

**FINAL ASSIGNMENT**  
**RESEARCH METHODS AND SKILLS**

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## **DETERMINANTS OF BALANCE OF TRADE: A CASE OF PAKISTAN (1985-2018)**

### **Abstract**

Balance of trade (BOT) is considered as a key macroeconomic variable which plays a crucial role in the country's economic growth. It determines the strength of an economy and shows how it competes in the global marketplace and its relationships with the rest of the world. It aims to exploring the association of real effective exchange rate (REER), inflation (INF), GDP and money supply on BOT from 1985-2018 in case of Pakistan. Unit root result shows that some variables are integrated at level  $I(0)$  while others are integrated at first difference  $I(1)$ . Therefore, Autoregressive distributed lag model is used to test long run relationship among dependent and independent variables. Assumption results (study in progress) indicate that REER and GDP have significant and positive impact on BOT in the long run while INF shows negative and significant impact on BOT of Pakistan.

## **CHAPTER 1 INTRODUCTION**

Fluctuations in exchange rate can affect exports and imports of a country. Net exports or the balance of trade (BOT) is the difference between the imports and exports of a country. If a country's exports are greater than its imports, the country will have a trade surplus and if its imports are greater than its exports, it will have a trade deficit. In simple terms, an exchange rate is defined as the value of one country's currency in terms of another country's currency or the rate at which one currency is converted in terms of another currency. In general, there are two kinds of exchange rates, the nominal exchange rate (NER) and the real effective exchange rate (REER).

Different economists such as Nevertheless, with time, economies around the globe have become more interdependent on each other due to globalization and technological advancement. Therefore, trade has increased significantly. Today, foreign trade is considered as an important element in economic growth of a nation. This study tries to associate international trade importance with economic advancement of Pakistan. Trade helps to improve standard of living of the households as it brings new opportunities, increases production, creates an atmosphere for new investments and increases employment in the country.

Moreover, relationship among trade and inflation is either positive or negative to affect the economy. When inflation is high then it adversely affects the economy and it creates uncertainty in the economy. For instance, if inflation increases in a country then the cost to manufacture a unit of a good will be more in that country compared to the cost in a low-inflation country. The link between money supply and trade balance is a bit unclear and the result is often unpredictable. However, an expansion of the money supply will reduce the value of money in a country, domestically. Due to which, the domestic goods become more expensive compared to the foreign ones. This encourages the flow of imports into the country while it discourages the outflow of exports which leads to a trade deficit.

Gross Domestic Product (GDP) is an important monetary measure which tells us how an economy is performing and also provides information about the size of the economy. It represents the aggregate value of all finalized products produced and services provided within a country for one fiscal year. It can be used by the economists to indicate whether an economy is growing or facing a recession. When GDP of a country ascends due to increase in productivity, it leads to an increase in the exports. This rise in exports directly affects the balance of trade and leads to a trade surplus. This study examines the influence of real effective exchange rate (REER) fluctuations, inflation, money supply, and GDP on balance of trade (BOT) is case of Pakistan.

## **1.1. Statement of the problem**

Pakistan is 23rd largest economy around the globe in case of purchasing power parity and 42<sup>nd</sup> largest in case of nominal GDP. Pakistan's GDP accounted to nearly \$313 billion in 2018. However, in the past few decades, Pakistan's economic condition has not been satisfactory in terms of economic and social indicators (World Bank, 2018). The economy is at risk as important sectors of the economy are indicating negative growth. The persistent increase in the demand of international currency leads to devalue the Pakistani currency (rupee) due to which the money supply increases in the country. The total imports of Pakistan reached to a record high of \$60.7 billion whereas the exports were only about \$26.6 billion in 2018 (World Bank, 2018). During the same year the trade deficit stood at \$34.1 billion which is about 16% or almost \$5 billion more than the previous year. Therefore, this study investigates the impact of GDP, inflation, money supply and REER on BOT of Pakistan.

## **1.2. Aim of Study**

The purpose of this study is to examine the effect of real effective exchange rate fluctuations, inflation, money supply and Gross Domestic Product (GDP) on trade balance (exports divided by imports) of Pakistan.

