International Journal of Social Sciences Bulletin
Volume 2, Issue 4, 2024 ISSN: (E) 3007-1917 (P) 3007-1909

EFFECTS OF EXCHANGE RATE AND MONETARY POLICY ON THE TRADE BALANCE OF PAKISTAN

Muhammad Usman Ghani[1], Muhammad Yaseen[2], Hafiz Muhammad Irfan[3], Amnan Javaid[*4], Muhammad Rashid Shabbir[5]

[1]Assistant Professor of Economics Government Muslim Associate College 41/ JB Faisalabad, Pakistan
[2]BS in Economics Government College University, Faisalabad, Pakistan
[3]M.Phil. Scholar, Government College University, Faisalabad, Pakistan
*[*4]PhD Scholar Economics Department Government College University Faisalabad, Pakistan*
[5]M.Phil. Scholar,Institute of Agriculture & Resources Economics University of Agriculture Faisalabad, Pakistan

[1]prof.usman.jutt@gmail.com, [2]mhdyaseen241@gmail.com, [3]mmirfanmanzoor4@gmail.com, [*4]amnanjavaid30@gmail.com, [5]rashideco5@gmail.com

Corresponding Author: *

Received	Revised	Accepted	Published
26 October, 2024	26 November, 2024	12 December, 2024	19 December, 2024

ABSTRACT

This study has been conducted to investigate the effects of exchange rate and monetary policy on Pakistan's trade balance. Trade Balance is the difference between exports and imports. It is a significant element of the balance of payment. Trade balance may be surplus or deficit. In that case, when a nation's exports exceed imports, it is such a favorable situation that it may rarely occur. A deficit in trade balance transpires when a country's imports are more significant than its exports. The secondary data of a time series nature spanning the range from 1971 to 2018 has been used for the analysis. The GDP, Interest rate, Exchange rate, Inflation, Foreign Direct Investment and Trade Balance data are collected from world development indicators and International financial statistics. The Johansen cointegration technique and Vector Error Correction method have been used to find the results. Monetary policy associated with the variations in interest rates may be contractionary or expansionary. This study has revealed that contractionary monetary policy, with the rise in the exchange rate, has worsened Pakistan's trade balance. The contractionary monetary policy caused a rise in interest rates, which decreased capital investment in the economy and resulted in a rise in the exchange rate, and this upward movement of the exchange rate worsened the trade balance of Pakistan. GDP has a positive and significant effect on the trade balance. The relationship between exchange rate and trade balance is negative, and the impact of ER on trade balance is significant. Inflation and foreign direct investment have a positive relationship, with trade balance having an insignificant effect. Interest rates negatively correlated with trade balance but significantly influenced the dependent variable. This study suggests that deterioration in the exchange rate improves Pakistan's trade balance mainly through increased exports and a cut in imports. It is exposed that the trade balance of Pakistan is highly sensitive to changes in exchange rate rather than interest rate, so it is considered that the trade balance of Pakistan is mainly and explicitly determined by the exchange rate.

Keywords: *Trade Balance, Exchange Rate, Monetary Policy, Johnson Cointegration test and Vector Error correction Model.*

INTRODUCTION

Trade Balance is the difference between imports and exports. It is a significant element of the balance of payment. Trade balance may be surplus or deficit. In that case, when a nation's exports exceed imports, it is a favorable situation that may rarely occur. However, a deficit in trade balance transpires when a nation's imports are more significant than its exports. (Hume 2005)

Pakistan is a developing country and faces a trade deficit yearly due to excessive imports compared to stagnant exports. Our major exports are agricultural, but imports are industrial, so imports are rising yearly compared to exports. Pakistan has been confronting successive trade deficits since its inception. The trade deficit was recorded in October 2018 at $26.11 billion compared to $601.97 million in 1971. Devaluation of domestic currency could recover the trade balance, but the impact of depreciation in the short and long run is different. First, the trade balance declines after devaluation and then moves towards recovery till it reaches long-run equilibrium. It is recognized as a J-Curve. (Kakar et al. 2010)

