not consider the direction of causal relation between the variables. Finally, the third group, which involves the application of modern time series techniques, does not suffer from shortcomings found in the previous groups. However, the conclusions from these studies are mixed and contradictory. Hence, these studies failed to provide uniform results. These may be due to the different methods, variable selections, time periods, and countries selected (Afzal & Hussain, 2010 ; Ekanayake, 1999 ; Eusuf & Ahmed, 2007 ; Kwan & Kwok, 1995; Lee & Huang, 2002 ; Medina - Smith, 2001; Shirazi & Abdul Manap, 2005).

In the early 1990s, when most of the countries initiated reforms, South Asia achieved progress in liberalizing trade regimes and reducing tariffs. Countries in South Asia undertook major industrial deregulation and other structural reforms. Most of the South Asian economies recognized vital importance of exports for overall growth of the economy and poverty alleviation, and hence export-led growth became crucial in each country (Jain & Singh, 2009). Thus, South Asia can be an interesting case study to analyze the trade - led growth hypothesis.

Review of Literature

A large number of studies have analyzed the relationship between exports and economic growth, but results remain inconclusive. All the studies are not unanimous with regard to the results. Empirical studies regarding the relationship between international trade and economic growth can be separated into two categories. The first type of empirical investigation focuses on country-specific studies, and the second concentrates on multi-country analysis related to the South Asian region.

To establish the validity of causal relation between trade and economic growth for India, Bhat (1995) and Chandra (2003) employed cointegration technique to find the relationship between exports growth and output growth. Both studies found a positive relationship. On the other hand, Padhan (2004), Pandey (2006), Ray (2011), and Devi (2013) used bivariate framework to investigate the relationship between export growth and economic growth. These studies also supported the ELG hypothesis. However, Pradhan (2010), Kaur and Sidhu (2012) used a multivariate framework to examine the relationship and supported the ELG hypothesis. The studies which did not support the ELG hypothesis in case of India include Ghatak and Price (1997), Dhawan and Biswal (1999), Nataraj, Sahoo, and Kamaiah (2001), Sharma and Panagiotidis (2003), and Mishra (2011).

For Bangladesh, Al Mamun and Nath (2005) and Uddin, Khan, and Ozturk (2013) using ECM found long run unidirectional causality from exports to growth. Chandra and Love (2005) using Johansen's multivariate framework found unidirectional causality from income to exports both in the long run and short run. Paul (2014), using ARDL bounds test approach, found a strong evidence for export-led growth for Bangladesh in both the short run and long run. Hossain and Karunaratne (2001) used VECM for empirical analysis. The study found both total exports and manufacturing exports having both long run and short run effect on the GDP. However, Razzaque, Khondkar, Ahmed, and Mujeri (2003) did not find any support for the export-growth relationship.

In case of Pakistan, Siddiqui, Zehra, Majeed, and Butt (2008) and Muhammad, Pervaz, and Ahmad (2011) used bounds test approach and confirmed the export-led growth hypothesis. Abbas (2012) found causality running from GDP to exports in the short run and long run. However, Afzal and Hussain (2010) found no support for an export-led growth hypothesis in Pakistan.

For Sri Lanka, Velnampy and Achuchuthan (2013) found that both exports and imports had a significant impact on economic growth. However, Dilrukshini (2008) did not find empirical support for the export-led growth hypothesis for Sri Lanka.

In the context of multi-country analysis related to the South Asian region, the available evidence appears to be mixed and inconclusive. Kemal, Din, Qadir, Fernando, and Colombage (2002) found a positive relationship between exports and economic growth for the South Asian countries. Shirazi and Abdul Manap (2005) also found strong support for the ELG hypothesis in South Asia except for Sri Lanka. Parida and Sahoo (2007) using Pedroni's panel cointegration approach found support for the export-led growth hypothesis. Din (2004) examined export - led growth for five South Asian countries. The study found long run equilibrium relationship only for Bangladesh and Pakistan.

