Journal of Economic Cooperation and Development, **31**, 1 (2010), 41-58

Testing Long Run Relationship between Exports and Imports: Evidence from Pakistan

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Exports and imports together play an integral role in determining the trade balance of a country. In this respect the dynamics of relationship between these variables hold significant importance and attract the researchers for testing the nature of relationship between exports and imports. This study empirically examines the long run relationship between exports and imports for Pakistan using quarterly data for the period 1972-2006. The econometric framework used for analysis is the Johansen Maximum Likelihood cointegration technique, which tests both the existence and the number of cointegration vectors. Results show that there is a long run relationship between exports and imports and the country is not in violation of its international budget constraint. Furthermore, for testing the stability of long run equilibrium relationship and direction of causality, vector error correction model (VECM) technique has been applied. The findings confirm the stability of the long run equilibrium relationship between exports and imports. Under Granger causality tests, it has been found that there exists bidirectional causality between exports and imports. Therefore, it suggests that overall macroeconomic policies are effective in bringing exports and imports into a long run steady state equilibrium. Conclusively, the trade balances are sustainable in the long run for Pakistan.

I. Introduction

Sustainability of external deficits always drew attention of the economists. During the past few years, studies performed on this argument have focused mainly on the long run relationship between exports and imports. Because the existence of a long run relationship

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between exports and imports points out that the foreign deficit is a short term fact and it is sustainable in the long run (Arize, 2002; Choong *et al*., 2004; Narayan and Narayan, 2005). Thus knowledge of whether exports and imports are cointegrated is essential for the design and evaluation of current and future macroeconomic policies aimed at achieving the external balance. As a stable long run relationship between exports and imports may suggest that a country is not in violation of its international budget constraint, policymakers in many countries have been forced to take renewed interest in the evaluation of the combined effects of all macroeconomic policies, such as exchange rate, fiscal and monetary, on the trade balance. Both the domestic and external environments play an important role in shaping the country's trade with rest of the world and the basic structure of trade consists of exports and imports composition and destinations.

Pakistan's export performance has been impressive in recent years (2002-03 to 2005-06) with exports registering an average growth of 16 percent per annum on the back of strong macroeconomic policies pursued at home and international trading environment remaining hospitable. Pakistan's export performance was dismal in 2006-07 as it witnessed abrupt and sharp deceleration to less than 4 percent. Pakistan's imports grew at an average rate of 29 percent per annum during 2002-03 to 2005-06 on the back of strong economic growth, which triggered a consequential growth in investment. The surge in investment led to a substantial increase in imports. However, import growth slowed to a normal level in the fiscal year 2006-07 but registered a sharp pick up once again in the fiscal year 2007-08 on account of unprecedented rise in oil import bills and some one off elements in the shape of imports of wheat and fertilizer[1]. As a result, Pakistan's trade and current account deficits have widened substantially in this year contributing to serious macro economic imbalances.

Pakistan's merchandise trade deficit has been in the range of $ 2 billion during 2000-2003 but started deteriorating thereafter at the back of surging oil import bill; continued strength in domestic demand, triggering consequential pick up in investment; continuous occurring of one-off imports (sugar, wheat, oil rigs, commercial aircraft etc.) and

[1] Economic Survey of Pakistan, 2007

abrupt and sharp deceleration in export growth, particularly in 2006-07. Merchandised trade deficit jumped from $ 2 billion in 2002-03 to $9.5 billion by 2006-07 –significant increase in just four years[2]. The recent deterioration in merchandise trade deficit over the last two years owes mainly to the continued robust domestic demand in the back of strong economic growth and an extraordinary rise in the international oil and food prices causing import bills to surge at new heights. The study has three main objectives. The *first* is to examine whether there exists any relationship between exports and imports for Pakistan. The *second* is to analyze the pattern of causality between exports and imports. The *third* to draw some relevant policy implications in order to improve our external sector performance.

Rest of the study is organized as follows. Section II includes the literature survey of some past studies in order to know the empirical evidence for the nature of relationship between exports and imports. Section III outlines the theoretical model. Sources of data and methodology are described in section IV. Section V presents the discussion on the estimated results. Final section concludes the study with some policy implications.