## **1.3. Research Question**

What impact does inflation, fluctuations in the rate of exchange, money supply and GDP have on balance trade of Pakistan?

## **1.4. Study Hypotheses**

H<sub>1</sub>: Real effective exchange rate (REER) has direct impact on balance of trade (BOT) of Pakistan.

H<sub>2</sub>: Inflation (INF) has inverse impact on the balance of trade (BOT) of Pakistan.

H<sub>3</sub>: Money supply (MS) has significant impact on balance of trade of Pakistan.

H<sub>4</sub>: GDP has direct impact on balance of trade (BOT) of Pakistan.

## **1.5. Organization of Study**

The study is arranged into five chapters as mentioned below.

Chapter 1 - Introduction of the project.

Chapter 4 - Results and Discussion.

Chapter 2 - Literature review.

Chapter 5 - Conclusion and Recommendation.

Chapter 3 – Methodology.

## CHAPTER 2 REVIEW OF THE LITRATURE

Bahmani-oskoe et al. (2016) studied the outcome of instability in the rate of exchange on commodity trade between America and Pakistan. Time series data on fifty-seven export industries of Pakistan and fifty-two import industries from America had been taken for the time-period of 1980-2014. Data was compiled from different sources like the World Integrated Trade Solution (WITS) system and IMF data. The OLS estimation method was applied. The results showed that almost 50% of the industries were affected in short run by the exchange rate volatility. In long run only twenty-six export industries and eighteen import industries were affected. The authors concluded that all four major import as well as export industries were positively influenced in long run.

Arize et al. (2017) examined whether exchange rate volatility positively affects the BOT of a country or negatively. They used an asymmetric nonlinear cointegration approach and investigated the influence of exchange rate in real terms on the BOT of 8 different nations including China, Israel, Pakistan, Philippines, Korea, Russia, Singapore and Malaysia. Data is compiled from IFS and direction of trade (DOT) of IMF from 1980-2014. Non-linear techniques like the non-linear autoregressive distributed lag model (NARDL) were applied. Results indicate that the short-run, half-lives as well as the analysis of the long-run cointegration all provide enough evidence to prove that depreciation has significant effects on BOT.

Jadoon et al. (2019) examines the variations in exchange rates and its effect on trade-balance of Pakistan. World development indicators (WDI) of World Bank is the only source of data from 1971-2016 to check the relationship among variables. In this analysis, ARDL technique has been employed and results reveal that both in long and short time period, the exchange rate and balance of trade have significant and positive association. The devaluation of PKR against USD will increase the country's exports, which will enhance the trade balance. Moreover, long-term effect of both money supply and inflation on BOT is negative and significant.

Mansoor et al. (2018) studied the association among rate of exchange in real terms, inflation and foreign direct investment (FDI) on growth rate in real terms in case of Pakistan. Data from 1960-2016 had been gathered from WDI. In this analysis, unit root test is applied in order to test data stationarity then ARDL approach is used. The results show that there is a positive and significant link among FDI and real GDP while a significant but negative relationship occurs between real GDP, REER and inflation. Moreover, real GDP and inflation shows bidirectional association while unidirectional association occurs between real exchange rate and real GDP and same for FDI and real GDP.

Nasir-Uddin et al. (2018) analysed the impact of various macroeconomic variables including GDP per capita, exchange rate, gross capital formation, exports and inflation on the fiscal deficit in Pakistan from 1985-2016. Data for this analysis was gathered from site of Economic Survey of Pakistan and WDI. Different techniques like ADF, Johnson Cointegration test and Vector Error Correction methods were applied to examine the association among the macroeconomic variables and fiscal deficit in the short-run and in the long-run. Results discovered that all the macroeconomic variables mentioned above have a strong relationship with fiscal

deficit and that the government should focus on these variables in order to overwhelm the situation of fiscal deficit in the country.

Parveen et al. (2012) used some important variables like growth rate, inflation, exports and imports to explore the unpredictability in the exchange rate of Pakistan. Data for the duration of 1975-2010 had been gathered from Economic Survey of Pakistan and IMF. The author utilized the model of simple linear regression and obtained the results by applying OLS technique. Author concluded that imports, exports and growth rate cause variations in exchange rate, but inflation causes far more variations in it, compared to other variables.

