Determinants of Exchange Rate: A Case Study of Pakistan

Muhammad Kamran Bhatti[1], Arif Raza[1], Nadia[1]

ARTICLE DETAILS	ABSTRACT
	Objective of the study is to check the effect of the determinants of the exchange rate the context of Pakistan for the 29 years (1991-2019). Data source is the World Bank (WB), International Financial Statistics (IFS) and Pakistan Economic Survey. The Ordinary Least Square (OLS) Method is applied to get the results of the study. Results of the OLS show that TOT and INF have statistically significant and positive impact on the Exchange Rate (ER) in the Pakistan. GOVD and IR have statistically significant and negative impact on the Exchange Rate (ER) in the Pakistan.

[1]M. Phil Scholar, National College of Business Administration & Economics Multan Campus

1 Introduction

The foreign exchange rate is an important source to determine the economic health of any country. Foreign exchange rate may be defined as "the rate at which one currency can be converted into other currency. It may change with daily changes in market forces of demand and supply of currency between the two countries. So, while sending or receiving money from abroad it is important to know what determines the exchange rate or what are the determinants of the foreign exchange rate.

Determinants of foreign exchange rate:

Following are the main determinants of foreign exchange rate:

1. Inflation rate
2. Interest rate
3. Balance of payments
4. Government debt
5. Terms of trade
6. Political stability
7. Recession
8. Speculation

Exchange rate changes alter the welfare conditions of the economy. As the exchange rate is the price of one currency in terms of other currency so the price of anything may affect the equilibrium condition like that the price of home currency in terms of foreign currency may also affect the equilibrium in the foreign market. In the short run, the factors that induce changes in the exchange rate are not much clear as compared to the long run (Kim, & Sheen, 2002). Mostly exchange rate is determined with the country's trading performance and what is its impact on the current account of its balance of payments. The demand for foreign currencies to finance the imports is to be compared with the supply made by foreigners purchasing exports.

According to Chow, & Chen, (1998), the monetary approach exchange rate determination is a process in which we equate the total demand of national currency to the total supply of national currency in every nation. The money supply is given by the monetary authorities while demand for money depends on some factors like price level, real income, and the real rate of interest. Price level and real income are positively related to the demand for money while the real interest rate is negatively related to the demand for money. Adjei, Yu, &Nketiah, (2019), have described the long-run approach that is purchasing power parity theory to determine the exchange rate. This approach helps to demonstrate the behavior of currency exchange in the long run. Purchasing Power Parity theory has mentioned that the exchange rate between two currencies is basically the ratio of the general price level of both countries. Therefore, this theory explains that the higher will be the prices the currency of that country will depreciate. On the other hand, the lower will be the prices the currency of that country will appreciate.

According to Khan, & Qayyum, (2007), the literature consists of a lot of studies regarding the determinants of the foreign exchange rate is playing an important role in the progress of a country. Most studies use cross-section data. Panel data is more helpful to answer the questions but there is a lack of specification in panel data. Recent research contributed in five different ways to the literature to analyze the determinants of the exchange rate.

Firstly, this research explains the exchange rate determination in Pakistan. In the era ofthe floating exchange rate system, Pakistan's home currency tends to depreciate at the beginning which indicates the inappropriate policies. Secondly, the present study uses the time series data that was long. It consists of 142 observations during the period 1973 to 2013. This large sample data helps in analyzing the exchange rate determination in Pakistan. Thirdly, this research uses the autoregressive distributed lag model in the investigation of the long-run relationship between variables. Fourthly, researchers are against the unit root test and co-integration techniques. According to them, these techniques mislead the results; the reason for misleading is low size.Fifth, this research is not constrained by any econometric approach for the estimation of coefficients in a long period.

Problem Statement

Due to rapidly change in Pakistani currency Pakistan faces the high exchange rate in international market. In international market Pakistan also faces the high prices of imports. Exports also effect by the exchange rate. The main problem is that what determinants effect the exchange rate. In this study we see the different determinants impact on Exchange rate of Pakistan.