II.Literature Review

The question, whether there exists a long run relationship between exports and imports, has been investigated for a number of countries. Conflicting results have been found in the literature in this respect. To a large extent, the conflicting results reflect the fact that the studies have used different econometric techniques in their empirical investigation, some of which are not appropriate with small samples. Husted (1992) has empirically analyzed the long run relationship between exports and imports relationship using quarterly data on trade for U.S. He finds a significant slope coefficient, which is in accordance with the theory. It implies that despite short run imbalances, overall there is a tendency in U.S. exports and imports to converge in the long run. Bahmani-Oskooee (1994) has used cointegration technique and tested the long run relationship between Australian exports and imports for the sample period from 1960-1992 and found that they will converge in the long

[2] Ibid.

run. A study by Fountas and Wu (1999) has examined the quarterly data on exports and imports for U.S economy and depicts conflicting results. By using various econometric tests that include standard Engle-Granger cointegration tests and two tests that allow for test-determined breaks in the cointegrating relationship, they have shown that the hypothesis of no long run relationship between exports and imports cannot be rejected. Irandoust and Ericsson (2004) have analyzed the long run convergence between exports and imports for selected industrial countries using Johansen and Juselius cointegration technique. The findings of the research suggest that except the United Kingdom (UK) all other countries in the sample are in line with their international budget constraint. Narayan and Narayan (2005) using the bounds testing approach to cointegration have found that exports and imports are cointegrated only for 6 out of the 22 least developed countries (LDCs) in their sample. Chaudhary *et al*. (2007) empirically analyse the link between trade policy and economic growth for Bangladesh. The study has employed cointegration and multivariate Granger causality tests to view the short run and long run dynamics among exports growth, imports growth and real output growth over the period 1973 to 2002.The results strongly support a long run relationship among the three variables for Bangladesh. Saribas and Sekmen (2007) have analysed the cointegration and causality among exchange rate, export, and import for Turkey for the period 1998 to 2006. The results show that there is a long run relationship between exports and import and bi-directional causality exists between these two variables.

In case of Pakistan, some of the recent studies that have shown a significant equilibrium relationship between exports and imports include Kemal and Qadir (2005), Naqvi and Kimio (2005) and Bader (2006). However, Tang (2006) has shown that there does not exist any cointegration between exports and imports for 18 out of the 27 selected the Organization of the Islamic Conference (OIC) member countries including Pakistan. This necessitates the re-examining of the nature of relationship between exports and imports for Pakistan using quarterly data as use of sufficient number of observations under cointegration analysis produce more conclusive results. Therefore, the present exercise has been done in line with this view in mind. Furthermore; none of the above studies on Pakistan has analyzed direction of influence between exports and imports. The significance of the study also lies in the fact that it fills this gap bringing under analysis the issue of causality between exports and imports.

III.Theoretical Model

Husted (1992) has suggested a simple model for the analysis of exports and imports. Following Husted (1992), we consider consumers who live in a small, open economy with no government intervention. The consumers are assumed to maximize their utility function subject to a budget constraint, and they borrow and lend in international markets at a predetermined world interest rate to achieve maximum utility. The consumers' revenues consist of an endowment of outputs and profits distributed from firms. These revenues are used for consumption and saving. Hence, the individual's current period budget constraint is as follows:

$$C_t = Y_t + B_t - I_t - (1 + r_t)B_{t-1} \qquad (1)$$

where C_t is current consumption; Y_t is output level; I_t is investment; r_t is the current world interest rate; B_t is the international borrowings; and $(1 + r_t)\ B_{t-1}$ is the debt of the previous period, this corresponds to the country's external debt. Since equation (1) must hold in every time period, the period-by-period budget constraints can be combined to form the country's intertemporal budget constraint which states that the amount a country borrows (lends) in international markets equals the present value of future trade surpluses (deficits). Husted then makes several assumptions to derive a testable model, which is given by

$$X_t = \gamma_0 + \gamma_1 M_t + \nu_t \qquad (2)$$

where X_t is exports and M_t is imports of goods and services. Equation (2) states that a country satisfies its inter-temporal budget constraint if the estimated coefficient of M_t equals to unity ($\gamma = 1$) and ν_t is white noise disturbance term and stationary. If both the conditions are valid, then exports and imports are cointegrated. Besides these two variables, we will include another very important variable that is exchange rate in our estimation model in order to test the long run relationship between exports and imports under multivariate cointegration framework.

