The Impact of Exchange Rate Uncertainty on Foreign Portfolio Investment in Pakistan

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The Impact of Exchange Rate Uncertainty on Foreign Portfolio Investment in Pakistan

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Dedication

To My Family

Declaration

I hereby declare that the work presented in the following thesis is my own effort, except where otherwise acknowledged and that the thesis is my own composition. No part of the thesis has been previously presented for any other degree.

Atlish Khalid

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Abstract

This study empirically examines the impact of exchange rate uncertainty on foreign portfolio investment (FPI) in Pakistan using sector level panel data covering the period from 2006 to 2011. We use sector-specific variables, namely sector size, net profitability, leverage, liquidity, dividend payout, growth of sector, and retention in business, in order to control sector specific effects. For empirical estimation, we utilize the two-step system GMM estimator to take into account the problem of endogeneity and heterogeneity. Apart from the level impact of exchange rates and the exchange rate volatility, we also examine whether lagged values of both have significant influence on foreign portfolio investment.

Our results reveal that both the exchange rate and exchange rate volatility have a negative impact on the foreign portfolio investment, that is, the higher exchange rate volatility hinders the foreign portfolio investment in Pakistan. We also find that sector size, its profitability, liquidity, and the level of leverage are significant in attracting foreign portfolio investment. While the exchange rate, the exchange rate volatility, dividend payout, sector growth, and retention in business have negative effects on FPI. These results are consistent with the previous studies and the economic theories of foreign portfolio investment.

Keywords: Exchange rate volatility, Foreign portfolio investment, Sector-level panel, System-GMM, Pakistan

JEL classification: G11, D81

Table of Contents

Dedication.....ii

Declaration.....iii

Acknowledgments.....iv

Abstract.....v

List of Tables.....ix

Chapter 1. Introduction.....1

1.1 Foreign portfolio investment in Pakistan: An overview.....3

1.2 Gap in the literature.....8

1.3 Objective of the study.....8

1.4 Research questions.....9

1.5 Importance of study.....9

1.6 Design of study.....10

Chapter 2. Economic theory.....11

2.1 Portfolio balance approach.....11

2.2 Behavioral portfolio theory.....13

Chapter 3. Literature review.....14

3.1 Variables having a positive impact on foreign portfolio investment.....14

3.2 Variables having a negative impact on foreign portfolio investment 16

3.3 Impact of exchange rate risk on foreign portfolio investment 17

Chapter 4. Data and research methdology 21

4.1 Data description 21

4.2 Empirical model 301

4.3 Estimation method 26

4.4 GARCH model 28

Chapter 5. Empirical analysis 30

5.1 Summery statistics of exchange rate series 30

5.2 Testing stationarity 32

5.3 Test for Heteroscedasticity 32

5.4 Measuring volatility of exchange rate 33

5.5 The robust two-step system GMM estimation 34

5.5.1 Summery statistics 35

5.5.2 Correlation matrix 37

5.5.3 Impact of the exchange rate volatility (at level) on FPI 39

5.5.4 Impact of the exchange rate volatility (at 1st lag) on FPI 42

5.5.5 Impact of the exchange rate volatility (at 2nd lag) on FPI 45

Chapter 6. Conclusions and policey recomendations 49

6.1 Key findings.....49

6.2 Policy implication.....50

6.3 Limitations and further research areas.....51

Refrences.....52

Appendix.....59

List of Tables

Table 1: Foreign portfolio investment in each sector from 2006-2011(Million US$) 6

Table 2: Summary statistics of the exchange rate returns..... 31

Table 3: Augmented-Dickey fuller test for the exchange rate returns 32

Table 4: ARCH-LM test for the exchange rate 33

Table 5: ARCH/GARCH estimates for the exchange rate.....34

Table 6: Summery statistics..... 36

Table 7: Correlation matrix..... 38

Table 8: Two-step system GMM results for impact of ER & its volatility(at level) on FPI 41

Table 9: Two-step system GMM results for impact of ER & its volatility(at 1st lag) on FPI.....44

Table 10: Two-step system GMM results for impact of ER & its volatility(at 2nd lag) on FPI...46

Table 11: ARCH/GARCH results for the exchange rate volatility.....60

Chapter 1

Introduction

Foreign portfolio investment (FPI) is the entry of funds in a country where foreigners make purchases in the country's stock and bond market, for the sake of rate of return. It is considered as one of the important segment of the growth magnifying components mainly in less developed countries. It is a vital source of fund to support the investment in a country that has a large saving-investment gap. It escalates the liquidity of firms, sectors, and the economy. It also facilitates to get better foreign reserves. Despite this growth-enhancing factor, another key purpose of foreign portfolio investments is to conserve and increase the value of portfolio. Further, it helps and encourages the existing business firms to enlarge their business by issuance of new securities. This enhancement of efficiency due to internationalization leads to lower cost of capital in the host economy.

