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Impact of Foreign Capital Inflows and Money Supply on Exchange Rate: A Case Study of Pakistan

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ABSTRACT

The study attempts to examine the impact of foreign capital inflows and money supply on exchange rate of Pakistan. For this purpose we have undertaken time series data for the period of 1973-2016. Annual data for the period 1973-2016 is used, taken from Economic Survey of Pakistan (various issues) and International Financial Statistics (IFS). The main variables used in our analysis are exchange rate, openness, workers' remittances, foreign direct investment, foreign aid and money supply. Simple Linear Regression model with ordinary least method (OLS) is used to analyse the results. Money supply is positively and significantly related to exchange rate. Worker's remittances (WREM), foreign aid (FAID), foreign direct investment. (FDI) and openness (OPP) are negatively and significantly related to exchange rate. The study shows that foreign capital inflows and workers' remittances significantly appreciate the exchange rate in the case of Pakistan.

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1. Introduction

The real exchange rate shows the degree of competitiveness of a country towards international trade. The real exchange rate is considered as an important factor for economic growth of a country. Stability of exchange rate is helpful for driving up exports and private investment. Misalignment in exchange rate will leads to price distortions which further leads to resource misallocations between the sectors of tradable and non-tradable goods. Undervaluation or overvaluation of a real exchange rate is a common case in underdeveloped countries. Due to overvaluation of real exchange rate the profit in tradable goods reduces which leads to less investment in this sector. So we can say that it has negative impact on exports and balance of trade.

Cottani et al. (1990) argued that in many developing countries, misalignment of real exchange rate harmed the agriculture sector and its growth which resulted in reduction of food supply. Besides, a number of economists have emphasized on understanding the importance of real exchange rate and its determinants.

Capital inflows are considered as important factor to determine the real exchange rate. According to a well-known Dutch Disease theory (Corden and Neary 1982), more amount of capital inflows are the main cause of appreciation of exchange rate. Moreover, this exchange rate also affects tradable and non-tradable sectors of a country. Capital inflows can be treated as a reserves' accumulation or a deficit in current account according to the type of exchange rate regime. For example in floating exchange rate regime where there is no role of central bank, capital inflows leads to increase in capital assets which will further leads to increase in imports. So in this way capital inflows will widen the current account deficit. Now, if there is fixed exchange rate then central bank will interfere by monitoring the appreciation pressure. In this case, capital inflows will lead to increase in foreign exchange reserves.

Monetary policy shocks have different effects on the exchange rate. The results are conflicting in nature. Commonly, there are two possible affects. The first is according to the prescribed theory and the second is opposite which is called 'a puzzle'. According to theory, monetary expansion is a main cause of increase in money supply. So in this way the interest rate of central bank will be reduced. If we increase money supply, the exchange rate of currency with other currencies will decrease. On the other hand, a tight monetary policy will leads to a higher base interest rate which will attract investors because of higher return on domestic assets than foreign assets. So the demand and value of domestic currency will increase and in the result the exchange rate will also increase. But there are lots of evidences which are contrary to the above theory called 'exchange rate puzzle'.

The main purpose of this paper is to evaluate the determinants of exchange rate in Pakistan for the period from 1973 to 2016 using time series econometric approaches that may be helpful to formulate a realistic exchange rate policy. The study proceeds as follows: In section 1 brief introduction of exchange rate is given. Section 2 gives a brief review of the empirical literature related to the study. Econometric model is developed in section 3 which includes data and methodology. Section 4 is based on results and conclusion which summarized the paper.

2. Literature Review

Cornel (1982) found the relationship between money supply, exchange rate and interest rate. The results showed that an unanticipated increase in money supply leads to increase in exchange rate and interest rate due to speculator's intervention. When money supply was increased through expansionary monetary policy then if investors believed that soon it leads to monetary contraction then they will increase the demand of currency to make future profits which will ultimately raise exchange rate.

Mahamadu and Philip (2003) explored the association between exchange rate, inflation and monetary growth in Ghana. They used Error Correcting Mechanism. The results indicated that there exist a long-run relationship between inflation, money supply and real income and exchange rate. It was demonstrated that inflation was positively correlated to exchange rate and money supply and negatively related to real income.