Ahmed and Rehman (2019) analysed the association amongst exchange rate with trade volume and deficit in Pakistan. Data from 1985-2017 is gathered from World Development Indicators. Test of unit root was utilized to avoid autocorrelation problem, the Vector Error Correlation Mechanism (VECM) is utilized to obtain short-run results while Johnson cointegration test was utilized to get long-term results. Results showed strong association among the stated variables.

Bahmani-oskoe et al. (2016) inspected short-term and long-term impact of exchange rate fluctuations on the commodity trade between Pakistan and Japan. An overall of 44 export industries of Pakistan and 60 import industries from Japan were included in the analysis. The data from 1980-2014 was obtained from the International Financial Statistics of IMF and WITS system of World Bank. The ARDL method was utilized to examine link among variables. It had been concluded that only seven export industries and twelve import industries were affected in short-run while in long-run the effects lasted in only four export industries and seven import industries.

Akinbobola (2012) provided an enumerative inquiry of the dynamics of inflation, money supply and rate of exchange in Nigeria. Data from 1986-2008 had been collected from International Financial Statistics (IFS). Vector Error Correction Mechanism (VECM) technique was applied to evaluate the model. Results implied that exchange rate variations and money supply have significant inverse influence on inflationary pressure.

Muhammad et al. (2009) examined broad money, government spending's and inflation on the economic growth of Pakistan. Data had been obtained from the International Financial Statistics and Federal Bureau of Statistics for the time-period 1975-2007. They used Granger causality test to study unilateral and bilateral causation among variables. Furthermore, to analyse the long-term relationship, Johnson cointegration test was used. The result showed that government expenditure and inflation were negatively related to economic growth of Pakistan while broad money is positively associated with economic growth.

Mehrara and Firouzjaee (2011) investigated the causal association of GDP and export growth of 73 developing nations. The countries are arranged in two groups of oil dependent developing nations and non-oil developing nations. The data is compiled from World Development Indicator (WDI), published by the World Bank for the time period of 1970-2007. The results revealed that both groups show a bi-directional long run causality between GDP growth and exports. In the short run there is no causality association among GDP growth and exports for oil

dependent developing countries while short run causation exists among the variables non-oil developing countries.

Yazgan and Ozturk (2019) inspected the connection of trade flows and REER, using bilateral trade flows of 33 countries from 1981-2010. The data was attained from the trade statistics of IMF. Conclusion is that in the long run, BOT is improved by the depreciation of home currency. While in the short run, only a small number of countries show such effects which indicates that the Marshall-lerner condition is more difficult.

Yaya and Lu (2013) find out that the appreciation of local currency leads to a fall in the relative prices of the foreign goods and increases the flow of imports in the country in long run. Bahmani-Oskoe (1991) concluded that the rate of exchange and trade balance are cointegrated and suggested that depreciation of local currency improves BOT of the less developed countries. Depreciation means to reduce officially the worth of the local currency or gold to reduce the gap in the balance of trade (BOT) (Bahmani-Oskoe, 1991).

Alexander (1952), Bahmani-Oskoe et al (2009) and Kale (2001) revealed that devaluation of the domestic currency helps to keep up fixed foreign exchange rate, which is remedy of the imbalances of the balance of trade. In the beginning, there was no as such concept of international trade as many of the economies were closed structured economies and the governments could not work properly in a sense that their activities were limited.

The movements in real exchange rate such as depreciation and appreciation can link a direct effect on balance of trade of a country (BOT) (Arize et al., 2017).

A balance of trade surplus has positive effects on economic growth while its deficit put negative effects on growth (Jadoon et al., 2019).

There occurs a bidirectional connection among trade and GDP growth and the policies aimed at trade expansion must be promoted in order to achieve high GDP growth (Gnoufougou, 2016).

