



Impact of Exchange Rate on Balance of Trade of Pakistan: An ARDL Approach

Muhammad Waseem¹, Ayesha²

ARTICLE DETAILS	ABSTRACT
History	The premier purpose of this research paper is to investigate the effect of exchange rate on trade balance of Pakistan. Time series data is used of different variables like Trade Balance, Exchange Rate, Inflation and Exports from 1976 – 2020. For this purpose, the study applied Autoregressive Distributed Lag (ARDL) approach and Bound Test to achieve short run and long run results. The result indicates that, exchange rate put positive but insignificant impact on trade balance in Pakistan. It shows that high rate of exchange with respect to USD is harmful for trade balance of Pakistan. The study suggests that stable rate of exchange is good for the trade balance.
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¹National College of Business Administration and Economics (Multan Campus).

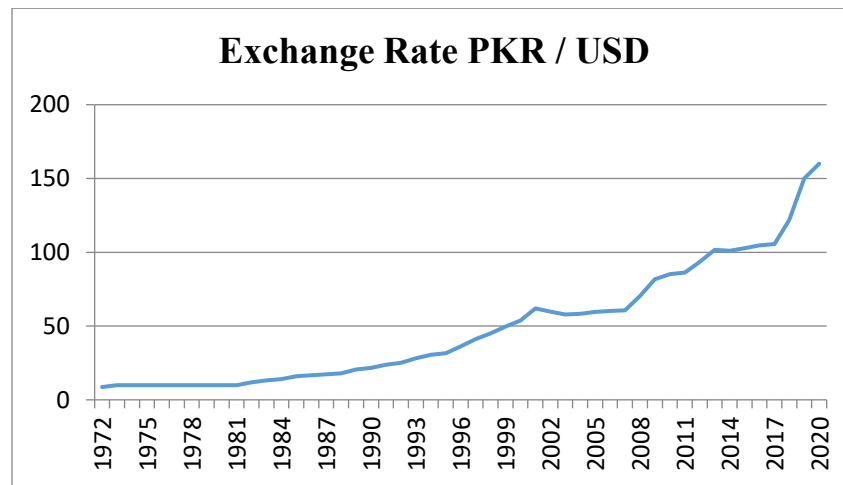
²PhD Applied Economics (Scholar), School of Economics and Trade, Hunan University, China.

1. Introduction

In developing and developed country growth of economy is determined by the Gross Domestic Product (GDP). Fluctuations in GDP effect the country's overall economic growth. The growth of economy in country can be affected positively or negatively by changes in rate of exchange. One domestic currency will be exchange for another is called exchange rate. It is very significant macroeconomic variable in international trade it also established the balance of trade. In open economy, it is extremely important variable because it affects the macroeconomic variables like FDI, trade, inflation, remittances, capital flows and GDP etc. If exchange rate of any country increases; export of goods domestically become inexpensive corresponded its trade partners, it will decrease in imports and increase in exports. In the economy, change in the price of exports and imports will also bring change in inflation rate. So, rate of Exchange disturbed the price level of traded commodities.

Some researcher found the influence of rate of exchange on balance of trade for developing and non-developing countries including Pakistan. Hassan (2020) explored that exchange rate put positive and significant impact on imports and exports with trade partner of Pakistan include China, UK and USA. Asghar et al (2020) indicate negative correlation b/w exchange rate and balance of trade. This negatively correlation is caused by high interest rate and low level of investment. Jadoon and Guang (2019), investigate positive influence of exchange rate on trade balance in long and short run. Depreciation of PKR against US\$ will tend to escalate in exports and trade balance will be improved in the end. Jayachandran (2013) reveals the negatively significant effect of instability of exchange rate on export and imports. Reduction in export is caused by higher level of exchange rate.

In developing countries exchange rate devaluation has been a critical problem. Pakistan is also a developing country. Pakistan is facing unfavorable balance of trade problems due to currency devaluation. Through a fixed system, Pakistan's rate of exchange is sustained for 35 years almost. Initial linkage of Pakistani rupee was established with Pound of Britain because of the affiliate of the Sterling region. In 1955, Pakistani rupee derogue by 30% very first time in relative to pound. Dollar is recognizing as an important currency, when USA become more observable in the world. Pakistan currency exchange rate is change in 1972 for the second time, and it was Rs. 9.90 per US\$, and go on till 1982. Because of the suggestion of IMF, Pakistani government changed the system of rate of exchange with US \$. In this system, central bank of Pakistan is accountable for PKR with US\$, and on the basis of weighted average of PKR with other currency in trade, exchange rate is determined.



