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Aggregate Exports Response to Trade Openness: Bounds Testing Approach for Pakistan

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Abstract: Trade liberalization has the potential to promote exports which plays dynamic role in the growth and development process of a nation's economy. This paper examines the impacts of trade openness measures on aggregate exports in Pakistan for the period of 1972-2010 by using Auto Regressive Distributed Lag (ARDL) approach. The empirical finding reveals that there exists a unique long-run relationship among real aggregate export, trade openness policies, production capacity and world income. As, export duty shows a statistically significant impact on exports in the short run, however, in the long run export duties attested to be insignificant. World income and production capacity both appears highly elastic in both the short run and in the long run. The relative price is significant in the short run but insignificant in the long run which reflects that any change in relative price due to exchange rate fluctuation will increase export in the short run. The trade openness dummy which reflected the impact of trade openness polices adopted in differed time period prove to significant in the long run and insignificant in the short which reflect the fact that exports responds to these policies in the longer time period then the short run period. The short-term dynamic behavior of Pakistan's export supply has been investigated by estimating an error correction model in which the error correction term has been found to be correctly signed and statistically significant. The results are robust not only in terms of statistical powers, but also in terms of economic instinct.

Jel Classification Code: E31 · F41
Key words: Exports · Trade openness · Relative prices · Cointegration · Pakistan

INTRODUCTION

Trade liberalization has the potential to promote exports which plays dynamic role in the growth and development process of a nation's economy [1]. According to UNCTAD [2] report also emphasis the role of trade in determining economic and social performance of countries, particularly developing countries. International trade encourages growth by enabling countries to specialize in goods and services, increasing competition and encouraging technological change based on 'competitive and comparative advantage [3]. As a result, the world would be able to consume more and better quality products at lower prices which will increase total world welfare. According to Milner [4], trade liberalization promotes exports by eliminating the strong anti-export biases created by quantitative restrictions and tariffs. For example, liberalizing tariffs on intermediate inputs for export production eliminates the input tax source of bias and lowering tariffs on imports of raw materials and capital good inputs for exports improves the competitiveness of the export sector vis-à-vis the rest of the world.

Therefore, almost all the developing countries of Asia, Latin America and Africa have adopted trade openness policies over the last four decade. Similarly, Pakistan has also adopted trade openness policies since mid 1980s under the series of Structural Adjustment Programme (SAP) developed by International Monitory Fund and World Bank. The objective of the paper is:

- To examine the potential impact of trade openness policies i.e. exports duties and other non tariff barriers on export growth both in the short run and long run.

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- To examine how changes in price competitiveness, world income and productive capacity affect the export performance in the short run and long run.

The study is arranged in the following manner: literature review is carried out in section 2 while data source and variables are mentioned in section 3. Research methodology and econometric model is explained in section 4. Results and discussion are stated in section 5, while the paper concludes in the last section.

Literature Review: The idea that the trade openness plays an important role because it increases the growth of exports and imports has been focused in various studies. Walter [5] studied the effects of non tariff barriers (NTB) on export growth for developing countries and concludes that NTB operate almost the same way as do the tariffs. According to him, import charges have similar effects to those of quotas and the impact of selective subsidies to import competing supplier is likewise similar to that of tariffs as regards the volume of trade and the national economic structure but quite different with respect to the fiscal aspects and domestic prices. The study also concludes that in some developing countries other supply side factors like domestic absorption, quality control, marketing techniques and their own import restrictions were judged even more serious barriers to increase exports than the tariff and non tariff barriers.

Using Flavery-Gemmell Modified Model, Greenway & Sapsford [6] examined the impact of trade openness measures on exports and economic growth for 19 developing countries. The study concluded that the trade openness measures lead to a significant increase in aggregate exports. Chadha [7] also find the positive impact of reduction in NTB on exports growth for India using CGE model. Ahmed [8] studied the relationship between export growth and trade openness measure in Bangladesh for 1974-1995 by applying co-integration and error correction model techniques and found short run as well as long run relationship between internal and external variables. Similarly, Sharma *et al* [9] studied the impact of trade openness measures on export growth for Nepal and did not find any relationship between protection measures and export growth. By taking the export duties as a measure of trade openness, Paulino [10] estimated the impact of trade openness on export growth for 22 developing countries of Asia, Latin America and Africa, including Pakistan for 1972-1998 time periods. He applied the dynamic panel data models based on Fixed Effects and Generalized Methods of Moments estimators. He concluded that export duties have negative impact on export growth and trade openness has significant positive impact on export growth and caused an increase in export growth by 2 percentage points. Moreover, he also found that real exchange rate depreciation positively effect export growth although the size of elasticity is small. The study also observed a positive impact of world income growth on the export of developing countries.