For India, Nepal, and Sri Lanka, no evidences were found. Eusuf and Ahmed (2007) found export-led growth for Pakistan, Sri Lanka, and Bhutan, and growth led exports for India, Nepal, and Maldives. However, the study failed to detect any of the two relationships for Bangladesh. Hye, Wizarat, and Lau (2013) used the ARDL approach to examine the long run relation between exports, imports, and economic growth. The study found export-led growth to be valid for Bangladesh, India, Sri Lanka, Nepal, and Bhutan. The study did not find the export led growth hypothesis valid for Pakistan. Thus, the results are fairly mixed and inconclusive.

Objective of the Study

This paper aims to analyze the trade-led growth hypothesis in select South Asian countries, namely Bangladesh, India, Pakistan, and Sri Lanka.

A Brief Overview of the Select South Asian Countries

The Table 1 highlights the major macroeconomic indicators of select South Asian countries for the year 2013. It shows that India is the most populous country among all. The volume of India's exports and imports of goods and services is higher than it is for other countries. Sri Lanka is leading in GDP per capita. Trade openness is found to be similar in these countries except Pakistan, which has the lowest share of trade in GDP.

(1) Bangladesh : Bangladesh practiced restrictive trade policies since its independence in 1971, which continued for one decade. In 1982, Bangladesh started moving towards export oriented policies by introducing the structural adjustment programs in various sectors of the economy. During the period between 1971 and 1982, four military coups occurred, which continued until the end of 1990. Therefore, the socioeconomic conditions were vulnerable between 1971 and 1990 (Sultan, 2008). Bangladesh initiated the trade reforms process in the early 1990s. Major steps were taken to liberalize the trade regime such as tariff reduction, elimination of quantitative restrictions, adoption of flexible exchange rate system, current account convertibility, and shift towards export oriented policies (The World Bank, n.d. b).

Table 1. Major Macroeconomic Indicators of Select South Asian Countries (2013)

Major Macroeconomic Indicators	Bangladesh	India	Pakistan	Sri Lanka
Population (millions)	157	1252	182	20
Per Capita Income (Constant 2005 US\$)	625	1165	806	2004
Exports of Goods& Services (Constant 2005 US\$ millions)	22152	352473	19914	9915
Imports of Goods & Services (Constant 2005 US\$ millions)	25720	429242	21294	14231
Trade (% of GDP)	53.8	53.2	31.6	54.5

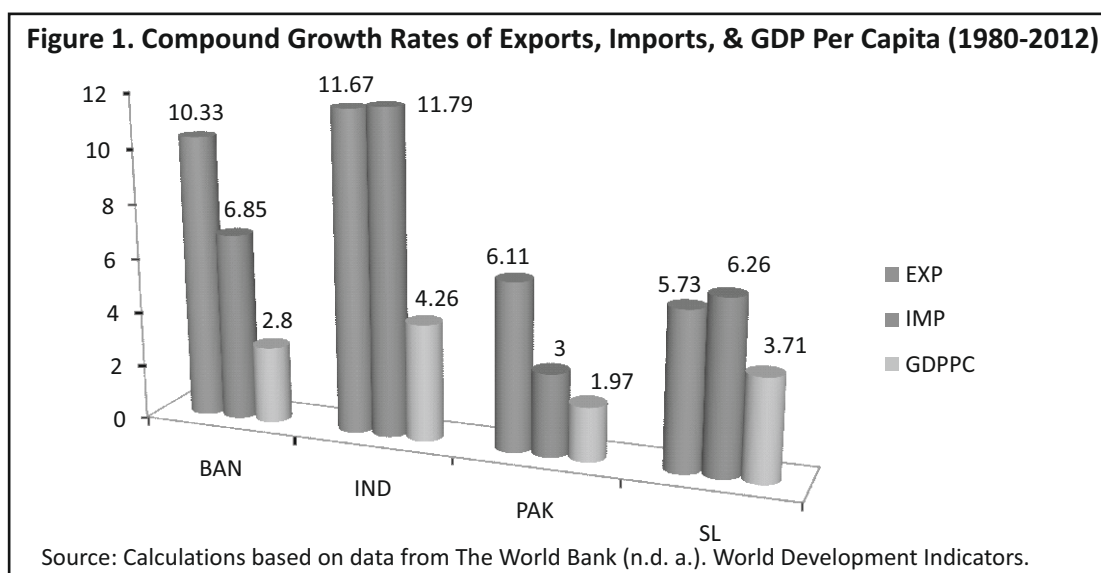
Source: The World Bank (n.d. a.). World Development Indicators.