Objective of the Study

To know the determinants of foreign exchange rate in Pakistan

1. To know the impact of term of trade on foreign exchange rate in Pakistan.
2. To find the effect of Government Debt on foreign exchange rate in Pakistan.
3. To see the impact of inflation rate on exchange rate of Pakistan.
4. This study also finds the effect of interest rate on economic growth of Pakistan.

2 Literature Review

Saeed, Awan, Sial, &Sher, (2012), explain the impact of macroeconomic variables that affect the exchange rate determination in seven countries using the data of 35 years from 1960 to 1994. Recently the difference between anticipated and unanticipated fluctuations in the exchange rate and its determinant variables has been focused (Raja, & Ullah, 2014). Frenkel and Mussa discuss the exchange rate highly sensitive to the asset price changes and affected instantly by the new information.

Foreign exchange rate exposure cannot provide more important results in the literature the reason is that the sensitivity of the exchange rate is identified after restricting the company's activities. Raza, &Afshan, (2017), explain that the companies usually adopt three types of hedging: financial hedging, operational hedging, and pass-through of input costs to the customers. Fuchs, (2019), used the non-parametric method while they know that the non-parametric method is not much clear as compared to the random walk model to forecast the exchange rate.

Faff and Marshall (2005), Highlighted worldwide proof on the determinants of foreign exchange rate presentation of global enterprises. The study shows that foreign exchange threat control of many corporations is defensive, in a try to minimize foreign exchange losses. The finding shows that UK MNCs will in general have negative foreign exchange exposures and the Asia Pacific subsample tend to have positive outside trade exposures.

Saeed, Awan, sial, and sher (2012) lead an econometric examination of determinants of conversion scale in Pakistan. The examination utilized Stock of cash, remote trade saves, and all-out obligation of Pakistan comparative with the United States Alongside Political flimsiness in Pakistan as a spurious variable. ARDL ways to deal with co-coordination and blunder remedy model are applied. Results show that Relative outside trade hold is adversely and essentially identified with remote trade save. Political precariousness adversely influences the estimation of monetary forms in the event of Pakistan. The investigation inferred that supply of cash, obligation, and remote trade hold balance all in relative terms are noteworthy determinants of conversion standard.

Kim and sheen (2002) analyze the determinants of foreign exchange intervention by the national bank of Australia. Utilizing probit and friction models it is concluded that swapping scale pattern correction, Australian interest rate differentials, exchange rate volatility smoothing, profitability, and remote money saves have a huge impact on intercession behavior. Intervention conduct is being affected by the development of the exchange rate. We conclude that the reserve bank of Australia has reacted to showcase scattering just when it is at a reasonable level. The RBA smoothed the market's tumult by interceding.

Chow and Chen (1998) give detail about the exchange rate exposures of Japanese firms and their determinants. This paper controls the impact of supporting on exposure. Conversion standard presentation is the relationship between changes in firm worth and swapping scale changes. Results show that Japanese firms are overwhelmingly contrarily uncovered, for example, their value returns decline as yen depreciates. The finding shows that

organizations with high influence, low liquidity, and high money profits have high exposures. For the short return horizon, littler firms have littler exposures, while for the longer-return horizons bigger firms have smaller exposures.

Bodnar and wong (2003) using the data of a large sample of US firms over the time of 1977-1996 this paper investigates the significance of highlights of model structure on the resulting assessments of exchange rate exposure. stock return regression is being utilized in this paper. Results show that large firms, which are normally more globally situated, will in general have more negative exposures to the value of the US dollar. conversely, small firms tend to have more positive exposure to the value of the US dollar.