Similarly, using time series data, Jayanthakumaran [11] examined the impact of trade openness reforms on manufacturing exports during the time period of 1968-2003 for Australia. The study concluded that there is strong link between falling protections and increase exports growth of manufacturing sector. His findings also showed that the relationship between export growth and intra-industry trade is significant among the branches where imports increased and this seems to highlight the significance of intra-industry trade in encouraging export growth. The export performance of Bangladesh after the rapid trade openness in the early 1990s was also evaluated by Mohiuddin [12], using the secondary data. The study concluded that the trade-GDP ratio of Bangladesh has increased significantly in 1990s reflecting the greater openness of the economy to the external world because its exports showed increase in 1990s as compared to previous decade. Export structure also changed from the primary goods and traditional items to the secondary and non-traditional items. The dominant export item, the ready made garments which covered almost the 80 percent of total exports may become challenging and difficult to maintain after the abolishment of Multi-Fiber Arrangement (MFA) quotas. Wu and Zeng [13] examined the impact of trade openness measures on imports, exports and the balance of trade for 39 developing countries of Asia, Latin America and Africa. The results estimated showed a strong and consistent indication that trade openness in developing countries promotes both imports and exports. Adewuyi & Akpokodje [14] examined the impact of trade openness on Nigeria's import and export flows. Econometric analysis revealed that the world income has significant augmenting impact on the aggregate exports. However, trade openness reforms have not originated an

impact that is powerful enough to enhance Nigeria's trade flows. Shamsadini *et al*. [15] examines the relationship between openness and growth in the selected MENA countries over a period of 1980-2005. The result reveals that there is a long-run relationship between openness and growth in Algeria, Jordan, Kuwait, Lebanon and Syria.

In case of Pakistan, various researchers have analyzed the impact of devaluation and other trade related measures on export growth using 3SLS (three stage least square) technique. Hasan and Khan [16] analyzed the impact of devaluation on trade balance, exports, imports and price level of Pakistan for the period of 1972-1991. The study concluded that the policy of devaluation (exchange rate management) improve the trade balance. Moreover, the Marshall Learner condition of devaluation for Pakistanis is also satisfied which further proves the argument that the devaluation is to be successful in improving trade balance. The import and export elasticities were also estimated by various researchers for Pakistan. Aftab and Aurangzeb [17] re-examined the long-run elasticities and existence of Marshall – Lerner condition. They empirically tested the trade performance of Pakistan with ten major trading partners and reconfirmed the satisfaction of Marshall - Lerner condition using quarterly data for the period of 1980-2000. By using Johansen co-integration technique, Afzal [18] re-investigating Marshal Learner condition for Pakistan by estimating the long run trade elasticities for the period of 1960 to 2003. The study concluded that although Marshal Learner condition holds true but despite this the trade balance does not improve significantly. It may be due to that the devaluation sets other forces in motion that tend to neutralize the positive effects of devaluation. However, this study did not indicate the impacts of trade openness on imports and exports by using any appropriate measure of openness or liberalizations. By using Lucas's endogenous growth model, Dutta and Ahmed [19] empirically tested the impact of trade policies on industrial growth in Pakistan during the period 1973 - 1995. The error correction modeling and co-integration techniques were applied. The empirical finding suggested that there a unique long-run relationship among growth of value added output and, import duties rates and real exports. The short term dynamic behavior of Pakistan's value added output performance was also found to be statistically significant with conventional signs. The effect of South Asian Free Trade Agreement (SAFTA) on Pakistan was analyzed by Shaikh & Rahpoto [20]. They applied CGE model and the result suggested that Pakistan would experience highest welfare gain under the combine policy reform adopted in SAFTA through larger economies of scales in production, increase in competition, specialization, expansion of aggregate exports and greater employment opportunities.

The impact of trade openness on different components of balance of payments for various developing and developed countries has been focused in various studies. However, very little work has been done in the context of Pakistan so far. Therefore, the present study estimate the long run and short run impact of trade openness measures on aggregates exports, imports and trade balance in Pakistan by using ARDL model.

Data Source and Variables Construction: The study implies annual observations for the period of 1972-2010. The data is obtained from World Development Indicators published by the World Bank [21] and GoP [22]. The variables used In this study are: aggregate exports and imports (fob), trade balance, Real Gross Domestic Product of the world and domestic country (Pakistan), nominal exchange rate, exports and import duties, trade openness and the interaction dummies. All the data was firstly converted in to billion rupees (i.e., local currency unit of Pakistan) and then their real values were obtained by keeping 2005 as base year.

