

# **INSTABILITY OF EXCHANGE RATE AND EXPORTS OF PAKISTAN**



*BY*

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**INSTABILITY OF EXCHANGE RATE AND EXPORTS OF PAKISTAN**

**A Post Graduate Thesis submitted to the Department of Business Studies as fulfillment of  
the requirement for the award of Degree of**

**Master in Business Administration**

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**INSTABILITY OF EXCHANGE RATE AND EXPORTS OF PAKISTAN**

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I would like to dedicate my thesis to my Parents because their prayers and encouragement let me to complete my research work on time.

**Dedicated to  
My Parents**

## **DECLARATION**

I **UMAR IQBAL** declare that this research work is my own effort, the material is properly identified and source of information is reliable, referenced completely and it is acknowledged according to the guideline which is provided to do this research work.

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## **Abstract**

The study investigates the impact of instability of exchange rate on exports of Pakistan, in particular estimating the association between exchange rate volatility and exports growth. Furthermore, it finds the direction of association between exchange rate volatility which is disaggregated into time groups and growth in exports. We have used monthly data from the period of July 2000 to March 2012 which is taken from IFS (International Financial Statistics). Wilcoxon signed ranks test is applied on the selected data and it is concluded that there is no significant association between exchange rate and export growth.

## Chapter 1

### INTRODUCTION

Exchange rate is the price of one currency (home) in terms of another currency (foreign). It can be quoted directly or indirectly. In a direct quotation, the price of a unit of foreign currency is expressed in terms of the domestic currency. In an indirect quotation, the price of a unit of domestic currency is expressed in terms of the foreign currency. Pakistan's direct exchange rate in terms of US dollar will be Rupees (home currency) Per Dollar (Foreign Currency) exchange rate.

Several factors contribute to the changes in exchange rate. The first and most important factor is *differential in inflation*. A Country with low inflation rate always have a higher value of their currency because of the people's purchasing power is increased. During the last half of 20<sup>th</sup> century japan, Germany, Switzerland are the only countries with low inflation rate and after sometime United States and Canada achieved low inflation rate. Besides this those countries in which inflation rate is higher, their currency depreciates day by day instead that of their trading partners. Similar is the case with Pakistan in which inflation rate is higher. Therefore, Pakistani currency is depreciating continuously.

The second factor that influences the exchange rate is the *differential in interest rate*. If the interest rate in a country is higher it offers lender a higher return and thus higher interest rate attracts the foreign capital due to which exchange rate rises. On the other hand, if a country offers a lower interest rate, it will give lender a lower return and hence lower interest rate will not attract any foreign capital due to which exchange rate is depreciated.

The third factor which affects exchange rate is the current account deficit which indicates all payments of goods and services between country and its trading partner the current account deficit is basically the balance of trade between country and its trading partner. The deficit in current account shows that a country is not earning much through exports and spending more on foreign trade. In order to pay these deficits the country then borrows capital from foreign resources. In other words, we can say when a country is in deficit and that country need foreign currency then it has to borrow capital from foreign resources. Because the foreign currency

receipts from the sales of exports are lesser that's why that country borrows capital from foreign resources. On the other hand, when the country pays back that borrowed capital then it has to use its own currency to pay them back. The best way to avoid deficit is to fulfill the foreign demand for a product through which that country receives the foreign currency from export and in that way they do not need to borrow capital from foreign resources. The main point is that the excess demand for any currency depreciates its exchange rate.

The biggest component which affects the current account deficit is *trade deficit* that is when country imports are more than their exports of goods and services. The other factor which affect current account deficit is *direct transfer* which include government allowance to foreigners and money sent back by foreigner to their home country.

Those countries which are suffering from current account deficit are usually the big spenders so these countries are considered creditworthy because they have the fear that if the borrower default on debt obligation. These countries' businesses do not borrow from their native because they don't have adequate money saved in regional or local bank. Businesses in that type of country cannot expend unless they borrow from foreigners which leads to credit worthiness. If a country spends too much money without thinking about the results than other countries do not lend to it unless it look like that it will repay the loan.

Another factor which affects the exchange rate is *public debt*. Various countries provide deficit financing on a large scale for the public projects or any governmental funds which stimulates our domestic economy because any development in a country or starting a new project have an effect on domestic economy. But there is big problem or issue regarding this, a country where public debt is more it will be less attractive to investors and the investors avoid to invest in that country. When a country suffers from large debt then it encourages the higher inflation. And when inflation is higher, then its currency depreciates day by day which affects the foreign exchange.

In worst scenario government can print the money to pay back its debts. But if government prints money, it will increase the money supply and due to which inflation will increase. By increasing money supply or through selling domestic bonds if a government is unable to reduce deficit so then that government have to increase supply of securities sales to foreigners. But again large debt is worrisome for a country because of the greater risk of default the foreigners do not show

any interest to buy the securities. From this, we came to know that debt rating is crucial determinant of exchange rate.

Apart from aforementioned factors, political stability and economic performance of a country can also affect exchange rate in the long as well as in the short run. The foreign investors only invest their capital in those countries which are stable and have strong economic performance rather than to invest their capital in unstable countries having weak economic performance. As investors do not invest in those countries due to instability and weak economic performance then obviously their exchange rate will depreciate. Therefore, a country's political stability and strong economic performance is of crucial importance.

Exchange rate can be measured in nominal terms as well as in the real terms. Nominal exchange rate is the number of unit of currency it takes to buy one US dollar (Rs./\$). In the sense of Pakistan how many units of Pakistani rupees is needed to buy one US dollar. While, real exchange rate is the value of one country's product in terms of another country, i.e., how many Pakistani product it takes to buy an American product. Suppose that Pakistani product is semi-conductor chip and American product is an American bear so in terms of real exchange rate we can say how many Pakistani semi-conductor chips it takes to buy an American bear to answer this question we need three type of information.

Real exchange rate can be measured in numerous ways. The most general way is to divide the nominal exchange rate by the ratio of foreign to domestic price level, i.e.,  $(RER = NER * (P_f / P_d))$ . Suppose if there is an *increase in the US price level* the real exchange rate will increase even though nominal rate is not changed. This shows that Pakistan will face real depreciation. If there is *nominal depreciation* in Pakistani rupee without change in foreign price level, It also leads to real depreciation. If the *price level rises* in Pakistan but there is no nominal depreciation and no change in the US price this new price level reflects a real appreciation for Pakistan.

Movements in exchange rate plays important role in making decision among the domestically produced goods and imported goods. Depreciation in exchange rate makes imported goods expensive and vice versa. Moreover, traders make their decisions based on the movement in exchange rate; appreciation in currency makes home goods expensive while foreign goods

cheaper and vice versa. Therefore, depreciation may lead to improvement in trade balance and vice versa.

Volatility in exchange rate plays important role in shaping the international trade. Highly volatility in exchange rate makes trader difficult to decide the proper time to imports as well as exports. Apart from exceptions, volatility in exchange rate in Pakistan could possibly favor exporters as well as importers.

Various empirical and theoretical studies are conducted to investigate whether exchange rate volatility influence trade and it is widely believed that if exchange rate is increased it affects the growth of foreign trade. In 1973, after the breakdown of Bretton woods system of fixed exchange rate and when floating exchange rate is adopted, various effects of exchange rate volatility are investigated both theoretically and empirically. Exchange rate volatility can be explained as risk associated with the unpredictable flow of exchange rate. Economics fundamental or the foundation of economics like inflation rate, interest rate which had become more volatile in 1970 and early 1980s are the causes of exchange rate volatility. When floating exchange rate is adopted in 1973 the floating exchange rate shows the higher volatility and uncertainty in exchange rate that led researcher to investigate the nature of such movements that affect the international trade. Cote's (1994) concludes from the survey of empirical literature that if volatility in exchange rate is increased it will obviously reduce level of trade. There are some theoretical analyses conducted by economist on exchange rate volatility and international trade according to some other economist and Hooper and Kohlhagen (1978) higher exchange rate volatility reduce foreign trade which ultimately increases the cost of risk averse traders .the volatile exchange rate create uncertainty about future profit and hence result in reducing the benefit of international trade.

### **1.1.Research questions**

- What is the association between exchange rate volatility and export growth?
- What is the nature of relationship between exchange rate volatility and export growth?

## **1.2.Problem statement**

In the view of economic theory exchange rate volatility can influence the export growth.in this regard this study investigates whether this association exist or not and if it does than what is the nature of this association.

## **1.3.Significance of the study**

Significance of the study lie in the underlying theory of exchange rate volatility this variability in exchange rate effect the export growth. The literature shows that it may have positive impact which means that it may reinforce exports growth while some studies reveals that it may decelerate export growth while some studies shows it have negative effect on export growth. So in view of above there is need to further explore this association because it will ultimately effect the trade balance of Pakistan which is integral part of open macro economy.in the literature different techniques are used to know the effect of exchange rate variability on export growth but we are using here Non Parametric test.

## **1.4.Objective of the Study**

The main objective is to find whether instability of exchange rate affects the exports of Pakistan if so then in what direction, in particular

- Estimating the association between exchange rate volatility and export growth.
- To find the direction of the association between exchange rate volatility disaggregated in to time groups and growth in exports.

## **1.5.Organization of the Study**

Following the first Chapter, Chapter 2 contains Literature Review in which we tried to explain the studies do far has been done in the light of our objectives. Chapter 3 explains the data, its limitations and descriptive analysis. Chapter 4 explains methodology we adopted for the estimation. Finally, Chapter 5 explores the estimation results and interpretations accompanied with the conclusion of the study.



## Chapter 2

### LITERATURE REVIEW

As discussed earlier, the previous studies on exchange rate volatility has strived to explore its impact on the exports but largely the nature of the results was mixed. It could be due to the inefficient data selection or due to the improper methodology. In the light of this there is dire need to explore the scenario in some new way. In this regard, we have a brief review of part literature on the subject matter.

The term exchange rate is the macroeconomics variable and exchange rate plays an important role in trade moreover the volatility in exchange rate create difficulties for the traders or investors which in turn slow down the process of trade so the investor avoid to invest in a country having high exchange rate volatility (Kemal, 2005).

Exchange rate volatility can be describe as the risk linked with unexpected movements in the exchange rate and the sources of exchange rate volatility which led to become more volatile exchange rate in 1980s and early 1990 are inflation rate, interest rate, and balance of payments. (Ozturk, 2006).

Exchange rate shows that how much unit of one country currency (foreign currency) can be purchased with one unit of domestic currency (home currency) or we can say that exchange rate is the conversion factor while on the other hand exchange rate volatility shows that exchange rate decide on demand and supply of one nations currency. (Javed & Farooq, 2009).