Khan and Qayyum (2007) utilizing Johansen multivariate cointegration and a bound testing way to deal with cointegration investigate that there is a high level of outside trade and merchandise market combination. By examining the validity of the purchasing power parity result shows that the validity of PPP demonstrates a higher level of products and foreign exchange markets integration. Financial changes assisted with expanding the adaptability of costs and nominal exchange rates in altering the monetary deviations. The short-run deviation from PPP has often occurred, yet since quite a while ago run legitimacy of purchasing power parity could not be dismissed.

3 Data and Methodology

Data Source

This study uses the time series data for the years 1991-2019 for Pakistan and data is collected from the World Bank (WB), International Financial Statistics (IFS) and Pakistan Economic Survey.

Model Specification

To see the impact of exchange rate on balance of trade in case of Pakistan, we use the following regression equation.

$$ER=f \ (TOT, \ GOVD, \ IR, \ INF)$$

The econometric model is as,

$$ER_t = \alpha_0 + \alpha_1 \ TOT_t + \alpha_2 \ GOVD_t + \alpha_3 \ IR_t + \alpha_4 \ INF_t + \varepsilon$$

Where;

ER= Exchange Rate

TOT= Terms of Trade

GOVD= Government Debt

IR= Interest Rate

INF= Inflation

ε= Error Term

t= Time Series

This equation shows the relationship between dependent variable (ER) and independent variables (TOT, GOVD, IR, INF). Exchange Rate is a function of terms of trade, government debt, interest rate and inflation rate. Changes in independent variables change the ER on Pakistan.

Time Series Data Analysis

Any variable that is measured overtime in sequential order is called a time series or data recorded at regular intervals of time is called time series. Time series data analysis is a statistical method which is used to make an inference about the pattern of the time series data is known as the time series analysis. This analysis is used to detect patterns of changes in statistical information over regular intervals of time. Time series data is used to analyze the relationship between dependent and independent variables over a specific time period. Time series data analysis is very useful to understand how variables change with time. In present study time series analysis is used to determine the relationship between dependent variable exchange rate and independent variable and examine the effects.

4 Empirical Results

The present study consists of various statistical techniques which is used to perform the empirical results of dependent variable and independent variables by using time series data. Firstly, we find descriptive statistics results to see the mean, median, skewness and kurtosis value etc of collected data of dependent variable and independent variables. In this chapter, we also present the correlation results, to measure the strength between the variables. In the last of this chapter, we use Ordinary Least Squares (OLS) Method to measure the long run and short run results of dependent and independent variables.

Descriptive Statistics

Descriptive statistics define the data's basic features. Central tendency uses the three measures, mean median and mode for the measurement of a random variables (Gujarati,2004).

Table: 5.1 Descriptive Statistics

	ER	TOT	GOVD	IR	INF
Mean	67.10604	76.40543	41.16121	11.87069	8.18865
Median	60.27134	65.01	57.8	12	7.692156
Maximum	121.8241	123.5	79.8	20	20.28612
Minimum	23.80077	53.81	5.2	6.25	2.529328
Std. Dev.	29.03732	22.09233	27.99361	3.808836	4.243012
Skewness	0.190805	0.611813	-0.39258	0.265109	0.687163