Construction of Variables and Their Justifications: The following variables have been used in this study i.e.,

Production Capacity of the Economy: Production Capacity is the supply side determinant of exports [9, 23, 24]. An increase in production capacity will cause an increase in exports growth because additional output can earn foreign exchange by selling it in world market. Therefore, the positive impact of GDP on exports growth is expected. In empirical literature, Kumar [25], Ahmed [24], Thirlwall [26] and Lopez [3] confirmed the positive impact of GDP on exports.

Price Competitiveness: A fall in the relative domestic prices due to exchange rate depreciation makes exports cheaper in international markets resulting in increased

demand for exports; therefore we expect the positive impact of real exchange rate on export growth. Thirlwall [25] and Lopez [3] confirmed the inverse relationship between exports growth and price competitiveness[1].

Real World GDP: World income[2] has positive impact on exports growth. An increase in world income level will lead to an increase export growth. Thirllwall [25] and Lopez 16] estimated the positive relationship between world income and export growth.

Export Duties: Export tariff inversely effect the export growth. An increase in export duties will tend to decrease export growth and vice versa. Lopez [3] verified the inverse relationship between export duties and export growth. The data of export duties was collected from CBR. Export duties are define as the levies collected on goods at the time of export to other country. We find the export duties simply by dividing export duties with their respective value of the exports.

Trade Openness Dummy: Pakistan government adopted the mixture of reforms packages for trade liberalization policies in the mid 1980s, therefore, the present study taken trade openness dummy variables for finding the impact of these reforms in the context of Pakistan. Dummy variable takes the value of zero prior to the trade openness episode and one afterwards. Similarly by following the methodology of Paulino and Thirwall [27], the present study also introduces two interaction dummies to capture the impact of trade openness measures on relative prices and world income.

There is a lack of internationally defined and globally comparable measure of a country's trade orientation because there are important conceptual difficulties in defining and measuring trade openness. Several measures for trade openness are available in the current literature adopted by different researchers. For example some researchers define trade openness as the ratio of export plus imports to GDP while other used dummy variable. Here we do not use import plus exports to GDP ratio index as a measure of trade openness because our intention is to investigate the effect of trade openness on aggregate imports and exports and if we use the index of openness itself includes the aggregate exports and imports as a variable then the relationship may become specious. Therefore we use openness dummy as an indicator for the year in which major trade openness took place.

In order to measure the trade openness, the main approach used is the identification of the years where the timing of openness is assessed by a set of guideline such as tariff reforms, relaxation of non tariff barriers, export promotion and exchange rate alteration [10]. Moreover, it is also a commonly used index in the existing literature which captures also the extent of import openness that might have spill over effect on exports. Therefore, openness dummy is best suited for our study.

Methodological Frameowrk: To analyze the impact of various factors on aggregate exports for Pakistan, the following aggregate exports function is developed:

$$Ex_t = f(P_t, Yw_t, PGDP_t, EXD_t, OP, OP \times YW, OP \times P_t) \quad (1)$$

Where, Ex_t represents the aggregate exports; P_t is the Price competitiveness; Yw_t is the world income $PGDP_t$ is the Production Capacity of the Economy; OP is the trade openness dummy; EXD_t is ratio of export duties to total exports where as $OP*YW_t$ and $OP*P_t$ are interaction dummy capture the impact trade openness measures on relative prices and world income.

Econometric Framework of the Study: In this study autoregressive distributed lag (ARDL) model or bounds testing approach [28] has been used to check the existence of short and long-run relationships between exports growth, world income, price competitiveness, production capacity, export duties and trade openness dummies in the specific context of Pakistan. Econometric theory designate a set of variables is co-integrated if there is a linear combination among them without stochastic trend. In this case, a long-run relationship subsists between these variables. However, this implication is only valid if the obligation of the same order of integration has been met. Assume an explanatory variable, which is stationary at level is regressed with another variable, which is non-stationary at level but is first-difference stationary, then this will capitulate a spurious regression and thereby give a deceptive and erratic conclusion.

The use of the bounds technique is based on three validations. First, Pesaran *et al*. [28] advocated the use of

[1]It is the rate of change of competitiveness. $P_t = P_f + NER - P_d$, Where; P_t = is the real exchange rate; P_f= is the foreign price (CPI and USA), P_d= is the domestic price (CPI of Pakistan); NER = nominal exchange rate

[2]The data for World GDP is taken by the difference between world GDP and domestic country GDP, i.e. Y_{wt} = (World GDP-GDP).

the ARDL model for the estimation of level relationships because the model suggests that once the order of the ARDL has been recognized, the relationship can be estimated by OLS. Second, the bounds test allows a mixture of I(1) and I(0) variables as regressors, that is, the order of integration of appropriate variables may not necessarily be the same. Therefore, the ARDL technique has the advantage of not requiring a specific identification of the order of the underlying data. Third, this technique is suitable for small or finite sample size [28].