An exchange rate represents the proportion of foreign currency exchanged with the national currency. The significant fluctuations in exchange rates are identified as volatility, which can determine a nation's trade balance. Many underdeveloped countries have a problem understanding how exchange rates affect economic decisions. It has a significant influence on the development of a country. Such movability consequently increases the nominal and real exchange rates. (Azid et al. 2005)

The efficiency of commercial policy can be judged by understanding the effect of currency depreciation on a nation's trade balance. Economic decisions are always determined to be in line with the exchange rate. Many under-developed countries adopt depreciation policies to enhance their exports. When any country's currency depreciates, the exported goods are found at a cheaper rate for foreigners, but imported goods are expensive for domestic consumers. So, the trade balance improves as the ratio of terms of trade improves positively. It is contending that deflation can be unproductive for a developing nation with price and exchange rate changes. (Meese and Rogoff, 1983)

The Exchange rate could be affected by the different economic decisions. The decision maker should adopt the following best alternatives to control the frequent variations in the exchange rate. Anticipating the Exchange rate is explained by two dissimilar schools of thought. One believes in the prediction that equilibrium occurs with the supply and demand of currencies, and the other presents that the exchange rate is settled through financial sector equilibrium. It is confirmed that the depreciation will recover a nation's trade balance of payment. This situation advocates a worsening of the trade balance in short-run cases. (Ellahi 2011).

The monetary policy and exchange rate linked with the trade balance can be debated in an open economy. Dorn Bush describes that those shocks in monetary policy primarily led to a rise in the exchange rate and then depreciated after all. The effect of monetary policy on trade balance is different regarding income and expenditures. The income effect improves the trade balance of any country through a reduction in real income. On the other hand, strict monetary action can raise the currency's value over the inflow of capital, resulting in a cut in exports that may cause a worse trade balance. Whenever the income-switching effect disturbs the trade balance, the expenditure-switching policy works as a curative measure to overcome the effect and improve the trade balance. It is confirmed that when the local currency deteriorates in terms of international currency, it may cause a deterioration in the trade balance. (Iverendi and Guloglu, 2010).

The effect of exchange rates on the economy is extensive. To understand a nation's trade volume, knowing the pattern and behaviour of exchange rate fluctuations in the international market is mandatory. Variations in exchange rates could be measured through monetary policy. Monetary policy settles the exchange rate that influences the foreign sector. The size of the foreign sector depends upon macroeconomic stability in the economy (Ahmad, 2009).

The planners and policymakers still drive the foreign sector of an economy through the policy

of devaluation to recover the trade balance or remove the deficit from the balance of payments. It forms inconsistency in the balance of payments by way of local currency persistently losing its worth in terms of international currency. The planners took necessary action to remove this economic disease in the economy and bring currency equilibrium to the foreign sector. which results in the inflow of foreign reserves in the economy. (Bhatti and Din, 2001).

Objectives

- Overview of trade and Trade Balance in Pakistan
- To measure the effects of exchange rate, monetary policy and other relevant variables on the Trade balance of Pakistan

MATERIAL AND METHODS

The primary purpose of the section is to describe the different methods and procedures used to collect, analyze, and interpret the empirical data to find the problem under consideration. The research intended to find the effect of exchange rate and monetary policy on the trade balance of Pakistan. Methodology denotes the logic of systematic technique to manage the research in a diagnostic manner. It also uses systematical methods to implement precision and implication of the study contended. Which was unanimously recognized as a suitable technique for the analysis. (Latifee 2003).

This research was an impact assessment, and according to Hulme (2000), impact assessment was implemented on the different key variables in the study amongst outcomes. It intended to practice the intervention against the crucial variables of the study. The interdependence of variables could be evaluated in this context.