(2) India : The Indian economy moved on the path of liberalization in a big way in 1991, when comprehensive economic reforms were introduced under the 'New Economic Policy' (Kaur, 2012). An important thrust of this policy was liberalization of the external sector by important trade policy changes, including tariff reduction, removal of quantitative restrictions, incentives for export sector, promotion of foreign investment, and so forth (Khan, 2005). Due to these policies, there was a substantial increase in exports as well as imports, and the Indian economy became more and more trade oriented. As a result of trade policy changes, tariffs were significantly reduced, quantitative restrictions were removed, except in a few cases of banned items, and the licensing system was phased out (Ministry of Commerce and Industry, 2015).

(3) Pakistan : After following a restrictive trade policy for many decades, Pakistan moved from import substitution to export promotion strategy in the late 1980s. The year 1988 has been considered as a turning point as the country adopted major changes in its economic policies such as removal of tariff barriers, reduction in taxes along with export promotion policy. The economy adopted measures to encourage the external sector. Export restrictions were reduced to a large extent, and more emphasis was given to foreign investment (Khan, Khan, & Khan, 2012 ; Zulfiqar & Kausar, 2012).

(4) Sri Lanka : Among all the South Asian countries, Sri Lanka took the lead in adopting economic reforms as early as in 1978. During 1961-1977, the government restricted imports by implementing permits and licenses. Few agencies were allowed to import. Ceilings were also imposed on imported goods. Apart from these measures, restrictions on foreign exchange transactions also contributed towards controlling imports (Perera & Varma, 2008). Despite suffering from civil conflicts, Sri Lanka's economy kept growing and responded well to reforms since the late 1970s. These reforms initially aimed at export promotion of manufactured goods, especially textiles and clothing (World Trade Organization, 1995).

The countries, namely Bangladesh, India, Pakistan, and Sri Lanka comprise of a large population of South Asia. These countries got independence from the British rule in the middle of the 20th century. After independence, these countries adopted almost similar approach by focusing on self-reliance and import substitution. A major role was assigned to the public sector. Hence, these economies managed to achieve substantial growth as compared to what was achieved during the British period. However, by the 1970s and the 1980s, these economies started exhibiting inefficiencies and imperfections of controlled regimes, and felt the need for economic reforms. An overview of these countries is presented in the Figure 1.



The compound growth rates of exports, imports, and GDP per capita during the study period has been presented in the Figure 1. During the study period, India's export growth was found to be greater (11.67%) followed by Bangladesh (10.33%). Regarding imports, again, India experienced higher growth rate (11.79%) followed by Bangladesh (6.85%). The Figure 1 depicts that growth rate of GDP per capita was 4.26% in India, 3.71% in Sri Lanka, 2.8% in Bangladesh, and 1.97% in Pakistan.

The Model, Database, and Methodology

➤ **The Model** : Export- led growth and growth-led exports have been examined through the equations :

$$Y_t = \alpha_0 + \alpha_1 X_t + \varepsilon_t \quad (1)$$

$$X_t = \beta_0 + \beta_1 Y_t + \nu_t \quad (2)$$

where,

Y represents real gross domestic product and X represents exports of goods and services. α_0 and β_0 represent the intercept term, α_1 and β_1 denote slope coefficients, and ε_t is an error term. Subscript ' t ' indicates that it is time series analysis.

The causality between imports and economic growth is explored through the following equations :

$$Y_t = \varphi_0 + \varphi_1 M_t + \varepsilon_t \quad (3)$$

$$M_t = \Theta_0 + \Theta_1 Y_t + \nu_t \quad (4)$$

where,

Y represents real gross domestic product and M represents imports of goods and services. φ_0 and Θ_0 represent the intercept term, φ_1 and Θ_1 denote the slope coefficients, and ε_t is an error term. Subscript ' t ' indicates that it is time series analysis.

➤ **Database** : The time series data covers the period from 1980 to 2012. The annual data at the 2005 constant U.S. dollar prices on real GDP per capita, real exports, and real imports have been compiled from the World Development Indicators. All the variables are taken in their natural logarithms to avoid the problem of heteroscedasticity. The variables used for analysis are :

(1) $LNGDPPC$ = Log of gross domestic product per capita.