Kurtosis	1.83985	2.02998	1.326054	2.122084	3.320367
Observations	29	29	29	29	29

Source: Software E-Views 9.0

Table 1 present the basic features of the data of every variable. Dependent variable is Exchange Rate (ER) but the Terms of Trade (TOT), Government Debt (GOVD), Interest Rate (IR), and Inflation (INF) are the independent variables of the model. Numbers of the observations are 29 years from 1991 to 2019. The mean, median, maximum and minimum values of the Exchange Rate (ER) are 67.10604, 60.27134, 121.8241 and 23.80077 respectively. Dispersion of data of every variable is measured by the standard deviation in descriptive statistics. Highest value of standard deviation is 29.03732 of Exchange Rate (ER) in this model of the study. The values of the standard deviation of other variables like Terms of Trade (TOT), Government Debt (GOVD), Interest Rate (IR), and Inflation (INF) are 22.09233, 27.99361, 3.808836 and 4.243012 respectively. The skewness value indicates about data distribution whether it is positively skewed or negatively. The value of skewness is 0.190805 of the Exchange Rate (ER) that show data distribution of the ER is positively skewed and progressive. The kurtosis value of Exchange Rate (ER) is 1.83985 that show Platykurtic distribution. Goodness of fit checked by the Jarque-Bera test. Jarque-Bera test based on residuals of OLS. Jarque-Bera test for Exchange Rate (ER) is 1.80232which is greater than 0.5 and forecast that data is not normally distributed. If probability of data is less then o.o5 means rejected null hypotheses. Probability (P) value of Exchange Rate (ER) is 0.406098,shows that it is statistically insignificant.

Terms of Trade (TOT) is first independent variable in this study. The mean, median, maximum and minimum values of the Terms of Trade (TOT) are 76.40543, 65.01, 123.5 and 53.81 respectively. The value of skewness is 0.611813 of the Terms of Trade (TOT) that show data distribution of the Terms of Trade (TOT) is positively skewed. The kurtosis value of Terms of Trade (TOT) is 2.02998 that show Platykurtic distribution. The value of Jarque-Bera is 2.946159 and probability value is 0.229218. Probability value show that that Terms of Trade (TOT) is statistically insignificant.

Government Debt (GOVD) is second independent variable in this study. The mean, median, maximum and minimum values of the Government Debt (GOVD) are 41.16121, 57.8, 79.8 and 5.2 respectively. The value of skewness is -0.39258 of the Government Debt (GOVD) that show data distribution of the Government Debt (GOVD) is negatively skewed. The kurtosis value of Government Debt (GOVD) is 1.326054 that show Platykurtic distribution. The value of Jarque-Bera is 4.130758 and probability value is 0.12677. Probability value show that that Government Debt (GOVD) is statistically insignificant.

Interest Rate (IR) is third independent variable in this study. The mean, median, maximum and minimum values of the Interest Rate (IR) are 11.87069, 12, 20 and 6.25 respectively. The value of skewness is 0.265109 of the Interest Rate (IR) that show data distribution of the Interest Rate (IR) is positively skewed. The kurtosis value of Interest Rate (IR) is 2.122084 that show Platykurtic distribution. The value of Jarque-Bera is 1.271007 and probability value is 0.529669. Probability value show thatInterest Rate (IR) is statistically insignificant.

Inflation (INF) is fourth independent variable in this study. The mean, median, maximum and minimum values of the Inflation (INF) are 8.18865, 7.692156, 20.28612 and 2.529328 respectively. The value of skewness is 0.687163 of the Inflation (INF) that show data distribution of the Inflation (INF) is positively skewed. The kurtosis value of Inflation (INF) is 3.320367 that show Platykurtic distribution. The value of Jarque-Bera is 2.406283 and probability value is 0.300249. Probability value show thatInflation (INF) is statistically insignificant.

Correlation Matrix

Correlation Matrix is used to check the statistical association among the variables. The relationship will be shown positive or negative between the variables if the working variables are increasing or decreasing together. However, if one variable is increasing and other is decreasing then the correlation between the variables is negative. Nature of the correlation is shown through the signs of the coefficient. Correlation Matrix is used to check the multi-collinearity in the data, the value of the variables is not more than 0.9.

Table: 5.2 Correlation Matrix

	TOT	GOVD	IR	INF
TOT	1			
GOVD	-0.8821	1		
IR	0.60725	-0.732688	1	
INF	0.046082	-0.17228	0.564772	1

Source: Software E-Views 9.0

Consequences of the table represents the links of the sequence between each other. Terms of Trade (TOT) is positively correlated with the Interest Rate (IR), and Inflation (INF) while it is negatively correlated with Government Debt (GOVD). Government Debt (GOVD) is negatively correlated with Interest Rate (IR), and Inflation (INF). Moreover, Interest Rate (IR) is positively correlated with the Inflation (INF). Moreover, the value of every variable is less than 0.9 in the table that predicts the absence of the multi-collinearity in the data and we can further proceed to the Ordinary Least Square (OLS) analysis.

