

# Foreign Direct Investment Lead to Exports of Pakistan: An Econometric Evidence

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## Abstract

The objective of the study is to empirically analyze that whether foreign direct investment lead to exports of Pakistan for the period from 1972 to 2014. Econometric results are estimated using Partial Adjustment Model for long run as well short run and then some diagnostic statistics are also applied for reliability of results. Long run and short run results propose positive influence of foreign direct investment, exchange rate, trade openness, and real GDP of Pakistan while inflation is found to have inverse effect of exports of Pakistan. Further tests indicate regression model free from Autocorrelation, Heteroskedasticity, abnormality of residuals and dynamic instability problems.

**Keywords:** Foreign Direct Investment, Real GDP, Exports, Exchange Rate, Inflation.

## 1. Introduction

Many studies on this areas postulate that FDIs can play a significant role in generating export supply to enable countries expand their international trade. It is often thought that foreign firms, particularly multi-national corporations usually have already established production, distribution and marketing networks and hence are more likely to engage in export oriented activities than local firms do. Hence it is mainly for these reasons that most countries today are seeking to attract foreign investment. Foreign direct investment is a source of development in host countries as it gives the amount of capital, managerial skills, and technical skill by providing better way to enter the market. This is particularly valid for developing countries. During the period of 1990 the foreign direct investment was the main outsider resource of funding in various economies. It is well-known that those economies which faced different economic challenges, foreign direct investment helped these economies to achieve various macroeconomic goals.

In global economy now a day, we observe several developing economies competing for foreign investment. The success stories of East and South East Asian countries suggest that FDI is a powerful tool of export promotion because multinational companies (MNCs) through which most FDI is undertaken have the well established contacts and up to date information about foreign markets. The benefit impacts of FDI come through three channels: improved productivity, marketing and networking externality advantages that help local firms to penetrate world markets, and crowd-in effects through communication growth and backward and forward linkages. The negative overflow effects take place with competition over limited resources and limited skilled manpower, and either due to planned purpose by the associate of MNCs or the high technological gap between local and foreign firms. There are also other costs associated with inflow of FDI, such as preventive business carry out by foreign firms (i.e., intra-firm trade, transfer pricing, and profit repatriation) and in the case of developing country governments that give up tax revenue (or high subsidies). The net welfare effects differ by the nature of FDI (amount and forms of entry), motives behind inside business, and host country government policies.

The academic work explains that impact of foreign direct investment on export is positive. (Athukorala and Menon 1995; Zhang and Song 2001; Zhang and Fellingham 2001; Zhang 2005; Banga 2006; Piamphongsant 2007; Kohpaiboon 2008). The focus of this study is to examine the role of foreign direct investment on exports in Pakistan. As introduction is discussed in section 1, rest of the sections of the study are organized as Analysis of Previous Studies, Measurement and Estimation Issues, Discussion on Econometric Results, Diagnostic Statistics and Concluding Remarks in sections 2, 3, 4, 5 and 6 consecutively. Lastly references are written at the

end.

## 2. Analysis of Previous Studies

The discussions regarding Foreign Direct Investment and exports relationship have been organized various times in recent years. Few studies among them have been comprehensively analyzed and summarized in this section as below;

Sharma (2000) explored the determinants of export performance in India. Using annual data for 1970-98, the research applied two-stage least squares (2SLS). The results suggested that demand for Indian exports increased as its prices fell in relation to world prices. Export supply was positively related to the domestic relative price of exports while higher domestic demand reduced export supply.

Vuksic (2005) examined foreign inflows as having an impact on export performance. The panel data approach for 21 manufacturing sector over the period between 1996 and 2002 resulted positive and statistically significant effect of foreign direct investment on exports using Ordinary Least Square method.

Xuan and Xing (2008) examined the experiences about foreign direct investment and exports. The study covered data from 1990 to 2004 from Vietnam. The empirical results demonstrate that Foreign Direct Investment was one of the major factors driving the rapid export growth.

Falk and Hake (2008) explored the relationship between exports and the outward Foreign Direct Investment stock using a panel of industries and seven EU countries for the period 1973-2004. By applying Granger-causality, estimates showed that exports were causing Foreign Direct Investment but not vice versa. The long-run elasticity of the outward Foreign Direct Investment stock with respect to exports was 0.78 with highly significant coefficient. These results found bi-directional relationship among Foreign Direct Investment and trade.

