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Article

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Effects of Exports Instability on Economic Growth in SAARC Region Countries

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Abstract

This study analyzed the hypothesis that export instability affects the economic growth for SAARC region countries (Pakistan, India, Sri-Lanka and Nepal) by using neoclassical aggregate production with export and export instability as the additional variables. The Augmented Dickey Fuller (ADF) and Johansson Cointegration tests are used to test stationarity for all variables and cointegration respectively. The results of these tests demonstrate that all variables are non-stationary at levels but stationary at their first difference and co integrated of order I(1). Export instability has deleterious effects for these four countries on economic growth and its magnitude is higher for Sri Lanka economy. The exports and investment has positive and significant effects on economic growth for all countries except the Nepalese economy where export has negative but insignificant effect on its economic growth.

The most important policy implications for these countries are that they should diversify their exports horizontally and liberalize their foreign exchange markets and capital accounts to control the instability in exports.

Keywords: Export instability, Growth, ECM, Cointegration, SAARC.

1. Introduction

The economic development is a process of structural transformation where countries shift towards production of high quality goods from low quality goods. The precondition for this process is the existence of an elastic demand for their exports in world markets so that they can influence global export markets without affecting their terms of trade. Many developing countries have very low domestic demand for their productions, which makes export earnings as the main source for their significant economic growth. So it is an important variable for all economies because they are linked through globalization and receive foreign exchange reserves by selling them exports that is an important source for Less Developing Countries (LDCs) to recover their balance of payment gap and for the

payments of their imports. So export earnings instability could have different effects on their economic growth. Export earnings instability also affects the government development plans because government takes a large number of revenues to finance these plans from export taxes.

The exports is also an important variable for developed countries (DCs) but their exports based on capital goods while the LDC's exports based on primary products. The prices of the primary products are low and more volatile in international markets. So the LDCs suffer higher export instability problems than the developed countries due to the inelastic and unstable demand and supply of their exports (Savvides, 1984). The high degree of export instability for these primary commodities may have an adverse effect on the growth of developing countries. Several studies were carried out to check the unfavorable effects of export instability on economic growth that provided mixed results. Using the notion of Granger causality Granger (1969), these studies have tested and shown that in most economies, export growth have made a significant contribution to economic growth (Bakar, 2010). But export fluctuations deleterious this strong relationship between export and economic growth in the economy. The price instability plays an important role for instability in exports. The reasons for high export instability in LDCs than DCs are: Specialization in production and exports of primary products, Commodity Concentration and geographical concentration of export markets (Hock, 2007).

According to the traditional views there exist strong relationship between export, investment, national income and foreign trade. The huge fluctuations in export earnings make quite complicated planned development that reduces the capital efficiency and returns on investment (Aggarwal, 1982).

This study involves the South Asian Association Regional Cooperation (SAARC) region countries. The SAARC was established in December 8, 1985. The SAARC union consists of eight countries that are: *Pakistan, India, Nepal, Sri-Lanka, Bangladesh, Afghanistan, Bhutan and Maldives*. The main objectives of SAARC was to promote the welfare and quality of life of people, increase in economic growth, peace, freedom, social justice and cultural development, to create the self-reliance, mutual trust, to strengthen the cooperation with other developing countries and with South Asian countries. This association involves all developing countries.

The main purpose of this study is to find out the relationship among the export instability, investment and economic growth in the LDCs, because export instability mostly prevailed in the LDCs. Therefore, this study has selected the four SAARC Region Countries (Pakistan, India, Nepal and Sri-Lanka). There are a large number of variables that can affect the economic growth, but this study considers only three variables that are: export, export instability and investment. This study also compares the magnitudes of export instability in selected SAARC countries.

The structure of the whole study is as follows. Section 2 and 3 explain the review of literature and theoretical background of relationship among variables respectively. The modeling for empirical analysis is provided in section 4; while results and discussion section is made available in section 5. The last section concludes the whole study and also gives the policy recommendation for the results.

2. Review of Literature

The detrimental effects of export instability on economic growth and investment were investigated for less developing countries by (Macbeen and Maizels, 1968) for eleven developing countries over the time period 1950-60 by using single equation regression model. The results of this study concluded that export instability may have negative impacts on economic growth for individual developing countries but in general for developing countries it had no relationship with economic growth and investment for short-run and long-run time period due to the high propensity to import and stabilizing expenditure behavior of firms in countries.

Glezakos (1973) conducted study against Macbeen (1966) and Coppock (1962) studies which found that there was no significant relationship between export instability and economic growth by covering the methodological deficiencies of their studies for 38 LDCs and 18 developed countries (DCs) for 1950-1966 time periods. This study also estimated the export price and export-quantity instability effects on economic growth. This study concluded that export instability had higher detrimental effects on LDC's economic growth than DCs. The exports price and exports volume instability was higher in LDCs than the DCs and export price instability had more severe effects on income and export growth rate than export volume instability in LDCs.

The study accomplished by Savvides (1984) was an extension of the Glezakos (1973) study to find out the effects of export instability on economic growth by including recent data 1967-77 for same sample. This study performed several cross-sectional regression analyses and same estimation procedure to (Glezakos, 1973) techniques. But the results of this study were against the results of Glezakos (1973) study. Export instability had positive and significant effect on economic growth and export growth in LDCs while positive and insignificant effect on export growth in DCs.

Glezakos (1984) replied to Savvides (1984) study which found reverse results of relationship between export instability and economic growth to Glezakos (1973) study. The objective of this reply was to reveal that Savvides (1984) argue of positive effect of export instability on economic growth was unjustifiable due to the faulty data and inappropriate measurement. The results of this study exhibited that export instability had negative and significant effect on income growth of the LDCs and insignificant results for DCs. But this study supports the argument of Savvide (1984) that export instability had positive and significant relationship with export growth in LDCs.

