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Export-Growth Linkages In Selected Asian Developing Countries: Evidence From Panel Data Analysis

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Abstract

This study examines the export-growth linkages for selected Asian developing countries for the period of 1975-2008. To test the causal relationship between exports and growth, this study employs panel unit root tests (IPS, LLC and Hadri), Larsson et al. (2001) likelihood-based panel co-integration technique, FMOLS by Pedroni (2001) and Hurlin and Venet (2001) panel causality test. The result of panel co-integration rank test confirms the existence of unique co integration relation between economic growth and exports in selected Asian developing countries. The estimated results of FMOLS shows that during a long period of time to export more, higher growth is required. The results based on panel homogenous causality hypothesis shows the significant effect of economic growth on export in selected panel. While the results on panel non-homogenous causality hypothesis show the existence of bi-directional causality between economic growth and exports. However, the empirical results on heterogeneous causality hypothesis show that the causality is found running from economic growth to exports in case of Pakistan, Sri Lanka and Indonesia and from exports to economic growth in Malaysia and Thailand. Bidirectional causality also exists in case of India, Sri Lanka and Indonesia while neutral hypothesis is found in case of Bangladesh.

Introduction

Export-led growth (ELG) hypothesis states that promotion of export sector is the best way to achieve sustainable growth and economic development. Theoretically, wide ranges of explanations are available to explain this hypothesis. Firstly, it is observed that export sector can expand the scale of domestic output which may result in higher productivity, batter employment opportunities and more consumption spending in an economy (Jung and Marshall, 1985). Secondly, an efficient export sector can expand the size of local market and in turn firms achieve economies of scale and reduction in cost per unit of output. Thirdly, it is argued that export sector allows a country to export those commodities in which it has comparative advantage (Tyler, 1981). Fourthly, ELG strategy may also help a country to fill their export-import gap by providing sufficient amount of foreign exchange reserves (Wilbur and Hague, 1992). Lastly, countries that followed outward-looking development strategies can easily overcome the unfavorable external circumstances as compared to those countries that followed outward-looking development strategies (Balassa, 1984).

Due to these benefits of export expansion, Asian developing countries such as Malaysia, Thailand, Indonesia and Philippines adopted the ELG strategy since 1980s. ELG strategies positively impact the economic growth of these countries and as a result, entered in the group of fast growing economies. Initially, other Asian developing countries such as India, Pakistan and Bangladesh are reluctant to adopt export expansion strategies. Recently, however these countries have been trying to follow liberal trade policies to get the benefits of trade openness.

ELG also accepts that there is also a possibility to exist causality from economic growth to export. This is called growth-led-export (GLE) hypothesis and the rationale behind the acceptance of this hypothesis is that economic growth has a positive impact on productivity growth and the quality of output on the one hand but also result in reduction in cost of factors of production on the other hand (Krugman 1984). All these have a positive impact on export.

Empirically, the positive association between exports and economic growth are necessary condition for the acceptance of ELG hypothesis. Numerous empirical studies (Darrat 1987, Thorton 1996, Ekanayake 1999, Panas and Vamvoukas 2002, Abual-Foul 2004) strongly supported the ELG hypothesis. Unfortunately, these studies have been criticized on two major grounds. First, most of the earlier studies have used time-series data analysis techniques (e.g. Xu 1996, Ekanayake 1999, Ramos 2001, Herzer, Nowak-Lehmann and Siliverstoves 2006, Chen 2007, Maneschiold 2008) to examine the export-growth linkages. These studies did not describe causality model carefully as pointed out by Awokuse (2003) because (i) time-series techniques do not perform well especially when the sample size is too short (ii) Granger causality results considered to be inefficient if the selected variables are co integrated (Toda and Philips, 1993). Secondly, empirical results of previous studies are mixed (Ahmad and Kwan 1991, Rehman and Mustafa 1997) and most studies failed to provide appropriate empirical evidence regarding the validity of ELG hypothesis (Love and Chandra 2005).

The main objective of this paper is to test empirically the export-growth relationship in 8 selected Asian developing countries using panel data analysis. This study has three contributions to economic literature. Firstly, this study uses more comprehensive and powerful panel data approach to examine the export-growth linkages in selected Asian developing countries. Secondly, Larsson et al. (2001) co-integration approach and FMOLS by Pedroni (2001) have been employed to test the long-run relationship. Thirdly, instead of using panel Granger causality test, we have also used panel causality approach developed by Hurlin and Venet (2001) to test the direction of causal relationship between export and economic growth.