Data Collection

The study examined the effects of the exchange rate and monetary policy on Pakistan's trade balance. It used secondary data, a time series from 1971 to 2018. The data on GDP, Interest Rate, Exchange Rate, Inflation, FDI, and Trade Balance were collected from world development indicators and international financial statistics. The Johansen cointegration technique and Vector error method was used to find the results.

Stationary time series

A time series is stationary when all its statistical properties, mean, variance and autocorrelation, are constant over time. Consequently, a time series is non-stationary when all its statistical properties change over time. However, the Signs of non-stationary are low DW but high R^2. When a time series drifts with fluctuations, it is not stationary, for the mean value entirely relies on time. Two methods are customarily used to change a trend series to stationary from: linear detrending and differencing. Jenkins prefers a differencing time series to eliminate trends and attain stationarity rather than detrending by lapsing on time trends.

Unit root tests

In Econometric analysis, a unit root test checks whether a time series is Stationary or not. If it is non-stationary, then it has a unit root. The null hypothesis is commonly defined as the existence of a unit root, and the alternative hypothesis is stationarity according to the test used. A test to verify the stationarity of time series data has become very popular in recent decades. It is called the root unit test. Given the following model established for a unit root test:

$y_t = \gamma\, y_{t-1} + \varepsilon_t$

Where

ε_t is the error term

Subtract y_{t-1} on both sides and get

$y_t - y_{t-1} = \gamma\, y_{t-1} - y_{t-1} + \varepsilon_t$

taking y_{t-1} as common

$\Delta y_t = (\gamma-1)\, y_{t-1} + \varepsilon_t$

Equation now stated as

$\Delta y_t = \delta\, y_{t-1} + \varepsilon_t$

where $\delta = \gamma-1$

Δ is the difference.

Then estimate the above equation test hat $\delta = 0$. If $\delta=0$, then $\delta=1$, that means it has a unit root, as it is understood that the time series considered is non-stationary. Now we take the first difference of Yt and explain them on Yt-1, then check if the estimated coefficient of regression is zero, then it is found that yt is stationary. To test the significance of it, Augmented Dicky Fuller or Philips Perron tests are used.

Model Specification

To evaluate the effect of the exchange rate and monetary policy on Pakistan's trade balance. The variables used in this research are GDP, Exchange rate, Inflation, interest rate and Trade balance. The functional relationship among selected variables can be stated as follows:

TB = f (GDP, ER, I, R, FDI)

Where TB is the Trade Balance % of GDP used as dependent variable

While GDP, ER, I, R and FDI are used as Explanatory variables

⇒ GDP refers to Gross Domestic Production

⇒ ER refers Exchange rate

⇒ I represent Interest rate

⇒ R represent Inflation

⇒ FDI refers to Foreign Direct Investment

GDP refers to the final goods and services, the Trade balance obtained by subtracting exports and imports, and the exchange rate is an expression of (the Pak rupee in US $). The Interest rate is the price of capital, and the Inflation rate is the monetary expression of a value.

The linear form of the model is given in equation form.

$TB = \beta_0 + \beta_1 GDP + \beta_2 ER + \beta_3 I + \beta_4 R + \beta_5 FDI + \mu$

β's are the slope coefficients that show the impact of explanatory variables on endogenous variables. While β_0 is an Intercept that happens to be the trade balance when all other variables are supposed to be zero, β_1 refers to the impact of GDP on TB, β_2 indicate the effects of exchange rate on the trade balance, β_3 represents the impact of Interest rate on trade balance, β_4 shows the impact of inflation on the TB and β_5 shows the effect of foreign direct investment on trade balance of Pakistan. and μ is the error term.

3.5 Johansen Co-integration Test

Johansen's cointegration test was developed by Johansen and Juselius (1990). It was designed to check the long-run association among the variables. The condition of its applicability is that when all the variables are found non-stationary at I (0). When all these variables convert into the first difference, they become stationary. The variables of this study were integrated into the same order. When converted into the first difference, they become stationary. So, the technique of Johansen cointegration is applied for general observation of the cointegrating vectors. This test explains more than one cointegrating association of the series. Which allows the evaluation of all the plausible cointegrating associations.