The cost of foreign capital also tends to be lower because the foreign portfolio can be more diversified across the national borders and therefore to be more efficient in reducing country-specific risks, resulting in a lower risk premium. According to behavioral portfolio theory (Shefrin and Statman, 2000), foreign portfolio investment helps investor to form a portfolio according to the desired investment need in the international market. The selection of the portfolio in one international market is theoretically like to the sub-portfolio selection problem in a mental account with exchange rate risk. The exchange rate risk is also considers as the background risk in foreign portfolio selection (Finkelshtain, 1999 and Fidora, 2006). Lots of studies have attempted to detain the patterns of exchange rates uncertainty. As

volatility is an essential concern in foreign stocks, various techniques were fabricated to manage the consequences of volatility. So when the problem of exchange rate risk arise, the available literature on estimation, impact, testing, and predicting volatility permitted researchers to assess these methods within the perspective of exchange rate volatility. To measure the risk related with the foreign investment the work of Philippe Jorion is of great importance. He discussed the GARCH, Moving averages, Exponential smoothing and VAR technique in order to calculate the risk related with international assets. Therefore, it would be worth exploring how the level of exchange rate and the volatility of exchange rate affect foreign portfolio investment.

Besides the exchange rate risks, there are many sector-specific factors, such as sector size, net profitability, liquidity, leverage, growth of a sector, retention in business, and dividend payment, that may influence the volume of portfolio investment in the particular sector. As number of merits and demerits relate with foreign portfolio investment flows to emerging economies are well present in the literature (Grabel, 1998 and Fitz and Gerald, 1999), extensive sort of factors have been illustrated to encourage the capital flows to emerging economies. However, variety of opinions are there, like the comparative involvement of "push" elements reflecting alterations in developed markets (Fernandez-Arias, 1994) plus "pull" factors emerging from alteration in developing markets (Chuhan, 1993, and Hernandez and Rudolph, 1995). Pull factors show the investment risk as well as returns of some specific country which attract international investment whereas, push factors show the global liquidity plus other elements to push investment into the emerging economies (Dua and Garg, 2013).

Along with the numerous factors that influence the international portfolio investment, the exchange rate volatility has become more significant in today's globalized economy because of foreign fund transfers among countries, are much more vital in capital markets (Anlas, 2012). The exchange rate volatility enhances the risk of foreign investment as well as its covariance with the local market returns. If covariance is positive then it adds to the exchange rate risk. Nielsen (2012) in his study of 42 countries found that those countries that have the stable exchange rate policies have the higher level of portfolio investment. The exchange rate volatility not always increases the risk of portfolio investment. In fact, when the covariance between exchange rate volatility and the local market returns is sufficiently negative to compensate the positive variance of exchange rate volatility, then the exchange rate volatility can actually reduce the risk of foreign investment. Eun and Resnick (1988) concluded that the risk of exchange rate creates the higher level of portfolio risk, although the exchange rate risk is important for the international investors because it has the ability to capture the possible increase from international diversification. Hence, it is likely that the exchange rate volatility has both the negative and the positive impact on foreign portfolio investment.