The rest of the paper is organized as follows: Section-2 explains review of previous studied; Section-3 presents econometric model and data source; Section-4 provides econometric methodology; Section-5 analyzes the results and their interpretation and final Section-6 provide conclusions and policy implications.

Review of Previous Studies

Empirical studies on this subject matter can be divided into three different categories. First category includes cross-sectional studies. These studies explained growth function in a bivariate framework by taking exports as an explanatory variable. Further, these studies used either bivariate correlation (the Spearman rank correlation test) or regression approach in cross-country format to test the effect of export on economic growth (Lussier, 1993). Findlay (1984) and Krueger (1985) was the first who conducted most comprehensive study on ELG hypothesis using rank correlation approach. The sample countries selected for the analysis were Hong Kong, Singapore, Korea and Taiwan. Researchers found a positive association between exports and economic growth in the sample countries. Furthermore, they concluded that economic growth of selected countries was highly depend upon export growth.

Ram (1985, 1987) conducted two different studies on ELG hypothesis using regression approach. Ram's studies were considered better as compared to correlation approach studies and showed some judgment of causality. Ram (1985) by regressing real output on capital, labor, and exports found that exports performance was important for the economic growth of both developed and developing economies of the globe. Ram (1987) study's objectives were to provide estimates of export-growth linkages in 88 less developed countries. Estimated results found the positive effect of exports on economic growth in more than 70% countries. On the basis of results, researchers concluded that export sector proved to be highly beneficial in economic growth of less developed countries. Limitations associated to these studies were that they assumed the same production function without considering the level of technology which may vary from country to country. By using same production function, these studies failed to provide any useful information regarding the technological differences between countries to policy makers.

Second category includes the time-series approach. This approach had been used in a number of studies that were planned to assess the validity of export-led growth hypothesis in individual country analysis. Ekanayake (1999) assessed ELG hypothesis using time-series approach but failed to provide any significance evidence to accept export-growth linkages in Asian developing countries. Medina-Smith (2001) study on Costa Rica also failed to provide any clear relationship between exports and economic growth. For instance, the studies of Bahmani-Oskooee and Alse (1993) strongly supported the evidence of export-led-growth hypothesis by using time series analysis. Love and Chandra (2005) investigated the validity of ELG hypothesis in South Asian countries by employing co-integration and error-correction approaches. Researchers used annual data set whose period was not unique but vary from country to country.

Empirical evidence supported mixed results and the researcher found no appropriate conclusion to support the export-growth relationship.

Chen (2007) examined the export-led growth (ELG) hypothesis and the growth driven export (GDE) hypothesis in Taiwan and found bidirectional causality between real GDP and real export by employing vector error correction model (VECM) which verified the importance of ELG hypothesis and GDE hypothesis for Taiwan. Omisakin (2009) examined the contribution of export sector in the growth performance of Nigeria, The result of bound testing approach to co-integration accept the hypothesis of co-integration while Toda-Yamamoto non-causality test revealed that bidirectional causality between output and export was found. The findings signify the importance of export for economic growth in Nigeria. Sami Ullah et al. (2009) re-investigated the export-led-growth (ELG) hypothesis in the case of Pakistan. The results of traditional Granger causality test showed the evidence of unidirectional causality running from economic growth to exports and imports while the results of Granger causality through vector error correction model (VECM) revealed bidirectional causality between exports and economic growth. Hye and Siddique (2011) investigated the relationship between exports, terms of trade and economic growth in the case of Pakistan. Empirical results of autoregressive distributed lag (ARDL) approach indicated that long-run relationship existed when real gross domestic product and real exports were dependent variables while rolling window regression confirmed the positive association between real exports and real GDP. Empirical findings thus, supported the export-led growth hypothesis in this particular case.