3.6 Vector Error Correction model

The vector error correction model was applied to non-stationary time series, but the series was cointegrated at the first difference I(1). Now run the Vector Error Correction Model in order to estimate the short-term and long-term dynamic of the series. This study, based on multivariate time series analysis and VECM, relies on restricted VAR and is applied when all the series are integrated in the first order and associated with them.

Result Analysis

Recent progress in econometrics demonstrates that the macroeconomic variables are initially non-stationary at the level. The ADF test has estimated the results. Therefore, it is important to this investigation that the stationarity of the macroeconomic variables of data be considered before evaluating the relationship amongst all study variables.

The method to measure the stationarity of time series data through unit root is t statistic and p-value; there are two ways to examine the stationary/non-stationary of a variable. One is if the value of absolute ADF is greater than that of critical values found correspondingly, than reject the null hypothesis and accept the alternative, and the variable result is stationary; on the other way, when the absolute value of ADF is less than that of critical values found correspondingly than do not reject null hypothesis mean accept it, in that case means the variable is non-stationary. (Sulaiman 2010)

The next way to find the unit root is the p-value; when the probability of the ADF test is less than 5%, the null hypothesis is rejected, and the alternative is accepted, which means the data is found stationary. If the probability of ADF is more than 5%, the null hypothesis is accepted, which means the data is non-stationary at the level.s

Table 1: Unit root /ADF test for Trade balance at first difference (Constant only)

Variable	ADF Test Statistics	Significance Level	Critical Values	Probability	Decision
Trade Balance	-7.489451	1%	-3.581152	0.0000	stationary at first difference
		5%	-2.926622		
		10%	-2.601424		

Source: Author's own calculations

ADF/unit root test results for the time series trade balance data at level positively demonstrate that the trade balance data is found non-stationary at level with constant only. ADF/unit root test results for the time series trade balance data at level positively demonstrate that the trade balance result is found non-stationary at level with constant and trend. The secondary time series data concerning the trade balance of Pakistan was found Stationary at first difference form as given in Table 4.3; the absolute value of test statistics in terms of the ADF unit root test is greater than the critical values that existed at the level of significance of 1%, 5% and 10% respectively. ADF/unit root test results for the time series trade balance data at first difference demonstrate that the trade balance data is found stationary at I (1) with constant only.

Table 2: Unit root/ADF test for Trade Balance at first difference (Constant and trend)

Variable	ADF Test Statistics	Significance Level	Critical Values	Probability	Decision
Trade Balance	-7.410179	1%	-4.170583	0.0000	Stationary at first difference
		5%	-3.510740		
		10%	-3.185512		

Source: Author's own calculations

The secondary time series data concerning trade balance of Pakistan found Stationary at first difference form as given in Table 2, the absolute value of test statistics in terms of ADF unit root test is greater than the critical values existed at the level significant of 1%, 5% and 10% respectively. ADF/unit root test results for the time series data of trade balance at first difference demonstrates that the result of trade balance is found stationary at I(1) with constant and trend.

Table 3: Unit root /ADF test for GDP at first difference (Constant only)

Variable	ADF Test Statistics	Significance Level	Critical Values	Probability	Decision
GDP	-6.060200	1%	-3.581152	0.0000	stationary at first difference
		5%	-2.926622		
		10%	-2.601424		

Source: Author's own calculations

ADF/unit root test results for the time series GDP data at level positively demonstrate that GDP data is found non-stationary at level with constant only. ADF unit root test results for the time series data of GDP at level positively demonstrates that the result of GDP is found non-stationary at level with constant and trendThe secondary time series data concerning GDP found Stationary at first difference form as given in Table 3, the absolute value of test statistics in terms of ADF unit root test is more

excellent than the critical values existed at the level significant of 1%, 5% and 10% respectively. ADF/unit root test results for the time series GDP data at first difference demonstrate that GDP data is found stationary at I (1) with constant only.

