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## Effects of International Trade on Economic Growth: The Case Study of Pakistan

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### Abstract

The study examines the impact of total exports to GDP ratio, imports to GDP, terms of trade, trade openness, investment to GDP ratio, and inflation on the economic growth of Pakistan. The empirical analysis is conducted by using time series data from 1973-2010. Chow test is used to test the structural break and model fitness. The OLS (Ordinary Least Square) technique is used to detect the relationship between exogenous variables and endogenous variable. The estimated results show that explanatory variables have positive and significant impact on the economy of Pakistan. The results also show that an increase in the import of raw materials, the production, employment and output of the country is boosted up. Similarly, Trade openness has also positive and significant influence on the economy of Pakistan. It concludes that international trade may play an important role to enrich the economy of Pakistan.

**Keywords:** Total Exports to GDP Ratio, Imports to GDP Ratio, Terms of Trade, Trade Openness, Investment to GDP Ratio, Inflation, Pakistan

## Introduction

The word trade has been defined in the Oxford Advanced Learner dictionary as “the activity in which people are buying and selling or exchanging the goods and services” (Kumar, 2009). International trade is the exchange of capital, goods, and services across international borders. It is a system where the goods and services are advertised, sell and switched between two or more than two countries through import and export. A trade theory describes that there is generally a positive association among openness, export to GDP ratio, investment to GDP ratio and inflation. There are several ways by which find that openness, export to GDP ratio, investment to GDP ratio influence economic growth (Iqbal, *et al.*, 1998).

In Pakistan’s economy trade openness do not have significant on international trade but the country meet low diversification in export division and production division. This creates unpleasant shocks and upsets in world markets. Consequently, economic performance decline over the time.

Exports of Pakistan are mostly based on the agriculture sector and it is a largest sector in Pakistan. Nearly 23 percent of Pakistan’s national income (GDP) and 42 percent of labor force is associated with agricultural sector. This sector also supplies raw stuff to food, chemical, and technical industries of Pakistan (Khan, 1997).

## Objective

To see the effects of inflation, trade openness, exports and imports on economic growth of Pakistan.

## Organization of the Paper

Resting this paper is shaped as under: Review of literature is presented in section II Methodology and data will be discussed in section III. In section IV and last, the conclusion of the study and suggestions will be discussed.

## Review of Literature

Michaely (1977) finds a optimistic association sandwich between export and growth of economics. Greenway and Sapsford (1994), Yamin *et. al* (1995) found that a little support for positive impacts of liberalization on trade.

Mendoza (2000) examines the affiliation among openness, exports to GDP ratio and economic enlargement for five ASEAN nations, and detected co integration between openness, exports to GDP ratio and economic expansion for all nations. Ahmad (2000) stated the result of long-term investigation in the computerized exports management. He discussed the Pakistan’s export trend and problem of export facing Pakistan and how to remove the difficulties of exports in Pakistan how it manage the export through the computer.

Mustafa, *et al* (2001) assessed the implication of globalization for poverty and agricultural in Pakistan They suggested that there is adverse impact of globalization on agriculture and poverty.

Hadass and Williamson (2003) find the empirical evidence between economic growths, terms of trade and exports over the period 1870-1940. They find strong disassociation between economic growths, terms of trade and exports. Evans (2007) argues that openness on inflation create positive effect in international market through monetary and fiscal policies. Hanif and Jafri (2008) suggest that foreign debt has positive impact on the Pakistan's textile sector and agricultural sector both in the short and the long run.

Sheikh and Rahpoto (2009) they analyzed the gains of Pak-India trade and probable economic costs in exporting a variety of consumable commodities like dates, leather and cotton made garments in two scenarios. They found an appraisal of the implications of SAFTA which allow the participating countries to achieve larger economics of scale in production, increase competitiveness, attain specialization and diversify their exports. It was suggested that under the combined policy reform of the SAFTA Pakistan would experience the maximum welfare gain.