1.1. Foreign portfolio investment in Pakistan: An overview

The inflow of overseas investment in Pakistan is however relatively small and particularly concentrated only to some specific sectors. Low economic development and comparatively weak macroeconomic fundamentals in Pakistan during the past few years partially are behind the low foreign investment, including portfolio investment flows in the country. Intensity and liquidity of the local debt and capital markets are always the most serious factor for the investors when portfolio allocations are being made. Likewise, any occasion where investor

is not able to get competitive market prices leaves a long-term impression, which is hard to remove (Ghumman, 2013). Foreign portfolio investment brings the benefit for the integration of Pakistan's economy with the global economy in the areas of technology and skill transfer. Portfolio investment in Pakistan is mostly in short term and medium term debt instruments. Pakistan has taken extensive steps to liberalize its inward investment system in the 1990s and has succeeded in attracting considerable quantity of overseas investment (Zakaria, 2009). In the 1990s, government begins to impose the similar rules and policy to international investors as on the native investors. The condition of government permission on international investment was discarded except than to some industries (currency and mint, arms and ammunition, high explosives, security printing, radioactive substances, and beverages contain alcohol). In sectors other than industrial, like forestry, commercial activities, agricultural land, housing, irrigation, and real estate were excluded to foreign investment. Numerous fiscal incentives, like tax holidays, were granted to investors in every industry, along with particular custom duty in addition to sales tax allowances. The removal of enormous amount of tariff plus nontariff barriers, broadening of export incentives, and modification of Pakistan's visa policy, are the steps to attract the international investors.

The portfolio investment system of Pakistan is comparatively easy and more liberal as compared to regional countries, including India and Bangladesh. Compared to India, Pakistan offers more encouraging regulatory atmosphere in terms of easy registration system; no quantitative limitations or restrictions on volume of overseas investment; simple procedure and no approvals required for repatriation of profits and principal amount; and permission to hedge foreign currency risk both in case of investment in equity and bond markets (Ghumman, 2013). Surges in foreign capital inflows create the volatility in the stock

exchange and exert pressures on the value of local currency. Definitely, variations in the value of Pak Rupee influence the decisions of the foreign investors. So keeping all these facts in view, this study is formulated to analyze the effect of the exchange rate and exchange rate volatility at the level, at 1st lag, and at the 2nd lag to see the deeper impact on the foreign portfolio investment. The study also aims to identify the sector-specific factors that are important in explaining the volume of foreign portfolio investment in different sectors.

Table 1 reports the foreign portfolio investment in million US dollar in each sector. From the year 2006 to 2011, the Fertilizer sector attracted more FPI than the rest of the sectors. From the beginning of 2006 to 2009, very low amount of FPI is made in food sector, while in 2011 enormous amount of investment made in this sector. Textile sector shows the somehow less variation in every year. Foreign investment of 75.5 million US$ was made in 2007 in the textile sector. Chemical sector gained good amount of FPI in 2006 and 2007 but after that foreign investors shows less interest in this sector. In cement sector, 149.6 million US$ investment made in 2007, which decreases to 104.4 million US$ in 2011, while very less investment is made in 2009 i.e. 7.70 million US$. As compared to other sector foreign portfolio investors invested very less in paper & pulp sector. The substantial amount of FPI is made in 2007 in communication sector i.e. 235.6 million US$, while very low investment made in 2011.

In transport equipment sector from 2006 to 2009 the level of investment was not good but it was considerable in year 2010 and 2011 i.e. 42.9 and 42.7 million US$, respectively. Power sector shows the consistency in every year, not huge investment is made in this sector in any year, from which 2008 carries lesser amount of FPI i.e. 27.1 million US$. When we compared all sectors' investment we came to know that petroleum refining sector faces major

obstacles to attract foreign portfolio investment. In 2008, the FPI was negative in petroleum refining sector. Other years also show very less amounts. Table 1 show that the main focus of the foreign portfolio investors is on the fertilizer sector. This is because Pakistan has an agricultural based economy, so investors would like to invest in the fertilizer sector. In 2006 investment is in 60 million US$ which jumped to 296 Million US$ in the very next year. In the next two preceding years, the investment decreased but not as much as in other sectors. In the year 2010 and 2011, again foreign investors invested substantially i.e. 284 and 239 million US$, respectively. The last column of table shows the aggregate amount of foreign portfolio investment of each sector.