Source: World Development Indicators (WDI)

Devaluation of Pakistani rupee put negative impact on balance of trade. Government and policy makers are trying to improve the balance of trade. They used various effective polices to improve the balance of trade but initially no positive result achieves.

The present study analyzes the exchange rate impact on trade balance in case of Pakistan. The study as well looks into the effect of other macroeconomic variables like Export and Inflation on Trade Balance of Pakistan. The present study organized by different sections, first section of the study is introduction, second section includes reviews of some relevant literature, third section provide introduction of different variables and present the empirical reseals. The fourth section provides summary and policy implications of the study.

2. Literature Review

There are various studies by which the effect of rate of exchange on balance of trade in different nations has been discussed. Some reviews of different studies are given below.

Hassan (2020), exploring the outcome of instability in exchange rate on exports and imports in Pakistan, with trading partner by utilize panel data from 1984 to 2015. The results of pooled least square (PLS) illustrate that, exchange rate put positive and significant impact on imports and exports with its trade partner include China, UK and USA.

Asghar et al (2020) probe into that how balance of trade is affected by fluctuation in exchange rate. The results show negative association b/w rate of exchange and balance of trade. Because of highly negative correlation Pakistan is facing trade deficit. This negatively correlation is caused by high interest rate and low level of investment.

Hina (2020) investigate the exchange rate effect on Pakistan's import and export from 1982 – 2019. The results of Johansen Co-integration disclose that, depreciation is not good for exports demand, however it increases the demand of imports and in the end, it depreciates the balance of trade. The study also concludes with the rejection of J – Curve in Pakistan.

Jadoon and Guang (2019), examines the effect of fluctuation in rate of exchange on trade stability of Pakistan from 1971 – 2016. After applying ARDL approach on different variables, the paper shows, positive influence of rate of exchange on balance of trade in long and short run. Depreciation of PKR against US\$ will tend to boost up exports and trade balance will be improved in the end. The study concludes with that, increment in supply of money and inflation would cause to deficit in trade.

Mohsin et al (2019), find out the effect of Balance of Trade, GDP and Unemployment on rate of exchange in Pakistan from 1995 to 2016. The result of the OLS shows that, GDP has on association with exchange rate, exchange rate is negative involvement with balance of trade and positively related with unemployment.

Dehraj et al (2019), look into the effect of volatility exchange rate on exports, imports of Pakistan from 1985 – 2015. The study used Exchange Rate as dependent variable and imports and exports are as independent variables. The results show that, variation in exchange rate is significant and positively related with imports and exports in Pakistan.

Kilicarslan (2018), finds the factors that influence the exchange rate in Turkey from 1974 to 2016 by using FMOLS and Johansen Co-integration method. The Results of the Johansen Co – integration confirm the co – integration between variables. The results of FMOLS illustrated that, instability of exchange rate is negatively affected by FDI, GDPC, GGEX, while positively affected by GFCF, money and trade.

Gachunga (2018), exploring the effect of volatility of rate of exchange on imports and exports in Kenya by utilizing data of time series from 1980 – 2015. The results of the study illustrate that, export and imports are significantly affected by volatility of rate of exchange in Kenya.

Kurtovic (2017) scrutinize the effect of devaluation in Real Effective Exchange Rate (REER) on trade balance in case of Albania by using data from 1994 to 2015. After applying VCM, the results indicating the long run positively effect of rate of exchange on trade balance. The study also specified the skinny survival of J – curve in Albania.

Ahmad et al (2017), look into effect of currency interchange on Pakistan's exports from 1970 to 2015. The study applied ARDL approach on variables. The results of the study show negative and insignificantly effect on Pakistan's exports, though income of the World is significant and positively effect on exports of Pakistan.

Tatliyer and Yigit (2016), inspected that how foreign trade affect by rate of exchange in Turkey by using monthly data from 1990 to 2015. The outcomes of the Johansen co-integration, VCM and VAR show the long run

correlation among trade and volatility of rate of exchange. The study also finds out the positive influence on export of volatility in long run.

Faridi and Kausar (2016), discover the effect of depreciation in exchange rate on trade balance of Pakistan from 1972 – 2014. Study applied ARDL approach on different variables. The study shows that, to persuade export and improve balance of trade, depression in exchange rate is very essential. In addition, LIR, INF, GDP and FDI set optimistic effect on trade stability. The study also confirms J – curve existence in Pakistan.