### Data & Methodology

The data for macroeconomics variables such as total exports to GDP ratio, imports to GDP, terms of trade, trade openness, investment to GDP ratio, and inflation have been obtained from different issues of Economic Survey of Pakistan.

Durbin Watson  $d$  test and Breusch-Godfray tests are used to detect fitness of model. The structural breaks of data are determined by Chow test. Jarque-Bera test for the normality in residuals and White's test is used for heteroscedasticity.

To examine whether a time series has a unit root problem, In this regard Augmented Dickey-Fuller (ADF) unit root test is used to detect the status of unit root. To implement the ADF test following regression will be estimated:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^m \Delta Y_{t-i} + \varepsilon_t$$

Where  $\varepsilon_t$  is a pure white noise error term and where  $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$ , the empirically number of lagged difference terms to include is often determined, so that it can be concluded that the above equation shows that the error term is serially uncorrelated. If the t-statistics are less than the critical value than the null hypothesis of the unit root ( $\Phi = 0$ ) cannot be rejected but if the t-statistics are greater than the critical values than null hypothesis of the unit root can be rejected.

The following test is used to judge the fitness of model.

### Coefficient of Determination $R^2$

$R^2$  shows the degree of variation in the dependent variable due to the variation in the explanatory variables.  $R^2$  is given as below:

$$R^2 = ESS / TSS = 1 - RSS / TSS$$

### Adjusted $R^2$

The term adjusted means adjusted for the degree of freedoms associated with the sum of

squares. As the number of explanatory variables increases, adjusted  $R^2$  increases less than unadjusted  $R^2$ . It can be calculated as

$$\overline{R^2} = 1 - \frac{\sum \hat{\mu}_i^2 / (n - k)}{\sum y_i^2 / (n - 1)}$$

Where  $k$  = number of parameters and intercept term in a model. Adjusted  $R^2$  can be negative. In case this case when it is negative, it is considered zero.

### White Test

The white test can be a test of pure heteroscedasticity or specification error or both. It has been argued that if no cross product terms are present in the white test procedure, then it is a test of pure heteroscedasticity. If cross-product terms are present, then it is a test of both heteroscedasticity and specification bias (Gujrati, 2004).

### Durbin-Watson $d$ Test

D.W test mathematically defined as:

$$d = \frac{\sum_{t=2}^{t=n} (\hat{u}_t - \hat{u}_{t-1})^2}{\sum_{t=1}^{t=n} \hat{u}_t^2}$$

This is simply the ratio of sum of the squared difference in successive residuals to the RSS. This test is used to find problem of autocorrelation in the model.

### Breusch-Godfray Test

To avoid some of the drawbacks of the Durbin Watson  $d$  test of the autocorrelation, Breusch and Godfray have constructed a test of autocorrelation that allows for: (a) non stochastic regressors, such as the lagged values of the regressands; (b) higher order auto regressive schemes such as AR1, AR2. (Gujrati, 2004).

$H_0$  = there is no autocorrelation in the error term

$H_1$  = there exists autocorrelation in the error term

### Jarque-Bera (JB) Tests of Normality

The Jarque-Bera test is used to detect normality of model. This test first finds the skewness and kurtosis of the OLS residuals. The statistics of the model is given as below:

$$JB = n \left[ \frac{S^2}{6} + \frac{(K - 3)^2}{24} \right]$$

Where  $n$  = sample size, Skewness =  $S$  and kurtosis coefficient =  $K$ . For distribution of variable,  $S=0$  and  $K= 3$ , therefore the JB test of normality is a test of joint hypothesis. as a result, Skewness and kurtosis are 0 and 3 respectively. The worth of the JB statistics is considered to be 0 in this case (Gujrati, 2004).