Bakar and Subramaniam (2010) conducted study on effects of export instability on economic growth for Malaysia economy by using Augmented Dickey Fuller (ADF) and residual based test to check the stationarity of the variables and cointegrated test to find out the long run relationship between export instability, export growth and economic growth. This study concluded that export instability had negative and significant effect on the economic growth of Malaysia economy. It affected the economic plans and reduced capital formation that led to increase in unemployment rate.

Fosu (1992) examined the effects of export instability on economic growth for 35 African LDCs, 30 Sub-Saharan LDCS and 38 Non- African countries. The augmented production function was used for the time period 1970-86. This study concluded that export earnings

instability had negative and significant effect on economic growth for the Non- African countries but insignificant effects for the African LDCs.

Autoregressive conditional heteroscedasticity approach was used to measure the export earnings instability index by the (Ozler, 1988). This study used the data for the time period 1963-82. The results of this study concluded that export instability had negative effects on the economic growth for the developing countries.

The relationship between the export instability and economic growth was estimated with neoclassical growth equation and ordinary least square method. Brempong (1991) used the cross-sectional data for Sub-Saharan Africa from 1960-1986 and found export instability had negative and significant effect on economic growth for Sub-Saharan Africa.

The export instability index was measured by transitory index, by the (Knudsen and Parens, 1975). The cross-sectional data was used for time period 1958-68 for 28 developing countries. The conclusion of this was that export instability had positive effects on the economic growth.

The results of Yotopoulos and Nugent (1976) research on the relationship between export instability and economic growth were matched with the results of the Knudsen and Parens (1975) research. This study also used the cross-sectional data and transitory index for the measurement of export instability index. The difference in this study was that it included 38 developing countries instead of 28 developing countries.

The impact of international trade especially for export earnings instability on economic growth through savings and investment was discovered by (Moran, 1983). Cross-sectional data had been used for 38 developing countries which included 18 Latin American countries for 1954-1975 time periods by using ordinary least square method (OLS). The conclusion of this study was that export fluctuations had no significant impact on economic growth for less developing countries in long time period while in short-time periods it had negative effects on the savings which further affect the economic growth negatively.

The study was conducted on the relationship between export instability and economic growth by using cross-sectional data, (MacBeen, 1966 and Kenen & Voivodas, 1972). This study concluded that there is no relationship between export instability and economic growth.

The ordinary least square method had been used to estimate the relationship between export instability and economic growth by (Lim, 1974). This study was conducted for the West Malaysia over the period 1947-1970. The results of this study showed that export instability had no effects on the economic development in this country.

GARCH model was used to measure the export instability index by (Sinha, 2007). The time series data was used to investigate the relationship between export volatility and economic growth for two countries Philippines and Thailand. This study concluded that these both countries relied on exports for their economic growth. This study also concluded that export volatility is permanent for these countries and is significant for the prediction of future volatility.

The relationship had been investigated among the export instability, investment and economic growth for nine Asian countries by (Sinha, 1999). The time series data analysis

was used with co- integration method. The results of this study were mixed. In some countries export instability affects the economic growth negatively and in some countries it affects positively. In some countries export instability had no effects on the economic growth. And investment had positive relationship with the economic growth.

Diversification policies had been adopted by different countries to control the export instability problem and to increase their economic growth since 1950s. Hesse (2008) examined the effect of diversification policies on economic growth for developing countries. Solow growth model was used to find out the relationship between these variables for 1961-2000 time periods. The conclusion of this study was that export diversification had positive relationship with economic growth in developing countries and developed countries could perform better by adopting specialization.

3. Theoretical Framework

Economic development is the main objective of every society in the world and the most important factor behind this is the economic growth. Economic growth has different contributors and a few of them are investment and exports of the economy. Most of the empirical work supports the export-led growth hypothesis while some studies in favour of growth driven export hypothesis. There is no clear cut consensus about these hypotheses. So, to investigate the relationship between these variables, this study uses the neoclassical aggregate production function with export instability and export as additional variables.

$$Y = f(\text{export}, \text{export instability and investment}) \quad (1)$$

As export growth is an important for the economic growth, so the stability of export is equally important because it has different affects on economic growth. Based on the above function the following equation is estimated in this study.

$$Y = \alpha_1 + \alpha_2 X + \alpha_3 EI + \alpha_4 I + \mu_i$$

Where;

X = Total Exports, EI = Export instability, I = Investment and μ_i = Error term

Theoretically α_2 & α_4 is expected to be positive for economic output, because the increment in export and investment increase the economic growth of the economy. But the sign of export instability is uncertain. It can be positive and negative, according to the tackling behavior of economies to this problem (Bakar and Subramaniam, 2010).

3.1 Export Instability and Economic Growth Mechanism

“Instability index is the absolute difference in the value of export from year to year, expressing this difference as a percentage of larger of the two annual values”, by the United Nations Secretariat (1952). This problem mostly occurs in less developing counties due to the unstable and inelastic demand and supply of their primary product exports. The demand for primary exports is inelastic in developing nations because developed nations spend only a small portion of their income on these products. The change in prices of these exports does not affect their demand, resulting in a price-inelastic demand. On the supply side, the supply of primary exports in LDCs price-inelastic due to the rigidities and internal inflexibilities in resources uses for the production of commodities. Supply of these exports also unstable because of weather conditions, pests and so on.