(2) $LNEXP$ = Log of exports of goods and services.

(3) $LNIMP$ = Log of imports of goods and services.

The prefix ' LN ' stands for natural logarithm and ' D ' denotes differencing of the time series.

Hypotheses

The analysis for select South Asian countries has been done using the following null hypothesis and alternative hypothesis as mentioned below :

➔ **H01** : The variables - real GDP per capita, real exports of goods and services, and real imports of goods and services are not stationary.

→ **Ha1** : The variables - real GDP per capita, real exports of goods and services, and real imports of goods and services are stationary.

→ **H02**: There is no cointegration among the variables - real GDP per capita and real exports of goods and services & real imports of goods and services.

→ **Ha2**: Cointegration exists among the variables - real GDP per capita and real exports of goods and services & real imports of goods and services.

→ **H03** : There is no causality between real GDP per capita, real exports of goods and services, and real imports of goods and services.

→ **Ha3** : There is causality between real GDP per capita, real exports of goods and services, and real imports of goods and services.

Methodology

(1) Unit Root Test : To get reliable and unbiased results, the variables of a model must be stationary (free from unit root). The non-stationarity of the variables can cause 'spurious regression' problem discussed in Granger and Newbold (1974), Phillips (1986), and Al-Yousif (1999). The Phillips and Perron (PP) (1988) test was carried out to determine the order of integration of each time series used in the analysis so as to determine the appropriate technique that can be used to find out the relationship among the variables.

The Phillips- Perron test is used to test the null hypothesis that a time series has unit root. It builds on the Dicky-Fuller test of null hypothesis $\delta=0$ in :

$$\Delta Y_t = \delta Y_{t-1} + U_t,$$

Here, Δ is the first difference operator. Like the augmented Dickey-Fuller (ADF) test, the PP test addresses the issue that the process generating data for Y_t might have a higher order of autocorrelation than is admitted in the test equation, making Y_{t-1} endogenous and then invalidating the Dickey-Fuller t -test. While the ADF test addresses the issue by introducing lags of ΔY_t as regressors in the test equation, the PP test makes a non-parametric correction to the t -test statistics. The test is robust with respect to unspecified auto-correlation and heteroscedasticity in the disturbance process of the test equation (Ray, 2011).

(2) Cointegration Test : Cointegration means that despite being individually non stationary, a linear combination of two or more time series can be stationary. Cointegration of two or more time series suggests that there is a long run or equilibrium relationship between them (Gujarati & Sangeetha, 2010). The Johansen approach to the cointegration test is based on two test statistics, that is, the trace test statistic, and the maximum eigen- value test statistic.

(i) The Trace Test Statistic : The trace test statistic can be specified as: $\tau_{trace} = -T \sum_{i=r+1}^k \log(1-\lambda_i)$, where λ_i is the i^{th} largest eigen value of matrix Π and T is the number of observations. In the trace test, the null hypothesis is that the number of distinct cointegrating vector(s) is less than or equal to the number of cointegration relations (r).

(ii) Maximum Eigenvalue Test : The maximum eigenvalue test examines the null hypothesis of exactly r cointegrating relations against the alternative of $r+1$ cointegrating relations with the test statistic: $\tau_{max} = -T \log(1-\lambda_{r+1})$, where λ_{r+1} is the $(r+1)^{th}$ largest squared eigen value. In the trace test, the null hypothesis of $r=0$ is tested against the alternative of $r+1$ cointegrating vectors (Mishra, 2011).

(3) Vector Error Correction Model : Once the cointegration is confirmed to exist between variables, then the third step entails the construction of error correction mechanism to model the dynamic relationship. The purpose of the error correction model is to indicate the speed of adjustment from the short run equilibrium to the long-run equilibrium state.

A Vector Error Correction Model (VECM) is a restricted VAR designed for use with non-stationary series that are known to be cointegrated. Once the equilibrium conditions are imposed, the VECM describes how the examined model is adjusting in each time period towards its long-run equilibrium state. Since the variables are supposed to be cointegrated, then in the short-run, deviations from this long-run equilibrium will feedback on the changes in the dependent variables in order to force their movements towards the long-run equilibrium state. Hence, the cointegrated vectors from which the error correction terms are derived are each indicating an independent direction, where a stable meaningful long-run equilibrium state exists (Mishra, 2011).