Third category includes the panel studies. Panel data can use the information more efficiently as compared to cross-sectional and time-series techniques. It gives "more variability, less co-linearity among variables, more degrees of freedom and more efficiency among variables" (Baltagi 2001). Only a limited studies such as Bahmani-Oskooee and Goswami (2005), Frederic (2007), Pazim (2009) and Symth and Sharma (2009) used the panel data technique to test the ELG hypothesis. Bahmani-Oskooee and Goswami (2005) examined the long-run association between exports and economic growth in 61 developing countries using panel data from 1960-1999. The researchers' findings indicated that when export was used as dependent variable in the regression analysis, positive association existed among all selected variables of the model. However, co integration disappeared when output used as dependent variable, revealed that in order to export more, developing countries must follow those policies that promote economic growth.

Frederic (2007) investigated the existence of a long-run relationship between GDP and exports for 15 Spanish Autonomous Communities. Researcher used panel data over the period 1988 to 2004. Panel co integration tests results did not support any significant long-run relationship between GDP and exports. Pazim (2009) examined the causality relations between size of GDP and export in the East Asian economies for the period 1985-2002 by using panel data analysis. The empirical findings did not support the "export-led hypothesis" in sample countries. Symth and Sharma (2009) examined the validity of the export-led growth (ELG) and import-led growth (ILG) hypotheses for a panel of Pacific Island countries (PICs) over the period 1982-2004. Empirical results revealed bidirectional Granger causality between exports and economic growth, imports and economic growth and exports and imports in the panel of PICs.

Econometric Model and Data Source

Since the relationship between exports and economic growth is not clear, this paper uses two different models to examine the causal relationship between exports and economic growth in panel data framework:

$$Y_{it} = \beta_{0i} + \beta_{1i} EXP_{it} + \mu_{it} \quad (1)$$

$$EXP_{it} = \gamma_{0i} + \gamma_{1i} Y_{it} + \nu_{it} \quad (2)$$

Where subscript i represents cross-sectional unit, subscript t indicate time period, Y is economic growth, EXP is export of goods and services and μ and v are error terms.

Both variables; GDP (gross domestic product) which is used as a proxy for economic growth and EXP (export of goods and services) are taken in constant prices of 2000 expressed in millions of $US. Furthermore, GDP and EXP have been transformed in natural logarithms. After transformation, variables are denoted as lnY and lnEXP.

The data source of both variables is "World Development Indicators" (CD-ROM, 2010) by World Bank. Asian developing countries selected for analysis are: Pakistan, India, Sri Lanka, Bangladesh, Malaysia, Indonesia, Thailand and Philippines. The time period of study is 1975-2008.

Econometric Methodology

Panel Unit Root Tests

Panel unit root tests have high power than the individual country unit root test. Numerous unit root tests based on panel data are available in econometric literature. However, we use LLC (Levin Lin and Chu, 2002), IPS (Im Pesaran and Shin, 2003) and Hadri (2000) unit root tests for the present analysis. All these tests are applied to a balanced panel. LLC and Hadri assume that the autoregressive coefficients remain constant for all panel members while IPS assume, these coefficients vary from country to country. Moreover, LLC and IPS are estimated on the basis of Augmented Dickey Fuller (ADF) principal while Hadri is based on Lagrange Multiplier (LM) principal. In order to conserve space and time, the study will not offer detailed explanation of unit root tests as they are well documented in the econometric literature.

The Likelihood-based Panel Co integration Test

To test whether exports and economic growth are co-integrated in a heterogeneous panel of eight Asian developing countries or not, the recently developed maximum likelihood-based co-integration test by Larsson et al. (2001) is applied. The LLL method is based on Johansen (1988, 1995) co-integration approach. The multivariate co integration trace test of Johansen (1988, 1995) is employed to investigate each individual cross-sectional unit independently in such a way allowing heterogeneity in each cross-sectional unit for the said panel.

The null hypothesis of panel co integration rank test which represents that all selected countries have same co-integrating rank R_i is as follows:

$H_n = rank(\eta_i + R_i < R$ for all i= 1,.....,N against

$H_n = rank(\eta_i) = \Phi$ for all i= 1,……,N

The LR test-statistic for group i is calculated as follows:

$$Z_{i,t} = \sum_{j=1}^{m} \rho^{(j)} + Z_{i,t-j} + \sum_{j=0}^{r} \gamma_i^{(j)} + Y_{i,t-j} + \varepsilon_{i,t}$$

$$\bar{\lambda}_{iT}[H(R)/H(\Phi)] = I/N \sum_{i=1}^{n} \lambda_{iT}[H(R)/H(\Phi)$$