Higher exchange rate volatility tends to reduce the trade because higher exchange rate volatility produce uncertainty about the future profit of exports, but in a short run the firm can reduce uncertainty by using forward market and by managing time of payments, but in a long run a firm investment decision can be effected indirectly by exchange rate volatility according to this traders are risk averse while hedging is impossible and expensive therefore it can be said that exchange rate volatility reduce profit from exports and on the other hand according to some studies risk averse traders always favor foreign and domestic trade when there is margin in it if

the profit is less the do not respond to foreign trade so this means exchange rate volatility impose cost on risk averse traders. (Mustafa & Nishat, 2004).

Exchange rates is fundamentally the price of one currency in terms of another currency which is driven by power of demand and supply and the factor which are contributing to exchange rate volatility are inflation ,growth rate, and imports and exports (Parveen, Khan, & Ismail, 2012).

Exchange rate is the one of the most important variable in an open economy it effects macroeconomics variables like inflation, trade, FDI, GDP and international reserves furthermore economist claims that increase in exchange rate brings competitive advantage in international trade that is when a country exchange rate is increased it will result in domestic exports become cheap to its trading partner which in turn result in increasing the international demand of exports and decrease in imports. (Khan, Sattar, & Rehman, 2012).

The major determinant of exports is exchange rate which determine international competitiveness of a country but higher exchange rate volatility make the country less competitive in the international market on the other hand exports of the country influence the balance of payments, economic growth and employment of the country since it means that fluctuations in export earnings produce uncertainty in economy and it in turn effect the investment decisions (Yusoff & Sabit, 2014).

The depreciation of currency usually means decrease in the value of the home currency in respect of gold and foreign currency countries lead off the depreciation to reduce the gap of deficit external balances because according to economist the reduction in the value of the currency is beneficial for a nation because weaker currency boost exports the result of which is increase in employment and economic growth (Shaheen, 2013).

Volatility can be describe as the uncertainty or instability and the measure of risk either in asset pricing, risk management, or option pricing, and present a clear specimen of risk measurement which could be helpful in various economic decisions. While volatility in exchange rate can be describe uncertainty accrue in international transection such as goods and financial assets while exchange rate represents unpredictable changes in demand and supply of foreign and domestic currencies, so exchange rate volatility indicate the expected changes in the money supply, interest rates and income. (Azid, Jamil, & Kausur, 2005)

The key reasons that cause exchange rate volatility has been explained, central bank has played important role in controlling inflation in recent years, but has been partially successful in controlling exchange rate volatility although it is observed that financial markets shifts were major reason of this volatility but the empirical evidences was limited in this regard it has been discussed that economist are having trouble in explaining effect of exchange rate volatility on welfare of the people whether it is flexible or fixed exchange rate regime macroeconomics performance is not effected in terms of its effect on aggregate consumption so in contrast to the European mainstream exchange rate volatility is not one worthwhile factor having effect on international macroeconomics policy (Rogoff, 1999).

To know the world trade effect, the constant market share analysis of export growth is used and also to know the market distribution effect the commodity composition effect and competitiveness effect and it is investigated that Pakistan market has maintain the export share in the world market and it is further investigated that competitiveness of Pakistani exports has been improved in the study period 1984-85–1988-89 and 1988-89–1992-93 and market distribution of Pakistani exports is also improved. Nevertheless the concentration of Pakistani exports in to traditional commodities whose world demand stayed slow has compensated the for the positive contribution of effective market contribution and the improved competitive strengths the restructuring of exports from traditional to non-traditional and the search for the fast growing market or development in economic or political environment or by increasing the variety of exports can increase exports. (Mahmood & Akhtar, 1996)

Exchange rate volatility is beneficial in improving the trade balance as exchange rate instability effect the exports positively and imports negatively due to real devaluation by reducing imports and increasing the exports, imports plays an important role in expanding the exports the imports can be in the form of raw material and machinery which is used in the manufacturing sector the imports of the consumer goods is directly related with exports while imports of capital goods effect the exports with two period lags because firstly setup the machinery and then start the production and after some time it will produce product for the exports therefore it can be said that agriculture and manufacturing variables have positive impact on exports, growth instability have a significant impact on imports, growth instability is the sudden increase or decrease in the growth an increase in a country growth rate have the positive effect on exports evenly if growth

is high but if they do not have the resources to finance so either they have to borrow from other resources for imports or to remove the imports. (Kemal, 2005).

Exchange rate has a strong effect on volume of exports and imports and it also influences the decisions of policy makers while exchange rate also affects balance of payments, reserve money, allocation of manufacturing goods while exchange rate volatility is beneficial for the investors (domestic) to invest in foreign currency by doing so the investor can gain higher profit and which in turn affects domestic currency the domestic currency loses its value while foreign currency gains the value furthermore exchange rate volatility has also strong influences on the prices of imports, exports, reserve money, manufacturing production and the growth rate of the country further the appreciation in the exchange rate impacts exports, reserve money, and manufacturing products positively while it affects imports negatively on the other hand the exchange rate depreciation affects exports, reserve money, manufacturing production negatively while it affects imports positively. (Javed & Farooq, 2009).

The exchange rate volatility is the originator of exchange rate risk and has an effect on volume of trade higher exchange rate volatility reduces the foreign trade and it produces higher cost for risk averse traders the reason for this is that payment is not made until the actual delivery of transaction in future while exchange rate is agreed at the time of contract and this in turn reduces the benefits of international trade because changes in exchange rate are unpredictable which create uncertainty of future profit the exchange rate risk of all countries cannot be hedged the reason for this is that forward market is not accessible to all traders and even if hedging in the forward market is possible there are limitations and costs because a contract which is larger in size while its maturity is short it is inconvenient to reach your target on time or in other words it is difficult to plan the timing and the magnitude of international transaction to capture the benefit of forward market. (Ozturk, 2006).

Exchange rate volatility will affect exports negatively when exports are invoiced in the importer's currency and exchange rate volatility will affect the exports positively if exports are invoiced in the exporter currency (Qian & Varangis, 1994).

Exchange rate affects the export positively and imports negatively, but imports are significant because in small developing countries importers are more risk averse than developing countries

because of less resources to reduce the cost of exchange rate while exports are insignificant because Pakistan is not only the country where instability is a major problem furthermore real devaluation makes local product cheaper and hence export rise and import reduces which also help in improving trade balance. The import of consumer goods are related with export while import of capital good required two period therefore it can be said that agriculture and manufacturing variable have positive impact on exports and furthermore growth rate have the significant impact on imports. (Kemal, 2005).

There is positive relationship between exchange rate volatility and microeconomics variables. The manufacturing product and economic growth show positive relationship that is one percent rise in manufacturing product will increase economic growth by thirty-two percent while reserve money have negative effect on economic growth because an increase in reserve money decreases economic growth further one percent increase in imports will bring 0.2 percent decrease in economic growth, furthermore exchange rate volatility, reserve money, exports have the long run positive relationship with economic growth. (Javed & Farooq, 2009).

Both in a short term and long run exchange rate volatility has negative and significant effect on volume of trade in UK, US, Australia, Bangladesh where volume of trade is consistent and less volatile with Pakistan furthermore the relationship between India and Pakistan is observed only in long run perspective while in Malaysia and new Zealand no empirical relation is observed. However estimation of some countries shows significant results while other shows insignificant results the reason is that export and imports of Pakistan is mainly depend on dollar because Pakistan economy is dollar economy. (Mustafa & Nishat, 2004).

Inflation is one of the most important factor that contributes to variation in exchange rate so it clearly indicates that inflation have negative effect on exchange rate because increase in inflation reduce the value of currency, the second important factor which effect exchange rate is economic growth while the third factor which effect the exchange rate is imports and exports furthermore it is recommend that to integrate fiscal policy with monetary policy and then make effective association of both these policy with trade policy (Parveen, Khan, & Ismail, 2012).

Positive effect of exchange rate volatility on exports could exist since impact of exchange rate volatility depend on degree of risk aversion because risk averse individual might worry about

worst possible outcome and when risk increases the will export more to avoid the drastic decline in there revenue, and if exchange rate volatility have the negative effect on international trade it should be through another mechanisms that is political economy effect of exchange rate (Grauwe, 1988).

High or low fluctuation in exchange rate have a significant long run impact on real exports of a country these high or low fluctuation in exchange rate is due to the unexpected factor as suggested by some models that cannot be hedge to the extent thus ultimately effect exporter behavior further policy makers should consider volatility for some countries but not for all countries when implementing the economic policy especially in case of Cyprus and Croatia because it is found that exchange rate volatility have positive effect on exports of Cyprus and Croatia (Serenis & Tsounis, 2014).

Fluctuation or movements in the exchange rate of Pakistan with its major trading partner will definitely affect the exports and will harm the economy. There is need to minimize this uncertainty for exporters if a country want a real economic development because this uncertainty leads to reduce the exports of Pakistan which have the strong influences on economy of Pakistan. It is suggested that there should be stabilization strategy to minimize or control the exchange rate uncertainty our central bank must have to take step to minimize as possible the volatility in exchange rate and to control the monetary policy to save exporter from loss which will affect the economy in beneficial way (Bashir, Hassan, Naseer, & Afzal, 2012).