Figure 1: Effects of Inelastic and Unstable Demand and Supply of Primary Exports on Export Earnings

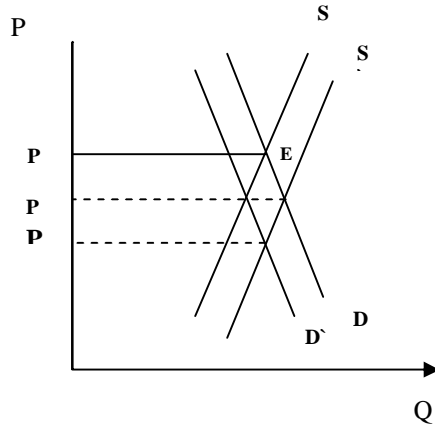
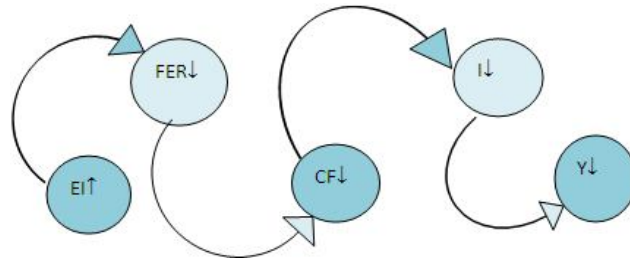


Figure 1 explains the effects of inelastic and unstable demand and supply of primary exports on export earnings instability. D and S represent the inelastic demand and supply curves of developing nation’s primary exports. The equilibrium price is P with D and S curves. If for whatever reason D decreases to D’ or S increase to S’, the equilibrium price falls to P’. If D decrease to D’ and S increase to S’ at the same time the equilibrium price fall even more to P’.

And if these curves shift backward to the initial state then price rise sharply and returns to the original P level. So this diagram shows that change in inelastic and unstable demand and supply curves of primary exports of developing countries lead to the large fluctuations in their prices that these nations receives for their exports (Salvatore, 2005).

The previous studies on the relationship between export instability and economic growth provided mixed results. Glezakos (1973); Ozler (1988); Brempong (1991); Fosu (1992); Vovoidas (1974) and Lim (1976) concluded that export instability and economic growth has negative relationship in LDCs. The reason behind this is the shortage of inputs during the production process. The negative transmission mechanism of export instability is given in below:

Figure 2: Negative Effects of EI on Economic Growth

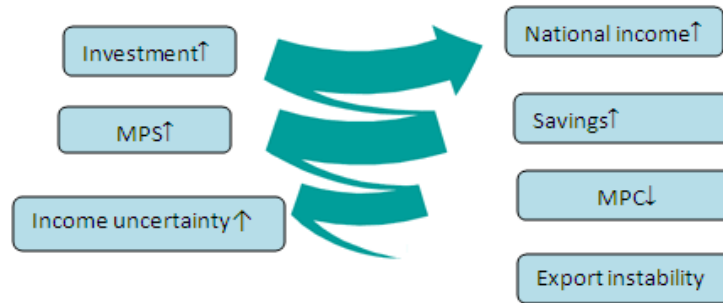


EI = Export Instability, FER = Foreign Exchange Reserve, CF = Capital Formation, I = Investment, Y = National Income

This mechanism explains that when exports instability increases the foreign exchange reserves of the country decrease. Due to the less foreign exchange reserves economies cannot import the capital that is necessary for the production process. So the decrease in capital formation causes the decrease in investment. The national income also decreases due to the decrease in investment. In this way export instability has negative effects on economic growth.

While Knudsen and Parens (1975); Sinha (2007); Savvides (1984) and Yotopoulos & Nugent (1976) found that there exist positive relationship between export instability and economic growth. They argued that LDCs tackled with the export instability problem by reducing their consumption. The reduction in consumption caused the increase in savings and hence the increase in investment. The mechanism through which it effects the economic growth positively is described in following:

Figure 3: Positive Effects of EI on Economic Growth



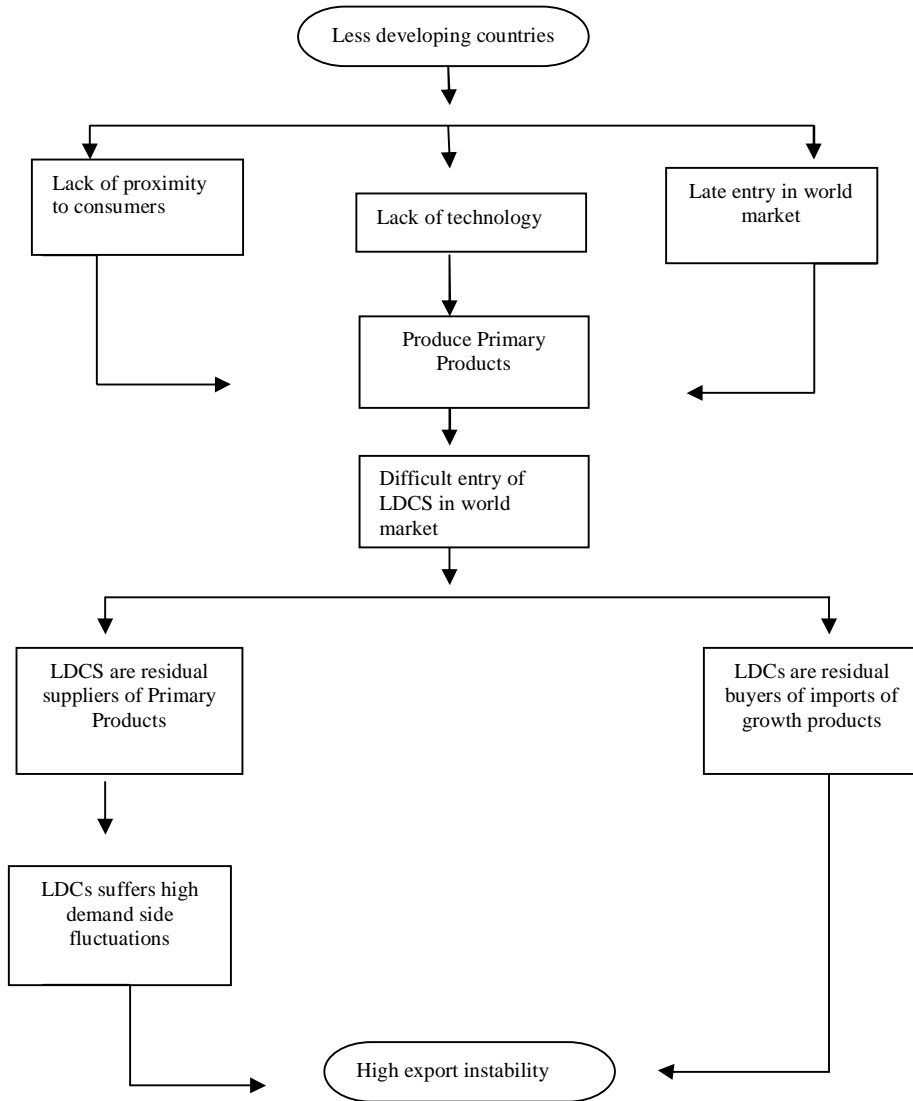
EI = Export Instability, MPC= Marginal Propensity to Consume, MPS = Marginal Propensity to Save, I = Investment and Y = National income

This mechanism shows that when increase in export instability creates uncertainty in income of people then they increase their savings for the precautionary demand motives by decreasing their consumption. This leads to the lower MPC and higher MPS in economy. So the increase in savings causes the increase in investment and further increase the national income. This mechanism shows that export instability effects the economic growth positively.

3.2 Product-Cycle Theory

The product-cycle theory suggested that initially growth products produce by DCs because they give more attention towards research of new methods and technology for the production process. DCs export these products and create natural monopoly in world market. LDCs purchase these exports from the DCs through world trade and also start to produce the same products and export these same products in world markets, but their entry becomes difficult due to the monopoly of DCs in world market. And LDCs become the only residual suppliers of growth products and suffers more demand side fluctuations due to the lack of proximity to consumers and product differentiation. Figure 4 explains the effect of this process on LDCs economic growth.

Figure 4: The Export Instability Case for LDCs



So this figure concludes that export instability depends upon the degree of industrialization of the economies and it is low for DCs because they have strong approach in world market due to the origination of growth products (Sebastian, 1988).

4. Data and Methodology

This section explains the modeling for empirical analysis conducting in this study. The relationship between export, export instability, investment and economic growth is analyzed for SAARC region countries by using time series data. The time series data has taken from IFS over the period of 1975-2004 for Nepal on the basis of 2000, from 1972-2008 for Sri-Lanka and from 1972 to 2009 for both countries Pakistan and India on the basis of 2005 base year. This study estimates the neoclassical aggregate production

function with export instability as an additional variable which differs from the previous studies because some previous studies regressed only export instability on economic growth.

The main variables of this study are: LRGDP (log of real GDP), LREXP (log of real export of goods and services), LRGFCF (log of real gross fixed capital formation) and LEI (log of export instability index). GDP deflator is used to convert the nominal variables into real variables. All variables are in log form that provides the growth rate of all variables. The basic purpose of this study is to examine the relationship among export instability, investment and economic growth for SAARC Region countries (Pakistan, India, Nepal and Sri- Lanka) by using the time series data analysis, Johansson Cointegration technique, Granger Causality and Error Correction Model (ECM).

4.1 Export Instability Index

“Export instability is the difference between the actual and estimated values of exports, expressing this difference as a percentage of average value of exports” (Devkota, 2004). Export instability index have been measured by different methods such as coefficient of variation, moving average method, absolute difference between actual export earnings and the trend values of export earnings and ARCH approaches etc. but this study will prefer the average of the square of the ratio of actual export earnings to trend values method to measure the export instability index. This method differs from the previous method because it gives greater weight to larger deviations from trend values than to the smaller values of deviation from export trend.

$$EI = \frac{1}{T} \sum_{t=1}^T (\log E_t - \log \hat{E}_t)^2$$

Where E_t is the actual export earnings and \hat{E}_t is the trend values of export earnings and T is the number of observations included in this study. This method differ from the previous method which is described above because it gives greater weight to larger deviations from trend values than to the smaller values of deviation from export trend. Limited studies have used this method for export instability index in international research. But no study has been made in SAARC Region Countries.

4.2 Augmented Dickey Fuller Test

As most economic variables are non-stationary at their levels, when OLS is applied on these variables they provide spurious results. To avoid this problem unit root test and ADF is applied on these variables to make them stationary. So the unit root test and augmented dickey fuller test will be applied on these variables for checking their stationarity.