Finally, the standardized panel co- integration trace test-statistic is given by:

$$T_{\bar{\lambda}}[H(R)/H(\Phi) = \frac{\sqrt{N}\left[\bar{\lambda}_{NT}\left[\frac{H(R)}{H(\Phi)}\right] - E(P_k)\right]}{\sqrt{VAR(P_k)}} \quad (3)$$

Where $\bar{\lambda}_{NT}$ is the average of individual LR statistic and $E(P_k)$ and $VAR(P_k)$ are the mean and variance of the asymptotic trace statistics reported by LLL (2001). The computed T_λ statistic, which will be used to determine the co integration rank of heterogeneous panel assumed to be normally distributed asymptotically, that is $T_\lambda \Rightarrow$ N(0,1). Finally, LLL co-integration test is one sided test and follow Z distribution.

Fully Modified OLS

When all variables are co integrated, the next step is to calculate the long-run estimates. In the presence of co integration, OLS estimates do not give efficient results. Therefore, for this purpose, FMOLS presented by Pedroni (2000, 2001) is applied to estimate long-run coefficients. The panel FMOLS estimator for the coefficient γ is defined as:

$$\gamma^*_{NT} = N^{-1} \sum_{i=1}^{N} \left[\sum_{t=1}^{T} (z_{it} - \bar{z}_i)^2 \right]^{-1} \left[\sum_{t=1}^{T} (z_{it} - \bar{z}_i) y^*_{it} - T\hat{\tau}_i \right] \quad (4)$$

The associated t-statistics are assumed to be normally distributed.

Panel causality test

Hurlin and Venet (2001) developed advanced version of Granger (1969) causality test for panel data models. Mathematical equation which will be used for empirical estimation is described below:

$$Z_{i,t} = \sum_{j=1}^{m} \rho^{(j)} Z_{i,t-j} + \sum^{r} \gamma_i^{(j)} Y_{i,t-j} + \varepsilon_{i,t} \quad (5)$$

Hurlin and Venet (2001) assumes that the auto-regressive parameters $\rho^{(j)}$ are identical for all individuals, whereas the regression slope coefficients $\gamma_i^{(j)}$ could be varying across each cross-sectional

unit. On the basis of model (5), Hurlin and Venet (2001), consider three major cases, that is, (1) homogenous non-causality hypothesis (2) homogenous causality hypothesis (3) heterogeneous non-causality hypothesis.

Homogenous Non-Causality Hypothesis (HNC)

Conditionally to the specific error components of the model, homogenous non-causality hypothesis **(**HNC) assumes non existence of causal relationship across N. The null and alternative hypothesis is defined by

$$H_n : \gamma_i^{(j)} = 0 \forall_1 \in [1, N], \forall_j \in [1, m]$$
$$H_a : \exists (i, j) / \gamma_i^{(j)} \neq 0$$

Wald statistic will be employed to test N_j linear restrictions:

$$F_{HNC} = \frac{\frac{RSS_{r1} - RSS_u}{Nj}}{[NT - N(1+j) - j]} \qquad (6)$$

Where RSS_{r1} is the restricted residual sum of square while RSS_u is the unrestricted residual sum of squares of equation (5).

If the calculated value of F-statistic is not significant, the homogeneous non-causality hypothesis is accepted. This result shows that the variable X is not causing Y in finite sample set of eight countries. The non-causality results are then totally homogenous that require no further empirical exercise.

Homogenous Causality Hypothesis (HC)

Conditionally to the specific error components of the model, homogenous causality hypothesis **(**HC) assumes that there exist N causality relationships.
Null and alternative hypotheses of homogenous causality are:

$$H_n : \forall_j \in [1, m] / \gamma_i^{(j)} = \gamma^{(j)} \forall \in [1, N]$$

$$H_a : \exists_j \in [1, m], \exists (i,1) \in [1, N] // \gamma_i^{(j)} \neq \gamma_1^{(j)}$$

The Homogenous causality **(**HC) hypothesis assumes that coefficients $\gamma_i^{(j)}$ are identical for all lag j and not equal to zero. In order to test the homogenous causality hypothesis, F statistics is calculated by using given formula as following:

$$F_{HC} = \frac{\frac{RSS_{r2} - RSS_u}{j(N-1)}}{[NT - N(1+j) - j]} \qquad (7)$$

Where RSS_u represent the unrestricted residual sum of squares of equation (5) While RSS_{r2} is the restricted residual sum of square. If calculated value of F statistic is less than critical value then homogenous causality hypothesis is accepted. The result shows that variable x is causing variable y in N countries of the samples.