Impact of exchange rate volatility on Malaysia exports is ambiguous and depends on country to country, exchange rate volatility have negative effect on US while in case of japan exchange rate volatility have positive effect the negative effect of exchange rate volatility on export between Malaysia and US is may be due to the lack of hedging facility in Malaysia financial market due to which trade is reduced because of the cost of risk is increased as the firm do not have means of hedging facility in financial market. This financial market helps the exporter to hedge the risk against any loss due to exchange rate volatility thus it may be helpful in eliminating risk through hedging. On the other hand exchange rate volatility and trade shows positive relationship between Malaysia and japan this is because exchange rate volatility reduces the future profitability so the firm in turn increases the production and sales that resulting in large amount of trade to compensate. Malaysia exports to UK and Singapore is not effected by exchange rate

volatility this is because trade relationship of UK and Singapore is from long time ago before independency therefore relationship with these countries is considered unique and beyond the factor of exchange rate because high level of exports to these two countries from Malaysia is accrue usually from their own firms which is in Malaysia (Zakaria, 2013). Exchange rate volatility have a negative and significant impact on exports and the variables such as volume of world trade, foreign prices, and domestic prices shows positive and significant impact on exports of Pakistan both in a short run and in a long run.it indicates that world economic activity have beneficial effect on Pakistani exports while the study further suggest that for promoting exports of Pakistan stable exchange rate should be effective (Aqeel & Nishat, 2006). If exchange rate volatility rises by 1 percent the exports fall by 0.21 percent and if real exchange rate depreciate by one percent exports will increase by 1.12 percent and when the GDP of china increase 1 percent the ASEAN countries to china increases by 1.86 percent (Yusoff & Sabit, 2014). Unidirectional and bidirectional causality relationship does not found between changes is exchange rate and domestic prices and money supply effect the domestic prices this show that imported inflation is not valid in case of Pakistan but control on domestic money supply and effort of promoting domestic economic activity is the major determinant of domestic prices (Siddiqui & Akhtar, 1999). If Pakistan employee US dollar as a base currency with its trading partner the exchange rate volatility will discourage both imports and exports in comparison demand function for both exports and imports remains unaffected by exchange rate volatility if Pakistan trade with its trading partner using bilateral exchange rate that is valued in domestic currency terms it indicate Pakistan should go for direct domestic currency when trading with middle and low income countries (Khan, Azim, & Syed, 2014).Regression analysis shows that Pakistan rupees devalue against the US dollar it will have positive impact on the exports of a country and it in turn boost up the exports of a country the reason for this is that due to devalue of Pakistan rupees the imports become expensive for a country in the history of Pakistan there is only event in which Pakistan currency appreciate against dollar and after that Pakistan rupees is depreciating continuously which in turn help in boost up the country exports in temporary way because on the other side if we see the price level is increase in the country and due to which purchasing power of people is reduce it leads to inflation thus it take away the benefit of boost up the exports.it is realized that whatever the reason is but when currency become devalue it result

in weakening of the economy instead of other countries and further more if the currency devalue the investor thinks again and again whether to invest in this country or not (Shaheen, 2013).

Considered two hypothesis that whether exchange rate volatility depress manufacturing production or whether the exchange rate volatility promote manufacturing production the result shows that it has positive impact on manufacturing production but insignificant and it do not support that excess volatility or changed in exchange rate regime have evident effect on the manufacturing production (Azid, Jamil, & Kausur, 2005). Exchange rate volatility has a significant negative impact on the volume of exports in each of the G-7 countries. If markets participants are risk averse, these results imply that exchange rate uncertainty causes them to reduce their activities, change prices, or shift sources of demand and supply in order to minimize their exposure to the effects of exchange rate volatility. This, in turn, can change the distribution of output across many sectors in these countries (Chowdhury, 1993). Exchange rate depress trade the impact of exchange-rate uncertainty on the demand for real exports has been examined It has been shown that exchange-rate uncertainty has a negative effect on U.S. real exports and, therefore, may have significant effects on the allocation of resources (Arize, 1995). There is positive impact of exchange rate volatility on the GDP, FDI, trade openness, is need to be strengthen by the government by improving the exports base of the country and reduce foreign imports of raw material in manufacturing sector which in turn improve the trade balance moreover it is crucial for a country to diversify its revenue base, furthermore exchange rate volatility have a negative impact on inflationary rate in a country. In addition to this, the country needs to improve their local production of commodities, so as to exhale from the inflationary pressure occasioned by the exchange rate volatility. (Danmola, 2013).

Based on the evidences of the previous literature we have come to conclude that the effect of exchange rate volatility on exports is ambiguous because various results of the previous studies show that exchange rates have positive effect on exports while few studies show that exchange rate volatility has negative effect on exports. This could be due to different techniques, different samples periods and different methodology. Hence, this study is aimed to bridge this gap to enrich the literature.



## Chapter 3

### DATA AND DESCRIPTIVE ANALYSIS

Monthly data are taken from July 2000 to March 2012 from International financial statistics (IFS) on nominal exchange rate, consumer prices of Pakistan, and consumer prices of US and exports of Pakistan. Real exchange rate is calculated by using the formula;

$$\left( RER = NER * \left( \frac{P_f}{P_d} \right) \right).$$

Where RER represents Real exchange rate, NER represents Nominal exchange rate, Pf represents consumer prices of US and Pd represents consumer prices of Pakistan.

Similarly the exports of Pakistan where not given in term of dollars we divide Exports in rupees by the nominal exchange rate to get exports in dollars.

Change in the nominal exchange rate and change in the real exchange rate for each month is calculated by using the following formula;

#### 3.1. Changes in Nominal Exchange Rate

Nominal devaluation= (Nominal exchange rate of Pakistan of the 1<sup>st</sup> month/Nominal exchange rate of Pakistan for the 2<sup>nd</sup> month -1)\*100

#### 3.2. Changes in Real Exchange Rate

Real devaluation= (Real exchange rate of Pakistan of the 1<sup>st</sup> month/Real exchange rate of Pakistan for the 2<sup>nd</sup> month -1)\*100

Moreover, export growth in terms of dollar and export growth in terms of rupees is calculated using the growth rate formula;

Export growth in Dollars= (Pakistan exports in terms of \$ of 2<sup>nd</sup> month/Pakistan exports in \$ of 1<sup>st</sup> month -1)\*100.

Export growth in Rupees= (Pakistan exports in terms of RS of 2<sup>nd</sup> month/Pakistan exports in RS of 1<sup>st</sup> month -1)\*100.

Several ways are given in the literature to find out the variability in exchange rate. Among them GARCH variance is known the best (Kemal, 2005). However, moving standard deviation is also considered as a good measure of variability in exchange rates. We have calculated 3 months as well as 6 months moving standard deviation for both the real exchange rate as well as the nominal exchange rate to check the variability.

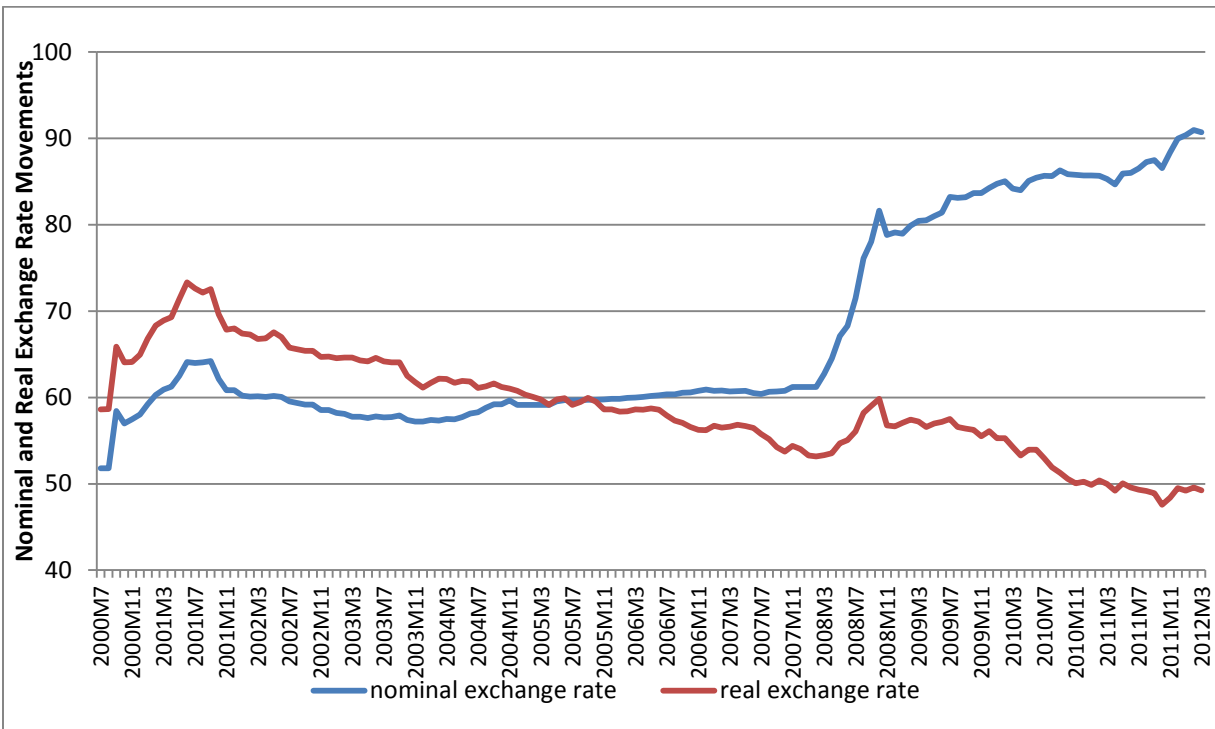
### **3.3. Descriptive Analysis**

In this section we discuss data movements and try to analyze the link between the volatility in exchange rate and exports growth. Mean, standard deviation, coefficient of variance, maximum and minimum values are calculated, the mean shows simply the average which shows the total volatility per each month in the data, the standard deviation is simply the measure of dispersion if the standard deviation is greater it shows that variability is also greater and greater is the risk and if the standard deviation is the less it shows that variability is less thus the risk is also less, while coefficient of variance is simply the ratio of standard deviation to the mean the larger coefficient of variance shows that larger is the relative risk while if the coefficient of variance is less it shows that relative risk is less in more simple words the coefficient of variance shows that how much volatility you are expecting in comparison of your amount of return.

The graph shows the overall fluctuation in the real exchange rate as well as in the nominal exchange rate. It indicates that from the period of July 2000 till September 2001 depreciation in the real exchange rate which means that if the Pakistan currency suffers from the real depreciation it will need more of its devalued product to buy foreign product and on average real exchange rate was 67.44. The real exchange rate was continuously appreciating from October 2001 to April 2008 on average real exchange rate calculated period is 60.63 this appreciation in real exchange rate since in this period of time when the real exchange rate appreciates the product in Pakistan gain the value to buy the foreign product and if see more preciously toward each month in this period these months showing the higher stability in this period thus this was a good period for the exporters, Furthermore the real exchange rate shows again the depreciation from June 2008 to October 2008 and on average real exchange is 57.64, in contrast if we proceed to next months from November 2008 till march 2012 there is continuous appreciation in the real exchange rate the on average real exchange rate in this period is 52.85.