## CHAPTER 3 DATA AND METHODOLOGY

### 3.1. MODEL

The aim of the research, to examine the effect of inflation, money supply, real effective exchange rate (REER) and GDP on balance of trade (BOT) from 1985-2018 in case of Pakistan. The following functional form of the model has been carried out to achieve the objective.

$$\text{BOT} = f(\text{REER}, \text{MS}, \text{INF}, \text{GDP}) \quad (1)$$

The econometric model is given as:

$$\ln(\text{BOT})_t = E_0 + E_1 \ln(\text{INF})_t + E_2 \ln(\text{MS})_t + E_3 \ln(\text{REER})_t + E_4 \ln(\text{GDP})_t + E_t$$

#### Dependent Variable

$\text{BOT}_t$  = the ratio of exports and imports is a proxy of balance of trade for the time period “t”

#### Independent Variables

$\text{INF}_t$  = Growth in the overall price is used as a proxy of inflation for time period “t”

$\text{MS}_t$  = The overall flow of money in the economy over time is used for money supply for t

$\text{REER}_t$  = is the rate of exchange adjusted for inflation over time “t”

$\text{GDP}_t$  = Total market value of all products and services used as a proxy of economic growth over time “t”

E= Error term

### 3.2. Data Type and Data Source

Time series data from 1985-2018 had been utilized in the current study. World Development Indicators (WDI) which is published by World Bank (WB) is the only data source of the study.

### 3.3. Variables

In this study, real effective exchange rate (REER), inflation (INF), GDP and money supply (MS) are taken as explanatory variables while balance of trade (BOT) (exports divided by imports), is taken as dependent variable.



### **3.3.1. Balance of Trade (BOT)**

Balance of trade is the gap between country's import value and export value for given a time period. The ratio between imports and exports has been used as a proxy of balance of trade.

### **3.3.2. Inflation (INF)**

In simple terms, it is the upsurge in the overall price or the rate at which the general prices of commodities or services increases. The purchasing power of money decreases during inflation though it is taken in percentage.

### **3.3.3. Real Effective Exchange Rate (REER)**

It measures the price of foreign goods comparative to domestic product price and is adjusted for inflation. In this study, rate of exchange is taken in real terms.

### **3.3.4. Money Supply (MS)**

Supply of money also known as broad money refers to the aggregate quantity of money utilized in an economy. In other words, it refers to the aggregate number of country's money in existence or flow.

### **3.3.5. Gross Domestic Product (GDP)**

GDP is a measure of the overall worth of all the finalised goods and services provided within the border of an economy during one fiscal year. In simple terms, it is a broad measure of the overall domestic production of a country. Through GDP, we can estimate the size and growth of an economy.

## **3.4. Econometric Technique**

### **3.4.1. Unit Root Test**

The unit root test is utilized to test data stationarity of the time series of the variables. It tests whether the data is non-stationary and possesses a unit root. The null hypothesis is used to define the presence of a unit root. The alternate hypothesis defines the presence of stationarity. Moreover, the results can be spurious if unit root of our variables is not checked and it will cause unpredictable results in our time series analysis. To avoid such consequences, Augmented Dickey-Fuller (ADF) test of unit root has been utilized.

## **Augmented Dicky-Fuller (ADF) Test**

ADF used to test stationarity within the data. The test has been utilized to check unit root. Furthermore, it is based on the idea that the error term is not correlated. ADF test uses two hypotheses. The null hypothesis denotes the existence of a unit root and vice-versa for alternative hypothesis.

### **3.4.2. Co-integration Tests**

The cointegration tests are employed to identify long run and stable associations among sets of variables. These tests are used to examine only non-stationary time series variables whose variances and means vary over time. In this study, bound test of Autoregressive Distributed Lag has been used to analyse the cointegration in variables.

### **Autoregressive Distributed Lag Bound Test (ARDL)**

The ARDL approach is a technique of cointegration that is applied to detect the existence of long-run relationships between variables. It doesn't matter whether the variables are at level or at first difference or a combination of both. ARDL approach gives more efficient and realistic results, compared to the Johansen and Juselius co-integration approach. This is due to the fact that the ARDL approach eludes the limitations of the Johansen co-integration test. Current study, ARDL approach is applied to evaluate the impact of fluctuations of exchange rate, supply of money and inflation on BOT of Pakistan. Note that the following two conditions must be fulfilled for the application of the test. The first condition is that the data must be free of serial correlation and the second is that the data must not be stationary.