GU et al. (2008) analyzed the contribution of Foreign Direct Investment to China's export performance during 1995-2005 by applying Ordinary Least Square method. The empirical results suggested that Foreign Direct Investment had statistically significant and positive effects on its exports.

Prasanna (2010) examined the impact of Foreign Direct Investment on the total manufactured exports of India between 1991-92 and 2006-07. To analyze the impact of Foreign Direct Investment on the high technology manufactured exports of India, the study used partial regression. The study found positive impact of Foreign Direct Investment on export performance.

Njong and Raymond (2011) estimated the potential effects of Foreign Direct Investment inflows on export growth in Cameroon by using time series data. The effects of Foreign Direct Investment were separated into supply capacity-increasing effects and spillover effects. The study found that Foreign Direct Investment had positive impact on Cameroon export performance from 1980 to 2003 by applying Engle – Granger two step co-integration.

Kumar (2011) explored the Relationship between Foreign Direct Investment and services export. The analysis found that Foreign Direct Investment had significantly positive impact on the services export of India by using Ordinary Least Square Method for the period of 2004-2009.

Rutaihua and Simwela (2012) examined the role Foreign Direct Investment in the Mining Sector to Tanzania's Export Capacity during 1989-2009 by using Ordinary Least Squares (OLS). The results showed total exports performance to the rest of the world as negative and insignificant implying weak contribution of Foreign Direct Investment in mining industry.

Kumar (2012) explored the relationship between Foreign Direct Investment, Export and Gross domestic product by using time series data from the 1991 to 2010. The estimates indicated that Foreign Direct Investment indeed had positive impact on India's export.

Barua (2013) explored the impact of Foreign Direct Investment on the growth of exports. The relationship between exports and Foreign Direct Investment are positive indicating increase in Foreign Direct Investment that could increase exports using time series data for the period 2000-2012.

## 3. Measurement and Estimation Issues

There are several data measurement and estimation issues that may be seen after development of various latest econometric techniques. This section provides detailed discussion on these issues.

### 3.1 Data Type, Range and Sources

Considering the objective of the study, time series data from 1972 to 2014 is utilized for analyzing the relationship. For measurement of elasticities, log – log form of the equation is taken. Various reliable sources are gone through for collection of data like Hand book of Statistics on Pakistan Economy 2010, Economic Survey of Pakistan (2014 – 15) and 50 Years of Pakistan provided by State Bank of Pakistan, Federal Bureau of Statistics and Pakistan Bureau of Statistics respectively.

### 3.2 Estimation of Results – Partial Adjustment Model

Suppose that the adjustment of the actual value of a variable  $Y_t$  to its optimal (or desired) level (denoted by  $Y_t^*$ ) needs to be modeled. One way to do this is through the partial adjustment model which assumes that the change in the actual  $Y_t(Y_t - Y_{t-1})$  will be equal to a proportion of the optimal change ( $Y_t^* - Y_{t-1}$ ) or:

$$Y_t - Y_{t-1} = \lambda (Y_t^* - Y_{t-1}) \quad (1)$$

Where  $\lambda$  is the adjustment coefficient which takes values from 0 to 1, and  $1/\lambda$  denotes the speed of the adjustment. Consider the two extreme cases; If  $\lambda = 1$  then  $Y_t = Y_t^*$ . Therefore the adjustment to the optimal level is instantaneous; whilst If  $\lambda = 0$  then  $Y_t = Y_{t-1}$  which means that there is no adjustment of the  $Y_t$ . Therefore, the closer  $\lambda$  is to unity, the faster the adjustment will be. Suppose  $Y_t^*$  is the desired level of inventories for a firm  $i$ , and that this depends on the level of the sales of the firm  $X_t$ ;

$$Y_t^* = \beta_1 + \beta_2 X_t \quad (2)$$

Suppose also that only a part of a gap can be closed each period  $\mu$  then the equation that will determine the actual level of inventories will be given by;

$$Y_t = Y_{t-1} + \lambda (Y_t^* - Y_{t-1}) + \mu_t \quad (3)$$

That is, the actual level of inventories is equal to that at time  $t-1$  plus an adjustment factor and a random component. Combining (1) and (2);

$$\begin{aligned} Y_t &= Y_{t-1} + \beta_2 \lambda (\beta_1 + \beta_2 X_t - Y_{t-1}) + \mu_t \\ &= \beta_1 \lambda + (1 - \lambda) Y_{t-1} + \beta_2 \lambda X_t + \mu_t \end{aligned}$$

From this model we have the short-run reaction of  $Y$  to a unit change in  $X$  is  $\beta_2 \lambda$ . The long-run reaction is given by  $\beta_1$ . An estimate of  $\beta_1$  can be obtained by dividing the estimate of  $\beta_2 \lambda$  by one minus the estimate of  $(1-\lambda)$ , i.e.  $\beta_1 = \beta_2 \lambda / [1 - (1-\lambda)]$ . Here, it is useful to note that the error correction model is also an adjustment model.

