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# Trade Openness and Its Effects on Economic Growth in Selected South Asian Countries: A Panel Data Study

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***Abstract*—**The study investigates the causal link between trade openness and economic growth for four South Asian countries for period 1972-1985 and 1986-2007 to examine the scenario before and after the implementation of SAARC. Panel cointegration and FMOLS techniques are employed for short run and long run estimates. In 1972-85 short run unidirectional causality from GDP to openness is found whereas, in 1986-2007 there exists bi-directional causality between GDP and openness. The long run elasticity magnitude between GDP and openness contains negative sign in 1972-85 which shows that there exists long run negative relationship. While in time period 1986-2007 the elasticity magnitude has positive sign that indicates positive causation between GDP and openness. So it can be concluded that after the implementation of SAARC overall situation of selected countries got better. Also long run coefficient of error term suggests that short term equilibrium adjustments are driven by adjustment back to long run equilibrium.

***Keywords*—**Causality, Economic Growth, Panel Co-integration, SAARC, Trade Openness.

## I. Introduction

INTERNATIONAL trade plays an important role in the development of any economy and assumed to be an engine of growth [1]. Trade is taking place not only in terms of commodities but also in terms of technology, flows of ideas and knowledge spillover.

International trade affects economy through different channels. It creates employment, generate capital formation that leads to better living standards in terms of higher level of GDP and GDP per capita. Over the past few years, the world trading system is becoming progressively open and competitive. Tariffs are reducing in both developed and developing countries and restrictions are eliminating. Economies are trying to adopt outward-looking economic policies, also looking for the ways to promote growth and employment through expanding export production and attracting inward investment.

The concept of trade openness and free trade is highly debated topic in economics. It is always assumed to be a very important source of economic growth. Trade openness can promote growth through several ways. It creates massive benefits, increase investments as a result of enlarged markets and economies of scale, flow of information, technology and knowledge spillovers. As, it creates efficient utilization of resources, improved technological efficiency and trade facilitation that returns in higher foreign exchange which is used to expand the less developed sectors of the economy. It is also supported by many economists in different studies. Some studies concluded that openness played effective role mostly in developed countries [2] whereas many studies concluded that openness can play significant role in less developed countries as well [3][4][5].

South Asia is economically one of the less developed regions of the world which accommodates more than 20 per cent of the world's population that is 1,542.95 million with the average GDP per capita of US $1,565[6]. The South Asian economies mostly followed protectionist trade policies during their initial phases of development. The prime principles behind the restrictive trade regimes were protection of the domestic industries from foreign competition and conservation of foreign exchange for balance of payments support [7]. Also, South Asia is assumed to be less integrated region of the world in terms of the trade of commodities, capital and ideas [8] whereas, Intraregional trade is very low for South Asia *i.e.* intraregional trade is less than 2 percent of GDP, compared to more than 20 percent for East Asia [8].

## II. Literatutre Review

The relationship between openness and economic growth has been extensively examined in the theoretical and empirical literature.

Dollar [9] used real exchange rate distortions to test that the law of one price holds in the long run. The study found a significant negative correlation between real exchange rate distortions and growth, which shows a positive trade-growth link. Harrison [10] investigated the association between openness and economic growth. The study concluded that the correlation between these two variables was strong. Frankel and Romer [11] examined the relationship between trade and growth and also considered geographic characteristics as an important ingredient in trade. The study concluded that trade has a large but moderately positive and significant impact on income of the country. Rodriguez and Rodrik [12] applied the

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Dollar [9] procedure to an updated version of the same data and found that the same regressions now yielded the opposite signed result. Ekanayake, Vogal and Veeramacheneni [3] checked the causal relationship between output level, inward FDI and exports for a cross-section of both developed and developing countries for period 1960-2001. The study concluded that there was bi-directional causality between export growth and economic growth. Dollar and Kraay [13] investigated the effects of trade on growth and poverty for 137 countries. The study concluded that at individual level and at cross country level the open regimes lead to faster growth and poverty reduction in poor countries. Din [14] examined the export-led growth hypothesis for the five largest economies of the South Asian region and found that long-run causality only existed in Pakistan and Bangladesh while all other countries had short run causality. Hassan and Kamrul [4] investigated the casual relationship between trade openness and economic growth and the structure of international trade for Bangladesh. The study explored that there was long-run uni-directional equilibrium relationship between trade openness and economic growth.