### **3.4.3. Diagnostic Tests**

#### **Serial Correlation LM Test**

Serial correlation occurs when the time series error terms move from one period to another. For instance, if the value of the random variable in any period is correlated to its own previous value then there will serial correlation. With the existence of autocorrelation, the hypothesis testing is no longer valid, and it can lead to misinterpretation of the data. The Breusch-Pagan-Godfrey test for autocorrelation is used in this study to check the presence of serial correlation. The alternate and null hypothesis of the test are;

$H_0$ : Autocorrelation does not exist.

$H_1$ : Autocorrelation exists.

## **Normality Test**

This test has been used to check normality of the data. It is used to check whether a sample fits a standard normal distribution or not. The outcome of the tests will be unreliable if the assumption of normality is invalid. In this study, Jarque-Bera test is used to check the normality of the data. The null and alternative hypothesis of the test are given as;

$H_0$ : Data is normally scattered.

$H_1$ : Data is not normally scattered.

## **Stability Test**

An unexpected change in the parameters of the regression model over time can lead to major forecasting errors and affects the reliability of the model. The stability tests used to examine a change in equation parameters of the model helps us to determine when and whether there is a significant change in our data. The Cumulative Sum Test (CUSUM) and Cumulative Sum of Squares Test (CUSUMQ) has been applied to assess the parameter stability. These tests identify the systematic and sudden changes in coefficients.

## CHAPTER 4 RESULTS AND DISCUSSIONS

In this study, secondary time series data had been utilized to inspect the impact of money supply, REER, GDP and inflation on the balance of trade of Pakistan. To investigate the effects of these variables, the study adopted the following tests.

### 4.1. Unit Root Test

#### ADF Test Result: Level I (0)

Variable	t-Statistic	P-value
lnBOT	1.92	0.99
lnMS	-4.27	0.00
lnREER	-7.92	0.00
lnGDP	2.00	0.99
INF	-2.47	0.12

Table 4.1

Source: Author's Analysis

#### ADF Test Result: First Difference I (1)

Variables	t-Statistic	P-value
lnBOT	-4.67	0.00
lnGDP	-3.36	0.02
INF	-7.00	0.00

Table 4.2

Source: Author's Analysis

Table 4.1, 4.2 (copied from previously run analysis) It is most common that the time series data are often non-stationary. In order to transform data to stationarity for appropriate calculations, Augmented Dicky-Fuller (ADF) test has been applied. Table 4.1 and table 4.2 demonstrate the result of the ADF test at I (0) and at I (1). Results implies that money supply and REER are stationary at level I(0) while balance of trade, GDP and inflation are stationary at order I (1).

## 4.2. Co-integration Analysis (Bound's Test)

### ARDL Bound Test Results of critical bound values

Significance	(0)Bound	(1)Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06
F-statistic = 5.123839    K=4		

**Table 4.3**

#### Source: Author's Analysis

The co-integration analysis depicts that there occurs a long run association among variables. The result of the bound test in table 4.3 reveals that calculated value of F-statistic (5.123839) is more from upper bound value. Therefore, the null hypothesis is rejected which indicates that there is no long run relationship. Hence, we reached to a conclusion that there occurs a long run connection among the variables.

## 4.2.1 ARDL Model (Long run and Short run Coefficient Analysis)

### Long run ARDL Model Results

#### Long-Run Coefficients of ARDL Model

#### Dependent Variable (BOT)

Variable	Coefficient	Standard	t-Statistic	Prob-Value
INFL	-0.061179	0.011542	5.300602	0.0000
LNMS	-0.120009	0.102847	-1.166867	0.2547
LNGDP	2.719076	0.161875	16.797421	0.0000
LNREER	1.708331	0.630650	2.708842	0.0123
C	-54.597894	6.467861	-8.441414	0.0000