### 3.3 Model Description

As regards with objective of the study that is to analyze the influence of foreign direct investment on exports of Pakistan, the following model is specified for econometric analysis.

$$LEXP = \beta_1 + \beta_2 LFDI + \beta_3 LINF + \beta_4 LER + \beta_5 LTOP + \beta_6 LRGDP + \mu_i$$

Where,

LEXP	= Log of Exports of goods and services.
LFDI	= Log of Foreign Direct Investment.
LER	= Log of Exchange Rate.
LINF	= Log of Inflation.
LTOP	= Log of Trade Openness.
LRGDP	= Log of Real Gross Domestic Product.
$\beta$ 's	= Coefficients
$\mu$	= Error term

### 3.4 Definition of Variables

#### 3.4.1 Exports of Goods and Services

Exports may be defined as the sale of domestically produced goods and services in foreign economies for the purpose of gaining profits. It is measured in million rupees at current market prices.

#### 3.4.2 Foreign direct investment

Foreign direct investment is investment of foreigners done in domestic economy for purpose of gaining future benefits. It is measured in million rupees. FDI is expected to be positively related with exports of domestic economy. Higher FDI may lead to higher production, creating demand of its exported items due to high quality that may be cause of higher exports.

#### 3.4.3 Exchange Rate

Exchange rate is the rate at which one currency is converted into another currency. Its unit is Pakistani rupees per dollar. It is hypothesized as positively influencing exports of Pakistan. The reason may be that depreciation of Pakistani rupees makes exports cheaper for foreigners. Their demand will rise in response of cheaper goods and services leading to higher exports.

#### 3.4.4 Inflation Rate

Inflation may be defined as rise in general price level of the economy. It is expected to be discouraging factor for exports of Pakistan. Higher prices of goods and services will decrease profit margin for foreigners due to higher export prices. In response to this, exports of Pakistan would fall.

#### 3.4.5 Real GDP

Real GDP is calculated at base year prices. It is measured in million rupees. Positive relationship is expected between real GDP and exports of Pakistan. If there are higher output levels in the economy, there are chances of lower prices. Lower price may create demand for foreigners for Pakistani exports that may be cause of higher exports.

### 3.4.6 Trade Openness

Trade Openness in any economy exhibits country's ability to trade among various nations. It is measured by this formula.

$$\text{Trade Openness} = (\text{Exports} + \text{Imports})/\text{GDP}$$

There may be positive relationship among trade openness and exports of the nations.

Table 1: Definition of Variables

Variables	Definition	Expected Relationship	Unit of Measurement
LEXP	Exports of goods and services	Dependent Variables	Million Rupees
LFDI	Foreign Direct Investment	Positive	Million Rupees
LER	Exchange Rate	Positive	Rupees per Dollar
LINF	Consumer Price Index	Negative	Price Index
LTOP	Trade Openness	Positive	Openness Index
LRGDP	Real Gross Domestic Product	Positive	Million Rupees

## 4. Discussion on Econometric Results

The relationship between FDI and various other variables with exports of Pakistan has been analyzed in the short run as well as in the long run and results are reported in tables 2 and 3. Table 2 gives long run results in column 2, third column demonstrates probability and last column shows significance of each coefficient. Short run results are presented in table 3 which show variables, coefficients, standard errors, t – ratio and probability in columns 1, 2, 3, 4 and 5 respectively.

The study finds positive relationship between foreign direct investments and exports of Pakistan in short run as well as in long run. Statistically, it is found to be significant at 5 percent level of significance. On the average, one percent higher foreign direct investment will increase exports of Pakistan by 0.05 percent in the short run and 0.10 percent in the long run. The relationship may be justified through many directions like higher foreign direct investment in domestic economy will generate new economic activities causing higher exports in the long run and short run in Pakistan. The FDI elasticity of Exports is estimated as 0.10 in the long run and 0.05 in the short run.