IV.Data And Methodology

The study has used quarterly observations for the period 1972 to 2006. The data, seasonally unadjusted and expressed in nominal terms, for imports, exports and nominal exchange rate have been obtained from various issues of *Economic Survey,* Government of Pakistan and IMF's *International Financial Statistics*. The nominal exports and imports are converted into corresponding real variables by deflating them by export and import price indices. Also the exchange rate is made real by multiplying nominal exchange rate with U.S (CPI) deflated by Pakistan's (CPI). The real exports, imports and exchange rate are represented by RX, RM and RER respectively.

IV.1. Unit Root Test

Since macroeconomic time-series data are usually non-stationary (Nelson and Plosser, 1982) and thus conducive to spurious regression, we test for stationarity of a time series at the outset of cointegration analysis. For this purpose, we conduct an augmented Dickey-Fuller (ADF) test, which is based on the t-ratio of the parameter in the following regression.

$$\Delta X_t = \kappa + \phi t + \Theta_i X_{t-i} + \sum_{i=1}^{n} \varphi_i \Delta X_{t-i} + \varepsilon_t \quad (3)$$

where X is the variable under consideration, Δ is the first difference operator, t captures any time trend, ε_t is a random error, and n is the maximum lag length. The optimal lag length is identified so as to ensure that the error term is white noise. While κ, ϕ, Θ *and* φ are the parameters to be estimated. If we cannot reject the null hypothesis $\Theta = 0$, then we conclude that the series under consideration has a unit root and is therefore non-stationary.

It is essential at the onset of cointegration analysis, that we should solve the problem of optimal lag length because multivariate cointegration analysis which we are going to conduct in the study is very sensitive to lag length selection. The two most commonly used lag length selection criteria are the Akaike Information Criterion (AIC) and the Schawartz Bayesian Criterion (SBC).Although there are several different ways to report the criteria, all will select the same lag length. In our study we will use the following formulas:

AIC = T ln (Sum of squared residuals) + 2n (4)

SBC = T ln (Sum of squared residuals) + nln (T) (5)

where

n = number of parameters estimated

T = number of usable observations

Since ln (T) will be greater than 2,the SBC will always select a more appropriate lag length than will the AIC.Ideally, the AIC and SBC will be as small as possible (note that both can be negative). As the fit of the model improves, the AIC and SBC will approach $-\infty$.

IV.2.Cointegration Test

The econometric framework used for analysis in the study is the Johansen (1998) and Johansen and Juselius (1990) Maximum-Likelihood cointegration technique, which tests both the existence and the number of cointegration vectors. This multivariate cointegration test can be expressed as:

$$Z_t = K_o + K_1 \Delta Z_{t-1} + K_2 \Delta Z_{t-2} + ... + K_{p-1} \Delta Z_{t-p} + \Pi Z_{t-p} + \mu_t \qquad (6)$$

Where

$Z_t = (RX, RM, RER)$

$Z_t =$ a 3 x 1 vector of variables that are integrated of order one [i.e. $I(1)$]

RX, *RM* and *RER* are real exports, real imports and real exchange rate respectively

$K =$ a 3 x 3 matrix of coefficients

$\Pi =$ 3 x 3 matrix of parameters and

$\mu_t =$ a vector of normally and independently distributed error term.

The presence of r cointegrating vectors between the elements of Z implies that Π is of the rank $r(0 < r < 3)$.