When Y_t and X_t are cointegrated, the first difference of Y_t and X_t can be modeled using a VAR, augmented by including $Y_{t-1} - \Theta X_{t-1}$ as an additional regressor.

$$\Delta Y_t = \beta_{10} + \beta_{11}\Delta Y_{t-1} + \dots + \beta_{1p}\Delta Y_{t-p} + \gamma_{11}\Delta X_{t-1} + \dots + \gamma_{1p}\Delta X_{t-p} + \alpha_1(Y_{t-1} - \Theta X_{t-1}) + \mu_{1t} \quad (5)$$

$$\Delta X_t = \beta_{20} + \beta_{21}\Delta Y_{t-1} + \dots + \beta_{2p}\Delta Y_{t-p} + \gamma_{21}\Delta X_{t-1} + \dots + \gamma_{2p}\Delta X_{t-p} + \alpha_2(Y_{t-1} - \Theta X_{t-1}) + \mu_{2t} \quad (6)$$

The term $Y_t - \Theta X_t$ is called the error correction term. The combined model in equation (5) & (6) is called the vector correction model (VECM). In a VECM, past values of $Y_t - \Theta X_t$ help to predict future values of ΔY_t and/ or ΔX_t (Stock & Watson, 2005).

(4) The Granger Causality Test : The concept of Granger causality involves feedback affect and it is widely used to develop forecasting models. Sequentially, Granger (1969) and Sims (1972) formalized this application of causality in economics. The Granger causality test is a method for determining whether one time series is significant in forecasting another (Granger, 1969). The standard Granger causality test seeks to determine whether previous values of a variable help to predict changes in another variable. The definition suggests that in the conditional distribution, lagged values of Y_t add no information to explanation of movements of X_t beyond that provided by lagged values of X_t itself (Greene, 2003). The causal behaviour of the variables can be put into three different groups:

(i) Unidirectional Causality : When x is caused by y (x to y) or when x causes y (y to x) after some lag. In other words, it suggests if the estimated coefficients on lagged x are statistically different from zero as a group and set of estimated coefficients on lagged y is not statistically different from zero and vice versa.

(ii) Bilateral Causality : When both variables x and y cause each other with some lag (x to y) or when sets of x and y coefficients are statistically different from zero in both the regressions.

(iii) No Causality or Independence : When one of the variables, say x does not or is caused by the other, say y , (with or without any lag), that is, there is no sign of causality (Gujarati, Porter, & Gunasekar, 2013).

Empirical Analysis and Results

As shown in the Table 2, the results indicate that the null hypothesis (H01) proposing non-stationarity can be rejected for all countries only at first differences. Thus, the results based on PP tests demonstrate that all the variables *LNGDPPC*, *LNEXP*, and *LNIMP* are non-stationary at level but become stationary after first differencing, that is, all series are integrated of order one or $I(1)$. The next step is to test for cointegration using Johansen's cointegration approach.

In the preceding Table, we found that all the variables of the model are stationary at first difference. Therefore, we

Table 2. Results of the Phillips - Perron Tests for Variables

	Bangladesh				India				Pakistan				Sri Lanka				Result
	Test Statistics	1% critical	5% critical	p-value	Test Statistics	1% critical	5% critical	p-value	Test Statistics	1% critical	5% critical	p-value	Test Statistics	1% critical	5% critical	p-value	
LNGDPPC																	
At level	0.202	-4.273	-3.557	0.997	-0.697	-4.273	-3.557	0.964	-2.292	-4.273	-3.557	0.425	0.995	-4.273	-3.557	0.999	Do not Reject
At first difference	-5.831*	-4.284	-3.562	0.000	-5.318*	-4.284	-3.562	0.000	-3.706**	-4.284	-3.562	0.036	-4.712**	-4.284	-3.562	0.003	Reject Null Hypothesis
LNEXP																	
At level	-2.135	-4.273	-3.557	0.507	-2.832	-4.273	-3.557	0.196	-1.841	-4.273	-3.557	0.660	-1.157	-4.323	-3.580	0.900	Do not Reject
At first difference	-7.217*	-4.284	-3.562	0.000	-5.273*	-4.284	-3.562	0.000	-5.529*	-4.284	-3.562	0.000	-6.446*	-4.339	-3.587	0.000	Reject Null Hypothesis
LNIMP																	
At level	-2.613	-4.273	-3.557	0.2772	-1.880	-4.273	-3.557	0.641	-3.506	-4.273	-3.557	0.055	-3.222	-4.323	-3.580	0.100	Do not Reject
At first difference	-6.015*	-4.284	-3.562	0.000	-5.919*	-4.284	-3.562	0.000	-5.923*	-4.284	-3.562	0.000	-5.466*	-4.339	-3.587	0.000	Reject Null Hypothesis