Serial Correlation LM Test:

Table: 5.3 Auto-Correlation

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	7.001571	Prob. Value	0.0042

Source: Software E-Views 9.0

To check the auto-correlation in the data, Breusch-Godfrey Serial Correlation LM Test is applied. The value of the F-Statistic is 7.001571 and probability value is 0.0042 which is greater than 5%. and outcomes predicts that auto-correlation exist in the data of the current study.

Heteroskedasticity Test: Breusch-Pagan-Godfrey:
Table: 5.4 Heteroskedasticity Test

Breusch-Pagan-Godfrey			
F-statistic	9.459798	Prob.Value	0.0001

Source: Software E-Views 9.0

To check the heteroskedasticity in the data,Breusch-Pagan-Godfrey Test is applied. The value of the F-Statistic is 9.459798 and probability value is 0.0001 which is greater than 5% and outcomes predicts that hetro exist in the data of the current study.

Ordinary Least Square (OLS) Method:

In statistics, ordinary least squares (OLS) is a type of linear least squares method for estimating the unknown parameters in a linear regression model. OLS chooses the parameters of a linear function of a set of explanatory variables by the principle of least squares: minimizing the sum of the squares of the differences between the observed dependent variable (values of the variable being observed) in the given dataset and those predicted by the linear function.

Table: 5.5 Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TOT	0.031837	0.012585	2.529758	0.0187
GD	-0.08468	0.016455	-5.14622	0.0000
IR	0.50189	0.068925	-7.28168	0.0000
INF	-0.739343	0.045541	16.23457	0.0000
R-squared		0.971297	**F-statistic**	160.1975
Adjusted R-squared		0.966305	**Prob(F-stat)**	0.0000
Durbin-Watson stat			2.376632	

Source: Software E-Views 9.0

This table of the study shows the regression results of the Terms of Trade (TOT) on the Exchange Rate (ER) in the context of Pakistan. Dependent variable is Exchange Rate (ER) but the Terms of Trade (TOT), Government Debt (GOVD), Interest Rate (IR), and Inflation (INF) are the independent variables of the model. Coefficients of the variables show the strength of the variables, but positive and negative signs of the coefficients show the direction of the variables either they are working in the same direction or opposite.

Results of the table show that the coefficient and probability values of the Terms of Trade (TOT) are0.031837 and 0.0187 respectively. Its mean that when TOT will increase by 1 unit then the rise in the Exchange Rate (ER) will be 0.031837 unit. TOT has statistically significant and positive impact on the Exchange Rate (ER) in the Pakistan. As the exchange rate will increase, it would become the cause to enhance the terms of trade because prices of exports will increase, and prices of imports will become cheaper. The coefficient and probability values of the Government Debt (GOVD) are-0.08468 and 0.0000 respectively. Its mean that when GOVD will increase by 1 unit then the decrease in the Exchange Rate (ER) will be 0.08468 units. GOVD has statistically significant and negative impact on the Exchange Rate (ER) in the Pakistan. When the exchange rate increase, value of the currency will decrease, then the government have to pay more amount against the principal amount and its services. That is why increased government debt will negatively affect the high exchange rate. The coefficient and probability values of the Interest Rate (IR) are-0.50189 and 0.0000 respectively. Its mean that when IR will increase by 1 unit then the decrease in the Exchange Rate (ER) will be 0.08468 units. IR has statistically significant and negative impact on the Exchange Rate (ER) in the Pakistan. Low interest rate will not attract the foreign capital, when the foreign direct investment will not come in the country then it not become the cause to increase the exchange rate. The coefficient and probability values of the Inflation (INF) are0.739343 and 0.0000 respectively. Its mean that when INF will increase by 1 unit then the increase in the Exchange Rate (ER) will be 0.08468 units. INF has statistically significant and positive impact on the Exchange Rate (ER) in the Pakistan.