To determine the number of cointegrating vectors, Johansen developed two likelihood ratio tests: Trace test (λ_{trace}) and maximum eigenvalue test (λ_{max}.).If there is any divergence of results between these two tests, it is advisable to rely on the evidence based on the λ_{max} test because it is more reliable in small samples (see Dutta and Ahmed, 1997 and Odhiambo, 2005).

IV.3. Granger Causality

If we exploit the idea that there may exist comovements among real exports, real imports and real exchange rate and possibilities that they will trend together in finding a long run stable equilibrium, by the Granger representation theorem (Engle and Granger 1987), we may posit the following testing relationships, which constitute our vector error-correction model:

$$\Delta RX_t = \alpha_1 + \sum_{i=1}^{l}\beta_{1i}\Delta RX_{t-1} + \sum_{i=1}^{m}\gamma_{1i}\Delta RM_{t-1} + \sum_{i=1}^{n}\delta_{1i}\Delta RER_{t-1} + \sum_{i=1}^{r}\theta_{1i}ECT_{r,t-1} + \xi_{1t} \quad (7)$$

$$\Delta RM_t = \alpha_2 + \sum_{i=1}^{l}\beta_{2i}\Delta RX_{t-1} + \sum_{i=1}^{m}\gamma_{2i}\Delta RM_{t-1} + \sum_{i=1}^{n}\delta_{2i}\Delta RER_{t-1} + \sum_{i=1}^{r}\theta_{2i}ECT_{r,t-1} + \xi_{2t} \quad (8)$$

$$\Delta RER_t = \alpha_3 + \sum_{i=1}^{l}\beta_{3i}\Delta RX_{t-1} + \sum_{i=1}^{m}\gamma_{3i}\Delta RM_{t-1} + \sum_{i=1}^{n}\delta_{3i}\Delta RER_{t-1} + \sum_{i=1}^{r}\theta_{3i}ECT_{r,t-1} + \xi_{3t} \quad (9)$$

where RX ,RM,RER have been explained in section IV, Δ is a difference operator, ECT refers to the error-correction term(s) derived from long run cointegrating relationship via the Johansen maximum likelihood procedure, and $\zeta_{it's}$ (for i = 1, 2, 3) are serially uncorrelated random error terms with mean zero. In our case, equation 7 will be used to test causation from real imports and real exchange rate to real exports. Equation 8 will be used to test causality running from real exports and real exchange rate to real imports whereas equation 9 will test causality running from real exports and real imports to real exchange rate. A consequence of relationships described by equations 9 to 11 is that either ΔRX_t, ΔRM_t, ΔRER_t or a combination of any them must be caused by ECT_{t-1} which is itself a function of RX_{t-1}, RM_{t-1}, and RER_{t-1}. Through the ECT, the error correction model (ECM) opens up an additional channel for Granger causality to emerge that is completely ignored by the standard Granger and Sims tests. The Granger causality (or endogeneity of the dependent variable) can be exposed either through the statistical significance of (1) the lagged *ECT*s (θ'$_s$) by a t=test; (2) a joint test applied to the significance of the sum of the lags of each explanatory variables (β'$_s$, γ'$_s$, and δ'$_s$) in turn, by a joint F or Wald χ^2 test. The nonsignificance of both the t and F or Wald χ^2 tests in the vector error correction model (VECM) indicates econometric exogeneity of the dependent variable. In addition to indicating the direction of causality amongst variables, the VECM approach allows us to distinguish between "short run" and "long run" Granger causality. The F or Wald tests of the "differenced" explanatory variables give us an indication of the "short run" causal effects, whereas the "long run" causal relationship is implied through the significance or otherwise of the t test(s) of the lagged error-correction term(s) that contains the long-term information since it is derived from the long run cointegrating relationship(s). The coefficient of the lagged error-correction term, however, is a short term adjustment coefficient and represents the proportion by which the long run disequilibrium (or imbalance) in the dependent variable is being corrected in each short period (Masih and Masih, 1997).