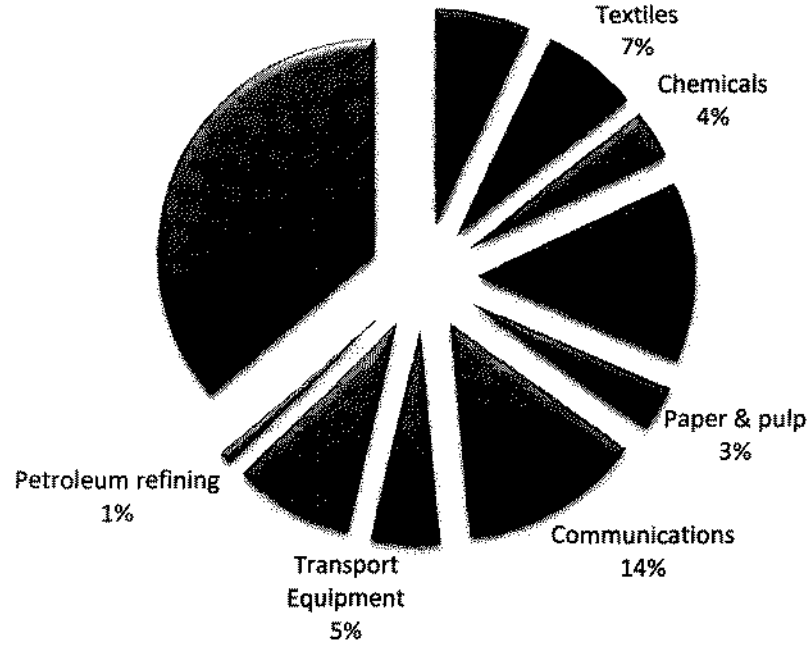
Table 1: Foreign Portfolio Investment in Each Sector from 2006-2011 (Million US$)

Sectors	2006	2007	2008	2009	2010	2011	Total
Food	0.50	0.90	0.60	0.00	94.9	135.2	232.1
Textile	21.3	75.5	15.8	22.4	48.6	51.3	234.9
Chemicals	55.0	41.1	16.6	1.30	2.70	4.30	121.0
Cement	24.8	149.6	73.8	7.70	80.8	104.4	441.1
Paper & pulp	22.7	0.70	9.00	27.9	24.3	29.4	114.0
Communication	30.2	235.6	63.2	31.7	53.7	26.8	441.2
Transport Equipment	20.5	25.6	20.4	15.7	42.9	42.7	167.8
Power	52.1	54.3	27.1	68.7	52.3	39.4	293.9
Petroleum refining	0.10	15.0	-11.3	6.00	10.8	11.2	31.8
Fertilizers	60.6	296.2	152.7	155.7	284.7	239.7	1189.6

Source: State Bank of Pakistan's publication "International Investment Position of Pakistan".

Similarly, Figure 1 shows the cumulative foreign portfolio investment in Pakistan in different sectors from the year 2006 to 2011. Table 1 and Figure 1 show that the major foreign portfolio investment is made in the fertilizer sector i.e. 36% of all the sectors. The year 2011 shows the enormous increase in all sectors' portfolio investment, especially in the fertilizer. After fertilizer sector foreign investors primarily has invested in cement and communication sector that is the 14%. Power and food sectors portion is comparatively less than the other sectors i.e. 9% and 7%, respectively. Textile and food sector almost have attracted equal proportion (7%) of the international foreign investment. After these sectors transport equipment, chemicals, paper and pulp, and petroleum refining sectors attracted the international portfolio investment in very less proportion i.e. 5%, 4%, 3%, and 1%, respectively. We observe from Table 1 that there is significant variation in foreign portfolio investment over the examined period.

Figure 1: The cumulative FPI in Pakistan classified by sectors during the year 2006-2011



Further, Figure 1 provides evidence of the cross sector variation in foreign portfolio investment. In this context, it would be useful to examine whether the exchange rate level and its volatility have any influence on foreign portfolio investment. It would be informative to see how and what sector-specific factors affect foreign portfolio investment.

1.2. Gap in the literature

Overall there have been very limited studies on this issue in the literature, which are conducted on the firm or sector level data. Most of the work related to this issue is on aggregate level. Second, no study has been conducted on the effect of the exchange rate volatility on foreign portfolio investment in case of Pakistan, neither on aggregate level nor on the sector or firm level data. So it would be worth exploring to see the impact of exchange rate and its volatility on the international portfolio investment in Pakistan.