## Graph1

**Figure 1: Nominal and Real Exchange Rate Movements**



Nominal exchange rate also shows higher amount of fluctuation so we will analyze this by considering different periods in these months, the graph shows the fluctuation in the nominal exchange rate and it indicates the depreciation in the nominal exchange rate from the period July 2000 to September 2001 the on average nominal exchange rate for each month in this period is 59.67 which shows that in this period the currency become weaken instead of US which is a great benefit for exporters to gain profit, the graph also indicate that nominal exchange rate is continuously appreciating from the October 2001 to July 2004 the graph shows the nominal exchange rate appreciation, and on average nominal exchange rate is 58.65 the appreciation in the nominal exchange rate is risky for the exporters. If we proceed to next period from August 2004 till march 2012 the graph show continuously depreciation in the nominal exchange rate and showing variation in the exchange rate but if we see more precisely some months show higher stability in nominal exchange rate, Furthermore the graph shows the depreciation in the nominal exchange rate from august 2004 to march 2012 while less volatile period is from September 2004 February 2008 in which nominal exchange rate is approx. stable and have the less

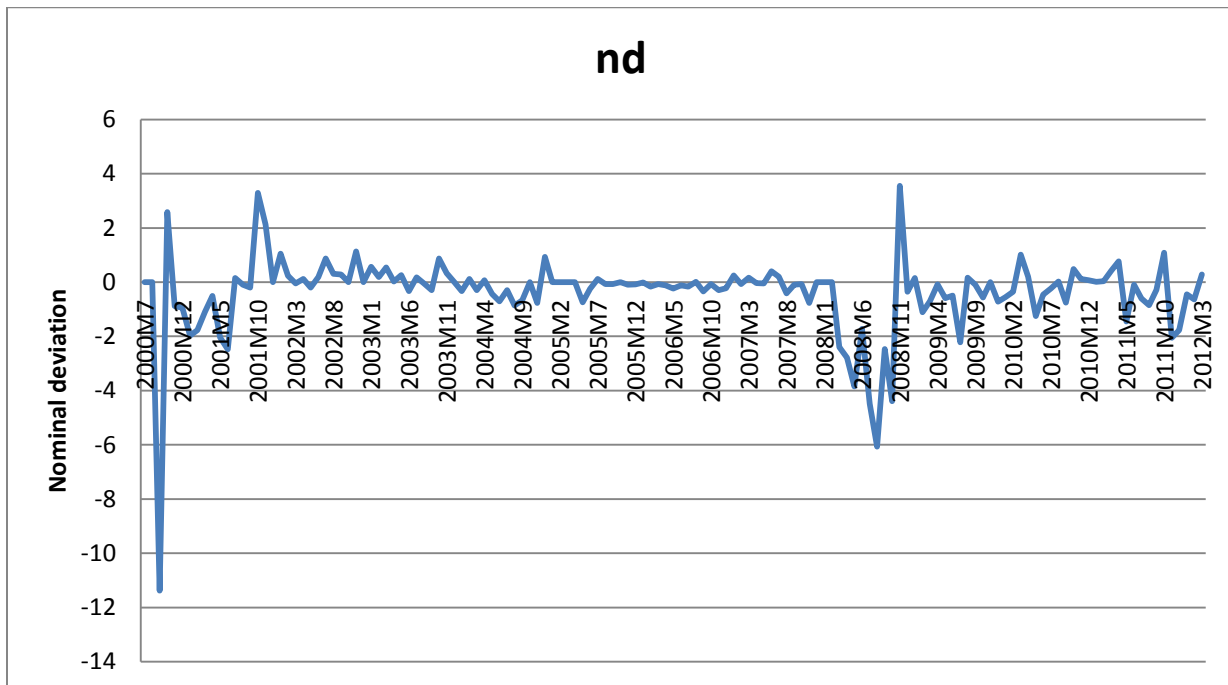
fluctuation while after this period the nominal exchange rate immediately fluctuate and shows the depreciation in the nominal exchange rate while the on average nominal exchange rate for this period is 72.08 this due to higher fluctuation in this period.

While looking at the graph a question may arise that why nominal exchange rate and the real exchange rate is moving in opposite direction to one another. This implies that real exchange rate does not remain constant and value of nominal exchange rate did not change according to the prices. Thus we can say that PPP does not hold even in the long run. Moreover, it also implies that even though nominal exchange rate shows continuous devaluation but the devaluation in the entire period was not real, except for some months.

The Graph 2 shows overall variation in nominal exchange rate. During July 2000 to December 2003 per month average devaluation was -0.22 while devaluation between January 2004 to the December 2007 was -0.13. However, steep curve shows that average nominal deviation between January 2008 to March 2012 was -0.78 which was higher than the other two episodes.

**Graph 2**

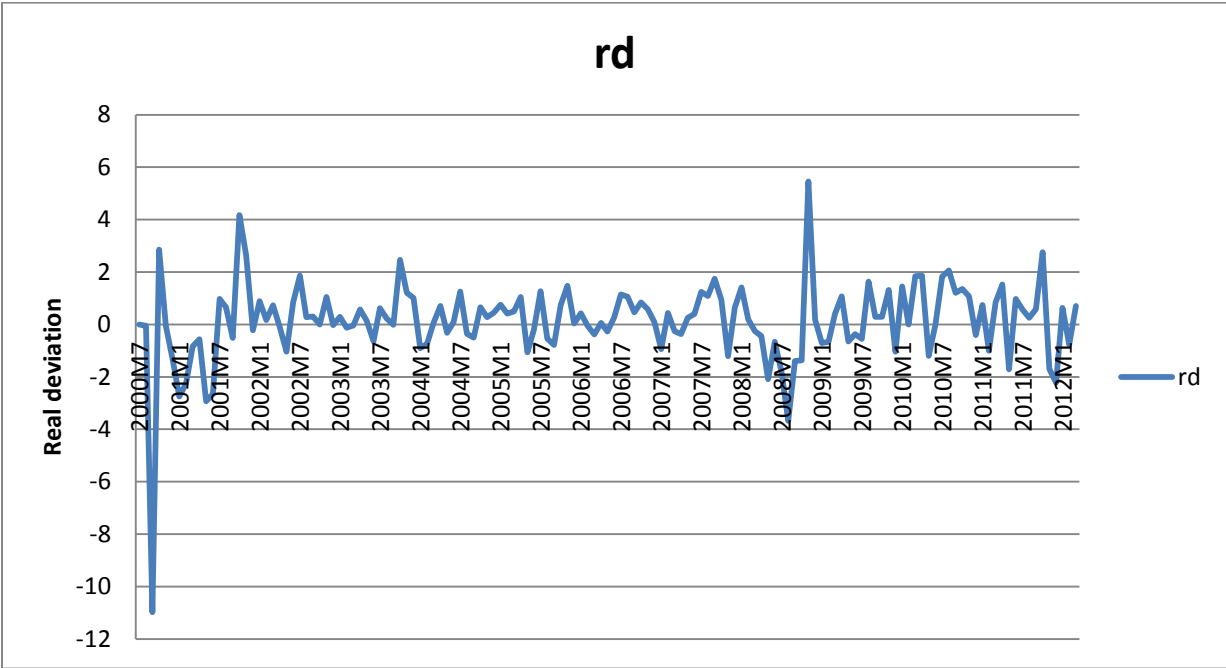
**Figure 2: Nominal Devaluation**



The graph 3 shows real exchange rate devaluation. From July 2000 till October 2008 the average devaluation in the real exchange rate was -0.00735. Average real devaluation during November 2008 to March 2012 was 0.48 which is comparatively more than the variation in period of July 2000 till October 2008 thus variation in last months in real exchange rate was greater while the graph indicate in September 2000 real exchange rate depreciation was -10.97 and in the month of November 2008 the variation is 5.45 which indicate real appreciation.

**Graph 3**

**Figure 3: Real Devaluation**

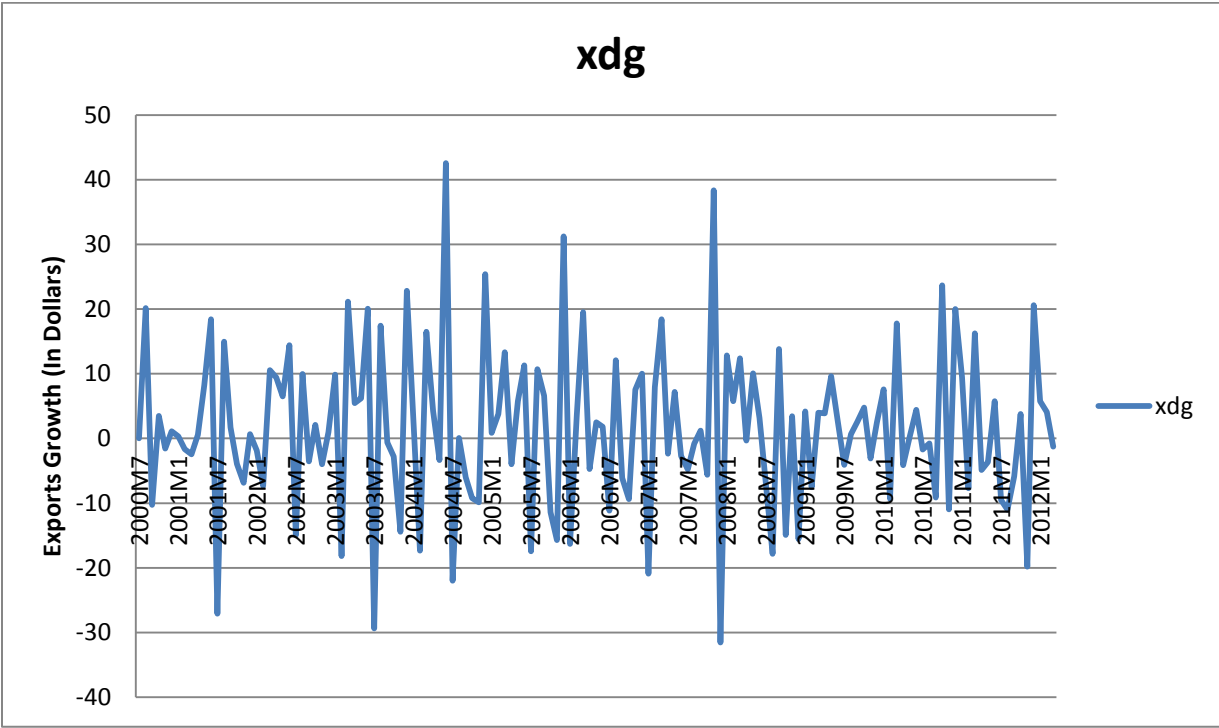


The graph 4 shows the overall per month growth in dollars from the period July 2000 till the march 2012, if we see the graph it clearly indicates from the month July of 2000 to May 2004 the growth in dollars are approx. stable, as we see graph the graph clearly indicate not high fluctuation, the average growth calculated for this period was 1.71, furthermore the graph indicates the higher fluctuation in the June 2004 till December 2007 in this period of time the graph shows higher fluctuation in export growth in terms of dollars while on average the export growth in dollars is 1.61 which is relatively less than the previous period calculated average for export in dollars, the graph shows higher fluctuation as if we see the months in every month in period of December 2007 till September 2010 shows rapid fluctuation which will result in less

growth that is why on average growth in dollars calculated for this period is 0.93 which is relatively less from the previous periods calculated, the remaining period from October 2010 till march 2012 shows some stability in the growth where the growth in dollars on average is higher in this period than remaining all the periods this is because in this period the fluctuation in exchange rate is not very more that's why the growth is higher in this period, so it is concluded from this graph that the higher fluctuation in exchange rate effect the export growth in dollars as we see the on average basis for different period of time but the graph indicate that in which period the fluctuation is less the growth rate is higher, as we have analyze different periods month July of 2000 to May 2004 indicates average of 1.71, the June 2004 till December 2007 indicates average of 1.61, December 2007 till September 2010 shows average of 0.93 and October 2010 till march 2012 indicates average of 1.92 it clearly indicates that growth rate is higher in October 2010 till march 2012.