Table 4: Unit root/ADF test for GDP at first difference (Constant and trend)

Variable	ADF Test Statistics	Significance Level	Critical Values	Probability	Decision
GDP	-5.980970	1%	-4.170583	0.0001	Stationary at first difference
		5%	-3.510740		
		10%	-3.185512		

Source: Author's own calculations

ADF/unit root test results for the time series data of exchange rate at level positively demonstrate that the exchange rate data is found non-stationary at level with constant only. ADF/unit root test results for the time series data of exchange rate at level positively demonstrates that the result of exchange rate is found non-stationary at level with constant and trendThe secondary time series data concerning GDP found Stationary at first difference form as given in Table 4, the absolute value of test statistics in terms of ADF unit root test is more excellent than the critical values existed at the level significant of 1%, 5% and 10% respectively. ADF/unit root test results for the time series data of GDP at first difference demonstrate that the GDP result is found stationary at I(1) with constant and trend.

Table 5: Unit root /ADF test for Exchange rate at first difference (Constant only)

Variable	ADF Test Statistics	Significance Level	Critical Values	Probability	Decision
Exchange rate	-9.577029	1%	-3.581152	0.0000	stationary at first difference
		5%	-2.926622		
		10%	-2.601424		

Source: Author's own calculations

The secondary time series data concerning exchange rate was found Stationary at first difference form as given in Table 5; the absolute value of test statistics in terms of ADF unit root test is more excellent than the critical values existed at the level significant of 1%, 5% and 10% respectively. ADF/unit root test results for the time series data of exchange rate at first difference demonstrates that the exchange rate data is found stationary at I (1) with constant only.

Table 6: Unit root/ADF test for Exchange rate at first difference (Constant and trend)

Variable	ADF Test Statistics	Significance Level	Critical Values	Probability	Decision
Exchange rate	-9.139163	1%	-4.170583	0.0000	Stationary at first difference
		5%	-3.510740		
		10%	-3.185512		

Source: Author's own calculations

The secondary time series data concerning exchange rate was found Stationary at first difference form as given in Table 6; the absolute value of test statistics in terms of ADF unit root test

is more excellent than the critical values existed at the level significant of 1%, 5% and 10% respectively. ADF/unit root test results for the time series data of exchange rate at first difference demonstrates that the exchange rate result is stationary at I (1) with constant and trend.

Table 7: Unit root /ADF test for the Interest rate at the first difference (Constant only)

Variable	ADF Test Statistics	Significance Level	Critical Values	Probability	Decision
Interest rate	-6.260198	1%	-3.581152	0.0000	stationary at first difference
		5%	-2.926622		
		10%	-2.601424		

Source: Author's own calculations

ADF/unit root test results for the time series data of Interest rate at level positively demonstrate that the data of Interest rate is found non-stationary at level with constant only.ADF/unit root test results for the time series data of Interest rate at level positively demonstrates that the result of Interest rate is found non-stationary at level with constant and trend. The secondary time series data concerning Interest rate was found Stationary at first difference form as given in Table 7; the absolute value of test statistics in terms of ADF unit root test is greater than the critical values existing at the level significant of 1%, 5% and 10% respectively. ADF/unit root test results for the time series data of Interest rate at first difference demonstrates that the data of Interest rate is found stationary at I(1) with constant only.

Table 8: Unit root/ADF test for Interest rate at first difference (Constant and trend)

Variable	ADF Test Statistics	Significance Level	Critical Values	Probability	Decision
Interest rate	-6.253518	1%	-4.170583	0.0000	Stationary at first difference
		5%	-3.510740		
		10%	-3.185512		

Source: Author's own calculations

The secondary time series data concerning Interest rate was found Stationary at first difference form as given in Table 8; the absolute value of test statistics in terms of ADF unit root test is greater than the critical values existing at the level significant of 1%, 5% and 10% respectively. ADF/unit root test results for the time series interest rate data at first difference demonstrate that the interest rate is found stationary at I(1) with constant and trend.