V. Empirical Results and Interpretation

The first step in cointegration analysis is to test the unit roots in each variable[3]. To this end we apply Augmented Dickey-Fuller (ADF) stationarity tests on logarithmic form of RX, RM and RER. Table 1 reports the results of the ADF test for the level as well as for the first-difference of the relevant variables. The results show that unit root tests applied to the variables at levels fail to reject the null hypothesis of non-stationarity of all the variables used. It implies that all the variables are non-stationary at levels. The null hypothesis is accepted when the series are first-differenced i.e. all variables are first-differenced stationary. This implies that all the series are integrated of order one [i.e. *I* (1)].

[3] Since the cointegration methodology involves finding a stationary linear combination of a set of variables, which are themselves non-stationary, therefore, a precondition for cointegration to be held is that all variables should be non-stationary.

Table 1.Augmented Dickey Fuller (ADF) Unit Root Tests

Variables	Level	First Difference	Mackinnon Critical Values for Rejection of Hypothesis of a Unit Root 1 %	5 %	10 %	Decision	Order of Integration
ln(*RX*)	0.614	-18.977	-2.583	-1.94	-1.62	Nonstationary at level but stationary at first difference	*I(1)*
ln(*RM*)	1.154	-18.53908	-2.583	-1.94	-1.62	Nonstationary at level but stationary at first difference	*I (!)*
ln(*RER*)	1.0865	-25.16168	-2.583	-1.94	-1.62	Nonstationary at level but stationary at first difference	*I(1)*

For getting optimal lag length for cointegration analysis, we have used two criteria, namely the Akaike Information Criteria (AIC) and the Schwarz Bayesian Criteria (SBC). SBC has suggested a lag length of 5 as optimal, while AIC has indicated 8 as optimal lag length (Table 2). However, We have selected optimal lag length 5 as suggested by SBC because of following two reasons, firstly, SBC is more accurate than AIC as we have discussed in section IV.1 and secondly, when we use the lag length 8 for our cointegration analysis, we have found no cointegrating vector under both trace and maximum eigen statistics. While at lag length 5 we are getting 1 cointegrating vector under both these statistics.

Table 2.Lag Length Criteria

Lag	AIC	SBC
0	-0.25872	-0.1932
1	-6.1782	-5.91612
2	-6.30666	-5.84803
3	-6.3405	-5.68532
4	-6.90963	-6.05789
5	-7.10757	-6.059280*
6	-7.00447	-5.75962
7	-6.95937	-5.51797
8	-7.147499*	-5.50954

*indicates lag order selected by the criterion
AIC: Akaike information criterion
SBC: Schwarz Bayesian criterion

Cointegration relationship among lnRX, lnRM and lnRER has been investigated using the Johansen technique. Table 3 reports our cointegration test results based on Johansen's maximum likelihood method. Both trace statistic (λ_{trace}) and maximal eigenvalue (λ_{max}) statistic indicate that there is at least one cointegrating vector among lnRX, lnRM and lnRER. We can reject the null hypothesis of no cointegrating vector in favour of one cointegrating vector under both test statistics at 5 percent level of significance. We also cannot reject the null hypothesis of at most one cointegrating vector against the alternative hypothesis of two cointegrating vectors, for both the trace and max-eigen test statistics. Consequently, we can conclude that there is only one cointegrating relationship among lnRX, lnRM and lnRER. This implies that imports, exports and exchange rate establish a long run relationship in Pakistan. Our finding is consistent with Kemal and Qadir (2005), Naqvi and Kimio (2005) and Bader (2006). Naqvi and Kimio (2005) opine that Pakistan's government has been playing crucial role in stabilizing the trade balances (exports and imports), and that overall macroeconomic policies have been effective in leading exports and imports into a long run steady state equilibrium relationship. All this indicates the adherence of Pakistan to international budget constraint, which shows that Pakistan is not in violation of its international budget constraint because as pointed by Husted (1992) the necessary condition for an economy to obey its international budget constraint is the existence of cointegration between its exports and imports.