Sarkar [15] investigated the relationship between openness and growth. Study found no positive long-term relationship between openness and growth in majority of LDC's. Klasra [5] examined the long-run relationship between Foreign Direct Investment (FDI), trade openness and economic growth for Pakistan ad Turkey and found that there was bi-directional causality between openness and growth in Pakistan whereas for Turkey there existed bi-directional relationship between FDI and exports

## III. Data and Variables

The analysis is based on annual data for four South Asian countries (N=1…….,4) that are Bangladesh (BNG), India (IND), Pakistan (PAK) and Srilanka (SLK) for the sample period 1972 to 2007 (T=1…….36). The data is divided into two time spans that are from 1972 to 1985 and 1986 to 2007 to analyze the situation before and after the implementation of SAARC.

The study used Gross domestic product (Current US $) as dependent variable whereas, the independent variables are the labor force, Gross fixed capital formation (Current US $), and openness. The variable openness is proxied by the ratio of imports plus exports to GDP. The data is taken from the World Development Indicators [6].

## IV. Model Specification

The following neoclassical production function is used to find out the effect of trade openness on economic growth

$$lnY= f\{ln\ (OP,\ K,\ L)\} \quad (1)$$

The double Ln model is used to represent the growth model, to explain all the variables in growth terms.

The panel version of equation (1) can be written as follows:

$$lnY_{i,t}= \alpha_{0,i}+ \beta_{1i} ln\ Op_{i,t}+ \beta_{2i} lnK_{i,t}+ \beta_{3i} lnL_{i,t}+\varepsilon_{i,t} \quad (2)$$

where i=1…..4 denote the countries, t=1972,…1985 and 1986…..2007 denotes time period. $\varepsilon_{it}$ is the error term with the usual statistical properties while $\alpha$ and $\beta$ are coefficients.

The use of panel data has advantage that it can exploit both the time series and cross sectional dimensions of data and provide more efficient estimations of parameters by considering wider sources of variation.

## V. Methodology

To estimate equation (2), panel Cointegration technique is used. The cointegration of panel data consists of four steps.

### *A.Panel Unit Root Tests*

The study uses unit root test to check the stationarity of the time series by using three different statistics proposed by Im, Pesaran, and Shin [16] , Maddala and Wu [17], and Levin, Lin, and Chu [18] panel unit root and stationary tests.

### *B.Cointegration Tests*

After checking the stationarity of data and confirming that each series is integrated of the same order, the next step is to check whether these series can be combined together into a single series, which itself must be non-stationary, that is known as cointegration. Cointegrated series move in the same direction in long run and are in equilibrium relationship. So, the cointegration between openness and economic growth will explain that how these variables are related in the long run. For this heterogeneous panel cointegration test developed by Pedroni [19] and Kao [20] are employed**.**

### *C.Panel Fully Modified OLS estimates*

When long run relationship among the variables is found then for the estimation of long run effects of openness on economic growth panel FMOLS is used, proposed by Pedroni [21].

### *D.Granger Causality Test*

Finally, if the variables are cointegrated and long run relationship exists, next step is to apply the Granger causality test. For this purpose a panel-based error correction model (ECM) is used to explain the long-run relationship by using the Engle and Granger [22] procedures. The Engle-Granger [22] consists of two steps. First, the estimation of the long-run model for Equation (2) in order to obtain the estimated residuals $\varepsilon_{it.}$ Second is to estimate the Granger causality model with a dynamic error correction:

$$\Delta lnY_{it} = \theta_{1j} + \lambda_{1i}\varepsilon_{it-1} + \sum_k \theta_{11\ ik}\Delta lnY_{it-k} + \sum_k \theta_{12\ ik}\Delta lnOP_{it-k} + \sum_k \theta_{13\ ik}\Delta lnK_{it-k} + \sum_k \theta_{14\ ik}\Delta lnL_{it-k} + \mu_{it} \quad (3)$$