Panda and Mohanty (2015) inspect that how export of India is influenced by REER instability. The study applied Johansen Co-integration on data of time series since 1971 – 2012. Results indicate that, volatility real rate of exchange is negatively associated with export of Indian. The conclusion is that, there exist co-integration between World GDP, instability in real exchange rate and export in long run.

Shaikh and Hongbing (2015), scrutinize the effect of discrepancy in rate of exchange on overseas trade in Pakistan, India and China. Study employs ARDL approach on panel data from 1980 to 2013. The results show positive related with export in long run negative related in long run in China, and negative associated with Pakistan and India trade in short and long run.

Zubair et al (2014), find out the influence of Exchange Rate instability on GDP, TB, export and imports in case of Pakistan from 1952 to 2010. The study utilizes ARDL technique to find the association among variables. The study shows that, devaluation in exchange rate put optimistic effect on exports, but vacillation in exchange rate is harmful for economic growth in Pakistan.

Ahmed et al (2014) find out the influence of (ER)exchange Rate on (BoP)Balance of Payment in Pakistan; by utilizing monthly data since 2007 – 2013. Study also applied ARDL approach on different variables like (ER)Exchange Rate, (BoP)Balance of Payment. Results show significantly optimistic impact on balance of payment in Pakistan.

Shah and Majeed (2014) find out the association between balance of trade and REER, income, and money supply by utilizing data from 1980 to 2011. After applying ARDL bound test approach, the study shows downgrading REER and increment in income is unhelpfully linked with trade balance in long and short run. Marshal – Lerner Condition for balance of trade does not exist in Pakistan.

Jayachandran (2013) delve into the effect of instability of (ER)Exchange Rate on imports and exports in India. Time series data since 1970 – 2011 is utilized. The results reveal that, negatively significant effect of instability of exchange rate on export and imports. Reduction in export is caused by higher level of exchange rate; GDP shows positive association with imports and exports.

3. Theoretical Framework

The study also threw light on the three important theories that are related to our study. These major theories are Marshall Lerner Condition (MLC) and Purchasing Power Parity (PPP) which shows the exchange rate changes effect on country's economy and performance of trade.

First is, Marshall Lerner Condition showed the effects of variations in rate of exchange on Trade Balance of independently. Exchange rate Devaluation improved the trade balance, if the (PED) Price Elasticity of Demand for exports and imports is superior than 1. The Trade Balance is worsening, if the PED for exports and imports is less than 1 or equivalent to 1, then the Trade Balance unaffected not improved further.

Secondly, Purchasing Power Parity (PPP) asserts that, currency interchange among 2 nations is in stability when the PPP in every of the 2 nations same. In other words, it shows that between two nations the currency interchange and the product price level should be equal. This based on the “Law of One Price” which asserts that; in the nonattendance of transaction cost, tariffs and other transportation cost, competitive market will equivalent the price of similar products in 2 nations when price is expressed in the similar money.

4. Data and Methodology

In research, it is very important to use different data of macroeconomic variables and also applied different methodologies to estimates the findings.

Time Series Data Analysis

The present study covered Time Series Data of Islamic Republic of Pakistan since 1972 – 2020. The time series data is utilized to analyze the association b/w explanatory and regress and variables. The time series data of variables like (TB)Trade Balance, (ER)Exchange Rate, (EX)Export, and (INF) Inflation, is taken from Word Development Indicators (WDI), The Global Economy and the official website of Pakistan Bureau of Statistics.

Description of Variables

The table 4.1 below presented the descriptions of variables that are analyzed in this paper.

Variables	Description	Units of Measurement
TB	Trade Balance	% Of GDP
ER	Exchange Rate	Percentage
INF	Inflation Rate	Percentage
EX	Exports	% Of GDP

Table 4.1: Description of Variables

Unit Root Test:

To get away from bogus results of regression, and adopt appropriate econometric technique, current study used (AD)Augmented Dickey Fuller test for unit root. It is a statistical technique which is used to check stationary of a specific time series data. The data used in this paper is stationary at first difference and trend and intercept and at level and intercept.

Model Specification

To find out the effect of Exchange Rate (ER) on Trade Balance of Pakistan, the present paper applied Autoregressive Distributed Lag (ARDL) technique. This approach is developed by Pesaran, shin and Smith in

2001 for co-integration. It is an econometric or statistical approach which is used for co-integration analysis and to establish the long and short run correlation.