**Graph 4**

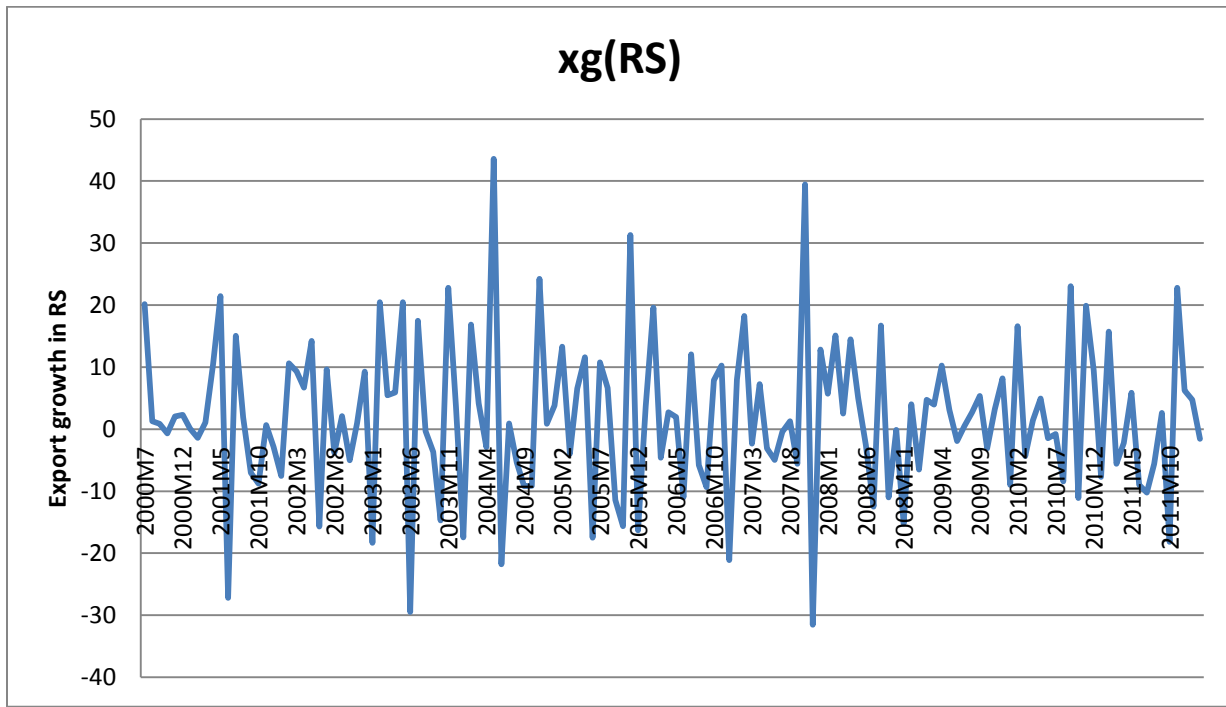
**Figure 4: Exports Growth (In Dollars)**



The graph 5 shows the overall fluctuation in the export growth in the Pakistan from the month of July of 2000 till month of March 2012. It shows per month export growth in terms of RS, if we see the graph there are different fluctuation in different months and seems to be complex therefore it is divided in to different periods, the graph clearly indicates from July 2000 to May 2004 that the fluctuation in export growth is not more therefore the average calculated for this period is 1.96, further if we see the graph over the next period from June 2004 to February 2007 the graph indicates higher fluctuation which shows a rapid increase or decrease in the months the average calculated for this period is 1.76 which is relatively less than the previous considered period hence it mean that exports are relatively less in this period due to higher fluctuation. Furthermore the graph indicates the fluctuations over next period January 2008 to September 2010 fluctuation in export growth are not rapidly changing this is because of less fluctuation in the exchange rate that is average growth for this period is recorded is 1.94 which shows that due to no rapid changes in exchange rate the export growth is increased, the remaining months from September 2010 to the march 2012 shows little bit stability in growth because of lower fluctuation in exchange that is if we see the graph growth rate is not changing rapidly and on average growth for these months is 2.18 which is relatively higher export growth than all the other periods consider for this analyses so it is concluded if the exchange is not changing rapidly the growth rate can be remain best therefore the variation in exchange rate have highly impact the export growth the different periods consider for export growth and there averages are July 2000 to May 2004 the average is 1.96, from June 2004 to February 2007 the average is 1.76, January 2008 to September 2010 the average is 1.94, and September 2010 to the march 2012 the average is 2.18 so now if we see the graph it clearly indicates that export growth in Pakistan is greater in September 2010 to the march 2012.

**Graph 5**

**Figure 5: Exports Growth (In Rupees)**



Furthermore the correlation has also been calculated between the nominal devaluation and the exports growth in dollars, and also the nominal devaluation and export growth in rupees similar is the case with real devaluation where the correlation is analyze between the real devaluation and export growth in dollars and also between the real devaluation and export growth in rupees, the correlation simply shows the relationship whether it is positive or negative how they are related with each other, the correlation between nominal devaluation and export growth In dollars indicate the value of 0.090 which is positive which means that if the nominal devaluation increase the export growth will also increase and if the nominal devaluation decrease the export growth will also decrease, similarly the correlation between the nominal devaluation and export growth in RS indicates the value of -0.030 which is perfectly negative correlation which means that if nominal devaluation increase the export growth in RS will decrease and if the nominal devaluation decrease the export growth in RS will increase .similar is the case with the real devaluation correlation between the real devaluation and export growth in dollars indicate the value of -0.029 which is perfectly negative correlation which means that if real devaluation increase the export growth in dollars will decrease and if real devaluation decrease the export



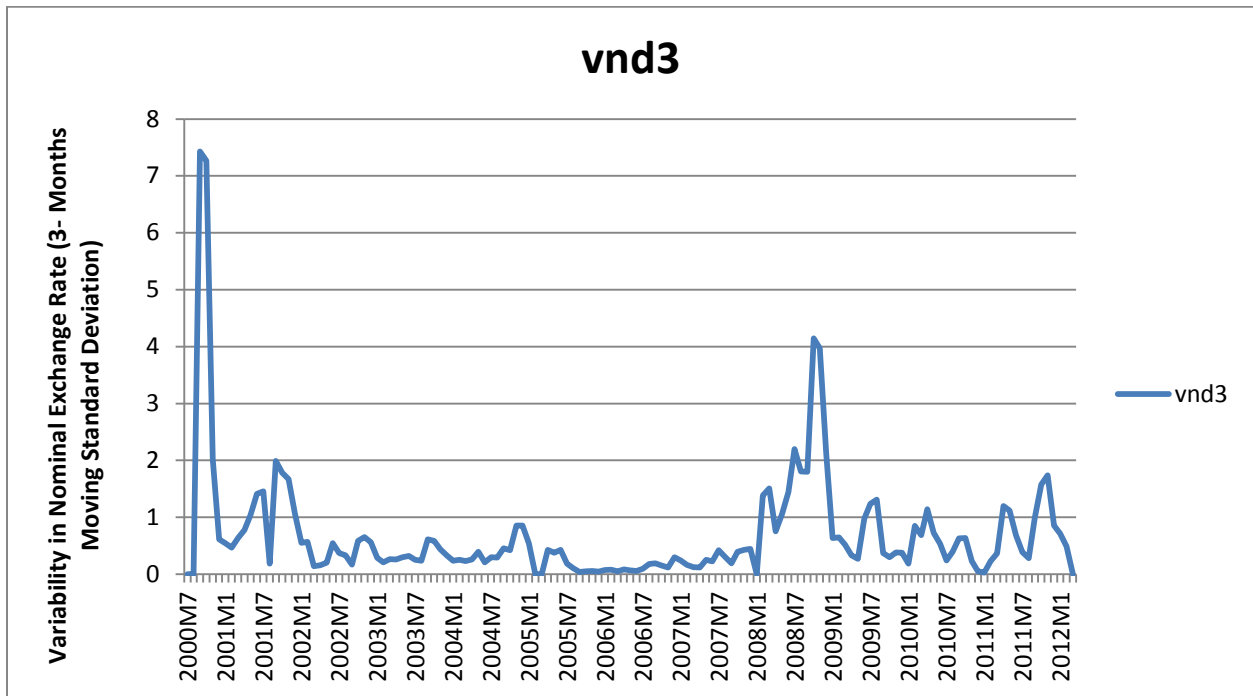
growth in dollar will increase, similarly the correlation between the real devaluation and export growth in rupees indicates the value of -0.13 which is also showing perfectly negative correlation thus if real devaluation increases the export growth in terms of rupees will decrease and if real devaluation decrease the export growth in terms of RS will increases, thus from by finding correlation we came to know that both real devaluation and nominal devaluation have the strong impact on export growth both in terms of dollars and rupees.

Now we will analyze the variability in nominal exchange rate as well as real exchange rate. The graph shows overall variation in nominal exchange rate. It is calculated using 3 months moving standard deviation from the period July 2000 to the period march 2012. Two major episodes in 2000 and 2008 were recorded with the two cliffs shown in the Graph. Otherwise there were several smaller episodes of variability during the entire period.

During July 2000 to December 2001, fluctuation in the nominal exchange rate was higher and on average the variation was 1.89. While during January 2002 to January 2008 the period shows stability in nominal exchange rate and shows very less fluctuation and on average standard deviation shows the value of 0.28 thus the standard deviation is also less which means that volatility is less in this period thus risk is less in this period, if we see next to this period from February 2008 to march 2012 the variation in nominal exchange rate start fluctuating again but not very high the average standard deviation calculated for this period is 0.94 which is also high showing the higher volatility and the higher risk. After analyzing all these differently we came to know on the basis of average standard deviation that from January 2002 to January 2008 the fluctuation in nominal exchange rate on the measure of three months are less that is why that period on average shows the less variability in exchange rate and showing that risk is less.