Heterogeneous Non-Causality Hypothesis (HENC)

Finally, heterogeneous non-causality hypothesis assumes that there exists at least one and at the most N−1 equalities. Null hypotheses of heterogeneous non- causality is

$$H_n : \exists_i \in [1, N] / \forall_j [1, m] \in \gamma_i^{(j)} = 0$$

And alternative hypothesis is

$$H_a : \forall_i \varepsilon [1, N] \exists_j \varepsilon [1, N] / \gamma_i^{(j)} \neq 0$$

This test is calculated for each individual and assumes that coefficients $\gamma_i^{(j)}$ are equal to zero. For that, compute N statistics:

$$F_{HENC} = \frac{\frac{RSS_{u,i} - RSS_r}{j}}{\frac{RSS_r}{[NT - N(1+2_j) + j]}} \qquad (8)$$

Where $RSS_{u,i}$ is the unrestricted residual sum of squares of equation (5).These causality tests permit us to identify those individual countries where there is no causal relationships. The acceptance of HENC hypothesis implies that variable x does not cause variable y in individual country.

Empirical Results and Interpretation

Test Results for Unit Roots

The empirical analysis starts by applying ADF unit root test. The test is performed on both variables for each country with intercept and with intercept and trend. The results are reported in Table-1 show that both series are non-stationary in their level form. However, both series are found to be stationary at 1st difference which indicate that both the series are integrated at I(1) for each country.

Table-1: **ADF Unit Root Test Results**

Country/ Variables	Level			
	Intercept	**P-Value**	**Trend &Intercept**	**P-Value**
Pakistan				
lnY	-1.2301	0.6489	-1.7684	0.6963
lnEXP	-0.5023	0.8784	-2.1372	0.5071
India				
lnY	2.7168	1.0000	-1.1157	0.9110
lnEXP	1.4495	0.9988	-1.3238	0.8641
Bangladesh				
lnY	3.3520	1.0000	0.5898	0.9991
lnEXP	2.3108	0.9999	0.0911	0.9958
Sri Lanka				
lnY	0.6876	0.9900	-1.3699	0.8512
lnEXP	0.3879	0.9794	-1.6943	0.7296
Indonesia				
lnY	-1.9601	0.3021	-1.8058	0.6783
lnEXP	0.0973	0.9706	-1.8515	0.6565
Malaysia				
lnY	-1.4641	0.5389	-1.5625	0.7861
lnEXP	-0.8687	0.7855	-1.03766	0.9245
Thailand				
lnY	-1.2095	0.6580	-1.7380	0.7185
lnEXP	-1.8204	0.3644	-0.7492	0.9604
Philippines				
lnY	0.5131	0.9846	-2.1314	0.5096
lnEXP	-0.2773	0.9179	-2.2380	0.4542
Country/ Variables	**1st Difference**			
	Intercept	**P-Value**	**Trend &Intercept**	**P-Value**
Pakistan				
ΔlnY	-3.9463*	0.0048	-4.0705**	0.0161
ΔlnEXP	-6.1363*	0.0000	-6.0321*	0.0001
India				
ΔlnY	-5.3729*	0.0001	-6.4522*	0.0000
ΔlnEXP	-5.7287*	0.0000	-6.7493*	0.0000
Bangladesh				
ΔlnY	-4.3852*	0.0015	-6.3002*	0.0001
ΔlnEXP	-5.1490*	0.0002	-6.4297*	0.0000
Sri Lanka				
ΔlnY	-4.4105*	0.0014	-4.3691*	0.0079
ΔlnEXP	-6.2166*	0.0000	-6.2057*	0.0001
Indonesia				
ΔlnY	-4.0011*	0.0042	-4.2526**	0.0105
ΔlnEXP	-6.2966*	0.0000	-6.4460*	0.0000
Malaysia				
ΔlnY	-4.4692*	0.0012	-4.4703*	0.0062
ΔlnEXP	-4.8407*	0.0005	-4.7822*	0.0029
Thailand				
ΔlnY	-2.9437***	0.0515	-5.0601*	0.0031
ΔlnEXP	-5.0663*	0.0002	-5.1905*	0.0010
Philippines				
ΔlnY	-3.6606*	0.0000	-3.7793**	0.0315
ΔlnEXP	-5.7937*	0.0000	-5.7348*	0.0003