Table 3.Cointegration Test Based on Johansen's Maximum Likelihood Method

Null Hypothesis	Alternative Hypothesis			Critical Values	
				95 %	P-values**
λ_{trace} rank tests		Eigen values	λ_{trace} rank value		
$H_0: r = 0$	$H_1: r = 1$	0.131709	39.2308**	35.19275	0.0174
$H_0: r = 1$	$H_1: r = 2$	0.082656	17.43485	20.2618	0.1171
$H_0: r = 2$	$H_1: r = 3$	0.0511	5.40464	9.1645	0.242
$\lambda_{\max}$ rank tests			$\lambda_{\max}$ rank value		
$H_0: r = 0$	$H_1: r > 0$	0.131709	23.92458**	22.2996	0.0486
$H_0: r \leq 1$	$H_1: r > 1$	0.082656	11.56055	15.8921	0.213
$H_0: r \leq 2$	$H_1: r > 2$	0.0511	7.028555	9.1645	0.1249

Normalized Cointegrating Coefficients:

ln(*RX*) = -6.321 + 0.890ln*(*RM*) + 0.477ln*(*RER)*

(-3.744)*** (1.873)** (7.101)***

*** denotes rejection of the null hypothesis at the 1 percent significance level.

** denotes rejection of the null hypothesis at the 5 percent significance level.

**MacKinnon-Haug-Michelis (1999) p-values.

Trace test indicates 1 cointegrating equation(s) at 5 percent significance level.

Max-eigenvalue test indicates 1 cointegrating equation(s) at 5% significance level.

The cointegrating equation, which is given at the bottom of the table 3, has been normalized for lnRX just to get meanings from the coefficients. As all variables are logarithmic, we may interpret coefficients in terms of elasticity. So we may say that 1 percent increase in imports is associated with 0.89 percent increase in Pakistan's exports. The coefficient of exchange rate is also significant, and its value is 0.477 showing that 1percent increase (decrease) will decrease (increase) exports by 0.477 percent. Thus, export elasticity with respect to imports is more elastic as compared to export elasticity with respect to real exchange rate. It points out towards making our economy more open and our imports should be less restricted.

Table 4.Summary Results from VECM

	$\Delta \ln(RX)$	$\Delta \ln(RM)$	$\Delta \ln(RER)$
Constant	0.02671	0.018922	0.007355
	(1.99724)**	(1.99159)**	(2.26470)**
$ECT(-1)$	-0.1661	0.130643	-0.04215
	(-2.74285)***	(3.08113)**	(-3.07692)**
R^2	0.706884	0.597216	0.273271
Adjusted R^2	0.6668	0.542135	0.173889
S.E. of Regression	0.127718	0.090735	0.031016
F-Stat	17.63498	10.8424	2.749711

** and *** denotes rejection of the hypothesis at the 5 percent and 1 percent significance level respectively.

Having established that all variables in the model are $I(1)$ and cointegrated , a VECM with one cointegrating relation and five lags in each equation has been estimated. The VECM allows the long run behavior of the endogenous variables to converge to their long run equilibrium relationship while allowing a wide range of short run dynamics. The coefficient of the error-correction term of export variable carries the correct sign and it is statistically significant at 1 percent, with the speed of convergence to equilibrium of 16 percent (see Table 4). Thus in the short run, exports are adjusted by 16 percent of the past year's deviation from equilibrium. It confirms the stability of the system. As large absolute values of the coefficient on the ECT shows equilibrium agents remove a large percentage of disequilibrium in each period i.e. the speed of adjustment is very rapid. While low absolute values are indicative of a slow speed of adjustment towards equilibrium. It means that speed of adjustment of expots towards equilibrium is slow one. The coefficient of the error correction term of imports has positive sign and it is statistically significant at 5 percent level. It implies that due to any disturbance in the system, divergence from equilibrium will take place and the system will be unstable. The coefficient of the error correction term of exchange rate carries negative sign and it is significant at 5 percent level. It depicts stability of the system and convergence towards equilibrium path in case of any disturbance in the system. However, the restoration to equilibrium path will take a longer time because the value ECT is quite small (0.042). The significant coefficients of the error correction terms for each time series depict that they all cause one another in the long run.