**Chow Break-point Test**

In econometrics, the Chow test is most commonly used in time series data to detect the presence of a structural break (Gujrati, 2004). Hypothesis about structural break, given as

$H_0$  = there is no structural break

$H_1$  = there exists structural breaks

**Specification of the model 1 is given as:**

$$Y = \beta_0 + \beta_1XR + \beta_2IR + \beta_3TOT + \beta_4P + \beta_5TOT + \mu \quad (1)$$

Where

Y = GDP growth

XR = total exports to GDP ratio

MR = total imports to GDP ratio

TOT = terms of trade [(export prices + import prices)/GDP]

TO = trade openness [(TX+TM)/GDP]

IR = investment to GDP ratio

P = inflation

The Augmented Dickey Fuller test is used to detect level of stationary and the results of AD are presented in Table No.1:

Table No. 1 Results of ADF

Variables	Level with intercept	1st difference without intercept
Y	-3.321	-5.802
XR	-3.195	-4.959
MR	-3.171	-4.686
TO	-3.170	-4.749
TOT	-2.341	-5.726
IR	-2.885	-5.037
P	-3.891	-7.085

The critical values -4.23, -3.53 and -3.20 at 1%, 5%, and 10%, respectively All variables are stationary except TOT and IR.

The results of estimation first model 1 are reported as under:

$$Y = -8.306 + 0.32XR + 0.18IR + 0.05P + 0.23TO + 0.31TOT \quad (2)$$

(8.40) (1.919) (3.21) (0.665) (3.32) (0.765)

R-squared = 0.238 F-statistic = 3.47

Adjusted R-squared = 0.168 D.W = 1.91

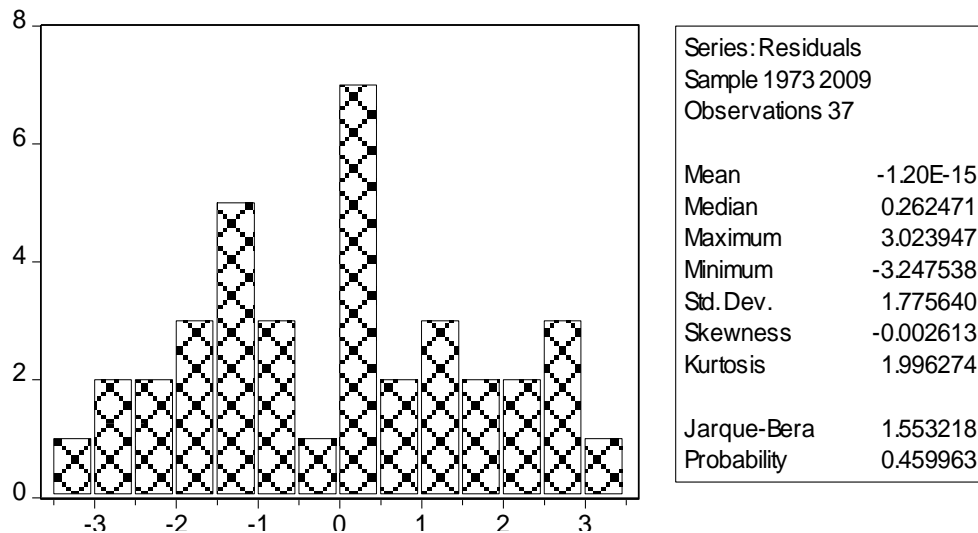
Results of the model are somewhat satisfactory and signs of the coefficients are supporting the previous research findings. The coefficients of all variables in above regression are statistically

significant except P which is not statistically significant even at 10% level. The sign of export to GDP ratio shows that there is positive relationship between export to GDP ratio and GDP growth. The justification for this positive relationship is that as the export to GDP ratio increases which raises GDP.