Table 9: Unit root /ADF test for Inflation at first difference (Constant only)

Variable	ADF Test Statistics	Significance Level	Critical Values	Probability	Decision
Inflation	-6.680497	1%	-3.581152	0.0000	stationary at first difference
		5%	-2.926622		
		10%	-2.601424		

Source: Author's own calculations

ADF/unit root test results for the time series data of the Inflation rate at level positively demonstrate that the Inflation rate data is found non-stationary at level with constant only. ADF/unit root test results

for the time series data of the Inflation rate at level positively demonstrate that the result of the Inflation rate is found to be non-stationary at level with constant and trend. The secondary time series data concerning the Inflation rate was found Stationary at first difference form as given in Table 9; the absolute value of test statistics in terms of the ADF unit root test is greater than the critical values that existed at the level significant of 1%, 5% and 10% respectively. ADF/unit root test results for the time series data of Inflation rate at first difference demonstrate that the Inflation rate data is found stationary at I(1) with constant only.

Table 10: Unit root/ADF test for Inflation at first difference (Constant and trend)

Variable	ADF Test Statistics	Significance Level	Critical Values	Probability	Decision
Inflation	-6.641476	1%	-4.170583	0.0000	Stationary at first difference
		5%	-3.510740		
		10%	-3.185512		

Source: Author's own calculations

The secondary time series data concerning the Inflation rate was found Stationary at first difference form as given in Table 10; the absolute value of test statistics in terms of the ADF unit root test is greater than the critical values that existed at the level significance of 1%, 5% and 10% respectively. ADF/unit root test results for the time series data of the Inflation rate at first difference demonstrate that the Inflation rate result is found stationary at I(1) with constant and trend.

Table 11: Unit root /ADF test for FDI at first difference (Constant only)

Variable	ADF Test Statistics	Significance Level	Critical Values	Probability	Decision
Foreign Direct Investment	-4.582176	1%	-3.581152	0.0006	stationary at first difference
		5%	-2.926622		
		10%	-2.601424		

Source: Author's own calculations

ADF/unit root test results for the time series data of FDI at level positively demonstrate that the data of FDI is found non-stationary at level with constant only. ADF/unit root test results for the time series data of FDI at level positively demonstrate that the result of FDI is found non-stationary at level with constant and trend. The secondary time series data concerning the Inflation rate was found Stationary at first difference form as given in Table 11; the absolute value of test statistics in terms of the ADF unit root test is greater than the critical values that existed at the level significance of 1%, 5% and 10% respectively. ADF/unit root test results for the time series data of FDI at first difference demonstrate that the FDI data is found stationary at I (1) with constant only.

Table 12: Unit root/ADF test for FDI at first difference (Constant and trend)

Variable	ADF Test Statistics	Significance Level	Critical Values	Probability	Decision
Foreign Direct Investment	-5.191153	1%	-4.170583	0.0008	Stationary at first difference
		5%	-3.510740		
		10%	-3.185512		

Source: Author's own calculations

The secondary time series data concerning FDI are found in Stationary at first difference form, as given in Table 12. The absolute value of test statistics in terms of the ADF unit root test is greater than the critical values at the levels significant of 1%, 5%, and 10%, respectively. The ADF/unit root test results for the time series data of FDI at first difference demonstrate that the result of FDI is found stationary at I (1) with a constant trend.

Johansen Test of Cointegration

The Johansen cointegration test was applied to check the long-run association among variables in the study after determining the order of integration between them (Johansen 1992). This test was applied to recently used research software, such as E-Views, and the results are compiled in the table below.