$$\Delta lnOP_{it} = \theta_{2j} + \lambda_{2i}\varepsilon_{it-1} + \sum_k \theta_{21\ ik}\Delta lnY_{it-k} + \sum_k \theta_{22\ ik}\Delta lnOP_{it-k} + \sum_k \theta_{23\ ik}\Delta lnK_{it-k} + \sum_k \theta_{24\ ik}\Delta lnL_{it-k} + \mu_{it} \quad (4)$$

$$\Delta lnK_{it} = \theta_{3j} + \lambda_{3i}\varepsilon_{it-1} + \sum_k \theta_{31\ ik}\Delta lnY_{it-k} + \sum_k \theta_{32\ ik}\Delta lnOP_{it-k} + \sum_k \theta_{33\ ik}\Delta lnK_{it-k} + \sum_k \theta_{34\ ik}\Delta lnL_{it-k} + \mu_{it} \quad (5)$$

$$\Delta lnL_{it} = \theta_{4j} + \lambda_{4i}\varepsilon_{it-1} + \sum_k \theta_{41\,ik}\Delta lnY_{it-k} + \sum_k \theta_{32\,ik}\Delta lnOP_{it-k} + \sum_k \theta_{33\,ik}\Delta lnK_{it-k} + \sum_k \theta_{44\,ik}\Delta lnL_{it-k} + \mu_{it} \quad (6)$$

The sources of causation between Y and OP are recognized by testing for the significance of the coefficients of the dependent variables in Eqs. (3) and (4). For short-run causality, study test $H_0$: $\theta_{12i,k} = 0$ for all i and k in Eq. (3) or $H_0$: $\theta_{21i,k} = 0$ for all i and k in Eq. (4). While, the long-run causality is tested by looking at the significance of the $\lambda$ , which is the coefficient of the error correction term, $\varepsilon_{i,t-1}$. The significance of $\lambda$ indicates the long-run relationship of the cointegrated process, and so movements along this path can be considered permanent. For long-run causality, test $H_0$: $\lambda_{1i} = 0$ for all i in Eq. (3) or $H_0$: $\lambda_{2i} = 0$ for all i in Eq. (4) is used. Similarly, sources of causation between Y and other variables (capital and labour) are identified in equation (5) and (6).

## VI. EMPIRICAL RESULTS

### *A.Panel Unit Root Results*

Panel unit root test results are reported in table I-a and I-b for 1972-85 and 1986-07 respectively. All tests results do not reject the null hypothesis of non-stationary at level with both individual effect and individual linear trend effect for both time periods.

TABLE I-A
PANEL UNIT ROOT TESTS RESULTS 1972-85

| | LLC | | IPS | | MW(ADF) | | Conclusion |
|---|---|---|---|---|---|---|---|
| | Intercept | Intercept and Trend | Intercept | Intercept and Trend | Intercept | Intercept and Trend | |
| Ln Y | -1.76 (0.23) | -1.54 ( 0.46) | 0.20 (0.57) | -0.70 (0.22) | 5.99 (0.67) | 9.89 (0.27) | -- |
| Ln OP | -3.66 (0.60) | -1.33 (0.39) | -2.34 (0.70) | -0.39 (0.65) | 18.31 (0.51) | 7.68 (0.46) | -- |
| Ln K | -1.28 (0.29) | 0.51 (0.69) | 1.19 (0.88) | 1.12 (0.87) | 2.53 (0.96) | 3.26 (0.91) | -- |
| Ln L | 0.21 (0.58) | -2.81 (0.30) | 1.03 (0.85) | -0.46 (0.32) | 7.07 (0.52) | 11.71 (0.16) | -- |
| ΔLn Y | -7.75 (0.00) | -11.52 (0.00) | -6.26 (0.00) | -6.02 (0.00) | 43.64 (0.00) | 35.08 (0.00) | I(1) |
| ΔLn OP | -3.29 (0.00) | -7.12 (0.00) | -2.08 (0.00) | -3.37 (0.00) | 16.91 (0.00) | 24.88 (0.00) | I(1) |
| ΔLn K | -5.33 (0.00) | -0.86 (0.00) | -3.69 (0.00) | -1.54 (0.00) | 26.84 (0.00) | 13.94 ( 0.00) | I(1) |
| ΔLn L | 0.33 (0.00) | -1.80 (0.00) | 1.18 (0.00) | 0.19 (0.00) | 5.32 (0.00) | 5.70 (0.00) | I(1) |