Following Pesaran *et al*. [28], we assemble the vector autoregression (VAR) of order *p,* denoted VAR (*p*), for the following growth function:

$$Z_t = \mu + \sum_{i=1}^{p} \beta_i z_{t-i} + \varepsilon_t$$

Where z_t is the vector of both x ,and y , ,where y is the dependent variable defined as Aggregate Exports, x_t is the vector matrix which represents a set of explanatory variables i.e., World income level ;Price competitiveness, Production Capacity, Export duties and Trade openness dummy and t is a time or trend variable. According to Pesaran *et al*. [28], y_t must be I(1) variable, but the regressor x_t can be either I(0) or I(1). We further developed a vector error correction model (VECM) as follows:

$$\Delta z_t = \mu + \alpha t + \lambda z_{t-1} + \sum_{i=1}^{p-i} \gamma_t \Delta y_{t-i} + \sum_{i=1}^{p-1} \gamma_t \Delta x_{t-i} + \varepsilon_t$$

Where Δ is the first-difference operator. The long-run multiplier matrix λ as:

$$\lambda = \begin{bmatrix} \lambda_{YY} \lambda_{YX} \\ \lambda_{XY} \lambda_{XX} \end{bmatrix}$$

The diagonal elements of the matrix are unrestricted, so the selected series can be either I(0) or I(1). If $\lambda_{YY} = 0$, then Y is I(1). In contrast, if $\lambda_{YY} < 0$, then Y is I(0).

The VECM procedures described above are imperative in the testing of at most one cointegrating vector between dependent variable y_t and a set of regressors x_t. To derive model, we followed the postulations made by Pesaran *et al*. [28] in Case III, that is, unrestricted intercepts and no trends. After imposing the restrictions $\lambda_{YY} = 0$ $\mu \neq 0$ and $\alpha = 0$, the function can be stated as the following unrestricted error correction model (UECM):

$$\begin{aligned} \Delta LEX_t = {} & \beta_0 + \beta_1 LEX_{t-1} + \beta_2 LP_{t-1} + \beta_3 LPGDP_{t-1} + \\ & \beta_4 LEXD_{t-1} + \beta_5 LYW_{t-1} + \beta_6 OP + \beta_7 (OP \times YW) + \\ & \beta_8 (OP \times P) + \sum_{i=1}^{p} \beta_9 \Delta (LEX)_{t-i} + \sum_{i=0}^{q} \beta_{10} \Delta (LP)_{t-i} + \\ & \sum_{i=0}^{r} \beta_{11} \Delta (LPGDP)_{t-i} + \sum_{i=0}^{s} \beta_{12} \Delta (EXD)_{t-i} + \\ & \sum_{i=0}^{t} \beta_{13} \Delta (LYW)_{t-i} + u_t \end{aligned} \quad (2)$$

Where Δ is the first-difference operator and u_t is a white-noise disturbance term where as rest of the variables are explained earlier. Equation (2) indicates that aggregate exports tend to be influenced and explained by its past values. The structural lags are established by using minimum Akaike's information criteria (AIC). From the estimation of UECMs, the long-run elasticities are the coefficient of one lagged explanatory variable (multiplied by a negative sign) divided by the coefficient of one lagged dependent variable [29]. For example, in equation (2), the long-run inequality, investment and growth elasticities are (β_2/β_1), (β_3/β_1), β_4/β_1 and β_5/β_1 respectively. The short-run effects are captured by the coefficients of the first-differenced variables in equation (2).

After regression of Equation (2), the Wald test (*F*-statistic) was computed to differentiate the long-run relationship between the concerned variables. The Wald test can be carry out by imposing restrictions on the estimated long-run coefficients of aggregate exports and its determinants. The null and alternative hypotheses are as follows:

H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$. (no long-run relationship) Against the alternative hypothesis

H_A: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$. (a long-run relationship exists)

The computed *F*-statistic value will be evaluated with the critical values tabulated in Table CI (iii) of Pesaran *et al*. [28]. According to these authors, the lower bound critical values assumed that the explanatory variables x_t are integrated of order zero, or I(0), while the upper bound critical values assumed that x_t are integrated of order one, or I(1). Therefore, if the computed *F*-statistic is smaller than the lower bound value, then the null hypothesis is not rejected and we conclude that there is no long-run relationship between aggregate exports and its determinants. Conversely, if the computed *F*-statistic

is greater than the upper bound value, then aggregate exports and its determinants share a long-run level relationship. On the other hand, if the computed *F*-statistic falls between the lower and upper bound values, then the results are inconclusive.