5 Conclusion and Recommendation Policy

Objective of the study is to check the effect of the determinants of the exchange rate in the context of Pakistan for the 29 years (1991-2019). Data source is the World Bank (WB), International Financial Statistics (IFS) and Pakistan Economic Survey. The Ordinary Least Square (OLS) Method is applied to get the results of the study. Results of the OLS show that TOT has statistically significant and positive impact on the Exchange Rate (ER) in the Pakistan. As the exchange rate will increase, it would become the cause to enhance the terms of trade because prices of exports will increase, and prices of imports will become cheaper. GOVD has statistically significant and negative impact on the Exchange Rate (ER) in the Pakistan. When the exchange rate increase, value of the currency will decrease, then the government has to pay more amounts against the principal amount and its services. That is why increased government debt will negatively affect the high exchange rate.IR has statistically significant and negative impact on the Exchange Rate (ER) in the Pakistan. Low interest rate will not attract the foreign capital, when the foreign direct investment will not come in the country then it not become the cause to increase the exchange rate. INF has statistically significant and positive impact on the Exchange Rate (ER) in the Pakistan.

The results of the study suggest that TOT has positive impact on exchange rate it means when our export increases our currency value increases and exchange rate goes upwards. The positive impact of TOT on exchange rate shows that our fiscal policy is going in right direction. Government should increase its exports to make exchange rate better. The results also show that increasing government debt has negative impact on exchange rate so government must keep a balance between its debts and exchange rates. Further results of study show that inflation has positive impact on our exchange rate in Pakistan which clearly means that our monetary policy is going in wrong direction. State Bank of Pakistan must review its monetary policy.

REFERENCES

Adjei, M., Yu, B., &Nketiah, E. (2019). The Development and Determinants of Foreign Exchange Market in Ghana. *Open Journal of Business and Management*, *7*(4), 1831-1845.

Bodnar, G. M., & Wong, M. F. (2003). Estimating exchange rate exposures: issues in model structure. *Financial management*, 35-67.

Chow, E. H., & Chen, H. L. (1998). The determinants of foreign exchange rate exposure: Evidence on Japanese firms. *Pacific-Basin Finance Journal*, *6*(1-2), 153-174.

Faff, R. W., & Marshall, A. (2005). International evidence on the determinants of foreign exchange rate exposure of multinational corporations. *Journal of International Business Studies*, *36*(5), 539-558.

Fuchs, F. U. (2019). Macroeconomic Determinants of Foreign Exchange Rate Exposure. *Available at SSRN 3439239*.

Khan, M. A., & Qayyum, A. (2007). Exchange rate determination in Pakistan: Evidence based on purchasing power parity theory. *Pakistan Economic and Social Review*, 181-202.

Kim, S. J., & Sheen, J. (2002). The determinants of foreign exchange intervention by central banks: evidence from Australia. *Journal of International money and Finance*, *21*(5), 619-649.

Raja, Y. Y., & Ullah, N. (2014). Determinants of foreign exchange markets. *IOSR Journal of Economics and Finance*, *2*(6), 10-16.

Raza, S. A., &Afshan, S. (2017). Determinants of exchange rate in Pakistan: Revisited with structural break testing. *Global Business Review*, *18*(4), 825-848.

Saeed, A., Awan, R. U., Sial, M. H., & Sher, F. (2012). An econometric analysis of determinants of exchange rate in Pakistan. *International Journal of Business and Social Science*, *3*(6), 184-196.

Wolff, C. C. (1988). Exchange rates, innovations and forecasting. *Journal of International Money and Finance*, *7*(1), 49-61.