Inflation in Pakistan is seen to be most discouraging factor for exports of Pakistan. Foreigners demand less if they fell higher prices of goods and services to be imported from Pakistan. This may decrease exports of Pakistan in the long run as well as in the short run. Statistically, this relationship is significant at 5 percent level of significance. On the average, one percent higher inflation rate may depress exports of Pakistan by 0.04 percent in the short run and 0.87 percent in the long run. Long run Inflation Elasticity of Exports is - 0.87 while short run inflation elasticity of exports is – 0.04.

Econometric results exhibit positive association of exchange rate with exports of Pakistan in the long run and short run. If Pakistani rupee is depreciated as compared to U.S dollar, so our goods and services will become cheaper for U.S. residents. Their demand will increase for Pakistani products that will cause our exports to be higher in long run and short run. One percent depreciation of Pakistani rupees in contrast to U.S. dollar will raise exports by 0.33 percent in the short run and 0.67 percent in the long run on the average. Statistically, exchange rate is significant at 1 percent level of significance. In the long run, Exchange rate elasticity of exports is 0.67 while it is in short run is 0.33.

Table 2: Long run results

Variables	Coefficient	Probability	Conclusion
FDI	0.1048	0.0544	Significant
Inflation	-0.8709	0.0589	Significant
Exchange rate	0.6767	0.0142	Significant
Trade Openness	1.0379	0.0002	Significant
Real GDP	1.0330	0.0002	Significant
Constant	-2.4941	0.0145	Significant

Trade Openness in Pakistan will be a source of higher exports in the longrun as well as in the short run. Positive correlation is found among trade openness and exports of Pakistan. On the average, one percent higher trade openness will increase exports of Pakistan by 1.03 percent in the long run and 0.51 percent in the short run. Trade Openness is statistically significant at 1 percent level of significance. Trade Openness Elasticity of Exports is 1.03 in the long run and 0.51 in the short run.

Real GDP is another important factor for enhancing exports of Pakistan in the long run and in the short run. Higher growth rate will maintain price level in the economy that may attract foreign customers in Pakistan leading to higher exports of Pakistan. There is positive relationship found among real GDP and exports with statistically significant coefficient value at 1 percent level of significance. Exports of Pakistan will be enhanced by 1.03 percent in the long run and 0.51 percent in the short run due to percent higher real GDP on the average.

In the short run, estimation Real GDP elasticity of exports is 0.51 while long run Real GDP elasticity of exports is 1.03.

Table 3: Short run results

Variable	Coefficients	Standard Errors	T – Statistics	Probability
Constant	-1.244305	0.482254	-2.580188	0.0145
FDI	0.052324	0.026228	1.994943	0.0544
Inflation	-0.0434534	0.222065	-1.956790	0.0589
Exchange rate	0.337610	0.130413	2.588786	0.0142
Trade Openness	0.517811	0.124595	4.155970	0.0002
Real GDP	0.515397	0.122804	4.196916	0.0002
Exports(-1)*	0.498896	0.143276	3.482074	0.0014
R-Squared	0.997503		F - Statistic	2196.947
Durbin-Watson	1.552032		Prob. (F - Statistics)	0.000000

\*(Speed of Adjustment Term)

In the study, error correction term is appeared to be with negative sign. Statistically, it is significant at 1 percent level of significance. Convergence from short run to long run equilibrium is suggested by speed of adjustment term.

## 5. Diagnostic Statistics

Reliability of previously discussed econometric result is based upon some diagnostic statistics presented in this section regarding problems of Autocorrelation, Heteroskedasticity, Distribution of Residuals, and Stability of models.

### 5.1. Autocorrelation Test

Breusch – Godfrey Serial Correlation LM test is used in the study to detect the problem of Autocorrelation. Null Hypothesis of this test is No Autocorrelation which may not be rejected after having probability values greater than 0.10. In table 4, probability value of Chi-square test is 0.26 suggesting no problem of autocorrelation in regression model.