RESULT AND DISCUSSION

The Augmented Dickey-Fuller (ADF) and Phillips-Parron (PP) unit root tests were used to check the order of integration of time series variables. The results are reported in Table 1. The test results shown that the log of the aggregate exports (LEX_t), log of price competitiveness (LP_t), log of the ratio of export duties and total volume of exports ($LEXD_t$) and log of production capacity of the economy ($LPGDP_t$) are non stationary series (i.e. at level, the ADF and PP statistics do not exceed the Mackinnon critical values). However, when we take the first difference of these variables, then the ADF and PP statistics are higher than their respective critical values (in absolute terms). But the log of world income (LYW_t) is stationary at level, there statistic is lower than the critical value without taking the first difference, therefore, we considered as I(0) variable.

This provides a good rationale for using the bounds test approach, or ARDL model, proposed by Pesaran *et al* [28]. The two step ARDL co integration procedure is taken for Pakistan by using annual observation over the periods of 1972 to 2010.

The regression results of equation 2 are accounted in Table 2. In order to regress the autoregressive distributive lag (ARDL) econometric model. We follow the general to

Table 1: Augmented Dickey-Fuller (ADF) Test on the levels and on the First Difference of the Variables (1972-2010)

Variables	Constant/ constant & trend	Level	1st Difference	Order of Integration
ADF Unit root test				
LEX_t	Constant	0.6697(0)	-6.690 (0)***	I(1)
LP_t	Constant	-0.294.(0)	-4.165 (1)***	I(1))
$LEXD_t$	Constant	-2.080(0)	-6.224 (1) ***	I(1)
LYW_t	Constant and trend	-2.041(0) *	-4.721(0)***	I(0)
$LPGDP_t$	Constant	0.172 (0)	-3.69(0)**	I(1)
Phillips-Perron Unit Root Test				
LEX_t	Constant	-0.623(3)	-6.69(0) ***	I(1)
LP_t	Constant	0.145(3)	-4.165(1)***	I(1))
$LEXD_t$	Constant	-1.933(3)	-6.22(1) ***	I(1)
LYW_t	Constant and trend	-2.12(3) *	-4.72(0)***	I(0)
$LPGDP_t$	Constant	-0.311 (4)	-3.69(0) ***	I(1)

Note: The null hypothesis is that the series is non-stationary, or contains a unit root. The rejection of the null hypothesis is based on MacKinnon (1996) critical values i.e., at level (constant): -3.6155, -2.9411 and -2.6090, at (constant linear trend):- -4.2191,-3.5330 and -3.1983 are significant at 1%, 5% and 10% level respectively. While at first difference (constant): -3.6210, -2.9434 and -2.6102 , at (constant linear trend):- -4.2268, -3.5366 and -3.2003 and are significant at 1%, 5% and 10% level respectively .The lag length for ADF are selected based on SIC criteria, this ranges from lag zero to lag four. The lag length for PP test is selected based on Bartlett Kernal criteria, this ranges from lag zero to lag seven. * and *** represents 0.09 percent and 0.01 percent significance level.

Table 2: Estimated Model Based on Equation (2)

Variable	Coefficient	t-Statistic	Prob.
Constant	12.84519***	3.984137	0.0006
LEX_{t-1}	-0.639299***	-4.099621	0.0004
LP_{t-1}	0.029162	0.518680	0.6089
$LPGDP_{t-1}$	1.925963***	4.283858	0.0003
$LEXD_{t-1}$	-0.009183	-0.657369	0.5175
LYW_{t-1}	1.727782***	-4.362977	0.0002
OP	0.111386***	3.978328	0.0006
OP×YW	0.023568	0.418523	0.5285
OP×P	0.019234	0.254631	0.5632
ΔLEX_{t-1}	-0.02569	-0.56983	0.6128
ΔLP_{t-1}	-0.557469**	-2.742957	0.0116
$\Delta LPGDP_{t-1}$	2.076292***	3.802867	0.0091
$\Delta LPGDP_{t-1}$	-1.637724*	-2.007429	0.0566
$\Delta LEXD_{t-1}$	0.034332**	2.539786	0.0183
ΔLYW_{t-1}	-2.066308**	-2.706588	0.0126
ΔLYW_{t-1}	1.502521*	1.879740	0.0729
R-squared	0.772567	Akaike info criterion	-2.252563
Adjusted R-squared	0.653907	Schwarz criterion	-1.680736
Durbin-Watson stat	1.865921	F-statistics	11.285***

Note: *, ** and *** represents 10%, 5% and 1% significance level.