**Notes:** LLC, IPS, MW and indicated the Levin *et al.* (2002), Im *et al.* (2003) and Maddala and Wu (1999) panel unit root and stationary tests. All tests examine the null hypothesis of non-stationary (unit root). The four variables were grouped into one panel with sample N= 4, T=14. The parenthesized values are the probability of rejection. Probabilities for the MW (ADF Fisher Chi-square) and PP (Fisher chi-square) tests are computed using an asymptotic $\chi 2$ distribution, while the other tests follow the asymptotic normal distribution.

However, all tests reject the null hypothesis of non-stationarity at first difference. This shows that all the variables Y, OP, K and L are integrated of order one, an I (1) process. So, as pooled data is stationary in first difference hence, the series can be cointegrated.

TABLE I-B
PANEL UNIT ROOT TESTS RESULTS 1986-2007

| | LLC | | IPS | | MW(ADF) | | Conclusion |
|---|---|---|---|---|---|---|---|
| | Intercept | Intercept and Trend | Intercept | Intercept and Trend | Intercept | Intercept and Trend | |
| Ln Y | 1.01 (0.84) | 0.60 (0.72) | 2.34 (0.99) | 2.93 (0.99) | 0.02 (0.98) | 0.006 (0.99) | -- |
| Ln OP | -2.62 (0.12) | -2.93 (0.16) | -1.41 (0.07) | -0.72 (0.23) | 5.26 (0.07) | 2.98 (0.22) | -- |
| Ln K | 1.48 (0.93) | 1.61 (0.94) | 2.57 (0.99) | 3.61 (0.99) | 0.01 (0.99) | 0.001 (0.99) | -- |
| Ln L | -0.78 (0.21) | -1.11 (0.13) | 0.99 (0.84) | 1.60 (0.94) | 0.33 (0.84) | 0.09 (0.95) | -- |
| ΔLn Y | -4.83 (0.00) | -5.91 (0.00) | -4.91 (0.00) | -5.24 (0.00) | 24.35 (0.00) | 23.99 (0.00) | I(1) |
| ΔLn OP | -9.39 (0.00) | -10.60 (0.00) | -8.64 (0.00) | -8.63 (0.00) | 31.26 (0.00) | 34.19 (0.00) | I(1) |
| ΔLn K | -6.10 (0.00) | -7.33 (0.00) | -4.86 (0.00) | -5.10 (0.00) | 24.07 (0.00) | 23.24 (0.00) | I(1) |
| ΔLn L | - 11.49 (0.00) | -6.48 (0.00) | -9.56 (0.00) | -5.34 (0.00) | 25.66 (0.00) | 24.57 (0.00) | I(1) |

**Notes:** LLC, IPS, MW and indicated the Levin *et al.* (2002), Im *et al.* (2003) and Maddala and Wu (1999) panel unit root and stationary tests. All tests examine the null hypothesis of non-stationary (unit root). The four variables were grouped into one panel with sample N= 4, T=22. The parenthesized values are the probability of rejection. Probabilities for the MW (ADF Fisher Chi-square) and PP (Fisher chi-square) tests are computed using an asymptotic $\chi 2$ distribution, while the other tests follow the asymptotic normal distribution.

### *B.Cointegration*

Table II-a and II-b present the results of Pedroni Cointegration for 1972-85 and 1986-2007 respectively. Pedroni provides seven statistics for tests of the null hypothesis of no cointegration in heterogeneous panels. With this technique two models are developed (1) with no deterministic trend and (2) with deterministic intercept and trend. Results show that null hypothesis of no-cointegration is rejected for seven statistics for both models at 10 percent level showing evidence of cointegration for the group as a whole and individual countries of the panel for both time spans.