Table 13: Cointegration Rank test of (Trace statistics)

Null Hypothesis	Alternative Hypothesis	Trace Statistic	0.05 Critical Value	Probability
r = 0	r = 1	199.0805	103.8473	0.0000*
r = 1	r = 2	88.86482	76.97277	0.0047*
r = 2	r = 3	51.35113	54.07904	0.0857
r = 3	r = 4	25.74423	35.19275	0.3564
r = 4	r = 5	12.85032	20.26184	0.3759
r = 5	r = 6	1.193312	9.164546	0.9244

Source: Author's own calculations

The results of the Johansen test show that there are two cointegrating equations at 5% level

The model's outcome explains that two vectors among six are cointegrated at a 5% significance level based on trace statistics because the value of trace stat is greater than the critical values at 0.05 level of both vectors. The probability value of both equations is always observed below 5%. With the consent of AIC and SC criteria, lag 1 was selected. The results conclude that the long-run association of the given model variables existed. The null hypothesis of no co-integration among variables was rejected at 5%. (Babatunde and Adefabi, 2005).

Table 14: Cointegration Rank test of (Maximum Eigenvalue)

Null Hypothesis	Alternative Hypothesis	Max-Eigen Statistic	0.05 Critical Value	Probability
r = 0	r = 1	110.2157	40.9568	0.0000*
r = 1	r = 2	37.51369	34.80587	0.0232*
r = 2	r = 3	25.6069	28.58808	0.1147
r = 3	r = 4	12.89392	22.29962	0.567
r = 4	r = 5	11.65701	15.8921	0.2068
r = 5	r = 6	1.193312	9.164546	0.9244

Source: Author's own calculations

The outcome of the Max Eigen test explains that two vectors among six are cointegrated at a 5% significance level based on Max-Eigen statistics because the values of Max-Eigen stat are more

significant than the critical values at the 0.05 level of both vectors (Chavel, 1984). The probability value of both equations is always observed below the level of 5%. The results reported a long-run association among the variables that existed. The null hypothesis of no co-integration among variables was rejected at 5%.

Table 15: Long run Cointegrating equation

Variables	Coefficients	T-Statistic
Trade Balance	1.0000	-
Constant	-22.830	-
Gross Domestic Product	0.156	5.909*
Exchange Rate	-0.777	-11.670*
Inflation	0.022	0.138
Foreign Direct Investment	0.193	0.282
Investment	-1.436	-2.113*

Source: Author's own calculations

The long-run coefficients are described in the form of the equation stated below.

TB = -22.830 + 0.156 GDP – 0.777 ER + 0.022 R + 0.193 FDI - 1.436 I

T-Statistics (5.909) (-11.670) (0.138) (0.282) (-2.113)

The results of the above equation represent that if one unit increase in GDP causes a 0.156-unit rise in the Trade balance of Pakistan by holding all other variables constant. GDP has a positive and direct effect on the trade balance. The probability value highlights that the impact of GDP on trade balance is significant.

The value of the exchange rate coefficient is -0.777, which depicts that one unit rise in the exchange rate brings a 0.777 unit decrease in Pakistan's trade balance. A rise in the exchange rate causes a decline in the country's external trade balance. The relationship between the exchange rate and trade balance is negative. The impact of ER on the trade balance is significant.

The value of the inflation coefficient is 0.022, which indicates that one unit upsurge in inflation takes a 0.022 unit increase in the trade balance. inflation positively affects the trade balance, but its impact on the trade balance is insignificant. The value of the FDI coefficient is 0.193, which means one unit rise in FDI brings a 0.193 unit increase in trade balance; hence, the impact of FDI on external balance is insignificant. The Interest rate coefficient is -1.436, depicting that a one-unit upsurge in interest causes a 1.436-unit fall in the trade balance. while the interest rate significantly influences Pakistan's trade balance.

4.4 Vector Error Correction Model

The vector error correction model is usually applied to time series data to test the short-run association among variables. Suppose the Johansen cointegration test results report a long-term relationship among variables. In that case, the application of VECM is justified based on the recommendations provided by the cointegration analysis. The VECM methodology is entirely based on restricted VAR. VECM measures the speed of adjustment from the short run to the long run after the long-term association is verified (Asari et al., 2011).