Note: * and ** indicate significance at the 1% and 5%, respectively.

Table 3. Johansen Co-integration Test Statistics for the variables *LNGDPPC* and *LNEXP*

Countries	Unrestricted Cointegration Rank Test (Trace)					Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Critical Value 0.05	Prob.**	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Critical Value 0.05	Prob.**
Bangladesh	None **	0.476	30.995	25.872	0.0105	None **	0.476	20.065	19.387	0.039
	At most 1	0.297	10.929	12.517	0.0908	At most 1	0.297	10.929	12.517	0.090
India	None	0.404	23.748	25.872	0.0898	None	0.404	16.080	19.387	0.141
	At most 1	0.219	7.668	12.517	0.2800	At most 1	0.219	7.668	12.517	0.280
Pakistan	None	0.245	13.113	25.872	0.7293	None	0.245	8.721	19.387	0.752
	At most 1	0.132	4.392	12.517	0.6849	At most 1	0.132	4.392	12.517	0.684
Sri Lanka	None **	0.507	28.574	25.872	0.0225	None**	0.507	19.119	19.387	0.054
	At most 1	0.295	9.454	12.517	0.1541	At most 1	0.295	9.454	12.517	0.154

Note: * and ** indicate significance at the 1% and 5%, respectively.

Table 4. Johansen Co-integration Test Statistics for the Variables *LNGDPPC* and *LNIMP*

Countries	Unrestricted Cointegration Rank Test (Trace)					Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Critical Value 0.05	Prob.**	Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Critical Value 0.05	Prob.**
Bangladesh	None *	0.521	32.824	25.872	0.0058	None **	0.521	22.848	19.387	0.015
	At most 1	0.275	9.976	12.517	0.1283	At most 1	0.275	9.976	12.517	0.128
India	None	0.319	14.616	15.494	0.0675	None	0.319	11.949	14.264	0.112
	At most 1	0.082	2.666	3.841	0.1024	At most 1	0.082	2.666	3.841	0.102
Pakistan	None	0.414	20.102	25.872	0.2208	None	0.414	15.531	19.387	0.166
	At most 1	0.145	4.571	12.517	0.6587	At most 1	0.145	4.571	12.517	0.658
Sri Lanka	None	0.457	24.124	25.872	0.0812	None	0.457	16.518	19.387	0.124
	At most 1	0.245	7.605	12.517	0.2856	At most 1	0.245	7.605	12.517	0.285

Note: * and ** indicate significance at the 1% and 5%, respectively.

need to find out whether these variables are co-integrated before turning to the test of causality. To test the presence of a long-run relationship between the variables, Johansen's (1995) cointegration test was conducted. Johansen cointegration test is a system estimation method, where the number of cointegrating vectors is not fixed *a priori*, but is determined in the course of estimation. Nevertheless, the Johansen procedure presents a greater difficulty in practice. An important question when applying this procedure is the deterministic terms specification to be used, since results may differ from one to another. To determine the most appropriate deterministic specification, the study followed the “Pantula Principle” [1] suggested by Johansen (1992) and chose the appropriate model out of the five possible specifications.

The results reported in Table 3 show that there exists a long run relationship for the variables *LNGDPPC* and *LNEXP* only in Bangladesh and Sri Lanka. The study did not find a long run relationship between these two variables for India and Pakistan. However, for the variables *LNGDPPC* and *LNIMP*, the study found long run

[1] The Pantula Principle involves the estimation of all three models and the presentation of the results from the most restrictive hypothesis (i.e. r = number of cointegrating relations = 0 and model 1) through the least restrictive hypothesis, that is, r = number of variables entering the VAR-1 = $n - 1$ and model 4). The model selection procedure then comprises moving from the most restrictive model, at each stage comparing the trace statistic to its critical value, stopping only when we conclude for the first time that the null hypothesis of no cointegration is not rejected (Asteriou & Hall, 2007).