TABLE II-A
HETEROGENEOUS PANEL COINTEGRATION RESULTS 1972-85

| Test Statistics | No Deterministic Trend | | Deterministic Intercept and Trend | |
|---|---|---|---|---|
| Panel Cointegration Statistics ( Within-Dimension ) | | | | |
| | | Weighted | | Weighted |
| Panel v-statistics | -0.141 ( 0.095) | -0.326 (0.078) | 0.810 (0.107) | -0.636 (0.125) |
| Panel pp type ρ-statistics | 0.782 (0.093) | 0.388 (0.169) | 1.432 (0.143) | 1.257 (0.101) |
| Panel pp type t-statistics | -0.408 (0.107) | -1.804 (0.078) | -3.034 (0.001) | -1.799 (0.079) |
| Panel ADF type t-statistics | -1.314 (0.068) | -2.263 (0.078) | -1.409 (0.147) | -3.124 (0.003) |
| Group Mean Panel Cointegration Statistics (Between-Dimension) | | | | |
| Group pp type ρ-statistics | 1.344 (0.141) | | 2.251 (0.031) | |
| Group pp type t-statistics | -1.559 (0.118) | | -2.089 (0.044) | |
| Group ADF type t-statistics | -4.375 (0.000) | | -4.463 (0.000) | |

**Note:** This table reports Pedroni (2004) residual cointegration tests. The number of lag truncations used in the calculation of statistics is fixed at 1. The null hypothesis is no cointegration. Probability values are in parenthesis.

TABLE II-B
HETEROGENEOUS PANEL COINTEGRATION RESULTS 1986-2007

| Test Statistics | No Deterministic Trend | | Deterministic Intercept and Trend | |
|---|---|---|---|---|
| Panel Cointegration Statistics ( Within-Dimension ) | | | | |
| | | Weighted | | Weighted |
| Panel v-statistics | 1.144 (0.007) | 0.973 (0.048) | 3.123 (0.003) | 1.231 (0.106) |
| Panel pp type ρ-statistics | 0.112 (0.096) | 0.055 (0.098) | 1.194 (0.105) | 0.693 (0.113) |
| Panel pp type t-statistics | -0.753 (0.100) | -1.009 (0.139) | -1.010 (0.239) | -1.397 (0.150) |
| Panel ADF type t-statistics | -2.380 (0.023) | -1.297 (0.102) | -2.211 (0.034) | -0.035 (0.098) |
| Group Mean Panel Cointegration Statistics (Between-Dimension) | | | | |
| Group pp type ρ-statistics | 0.954 (0.053) | | 1.550 (0.119) | |
| Group pp type t-statistics | -0.630 (0.121) | | -1.258 (0.100) | |
| Group ADF type t-statistics | -1.005 (0.140) | | -1.522 (0.105) | |

**Note:** This table reports Pedroni (2004) residual cointegration tests. The number of lag truncations used in the calculation of statistics is fixed at 1. The null hypothesis is no cointegration. Probability values are in parenthesis.

Kao [21] residual cointegration test results for before and after the implementation of SAARC are reported in table III. The results show that null hypothesis of no cointegration is strongly rejected at one percent level of significance. So there exists a long-run relationship among Y, OP, K, and L for the panel of selected South Asian countries.

TABLE III
KAO RESIDUAL COINTEGRATION TEST RESULT

| Model Specification : No Deterministic Trend | | |
|---|---|---|
| Time Periods | 1972-85 | 1986-2007 |
| ADF t-statistics | -3.5196 (0.0002) | -3.7458 (0.0002) |

**Notes:** This table reports Kao (1999) residual cointegration test. The number of lag truncations used in the calculation of statistics is fixed at 1. The null hypothesis is no cointegration. Probability values are in parenthesis and computed using asymptotic Chi-square distribution.

*C. FMOLS Estimates*

Tables IV-a and IV-b exhibit the results of the long-run elasticities for each country and a panel of these countries based on Pedroni's group mean FMOLS estimator for 1972-85 and 1986-2007 respectively. The results of regression equation in which Y was taken as the dependent variable show that the variables OP, K, and L, are statistically.

At country level, trade liberalization played negative role that is coefficient of OP is negative for three out of four countries in the time period of 1972-85. Openness played a positive role only for Pakistan before the implementation of SAARC and is statistically significant. One major reason for positive impact of OP on GDP for Pakistan is the green revolution. That took place in the late 1960's and led to the growth of agriculture products to double approximately. Whereas, due to the separation between East Pakistan (Bangladesh) from West Pakistan (Pakistan) badly affected the Bangladesh's economy as it was left with very few industries and was mainly an importer country.