Simple AR (1) process

$$Y_t = \rho Y_{t-1} + e_t$$

Where; y_t is a time series, ρ is parameter to be estimated and e_t is the white noise error term. The ADF test is implemented after subtracting the term Y_{t-1} from both sides of the equation.

$$\Delta Y_t = \alpha Y_{t-1} + e_t$$

Where Δ is the first difference operator and $\alpha = \rho - 1$. The null hypothesis is that $H_0: \alpha = 0$. If this hypothesis accepted then variables are non-stationary at their first difference. Higher order difference is required to make the variables stationary. When higher order lags are introduced in the above model then it will be changed to the Augmented Dickey Fuller (ADF) model. The ADF assumes that Y series is the AR (ρ) process.

$$\Delta Y_t = c_1 + \theta Y_{t-1} + c_{2t} + \sum_{i=1}^p d_i \Delta Y_{t-i} + v_t$$

It can be estimated without including the trend term that is c_{2t} and intercept term that is c_1 . ADF test statistics are based on collective distribution by Dickey and Fuller (1979), if the calculate-ratio (value) of the coefficient δ is lower than τ critical value from Fuller table, then it is said that y do not have unit root problem (Ullah et al. 2009).

4.3 Johanson Cointegration Technique

Johanson Cointegration test provides the long run relationship between the economic variables and the deepest idea for cointegration test is relevant to the functional form of the model. The cointegration approach was first commenced by (Engel and Granger, 1987). Later on, it was further advanced and changed by (Stock and Watson, 1988 and Johansen & Juselius, 1990). In this study, Johansen maximum likelihood (ML) approach is applied to examine the cointegration among variables. The main reason is that Johansen cointegration is the most consistent one and it also better for small sample data set. In addition to it, another improvement of this approach is that it estimates several co integration relations among the variables at the same time. Two statistics i.e. trace (Tr) test and the maximum Eigen value (λ_{max}) test are being used for checking cointegration vectors.

The variables can be cointegrated when they have one or more linear combinations among themselves which are cointegrated. Furthermore, there is long run association between variables if they are stationary at same order of integration i.e. cointegrated at I(1). If variables non-stationary at their level and stationary at the first difference and their also exist linear combination among the stationary variables, then these non-stationary series are said to be co integrated. The stationary linear combination is called the co integrating equation (Engle and Granger, 1987). Johanson Cointegration is applied when the following conditions fulfilled:

- All variables are non stationery at their level but integrated at same order.
- There exists at least one linear relationship among these variables.

The model of Johnson co integration is described in following:

$$\Delta Y_t = \mu + \Gamma_1 \Delta Y_{t-1} + \Gamma_2 \Delta Y_{t-2} + \dots \dots \dots \Gamma_k \Delta Y_{t-k} + \Pi Y_{t-1} + \varepsilon_t$$

Where $\Pi = \alpha \beta$

In this equation α is convergence parameter and β shows the co-integration equations. And $\sum_{i=1}^k \Delta Y_{t-i}$ Show the short term effects.

4.4 Granger Causality Model

Granger casualty test developed by Granger (1969) is used to check the causal relationship among variables for this study. According to Granger, a variable x_t is said to be Granger cause another variable y_t if the past and present values of x_t helps to predict y_t . The following regression is estimated to find the causal relationship between these variables.

$$y_t = \sum_{j=1}^p \alpha_{2j} y_{t-j} + \sum_{j=1}^p \beta_{2j} x_{t-j} + \phi_2 \varepsilon_{2t-1} + \mu_{2t}$$

$$x_t = \sum_{j=1}^p \alpha_{1j} x_{t-j} + \sum_{j=1}^p \beta_{1j} y_{t-j} + \phi_1 \varepsilon_{1t-1} + \mu_{1t}$$

The null hypotheses that are tested are:

$H_0 : \beta_{1j} = 0, j = 1,2,3,\dots,p$, which indicate that x_t do not Granger cause y_t ; and $H_0 : \alpha_{2j} = 0, j = 1,2,3,\dots,p$, which means that y_t do not Granger cause x_t . if both hypotheses are accepted, its means that there is no casual relationship between variables. That shows that two variables are independent. The rejection of one hypothesis indicates the uni-directional relationship between variables and the rejection of both hypotheses indicate the existence of bidirectional relationship between them (Ullah et al. 2009).

5. Results and Discussion

5.1 Unit Root Test

It is important to check the unit roots for all variables to determine whether they are I(0) at levels and I(1) at first difference for cointegration analysis. The Johanson cointegration requires that all variables must be non-stationary at their levels and stationary at I(0)the analysis of cointegration technique on non- stationary variables may lead to spurious results (Kazi, 2009). So Augmented Dickey-Fuller (ADF) test has used to check the stationarity of the variables in this study. The results are compared with their critical values for the rejection of null hypothesis of no unit root. The results show that all variables are non-stationary at their levels and stationary on first difference on 1% level of significance for all countries except the real exports in India that is stationary on 10% level of significance.

Table 1: Unit Root Test

Variables	Level	1 st Difference
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	T-Statistic	Critical Value	T-Statistic	T-Critical value
Pakistan				
LRGDP	-2.309168	-3.621023	-4.160805	-3.626784
LREX	-2.164623	-3.621023	-9.237319	-3.626784
LRGFCF	-2.209602	-3.626784	-3.853362	-3.626784
LEI	1.665751	-2.636901	-5.569379	-2.634731
India				
LRGDP	2.590974	3.621023	-6.065366	-3.626784
LREX	0.261741	-3.621023	-2.711879	-2.612874
LRGFCF	1.224871	-3.621023	-5.881033	-3.626784
LEI	0.537156	-2.632688	-3.773009	-2.632688
Nepal				
LRGDP	0.450265	-3.699871	-5.980702	-3.699871
LREX	-1.155751	-3.679322	-4.689982	-3.689194
LRGFCF	-1.582620	-3.689194	-7.782891	-3.689194
LEI	0.651941	-2.650145	-4.738471	-2.650145
Sri-Lanka				
LRGDP	-0.446037	-3.626784	-5.009385	-3.632900
LREX	-2.330557	-3.626784	-4.703759	-3.632900
LRGFCF	-1.729014	-3.632900	-3.666072	-3.639407
LEI	1.869631	-2.636901	-3.482426	-2.636901

5.2 Johanson Cointegration Technique

Kazi (2009) Johansen cointegration technique actually represents nothing more than a multivariate generalization of the Dickey-Fuller test used for unit root test in previous section. It is used to find out the long run relationship among variables. All conditions of Johanson cointegration test are fulfilled for all variables of this study. So this study has used the Johansson co integration technique to find out the long run relationship among export instability, export, investment and economic growth for selected SAARC region countries and its results are illustrated in following tables separately for each country and

the results for lag length criteria are explained in Appendix A for all countries that explains which lag is most appropriate for the co integration technique.