Graph 6

Figure 6: Variability in Nominal Exchange Rate (3- Months Moving Standard Deviation)



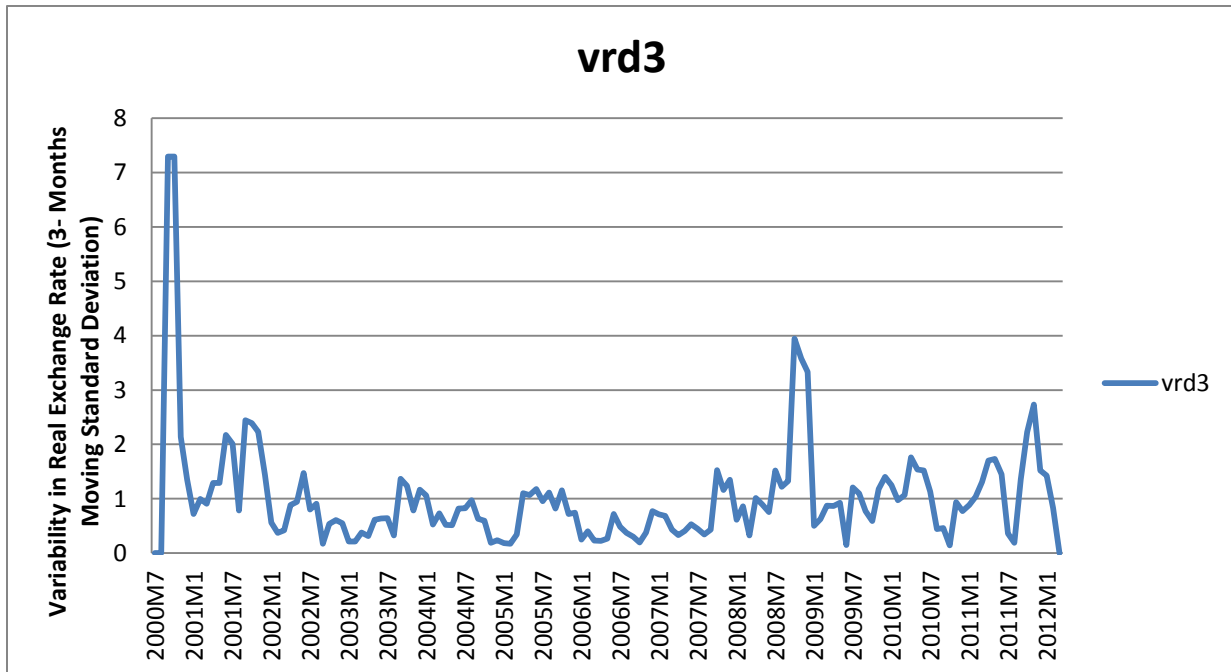
The graph 7 shows overall fluctuation in the real exchange rate calculated using 3 months moving standard deviation. During July 2000 to March 2012, one major and two moderate cliffs were observed while several smaller cliffs were present over the entire period of time.

During July 2000 to December 2001 there is high fluctuation in the real exchange rate the standard deviation calculated on average basis shows the value of 2.29 which is very high which means the volatility in this period is very high which means the risk in this period is also higher, further if we go through next period from January 2002 till September 2007 the fluctuation in real exchange rate is very less and seems to be little bit stability in different months between the period the on average standard deviation calculated for this period on the measure of 3 months is 0.61 which is less showing that variability is less therefore the risk is also less, the remaining period from October till march 2012 shows that there is rapid fluctuation in the real exchange rate and the fluctuation seems to be high on average the standard deviation for this period in real exchange rate shows the value of 1.21 which is very high as the higher standard deviation means that variability is higher thus risk for exporter during this period is higher, thus while on measure

of 3 month variation in real exchange rate the period from January 2002 till September 2007 is best that shows on average value of standard deviation very less this it means the variation in this period of time is very less.

**Graph 7**

**Figure 7: Variability in Real Exchange Rate (3- Months Moving Standard Deviation)**



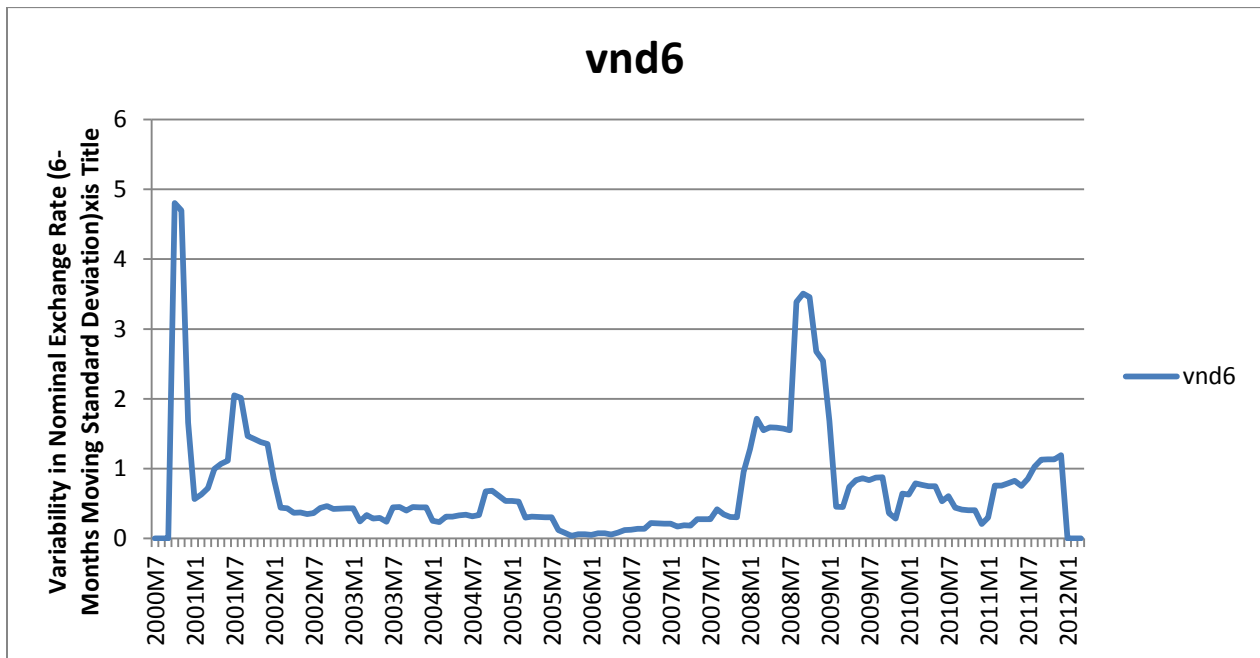
The graph 8 shows the overall variation in nominal exchange rate, calculated using 6 months moving standard deviation. As expected the overall variation has been calmed down when we increase the size of observations.

It clearly indicates that in some months there is high fluctuation while in some months the variation less or little bit stable, if we see the graph from July 2000 to December 2001 the graph indicate very high variation in the nominal exchange rate on the measure of 6 months, the average standard deviation for these months on the measure of 6 months is 1.72 which is very high that mean there is high variation in the consider period thus the period consider is risky, furthermore if we see the next period over it from the period January 2002 to November 2007 under this period the fluctuation is very less and we can see little bit stability in different months the average standard deviation calculated for this period is 0.3 on the measure of 6 months

which is very less as compare to the previous period from July 2000 to December 2001 thus less standard deviation means lower variation thus the risk is low, if we proceed to next period over this period which is from December 2007 to December 2008 a high amount of variation is recorded in this period the graph clearly indicate the higher variation in this period the on average standard deviation calculated for this period is 2.07 which relatively very high as compare to previous periods examine thus it means that variation in this period was relatively very high thus this period is very risky as compare to other periods, furthermore the next period from January 2009 to march 2012 from the graph clearly shows that there is less variation in this period of time thus on average standard deviation calculated for this period is 0.70 which is less indicating less variation and shows that the studied period is less risky, thus by comparing different periods we came to know that different periods shows different results and different months shows different variation the only the period in which the variation on measure of 6 month is less risky is January 2002 to November 2007 and the second period which is observed less risky is from January 2009 to march 2012.

**Graph 8**

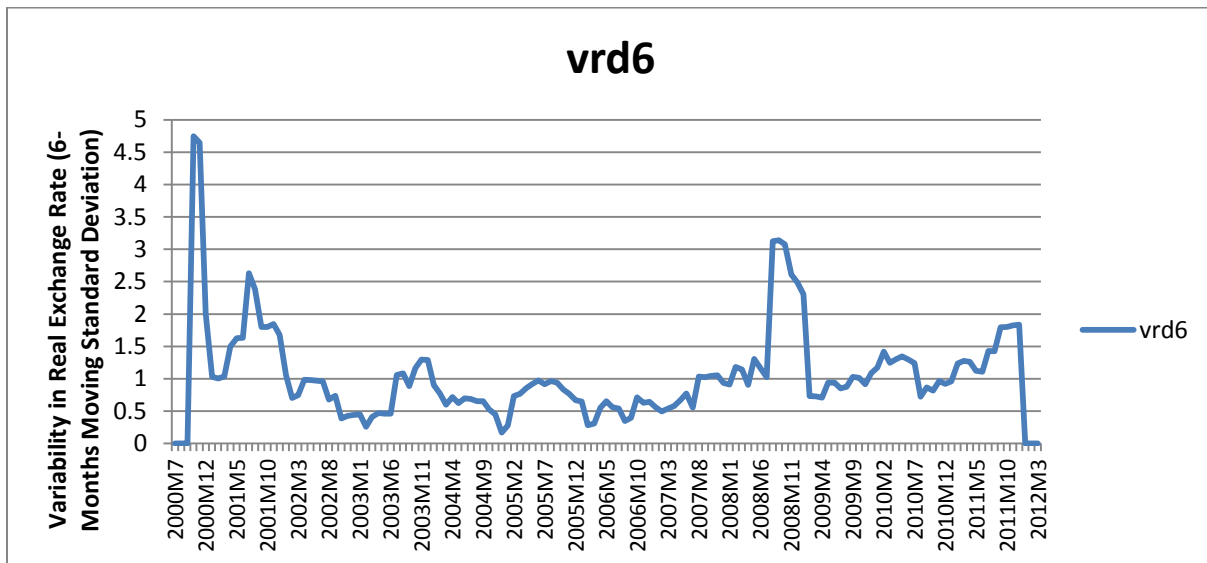
**Figure 8: Variability in Nominal Exchange Rate (6- Months Moving Standard Deviation)**



The graph 9 shows overall variation in real deviation from the period July 2000 to march 2012, calculated using 6-months moving standard deviation. The graph shows that from July 2007 to December 2012 a very high variation in real deviation on the measure of 6 months the average standard deviation calculated for this period is 1.27 which is very high which means the variation in this period is very high thus the period is risky, furthermore if we proceed next to this period January 2004 to July 2007 if we see the graph more precisely it indicates the less fluctuation in period from January 2004 to July 2007 as compared to previous period considered, the on average standard deviation for this period is calculated is 0.64 which is relatively showing the less fluctuation than the previous considered period thus the risk is also less in this period, furthermore the period from August 2007 to march 2012 again showing a higher variation in the real deviation on the measure of 6 months thus as the graph indicate the higher variation the average standard deviation indicates the value of 1.31 which very high which means this considered period is very risky showing the higher variation, thus the only considered period from January 2004 to July 2007 indicates the lower standard deviation which means variation in this period was less thus less risky while in contrast other studied periods are risky because of the higher variation.