TABLE IV-A
FULLY MODIFIED OLS ESTIMATES RESULTS 1972-85

| | Independent Variables | | | |
|---|---|---|---|---|
| Countries | Intercept | Δ Ln OP | Δ Ln K | Δ Ln L |
| BNG | -28.812 (-2.17)*** | -1.019 (-5.512)* | 0.086 (0.755) | 2.779 (3.176)* |
| IND | 39.668 (5.449)* | -0.256 (-5.274)* | 1.224 (13.056)* | -2.248 (-4.597)* |
| PAK | -10.058 (-3.284)* | 0.434 (4.177)* | 0.587 (16.265)* | 1.243 (5.718)* |
| SLK | -0.908 (-0.808) | -0.620 (-3.528)* | 0.336 (2.394)** | 1.023 (1.163) |
| Panel Group | 5.518 (5.847)* | -0.129 (-0.617)* | 0.499 (6.319)* | 0.407 (-0.752)* |

**Notes:** The number of lag truncations used in calculation is 2. The values in parentheses denote the t-statistics following a standard normal distribution. Asterisk * , ** and *** indicate statistical significance at 1% , 5% and 10% levels, respectively.

While, the results are mixed for L and K for all four countries. The sign of the coefficients of L is positive for three out of four countries except India before the implementation of SAARC but for Sri lanka L played positive but insignificant role.

After the implementation of SAARC openness played positive and statistically significant role for all the four countries whereas, L played positive and statistically significant role for three out of the four countries. L responded negative only for Bangladesh.

TABLE IV-B
FULLY MODIFIED OLS ESTIMATES RESULTS 1986-2007

| | Independent Variables | | | |
|---|---|---|---|---|
| Countries | Intercept | Δ Ln OP | Δ Ln K | Δ Ln L |
| BNG | 10.274 (2.326)** | 0.148 (1.422)*** | 0.839 (6.650)* | -0.290 (-0.860) |
| IND | -20.477 (-8.577)* | 0.356 (-7.251)* | 0.834 (35.754)* | 1.291 (13.282)* |
| PAK | -5.591 (-2.853)* | 0.192 (-1.237)** | 0.716 (12.379)* | 0.776 (4.596)* |
| LKA | -12.1929 (5.200)* | 0.430 (-4.289)* | 0.700 (15.824)* | 1.265 (6.350)* |
| Panel Group | 3.450 (8.077)* | 0.034 (-2.488)* | 0.914 (12.393)* | 0.120 (-0.125)* |

**Notes:** The number of lag truncations used in calculation is 2. The values in parentheses denote the t-statistics following a standard normal distribution. Asterisk * , ** and *** indicate statistical significance at 1% , 5% and 10% levels, respectively.

From the panel results of estimated regression the coefficients can be interpreted as long-run elasticities for group of countries. The results suggest that 1 percent increase in openness leads to approximately 0.13 percent decrease in GDP for time period 1972-85, whereas after the implementation of SAARC in the period of 1986-2007 the overall situation got better as a 1 percent increase in openness leads to 0.03 percent increase in GDP. While, the role of

capital also got better after SAARC that is a 1 percent change in capital leads to 0.91 percent instead of 0.50 percent in 1972-85. But the role of labor decreased from 0.40 to 0.12 that is because of the reason that technological advancements took place of labour. So it can be clearly concluded that overall situation of the panel of four countries got better.

*D.Granger Causality Test Results*

Table V-a and V-b presents the short-run and long-run panel Granger causality results from estimating panel based error correction model set out in Eqs. (3), (4), (5) and (6). The optimal lag length is obtained (2) by using SIC[****]

TABLE V-A
PANEL GRANGER CAUSALITY RESULTS

| | Source of Causation (Independent Variables) | | | | |
|---|---|---|---|---|---|
| | Short- run | | | | |
| | ΔIn Y | ΔLn OP | ΔIn K | ΔLn L | ECM $_{t-1}$ |
| Dependent Variable | $X^2$-statistics (p-value) | | | | Coefficient (t-ratio) |
| ΔLn Y | -- | 5.715 (0.457) | 0.815 (0.665) | 3.764 (0.152) | -0.357 (-3.467)* |
| ΔLn OP | 4.867 (0.087)** | -- | 5.737 (0.056)** | 1.184 (0.911) | 0.201 (2.104)* |
| ΔLn K | 2.601 (0.272) | 2.348 (0.309)* | -- | 1.682 (0.431) | -0.301 (-2.137)* |
| ΔLn L | 0.440 (0.802) | 0.388 (0.823)* | 2.991 (0.224)* | -- | -0.0003 (-0.402) |