Table 2: Cointegration Results For Pakistan

Null Alternatives	r=0	r ≤1	r ≤2	r ≤3
	r ≥1	r ≥2	r ≥3	r=4
Trace Statistics	92.90775	38.75715	7.967838	0.488217
Eigen Values	0.787148	0.585090	0.192412	0.013852
Critical Values	47.85613	29.79707	15.49471	3.841466
Probability	0.0000	0.0036	0.4689	0.4847
LRGDP = 5.434732 + 0.089480 LREX - 0.788098LEI +0.438618 LRGFCF.....(i)				
Standard errors	(0.02038)	(0.04301)	(0.02691)	
t-statistics	[-4.39127]	[18.3249]	[-16.2997]	

Table 2 explains the cointegration results between economic growth and its determinants for Pakistan. Trace-test values and maximum-Eigen values investigate the existence of long run relationship between these variables. The probability for two cointegrating vectors is less than 0.05 which support the existence of long run relationship among the running variables in the model. Hence it is found that existence of numerous cointegrating vectors supports the empirical resulting of estimated model inferable, meaningful and substantial.

The impacts of independent variables on economic growth are shown in equation (i). The estimated results are showing significant and theoretical correct signs of coefficients of concerned variables. Pakistan's real export and gross fixed capital formation have positive and significant coefficients which exhibiting the positive relationship of these variables with economic growth while export instability has negative and significant effect on economic growth. Pakistan's real export, export instability and gross fixed capital formation has respectively 0.089, 0.79 and 0.49 coefficients which explains that 1% increase in these variables leads to 0.089%, 0.79% and 0.49% respective change in economic growth. The magnitude of export instability effects on economic growth is 0.79 and its magnitude is lowest for Pakistan economy from the selected SAARC region countries. There exist also negative relationship between investment and export instability. This negative relationship between export instability and investment leads to the negative relationship between export instability and economic growth. T-statistic of real exports is [-4.39127], export instability [18.3249] and gross fixed capital formation [-16.2997] which explain their significance and all these t-statistic values are ≥ 2 that is the thumb rule for t-values. The result of relationship between real exports and economic growth is correspondent to the Feder (1983) hypothesis that export does not only affect economic growth directly; it also affects economic growth indirectly by enhancing the productivity of other inputs, and this effect could be very large.

Table 3: Cointegration Results For India

Null Alternatives	$r=0$ $r \geq 1$	$r \leq 1$ $r \geq 2$	$r \leq 2$ $r \geq 3$	$r \leq 3$ $r = 4$
Trace Statistics	71.66962	17.71235	8.601349	3.906976
Eigen Values	0.785969	0.229191	0.125519	0.105623
Critical Values	47.85613	29.79707	15.49471	3.841466
Probability	0.0001	0.5874	0.4035	0.0481
LRGDP = -4.882178 + 0.173696 LREX - 0.965738 LEI + 0.495008 LRGFCF.....(ii)				
Standard errors	(0.03004)	(0.08170)	(0.04971)	
t-statistics	[-5.78252]	[11.8209]	[-9.95854]	

Table 3 explains the cointegration results between export, export instability, investment and economic growth for India. There exists only one cointegrating vector because Trace-test value 71.66962 is greater than the critical value 47.85613 only for first null-hypothesis. While Trace-test values for other vectors are less than their critical values that reject the alternatives hypothesis. The probability value is also less than 0.05 for first cointegrating vector which explains the existence of cointegrating vector. So the existence of long run relationship between these variables approved the construction of model.

The effects of independent variables on economic growth are shown in equation (ii) for Indian economy. All variables have significant and theoretical correct signs of coefficients for the relationship between them. The results explains that 1% change in real exports, export instability and gross fixed capital formation leads to the 0.17%, 0.96% and 0.49% respective change in economic growth according to their signs. The significance of these results is shown by t-statistics and real exports [-5.78252], export instability [11.8209] and gross fixed capital formation [-9.95854] has these t-statistic values which are ≥ 2 . Export instability has negative and significant effect on economic growth with 0.96 magnitudes and with higher significance level and its magnitude is on 2nd number from all selected SAARC region countries. This result of negative relationship between export instability and economic growth confirms the negative relationship between export instability and investment.

Table 4: Cointegration Results for Sri Lanka

Null Alternatives	r=0 r≥1	r ≤1 r ≥2	r ≤2 r ≥3	r ≤3 r=4
Trace Statistics	82.51060	36.78995	12.97401	3.265008
Eigen Values	0.739389	0.503648	0.248406	0.091563
Critical Values	47.85613	29.79707	15.49471	3.841466
Probability	0.0000	0.0066	0.1158	0.0708
LRGDP = 2.915778 + 0.103138LREX -1.798587LEI+ 0.590019LRGFCF.....(iii)				
Standard errors		(0.08094)	(0.15763)	(0.11586)
t-statistics		[-1.27428]	[11.4104]	[-5.09230]

Trace statistic and Eigen values indicates that there exist two cointegrating vectors the variables GDP, exports, export instability and investment in Sri Lanka. Because their probability is ≤ 0.05 and their Trace statistic is greater than their critical values. The existence of cointegrating vectors supports the significant and generous of the model.