Due and Sen (2006) examined the interrelation between real exchange rate, capital inflows, indicators of fiscal and monetary policy and balance of account for Indian economy for the period of 1993 to 2004. The result indicated that variables were cointegrated with each other and granger caused to real exchange rate. The analysis of generalized variance decomposition suggested that determination of the real exchange rate include net capital flows, current account surplus, government surplus and money supply.

Hyder and Mehboob (2006) explored equilibrium exchange rate and its misalignment in Pakistan. They collected annual data from 1978 to 2005 and used co-integration econometric technique. It was founded that gross domestic product and real investment to GDP ratio were negatively related to exchange rate. Terms of trade and real investment to GDP ratio were positively and negatively related to exchange rate respectively.

Korsu and Braima (2007) evaluated the determinants of real exchange rate in Sierra Leone. They found that equilibrium exchange rate, the sustainable level of macroeconomic policies and nominal exchange rate were positively related to actual real exchange rate and the index of macro policies is negatively related to real exchange rate. The authors suggested that real exchange rate was undervalued during the periods of 1999 to 2005 and 1972 to 1998.

Zakaria et al. (2007) analyzed the determination of nominal exchange rate in Pakistan. They used quarterly time series data that covered the period of 1983 to 2004 and used a generalized method of moment (GMM) estimation technique. They concluded that relative price (RP) was negatively related to nominal exchange rate and net capital inflow was positively related to nominal exchange rate.

Rehman et al. (2010) tested the effect of FDI (foreign direct investment) on equilibrium real exchange rate in Pakistan. They collected the annual time series data from the period 1993 to 2009 by using the method of behavioral equilibrium exchange rate (BEER). They applied cointegration technique and concluded that FDI inflows and worker's remittances had significantly appreciated the equilibrium real exchange rate in Pakistan.

Fida et al. (2012) examined the value of equilibrium exchange rate in long run by applying purchasing power parity (PPP) approach. They collected time series data that covered the period of 1983 to 2010. They used co-integration technique and concluded that terms of trade, government expenditures and productivity were negatively related to real exchange rate. They argued that external debt among other microeconomic variables plays a significant role in the fluctuations of real exchange rate.

Saeed et al. (2015) investigated the behavior of exchange rate. They used time series data that covered the period of 1982 to 2014. They concluded that nominal money, foreign debt and politically instability were positively associated to exchange rate and foreign exchange reserves were negatively associated to exchange rate. The author suggested that an effective monetary and fiscal policy together with political stability is necessary to maintain the exchange rate and macroeconomic stability in Pakistan.

3. Data and Methodology

Secondary data is used in this study which covers the period from 1973 to 2016. Data have been obtained from International Financial Statistics (IFS), 50 Years Statistics of Pakistan published by Federal Bureau of Statistics and Economic Survey of Pakistan (various issues).

This paper investigates the determinants of exchange rate by examining the impact of foreign capital inflows and money supply on exchange rate of Pakistan. We construct the following mathematical model for analysis:

$$\mathbf{ER = f\ (WREM,\ FAID,\ FDI,\ OPP,\ M_2)}$$

The econometric model of the study is given as follows.

$$\mathbf{ER = \beta_0 + \beta_1\ WREM + \beta_2\ FAID + \beta_3 FDI + \beta_4\ OPP + \beta_5\ M_2}$$

Where,

E.R = Exchange rate
WREM = Workers' remittances
FAID = Foreign aid
FDI = Foreign direct investment
OPP = Openness
M_2 = Money supply

3.1 Variable Description

This section of the study is reserved to explain the variables of the analysis. The variables are selected due to their relative importance on theoretical as well as empirical grounds. Attempted variables and their

explanation about hypothetical impact are defined as follows:

3.2 Workers' Remittances

Workers' remittances are referred to current transfers by migrants who are employed in some other economy in which they are considered residents. Workers' remittances are the type of unrequited current private transfers which minimizes the deficits in current account of receiving country. These inflows have also significant effect on equilibrium real exchange rate. If an economy properly spends these inflows on non-tradable goods then it leads to appreciation of real exchange rate.

3.3 Money Supply

The money supply include total amount of monetary assets circulated in a country in some specific period of time. M_1 money supply contains cash and assets that can be immediately converted into currency while M_2 money supply refers to M_1 + short term money deposits and saving deposits. Theoretically, an increase in money supply leads to reduction in exchange rate and vice versa.