The Macroeconomic Model can be anticipated as:

$$\text{Trade Balance (TB)} = f(\text{Exchange Rate, Inflation, Exports})$$

In Econometric form it can also be written as:

$$\text{TB} = \beta_0 + \beta_1\text{ER} + \beta_2\text{INF} + \beta_3\text{EX} + \mu_i$$

Hypothesis:

H₀ = Long Run Relationship does not exist (Null Hypothesis)

H₁ = Long Run Relationship exist (Alternative Hypothesis)

5. Results and Discussion:

This part of the study, analysis of empirical data will be present.

Descriptive Statistics:

The Descriptive Statistic summaries of variables are given in the below table 5.1.

Variables	TB	ER	INF	EX
Mean	-6.780222	52.35758	8.095556	13.10756
Median	-6.320000	45.04700	7.690000	13.23000
Maximum	1.030000	160.0500	20.28000	17.36000
Minimum	12.39000	9.900000	2.520000	8.240000
Std. Dev.	3.927117	39.97203	3.647755	2.632527
Skewness	0.224403	0.859224	0.760066	-0.098442
Kurtosis	1.910131	2.963378	4.00400	1.884653

Sources: Calculation by Using E-views 9

First row shows the mean value of TB, INF, ER, and EX is (-6.320222), (52.35758), (8.095556) and (13.10756). Mean value illustrate the center value of the data. Second row shows the midpoint of the data. So the Median values of TB, ER, INF and EX are (-6.780000), (45.04700), (7.690000), and (13.23000). The third row shows the Maximum and fourth row shows Minimum values of the data. The sixth row shows the values of sekwness, represents the asymmetry and inequity from the mean of data distribution. The values show only EX is skeweed negatively because the mean value is less than median value, while TB, ER and INF are positively skeweed because their mean value is greater than median. Next row presented the values of Kurtosis, the data is Leptokurtic if the value is greater than 3, if the value is fewer than 3 it identify Platykurtic. So, ER value is superior than 3 so it is Leptokurtic and TB, EX and INF is less than 3, it is Platykurtic.

Pair – Wise Correlation:

Multicollinearity problem among explanatory and predicted variables is often recognized by Pair – Wise Correlation of Coefficient. High values of Coefficient of Correlation of more than one variable show the problem of multicollinearity.

Variables	TB	ER	INF	EX
TB	1.000000			
ER	0.335653	1.000000		
INF	-0.095245	-0.053944	1.000000	
EX	0.615440	-0.271224	0.228504	1.000000

Sources: Calculation by Using E-views 9

The table 5.2 above shows the correlation matrix of all variables. The results show that, ER and EX are positively correlated with TB and only INF is negatively correlated. So, there is no colinearity in the data.

ADF Unit Root Test:

Results of the (ADF)Augmented Dickey Fuller test for unit root are present in table5.3 below.

Variables:	At Level:		At 1 st Difference:		Conclusion:
	Intercept:	Trend & Intercept:	Intercept:	Trend & Intercept:	
TB	-----	-----	0.0000	-----	1(1)
ER	-----	-----	0.0014	-----	1(1)
INF	0.0004	-----	-----	-----	1(0)
EX	-----	-----	0.0000	-----	1(1)

Sources: Calculation by Using E-views 9

Table 5.3 above expressed the outcome of the ADF unit root test. We can see that entire variables are not stationary at same level, TB, ER and EX are stationary at 1st difference and intercept while only variable INF is at Level and Intercept.

Bound Test (F – Statistic):

Variables	F – Statistic	Upper Bound Critical Value	Conclusion
TB/ER, INF, EX	4.947138	4.35(95%)	Co-integration Exist

Source: Authors Calculation by Using E-views – 9

The outcome illustrates in Table 5.4 above. It indicates that F-Statistics value is 4.947138, this superior than value of Upper Bound 4.35 at 95%. It demonstrates that, decline the null hypothesis (H₀), of No Association in Long Run; and accept alternative hypothesis(H₁) of of Long Run Association existence.