The VECM results reported in the Table below concern variables taken in column one, coefficients in column two, and t-stat in column three, with probability placed in the last column of the table.

Table 16: VECM results with Trade Balance as the dependent variable

Variables	Coefficients	T-Statistics	Probability
Coin. Equation	-0.725368	-3.397	0.000*
Constant	-0.230240	-0.138	0.891
Gross Domestic Product	0.0876	2.965	0.001*

Exchange Rate	-0.7431	-4.237	0.000*
Inflation	-2.469	-1.182	0.253
Foreign Direct Investment	0.050	0.458	0.652
Investment	1.326	2.457	0.003*
R-squared = 0.61	F-Statistics = 4.11		DW-Statistics = 2.04

Source: Author's own calculations

The estimated results of Table 4.30 show Vector Error Correction results (VECM), which explain the correction value of the model toward equilibrium due to any shock in the explanatory variables in the short run. The estimated results show we can reject the null hypothesis of no co-integration based on t-statistics and probability values. The empirical results of the ECM coefficient show that 72 per cent correction takes place in one year in the short run due to any shock in explanatory variables. The t statistics and probability values show the significance of the ECM parameter. (Maysami and Koh, 2000).

Results confirmed that GDP positively affects Pakistan's trade balance, and its coefficient's impact is significant. The exchange rate has a negative effect on the trade balance as a unit rise in the exchange rate deteriorates the trade balance by 0.743. the impact of its coefficient on the trade balance is significant. The probability value of Inflation shows insignificant results as more significant than 5%, and Foreign direct investment is also found insignificant. At the same time, the relationship between FDI and trade balance is positive. Moreover, Inflation negatively affects the trade balance.

The results of the VECM model show a short-run relationship among the study's variables. Gross Domestic Product, Foreign Direct Investment, and Interest Rate positively affect the trade balance, but among these variables, the impact of GDP and Interest Rate is significant except for the interest rate. While the effect of the exchange rate and inflation is negative on the trade balance, both the exchange rate and inflation significantly and insignificantly influence Pakistan's trade balance (Sulaiman, 2010).

The coefficient of the cointegrating equation, which has a negative sign with a significant impact, shows that a long-run relationship exists among trade balance, exchange rate, foreign direct investment, inflation, and interest rate. the value of R-squared is 0.61, representing that about 61 per cent of variations in the dependent variable (The trade balance) are due to all independent variables (exchange rate, GDP, foreign direct investment, Inflation and Interest rate). and the rest of the 39 per cent variation is due to other variables. The value of F-statistics 4.11 shows the model is an overall good fit. The value of the Durbin-Watson test Statistics around two shows no autocorrelation found in the data.

Findings

This study was conducted to estimate the effect of exchange rate and monetary policy on Pakistan's trade balance. This study explained that deflationary monetary policy and exchange rate appreciation worsen the trade balance of Pakistan. Monetary policy is associated with variations in interest rates that may be contractionary or expansionary. This study revealed that contractionary monetary policy with the rise in exchange rate worsened Pakistan's trade balance. The contractionary monetary policy causes a rise in interest rates, which decreases capital investment in the economy and increases the exchange rate. This upward movement of the exchange rate worsens Pakistan's trade balance.

The secondary data of a time series nature spanning from 1971 to 2018 was used for the analysis. The Johansen cointegration technique was applied to find the long-run association among the study variables. Pakistan has been facing a trade deficit for a long time because of excessive imports and stagnant exports. It is difficult for the administrative authorities to stabilize the worth of domestic currency in terms of foreign currency. That is why the rupee has been devalued in the context of the dollar. It is also hard for the government to curtail expensive and industrial imports due to the immense need for a rising population.

Recommendations.

This study suggested that deterioration in the exchange rate improves Pakistan's trade balance mainly through an increase in exports and a cut in imports. It clearly exposed that Pakistan's trade balance is more sensitive to variations in the exchange rate than that of the interest rate, so it is considered that the trade balance is mainly and explicitly determined by the exchange rate.

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