3.4 Foreign Aid

It is referred to international transfer of capital, goods or services from one country to another country for the purposes of relief, rehabilitation or economic stability. Theoretically, foreign aid should have a positive effect on the exchange rate of recipient country.

3.5 Openness

Open economy means that market economy which is almost free from barriers of trade and thus imports and exports form a large proportion of the GDP. In fact, no economy is considered totally open or closed and different countries have varying degree of control over foreign trade. One of the important measurements for the openness of a country is the percentage of its GDP devoted to foreign trade.

3.6 Foreign Direct Investment

Foreign direct investment (FDI) indicates the direct investment in production by such a company which is located in some other country. This company invests in some other country by buying a company or expanding the existing business. FDI can affect the exchange rate in two ways i.e, by depreciation of domestic currency or appreciation of domestic currency depending on utilization of FDI inflows.

4. Results and Discussions

In this section, first of all the descriptive statistics of the data is presented. Descriptive statistics describes main quantitative features of the data through statistical and econometric analysis of data. It gives simple and uncomplicated summaries about the data and the measures.

Table 1: Descriptive Statistics of the Variables

	ER	WREM	FAID	FDI	OPP	M2
Mean	31.29233	2110.926	2004.766	755.6184	0.340853	1040628.
Median	22.75407	1647.140	1913.500	256.1000	0.333494	370947.5
Maximum	83.80170	7810.950	4688.000	5410.200	0.480454	5137205.
Minimum	8.500000	128.0000	355.0000	-6.300000	0.259786	22059.00
Std. Dev.	22.48348	1760.161	959.9782	1359.545	0.045079	1372136.

Note: All the estimations are carried out by E-views

Table 1 represents the descriptive statistics of the model. In the above table exchange rate (ER) is a dependent variable and workers' remittances (WREM), foreign direct investment (FDI), foreign aid (FAID), openness (OPP) and money supply (M_2) are independent variables. The sample size consists of

43 observations from the period of 1973 to 2016. The maximum and minimum value of exchange rate is 83.80 and 8.5 respectively, whereas the standard deviation is 22.48 and the mean value is 31.29. Workers' remittances have minimum value 128.0, maximum value 7810.95, mean value 2110.92 and standard deviation 1760.161.

Foreign direct investment having minimum value -6.30, maximum value 5410.20, mean value 755.61 and standard deviation 1359.54). Openness having minimum value 0.259, maximum value 0.480, mean value 0.340and standard deviation 0.045. Foreign aid having minimum value 355.0, maximum value 4688, mean value 2004.76 and standard deviation 959.97. Money supply has minimum value of 22059, maximum value 5137205, mean value 1040628 and standard deviation 1372136.

In equation the dependent variable is exchange rate while the independent variables are worker's remittances, foreign aid, foreign direct investment, Openness unit and money supply. The coefficient of worker's remittances is negative and highly significant at one percent level. It indicates that if worker's remittances increase one million then the value of exchange rate will decrease 0.0067 percent and due to decrease in the value of exchange rate our currency will appreciate.

The negative coefficient of foreign aid is significant at five percent level shows the decrease in the value of exchange rate due to increase in foreign aid. If the foreign aid increases one million then the value of exchange rate will decrease 0.00305 percent. Due to decrease in the value of exchange rate our currency will appreciate. The negative coefficient of foreign direct investment shows the decrease in the value of exchange rate due to increase in foreign direct investment and is highly significant at five percent level. If the foreign direct investment increases one million then the value of exchange rate will decrease 0.00404 percent and our currency will appreciate. The openness has negative effect on the value of exchange rate and its coefficient is significant at one percent level. If the value of openness increases then the value of exchange rate will decrease and hence our currency will appreciate.

Money supply is positively associated to exchange rate. Increase in the supply of money leads to increase in the value of currency. Here coefficient is highly significant at one percent level. Increase in the value of exchange rate means depreciation of our currency. This finding is in line with previous work by Saeed et al. (2012). The value of R^2 is .99 which implies that approximately 99 percent of the variation in the dependent variable is explained by the variation in explanatory variables. F-Test is used to test the overall significance of the model and it determines whether a significant relationship exists between dependent variable and all the independent variables. For detection of auto-correlation we have used Durbin Watson test. The value of this test shows that there is no autocorrelation in our data set.