Sri-Lanka's relationship between real exports, export instability, investment and economic growth is explained in equation (iii). Real exports has positive but insignificant relationship with Sri-Lanka's economic growth. The coefficient of real exports is 0.103138 with t-statistic value [-1.27428], t-statistic value is less than 2 which shows the insignificance of this relationship. Export instability has negative (-1.798587) and significant with t-statistic value [11.4104] effect on economic growth. This shows that 1% increase in export instability leads to the 1.79% decrease in economic growth. Investment also has negative relationship with export instability in this economy. The magnitude of export instability effects is 1.79 that is on top from SARRC region countries. Gross fixed capital formation has positive and significant effect on GDP with 0.590019 coefficient and [-5.09230] t-statistic.

Table 5: Cointegration Results For Nepal

Null Alternatives	r=0	r ≤1	r ≤2	r ≤3
	r ≥1	r ≥2	r ≥3	r =4
Trace Test	87.16133	52.84665	29.72024	8.871935
Eigen Values	0.719425	0.575369	0.537986	0.280062
Critical Values	47.85613	29.79707	15.49471	3.841466
Probability	0.0000	0.0000	0.0002	0.0029
LRGDP = -1.158193 - 0.342576LREX - 0.806254LEI + 1.651123LRGFCF.....(iv)				
Standard errors		(0.25100)	(0.25100)	(0.51373)
t-statistics		[1.36485]	[2.40722]	[-3.21402]

The results of cointegration analysis among export, export instability, investment and economic growth for Nepal are presented in table 5. The results reveal that trace-test values and Eigen test values support the validity of long run relationship between these variables. Trace-test values greater than their critical values for all null hypotheses that indicate all null hypotheses are rejected on the biases of their tabulated values and acceptance their alternative hypotheses in this model. And their probability values also less than 0.05 which support the existence of four cointegration equations. So these results reveal that four cointegrating vectors exist in the running variables.

The empirical results of relationship among export, export instability, investment and economic growth are exhibited in equation (iv). Nepalese real exports has (-342576) coefficient with t-statistic [1.36485] which shows that real exports has negative and insignificant effect on economic growth. The coefficient (-0.806254) of export instability explains the negative effect of this indicator on economic growth with t-statistic [2.40722] which shows the significance of this relationship. The magnitude of this relationship is based on 0.80 value that is on 3rd number in this study. The negative relationship between export instability and economic growth reveal that investment and export instability also has negative relationship between them. Gross fixed capital formation also has theoretical correct sign of coefficient with significant t-statistic value [-3.21402].

It can be concluded from these statistical results that all concerning variables are showing theoretical correct signs of coefficients for all countries except Nepal's real exports which are showing negative but insignificant relationship with economic growth. Export instability has negative and significant effect on economic growth for all countries analyzed in this study. Sri-Lanka economy has high magnitude of export instability while the magnitude of export instability is lowest for Pakistan. As discussed in theoretical framework section that negative effects of export instability on economic growth occurs due to the negative relationship between export instability and investment. So it can be concluded from the negative relationship between export instability and economic growth that it also affects the investment negatively. This negative effect of export instability on

economic growth also confirmed the negative effect of its on investment for all countries. The channel how it affects the investment is explained in above.

The results of positive relationship between export and economic growth of this study also support the results of these studies (Jaffee, 1985; Buffie, 1992; Siliverstovs and Herzer, 2005; Awokuse, 2003 and Ullah et al., 2009). SSARC region countries that are being studied have negative and significant effect of export instability on economic growth which reconcile to these studies results (Glezakos, 1973; Rangarajan and Sundararajan, 1974; Sebastian, 1988; Love, 1992; Fosu, 1992; Dawe, 1999; Akpokodje, 2000 and Bakar & Subramaniam, 2010). Chen and Zhu (2008); Dritsaki and Adamopoulos (2004) and Mun et al. (2008) also found positive relationship between economic growth and investment which reconcile to the results of this study. All countries that are estimated in this study support the positive relationship between investment and economic growth.

5.3. *Granger Causality Test*

Granger Causality test is used to check the direction of causal relationship among variables. A variable said to be Granger cause another variable when the present and past values of first variable help to predict the values of second variable. So this study uses the Granger Causality test on 5% level of significance to check the causal relationship among the variables. The decision about the null hypothesis is made according to the P-values. If P-value is less than significance level that is 0.05 then we reject the null hypothesis and accept the alternative hypothesis. The results of this test are demonstrated in the following tables separately for each country.