Note: (1) ***, **,* denote stationary of the series at 1%, 5% and 10% level of significance respectively. (2) Critical values for 1%, 5% and 10% level are -3.6537, -2.9571 and- 2.6174 respectively when the test equation include constant. (3) Critical values for 1%, 5% and 10% level are -4.2732, -3.5577 and -3.2123 respectively when the test equation include constant and trend.

After testing the individual country order of integration, the study employs three different panel unit root tests (IPS, LLC and Hadri) to confirm the order of integration of the panel data. The estimated results of all three panel unit root tests (Table-2) show that both series are non stationary in their level form and stationary in their first difference form. This confirms that series are integrated at I(1) in panel analysis.

Table-2: **IPS LLC and Hadri Unit Root Tests Results**

		Level Series		
Variables	Intercept	P-Values	Trend &Intercept	P-Values
IPS Test				
LnY	5.3117	1.000	2.7350	0.9969
lnEXP	5.1842	1.000	1.9270	0.9730
LLC Test				
LnY	2.1611	0.9847	0.9675	0.8334
lnEXP	3.2819	0.995	1.4606	0.9279
Hadri Test				
LnY	1.3707	0.8520	0.7963	0.2129
lnEXP	0.0393	0.4843	0.6228	0.2667
		1st Difference Series		
Variables	Intercept	P-Values	Trend &Intercept	P-Values
IPS Test				
ΔlnY	-13.4681*	0.0000	-8.2541*	0.0000
ΔlnEXP	-7.7050*	0.0000	-3.0911*	0.0000
LLC Test				
ΔlnY	-7.5700*	0.0000	-8.8745*	0.0000
ΔlnEXP	-4.4071*	0.0000	-10.1976*	0.0000
Hadri Test				
ΔlnY	30.1780*	0.0000	16.9392*	0.0000
ΔlnEXP	30.0514*	0.0000	14.1055*	0.0000

Note:* denotes rejection of unit root hypothesis at 1% significance level. 2) For IPS and LLC tests, null hypothesis is that the series has unit root while for Hadri test, null hypothesis is that the series is stationary.

5.2.1. Test Results for Panel Co integration

Having confirmed the order of integration of individual and panel series, the next step is to determine the long run linear relationship between both the variables. For this purpose, first, Johansen co-integration is applied on each county separately. After this, Larsson et al., (2001) likelihood based panel co-integration test is applied in panel of selected countries.

The country-wise co-integration result are reported in Table-3 show that no long-run linear relationship exists in case of Pakistan, Malaysia, Thailand and Philippines while unique long-run linear relationship exists in case of India, Indonesia and Sri Lanka at 5% significance level. The results shows two co-integrating relationship at 5% significance level for Bangladesh.