The slope of exports suggests that 1 unit increase in exports leads to 0.32 units boost in GDP growth. The investment to GDP ratio has also positive relationship with GDP growth. Its slope coefficient indicates that 1 unit increase in investment to GDP ratio leads to 0.18 units enlarge in GDP growth. Inflation affects GDP growth in positive manner as indicated by the sign but it is insignificant. The value of  $R^2$  is 0.238 which shows that about 23.7 % variation in GDP growth is explained by the exports, imports and other factors. Similarly, TO is significant and has positive impact on economic growth, while TOT is insignificant but it has appropriate sign with reference to model.

The value of Durbin-Watson test is close to 2, which shows there is no auto correlation exists. Similarly Jarque-Bera Test indicates that the probability of JB statistics is significance which shows that the error term is normally distributed.

Result of Jarque-Bera test



Result of White Heteroscedasticity test

White Heteroscedasticity Test		
F-statistic	0.308	0.927
		Probability
Obs*R-squared	2.138	0.906
		Probability

Results of White Heteroscedasticity test show that the probability of the model is insignificant, so that the null hypothesis accepted as the error term is homoscedastic and model is fit for analysis.

Table No. 2 Result of Chow test:

F-statistic	2.953	Probability	0.065
Log likelihood ratio	6.086	Probability	0.0476

Table No. 2 shows that, there is no structural break in the analysis data over the period from 1973-2010, except in 1995.

Table No. 3 Breusch-Godfrey serial correlation (LM) test

F-statistic	0.264	Probability	0.769
Obs*R-squared	0.637	Probability	0.727

The Breusch- Godfrey test is applied to detect the serial correlation in the data. The results are given in the Table No.3 which shows that there is no serial correlation in the data.

**Specification of the model 2 is given as**

$$Y = \beta_0 + \beta_1 MR + \beta_2 IR + \beta_3 P + \mu \quad (2)$$

$$Y = 6.36 + 0.18 MR + 0.16 IR + 0.23 P$$

$$(1.55) \quad (3.04) \quad (1.99) \quad (3.12)$$

$$R\text{-squared} = 0.236 \quad \text{Adjusted R-squared} = 0.166$$

$$D.W = 1.91 \quad F\text{-statistic} = 3.45$$

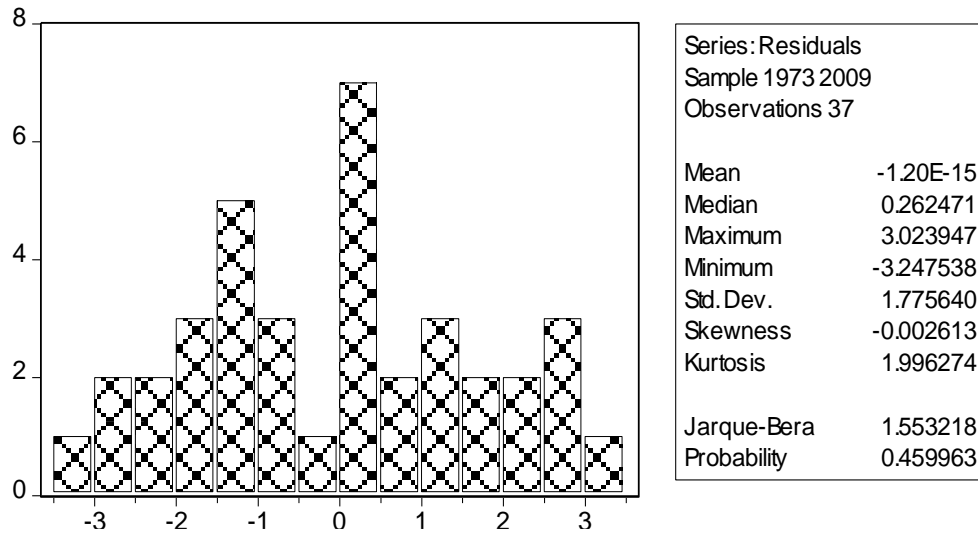
Results of the model are somewhat satisfactory and signs of the coefficients are supporting the prior findings. The coefficients of all variables in above regression are statistically significant. The sign of import to GDP ratio shows that there is positive relationship between import to GDP ratio and GDP growth; this is so because growth of GDP raises income households.