Table 3: Diagnostic and Stability Test

	F-Statistics	Probability
χ^2_{NORM}	0.109331	0.846802
χ^2_{WHITE}	1.015095	0.509541
χ^2_{RAMSEY}	0.395304	0.677611
χ^2_{ARCH}	0.153846	0.697409
$\chi^2_{Sertal\ Corr}$	0.200858	0.818587

Note: For normality test, we report Jarque-Bera statistics. χ^2_{NORM}, χ^2_{WHITE},χ^2_{RAMSEY},χ^2_{ARCH}, $\chi^2_{Serial\ Corr}$, are non-normal errors normality test, white Heteroscedasticity test, Ramsey Regression Specification Error Test and Auto regressive Conditional Heteroscedasticity (ARCH Test), Serial correlation Lagrange Multiplier Test (LM-type Breusch-Godfrey-Test). These statistics are distributed as Chi-square values and capture degree of freedom in parenthesis.

specific rule in order to remove the highly insignificant or less significant variables from our regression analysis. This process may help us to follow the important property of autoregressive distributive lag (ARDL) model and make our regression analysis most appropriate or desirable. The above procedure in estimating equation (2) may appear as result of one or none lags with the explanatory variables. Interestingly, it captures all lags that may have desirable significance power in term of statistical inference. Table 2 shows all the variables are significant in the long run except the price competitiveness and export duties. However, in the short-run, all explanatory variables are significant in the short run.

The goodness of fit, model selection criteria and the results of Durbin-Watson statistics that capture the problem of serial autocorrelation are also reported in Table 2. Since, our dependent variable is real aggregate exports and its reaction along with set of independent variable. The value of adjusted R-square is 0.65 that shows that 65 percent variation in the determination of real aggregate exports is explained by our model. The value of Durbin-Watson statistics is 1.86 that satisfies to the desirable level and shows the rejection of null hypothesis of serial autocorrelation of any order. The model selection criteria are mentioned by Akaike Information Criteria (AIC) and Schwarz Criteria that is -2.252 and -1.680, respectively. Table 3 show the statistics of different diagnostic and stability test to check our all stability of the model.

Diagnostic and stability test such as heteroscedasticity, normality, serial correlation, autoregressive conditional heteroscedasticity (ARCH) test and functional-form misspecification (Ramsey Regression Specification Error Test) are reported in Table 3 above. The impact of trade openness measure on aggregate export passes all diagnostic tests. For normality test, we report Jarque-Bera statistics that takes non-normal errors, its value is 0.109 along with probability value 0.84. The null hypothesis of heteroscedasticity is rejected that support the evidence of no heteroscedasticity across the terms. There also does not be present an evidence of serial autocorrelation that errors are normally distributed. Ramsey test also indicates that the result is in favor of stability of parameters. Table 4 reports the short – and long-run elasticities of real aggregate export function.

The long-run coefficients are derived by normalization process in which co-integration vector term are divided by all explanatory variables. This hibernating procedure may help us to catch up long-run estimates of real exchange rate to real output model. The derived or calculating results are reported in Table 4. The theory explains that there is a positive effect of real world income and trade openness policies on real aggregate exports where as export duties and exchange rate have inverse relationship with export. The regression results prove these arguments as there is a statistically significant positive relationship between real world income and real aggregate exports both in the long run and the short run. The coefficient of 1.5 and 2.7 suggests that 1% change in the world income will increase the aggregate exports to 1.5% in the short run and 2.7% in the long run. Similarly the country's productive capacity is also statistically significant both in the long run and in the short run. Price competitiveness (real exchange rate) is statistically significant in the short run but in the long run its impact is insignificant. Similarly, the impact of export duties is statistically significant in the short run although its co-efficient of 0.034 depicts that a 1 % fall in export duties increase the aggregate export by 0.034%, however, it is insignificant in the long run referring that apart from export duties there are some other factors that effect growth rate of aggregate exports, for example, non quantitative restriction and other country specific institutional elements. Therefore the impact of trade openness reforms on aggregate exports seems to more significant (as trade openness dummy coefficient is 0.17% which is greater than export duties coefficient of 0.014%).

In order to find out the short run dynamic relationship for real aggregate export function, we employ error correction model (ECM). Table 5 shows the estimation of error correction model.