4.1 Normality Test

We apply the normality test to check the normality of the residuals. We have the null and alternative hypothesis as following:

H_0: Residuals are normally distributed

H_1: Residuals are not normally distributed

Table 2: Parameters Estimates of Foreign Inflows, Money and Exchange rate in Pakistan Equation

Independent Variables	Coefficients	Probability Value
Openness	-0.667402	0.02624*
Worker Remittances	-0.0000667	0.0057*
Foreign Direct Investment	-0.0000404	0.0428**
Foreign Aid	-0.0000305	0.0489 **
Money Supply	0.00000022	0.0251*
Constant	0.761	0.1751
R^2	0.995958	
Durbin Watson Stat	1.994866	
F-Statistics	5.368062	0.0372504
Sample Size	40	

Note: All the estimations are carried out by E-views

Note:*, **, *** indicates that parameters are significant at 1 percent, 5 percent and 10 percent level respectively.

As we see that the probability value is greater than 0.10 so we may not reject the null hypothesis and concluded that residuals are normally distributed.

4.2 Tests for Autocorrelation and Heteroskedasticity

Now we use Breusch - Godfrey serial correlation LM test for the detection of autocorrelation and white test for detection of heteroskedasticity in our data.

4.2.1 Breusch-Godfrey Serial Correlation LM Test

The Breusch–Godfrey serial correlation LM test is used for the detection of autocorrelation in a regression model. It uses the residuals of the model which considered in a regression analysis and a test statistic is also obtained from these residuals. We have null hypothesis (H_0) and the alternative hypothesis (H_1) as follows:

H_0: There is no problem of autocorrelation

H_1: There is a problem of autocorrelation

R^2 shows explanatory power of the model it measures the proportionate of variation in dependent variable which is explained by independent variable. The value of F-statistics shows overall significance of the model. The values of this test show that there is no presence of autocorrelation.

4.2.2 White Heteroskedasticity Test

The white heteroskedasticity test is the most general test for detection of heteroskedasticity. This test is very general and commonly used for large sample sizes. The values of this test show that the problem of heteroskedasticity is not present in estimated problem.

Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.820480	Probability	0.372504
Obs*R-squared	1.009812	Probability	0.314948

White Heteroskedasticity Test			
F-statistic	0.368062	**Probability**	0.949647
Obs*R-squared	4.588275	**Probability**	0.916933

5. Policy Recommendations

The paper's examination of the impact of foreign inflows and money supply on exchange rate exposes genuine contributions that allow us to depict following policy recommendations:

I. Foreign remittances help countries to balance their exchange rate depreciation during recession. So Pakistan should make policies to reduce or avoid the competitiveness which is related to the appreciation of exchange rate that follows capital inflows. Furthermore, it is necessary to make such monetary arrangements which balance the exchange rate that is one of the main macroeconomic tools for attracting the significant amount of remittances and capital inflows.

II. Developing countries appreciate exchange rate to attract capital inflows. But the appreciation of exchange rate might destabilize macroeconomic management. Developing countries should concentrate on short-term inflows like portfolio investments which have a large appreciation effect than other types of capital inflows.

III. Unfortunately, the exchange rate policy failed in Pakistan due to several reasons. The main reason is that devaluation of our currency was accompanied by inappropriate monetary management. Increase in money supply resulted in a high inflation which led to offset the favourable effects of devaluation. So it is a need to improve the balance of payment through adjustment of real exchange rate. The State Bank of Pakistan should adopt tight monetary policy and should have also control on money supply.

IV. In Pakistan, both fiscal and monetary policy has a significant effect on exchange rate variation. So it is a need to harmonize both policies with each other and then link them with trade policy. If monetary and fiscal policy will run smoothly then we can boost economic growth as well as stabilize the exchange rate.

6. Conclusion

In this study the issues of the impact of foreign inflows and money supply on exchange rate has been discussed. Money supply is positively and significantly related to exchange rate. Workers' remittances (WREM), foreign aid (FAID), foreign direct investment. (FDI) and openness (OPP) are negatively and significantly related to exchange rate. Due to increase in money supply exchange rate will increase and the value of currency will depreciate. FDI inflows appreciated the exchange rate in Pakistan which shows the signs of 'Dutch Disease'. Workers' remittances also appreciate the exchange rate. In Pakistan, although workers' remittances are increasing day by day since 9/11 but the sources of these inflows are concentrated to a few countries of the world.

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