ARDL Long Run Coefficient:

Estimated Long Run Coefficient using ARDL Approach				
ARDL Selected Model (3, 4, 4, 0)				
Dependent Variable is TB				
41 Observation after adjustment from 1976 to 2020				
Variables	Coefficient	Std. Error	t-Statistic	Probability
ER	0.005022	0.022904	0.219275	0.8281
INF	-0.749359	0.174762	-4.287873	0.0002
EX	1.450604	0.165464	8.766887	0.0000
C	-22.869721	2.708172	-8.444708	0.0000

Sources: Calculation by Using E-views 9

The table 5.5 above shows the impact of ER, INF, and EX on Balance of Trade. The value of coefficient of exchange rate is (0.005022), and value of probability is (0.8281), this shows positive but insignificant impact on trade balance. It implies that, stability in the rate of exchange improved the balance of trade, while higher rate of exchange will deteriorate the trade balance. The findings is supported by Jadoon, A. U., & Guang, Y. (2019), shows positive impact on Balance of Trade (TB) of Pakistan.

The value of coefficient of inflation rate is (-0.749359), and value of probability is (0.0002), this shows negative and significance impact on dependent variable TB. Inflation rate decrease the demand of export, and this will create deficit in trade. This finding is also supported by Jadoon, A. U., & Guang, Y. (2019), also shows negative and significant impact of inflation on Trade Balance (TB).

The value of coefficient of export is (1.450604), probability is (0.0000), it proves significantly positive effect on dependent variable TB. It shows, 1% increment in exports will lead to (1.656410) percent increase in trade surplus.

Estimation of Error Correction Model (ECM):

Error Correction Representation for the Selected ARDL Model				
ARDL (3, 4, 4, 0) selected based on Akaike info Criterion (AIC)				
Dependent Variable is TB				
41 Observation after adjustment from 1976 to 2020				
Variables	Coefficient	Std. Error	t-Statistic	Probability
TB(-1)	0.337386	0.138459	2.436731	0.0220
TB(-2)	-0.291946	0.154976	-1.883820	0.0708
TB(-3)	0.320965	0.124274	2.582711	0.0158
ER	0.070151	0.057399	1.222169	0.2326
ER(-1)	0.215789	0.108900	1.981541	0.0582
ER(-2)	-0.237149	0.141022	-1.681647	0.1046
ER(-3)	0.308260	0.149611	2.060402	0.0495
ER(-4)	-0.353869	0.110620	-3.198956	0.0036
INF	-0.262105	0.083844	-3.126118	0.0043
INF(-1)	0.071515	0.097399	0.734244	0.4694

INF(-2)	-0.228984	0.089129	-2.569144	0.0163
INF(-3)	0.132017	0.097910	1.1348356	0.1892
INF(-4)	-0.187233	0.086469	-2.165325	0.0397
EX	0.919095	0.197374	4.656614	0.0001
ECM(-1)	-0.633595	0.125412	-5.052104	0.0000
R²:	0.925287		Adjusted R²:	0.885057
S.E. of Regression	1.329297		F – Stat	22.99983
Schwarz Criterion	Bayesian	4.310325	Akaike info Criterion	3.683409
Durbin – Watson Stat	2.231762		Probability:	0.000000

Source: Calculation by Using E-views 9

The outcome short and long period of the anticipated model is shows in framework of ARDL by utilizing ECM (Error Correction Model). Value of ECM (-1) indicate that almost 63 % errors will be accurate from Short to Long period stability each year. Overall outcome illustrates the long and Short Run association among variables.

6. Conclusion

The primary aim of this paper is to ascertain the exchange rate effect on the current account Balance in Pakistan. To attain this purpose; present paper covered Time Series data from 1976 to 2020 of different macroeconomic variables like Trade Balance, Exchange Rate, Inflation Rate and Exports. The current paper reviews several national and foreign literatures which are relevant to this paper. The paper also throws light on related theories Marshal Lerner Condition (MLC) and Purchasing Power Parity (PPP).

Firstly, the paper illustrated the summaries of descriptive statistics; the ADF test is applied for the data normality purpose. After this; the paper specifies the correlation among variables; to ensure the issue of multi-collinearity. Secondly; the paper applied Autoregressive Distributed Lag (ARDL) Technique and Bound test for the long and short run association.

The outcome indicates that, exchange rate has positively insignificant impact on trade balance. This indicate that higher exchange rate demolishes the balance of trade, while stable rate of exchange will lead to reduce deficit in trade. Inflation is showing negative and significant impact on trade balance, this indicates that, high prices decrease the demand of exports, but stable price is significant for trade balance. Export is showing positive and significant impact on trade balance. Promoting exports is very important for the trade surplus.

It is very important to recommend some effective policies regarding this paper. Government and policy makers should take series step to reduce trade deficit through increase in exports, enhancement in exports will be very helpful to trade surplus. Pakistan's exports is less than imports, government should increase exports and limited its imports.

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