**Notes:** Wald Chi-square tests reported with respect to short-run changes while error term coefficient as long-run changes. Parentheses values are the probability of rejection of Granger non-causality. Asterisks * and ** indicate statistically significant at 1 % and 5% level respectively.

The results find that there exists significant unilateral causal relationship between Y and OP in the short-run before SAARC *i.e.* in 1972-85 running from Y to OP. This shows that Y caused OP through error correction term. Also, there exists bi-directional causality between OP and K, and uni-directional causality between OP and L and between K and L running from OP to L and from K to L. For GDP equation, the estimated coefficient on the error correction term is negative and statistically significant. It shows that short-term adjustments to equilibrium are driven by adjustment back to long-run equilibrium through error correction term.

TABLE V-B
PANEL GRANGER CAUSALITY RESULTS

| | Source of Causation (Independent Variables) | | | | |
|---|---|---|---|---|---|
| | Short- run | | | | |
| | ΔIn Y | ΔLn OP | ΔIn K | ΔLn L | ECM $_{t-1}$ |
| Dependent Variable | $X^2$-statistics (p-value) | | | | Coefficient (t-ratio) |
| ΔLn Y | -- | 3.312 (0.090)*** | 0.2110 (0.109)*** | 1.312 (0.118)*** | -0.102 (2.674)* |
| ΔLn OP | 2.027 (0.042)** | -- | 3.855 (0.145)*** | 11.264 (0.003)* | -0.160 (-4.355)* |
| ΔLn K | 2.463 (0.091)*** | 1.621 (0.444) | -- | 4.359 (0.113)*** | 0.070 (1.172) |
| ΔLn L | 6.390 (0.041)** | 2.557 (0.278) | 2.046 (0.359) | -- | -0.011 (-0.724) |

**** Schwarz Information Criterion

**Notes:** Wald Chi-square tests reported with respect to short-run changes while error term coefficient as long-run changes. Parentheses values are the probability of rejection of Granger non-causality. Asterisks * and ** indicate statistically significant at 1 % and 5% level respectively.

The results for time period after the implementation of SARRC find that there exists significant bilateral causal relationship between Y and OP, between Y and K and also between Y and L in the short run. This shows that both of the variables in each set caused each other through error correction term. While, there exists uni-directional causality between OP and K, OP and L, L and K running from K to OP and from L to OP and from L to K.

For GDP equation and for OP equation, the estimated coefficient on the error correction term is negative and statistically significant. It shows that short-term adjustments to equilibrium are driven by adjustment back to long-run equilibrium through error correction term. It specifies long-run feedback between Y and OP.

## VII. SUMMARY AND POLICY IMPLICATIONS

The goal of this study is to determine the direction of causal relationship between openness and economic growth in four South Asian countries for two time spans that is from 1972-85 and from 1986-2007 to examine the scenario of economic growth before and after the implementation of SARRC.

The panel cointegration technique and panel based error correction models (ECM) are used to find out the causation results. Also, fully modified ordinary least squares (FMOLS) technique is used to find the long-run responsiveness relationship.

The results of the study have important policy implications. There exists short run unidirectional causality running from Y to OP but not vice versa in the time period of 1972-85. While, negative relation exists between the two in the long-run whereas, in 1986-2007 there exists short-run bi-directional causation between Y and OP. The FMOLS results explored positive sign which show that there exists a long-run positive causation between these two variables. The magnitude of long run elasticity is not very high after the implementation of SAARC but the good point is that it shows positive responsiveness in GDP due to Openness. The results show that a one percent increase in OP will lead to 0.03 percent increase in GDP.