Table-3: **Country-wise Results of Co integration**

Country	**Hypotheses**	**Likelihood Ratio**	**5% critical value**	**P-value**
Pakistan	R=0	18.9451	25.8721	0.2840
	R≤1	3.1381	12.5179	0.8597
India	R=0	32.2222*	25.8721	0.0071
	R≤1	7.4154	12.5179	0.3032
Bangladesh	R=0	38.1516*	25.8721	0.0009
	R≤1	13.3598*	12.5179	0.0361
Sri Lanka	R=0	28.1253*	25.8721	0.0258
	R≤1	4.2748	12.5179	0.7021
Indonesia	R=0	29.7576*	25.8721	0.0156
	R≤1	9.3105	12.5179	0.1621
Malaysia	R=0	19.1703	25.8721	0.7204
	R≤1	3.1888	12.5179	0.9661
Thailand	R=0	13.9335	25.8721	0.6631
	R≤1	5.3003	12.5179	0.5538
Philippines	R=0	8.7093	25.8721	0.9680
	R≤1	2.2798	12.5179	0.9489
Country	**Hypotheses**	**Maximum Eigen values**	**5% critical Value**	**P-value**
Pakistan	R=0	15.8069	19.3870	0.1537
	R=1	3.1381	12.5179	0.8597
India	R=0	24.8067*	19.3870	0.0074
	R=1	7.4154	12.5179	0.3032
Bangladesh	R=0	24.7918*	19.3870	0.0074
	R=1	13.3598*	12.5179	0.0361
Sri Lanka	R=0	23.8505*	19.3870	0.0105
	R=1	4.2748	12.5179	0.7021
Indonesia	R=0	20.4471*	19.3870	0.0305
	R=1	9.3105	12.5179	0.1621
Malaysia	R=0	15.9814	19.3870	0.4944
	R=1	3.1888	12.5179	0.9661
Thailand	R=0	8.6334	19.3870	0.7615
	R=1	5.3003	12.5179	0.5538
Philippines	R=0	6.4295	19.3870	0.9353
	R=1	2.2798	12.5179	0.9489

Note:* denotes rejection of null hypothesis at 5% significance level.

The confirmation of long-run relationship by applying country-wise co-integration test has not much importance because the major emphasis of this study is on panel co integration test. Empirical findings of Larsson et al. (2001) likelihood based (LR) panel co-integration test are reported in Table-4 showing that the value of t-statistics is 4.7281 which is greater than critical value of 1.645 at 5% level of significance. This reveals that the hypothesis of panel co- integration cannot be rejected. Based on the panel likelihood based co integration test it can be concluded that a stable long run relationship exists between economic growth and export between all selected Asian developing countries for the period of 1975- 2008.

Table-4: Panel Co integration results

Hypotheses	**Likelihood ratio**	**5% critical value**
$R = 0$	4.7281**	1.645
$R \leq 0$	0.0458	

Note: L.R. test indicate one co integrating equation at 5% significance level.

5.2.2. Panel FMOLS

Table-5 presents the results of panel FMOLS. Firstly, we take lnY as dependent variable and find the value of lnEXP coefficient. Result shows the positive and significance effect of export on economic growth at 1% significance level which confirms the importance of exports in economic growth of Asian developing countries.

After this, lnEXP is taken as dependent variable and find the value of lnY coefficient. The results are highly surprising and show that the coefficient of lnY is also positive and highly significant and its estimated value is greater as compared to lnEXP. This reveals that to export more, Asian developing countries must attain a sustainable level of economic growth.

Table-5: Panel FOLS Estimates

Dependent Variable		**Independent Variable**	
	lnEXP	**S.E**	**t-value**
lnY	0.1892*	0.02386	7.9276
Dependent Variable		**Independent Variable**	
	lnY	**S.E**	**t-value**
lnEXP	1.3373*	0.20756	6.4429

Note: * indicate significance of coefficient at 1% significance level.

Panel Causality Test Results

Homogenous and Non-Homogenous Causality

Table-6 reports the empirical estimations of homogenous non-causality and homogenous causality hypotheses. The estimated results of homogenous non-causality suggest that there exists bidirectional causality between lnY and lnEXP in selected panel. This indicates that these counties implemented sound trade and investment policies to enjoy the benefits of trade liberalization and higher economic growth.

After testing the homogenous non-causality hypothesis, the next step is to test the homogenous causality hypothesis which assumes homogenous causal relationship in all selected countries. Empirical result only shows the existence of uni-directional causal relationship running from economic growth (lnY) to exports (lnEXP) in selected panel which means Asian developing countries are not homogenous in making trade policies.

Table-6: **Homogenous non-causality and Homogenous Causality Hypothesis**

Dependent Variable	**Homogenous non- causality**		Homogenous Causality	
	lnY	LnEXP	lnY	lnEXP
lnY	-	Causality exists*	_	No Causality
lnEXP	Causality exists*	-	Causality exists **	-

Note:*and**represent significance at 1% and 5% level respectively.

Heterogeneous Causality

Final step in the causality analysis is to check heterogeneous causal relationship between lnY and lnEXP in each selected Asian developing country.

