

## ANALYSIS OF THE FACTORS AFFECTING EXCHANGE RATE VARIABILITY IN PAKISTAN

**Shabana Parveen**  
Hazara University, Mansehra  
PAKISTAN.  
[krn\\_roshni@yahoo.com](mailto:krn_roshni@yahoo.com)

**Abdul Qayyum Khan**  
COMSATS, WahCantt  
PAKISTAN.  
[qayyum\\_72@yahoo.com](mailto:qayyum_72@yahoo.com)

**Muammad Ismail**  
COMSATS, WahCantt  
PAKISTAN.  
[mimkb80@gmail.com](mailto:mimkb80@gmail.com)

### ABSTRACT

*The Paper examines/analyzed the factors contributing exchange rate vitality in Pakistan. The study was conducted on some major factors contributing to exchange rate volatility, and their relative importance. Annual data for the period 1975-2010 is used, taken from Economic Survey of Pakistan (various issues) and International Financial Statistics. The main variables used to check variability are inflation, Growth rate, imports and exports on exchange rate volatility. Simple Linear Regression model with ordinary least method (OLS) is used to analyze the results. The study revealed that inflation is the main factor affecting exchange rate in Pakistan. The study further show that the second important variable which bring more variation in exchange rate is economic growth, while order of export and import in variation lies at third and fourth position. Based on the finding of the study it is recommended to harmonize fiscal policies with monetary policy first and then make effective link of both these policies with trade policy.*

**Keywords:** Exchange rate Variability, Inflation, Linear Regression and Economic Growth

### INTRODUCTION

For most of the twentieth century, exchange rates have been fixed by government action rather than determined in the marketplace. Before World War I the values of the world's major currencies were fixed in terms of gold, while for a generation after World War II the values of most currencies were fixed in terms of the U.S. dollar. However, some of the world's most important exchange rates change frequently.

Equilibrium in exchange rate is determined in the foreign exchange market at a point where demand for and supply of foreign currency equates. Demand for a currency comes from net export while supply of the currency comes from net foreign investment. Any change in demand for and supply of currency effect its value just like a good market that is if demand for a currency increases its value (exchange rate) will be increased while increase in supply of the currency will reduce its value(exchange rate) in the foreign exchange market.

Pakistani rupee was linked with British Pound Sterling till 1970 but in 1971 it was linked with US dollar because of the increasing influence of US in the region. Until 1982, The Pakistani Rupee was pegged to the US Dollar. The currency depreciated by 38.5% from 1982-1988, when the government of General Zia-Ul-Haq convert it to Managed float, and again depreciated as a result of bad relationship with donors agencies and trade partners due to nuclear test in 1998.

The empirical studies relating to the link between exchange rate variability and its factors are not conclusive. Exchange rates are basically the prices of one currency in terms of other currencies driven by the normal forces of supply and demand. There are a fixed number of Euros, Dollars, Yen, etc issued at any given time (although governments can and do print extra money to buy other currencies and impact their currencies value). As the demand increases or decreases for any single currency, it drives the clearing price for that currency.

Zada (2010) studied the factors affecting exchange rate of Pakistan for the period 1979 to 2008. The study used multiple regression model in which exchange rate was taken as dependent variable while Inflation, interest rate, Foreign exchange reserves, trade balance, money supply and Gross Domestic Product were the independent variables. The study showed that Inflation, interest rate and foreign

exchange reserves strongly influence the exchange rate and remained significant at 1% level while other variables GDP, Money supply and trade deficit remained insignificant.

Hussain and Farooq, (2009) analyzed the effects of exchange rate fluctuations on macroeconomic variables for Pakistan for the period of 1982 to 2007. They used quarterly data and concluded that exchange rate volatility, exports of country and reserve money possess long run positive relationship to the growth of economy. Khan and Sajid, (2005) used the data from 1982-II to 2004-IV to identify both short term and long term relationship of real money balances, rate of inflation, rate of interest both in foreign and at home and real effective exchange rate for Pakistan.