Table 5. Causality Results Based on Vector Error Correction Model for Bangladesh and Sri Lanka (LNGDPPC, LNEXP)

Countries	Direction of Causation	ECT (<i>p</i> - value)	Short-run coefficient (<i>p</i> - value)
Bangladesh	<i>LNEXP</i> to <i>LNGDPPC</i>	-0.016* (0.000)	-0.029 (0.133)
	<i>LNGDPPC</i> to <i>LNEXP</i>	-0.033 (0.364)	-0.971 (0.656)
Sri Lanka	<i>LNEXP</i> to <i>LNGDPPC</i>	-0.056* (0.005)	0.027 (0.745)
	<i>LNGDPPC</i> to <i>LNEXP</i>	0.044 (0.536)	-0.222 (0.839)

Note: * indicates significance at the 1% level of significance.

Table 6. Causality Results Based on Granger Causality Test for India and Pakistan (LNGDPPC, LNEXP)

Countries	Direction of Causation	<i>F</i> -Statistics	Probability
India	<i>LNEXP</i> to <i>LNGDPPC</i>	4.600**	0.040
	<i>LNGDPPC</i> to <i>LNEXP</i>	5.795**	0.022
Pakistan	<i>LNEXP</i> to <i>LNGDPPC</i>	1.572	0.220
	<i>LNGDPPC</i> to <i>LNEXP</i>	0.769	0.387

Note: ** indicate significance at the 5% level of significance.

relationship only in Bangladesh (Table 4). Both Trace and Max-Eigen statistic could not reject the null hypothesis (H02) of non-existence of long run relationship for India and Pakistan. However, the null hypothesis (H02) of no cointegration stands rejected for Bangladesh and Sri Lanka.

Once the cointegration is confirmed to exist between the variables, then the third step entails the construction of the error correction mechanism to model the dynamic relationship. The purpose of the error correction model is to indicate the speed of adjustment from the short-run equilibrium to the long-run equilibrium state. As shown in the Table 3, cointegration is confirmed for Bangladesh and Sri Lanka, and in the Table 4, the long run relationship was found in Bangladesh only. Hence, the next step is to find speed of adjustment and short run causality for these countries. The study uses the ordinary Granger causality test to find causation among variables for those countries who did not confirm cointegration.

The results of VECM to analyze ELG and GLE hypothesis for Bangladesh and Sri Lanka have been presented in the Table 5. The estimation of VECM requires selection of an appropriate lag length. The number of lags in the model has been determined according to the Schwarz information criterion (SIC). The results demonstrate that the coefficient of an error correction term in the ELG equation is statistically significant and has a negative sign for both Bangladesh and Sri Lanka, which confirms the presence of a long run relationship at the 1% level of significance. While for the GLE equation, the coefficient is neither statistically significant, nor it has a negative sign. However, short run coefficients were not found to be significant for both countries. Hence, we fail to reject the null hypothesis (H03) of no causality between exports and GDP per capita.

The results of pair-wise Granger causality test for India and Pakistan are presented in the Table 6. For India, the results imply that exports Granger cause GDP per capita, while GDP per capita also Granger cause exports. Hence, the results show that causality is bidirectional (causality runs in both directions). Thus, the results of the Granger causality test support ELG and GLE hypothesis in case of India. For Pakistan, the study does not find support for any of these two hypotheses. The Table 6 depicts that the null hypothesis of no causality from exports to GDP per capita and GDP per capita to exports can be rejected for India. We could not reject the null hypothesis (H03) of no causality for Pakistan in any of the two cases.

To examine causal relationship between imports and economic growth, the study used VECM for Bangladesh and ordinary Granger causality test for other countries depending upon the results of the cointegration analysis. The results for causality tests are reported in the Tables 7 and 8. The results show that imports are significantly

Table 7. Causality Results Based on Vector Error Correction Model for Bangladesh (LNGDPPC, LNIMP)

Countries	Direction of Causation	ECT (p - value)	Short run coefficients (p - value)
Bangladesh	LNIMP to LNGDPPC	-0.027* (0.000)	-0.023*** (0.099)
	LNGDPPC to LNIMP	0.052 (0.541)	2.508 (0.370)

Note: * indicates significance at the 1% level of significance.