Table 4.4

#### Source: Author's Analysis

Table 4.4 (copied from previously run analysis) illustrates outcome of the long run association of the chosen ARDL model by applying Akaike Info Criterion (AIC). The result reveals that inflation has a negative and significant impact on BOT of Pakistan. The coefficient value -0.061179 indicates that BOT of Pakistan decreases by 0.612% with a 1% climb in inflation. Broad money or supply of money has an insignificant influence on BOT. GDP has direct and significant influence on BOT of Pakistan with the coefficient value 2.719076. Which indicates that a 1% expansion in GDP lead to an upsurge of 2.72% in the BOT of Pakistan. Moreover, REER has a positive and significant influence on BOT of Pakistan. The coefficient value 1.708331 shows that a rise of 1% in the REER leads to an increase of 1.708% in BOT.

## Short Run Dynamics

### Error Correction Representation of the ARDL Model

#### Dependent Variable (BOT)

Variable	Coefficients	Standard Error	t-Statistic	Prob-Value
D(INFL)	-0.028284	0.006063	4.664815	0.0001
D(LNMS)	-0.055482	0.047382	-1.170966	0.2531
D(LNGDP)	1.282945	1.684876	0.761448	0.4538
D(LNGDP)(-1)	8.685150	1.351526	6.426179	0.0000
D(LNREER)	0.789791	0.326620	2.418072	0.0236
ECM <sub>t</sub> (-1)	-0.462318	0.064806	-7.133845	0.0000

Table 4.5

#### Source: Author's Analysis

Table 4.5 (copied from previously run analysis) reveals short run outcomes of ECM under ARDL model by applying Akaike Info Criterion. It suggests that inflation put significant and negative influence on the BOT with a coefficient value of -0.028284. 1% increases in inflation cause a decrease of 0.028% in BOT in the short-run. MS and GDP have an insignificant impact on the balance of trade in the short run. ln(REER) has direct and significant effect on BOT of Pakistan in short run. The coefficient value 0.789791 means that 1% increase in the REER leads to an increase of 0.79% in BOT of Pakistan. According to ECM the probability value must be significant and have negative coefficient value. The value of ECM (-0.462318) in table 4.5 indicate that the economy will move from disequilibrium to equilibrium level in 2.5 years of speed adjustment.

## **CHAPTER 5 CONCLUSION AND RECOMMENDATIONS**

### **5.1. Conclusion**

This study is to explore the impact of inflation, money supply, GDP and REER on BOT of Pakistan. Data from 1985-2018 was obtained from World Development Indicators, published by World Bank. In this study, ADF test has been applied to test data stationarity and result shows there is no autocorrelation. Furthermore, bound test has been applied to examine both long run and short run associations among variables. The results revealed, there occurs a long run association among variables. ARDL technique has been utilized for long run and short run analysis of coefficients. GDP and REER has positive and significant influence on BOT of Pakistan. Results conclude inverse and significant relationship between BOT and inflation in the long-run. The long run impact of money supply on BOT is insignificant. In the short run, money supply and GDP show an insignificant influence on BOT. Inflation has significant and negative impact on BOT while, REER has significant and positive impact on BOT of Pakistan in the short run.

### **5.2 Recommendations**

Throughout the history of Pakistan, there has only been one point where Pakistani rupee appreciated against the United States dollar and for the rest of the time it has depreciated against US dollar. The devaluation of the Pakistani rupee boosts up the exports as the exports become cheaper to foreigners and it ameliorates trade balance. Meanwhile, the devaluation of rupee against dollar also leads to a rise in inflation which ultimately bears away the temporary benefits from the exports boost up. Devaluation or depreciation of Pakistani rupee is not a long-term tactic to decrease the trade deficit in Pakistan. Unless the government control the rise in general price level, depreciation or devaluation alone cannot improve the BOT of Pakistan. The study has a policy implication for the government. The government should consider the likely impact of each macro-economic variable on Pakistan's trade balance in implementation of trade policies. Based on our results, it is suggested that government should improve BOT of the country by increasing REER because this study shows positive relationship among the two. Furthermore, it is suggested that the authorities must control inflation rate to minimal level because higher inflation leads to decrease the trade balance of Pakistan.



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