Results of heterogeneous causality are presented in Table-7. Uni-directional heterogeneous causal relationship from LGDP to LEXP exists in the case of Pakistan, Sri Lanka and Indonesia. These results

indicate that exports directly depend upon economic growth in these countries. Hypothesis pertaining bidirectional causal relationship between lnY and

lnEXP has been accepted in the case of India and Philippines. It is concluded that economic growth and exports contributed to each other in increasing the economic development of these countries. In the cases of Malaysia and Thailand, exports have significant effect on economic growth which is due to the fact that these countries have promoted export sector since the last 20 years. Only in Bangladesh, exports are not causing economic growth. This represents that Bangladesh economy is still lacking behind in adopting export promotion strategies.

Table-7 Heterogeneous Causality

Country	Variables	LGDP	LEXP
Pakistan	lnY	-	No causality
	lnEXP	Causality exists*	-
India	lnY	-	Causality exists*
	LnEXP	Causality exists*	-
Bangladesh	LnY	-	No Causality
	LnEXP	No causality	-
Sri Lanka	LnY	-	No Causality
	LnEXP	Causality exists*	-
Indonesia	LnY	-	No Causality
	LnEXP	Causality exists*	-
Malaysia	LnY	-	Causality exists*
	LnEXP	No Causality	-
Thailand	LnY	-	Causality exists*
	LnEXP	No Causality	-
Philippines	LnY	-	Causality exists*
	LnEXP	Causality exists**	-

Note: * and** represent significance at 1% and 5% level respectively.

Conclusions and Policy Implications

The main objective of present paper is to test empirically the export-growth linkages in the balanced panel of eight Asian developing countries for the period of 1975-2008. The results of ADF test and IPS, Levin et al and Hadri panel unit root test shows that both variables (lnY and lnEXP) are first difference stationary. The results of Johansen co-integration analysis describe that economic growth and exports are co-integrated in India, Bangladesh, Sri Lanka and Indonesia. The results of Likelihood-based panel co-integration test also confirm the existence of long-run stable relationship between economic growth and exports in selected panel. The results of Panel FMOLS indicate that not only exports are important for economic growth but also economic growth is much more important for the promotion of exports.

The estimated result of panel homogenous causality hypothesis shows that only economic growth has causal effect on exports. Panel homogenous non-causality hypothesis describes bidirectional causality between economic growth and exports. The results of heterogeneous causality hypothesis show the existence of bidirectional causality between economic growth and exports in India and Philippines. The results also describe the validity of ELG hypothesis in Malaysia and Thailand whereas economic growth has significant effect on exports in Pakistan, Sri Lanka and Indonesia. However,

empirical findings failed to provide any kind of causality in case of Bangladesh.

The main problem facing the Asian developing countries in the world market is that how to improve the competitiveness and diversification of their exports so that they can expand their economic integration. From a policy perspective, the general results of this study on bidirectional causality suggest that Asian developing countries need to follow liberal trade policies to make their strong trade relations with the rest of the world. It can also be emphasized that a country can gain maximum benefits from trade only if domestic industries produces efficiently. Industries, those are using resources inefficiently must be eliminated through unilateral trade liberalization measures. In this way, trade efforts must be directed towards the right path and country must be able to minimize their trade risks.

In case of unidirectional causality from exports to economic growth, general suggestion is that these countries pay full intension to boost up their exports. It is also recommend that high exports targets can only be achieved if these countries enhance their technological strength and efficiency, encourage the attainment of internationally accepted standard of quality, providing consumer with good quality products and services at reasonable prices, implementing a stable exchange rate policy, setting up the legal system, a stable and well developed financial system and implementing supply side policies that affect the exports and imports elasticities (for example, education and infrastructures). Moreover, these developing countries must replace the agricultural exports by the industrial exports which command reasonable and stable price in world market and help further to increase exports.

In case of unidirectional causality from economic growth to export, common suggestion is that in order to export more, developing countries must adopt growth promoting economic policies such as stable macroeconomic environment, political stability, efficient fiscal management and resource allocation, appropriate regulatory systems, sound public financial systems, reduction of corruption, and improve entrepreneurial, management and marketing skills of workforce.

Those countries where no causality is found, the general policy implication is that a certain level of economic growth may be a pre-condition for promoting exports. Because growth may help to achieve efficient allocation of resources according to comparative advantage and realization of economies of scale which lowers the cost of exportable commodities and make export more competitive in international market.

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