1.3. Objectives of the study

The main objective of the study is to analyze the impact of exchange rates and the exchange rate volatility on the foreign portfolio investment in Pakistan. To see the deeper impact of exchange rate and its volatility we used their 1st and 2nd lags. In this aspect, we will predict that low currency risk enhances the portfolio investment in Pakistan. This study uses sector-level data to explore the effect of exchange rate and exchange rate volatility on foreign portfolio investment. The study also aims to explore the sector level variables that have significant impact on the foreign portfolio investment. Specifically, sector size, net profitability, dividend payment, liquidity, leverage of a sector, growth of a sector, and retention in business of a sector are considered as explanatory variables while examining the impact of exchange rate volatility on foreign portfolio investment.

1.4. Research questions

1. Does exchange rate volatility significantly affect the inflows of foreign portfolio investment in Pakistan?

2. How does the exchange rate affect the foreign portfolio investment in Pakistan?

3. Does the past values of exchange rate and its volatility affect current level of foreign portfolio investment in Pakistan?

4. What are the sector-level variables that affect the foreign portfolio investment?

1.5. Importance of the study

The exchange rate volatility creates risk in financial instruments. Moreover, the pervious literature shows that high exchange rate risk lowers the foreign portfolio inflows (Stancu, 2010, Jiang, Yma, and Yan, 2012, and Aranyarat, 2011). The unpredictable variation of exchange rate affects the economy through trade of goods and services as well as gains and losses on financial assets valuation (Gourinchas and Rey, 2005 and Aranyarat, 2011). In recent years, the value of Pakistani rupee against almost all major currencies has decreased significantly.

This drastic change in currency value definitely influences the decisions of investors (both domestic and foreign) to invest in Pakistan. Therefore, it is very necessary to examine how unexpected variation in exchange rate affects foreign portfolio investment in Pakistan. Understanding of the exchange rate volatility effects on foreign portfolio investment helps policymakers to design effective policies in order to enhance the volume

of FPI in Pakistan. The study also helps to investors and business firms to design effective strategies to hedge exchange rate exposures.

1.6. Design of the study

The outline of thesis is as follows. The second chapter presents the economic theories related to the impact of exchange rate risk on foreign portfolio investment. The third chapter contains the literature review about the exchange rate uncertainty and sector-specific variables. Fourth chapter is about the data and the overview of research methodology. Fifth chapter presents the empirical analysis and interprets the results. The last chapter is composed by presenting conclusion, policy recommendations and limitation of the study.

Chapter 2

Economic Theory

There are some economic and finance theories related with the impact of exchange rate volatility on the foreign portfolio investment. In this chapter we discuss two main theories that explain the impact of exchange rate risk on foreign portfolio investment.

2.1. Portfolio balance approach

According to portfolio balance approach asset holders wish to allocate their portfolios in shares that are well defined function of expected rate of return. This theory mainly focuses on the exchange rate changes as the policy instrument and ignored the movements in capital. Patinkin (1965) suggested that the changes in nominal money are opposite to the changes in exchange rate, which means reduction in nominal money supply of money directly leads to devaluation. In 1969 Mackinnon proposed the portfolio balance model with in the standard Keynesian model, which de-emphasizes the value of income flows and balance sheet considerations. He also took into the consideration, issues of capital mobility, and the capital immobility in line with the exchange rate during fixed and floating exchange rate regimes. He concluded that when in a non-growing economy exchange rate is fixed and there is no control on the trade, in a deficit situation of fiscal authority's budget, eventually creates the continuous losses in the flow of exchange reserves (Dreyer, 1974).

The assumption of this theory is that no perfect substitute of asset is present in different countries. The demand and supply value of assets are affected through the exchange rate, and

the premium given on that risk included in the interest power parity condition. The existing empirical literature shows the mixed results of portfolio balance model. Frankel (1983) supported portfolio balance model by showing the effects of exchange rates using data of Canada and the USA. Obstfeld (1980) has not seen such exchange rate effects in his study. However, Black and Salemi (1988) results support the asset balances with the unpredicted exchange rate volatility. Blundel-wingnall (1991) examines exchange rate effects on the balance of current account. His results are also consistent with portfolio balance models (Cushman, 2003).

In this theory asset market model is of great importance, in which condition of perfect capital mobility holds, for which exchange rate movement occurs to equilibrate the demand of domestic assets. The domestic and international bonds are become perfect substitute in asset holder portfolio, is a strong assumption. Portfolio shares react very much to the predicted rate of return. In the balance portfolio approach, Frankle (1983) examines the exchange rate effect on the current account. According to him it is not necessary for the exchange rate to clear the current account. The correlation between the current account deficit and the exchange rate is very strong, not only when value of dollar depreciated in 1978 but also when the condition was reversed in 1980.