Ahmed, Ara and Hyder (2005) used structural vector auto regression (VAR) model and found that external shocks are important in driving economic fluctuations in Pakistan and their importance has increased since September 11, 2001. The primary source of external shocks is foreign remittances. They found that terms of trade shocks appear to have very little effect on Pakistan's real exchange rate, domestic output, and domestic prices. However, because the volatility of these shocks is relatively high, they do explain a non-trivial proportion of the fluctuations of these variables, especially the price level, around the baseline. Foreign output shocks lead to a real depreciation of the rupee but their spillover effects on domestic output are rather modest. By contrast positive shocks to remittances from abroad lead subsequently to a significant increase in domestic output and a substantial real exchange rate appreciation.

Galati and Ho (2003) showed that news play a role in fluctuation of exchange rate for Euro and dollar. The results of the study showed that good news bring appreciation while bad news depreciates currency. Sanchez-Fung (2003) also studied the same relationship and stated that exchange rate is more responsive in case of depreciation. Xiaopu (2002), MacDonald and Ricci (2003) studied the long term determinants of real exchange rate are Openness of an economy, capital flows and terms of trade.

Ejaz, Abbas and Saeed (2002) showed a direct relationship between exchange rate and budget deficit under the managed floating exchange system. Their study covered the period of 1982 to 1998 for Pakistan. It is proved that budget deficit is also playing an active role in determining real exchange rate in Pakistan. In the present study different choices were included to find out the interaction of exchange rate and exogenous factors.

## OBJECTIVES

The main objectives are (1) To analyze the determinants of Foreign Exchange Rate in Pakistan (2) To know which of the determinants is playing the main role in foreign exchange rate, and (3) To make appropriate suggestions for suitable policy implementation for problems arising from the appreciation/depreciation of currency in the light of finding of the study.

## DATA AND METHODOLOGY

This study used annual data for the period 1975-2010. Different sources for the data were approached (Government of Pakistan, private sector, and international organizations) to find out the nature of the available data. The stationarity of data is determined, by using Augmented Dickey-Fuller (ADF) test. To select the optimum ADF lag, Akaike Information Criterion (AIC) is used. Stationarity of the variables are checked once with an intercept is included only, and again when both an intercept and a linear deterministic trend is included. Johansen cointegration test is used to determine the cointegration in the regressions used for analysis.

In order to analyze the factors affecting the exchange rate, a linear regression model has been used. The two stage least square method has been used for estimating the important linear regression equation models.

The following is the main linear regression model which will be used for analysis:

$$Y = \alpha + \beta_1(INF) + \beta_2(GR) + \beta_3(X) + \beta_4(IMP) + \mu$$

Where Y is Exchange rate, INF is Inflation, GR is Growth rate, X is Exports, IMP is Imports and  $\mu$  is the residual term.

**RESULTS AND DISCUSSION****The Augmented Dickey-Fuller (ADF) Test Result**

The results in Table I and II of the unit root test indicate that all the variables except Economic Growth, Exchange Rate, Export, Import and Inflation are non-stationary at level whether trend is included or not, while Economic Growth is stationary at level when trend is included.

Table1.ADF Test for Stationarity (Includes Intercept but not a Trend)

Variables	I(0)		I(1)		I(2)		Result
	Test statistics <sup>1</sup>	Critical value	Test statistics	Critical value	Test statistics <sup>1</sup>	Critical value	
Exchange Rate (ER)	.0079[0]	-3.5814	-5.2760[0]	-3.5850			I(1)
Economic Growth (EG)	-0.6369[2]	-3.5814	-9.8811[1]	-3.5850			I(1)
Export(x)	-1.4207[1]	-3.5814	-9.5202[2]	-3.5850			I(1)
Import (Imp)	0.0812[0]	-3.5814	-6.8740[1]	-3.5850			I(1)
Inflation (infl)	-1.4018[0]	-3.5814	-5.7430[0]	-3.5850			I(1)

<sup>1</sup> Figures in square brackets besides each statistics represent optimum lags, selected using the minimum AIC value.