The slope of import suggests that 1 unit increase in exports leads to 0.18 units boost in GDP growth. The investment to GDP ratio has also positive relationship with GDP growth but it is statistically significant. Its slope coefficient indicates that 1 unit increase in investment leads to 0.16 units enlarge in GDP growth. Inflation affects GDP growth in positive manner as indicated by the sign. The value of  $R^2$  is 0.236 which shows that about 23.7 % variation in GDP growth is explained by the exports, imports and other factors.

The value of Durbin-Watson test is 1.91 which is close to 2, which shows that there is no auto correlation. Similarly Jarque-Bera statistics is insignificance which shows that the error term is normally distributed.

Jarque-Bera test





**Table No. 4 Breusch-Godfrey serial Correlation LM Test:**

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.315220	Probability	0.731
	757698		
Obs*R-squared	0.734184	Probability	0.692
	904417		

The Breusch- Godfrey test is used to detect the serial correlation in the data. The results are given in the Table No.4 which shows that there is no serial correlation in the data.

**Table No.5 White's heteroscedasticity test**

White Heteroskedasticity Test:			
F-statistic	0.275278	Probability	0.944313
Obs*R-squared	1.922210	Probability	0.926712

The results in Table. No.5 shows that the probability of the model is insignificant, so that the null hypothesis accepted as the error term is homoscedastic and model is fit for analysis.

**Table No.6 Chow Breakpoint Test**

Chow Breakpoint Test: 1995			
F-statistic	2.463889	Probability	0.1001
	56032		
Log likelihood ratio	5.143210	Probability	0.0764
	84325		

The results in Table No. 6 show that, there is no structural break in the analysis data over the period from 1973-2010, except in 1995.

### Conclusion and Discussions

The central objective of this research is to examine the effect of international trade on economic growth through empirical analysis using annual data in Pakistan over the period 1973 to 2010. Results of the model 1 and model 2 are quite satisfactory and signs of the coefficients are supporting the previous research findings. The coefficients of all variables in above regression are statistically significant except inflation which is not statistically significant even at 10% level. Results of the model are somewhat satisfactory and signs of the coefficients are supporting the previous research findings. The coefficients of all variables in above regression are statistically significant except P which is not statistically significant even at 10% level. The sign of export shows that there is positive relationship between export and GDP growth. The justification for this positive relationship is that as the export increases which raises GDP.

The slope of exports suggests that 1 unit increase in exports leads to 0.32 units boost in GDP growth. The investment to GDP ratio has also positive relationship with GDP growth and is statistically significant. Its slope coefficient indicates that 1 unit increase in investment leads to 0.18 units enlarge in GDP growth. Inflation affects GDP growth in positive manner as indicated by the sign but it is insignificant. The value of  $R^2$  is 0.234 which shows that about 23.7 % variation in GDP growth is explained by the exports, imports and other factors. In model 2 the sign of import to GDP ratio shows that there is positive relationship between import and GDP growth, this is so because growth of GDP raises income households. The slope of import suggests that 1 unit increase in exports leads to 0.18 units boost in GDP growth. The investment to GDP ratio has also positive relationship with GDP growth and is statistically significant. Its slope coefficient indicates that 1 unit increase in investment leads to 0.16 units enlarge in GDP growth. Inflation affects GDP growth in positive manner as indicated by the sign.

In nut shell, international trade has positive impact on the economy of Pakistan. The economy Pakistan can be better if Government should adopt multipurpose strategies such as improvement in tax and revenue structure, improving fiscal, monetary policies and structural adjustments policies and eradicate anticompetitive market practices. Moreover, Govt should decrease the imports of costly products with suitable policies and prefer to prepare all required things inside the country.

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