Table 4: Breusch - Godfrey Serial Correlation LM test

F-Statistic	1.100270	Prob.F(2,31)	0.3454
Obs*R-Squared	2.651210	Prob. Chi-Square(2)	0.2656

### 5.2 Heteroskedasticity

For detection of Heteroskedasticity, Breusch – Pagan – Godfrey Heteroskedasticity test is utilized having Null Hypothesis as there is no Heteroskedasticity problem in the regression model. Alternative Hypothesis may be rejected due to having probability values greater than 0.10 i.e. 0.86, 0.83 and 0.95. It is concluded that there is no problem of Heteroskedasticity in regression model.

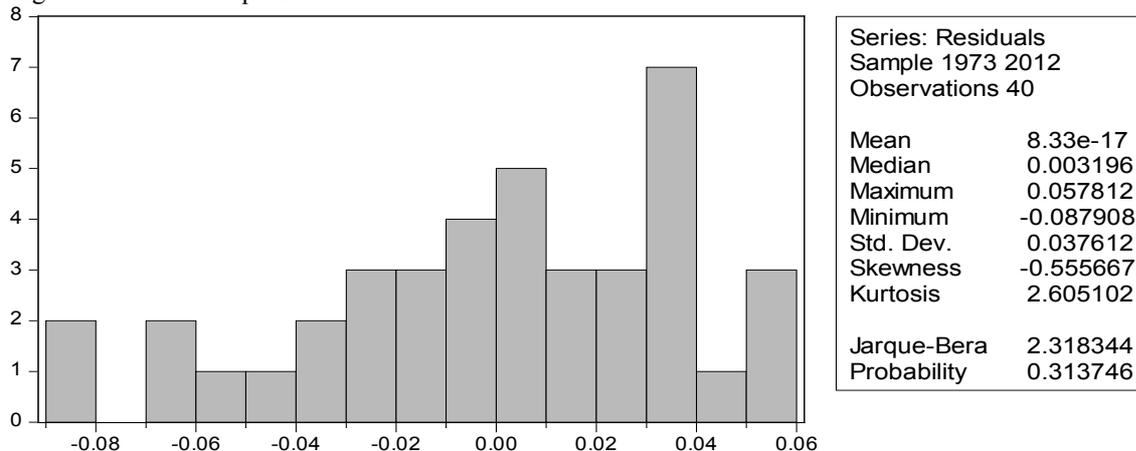
Table 5: Breusch - Pagan – Godfrey test

F-Statistic	0.41712	Prob.F(3,3)	0.8617
Obs*R-Squared	2.824724	Prob.Chi-Square(6)	0.8305
Scaled Explained SS	1.542966	Prob.Chi-Square(6)	0.9566

### 5.3 Normality Test

Normality test is applied for checking normal distribution of residuals using Jarque – Bera Statistics. Null Hypothesis of Jarque Bera test is that Residuals are normally distributed which cannot be rejected due to its probability i.e. 0.31. It is concluded that residuals of regression model is normally distributed.

Figure 1: Jarque Bera Test



#### 5.4 Dynamic Stability

For dynamic stability of regression model, the analysis applied CUSUM and CUSUMSQ tests. If estimated lines of CUSUM and CUSUMSQ lie between its critical lines drawn at 5 percent level of significance, then regression model is considered to be significantly dynamic stable.