Table 6: Granger Causality Test For Pakistan

Null Hypothesis	F-Statistics	Probability
Pakistan		
LREX does not Granger Cause LRGDP	1.00044	0.3793
LRGDP does not Granger Cause LREX	5.15714	0.0117
LEI does not Granger Cause LRGDP	1.34894	0.2743
LRGDP does not Granger Cause LEI	14.8664	3.E-05
LRGFCF does not Granger Cause LRGDP	0.69846	0.5050
LRGDP does not Granger Cause LRGFCF	11.4097	0.0002
India		
LREX does not Granger Cause LRGDP	1.18238	0.3200
LRGDP does not Granger Cause LREX	2.71884	0.0817
LEI does not Granger Cause LRGDP	0.43556	0.6508
LRGDP does not Granger Cause LEI	2.04585	0.1464
LRGFCF does not Granger Cause LRGDP	1.17089	0.3234
LRGDP does not Granger Cause LRGFCF	3.20976	0.0541
Sri-Lanka		
LREX does not Granger Cause LRGDP	0.02673	0.9737
LRGDP does not Granger Cause LREX	0.93172	0.4050
LEI does not Granger Cause LRGDP	0.48795	0.6187
LRGDP does not Granger Cause LEI	5.04886	0.0129
LRGFCF does not Granger Cause LRGDP	2.81947	0.0755
LRGDP does not Granger Cause LRGFCF	1.56172	0.2264
Nepal		
LREX does not Granger Cause LRGDP	0.16771	0.8466
LRGDP does not Granger Cause LREX	1.19640	0.3204
LEI does not Granger Cause LRGDP	0.86512	0.4343
LRGDP does not Granger Cause LEI	1.83542	0.1822
LRGFCF does not Granger Cause LRGDP	1.72945	0.1997
LRGDP does not Granger Cause LRGFCF	1.17464	0.3268

The Granger Causality results are shown in table 6 for all under study countries. The results reveal that LRGDP is Granger causing to LREX, LEI and LRGFCF for Pakistan economy and there exist only uni-directional relationship between these variables because only their P-values are less than 0.05. The Granger causality results for Sri-Lanka shows that only LRGDP is Granger Causing to LEI because its P-value is $0.0129 \leq 0.05$. While all other null hypotheses are accepted on the basis of P-values criteria that

explains that there does not exist any causal relationship between those variables. There does not exist any causal relationship among all variables for India and Nepal economies. Because the P-values for all null hypotheses are greater than 0.05 that shows all null hypotheses are accepted and rejected their alternative hypotheses.

6. Conclusion and Policy Recommendations

The hypothesis that export instability affects the economic growth is analyzed in this study for SAARC region countries (Pakistan, India, Sri-Lanka and Nepal) by using the neoclassical aggregate production function with export and export instability as additional variables. To check the stationarity of all Variables Unit root and Augmented Ducky Fuller (ADF) test is used that shows all variables are integrated of same order and stationary at first difference and Johanson cointegration technique is used to inspect the short run and long run relationship between economic variables. The empirical results of this study conclude that export instability has negative and significant effects on economic growth for all selected SAARC region countries. The use of a neoclassical growth equation makes it possible to segregate the negative and significant effects of export instability on economic growth rate after allowing the effects of other variables for all these countries. So the results of this study are conformed with previous studies which found negative relationship between export instability and economic growth (Glezakos, 1973; Dawe, 1999; Akpokodje, 2000 and Bakar & Subramaniam, 2010). Sri-Lanka has high magnitude of export instability while Pakistan has the lowest magnitude from all selected SAARC region countries.

This study is conducted only for the impact of export earnings instability on economic growth for Pakistan, India, Nepal and Sri-Lanka. So the useful extension of this study would be to check the effects of export price instability, export quantity instability with additional explanatory variables on economic growth for all SAARC region and South Asian countries. This study also can be moved to check the effects of export diversification policies on export instability problem.

The result of this study has some development policy implications for SAARC region countries which can be helpful to reduce the negative effects of export instability on their economies. They should start the export promotion polices for strong export and economic growth relationship.

- To liberalize foreign exchange and capital markets to control the bad effects of exports fluctuations.
- Prefer market forces instead of government control for the determination of resource allocation.
- Diversify their exports horizontally and remove the geographical concentration from the economies.
- There should be strong law and order situation and there should be high penalties against war and terrorism.

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APPENDICES

APPENDIX A: LAG ORDER SELECTION CRITERIA

A 1: Lag Order Selection Criteria in Pakistan

Lag	LogL	LR	FPE	AIC	SC	HQ
0	62.74188	NA	4.10e-07	-3.356679	-3.178925	-3.295318
1	338.4625	472.6640	1.48e-13	-18.19786	-17.30909	-17.89106
2	375.5460	55.09536*	4.61e-14	-19.40263	17.80284*	18.85038*
3	394.1238	23.35507	4.41e-14*	19.54993*	-17.23913	-18.75225

A 2: Lag Order Selection Criteria in India

Lag	LogL	LR	FPE	AIC	SC	HQ
0	55.48654	NA	6.20e-07	-2.942088	-2.764334	-2.880728
1	319.4673	452.5384	4.38e-13	-17.11242	-16.22365	-16.80561
2	363.9874	66.14421*	8.93e-14*	-18.74214	17.14235*	18.18989*
3	380.0657	20.21268	9.85e-14	18.74661*	-16.43581	-17.94892

A 3: Lag Order Selection Criteria in Nepal

Lag	LogL	LR	FPE	AIC	SC	HQ
0	40.25340	NA	8.82e-07	-2.589529	-2.399214	-2.531347
1	217.7640	291.6245	8.75e-12	-14.12600	13.17442*	-13.83509
2	241.8070	32.62977*	5.33e-12*	14.70050*	-12.98766	14.17687*

A 4: Lag Order Selection Criteria in Sri Lanka

Lag	LogL	LR	FPE	AIC	SC	HQ
0	38.02542	NA	1.59e-06	-2.001495	-1.821923	-1.940256
1	283.3410	418.4795	2.22e-12	-15.49065	-14.59279	-15.18445
2	346.8796	93.43908*	1.41e-13*	-18.28703*	-16.67089*	-17.73588*
3	359.2827	15.32153	1.95e-13	-18.07545	-15.74102	-17.27935

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion