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STATISTICAL ANALYSIS OF PAKISTANI CURRENCY REGIME BEFORE AND AFTER FLOATATION

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Abstract:
In this paper the trends of exchange rates for the foreign currency are studied yearly for Pakistan rupee. In 2000 State bank of Pakistan officially floated the rupee. In this studies the trends of the exchange rate before floating and after floating and then checks its impact on the GDP per capita of the country. Here we consider the daily data of exchange rates of Pakistani currency from 1995 to 2009. Data was analyzed from 1995 to 2000 in the first step. In the second step data from 2001 to 2009 was analyzed with the help of statistical software. And lastly the graphs, tables and the data results were interpret and a comparison is given between the two situations of fixed and floated currency. At the end it is recommended that if one want to float currency he must keep in mind that the political condition or stable and that the economy is also stable so that the system of float can perform its functions completely.

Key words:

1.1. Introduction

In this paper we studied the effect of floatation of Pakistan currency. State bank of Pakistan in 1999 decided to re-categorize Pakistan rupee interbank exchange rates. Thus the exchange rate was classified into a semi fixed pegged and a managed floating arrangement. Officially the SBP started operating on multiple exchange system in July 2000. This was a unified system in which rupee was pegged to US dollar to a certain amount but was still floated to a large extent. According to financial critics, this was a wrong decision taken because as far as the conventional thinking is concerned, it claims that a country whose political system is not stable should not float its currency as it will stop the entry of new investors in the country and at that time Pakistan was not in a stable position to float its currency but they did it. The basic rationale which an ordinary mind finds is that in a floating currency the demand and supply is corrected by the market and as Pakistan was politically unstable at that time with army ruling the country and a dictator was the Chief Executive of emergency in the state they took this action due to the automated corrective effect of the floating exchange system. At that time demand for Pakistan Rupee was low, and it was going

more and more down. When it was floated it was open to all the currencies and in the float market it would have gone down thus imports would have got expensive and the demand for local goods would have increased which would have caused an auto correction in the market. The basic aim of floating a currency is that in a free float the interbank exchange rate are determined by demand and supply of foreign exchange and interest rate is used as key monetary tool for controlling value of currency by open market operations. The basic aim of this study is to check the ups and downs of the interbank currency exchange rate after it is floated and its some effects on the growth of economy of the country as the decision was taken at a wrong time as conventional thinkers say. But before going into details of the study, a small overview of history of Pakistan Rupee, exchange rates and floating and fixed exchange rates is presented.

1.2. History of Pakistan Rupee (PKR)

Rupee has served as National currency of Pakistan since 1948. Pakistan rupee is a distinct cousin of Indian rupee. In fact, when Pakistan came into being the notes issued were Indian rupee notes with Pakistan imprinted hastily on its face. Shortly after independence state bank was incorporated that started issuing it own notes.

Pakistan rupee was converted to decimal-based currency system in 1961. before that in the imperial system the Rupee was divided into 16 anna, each anna consisted of 4 paisas. The decimal system divided it into 100 paisas and thus the imperial system of anna became obsolete.

Pakistan rupee was pegged to British pound sterling till 1971. After that it became pegged to US dollar and was devalued. In 1982 the Rupee was devalued because SBP unhitched it from US dollar and abolished the fixed rate but not completely. A new effective exchange rate was set in accordance to the trade basket in which the rupee was placed. This trade basket has members who were the trade partners of Pakistan.

In 1988, due to nuclear weapons tests, the country faced a lot of sanctions by global superpowers and thus the country has to follow a two tiered exchange rate policy.

In 1998, another step was taken and banks were than made allowed to quote exchange rate for other currencies as well. Exports were done the official exchange rate and not by the quoted. The system was reclassified to managed float. The rupee was narrowly controlled by the SBP and was informally floated.

In July 2000 the currency was fully floated, pegged within a certain band to the US dollar but the official rate was determined by demand and supply of the foreign exchange and not wholly the dollar. This free floating of the currency continues till date.

1.3. Exchange rates

An exchange rate is the rate at which one country's currency is traded or exchanged to another country's currency. Like, if you go to some foreign country or trading with foreign country, you are required to buy local currency of that country. Price of the

buying of the local currency is the exchange rate. If you are traveling to England, the exchange rate is 123 rupees, which means for every one pound you need 123 rupees to buy.

Ways by which the value of currency can be determined are two.

1.3.1. Fixed exchange rates

It is the exchange rate which the government or central banks sets and controls as the official exchange rate. In this system the exchange rate is determined by setting a rate with a major currency of the world. For maintenance of this exchange rate the central banks buys and sells other foreign exchange funds in the exchange market for the currency to which it is pegged or fixed.

For example if Pakistani Rupee is pegged to US dollar at a rate of 80. This means that State bank has to keep a certain amount of US dollars in order to maintain the rate, the state bank should have to control the money supply, inflation deflation and thus the exchange rate is kept controlled. They State bank can also adjust the official exchange rate when necessary.

1.3.2. Floating Exchange rate

It is the exchange rate which is determined by the demand and supply of the foreign exchange with the home or local currency. This rate is often termed as self correcting, as the differences in demand and supply are automatically corrected by the market.

Keeping in mind this model it can be easily explained that if the demand for a currency is low, its value will decrease, that will cause an increase in the prices of the imported goods but on the other hand it will also increase the demand for local goods as imports will go down thus at the end of the day with the increased demand of local goods the local industry will flourish and the currency will get stable automated.

2.1. Literature Review

For a region to enter into a currency union differ from that of the incentives for admission of a region into a union. The entrant starts from low transaction cost of trade with the existing union, while the already existing regions gain on trade from the potential entrant and with the potential entrant. This shows that even a country with a free float across its regions may find this attractive to make or join a currency union with other regions Bayoumi (1994).

It is also proved that a fixed exchange rate with the desire to have credibility of a non-domestic currency is vulnerable in achieving self fulfilling currency crisis state. In this type of cases the credibility of fixed peg decreases and unemployment also increases to such extent that the critical threshold is reached where the policy maker has to devalue the currency. These issues cannot stand the crisis and imposes unwanted costs on the home economy. This shows that a semi floated or fully floating currency regime is required to decrease the risk of crisis Bensaid and Jeanne (2000).

Calvo and reinhart suggests that if capital markets are highly integrated, then the floated exchange rate also lack monetary freedom. And in this scene the difference between fixed and floated currencies liberalize or are in the phase of liberalizing their capital flows. Out of a few large, base currency countires, only the countries that have not integrated their capital markets have monetary freedom. According to this opinion, floated currency will get no advantage over fixed currency and thus countries would likely to remain pegged or fixed Calvo and Reinhart (2002).

According to Shambugh, he does not agree completely with the above view and he claims that reluctance and hesitation from floating the currency can be due to other variables like inflation, currency mismatches, import export and certain other factors Shambaugh (2004).

Another research study shows that policy choice of government that faces a trade-off between monetary policy autonomy and exchange-rate stability depends on global monetary system, the greater the dominance of key currencies and the larger will be the correlation between monetary relations and trade relation of the countries, the more likely does the country with smaller currency fix its exchange rate with the dominant or large key currency. These countries do not simply fix their exchange rate but countries fix their exchange rate with key currencies or basket of key currencies in order to stabilize the country's economy Plümper and Troeger (2008).

Adjustable pegs are rightly discredited, as there is no way for them to stop massive capital flows. Defense attempted usually results in large reserve losses and increase in interest rates which weakens the banking system and causes recession of the economy. Due to this reason we are only left with hard pegs and floats of the exchange rate.

They claim that in designing an exchange rate regime, the query about credibility remains constant again and again. In this way the only option left is of hard peg which can cost too high most of the times.

For emerging economies floating seems to be better option as Chile and Brazil did so and they came out of crisis due to currency float Larrain and Velasco (2002).

According to Elhanan and Assaf, anticipated changes in the money supply have no real effects while the unanticipated changed do have real effects. They further say that no real distribution takes place when changes in the monetary policy are anticipated. They introduced several traded goods to give rise to new or emerging possibilities regarding the exchange rate dynamics. If a single good is traded deficits are associated with depreciations of the exchange rate. If there are several goods traded then deficits on current account are associated with depreciations of the real exchange rate, but they are further associated with appreciation of the exchange rate Helpman and Razin(1982).

From studying the economies of Austria, Canada and New Zealand the paper shows that a good monetary policy is required to back the considered exchange rate regime. Also economic integration may become a feature of floating regimes as the interdependence that is generated through fixed exchange rate arrangement. The end word of this study is that core differences that may be considered in deciding the monetary regime to follow may be right for one country but cannot be right for the other country Hochreiter et al.(2003).

The automated corrective behavior of floating exchange rate due to shock caused by forex reserves adjusts and restores the equilibrium itself by its dynamic change with the change in the behavior of the market Kemal and haider(2004).

3.1. Methodology of the research

This study is done by using simple regression model that is build for statistically inferring the currency regime which measures the relationship between daily changes in the cross currency rate involving a numeriare currency.

The regression model is derived from Shah et al. [2005] model which they used while they were studying the Chinese currency regime after it was floated.

The model estimated is:

$$RS.CHF = a_0 + a_1 GBP.CHF + a_2 RMB.CHF + a_3 USD.CHF + a_4 SAR.CHF + a_5 UAD.CHF$$

In our study we took the currencies on the basis of high import export with Pakistan. Switzerland Franc is taken as the numeriare, as it has no effect on Pakistan rupee because there is not a huge amount of trade relationship between the two countries and secondly the Swiss Franc is clean floating exchange rate currency.

The analysis is done with the help of Statistical package "R", version 2.10.0 R Development Core Team (2009) and the packages boot (Canty and Ripley 2005), Lmtest (Zeileis and hothorn 2002), sandvich (Zeileis 2004), strucchange (Zeileis, Leisch, Hornik, Kleiber 2002) and zoo(Zeileis and Grothendieck 2005) .

3.1.1. Regression Analysis

It is used as a statistical tool for analyzing and investigating the relationship between variables. Usually, the analyzer ascertains the causal effect of one variable on the other. To explore issues of finding causal relations the analyzer assembles data on the topic of interest and then applies regression to estimate the quantitative effect of the causal variables on the variable that they influence. The analyzer typically assesses the significance of the relationship that is the degree of confidence that real relationship is near to the estimated or not, Lindley (1987).

3.2. Data Source

The data for the exchange rates is taken from 1995 to 2009. The complete data is obtained from internet, (http://www.oanda.com/currency/historical-rates).

All the exchange rates of the currency are obtained and will be analyzed for changes in the interbank rates.

The yearly GDP per capita income and the Annual growth rate are also obtained from internet.

4.1. Analysis

The analysis is divided into three parts; firstly the data before floating is analyzed with graphs, then data after floating and then the concluding part in which the difference or information about the trends will be explained.

For this purpose we used six different country's currencies and their respective exchange rate taking Switzerland Franc as the *numeriare*. From 95 to 2000, the currency was fixed and pegged to dollar while from 2001 to 2009 it was float with a minimum pegging to dollar.

The following are the graphs of all currencies exchange rates from 1995 to 2000, that is before floating the currency, of the exchange rates with respect to the *numeriare*.

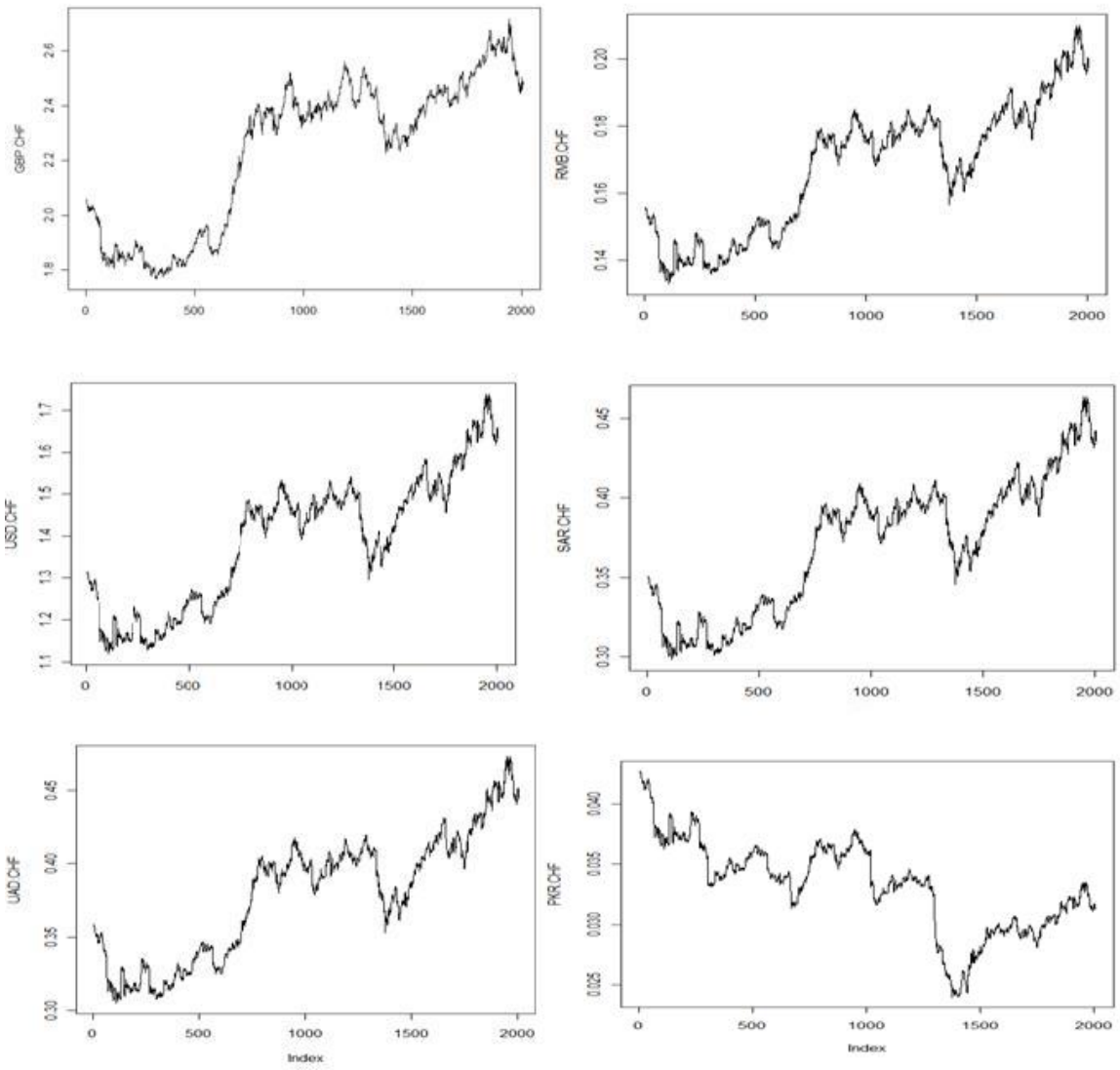


Figure 4.1. Exchange rate graph for all currencies to Swiss Franc, before Floatation of Pakistan rupee.

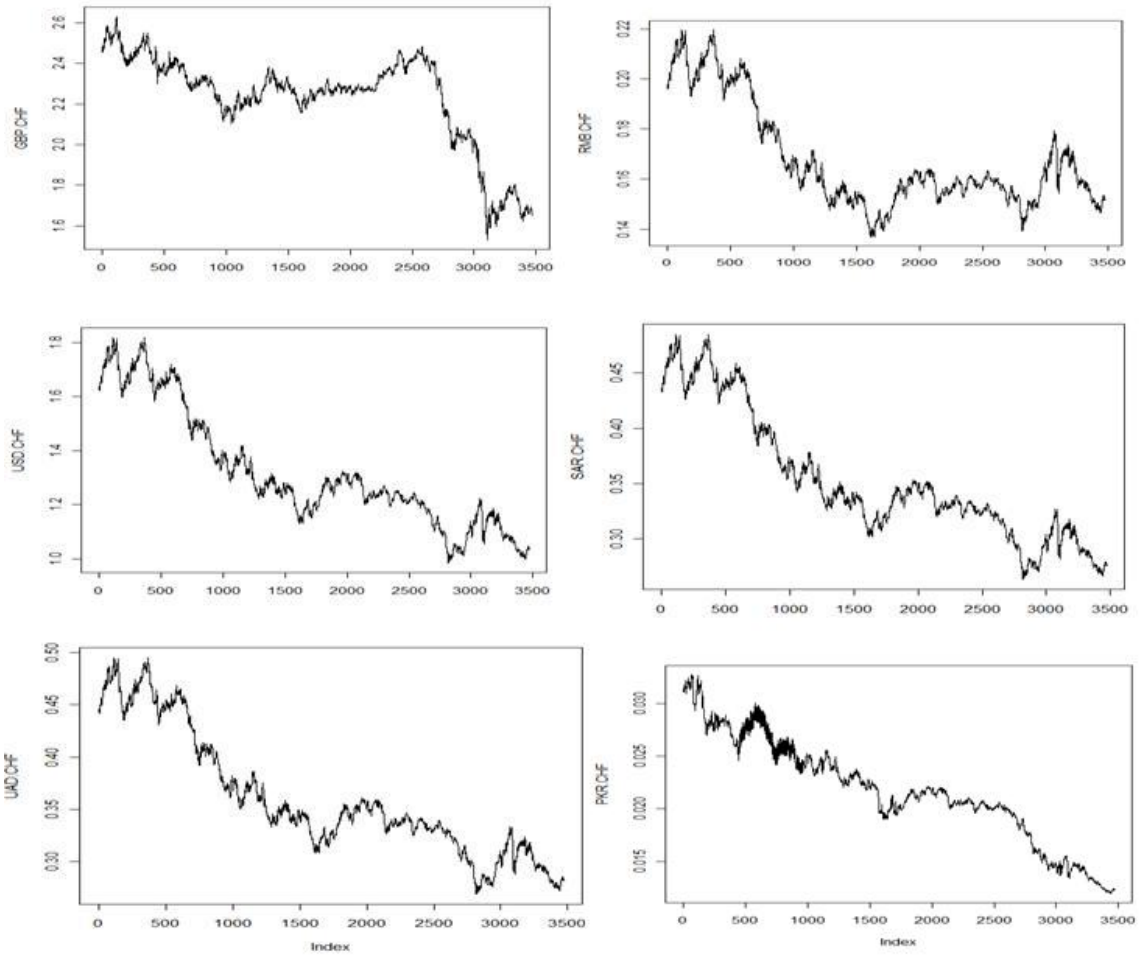


Figure 4.2. Exchange rate graph for all currencies to Swiss Franc, After Floatation of Pakistan rupee

Table 4.3.1. Descriptive Analysis of the data before float

Currency	Minimum	Quartile 1	Median	Mean	Quartile 3	Maximum	Skew ness
Pounds to Franc	1.767	1.916	2.352	2.237	2.442	2.719	-0.4374930
Yuan to Franc	0.1328	0.1489	0.1731	0.1676	0.1811	0.2102	-0.09659218
Dollar to Franc	1.119	1.242	1.434	1.391	1.499	1.740	-0.08460097
Riyal to Franc	0.2983	0.3312	:0.3823	0.3708	0.3997	0.4639	-0.0842788
Dirham to Franc	0.3046	0.3382	0.3903	0.3786	0.4082	0.4737	-0.08490463
Rupees to Franc	0.02392	0.03050	0.03361	0.03320	0.03600	0.04277	-0.2572471

Table 4.3.2. Descriptive Analysis of the Data after float

Currency	Minimum	Quartile 1	Median	Mean	Quartile 3	Maximum	Skew ness
Pounds to Franc	1.529	2.185	2.281	2.237	2.229	2.634	-1.263479
Yuan to Franc	0.1368	0.1537	0.1596	0.1676	0.1775	0.2199	1.016689
Dollar to Franc	0.984	1.178	1.259	1.322	1.462	1.821	0.7239377
Riyal to Franc	0.2631	0.3146	0.3357	0.3527	0.3898	0.4854	0.7275266
Dirham to Franc	0.2682	0.3207	0.3428	0.3601	0.3980	0.4957	0.7245725
Rupees to Franc	0.01197	0.01953	0.02160	0.02173	0.02512	0.03275	-0.0585412

4.4.0. Summary of Regression Analysis

Table 4.4.1. Regression summary table before floatation of Currency

	Estimated Standard Deviation	Error	T-value	Pr(>|t|)
(Intercept)	-0.0026778	0.0002613	-10.247	< 2e-16
Pounds to Franc	0.0031269	0.0001144	27.323	< 2e-16
Yuan to Franc	-0.1542281	0.0025716	-59.973	< 2e-16
Dollar to Franc	0.2160903	0.0452235	4.778	1.84e-06
Riyal to Franc	0.4907972	0.0536617	9.146	< 2e-16
Dirham to Franc	-1.1540750	0.1820820	-6.338	2.62e-10

Table 4.4.2. Analysis of Variance before floatation

	Df	Sum of sqaures	Mean square	F-Value	Pr(>F)
Pounds to Franc	1	0.0064681	0.0064681	899.1304	<2e-16
Yuan to Franc	1	0.0005452	0.0005452	75.7830	<2e-16
Dollar to Franc	1	1 0.0055605	0.0055605	772.9656	<2e-16
Riyal to Franc	1	1 0.0000074	0.0000074	1.0351	0.3091
Dirham to Franc	1	0.0008449	0.0008449	117.4446	<2e-16
Residuals	2003	0.0144090	0.0000072		

Table 4.4.3. Regression summary table after floatation of Currency

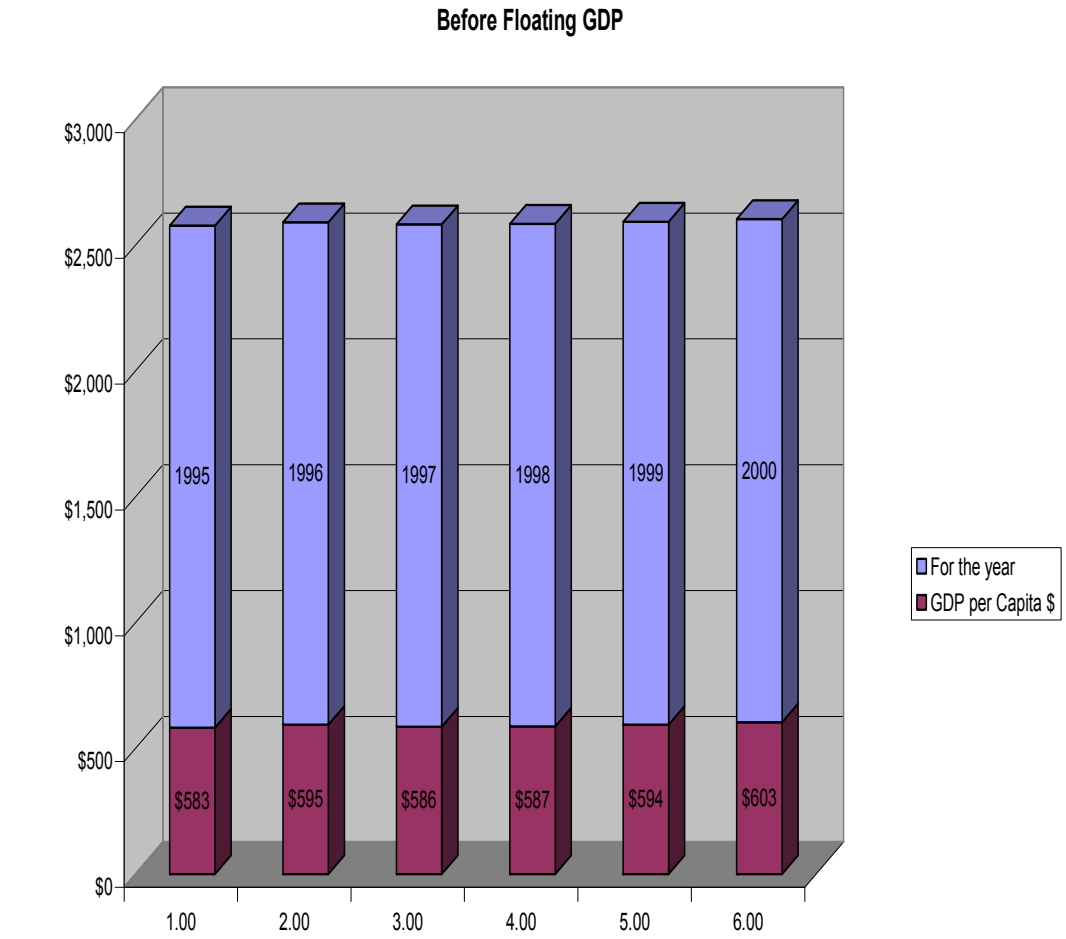
	Estimated Standard	Error	T-Value	Pr(>|t|)
Intercepts	0.0338570	0.0006796	49.818	< 2e-16
Pounds to Franc	-0.0121861	0.0009229	-13.204	< 2e-16
Yuan to Franc	-2.8974471	0.1141988	-25.372	< 2e-16
Dollar to Franc	-3.2617913	0.4443560	-7.340	3.08e-13
Riyal to Franc	0.1411747	1.2083358	0.117	0.907
Dirham to Franc	13.1937645	1.2174532	10.837	< 2e-16

Table 4.4.4. Analysis of Variance after floatation

	Df	Sum of sqaures	Mean square	F-Value	Pr(>F)
Pounds to Franc	1	0.055269	0.055269	68557.378	< 2.2e-16
Yuan to Franc	1	0.015856	0.015856	19667.735	< 2.2e-16
Dollar to Franc	1	0.010852	0.010852	13460.600	< 2.2e-16
Riyal to Franc	1	0.000041	0.000041	50.567	1.392e-12
Dirham to Franc	1	0.000032	0.000032	40.173	2.624e-10
Residuals	3464	0.002793	0.000001		

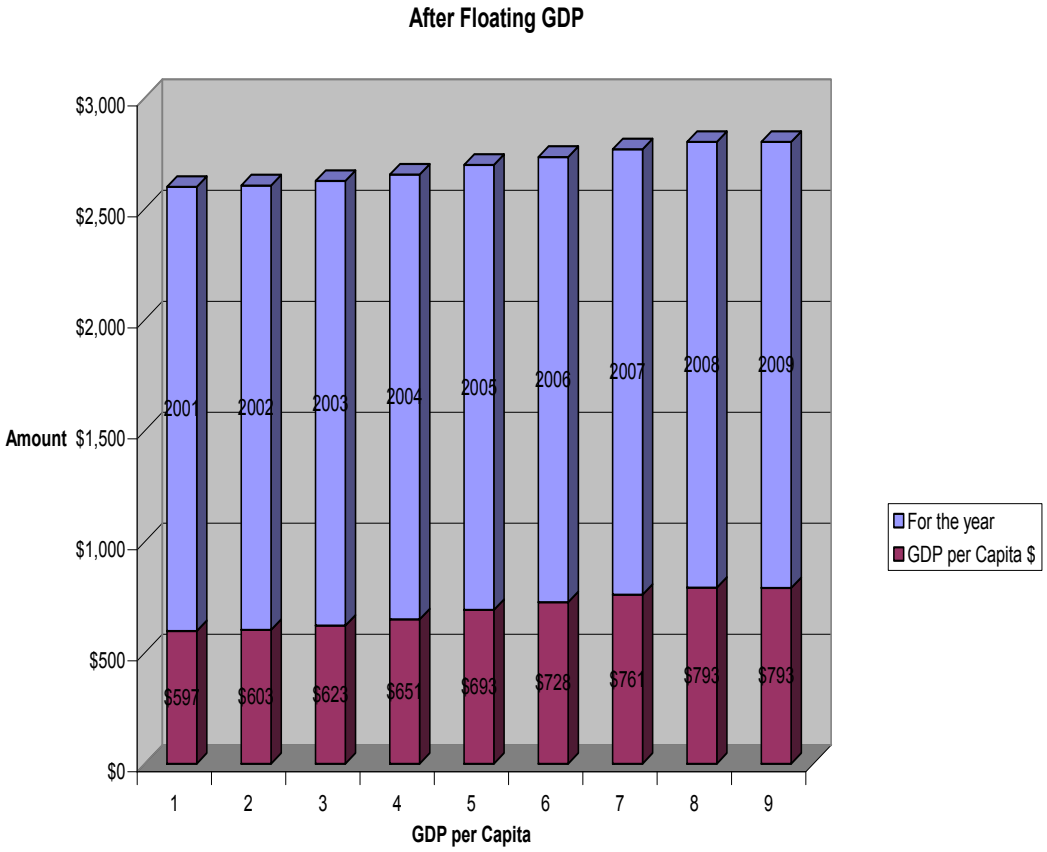
5.1. Conclusion

In graphs 5.1 and 5.2 (last figure) shows that after floatation of rupee the exchange rate from Pakistani rupee was in a down trend from which we can infer that it has some positive impact on Pakistani rupee and exchange rate has decreased with the *numeriare* currency which will also have some impact on the other currencies. When the currency was pegged to dollar the trend showed some ups and downs, from which we can infer that the fixed pegging has bad impact on the currency exchange rates and that if float is done in a politically stable environment then the currency can gain value.



	1	2	3	4	5	6
For the year	1995	1996	1997	1998	1999	2000
GDP per Capita $	$583	$595	$586	$587	$594	$603

Figure 5.1. Graph showing GDP per capita before floatation



	1	2	3	4	5	6	7	8	9
For the year	2001	2002	2003	2004	2005	2006	2007	2008	2009
GDP per Capita $	$597	$603	$623	$651	$693	$728	$761	$793	$793

Figure 5.2. Graph showing GDP per capita After floatation

The descriptive analysis shows a negative impact as the skew ness of data is negative. If we look at the data skew ness of Franc with other currencies it has completely turned out in a different way and its relation with franc has changed to positive, which from the regression has some positive impact on the Pakistan rupee as Swiss Franc is the *numeriare* currency and value of skew ness depends on it as its value changes with other currencies.

The table 4.4.1 shows the regression analysis of the data before float in which effect of exchange rate change with riyal is not significant while the other is significant. This result is due to the reason that Pakistan has higher trade relations with Saudi Arabia in importing oil from them and in return export fruits and certain other goods, as a result the exchange rate do not change significantly in that case. For the other currencies, Pakistan does not have exports to those countries that are the reason the exchange rates change with significant figures.

In table 4.4.3 the regression analysis after float is taken, that shows significant change in the exchange rates. This shows that the floatation was not done in a good time, like politically Pakistan was unstable and also after a year there was this jolt to the world

economy in the form of 9/11 world trade center attacks, also recent crisis faced by the world economy in 2008 has a big role to play in it.

The table 4.4.2 and 4.4.4 shows the f- statistic results, whose results are almost similar to that of the above regression analysis summary and that also has significant change in exchange rates in all other currencies except Riyal. And it continues the same after floatation as well as in the regression analysis.

The graph 4.5.1 shows yearly GDP per capita in dollar amounts before the currency was floated. It was increasing with a slow growth rate. Once the currency was floated and Pakistan was allowed to trade freely in the world with determination of exchange rates on the basis of supply and demand of foreign exchange and not pegged with dollar then the imports and exports slightly increased and thus the per capita GDP increased from an average 0.91% to a higher annual growth rate of 3.11% and touched the figure of 793$ for the year 2009.

The value of R-Sqaured is 48.11% before floating of currency, which shows that 48.11% of changes are caused in the Pakistan Rupee due to the changes in the exchange rates of the other currency. After floating the value is shifted to 96.7% which gives us the result that 96.7% of the change in Pakistan Rupee is due to the fluctuation of exchange rates of the five other currencies that means that the currency after floatation has positive effects on the exchange rates and that imports and exports are increased.

The overall F-Statistic of the data before and after floatation is nearing zero that means that there is no significant change in the exchange rate but only the growth rate has increased a little bit.

From the above analysis it is almost clear that the floatation of currency do effect GDP per capita of the country and if the floatation is done in a politically stable and serene environment then it is more likely to grow.

From the literature studied it is clear that floating currency is a good option as it is a self corrective system. Like if the exchange rate falls in the foreign exchange market, the foreign good become expensive and people prefer to buy home products so with the increase in demand for home products the currency again stabilizes and gains its value.

But the thing is that it needs a politically stable environment in which at least you are able to give opportunities for investors to open up new industries in the home country so that if the exchange rates drop down then we can have local industry working and fulfilling the needs of the consumer.

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