When the stock prices increases it boosts the value of domestic currency. This encourages investors to buy domestic stocks and sell the international securities present in portfolios. Apart from the direct impact, it also creates a pressure over the exchange rate. Increases in prices of stocks raise the demand of money as well as interest rates. An increase in the interest rates captivates the overseas portfolio investments. So in this scenario, international portfolio managers create demand of the domestic currency by selling the

international currency; which generate the downward pressure upon the exchange rate. Similarly, in a declining stock market, international funds sell the native currency and buy international currency that creates an upward pressure on the exchange rate (Anlas, 2012).

2.2. Behavioral portfolio theory

According to behavioral portfolio theory (BPT) presented by Shefrin and Statman (2000), it is well known, that some risks are there in foreign portfolio investments: portfolio risk and exchange risk. Portfolio risk emerges from the fluctuation in prices of particular assets calculated in domestic currencies, whereas the exchange rate risk is because of the portfolio's local currency return divergence as consequences of fluctuation in foreign exchange. In the existence of exchange rate risk faced by foreign investors, the preferred optimal portfolio diverges mostly from the efficient foreign portfolio without contemplation of exchange risk. It is necessary to consider the foreign portfolio selection method and features of foreign optimal portfolios within the existence of exchange rate risk, because this will improve perspective of practical foreign investment strategies (Jiang, Yma, and Yan, 2012).

The key purpose of foreign portfolio investments is the price preservation of portfolio and appreciation. For value preservation, it is required to control the risk, whereas for the value appreciation, the high portfolio return is required. These goals are best presented in the BPT (Shefrin and Statman, 2000) rather than within the conventional mean-variance (MV) approach. According to this theory if investors invested in imported goods, but have no foreign security in his portfolio, then he faces the two types of risk i.e. the exchange rate risk, as well as domestic and foreign inflation risk. Duefy (2011) states if the purchasing power parity condition holds then the exchange rate risk do not affect the international portfolio investment.

Chapter 3

Literature Review

Research previously done on the exchange rate has emphasized on its significance as one of the main determinants of global portfolio investment. However, whether the exchange rate risk affects the portfolio investment positively or negatively is not clear. Prior studies have reported mix results. This section will review the relevant literature on the impact of exchange rate volatility and other macroeconomic variables on foreign portfolio investment. The literature review is organized in subsections according to the findings of the previous studies.

3.1. Variables having a positive impact on foreign portfolio investment

Thapa and Poshakwale (2011) in their study use panel data of 36 developing and developed countries from 2001 to 2009 for analyzing empirically the effect of equity specific market characteristics on foreign equity portfolio investment. They use stock market development factors and market liquidity that have the noteworthy impact on the foreign portfolio equity portion. Their results show that the foreign investor preferably invests on those markets that have the good efficiency, larger in size, having high liquidity and lesser trading charges.

Another study of Lijebolum and Loflund (2000) analyze the determinants of foreign investor equity investment flows on which restriction for foreign investment is recently removed. By using the monthly data of Finnish non-financial companies listed on Helsinki Stock Exchange during 1993 to 1998. They run the multivariate regression of foreign

ownership on firms' characteristics to evaluate the performance of local and foreign investor. Their results indicate that foreign investment flows are significantly related to the dividend yield, liquidity, and firm size and to some extent to profitability. They also conclude that there is a significant difference between foreign and local investor returns and foreign investor beat the market in the Finnish case.

Chai (2010) use the panel data set of Korean listed firms from 1999 to 2003 and run the Tobit regression. Study concludes that firm size, export intensity, and book to market ratio is significantly positively related to foreign portfolio investment. The dividend payout is only positively related to foreign portfolio investment in 2003, in rest of the years it has negative impact on the FPI.

Gumus, Duru, and Gungor (2013) use VAR, impulse response, Var Granger tests, and variance decomposition to check the relationship between the macroeconomic factors and foreign portfolio investment from 2006 to 2012. Their results show that for some periods, the macroeconomic factors have a positive effect, while for other periods, they have a negative impact on FPI. However, they show that the exchange rate has a negative impact on foreign portfolio investment for all periods.