**Graph 9**

**Figure 9: Variability in Real Exchange Rate (6- Months Moving Standard Deviation)**



The correlation among the export growth in Pakistan and variation in real and nominal exchange rate on the measure of 3 months and 6 months moving standard deviation is also analyze the correlation between the variation in nominal exchange rate on the measure of 3 months and export growth shows correlation value of -0.095 which is negative correlation which means that if variation in nominal exchange rate is higher the export growth will be lower in terms of RS and if variation in nominal exchange rate is lower the export growth will be higher on the measure of 3 months, similarly the correlation among the variation in real exchange rate on basis of 3 months and export growth in RS indicate the correlation value of -0.096 which is also perfectly negative correlated which means that if variation in real exchange rate on the measure of 3 months is higher the export growth in terms of RS will be lower and if variation in real exchange rate on the measure of 3 months is lower than export growth will be higher, similar is the case when variation in real and nominal exchange rate is taken on measure of 6 months the correlation between the variation in nominal exchange rate on the measure of 6 months and export growth shows correlation value of -0.084 which is perfectly negative correlation which means that if variation in nominal exchange rate is higher the export growth will be lower in terms of RS and if variation in nominal exchange rate is lower the export growth will be higher on the measure of 6 months, furthermore the correlation among the variation in real exchange rate on basis of 6 months and export growth in RS indicate the correlation value of -0.10 which is also perfectly negative correlated which means that if variation in real exchange rate on the measure of 6 months is higher the export growth in terms of RS will be lower and if variation in real exchange rate on the measure of 6 months is lower than export growth will be higher.

The correlation between the export growth in dollars with the variation in nominal exchange rate on the measure of 3 months shows the correlation value of 0.14 which positive correlation which means that if variation in nominal exchange rate on the measure of 3 month is less the export growth in dollars will be lower and if variation in nominal exchange rate on measure of 3 months is high the export growth will be greater, similarly the correlation of export growth in dollar and the variation in real exchange rate on the measure of 3 months showing the correlation value of -0.13 which also shows the perfectly negative correlation which means if the variation in the real exchange rate on the measure of 3 months is low the export growth will be higher and if variation in real exchange rate on the measure of 3 months Is high the export growth will be less, the similar is the case variation measure for 6 months, the variation in nominal exchange rate on

the measure of 6 months showing the correlation with export growth showing the value of -0.10 which is also perfectly negative correlation which also means that if variation in nominal exchange rate on the measure of 6 month is higher the export growth will be less and if the variation in nominal exchange rate is lower the export growth will be higher while correlation among the export growth and the variation in real exchange rate on the measure of 6 months is -0.11 thus it also indicates the perfectly negative correlation which means that if variation in real exchange rate on the average of 6 month is less the export growth will be higher and if variation in real exchange rate on average of 6 month is higher the export growth will be lower in terms of dollar.

**Table 1: Table for Correlation**

	<b>Exports Growth (in Rupees)</b>	<b>Exports Growth (in Dollars)</b>
<b>Nominal Exchange Rate Variability (3-Months Moving Standard Deviation)</b>	<b>-0.0956</b>	<b>0.1411</b>
<b>Real Exchange Rate Variability (3-Months Moving Standard Deviation)</b>	<b>-0.0962</b>	<b>-0.1318</b>
<b>Nominal Exchange Rate Variability (6-Months Moving Standard Deviation)</b>	<b>-0.0847</b>	<b>-0.107</b>
<b>Real Exchange Rate Variability (6-Months Moving Standard Deviation)</b>	<b>-0.1026</b>	<b>-0.1153</b>
<b>Nominal Devaluation</b>	<b>-0.0306</b>	<b>0.0902</b>
<b>Real Devaluation</b>	<b>-0.1340</b>	<b>-0.0292</b>

From descriptive statistical analysis we can conclude that correlation between exports growth and exchange rate variability (both real and nominal) is negative but very low. However, whether it is significantly negative we can check it by using the Wilcoxon Signed Rank test in Chapter 5.

## Chapter 4

### METHODOLOGY

Several studies have checked the impact of exchange rate volatility on the exports and they have used different estimation techniques. Few studies have used GARCH variance to calculate instability in exchange rate (Kemal, 2005), while few have used moving standard deviation. Apart from these two, several other calculations were done to calculate the variability in nominal exchange rate.

Some uses simultaneous equations with 3SLS technique to estimate the association between exchange rate instability and trade. Few studies such as (Parveen, Khan, & Ismail, 2012) used Simple Linear Regression model with ordinary least method (OLS) to analyze the results. Co-integration and error correction technique is used to establish empirical relationship between exchange rate volatility and export growth by (Arize, 1995), (Azid, Jamil, & Kausur, 2005), (Azeez, Kolapo, & Ajayi, 2012), (Aqeel & Nishat, 2006), (Mustafa & Nishat, 2004), (Chowdhury, 1993) and (Bashir, Hassan, Naseer, & Afzal, 2012). Moreover, auto regressive distributed lag model is used by (Javed & Farooq, 2009). Granger Causality test is used by (Khan, Sattar, & Rehman, 2012). Generalized method of moments (GMM) is used by (Yusoff & Sabit, 2014).

In this paper we do not use regression analysis to check the association between exports and variability in exchange rate. Instead we use non-parametric test to check the association among the variables. The detail procedure of the non-parametric test applied in the thesis is given below.

Non-parametric test is used to analyze the characteristics of non-curve data and these characteristics of non-curve data are analyzed by specialized methods of non-parametric tests, a non-parametric test can be used whenever the given data are of nominal scale or ordinal scale, data can be of ratio or interval scale but when normality assumption didn't meet. when the assumption of parametric test has been violated it meet the assumptions of non-parametric test that is the basic assumption for parametric test is that if the population is not normally distributed, the non-parametric data, is applicable on nominal, as well as ordinal data the nominal data is in the farm of groups , while ordinal data can be displayed in the farm of set of steps, or in



simple words when items are classified according to whether they have more or less of a characteristic this is referred to as ordinal scale. The basic advantage of non-parametric test is that there is fewer assumptions about the population that is non-parametric test does not need that population is normally distributed or in simple words it does not need the requirement of any specific distribution. Even the techniques of non-parametric can be applied if the sample size is small and the other advantage of non-parametric test is that nominal and ordinal data can be used. The disadvantages of non-parametric is that the information in the data is used less efficiently than the parametric test so it means that power of non-parametric test is lower thus if the assumption meets then parametric test will be better, the other disadvantage of non-parametric test is that it has the greater dependence on the statistical tables if software packages are not used.

The basic assumption for non-parametric test is that population is not normally distributed, the variance assumed for non-parametric test can be both heterogeneous as well as homogeneous, the typical detail for non-parametric test can be measure on nominal as well as ordinal scale, the data set relationship for non-parametric test can be dependent or independent, the benefit of non-parametric test is that it is less effect by outliers, the correlation test for non-parametric test is spearman.

Non parametric statistical test is used when sample size, is very small, or few assumption, can be made about data that is data rank ordered or nominal and when the samples are taken from several different population non parametric test is used furthermore the level of measurement of variables and the number of samples and whether they are related or independent are all factors that determine which test is appropriate for your research.

In this research Wilcoxon signed ranks test is designed, to test a hypothesis for the median differences, it involves, the use of match pair e.g. before and after data in which case it test for the median, differences of zero. Like other parametric tests the Wilcoxon signed ranks test do not need the assumption that population is normally distributed this test is used instead of one sample t test when normality, assumption is questionable, When the observation in the given sample are ranks, that is in the farm of ordinal data Wilcoxon sign ranks test can be applied, Wilcoxon signed ranked test can be used to see the difference, in smokers daily cigarette consumption, before and after 6 weeks of hypnotherapy, program here the dependent variable,

could be daily cigarette consumption, while two related groups is cigarette consumption values before and after, the hypnotherapy program.

Wilcoxon signed test can be analyze using the SPSS statistic to interpret the result from the test, before applying the Wilcoxon sign ranks test first you need to understand the certain assumption In order to know that Wilcoxon signed ranks test is appropriate for your research.

Assumption 1: your dependent variable should be measure on ordinal or nominal level.

Assumption 2: your independent variable must consist of two “match pairs” or related groups which mean that same subject is presented in both groups.

Assumption 3: when population is not normally distributed.

In SPSS we can analyze the data in six steps if you think that your data is appropriate for Wilcoxon signed rank test the test procedure is follow the following steps:

1. Go to Analyze > non-parametric test> legacy dialogs> 2 related samples.
2. The two related sample dialog box will appear.
3. Transfer the variables in to test pair box and tick Wilcoxon checkbox.
4. Click ok the results will appear.
5. If significance value is greater than critical value which is 0.05 we will accept null hypothesis and reject alternative hypothesis but if the value is less than 0.05 so we will reject null hypothesis and accept alternative hypothesis.

## Chapter 5

### RESULTS AND INTERPRETATIONS

#### Wilcoxon Signed Ranks Test 1

##### Ranks

	N	Mean Rank	Sum of Ranks
Negative Ranks	70 <sup>a</sup>	65.69	4598.50
Positive Ranks	59 <sup>b</sup>	64.18	3786.50
Ties	9 <sup>c</sup>		
Total	138		

a.  $\text{vart in nominal dep 3(vnd3)} < \text{export growth in RS(xg)}$

b.  $\text{vart in nominal dep 3(vnd3)} > \text{export growth in RS(xg)}$

c.  $\text{vart in nominal dep 3(vnd3)} = \text{export growth in RS(xg)}$

##### Test Statistics<sup>a</sup>

	vart in nominal dep 3(vnd3) - export growth in RS(xg)
Z	-.955 <sup>b</sup>
Asymp. Sig. (2-tailed)	.340

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

$H_0$ : variation in Nominal exchange rate for 3 months does not affect export growth in RS.