Table 2.ADF Test for Stationary (Includes Intercept and a Trend)

Variables	I(0)		I(1)		I(2)		Result
	Test statistics <sup>1</sup>	Critical value	Test statistics	Critical value	Test statistics	Test statistics <sup>1</sup>	
Exchange Rate (ER)	-1.8765[1]	-4.1728	-5.1948[0]	-4.1781			I(1)
Economic Growth (EG)	-5.4659[0]	-4.1728					I(0)
Export(x)	-4.0627[0]	-4.1728	-9.4101[2]	-4.1781			I(1)
Import (Imp)	-2.7585[0]	-4.1728	-6.8051[1]	-4.1781			I(1)
Inflation (infl)	-0.0915[0]	-4.1728	-6.9744[0]	-4.1781			I(1)

<sup>1</sup> Figures in square brackets besides each statistics represent optimum lags, selected using the minimum AIC value

**Johanson Co-Integration Test**

Table 3 Johansen co integration test result with intercept (no trend) in CE and no intercept in VAR.

ER = c<sub>1</sub>(EG) + c<sub>2</sub>X + c<sub>3</sub>Imp + c<sub>4</sub>Infl. (Variables included in the co integrating vector: ER, EG, X Imp and Infl) Test assumption: No deterministic trend in the data. Lag interval is 1 to 2

Eigen value	Likelihood	5 Percent	1 Percent	Hypothesized
0.7413	137.15	102.14	111.01	None **
0.4988	79.01	76.07	84.45	At most 1 *
0.3865	49.30	53.12	60.16	At most 2
0.3063	28.29	34.91	41.07	At most 3
0.1500	12.57	19.96	24.60	At most 4

\*(\*\*) denotes rejection of the hypothesis at 5 % (1%) significance level

L.R. test indicates 2 co integrating equation(s) at 5% significance level

The results of Likelihood Ratio (LR) test is presented in Table 3. There is possibility of spurious regression, due to non-stationary time series variables. But when performed Johansen's cointegration test, long run relationships were found. The Likelihood Ratio (LR) test results reject the assumption of no cointegration, and indicate the existence of one cointegrating equation as the calculated value of Likelihood Ratio (LR) is greater than the critical values at 1 percent.

### REGRESSION ANALYSIS

The regression equation is

$$ER = 9.66 + .170 GR + 0.384 INF + 0.08818 X - 0.0764 Imp$$

$$StDev = 2.270 \quad 0.03221 \quad 0.07569 \quad 0.03008 \quad 0.02720$$

$$t\text{-stat} = 4.25 \quad 5.28 \quad 5.08 \quad 2.93 \quad -2.81$$

$$S = 3.194 \quad R\text{-Sq} = 98.2\% \quad R\text{-Sq (adj)} = 98.0\%, \text{ DW statistic} = 1.10$$

Given above are the results of the regression of Exchange Rate on Growth Rate (GR), Inflation (INF), Exports(X) and Imports (Imp). It is evident from the p-values and t-statistic of each variable that all the variables including constant term in the model are highly significant. As far as the overall fit of the model is concerned the coefficient of Determination(R-Sq) and the adjusted coefficient of determination(R-Sq (adj)) show that the model is a very good fit.

It is quite clear from the above results that regression is a good fit as adjusted R-square is 98.2% which means that 98.2% of the variations in exchange rates are explained by this model. The main factors determined here are economic growth, inflation, exports and imports or we can say on the basis of the model that 98.20% variation in exchange rate is due to the four factors that is growth rate, Inflation, exports and imports model whereas only 1.80% of the variation in Exchange Rate is due to other factors that have not been taken into account. Further the Model shows that Increase in growth rate, inflation and export would increase exchange rate pretty clear from coefficient signs. While increase in import would reflect in decreasing exchange rate value (-ve sign of coefficient). The Durbin Watson statistic for the model shows that there is no evidence of the presence of autocorrelation.

### CONCLUSION AND RECOMMENDATIONS

The present study revealed that inflation is the most important factor that bring volatility in exchange rate in the country as it contributes more to variations in exchange rate. The results further indicate that due to high inflation the currency got devalues in exchange. Inflation has a negative effect on exchange rate as when inflation increases it reduce the value of currency. The result further shows that second important variable which bring more variation in exchange rate is economic growth, while order of export and import in variation lies at third and fourth position.

Based on these evidences it is clear that in Pakistan fiscal and monetary policies play important role in exchange rate variation. It is recommended to harmonize fiscal policies with monetary policy first and then make effective link of both these policies with trade policy. Effective and smooth running of fiscal and monetary policies are required to reduce inflation and boost up economic growth. The gap between policy formation and its implementation both in fiscal and in monetary policy required to reduce.

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