Modeling Dynamics of Exchange Rates Volatility: A Case of Pakistan from 1980-2010

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Abstract
The thesis aims to analyze the exchange rate volatility that exists in Pakistan. What threats does this volatility pose to various macroeconomic variables of the country? This is the main question that is being addressed in this thesis. The study also aims to look at the implications of the various exchange rate regimes followed in the country, upon some of the core variables such as inflation, trade, foreign direct investment etc. Both the official exchange rate and the real effective exchange rates are taken into account to look at the extent to which they get affected by different core variables, and vice versa. The paper also sheds light on the role of the State Bank of Pakistan, in reducing the fluctuations and the annual volatilities in the currency. How autonomous are its operations? How transparent is the State Bank of Pakistan? All such questions are addressed in this thesis. An OLS approach is being used to carry out a time series analysis, and the data is gathered for the 30 years from 1980 to 2010. The data was collected from various databases that were accessible. It is made sure that these sources were authentic and recognized. The findings of the paper mainly focus on the significance of their relation with the official and the real effective exchange rates. The study shows that the real effective exchange rate is more sensitive to current account balance, aid and foreign private investment as compared to the official exchange rate. It can also be seen that inflation and foreign direct investment are closely linked to the exchange rates.

Keywords: Exchange Rate, Terms of Trade, Balance of Payments
JEL Code: O24, B27

I. Introduction

This part pertains solely to the country of Pakistan and so provides with the facts and figures of the country. Since there are a lot of ongoing problems in the economy and, the exchange rate management difficulty also is one of them. The following proceeding part will discuss the trends that have been existed there during the time period of 1980-2010, related to the approach that is selected in this study.

I.I. Evolution and History of Exchange Rate in Pakistan

Pakistan got independence in 1947 and ever since then it faced great hardships that were in the form of macroeconomic challenges. These difficulties needed to be countered with relevant policies in the respective fields. And Pakistan being a developing nation always tried hard to deal with these issues with the main objective to maintain prosperity in the country. Exchange rates play a crucial role in the development process of any country. Pakistan being a developing country also places some significance on its exchange rate regime to remain competitive in the foreign markets. The role of any exchange rate regime is very important when it comes to the adjustment process of a country (Chisti and Hassan, 1993).

I.II. Trends & Regimes

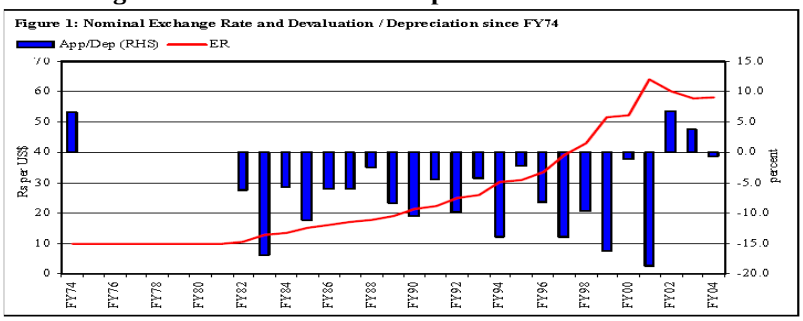
After the collapse of the Bretton-Woods arrangements in 1970, Pakistan did not initially allow its currency to float but decided to start with a pegging against the US dollar. Thereafter, Pakistan adopted a variety of exchange rate regimes, from 1980 to 2010. To make it simple and brief, we can divide the time period into short intervals in order to trace down the history and trends of the exchange rates and exchange rate regimes in Pakistan. During the fiscal year of 1973 to 1981, the exchange rate policy of Pakistan evolved through a fixed exchange rate. While, by the end of 1999, it progressed towards a managed float. And finally, since July 2000, it moved to a fully flexible exchange rate policy (Adil & Mahboob, 2005). The trends of nominal exchange rates and real effective exchange rates (REER) are shown in the figure 1 and figure 2, respectively. To outline the reasons for the changes in the exchange rate policies mentioned above, the official website of the state bank of Pakistan proved very helpful and effective. The studies conducted by Muhammad Farooq Arby (2004) and Hyder and Mahboob (2005), provide with the facts and figures that are authenticated by the State Bank of Pakistan, itself.

The first study when discussing the exchange rate regimes of the country, states that due to the fear of an appreciation in the Pound Sterling, Pakistan chose to remain pegged to the US dollar, especially after the disintegration of the Bretton Woods System, in 1970.However, in the later years, the US dollar also started to appreciate posing some of the adverse effects on the Rupee. This allowed Pakistan to move to a managed float. "In February 1973, the US Dollar was devalued by 10 percent which led to subsequent revaluation of Pakistani Rupee by 10 percent to Rs 9.90 per dollar and it remained fixed at this level" (Hyder & Mahboob, 2005, p.5). In 1980, the Real Effective Exchange Rate of Pakistan (REER) registered an appreciation, due to the strengthening of the US dollar, against major currencies of the world. Figure 2 below shows that REER witnesses a consistent negative trend throughout the fiscal years of 1980-2004. Figure 1, on the other hand is showing a persistent devaluation/depreciation since the fiscal year 1974. After the end of the managed float, and during the process of moving towards a floating exchange rate, the rupee dollar parity showed a sharp depreciation. "After nuclear detonation by Pakistan in 1998, a two tier exchange rate system was introduced temporarily, under which official exchange rate was fixed at Rs. 46 per US dollar" (Arby, 2004, p.22). In 1999, the exchange rate was unified under the market based floating exchange rate system. In 2001, there was 18.6 percent depreciation, which was the second largest drop after 1982, the time when Pakistan was using a managed float. According to the records that are provided by the SBP (Figure 3), the depreciation was shown as the cumulative of two fiscal years that are FY00-FY01. The stability in this year did not change the nominal exchange rate. This is due to the absence of the IMF program that a degree of some freedom was there that caused the narrowing down of the current account. Figure 3 below, shows the annual depreciation from 1991-2001. As compared to the FY07, the fiscal year 2008, showed considerably high volatility, since the worsening of the external account was becoming more distressful and was creating pressure on the exchange rates of the country.

Nominal exchange rate showed 13.3 percent depreciation, while REER showed a 2.3 percent, due to prevailing high levels of Inflation (State Bank of Pakistan, Annual Report, 2008). The report states that during the year, Rupee weakened but, the volatility was curbed by the SBP. Though it was not only the Rupee that was registering this depreciation, there were other regional currencies in the league, too. These currencies were the Indian Rupees and the Thai Baht (see Figure 5). The financial year 2008 proved volatile for the country. But it was the SBP that intervened effectively and helped in restoring the parity around PKR67 by the end of May, in which the currency showed great volatility (Figure 4). In FY 09, there were some alarming factors that were posing pressure on the exchange rates of

Pakistan, such as excessive high price of oil. The deterioration in the external accounts triggered excessive volatility in the first two quarters of FY 09.

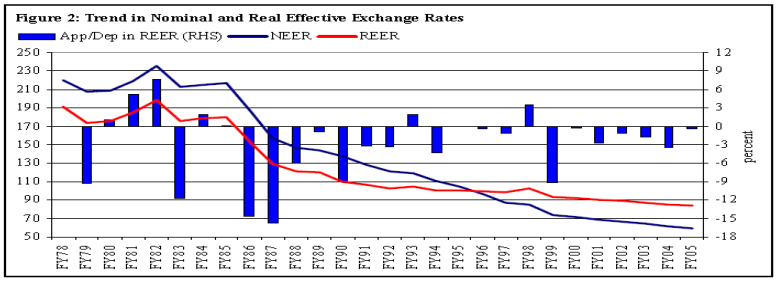
Figure 1: Nominal Exchange Rate and Devaluation/Depreciation



Source: (Hyder, Z., & Mahboob, A. (2005). Equilibrium Real Effective Exchange Rate and Exchange Rate Misalignment in Pakistan. *SBP conference* , 1-28.)

The figure above is showing a trend of the extent to which the nominal exchange rate depreciated from 1974-2010. It could be seen that there has been a persistent negative trend, shown by the bars that are below the axis. However, the lengths of the bars are differing depending on the extent to which these depreciations/devaluations took place.

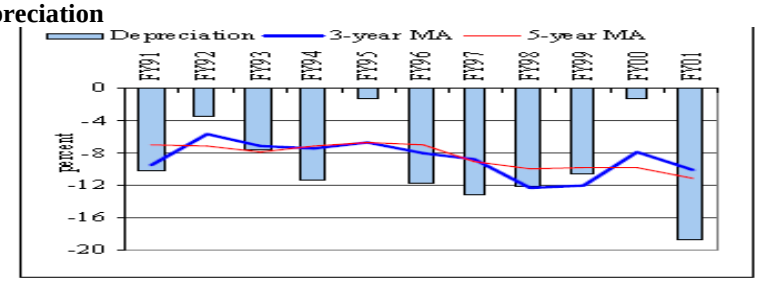
Figure 2: Nominal and Real Effective Exchange Rates



Source: (Hyder, Z., & Mahboob, A. (2005). Equilibrium Real Effective Exchange Rate and Exchange Rate Misalignment in Pakistan. *SBP conference* , 1-28.)

This graph above shown, is depicting the trends of both the nominal and the real effective exchange rates on the same figure, with the aim of making comparisons. The line graphs in the figure are showing a continuous falling trend from 1978-2005. But the important thing to notice here is that the REER has remained below than the nominal exchange rate till 1996, but pick up pace later on moving above it from 1997 onwards. The gap between the two also widens up in the later years.

Figure 3: Annual Depreciation



[Source: State Bank of Pakistan Annual Report FY 01]

The figure above is showing the same information as the figures above. But the sole purpose of stating them one by one is to magnify the depreciation trends in some of the years, which are explained by some of the crucial policies of the country. The negative trend is clearly shown by the bars that are below the axis.

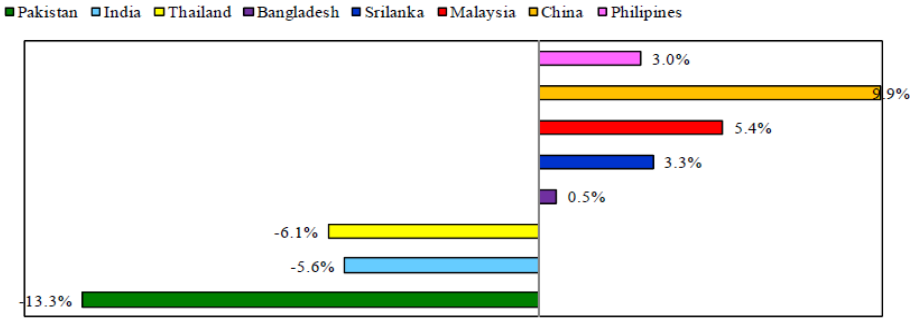
Figure 4: Annual Volatility in PKR and changes in %age

Year	High	Low	Close	Average	Volty C/C	Percent change
FY05	61.6	57.55	59.64	59.35	2.57	-3.21
FY06	60.45	59.57	60.22	59.87	0.92	-0.97
FY07	61.01	60.18	60.37	60.65	0.96	-0.26
FY08	69.75	60.3	68.4	62.73	0.04	-13.30

[Source: State Bank of Pakistan Annual Report FY 08-09]

To explain the first three figures in numbers, they can be best told in the form of the volatilities. Starting off with the FY05, the percent change in the volatility is the key thing to notice here. In the FY08, the percentage change was the highest. It was in this year that the SBP was able to intervene in the exchange rate markets to restore the position of rupee.

Figure 5: Regional Currencies Performance against US$



[Source: State Bank of Pakistan website: www.sbp.org.pk]

The figure above is showing that how well the currencies are doing against the US$. The bars on the left hand side are signifying the currencies of Thailand, India and Pakistan (starting from the top). These currencies are depreciating against the dollar, and the amount of depreciating is shown by the figures stated in the figure.

I.III. Role of the State bank of Pakistan (SBP) in the Exchange Rate Policy of Pakistan.

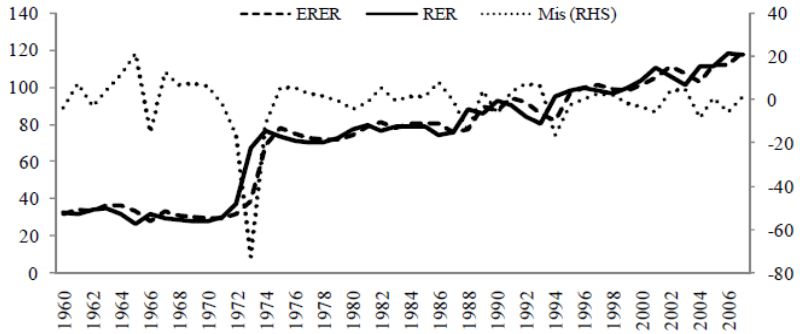
State Bank of Pakistan (SBP) is the central bank of the country. Various sources talk about the functions and the purpose of its existence in various aspects, and so under this sub heading it would be useful if we talk about its purpose in context to the exchange rate policy of Pakistan. The bank incorporates the exchange rate policy as part of its main objective of establishment**.** Exchange rate Management is one of the secondary functions of the bank. This responsibility is given to the bank under the Foreign Exchange Rate Act. Where, mainly the bank acts as the bank of the government of Pakistan, as the sole authority to issue currency notes and as the regulator of the financial system (Arby, 2004). SBP is responsible to monitor the stability the exchange rates and to smooth out any fluctuations that adds to the volatility of the exchange rates. SBP is given autonomy to intervene in the foreign exchange market, for this purpose. This is supported by the annual interventions that are taken place by the SBP in the foreign exchange markets. The stability in the rupee, in 2005-2006, can be attributed to the intervention of the SBP along with a wide amount of inflows of funds, in the form of remittances. Also in FY09, when there were soaring oil prices, and the exchange rates of Pakistan experienced a high unpredictability, the SBP took a number of proactive measures to smooth out these fluctuations. (State Bank of Pakistan Annual report,2009). But the situation began to settle, when there was a recommencement in the IMF program, which proved crucial for the country.

I.IV. Exchange Rate Volatility & Macro economy

Pakistan had been facing excessive volatility for the past years (Figure 6), the main reason being its inefficiencies on part of its policy making. Exchange rates are one of the key macroeconomic variables for any economy. Therefore, for Pakistan also there is a dire need to look for the volatility trends in the past and to jot down the variables that tend to influence this volatility and misalignment. Shah Hussain, in the study done for the research bulletin of the SBP (2009), finds out the reasons of misalignment and the volatility of the

exchange rates in Pakistan. "If the co-movements in actual and equilibrium real exchange rate is observed due to changes in fundamentals, the policy intervention may not needed" (Hussain, 2009, p.1). Real variables are taken into account to see their impact on Pakistan's real exchange rates, in the study of Shah Hussain (2009).

Figure 6: Misalignment Trend in Pakistan



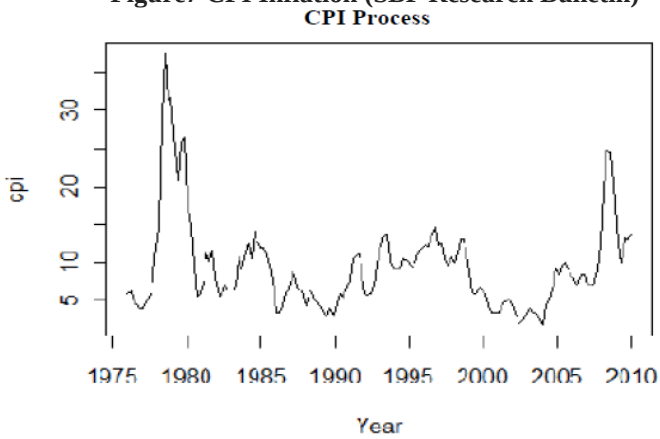
Source: (Hussain, F., & Jalil, A. (2006). Effectiveness of Foreign Exchange Intervention: Evidence from Pakistan. *SBP Working Paper Series No. 14* , 1-23).

The trend above is showing the actual, equilibrium and the misalignment trends in Pakistan. This is obtained from the study of Hussain. The misalignment is rather defined as the difference between the actual and the equilibrium paths.

I.V. Impact of Inflation on exchange Rates

Inflation is one of the biggest issues that Pakistan had been facing throughout its existence is that pertaining to high level of prices. Figure 7 below, shows the persistent high trends in CPI of Pakistan. The high and the low peaks are showing the volatility in the prices from 1975-2010. The graph is taking 5 year times period to record these price changes, so that some sort of a solid comment could be made. The country has made adjustments to its exchange rate regime, over the years. And these changes were made on the grounds of the sole objective of maintaining low inflation. The central bank of Pakistan has always prioritized this macroeconomic goal, so it designs the monetary policy accordingly. But this does not establish that the SBP is not on the verge of supporting the growing importance and the crucially of remaining competitive in the International markets (Zaidi, 2006). For this purpose, the relevant authorities aim to bring stability in the real effective exchange rate.

Figure7 CPI Inflation (SBP Research Bulletin)



[Source: Zaidi, et.al, 2011]

The choice of the monetary policy by the SBP reflects its intention of the extent to which the inflation rates could be curbed. Moinuddin (2007), states in his study that there is a relationship between the monetary

aggregates and the inflation targets. He raises the point that the structural changes that are taking place in the economy that can be defined in terms of the technological advancement, are the main reason of the diminishing significance between the two. The study that is accomplished in this paper written, answers the query that is often raised in the situation of Pakistan. And the question is that if inflation and monetary targets are weakly related together, then is it appropriate to emphasis on this link, or then is it good enough to pursue the inflation targeting monetary policies? "In case, SBP abandons monetary aggregate targeting, the alternative monetary policy regimes available to SBP are (1) exchange rate targeting, (2) nominal income targeting, (3) interest rate targeting, and (4) inflation targeting" (Moinuddin, 2007, p.15). Hamza Ali Malik (2005) says that flexible exchange rate policy is not as effective as the managed exchange rate regime (Dirty floating) might be, if inflation targeting policy is pursued on the federal level. If too much stress is placed on the stabilization policy, then under this pressure it is more likely that the bank approaches to a fixed exchange rate case. It means that there will be a loss in the welfare of the country. Whenever, the SBP places greater stress on the stabilization of the exchange rate policies along with the engagement in inflation targeting policies, so in that case the welfare of the county rises (Malik, 2005). When the inflation rates rise, it causes an appreciation in the exchange rates of Pakistan. The study draws some interesting results. It suggests that focusing on the exchange rate policy alone is not sufficient.

I.VI. Impact of Exchange Rates on Monetary policy

The State Bank of Pakistan looks into the different frameworks of monetary policy that blends well with the regime followed in the country, with special reference to the flexible exchange rate regime (Zaidi, 2011). In analyzing the impact of policy making framework, Ali Kalim Zaidi and Iqbal Zaidi (2011), have conducted a detailed study on the role of the SBP. In another similar study that is done by Iqbal Zaidi, is on the choice of the exchange rate regime and the implementation of that choice on the monetary policy. Despite the relevant choice of an exchange rate regime, the main motive of the monetary policy has been kept on keeping the inflation to its minimum level. So under the flexible exchange rate. The working papers, those are prepared under the supervision and authenticity of the State Bank of Pakistan consistently talks about the monetary framework, given that the bank aims to design the monetary policy that coordinates with the fiscal consolidation. This is also discussed in detail under the next sub heading. In much of the work that is available regarding this field, greater emphasis is made on the impact of the exchange rate policy on the monetary policy framework, rather the other way round. This is what is conversed in the study made by Malik (2005), which is presented in the conference organized by the SBP in the FY05. This research scrutinizes the two important yet not very common questions. The first important thing that is addressed in this study is that, how and to what extent the monetary policy is altered when an economy moves from a closed structure to an open economy framework. And secondly, the role of the exchange rate policy in the monetary setting of an economy which is categorized as an open economy. He writes that a tight monetary policy leads to an appreciation. This is a vital conclusion that he draws in the process of the conduct of the research.

I.VII. Policy Coordination

Many studies show that how the fiscal and the monetary policies coordinate. The study that is conducted by Arby and Hanif (2010), states that there are some institutional arrangements that exist in the country in order to ensure that these two policies coordinate well. The study elaborates on the relationship that exists between the two policies. However, the extent to which the exchange rate policy is incorporated between the two depends on the link between the monetary, fiscal and the exchange rate variables. It is seen that the monetary policy is independently designed, without the influence of the fiscal policy. And therefore, the exchange rate policy is constructed in line with the desired monetary policy.

I.VIII. Impact of interest rate on exchange Rates

Changes in the nominal interest rates have a crucial impact on the exchange rates. Since they are linked with the investment climate of a country, and the capital flows affect the exchange rates in a positive manner, therefore, the interest rates also play an essential role, in influencing the exchange rates of Pakistan. If the economy keeps on raising the interest rates, this will intensify the appreciation of exchange rates (Malik, 2005).

I.IX. How Capital flows affect the Exchange Rate Volatility in Pakistan?

There are a lot of studies conducted on the affect of either the effect of exchange rate volatility on various macroeconomic variables or the other way round. In the study conducted by Abdul Rashid (2009), it is seen

that hoe capital inflows that is in the form of capital investments, affect the nominal and the real effective e exchange rate volatilities. The researcher argues that everything has its own good and bad elements attached to it, and based on these we cannot simply establish that a certain change that is about to incur in the economy is good or bad. Certain situations have their own demands and so there is a need to prioritize ourselves. Therefore this foreign capital inflow also brings some positive and the negative effects along with it. The FDI generates some concerns for the recipient economies, in the form of real appreciation leading to a loss of competitiveness, banking crisis and etc. The study clearly provides with evidence that how capital inflows can be easily determined under either cases of the exchange rate regimes. There is a net increase in the capital asset and so there is also a current account deficit, incase if there is a pure float exchange rate regime. However, the foreign exchange reserves increase under the fixed exchange rate regime. The three periods moving average standard deviation is used to measure the volatilities in both the nominal and the real effective exchange rates. The conclusion of the study is that there is a significant relation between the two. But it also states that the volatility in the real effective exchange rate is more sensitive to change in the capital flows

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I.X. Exchange Rate Volatility and the Import Demand in Pakistan

Pakistan has been facing a persistent current account deficit, which is due to massive imports balanced by a comparatively low amount of exports. In the study conducted by Shaista Alam and Qazi Masood (2010), it says that there is significant relationship that exists between the real growth, import demand and the volatility in the real effective exchange rate. The study establishes that the country's trade policy not only depends not only on the elasticities of imports and exports but also on the volatility of the exchange rate volatility. It says that the import demand of Pakistan is determined by the exchange rate volatility. The conclusion of the study states that there is a long term relationship between the import demand and all the volatilities that exist with the exchange rate regimes of Pakistan. It is also found in the study that the real depreciation and the volatility of this depreciation has little or no affect to decrease the import demand in Pakistan.

I.XI. Exchange Rate Interventions and International Policy Coordination

When we talk about the foreign interventions under the light of exchange rate policies and regimes, the one major source from where this intervention is expected, comes into our mind. And that is the International Monetary Fund, or the IMF as it is shortly known. The IMF promotes international monetary cooperation between the states (as the name suggests), plus it aims to facilitate the exchange rate stability. By keeping a good track of the history of the states, the institution makes them aware of the growing risks and threats. Apparently, it tends to holds equality between the treatments of all the member states; however, there are some limitations to the benefits of being a member to this international forum. Specialist advices are made by the authorities of the IMF to the authorities of the member states, with an intention to remove any dangers to the growing horizon. Before moving on to the issues and concerns that the authorities of Pakistan has to face regarding the IMF intervention, it's important to know that what kind of help and assistance do they provide and in what form. From the mid-1970s, it has been there to solve the balance of payment imbalances of the countries, especially extending the help to the poor nations. This is done by the provision of "concessional financing", as defined by itself. This financing is done through the "Trust Fund". The Structural Adjustment Facility is a name that is given to the program of a concessional loan to these poor nations. This program is perfectly relevant in case of Pakistan that is discussed in accordance with the policy coordination by the SBP, in the subheading below.

I.XII. Issues & Concerns for Pakistan

In the paper that is collectively presented by Ali Kalim Zaidi and Iqbal Zaidi in 2011, in the SBP Research Bulletin, a very important aspect about the IMF discussions has been highlighted. They state that despite that Pakistan has been following a flexible exchange rate, a lot of importance is placed on the monetary aggregates. This is not something done deliberately by the SBP, but it is what the IMF wants the SBP to do. In all the discussions that are carried out with the IMF missions, it is the only thing that gains priority. The IMF stays closely stuck to the relevance of the monetary equation of MV=PY. According to which the monetary aggregates should move along with the price levels. The study claims that there have been many issues regarding the models of "underlying design and implementation" of the IMF adjustment programs (Zaidi, et.al, 2011, p.2). One of the main reasons for the limitations of getting bountiful results from the IMF programs is that every time the dialogue is made between the two authorities, they talk nothing but about the monetary stance of the country. The same study holds an ongoing list of criticism regarding the IMF approach in case of Pakistan. Little importance is attached to the supply side influences and impact. Another, problem that exists

regarding the IMF programs is that they do not provide with the assumptions that are needed to incorporate by the SBP. The researchers claim that given the fact that both the IMF and the SBP focus on the monetary policy only, much of the vulnerability would have avoided if some discussions were held on the fiscal consolidation and the building up of reserves. This missing presence of the fiscal consolidation and the backing up of reserves is mainly attributed to the lack of ownership of the government of Pakistan, along with the insufficient monitoring on part of the IMF (Zaidi, et.al, 2011). Though the IMF exists for the betterment of the exchange rate stability positions of the countries, but little is done for this purpose and the main emphasis is made on the monetary policies and aggregates. However, the Foreign Currency Deposits (FCDs) needed much of the specialist discussions by the IMF. In 2009, when the Rupee was experiencing excessive volatility, the SBP came into the grounds to smooth out these fluctuations. At this point in time, the continuation of the IMF program came as a sigh of relief for the central bank of Pakistan.

This paper aims to study different economic, international and macroeconomic variables and the degree of their impact on the exchange rates, in a time series analysis. The main objective is to see that in what direction these exchange rates will move given an increase/decrease in these variables. In this study, two proxies of the exchange rates have been taken. One is the Real Effective Exchange rate and the other is the Official Exchange rate. These two proxies are determined by the same set of variables to examine the magnitude of the volatility in these two proxies, which makes it a competing model. Same correlation is expected in both the cases; however, the extent to which the variables are significant might differ. Hence, the main objective is to look at the volatilities of both the Official and the Real Effective Exchange Rates of Pakistan, given the same set of variables.

II. Literature Review

A lot of researchers step forward to contribute to the already large amount of literature available. Many studies have been done in the area of exchange rate management. This part of the paper will mainly talk about the academic research that is available and the findings and key analysis that has been highlighted in these studies. In a study, it is also mentioned that floating exchange rates are not allowed to float the way they are supposed to be. However, there are limitations to that, given the government's claim to allow the market forces to determine the rates but in real case scenario it intends nothing but to reduce the exchange rate fluctuations (Calvo & Reinhart, 2002). The Fixed and the floating exchange rates have separate dynamics when it comes to the stability and volatility of the exchange rate mechanism (Klein, 2008). Fixed exchange rates are often referred to as pegged exchange rate, since the domestic currency is fixed against the foreign currency. And every peg is often followed by a new peg. Each of the different types and exchange rate regimes has an impact on the macro economy and trade, specifically. The study presents the stance that a fixed exchange rate or a pegged currency have a positive impact on trade. This study carries out the statistics of the peg and the float spells. It also focuses on the fact the de jure pegs actually understates the extent to which the volatility in the spells of de facto floats exists. The study keeping in mind the various exchange rate regimes, talks about the volatility and their implications on the macroeconomic variables of an economy.

In another study conducted by Michael W.Klein, fixed exchange rates are explained in relation to trade. A two sided argument is presented. It says that a very small negative impact could be seen on trade pertaining to this category of Exchange rates. The study explains that a significant amount of trade exists between countries that tend to peg their currencies against any major foreign currency. Since already established that the fixed exchange rate are associated with a lower volatility therefore, this kind of a regime encourages a great deal of trade transactions between countries that have pegged exchange rate. After the use of econometric model, the researcher has concluded that fixed exchange rate has more or less significant impact on trade. Evaluations are based on the results of the model. So can we say that fixed rates are better than the flexible exchange rates? From a European point of view, there are pros and cons of flexible exchange rates (Gylfason, 2000). The author has presented the cases of Iceland and Norway to explain them in a clearer manner. The two exchange rate policies are evaluated in context to the natural resources that they own. Buffie and Adam (2004) have defines the fixed and the floating exchange rates in a rather simple manner. They establish that in flexible regimes, the central bank never intervenes. However, the element of float is also an important thing to be taken into account. The peg is explained as the endogenous adjustments of the money supply through the capital account.

Currency crisis and exchange rate regimes are talked simultaneously in this study. How economies decide that which regime to chose? There are a lot of factors that can affect this decision e.g. structural, political and financial arrangement of a country. Therefore, the decision does not move in isolation (Asici. 2011). Countries that are faced with a high inflation then for them it is suitable to use a pegged exchange rate to bring in stability. The authors are taking different determinants for each of the above mentioned factor to look at the extent to which they are going to

affect the choice of exchange rate regime. The study claims that when an economy chooses an inconsistent way to decide on its exchange rate regime, there is a high probability that negative consequences will prevail. Effective exchange rate and the Official (bilateral) Exchange rate differs in both the cases when we talk about the OECD and the non-OECD Countries (Zumaquero, 2010). In this study, the behavior of real exchange rates has been examined in both the classification of countries, regarding the fixed and the floating exchange rates. The results in the end suggests that situations differ greatly in the case of developed and the developing economies.

In most of the literature work, there is strong stance provided in the support of exchange rate volatility and the flexible exchange rate (Mussa, 1986; Rogers, 1995). Countries that have experienced a high volatility in Real Effective Exchange rate tends to have a flexible exchange rate. The study uses a sample of countries in OECD and non-OECD countries to look at the regimes that are followed by them during the time period for which the time analysis is carried out. In another study of Jeong (2001), G-7 countries are being discussed. In most of these cases an equilibrium mechanism prevails under fixed and the flexible exchange rates. Friedman (1953) provides an argument for the flexible exchange rates by highlighting an indirect link, in the transmission of inflation across these countries. Does Exchange rate policy matters in the process of trade balance? This the question for which the answer is provided in the next study under discussion. Under flexible exchange rates there is a contraction of exports, hence a deterioration of trade balance (Lane, 1998). In this research paper, panels of OECD countries have been used to hold the theory true. Countries that keep on shifting their fiscal policy tends to affect the trade balance in a very significant manner.

Paula Caselli (2001) provides a viewpoint that what is the implication of the fiscal consolidation under fixed exchange rates. If the economy is using a fixed exchange rate, the decrease in the public consumption will appreciate the currency in the short run. Similarly, the fall in the output is not very pronounced in case of the fixed exchange rate regime. In the money wage model, the exchange rate overshoots if the money expansion leads to an increase in nominal wealth, and vice versa (Ahtiala). The monetary expansion is expansionary under flexible exchange rates, suggested in the papers of Mundell (1963) and Fleming (1962). This monetary expansion will appreciate the exchange rate (Ahtiala, 1998). The case of the Chinese economy prove that there are conflicts between monetary and the exchange rate policy. Krugman (2000), states that an economy at most achieve two of the three macroeconomic goals, simultaneously. These are the independent monetary policy, stability of the exchange rate and the free movement of the capital (Ping, et.al, 2003). The Chinese case study examined in this study evaluates different dimensions and phases of the economy to develop a better understanding of the situation. There are three types of conflicts that are mentioned in the study and they are stated as it is.

- Conflict between the buildup of reserves and high inflation.
- Conflict between the rapid decline of the growth of foreign exchange reserves and the deflationary pressure.
- Conflict between the exchange rate stability and the interest rate differentials (Domestic and the foreign currency).

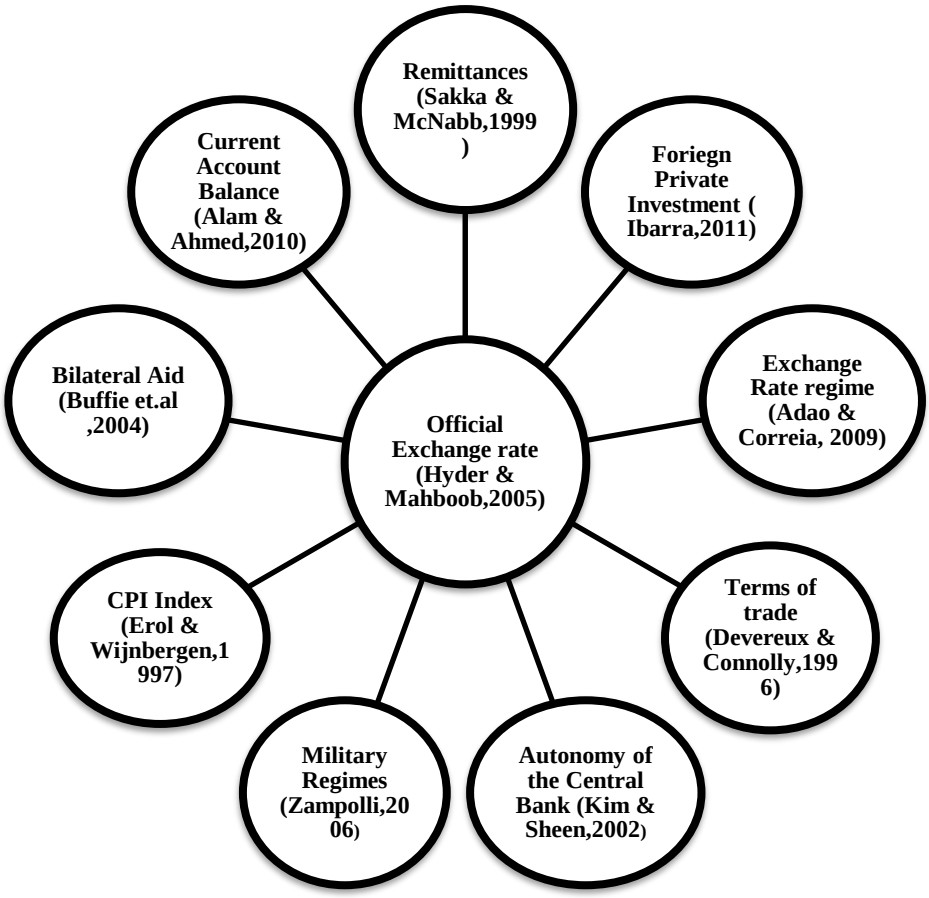
It is vital to know the positions of the Central banks in the volatility of the exchange rates. Every economy has its own central bank and so the autonomy also differs at large, though they are influenced by International forums that are of great dominance. Exchange rate regimes explain the different ways of interventions (Neely, 2008). The study mainly focuses on the monetary authorities and their intervention regarding the foreign exchange intervention. In another study conducted by the same researcher in 2000, it was explained that it is the changing exchange rates that incorporates the intervention on part of the central bank. There are certain financial responsibilities that are given to the central banks. Oosterloo and Haan, (2004), states and examines the way these responsibilities are executed. Different elements of financial stability are mentioned in the study in order to clarify the central bank responsibilities. Before looking at the literature available on this, it is first crucial to know the transparency of the Central banks. How transparent are the Central banks? Eijffinger et.al (2006), proposes an index that will measure its transparency. For the criteria to hold some significance the study uses nine major central banks around the world. They present the components to be "political, economic, procedural, policy and operational aspects of central banking." Researchers provide different components on which the index is designed. Some take objectives, strategy, publication of data and forecasts, and communication strategy (Bini & Gros, 2001).

III. Methodology and Theoretical Framework

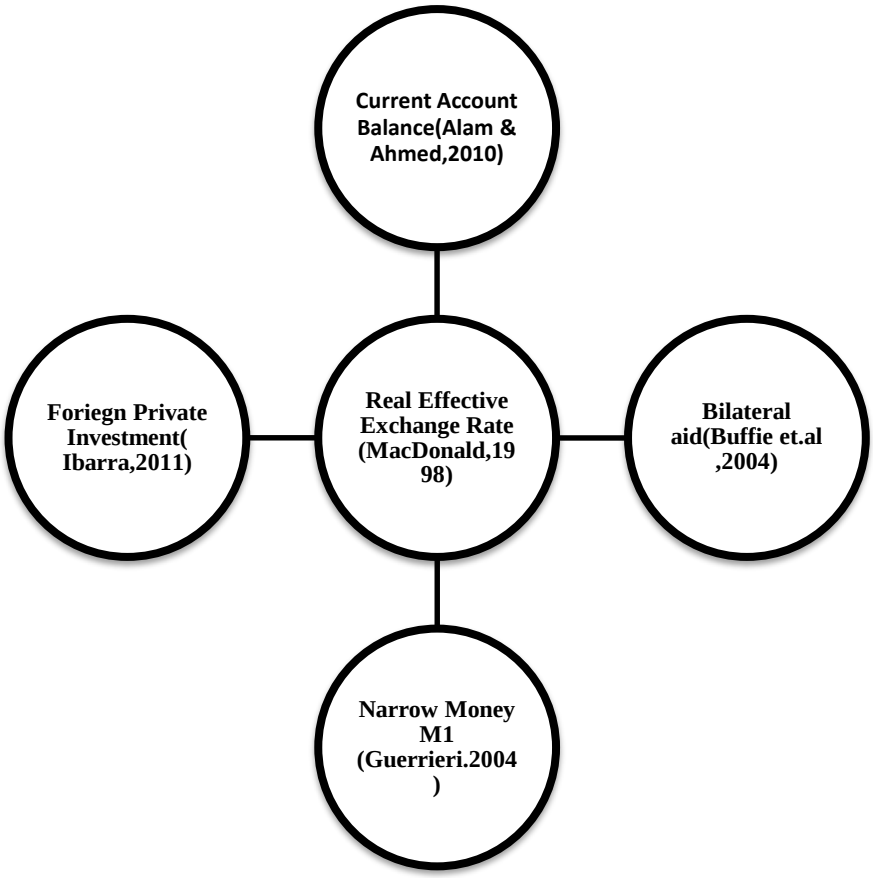
This part aims to look at the approach that has been adopted in order to account for the statistical significance of the model that is incorporated in this thesis. The following headings to come will specifically concentrate on data type, the model specification, the statistical significances, the relationships between the dependent and the independent variables and the likely hypothesis that is likely to establish throughout the thesis. The main purpose of the first equation is to test

the extent to which the official exchange rate is sensitive to the set of variables that are incorporated in the equation. Since the exchange rates can be taken in a number of forms, the official exchange rate is one of the important one that is entirely applicable in case of Pakistan. Both the official and the official exchange rates are important for any economy (McDonald, 1998). And so they get affected by each of the different set of variables already mentioned in the flow charts above. Remittances play a vital role in the stability or appreciation of the exchange rates (Sakka & McNabb, 1999). The higher the inflow of remittances the greater will be an upward pressure on the currency, the other literature work supports. Similarly, other types of inflows that are the capital inflows and the official aid, both the types have an appreciating affect on the exchange rates (Ibarra, 2011). Aid flows tends to create some problems for the recipient country, and so it needs to be looked upon that how that aid is being used in the economy (Buffie et.al, 2004). Erol and Wijnbergen (1997), supports that inflation that is measured as the CPI index, is important in affecting the international competitiveness. The higher the prices, the lower will be the demand for exports and people are going to prefer imported cheap items. As a result of this the current account will face a deficit. This leads us to the variable of the current account balance. Alam and Ahmed (2010) states that current account balance has a negative relation with the exchange rates. Deterioration in this will depreciate the currency. The terms of trade also has a negative relationship with the exchange rate (Devereux & Connolly, 1996). Beside these, the other variables of autonomy, the exchange rate regimes and the military regimes are all backed by some theory, however to make them applicable in Pakistan some criteria is decided on which these dummies are based.

Flow chart of equation 1



Flow chart of equation 2



Equation 1

Official Exchange Rate = βo - β1Remittances ($m) - β2 Foreign Private Investment + β3 Exchange rate regime (1=flexible, 0=Otherwise) - β4 Terms of trade + β5 Autonomy of the SBP 1=Autonomous (>10%, 0=Otherwise) + β6 Military Regime (1=Military Regime, 0=Otherwise) + β7 CPI index – β8 bilateral Aid+ β9 1/Current Account Balance

The hypotheses to be tested are as follows:

Ho = There is no significant relationship between the official exchange rate and the remittances (β1=0)

H□ = There is a negative significant relation the official exchange rate and the remittances. (β1<0).

Ho = Foreign Private Investment and the official exchange rate are not significantly related. (β2=0)

H□ = Foreign Private Investment and the official exchange rate are significantly related. (β2<0)

Ho = There is no significant relationship between the official exchange rate and the exchange rate regime. (β3=0).

H□ = There is significant relationship between the official exchange rate and the exchange rate regime. (β3>0).

Ho = There is no significant relationship between the official exchange rate and the terms of trade. (β4=0)

H□ = There is a significant relationship between the official exchange rate and the terms of trade. (β4<0).

Ho = Autonomy of the State Bank of Pakistan and the official exchange rate are not significantly related. (β5=0)

H□ = Autonomy of the State Bank of Pakistan and the official exchange rate are significantly related. (β5>0).

Ho = There is no significant relationship between the official exchange rate and the military regimes. (β6=0)

H□ = There is a significant relationship between the official exchange rate and the military regimes. (β6>0)

Ho = Inflation and official exchange rate are not significantly related. (β7=0)

H□ = Inflation and official exchange rate are significantly related. (β7>0).

Ho= There is no significant relationship between the official exchange rate and the official aid. (β8=0)

H□ = There is a significant relationship between the official exchange rate and the official aid. (β8<0).

Ho = Current account balance and the official exchange rate are not significantly related. (β9=0)
H□ = Current account balance and the official exchange rate are significantly related. (β9>0).

Equation 2:
Real Effective Exchange Rate = βo – β1 current account balance $b – β2 bilateral Aid+ β3 1/Foreign Private investment + β4 Narrow Money (M1)

The hypotheses to be tested are as follows:
Ho = Current account balance and the real effective exchange rate are not significantly related. (β1=0)
H□ = Current account balance and the real effective exchange rate are significantly related. (β1<0).

Ho = There is no significant relationship between the real effective exchange rate and the official aid. (β2=0)
H□ = There is no significant relationship between the real effective exchange rate and the official aid. (β2<0)

Ho = Foreign Private Investment and the real effective exchange rate are not significantly related. (β3=0).
H□ = Foreign Private Investment and the real effective exchange rate are significantly related. (β3>0)

Ho = Narrow money (M1) and the real effective exchange rate are not significantly related. (β4=0)
H□ = Narrow money (M1) and the real effective exchange rate are significantly related. (β4>0).

The data that is taken for this paper could have been taken from various sources, however, the data was not completely available for all the years. So for this purpose various sources were consulted in order to make sure that the data was authentic and complete for all the 20 years that are selected as the time period. Some of the national databases and international databases were consulted on which the data on these variables were expected to be available. These databases included the International Monetary Fund (IMF), The State Bank of Pakistan (SBP), The World Bank, and Federal Board of Revenue. Some of the other national databases websites were consulted e.g. The Nation Master. However, all these databases included the same data that was available with the World Bank.

IV. Estimation, Analysis and Conclusion
This part of the study emphasizes on the models and their findings. It is not just sufficient to talk about the expected signs and significance of each of the variable, therefore this part entirely focuses on all the relevant findings which are then rationalized in the context of Pakistan. The part talks about the relevance of each variable's significance, and explains why a particular variable is not coming out to be significant in case of Pakistan.

Equation1
Regression Analysis: OER versus Remittances ($m), Foreign Pvt Inves, ...

Official Exchange Rate = 15.1 - 0.00378 Remittances ($m) - 0.00148 Foreign Private Investment + 2.23 Exchange rate regime (1=flexible, 0=Otherwise) - 0.127 Terms of trade + 0.89 Autonomy of the SBP (1=Autonomous>10%, 0=Otherwise) + 5.03 Military Regime (1=Military Regime, 0=Otherwise) + 0.452 CPI index - 0.000000 bilateral Aid+ 0.908 1/Current Account Balance

Remittances

Coefficient	-0.0037779
Standard Error Coefficient	0.0004011
T Value	-9.42
P Value	0.000

The negative sign with the coefficient explains a negative relation between the official exchange rate and the remittances. It suggests that a 1 unit change in the remittances lead to a 0.0037779 units change in the official exchange rate. When remittances rise, it leads to an appreciation of the currency, which is shown as the negative sign. The p-value is less than 0.05 which means that the variable is significantly related with the dependent variable. Therefore, we reject Ho. To rationalize the finding, it can be obtained that this variable is relevantly applicable in the case of Pakistan. Since,

there are a large no of people who go abroad for work and send money into the country, to support their families. So 'remittances' is an important variable that is shown by the high significance in the form of the p-value.

Foreign Private Investment

Coefficient	-0.0014837
Standard Error Coefficient	0.0003301
T Value	-4.50
P Value	0.000

The negative sign with the coefficient is showing that a 1 unit increase in the foreign private investment, the currency will appreciate by 0.0014837 units. When foreign private investment rises, the currency appreciates, that is shown by a fall in the currency value in absolute terms. The p-value again is less than 0.05; therefore, the variable is significantly related with the official exchange rate. We reject Ho in this regard. Pakistan has a great scope for investment; however, there are certain limitations that restrict the amount of potential investment. Due to the availability of cheap labor and high scope for tax evasion, foreign investors are attracted towards investing money in Pakistan, after all the cost and benefits are accounted for. Hence this variable is incorporated in the model that is of great significance in case of Pakistan.

Terms of Trade

Coefficient	-0.12669
Standard Error Coefficient	0.04167
T Value	-3.04
P Value	0.006

The negative sign is there with the coefficient, suggesting that a rise in the 1 unit in the terms of trade value; the currency will appreciate, shown by a negative sign. This appreciation will be caused by a 0.12669 units. The p-value for this variable is also less than 0.05, which shows that the terms of trade is significantly related with official exchange rate. Therefore, we reject Ho. The result above is showing a high significance in case of Pakistan. The variable shows the unit value of export vs. the unit value of import. Since the country exports low value goods, therefore this is showing a high significance in this regard.

CPI Index

Coefficient	0.45176
Standard Error Coefficient	0.01068
T Value	42.31
P Value	0.000

The CPI Index is one of the core variables in the equation. The variable is positively related with the official exchange rate as stated in the theory earlier. A 1 unit increase in the prices, will lead to an increase in the currency (meaning that the currency depreciates). The sign is supported by the theory that is available in this regard. The p-value is 0.00, which is less than 0.05, which implies that the variable is significantly related with the dependent variable. So, basing on this, we reject Ho. The country is facing adverse problem of hiking prices and so it is considered to be the core variable in the equation. The perfectly '0' p-value is showing its relevance when it comes to Pakistan.

Bilateral Aid

Coefficient	-0.00000000
Standard Error Coefficient	0.00000000
T Value	-1.95
P Value	0.064

The sign of the coefficient is negative as backed by the theory, with implies that the variable of bilateral aid and the official exchange rate are negatively related. The coefficient is nearly zero, suggesting that a 1 unit increase in aid leads to a fall in currency by an insignificant number of units. The p-value therefore is also greater than 0.05, however, it is only 0.064. Based on this we do not reject Ho. The sign of the coefficient supports the evidence that is provided in the theory available on this. The official figures state that Pakistan is heavily dependent on the aid that is given by the US

that is used to exploit the country in their own interests. This variable is equally applicable to all the developing nations, and so in case of Pakistan too, this variable is of great significance.

Reciprocal of Current account Balance

Coefficient	0.9085
Standard Error Coefficient	0.3819
T Value	2.38
P Value	0.027

The coefficient sign of the reciprocal is positive. The relationship between the current account balance and the official exchange rate is negative. But since, the variable is taken as the reciprocal in the equation, the sign is reversed but it implies the same thing. There is a negative relation between the two variables. A 1 unit increase in the current account balance will lead to an appreciation of 0.9085 units. The reciprocal of the current account balance is taken because it is the mathematical form that exits with the official exchange rate. The p-value is less than 0.05; therefore we reject the null hypothesis (Ho). It shows that it is significant in case of Pakistan.

Autonomy of the State Bank of Pakistan (1=Autonomous, 0=Otherwise)

Coefficient	0.889
Standard Error Coefficient	1.008
T Value	0.88
P Value	0.388

The coefficient of this variable is positive. It means that that when the SBP is autonomous, the currency depreciates by 0.889 units. The p value is greater than 0.05, meaning that it is not significantly related with the official exchange rate. Therefore, we do not reject Ho. The theory also supports this insignificance of the autonomy of the SBP. The State Bank of Pakistan though exists but is of little significance in case of Pakistan, since its autonomy is still a question mark. That is why the variable is showing no significance in Pakistan. The transparency and its autonomy is influenced by the political powers and the foreign powers, so the extent to which the bank is free in its operations is limited.

Exchange Rate Regime (1=Flexible, 0=Otherwise)

Coefficient	2.233
Standard Error Coefficient	1.090
T Value	2.05
P Value	0.053

The coefficient sign is positive. This is a dummy variable for the exchange rate regime. If the country is experiencing a flexible exchange rate, it is likely that the currency will depreciate. This change in the value of currency is quite prominent. That is the currency will rise by 2.233 units (suggesting depreciation). Since the p-value I slightly greater than 0.05, so we can say that the variable is slightly insignificantly. Therefore, we do not reject the null hypothesis. Throughout the 63 years of the country's establishments there have been changing governments and so the policies have also been altered. With respect to that the exchange rate regime is significant in Pakistan. With changing leaderships, the policies have also been changing, so in times when the country has flexible exchange rate regimes the volatility in the official exchange rate is high.

Military Regime (1=Military, 0=Otherwise)

Coefficient	5.0310
Standard Error Coefficient	0.7641
T Value	6.58
P Value	0.000

There is a positive e relation between the official exchange rate and the type of regime. Since, it is a dummy variable.'1' is taken for the military regime and '0' otherwise. The coefficient can be interpreted in a manner that if the country goes through a military regime, the currency depreciates by 5.0310 units. The p-value is coming out to be exactly zero, which shows its significance with the dependant variable, in Pakistan. Therefore, we reject the null hypothesis. Pakistan

has remained under the military regimes, since its independence. In periods when it is undergoing a military dictatorship, the high coefficient is showing its relevance in Pakistan. This coefficient is therefore showing high significance.

Equation 2:
Real Effective Exchange Rate = 90.7 - 1.11 current account balance $b - 0.000000 bilateral Aid+ 10781 1/Foreign Private investment + 0.000007 Narrow Money (M1)

Current Account Balance

Coefficient	-1.1059
Standard Error of Coefficient	0.8782
T Value	-1.26
P Value	0.219

The current account balance is showing a negative sign that become positive if using it as a reciprocal (in the case of equation 1). A 1 unit improvement in the current account balance leads to change of 1.1059 units, in a downward direction. This improvement leads to an appreciation in the currency, shown by a negative sign. The p-value however, is coming out to be more than 0.05; therefore we do not reject the null hypothesis and can conclude that it is not significant in relation to the REER, when we apply it to Pakistan. This variable is of little relevance here. The country is constantly facing a deficit and its relation to the real effective exchange rate is weak and not significant enough.

Bilateral Aid

Coefficient	-0.00000006
Standard Error of Coefficient	0.00000001
T Value	-3.92
P Value	0.001

The negative sign of the coefficient means that a 1 unit change in the bilateral aid will be followed by a 0.00000006 units, in an opposite direction. This negative sign means that when aid goes up, the currency depreciates. The p value is less than 0.05, so we reject Ho. With the same relevance, as explained in equation 1, bilateral aid is of great significance in Pakistan. Since, this aid is coming from the Development Assistance Committee (DAC) donors; therefore, this variable is of great significance when applied to Pakistan.

Reciprocal of Foreign Private Investment

Coefficient	10780.8
Standard Error of Coefficient	671.5
T Value	16.05
P Value	0.000

The coefficient is positive, suggesting that the relation of foreign private investment is negatively related with the real effective exchange rate. A 1 unit change in this variable will cause the currency to get altered by 10780.8 units. The p value is signifying a high significance of the variable with the dependent variable in the country. So, we reject Ho, since the p value is less than 0.05. This variable is highly important in context of Pakistan. Both in the case of the official and the real effective exchange rate, this variable this is showing a high significance.

Narrow Money (M1)

Coefficient	0.00000741
Standard Error of Coefficient	0.00000375
T Value	1.98
P Value	0.059

The variable of M1 is covering the affect of inflation, and so is supported by a positive sign as explained earlier and backed by theory as well. A 1 unit increase in the narrow money, the currency depreciates by 0.00000741 units. The p value is greater than 0.05, however this value is not depicting a much higher significance in Pakistan But still basing are

decision on the p-value we do not reject Ho. When CPI Index was checked for its significance, it resulted in a weak relationship. But when the narrow money was used to incorporate the effect of inflation, there was high significance obtained.

V. Conclusions

The study of this thesis mainly focuses on the determinants that affect the exchange rates in Pakistan. A time series data is used from 1980-2010, in order to look at the macroeconomic variables that are important in influencing the movements in the exchange rates. The models results show that majority of the variables are significantly related with the official exchange rate and the real effective exchange rate. The results show that the changes in the current account balance leads to greater change in the real effective exchange rate. In other words, the real effective exchange rate is more sensitive to a 1 unit change in the current account balance. Similarly, the real effective exchange rate is also more sensitive to any change in the bilateral aid. Inflation on the other hand is more important when looking at the official exchange rate; it is more sensitive to inflation as compared to the real effective exchange rate. The affect of the foreign private investment is more pronounced in the case of real effective exchange rate. As far as the recommendations in this regard are concerned, Pakistan is very much relied on international authorities for its survival, both domestically and on international levels. The International Monetary Fund (IMF) is there to exploit Pakistan, knowing the persistent deteriorating condition of the country. The general public theory regarding the IMF is that, that there operation and strategies are such that benefit the nations on a rather temporary basis. However, in real terms the situation gets worsened and so they need to rely even more heavily than before. This is what happening to Pakistan; therefore, it needs to be more careful when relying on the IMF. In all the IMF papers that are consulted, and in all the annual reports of the SBP, the dominance of the IMF strategies and programs is very prominent. So the country on its part needs to look for areas that need more concentration and should design policies that are free from the IMF influence to make them more relevant and healthy to be implemented. Another important recommendation is that the SBP should be given a fair degree of autonomy to intervene in the exchange rate markets, to keep it stable and smooth with the main currencies, especially the US$.

The sources of all the databases have been already mentioned. However, the access to these databases was not very easy. Though all these were available on the internet, but the research on these were improved with a passage of time. The SBP website was easily accessible and so was the database of the World Bank. But in my case, it was not much of the contribution\, since all my variable were finance based, and the WB deals with the economic and social indicators, so the variable falling in this category was obtained from it (e.g. Bilateral Aid). The rest of the data was collected from either the IMF or the SBP. Annual reports were available on the SBP website. But for that purpose, each of the separate report had to be consulted to gather data on variables. The variable on the autonomy of the SBP was very difficult to obtain. So to make it rather easily and approachable, a dummy was created, the data of the criterion on which this dummy was based however was again taken from the SBP. The topic of my thesis pertains to the monetary and the exchange rate regimes of the country, therefore in this regard all the record of all the previous years was available on its website. Since the time period considered for this paper is from 1980-2010, therefore it was honestly preferred that there was no missing data to avoid any bias. Because if that would have been the case, interpolation technique was a must use to generate data for those missing years. And that would have caused bias in the results.

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