Figure 2: CUSUM Test

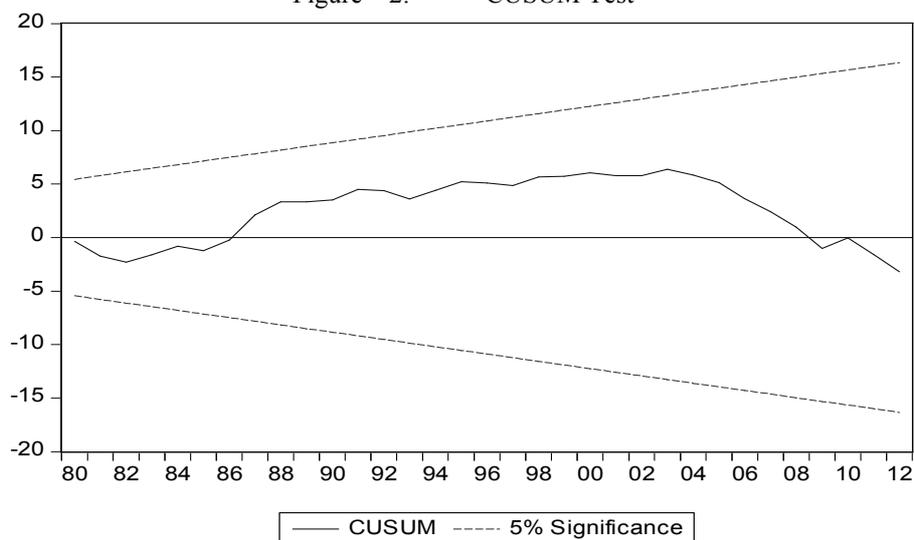
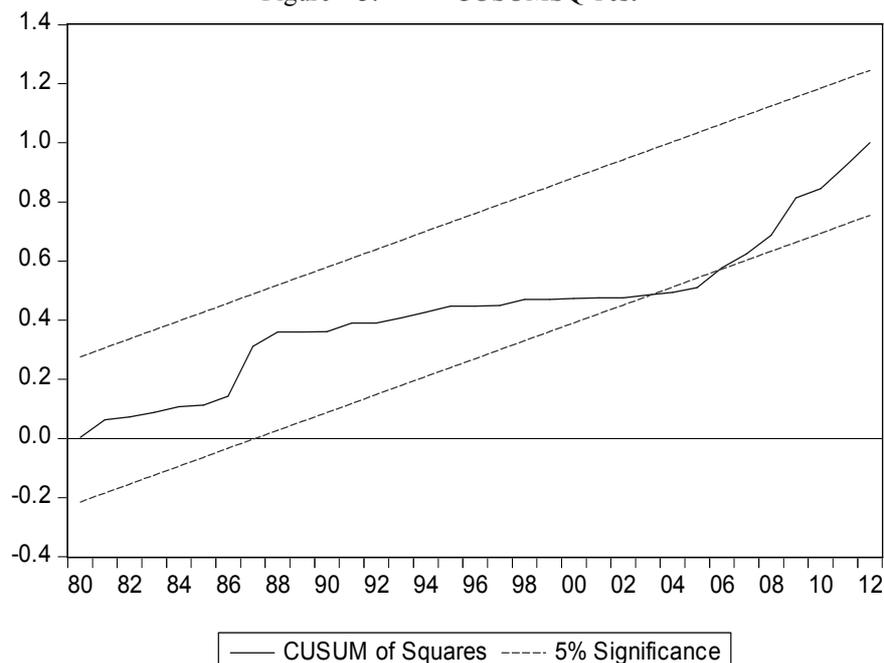


Figure 3: CUSUMSQ Test



## 6. Concluding Remarks

Foreign direct investment is having considerable importance with respect to influence on exports of Pakistan. Due to inefficiency and diseconomies of scale in Pakistani industrial sector, it is desired to invite foreigners to produce higher quality products by utilizing domestic resources and export some off the excess production that may be beneficial for economy of Pakistan.

Considering its imports, the current study is aimed at investigating the influence of foreign direct investment on exports of Pakistan. For that purpose, time series data is collected from 1972 to 2014 through various reliable sources like Handbook of Statistics on Pakistan Economy 2010, Economic Survey of Pakistan (2014 – 15) and 50 Years of Pakistan (1947 – 1997) published by various institution of Government of Pakistan. For estimation of elasticities, the study chooses log – log form of the equation. The econometric results are estimated for the long run as well as short run by using Partial Adjustment model and some diagnostic statistics are also applied for reliability of coefficient. The problems associated with regression like Autocorrelation, Heteroskedasticity, normality of residuals and dynamic stability are detected using appropriate tests.

In the long run as well as short run, foreign direct investment, exchange rate, trade openness and real GDP are appeared to be positively associated with exports of Pakistan during period of study. Inflation is tended to inversely affecting exports of Pakistan in long run and short run. Speed of adjustment term suggests convergence towards long run equilibrium due to any disturbance appeared in short run with statistically significant coefficient. Elasticities of Exports with respect to FDI, Inflation, Exchange rate, Trade Openness and Real GDP are 0.10, - 0.87, 0.67, 1.03, and 1.03 in the long run and 0.05, - 0.04, 0.33, 0.51, and 0.51 in the short run respectively. Diagnostic statistics confirms that regression model is free from all econometric problems of autocorrelation, Heteroskedasticity, abnormality of residuals and dynamic instability of models.

On the basis of econometric results, it is suggested that Pakistani economy should be free of terrorism, political, economic and trade instability so that foreigners may be invited for investment in Pakistan that may lead our economy towards long run economic growth, price and exchange rate stabilities.

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