$H_1$ : variation in Nominal exchange rate for 3 months effect the export growth in RS.

Thus the result indicate the significance value of 0.340 which is greater than the critical value which is 0.05, thus according to this result the significance value is greater than critical value thus we will accept null hypothesis and reject the alternative hypothesis.

### Wilcoxon Signed Ranks Test 2

#### Ranks

	N	Mean Rank	Sum of Ranks
Negative Ranks	70 <sup>a</sup>	65.38	4576.50
vart in real dep3(vrd3) - export growth in RS(xg) Positive Ranks	61 <sup>b</sup>	66.71	4069.50
Ties	7 <sup>c</sup>		
Total	138		

a.  $\text{vart in real dep3(vrd3)} < \text{export growth in RS(xg)}$

b.  $\text{vart in real dep3(vrd3)} > \text{export growth in RS(xg)}$

c.  $\text{var}t \text{ in real dep3(vrd3) = export growth in RS(xg)}$

**Test Statistics<sup>a</sup>**

	vart in real dep3(vrd3) - export growth in RS(xg)
Z	-.583 <sup>b</sup>
Asymp. Sig. (2-tailed)	.560

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

$H_0$ : variation in Real exchange rate for 3 months does not affect export growth in RS.

$H_1$ : variation in Real exchange rate for 3 months effect the export growth in RS.

Thus the result indicate the significance value of 0.560 which is greater than the critical value which is 0.05, thus according to this result the significance value is greater than critical value thus we will accept null hypothesis and reject the alternative hypothesis.

### Wilcoxon Signed Ranks Test 3

#### Ranks

	N	Mean Rank	Sum of Ranks
Negative Ranks	69 <sup>a</sup>	64.02	4417.50
Positive Ranks	58 <sup>b</sup>	63.97	3710.50
Ties	8 <sup>c</sup>		
Total	135		

a. vart in nominal dep 6(vnd6) < export growth in RS(xg)

b. vart in nominal dep 6(vnd6) > export growth in RS(xg)

c. vart in nominal dep 6(vnd6) = export growth in RS(xg)

#### Test Statistics<sup>a</sup>

	vart in nominal dep 6(vnd6) - export growth in RS(xg)
Z	-.851 <sup>b</sup>
Asymp. Sig. (2-tailed)	.395

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

$H_0$ : variation in Nominal exchange rate for 6 months does not affect export growth in RS.

$H_1$ : variation in Nominal exchange rate for 6 months effect the export growth in RS.

Thus the result indicate the significance value of 0.395 which is greater than the critical value which is 0.05, thus according to this result the significance value is greater than critical value thus we will accept null hypothesis and reject the alternative hypothesis.

#### Wilcoxon Signed Ranks Test 4

##### Ranks

	N	Mean Rank	Sum of Ranks
Negative Ranks	67 <sup>a</sup>	65.40	4382.00
var in real dep 6(vrd6) - Positive Ranks export growth in RS(xg)	62 <sup>b</sup>	64.56	4003.00
Ties	6 <sup>c</sup>		
Total	135		

a.  $\text{var in real dep 6(vrd6)} < \text{export growth in RS(xg)}$

b.  $\text{var in real dep 6(vrd6)} > \text{export growth in RS(xg)}$

c.  $\text{var in real dep 6(vrd6)} = \text{export growth in RS(xg)}$

### Test Statistics<sup>a</sup>

	vart in real dep 6(vrd6) - export growth in RS(xg)
Z	-.446 <sup>b</sup>
Asymp. Sig. (2-tailed)	.656

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

H<sub>0</sub>: variation in Real exchange rate for 6 months does not affect export growth in RS.

H<sub>1</sub>: variation in Real exchange rate for 6 months effect the export growth in RS.

Thus the result indicate the significance value of 0.656 which is greater than the critical value which is 0.05, thus according to this result the significance value is greater than critical value thus we will accept null hypothesis and reject the alternative hypothesis.



### Wilcoxon Signed Ranks Test 5

#### Ranks

	N	Mean Rank	Sum of Ranks
Negative Ranks	66 <sup>a</sup>	68.36	4512.00
vart in nominal dep 3(vnd3) - exports growth in \$(xdg)      Positive Ranks	64 <sup>b</sup>	62.55	4003.00
Ties	8 <sup>c</sup>		
Total	138		

a. vart in nominal dep 3(vnd3) < exports growth in \$(xdg)

b. vart in nominal dep 3(vnd3) > exports growth in \$(xdg)

c. vart in nominal dep 3(vnd3) = exports growth in \$(xdg)

#### Test Statistics<sup>a</sup>

	vart in nominal dep 3(vnd3) - exports growth in \$(xdg)
Z	-.592 <sup>b</sup>
Asymp. Sig. (2-tailed)	.554

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

H<sub>0</sub>: variation in Nominal exchange rate for 3 months does not affect export growth in \$.

H<sub>1</sub>: variation in Nominal exchange rate for 3 months effect the export growth in \$.

Thus the result indicate the significance value of 0.554 which is greater than the critical value which is 0.05, thus according to this result the significance value is greater than critical value thus we will accept null hypothesis and reject the alternative hypothesis.

### Wilcoxon Signed Ranks Test 6

#### Ranks

	N	Mean Rank	Sum of Ranks
Negative Ranks	67 <sup>a</sup>	66.96	4486.00
var in real dep3(vrd3) - Positive Ranks exports growth in \$(xdg)	65 <sup>b</sup>	66.03	4292.00
Ties	6 <sup>c</sup>		
Total	138		

a.  $\text{var in real dep3(vrd3)} < \text{exports growth in } \$(\text{xdg})$

b.  $\text{var in real dep3(vrd3)} > \text{exports growth in } \$(\text{xdg})$

c.  $\text{var in real dep3(vrd3)} = \text{exports growth in } \$(\text{xdg})$

### Test Statistics<sup>a</sup>

	vart in real dep3(vrd3) - exports growth in \$(xdg)
Z	-.220 <sup>b</sup>
Asymp. Sig. (2-tailed)	.826

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

H<sub>0</sub>: variation in Real exchange rate for 3 months does not affect export growth in \$.

H<sub>1</sub>: variation in Real exchange rate for 3 months effect the export growth in \$.

Thus the result indicate the significance value of 0.826 which is greater than the critical value which is 0.05, thus according to this result the significance value is greater than critical value thus we will accept null hypothesis and reject the alternative hypothesis.

### Wilcoxon Signed Ranks Test 7

#### Ranks

	N	Mean Rank	Sum of Ranks
Negative Ranks	66 <sup>a</sup>	66.98	4421.00
Positive Ranks	63 <sup>b</sup>	62.92	3964.00
Ties	6 <sup>c</sup>		
Total	135		

a.  $\text{vart in nominal dep } 6(\text{vnd}6) < \text{exports growth in } \$(\text{xdg})$

b.  $\text{vart in nominal dep } 6(\text{vnd}6) > \text{exports growth in } \$(\text{xdg})$

c.  $\text{vart in nominal dep } 6(\text{vnd}6) = \text{exports growth in } \$(\text{xdg})$

#### Test Statistics<sup>a</sup>

	vart in nominal dep 6(vnd6) - exports growth in \$(xdg)
Z	-.537 <sup>b</sup>
Asymp. Sig. (2-tailed)	.591

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

H<sub>0</sub>: variation in Nominal exchange rate for 6 months does not affect export growth in \$.

H<sub>1</sub>: variation in Nominal exchange rate for 6 months effect the export growth in \$.

Thus the result indicate the significance value of 0.591 which is greater than the critical value which is 0.05, thus according to this result the significance value is greater than critical value thus we will accept null hypothesis and reject the alternative hypothesis.

### Wilcoxon Signed Ranks Test 8

#### Ranks

	N	Mean Rank	Sum of Ranks
Negative Ranks	65 <sup>a</sup>	67.38	4380.00
var in real dep 6(vrd6) - Positive Ranks exports growth in \$(xdg)	66 <sup>b</sup>	64.64	4266.00
Ties	4 <sup>c</sup>		
Total	135		

a.  $\text{var in real dep 6(vrd6)} < \text{exports growth in $(xdg)}$

b.  $\text{var in real dep 6(vrd6)} > \text{exports growth in $(xdg)}$

c.  $\text{var in real dep 6(vrd6)} = \text{exports growth in $(xdg)}$

**Test Statistics<sup>a</sup>**

	vart in real dep 6(vrd6) - exports growth in \$(xdg)
Z	-.131 <sup>b</sup>
Asymp. Sig. (2-tailed)	.896

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

H<sub>0</sub>: variation in Real exchange rate for 6 months does not affect export growth in \$.

H<sub>1</sub>: variation in Real exchange rate for 6 months effect the export growth in \$.

Thus the result indicate the significance value of 0.896 which is greater than the critical value which is 0.05, thus according to this result the significance value is greater than critical value thus we will accept null hypothesis and reject the alternative hypothesis.

We have also applied the Wilcoxon test on the nonlinear variability in exchange rate by looking at the association between square and cubes of exchange rate variability (both nominal and real) with the exports growth (both in rupees and dollars). The results are nonetheless not different from our earlier results, i.e., there is not significant association between exchange rate instability and exports.

## **CONCLUSION**

The thesis examined the link between the exchange rate variation and exports growth. Moving standard deviation is considered as the good measure of variability in the exchange rate therefore 3 months as well as 6 months moving standard deviation is calculated for both real exchange rate and nominal exchange rate. Monthly data are taken from July 2000 to March 2012 from international financial statistics. The exports growth in dollar and exports growth in rupees is analyzed by considering the different intervals according to their fluctuation through descriptive statistics.

The literature shows ambiguous results about the exchange rate variability and exports. Using the descriptive statistics it is concluded that if the fluctuation in the exchange rate is low the export growth will be higher and if the fluctuation in exchange rate is higher the export growth will be lower. Correlation between the export growth and exchange rate variability (both real and nominal) is negative and very low, the lower correlation value indicate that there is nearly no association between the variables, similarly the correlation between the export growth in dollars and rupees for both the variation in nominal and real exchange rate on the measure of 3 and 6 months moving standard deviation shows negative and weak correlation however whether it is significantly negative we have checked it by using Wilcoxon signed ranks test.

The results of Wilcoxon signed ranks test using the statistical package indicate the significance value greater than the critical value thus as the significance value for all the match pair is greater than the critical value of 0.05 thus on the basis of significance value we have to accept the null hypothesis and reject the alternative hypothesis It is concluded from the Wilcoxon signed ranks test that there is no significant association between variation in exchange rate and export growth.

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