Table 4: Long-run and Short run Elasticities of Aggregate Export Function

Dependent Variable = Δ LEX_t		
Variables	Short Run	Long Run
LP_{t-1}	0.557469**	0.045616
$LPGDP_{t-1}$	1.637724*	3.012617***
$LEXD_{t-1}$	-0.034332**	-0.01436
LYW_{t-1}	1.502521*	2.70262***
OP	----	0.174231***

Note: *, ** and *** denote the significance level at 10%, 5% and 1% level of significance, respectively.

Table 5: Error Correction Model

Variables	Coefficient	t-Statistic	Prob.
Δ LP_{t-1}	-0.557466***	-3.957828	0.0005
Δ $LPGDP_{t-1}$	2.076290***	3.694195	0.0009
Δ $LPGDP_{t-1}$	-1.637726***	-2.767848	0.0099
Δ $LEXD_{t-1}$	0.034332***	3.289612	0.0027
Δ LYW_{t-1}	-2.066305***	-3.618632	0.0012
Δ LYW_{t-1}	1.502524**	2.676244	0.0123
Constant	12.84516***	8.195482	0.0000
ECT(-1)	-0.639298***	-8.134402	0.0000
R-squared	0.772567	Akaike info criterion	-2.530340
Adjusted R-squared	0.715709	Schwarz criterion	-2.178447
Durbin-Watson stat	1.865921	F-statistics	18.289***

Note: ** and *** denote the significance level at 5% and 1% level of significance, respectively.

The error correction term indicates the speed of adjustment which restored equilibrium in the dynamic model with in one year and it is calculated from the long-run co-integration vector. The ECM $_{t-1}$ coefficient shows how quickly variables return to equilibrium and it should have statistically significant coefficient with negative sign. The feedback coefficient of error correction model term is equal to 0.639 which implies that deviation form the long term exports is corrected by about 63.9% over the following year.

CONCLUSION

Using the Auto Regressive Distributed Lag Model approach with annual data from 1972 to 2010, the study investigated the impacts of trade openness measures on the aggregate exports of Pakistan. It was observed that the variables in the aggregate exports function are co-integrated. Price, income, production capacity, export duties rate and the trade openness dummy all significantly influence aggregate exports in Pakistan with consistent signs. In the long run, the trade openness dummy shows a significant but low positive (0.17) impact, while the import duty rate as a measure of trade liberalization shows insignificant impact on the aggregate exports. Production capacity shows the highest positive impact (i.e., 3.01). Similarly, World Income also exhibits a positive and statistically significant impact (i.e., 2.70); while competitive prices (i.e., 0.045) show low impact on the aggregate exports. In the short run, the aggregate exports are significantly influenced by world income (i.e., 1.50), production capacity (i.e., 1.63), prices (i.e., 0.55) and the export duty rates (i.e., 0.034).

The export duty as measure of trade openness shows a statistically significant impact on exports in the short run which means an increase in trade openness through reduction in export duties will increase the exports in the short run. However, in the long run export duties prove to be insignificant. World income appears highly elastic in both the short run and in the long run suggesting that aggregates exports are highly income elastic and depends upon the developed countries demand. The production capacity also highly elastic both in the long run and the short run reflecting the fact that our production consists on export oriented industries. The relative price is significant in the short run but insignificant in the long run which reflects that any change in relative price due to exchange rate fluctuation will increase export in the short run. The trade openness dummy which reflected the impact of trade openness polices adopted in differed time period prove to significant in the long run and insignificant in the short which reflect the fact that exports responds to these policies in the longer time period then the short run period. The error correction term in the model is found to be statistically significant, confirming the validity of the long-run equilibrium relationship. The coefficient estimate of the error correction term is 0.69 indicating a high speed of adjustment to equilibrium.

The policy implications are straightforward. For rapid expansion of exports, trade liberalization policies need to be associated with promotion of public policies for greater utilization of productive capacity of the economy. This is because any trade openness measures which encourage exports must be supported by increased potential of exports. However, for effective policy analysis studies may be undertaken using data at the disaggregate level.