To increase this long run responsiveness magnitude the South Asian countries should introduce export oriented policies to enhance more and more exports that will help in the earnings of foreign exchange and will lead to the economic growth rapidly. Also these countries should try to switch from the exports of raw material and semi manufactured goods to final product. It is essentially needed to change the export and import patterns in the region. Furthermore there is need of technological advancement, production of capital intensive commodities instead of more labor intensive commodities and also there must be proper vocational institutes to train and increase the number of skilled labor force which can

effectively contribute towards the trade sector as well as GDP of the region.

## REFERENCES

[1] W. A. Lewis, (1980). The slowing down of engine of growth. *American Economic Review*, 70: 555-564.

[2] Dowrick, S. and Golley, J. (2004). Trade openness and growth: Who benefits*? Oxford Review of Economic Policy,* 20(1): 38-56.

[3] Ekanayake, Vogal and Veeramacheneni (2003). Openness and economic growth: empirical evidence on the relationship between output, inward FDI, and trade. *Journal of Business Strategies*, 20.

[4] Hassan and Kamrul, A F, (2005). Trade openness and economic growth: Search for a Causal Relationship. *South Asian Journal of Management.* Retrieved on 25th December,2010 from http://findarticles.com/p/articles/mi_qa5483/is_200510/ai_n21363857/?tag=content;col1

[5] Klasra, M. Ahmad (2009). Foreign direct investment, trade openness and economic growth in Pakistan and Turkey: an investigation using bounds test. Retrieved on 25th December,2010 from http://www.springerlink.com/content/w11nA14p1526m0107/

[6] World Bank. (2008). *World Development Indicators* [CD Rom 2009]. World Bank, Washington, D.C.

[7] Kemal, A. R., Musleh Ud Din, Q. Usman, F. Lloyd and S. Sirimevan (2002). Exports and economic growth in South Asia, *A Study Prepared for the South Asia network of Economic Research Institutes*.

[8] Ahmed and Ghani (2007). South Asia growth and regional integration. *World Bank Publication.*

[9] Dollar, D. (1992). Outward-oriented developing economies really do grow more rapidly: Evidence from 95 LDCs, 1976-1985. *Economic Development and Cultural Change*. 40(3), 523-44.

[10] Harrison (1996).Openness and growth:A time series cross country analysis for developing countries. *National Bureau of Economic Research*. Working paper no.5221.

[11] Frankel, J. and Romer, D. (1999). Does trade cause growth? *The American Economic Review*, 89(3).

[12] Rodriguez, F. and Rodrik, D. (2001). Trade policy and economic growth: A Asceptic's guide to the cross-national evidence. In Macroeconomics annual 2000, ed. *Ben Bernanke and Kenneth S. Rogoff. Cambridge: MIT Press.*

[13] David, D. and Kraay, A. (2002). Trade, growth and Poverty. *Development Research Group, The World Bank.*

[14] Din, Musleh-ud (2004). Exports, imports, and economic growth in South Asia: Evidence using a multivariate time-series framework. *The Pakistan Development Review.*43(2),105-124.

[15] Sarkar P. (2007). Trade openness and growth: Is there any link*? MPRA Paper* No. 4997, 04:22.

[16] Im, K. S., Pesaran, M. H., and Shin, Y. (2003). Testing for unit roots in heterogeneous panels. *Journal of Econometrics*, 115, 53–74

[17] Maddala, G.S., and Wu. S. (1999). A comparative study of unit root tests with panel data and a new simple test. *Oxford Bulletin of Economics and Statistics,* 61, 631–652.

[18] Levin, A., Lin, C.F., and Chu, C.S. (2002). Unit root tests in panel data: asymptotic and finite-sample properties. *Journal of Econometrics,* 108, 1– 24.

[19] Pedroni, P. (2004). Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to PPP hypothesis: new results. *Econometric Theory*, 20(3), 597-627.

[20] Kao, C. (1999). Spurious regression and residual–based tests for cointegration in panel data. *Journal of Econometrics,* 90 (1), 1–44.

[21] Pedroni, P. (2000). Fully modified OLS for heterogeneous cointegrated panels, nonstationary panels, panel cointegration and dynamic panels. *Advances in Econometrics* , 15, 93-130.

[22] Engle, R.F., and Granger, C.W.J. (1987). Cointegration and error correction: representation, estimation, and testing. *Econometrica,* 55, 251–276.