Table 5.VEC Granger Causality Test

Dependent Variable = D(lnRX)

Excluded	Chi-sq	df	Prob.
D(lnRM)	20.57166	5	0.001
D(lnRER)	15.79635	5	0.0075

Dependent Variable = D(lnRM)

Excluded	Chi-sq	df	Prob.
D(lnRX)	19.23856	5	0.0017
D(lnRER)	3.646524	5	0.6013

Dependent Variable = D(lnRER)

Excluded	Chi-sq	df	Prob.
D(lnRX)	6.813396	5	0.2349
D(lnRM)	4.476271	5	0.4831

Finally, in order to analyse short run causal relationships among lnRX, lnRM and lnRER for each equation in the VECM, we consider $\chi 2$ (Wald) statistics for the significance of the lagged endogenous variables in that equation. Table 5 reports the results. Real imports and real exchange rate both cause real exports. It validates our findings of the long run relationship among exports, imports and exchange rate. Real imports are being caused by real exports while real exchange rate does not Granger cause real imports. So, there exists a bi-directional Granger causality between exports and imports in Pakistan. This result is consistent with Saribus and Sekmen (2007) who have provided the same evidence for Turkey. It is further suggestive of the need to inquire the nature of relationship between exports and imports in simultaneous equations framework instead of doing it in single equation model for Pakistan. As for as the case of real exchange rate is concerned, both of exports and imports are not Granger causing it. It implies that unidirectional causality is running from real exchange rate to real exports only.

VI. Conclusion and Policy Implications

The long run relationship between exports and imports is of significant importance due to fact that it reflects the sustainability of foreign trade situation of a country. The main objective of the study is to investigate the long run relationship between Pakistan's exports and imports by applying cointegration and vector error correction model techniques. We have used quarterly data for real exports, real imports and real exchange rate for the period 1972 to 2006.

The results of the ADF unit root tests demonstrate that all series are non-stationary at their levels but stationary at their first difference i.e. they are integrated of order one i.e. $I(1)$. Then we move forward by applying the Johansen multivariate cointegration test in order to investigating the long run relationship among exports, imports and exchange rate. The results indicate the existence of one cointegrating vector among these variables. Real imports positively and significantly affect real exports. The value of coefficient of real imports is 0.89, which is close to unity. It shows that trade deficit is sustainable in the long run for Pakistan. Real exchange rate is also significant determinant of real exports and it is positively affecting real exports. The value of coefficient of real exchange rate is 0.477.As all the three variables used in our study are logarithmic, we can interpret the values of their coefficients as elasticities. Therefore, we may say that exports are relatively more elastic w.r.t. imports than w.r.t. exchange rate.

Furthermore, we have tested the stability of the equilibrium using VECM.The results indicate that the coefficient of the error-correction term of export variable carries the correct sign (negative) and it is statistically significant at 1 percent, with the value 0.16. It shows that in any case of disequilibrium, the system will converge towards equilibrium path. In every period there will be 16 percent convergence for restoring the long run equilibrium position. The coefficients of the error correction term of imports have the positive sign but statistically significant at 5 percent level for exports and depict divergence from the long run equilibrium in the system. Also the coefficients of exchange rate with negative sign and significance at 5 percent depict convergence towards equilibrium, but the period of convergence will take a longer time, as the value is quite small. The significant error correction terms for each time series imply that they Granger cause one another in the long run. However, in the short run both real exports and real imports Granger cause each other while real exchange rate is not being caused by either of them. Furthermore, unidirectional causality is running from real exchange rate to real exports and real exchange rate does not Granger cause real imports. The overall analyses show that both exports and imports are cointegrated. It implies that Pakistan is not in violation of its international budget constraint. Thus the trade balances are sustainable in the long run for Pakistan.

The policy implication of the exercise is straightforward. On the face of burgeoning trade deficit, there is a need to analyse the different policy options to control trade imbalances. In this context, restricting imports through tariff measures might not be desirable as they will also affect exports and furthermore it will be a tough choice given the country's obligation under World Trade Organization (WTO) commitments. Thus any slowdown in trade imbalance could only be achieved through appropriate exchange rate adjustments that should be quite favorable in boosting our export performance.

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