REFERENCES

1. Bakare, A.S. and F.O. Fawehinmi, 2011. Trade Openness and Its Impact on Nigeria's Non-Oil Industrial Sector: 1979-2009. Economics and Finance Review, 1(5): 57-65.
2. UNCTAD. 1999. United Nations Conference on Trade and Development, Trade and Development Report 1999, Geneva.
3. López, P., 2005. The Impact of Trade Liberalization on Exports, Imports, the Balance of Payments and Growth: the Case of Mexico. J. Post Keynesian Economics, 27(4): 595-61.
4. Milner, C., 1990. The role of import liberalization in export promotion. In Export Promotion Strategies: Theory and Evidence from Developing Countries, ed. C. Milner, pp. 81-88. Harvester/Wheatsheaf, London.
5. Walter, I., 1971. Non-tariff Barriers and the Export Performance of Developing Economies. The American Economic Review, 61(2): 195-205.
6. Greenway, D. and D. Sapsford, 1994. What does liberalization do for exports and growth, Weltwirtschaftliches, 130(1): 152-74.
7. Chadha, R., 1997. India's Export Performance: Are There Lessons from East Asia?. Paper presented at NCAER, May 9, 1997.
8. Ahmed, N., 2000. Export responses to trade liberalization in Bangladesh: a cointegration analysis. Applied Economics, 32: 1077–84.
9. Sharma, K., S. Jayasuriya and E. Oczkowski, 2000. Liberalization, Export Incentives and Trade Intensity: New Evidence from Nepalese Manufacturing Industries. J. Asian Economics, 12: 123-135.
10. Paulino, S.A., 2002. Trade Liberalization and Export Performance in Selected Developing Countries. Journal of Development Studies, 39(1): 140-164.
11. Jayanthakumaran, K., 2004. The impact of trade liberalization on manufacturing sector performance in developing countries: a survey of the literature. Thammasat Economic J., 22(2): 115-37.
12. Mohiuddin, G.K.M., 2005. Trade Liberalization and Export Performance of Bangladesh. The Cost and Management, pp: 44-46.
13. Wu, Y. and L. Zeng, 2008. The Impact of Trade Liberalization on the Trade Balance in Developing Countries. IMF Staff Papers 08/14,
14. Adewuyi, A.O. and G. Akpokodje, 2010. Impact of Trade reforms on Nigeria's Trade Flow. The International Trade J., 24(4): 411-439.
15. Shamsadini, S., R. Moghaddasi and M. Kheirandish, 2010. Relationship between trade openness and GDP-a panel data analysis. World. Appl. Sci. J., 8(7): 906-911.
16. Hasan, M.A. and A.H. Khan, 1994. Impact of Devaluation on Pakistan's External Trade: An Econometric Approach. The Pakistan Development Review, 33(4): 1205-1215.
17. Aftab, Z. and M. Aurangzeb, 2002. The Long-run and Short-run Impact of Exchange Rate Devaluation on Pakistan's Trade Performance. The Pakistan Development Review 41(3): 277–286.
18. Afzal, M. (2004). Estimating Long - Run Trade Elasticities in Pakistan: Cointegration Approach, The Pakistan Development Review, 43(4), 757-770.
19. Dutta, D. and N. Ahmed, 2004. Trade liberalization and industrial growth in Pakistan: a Cointegration analysis. Applied Economics, 36: 1421-1429.
20. Shaikh, F.M. and M.S. Rahpoto, 2009. Impact of Trade Liberalizations and SAFTA on Pakistan's Economy by Using CGE Model, International J. Business of Management, 4(4): 192-209.
21. World Bank, 2010. World Development Indicators (WDI). Washington, DC. http:// www.worldbank.org/ data/wdi2010
22. GoP. 2011. Government of Pakistan, Economic Survey 2010-11, Economic Advisor's Wing, Ministry of Finance, Islamabad.
23. Bertil, O., 1968. Model Construction in International Trade Theory. Published in Induction, Growth and Trade. Clarendon Press. Oxford., pp: 325-341.
24. Ahmed, N., 2001. Trade liberalization in Bangladesh—An investigation into trends. Dhaka: The University Press Limited (UPL).
25. Kumar, N., 1998. Multinational Enterprises, Regional Economic Integration and Export-Platform Production in the Host Countries: An Empirical Analysis for the US and Japanese Corporations. Eltwirtschaftliches 134: 450-83.
26. Thirlwall, A.P., 2003. Growth and Development: with Special Reference to Developing Economies, 7th edition (London: Palgrave-Macmillan).

27. Paulino, S.A. and A.P. Thirlwall, 2004. The Impact of Trade Liberalization on Exports, Imports and the Balance of Payments of Developing Countries. Economic J., 114(1): 50-72.
28. Pesaran, M.H., Y. Shin and R.J. Smith, 2001. Bound testing approaches to the analysis of level relationships. J. Applied Econometrics, 16: 289-326.
29. Bardsen, G., 1989. Estimation of long-run coefficients in error correction models. Oxford Bulletin of Economics and Statistics, 51: 345-350.