Table 8 . Causality Results Based on Granger Causality Test for India, Pakistan, and Sri Lanka (LNGDPPC, LNIMP)

Countries	Direction of Causation	F-Statistic	Probability
India	LNIMP to LNGDPPC	1.562	0.221
	LNGDPPC to LNIMP	0.196	0.660
Pakistan	LNIMP to LNGDPPC	0.585	0.450
	LNGDPPC to LNIMP	13.278*	0.001
Sri Lanka	LNIMP to LNGDPPC	0.755	0.393
	LNGDPPC to LNIMP	0.010	0.920

Note: * indicates significance at the 1% level of significance.

causing GDP per capita in Bangladesh in the long run as well as in the short run. Therefore, the study rejects the null hypothesis (H03) of no causality from imports to GDP per capita, but fails to reject null hypothesis of no causality from GDP per capita to imports. The error correction term is statistically significant at the 1% level of significance and has a negative sign also. No long run causal relationship was found from GDP per capita to imports (Table 7).

The results of the Granger causality test do not show any causal relationship between imports and GDP per capita for India and Sri Lanka, but for Pakistan, causality is running from GDP per capita to imports (Table 8). The study could not reject the null hypothesis of no causality for imports and GDP per capita for India and Sri Lanka. For Pakistan, the study rejects the null hypothesis (H03) of no causality, particularly from GDP per capita to imports.

Policy Implications

South Asian economies have tried to reap the benefits of export led strategy. However, these economies have not experienced a similar success as attained by the East Asian economies. Therefore, the study suggests that :

- ✍ There is a need to redesign development policies so as to attain rapid export growth.
- ✍ Countries promoting exports should also open their market to imports and maintain competitive pressure for domestic producers. They should also try to reap the gains from research & development (R&D) of foreign countries embodied in imported machinery and equipment (Palley, 2002).
- ✍ India, Pakistan, Bangladesh, and Sri Lanka are highly populated countries of South Asia. India is the second most populous country in the world. These countries should take advantage of their abundant and cheap labour in promoting manufacturing as well services sectors to increase exports and capacity to import (Felipe, 2012).

Conclusion

In the literature during the last three decades, there has been a greater focus on the critical role of trade as a vehicle to accelerate economic growth. Most economists have argued that export-led growth is an effective strategy of achieving faster growth. Also, there is scope for reverse causality, that is, GDP growth leads to exports growth. Some economists also highlight the role of imports. These issues are still debatable because empirical evidences are contradictory.

This study adopts modern time series techniques to examine the relationship between trade and economic growth. The study used time series data at the 2005 constant U.S. dollar prices which covers the period from 1980 to 2012. The study aimed to compare select South Asian countries namely Bangladesh, India, Pakistan, and Sri Lanka and analyzed the trade-led growth hypothesis in these countries. The results support the export-led growth hypothesis to be valid for Bangladesh and Sri Lanka only in the long run. For India, the study finds evidence of export-led growth hypothesis, particularly for the short run. No short run and long run relationship was found for Pakistan. The VECM results for imports and GDP per capita show that imports are significantly causing GDP per capita only in Bangladesh, but no long run causal relationship was found for GDP per capita to imports. The results of the Granger causality test do not show any causal relationship between imports and GDP per capita except for Pakistan, in case of which there is unidirectional causality running from GDP per capita to imports. The present study supports the findings of Almamun and Nath (2005) for Bangladesh, and Afzal and Hussain (2010) for Pakistan. The study contradicts the findings of Akmal, Ahmad, and Ali (2009) for Pakistan. This study lends support to the short run results of Dhawal and Biswal (1999) and Ray (2011) for India and Tahir, Khan, Israr, and Qahar (2015) for Sri Lanka; however, it contradicts their long run results.

Limitations of the Study and the Way Forward

The limitations associated with the study include lack of sectoral as well as forecasting analysis. Unavailability of appropriate sectoral data for select South Asian countries constrained further research. Inter country analysis tends to be more aggregative. For greater insights, country specific analysis can throw more light on the subject.

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