Makaew (2008) takes into consideration the Thailand stock market from September 2005 to August 2006, to check the impact of foreign portfolio investment on different sizes of firms. His results show that foreign portfolio investment is more beneficial to the large size firms. FPI is also positively related with the small size firms but with the smaller proportion. Other variables that are profitability of firms, export size, and the firms with foreign directors attract FPI but with the lesser proportion to the big size firms.

Some other studies such as Agerwall (1997), Klapper and Peter (2003), and Giofre (2012) have successfully related the FPI to other factors such as, economic activity, shares of domestic market, corporate governance, legal framework, and the stronger shareholder rights.

Following the studies cited above, this study includes the following factors: Liquidity of sectors, Size of sectors, Dividend payout of sectors, Leverage of sectors, and the Profitability of sectors.

3.2. Variables having a negative impact on foreign portfolio investment

Chukwuemeka, Malaolu, Oduh, and Onyema (2012) find that the real exchange rate, market capitalization, trade degree of openness and institutional quality in Nigeria are the long run determinants that negatively related to international portfolio investment. Another study of Leape and Thomas (2010) revealed that the rises in an inflation discrepancy and long-term bond discrepancy, both relative to the US, depress foreign portfolio investment inflows. In addition, the long-term enhancement in the Government excess to GDP ratio for South Africa also disheartened the flows.

According to Chukwuemeka and Ekeocha (2008) in Nigeria, the long run determinants of FPI over period 1986-2006 are checked through time series analysis, which concludes that the Market capitalization, real exchange rate and trade openness have the long run negative impact on cross border portfolio investment in Nigeria. The capital market and real GDP growth rate have the unidirectional causality relationship with FPI.

Chai (2010) use the panel data set of Korean listed firms from 1999 to 2003 and run the Tobit regression. He found that firm leverage is significantly negatively related to foreign

portfolio investment. The relationship between the foreign portfolio investment and the dividend is negative but not significant statistically from 1999 to 2002.

Durham (2013) utilizes cross sectional 88 countries data from 1977 to 2000. The OECD data from 1977 to 1981 shows the negative impact of Growth which is insignificant. The one percent increase to FPI decreases the 1.396 percent to growth rate. The result of regression on FPI and development of stock market interaction shows the insignificant impact.

The study of Uctum and Uctum (2011) in Turkey examines the essentials of foreign portfolio inflows to Turkey using endogenous break analysis by controlling the economic, financial and political uncertainty with country specific risk indicators. This study indicates that FPI is affected through the domestic banking crises of 2000, the current volatility in the market and breaks parallel to policy shift and crises can have the remarkable effect on capital flows.

Following the studies cited above, this study includes the following factors: Growth of the sectors, Dividend payout of sectors, Retention in business of the sectors, and the Exchange rate.

3.3. Impact of exchange rate risk on foreign portfolio investment

On the issue of exchange rate risk impact on foreign portfolio investment, many studies have been conducted. In the literature Aranyarat (2011) in this respect examines the link between the foreign exchange rates risks on foreign portfolio flows across individual listed firms listed in stock exchange of Thailand. It is one of the unique studies, which analyzed this impact on firm level data. For this purpose panel data analysis and monthly data from 2005

to 2009 is used. His results showed that there is a negative relationship between the exchange rate volatility and foreign portfolio investment. Means high exchange rate risk lowers the firm specific foreign portfolio flows to Thailand. He also reports the stock return is one of the powerful determinants of foreign firm specific portfolio flows.

Sirr, Garvey, and Gallagher (2011) analyze the correlation between foreign exchange rate and foreign equity portfolio investment in emerging markets of Argentina, Mexico, India, China, Brazil and Russia to compare these with portfolio risk in the USA through variance-covariance VaR risk factor mapping approach over the period January 2003 to December 2010. They showed that foreign exchange risk is significant in Brazil and Mexico, but it is less significant in China and Russia as compared to the USA equity portfolio. So Argentina and India have the same level of foreign exchange risk as of the USA. In the equity portfolio investment, the exchange rate instability and the association between exchange rate return and foreign equity return are the contributory factor in foreign exchange risk.

Stancu (2010) studies the impact of foreign exchange risk on international well-diversified portfolio of assets by using relative VaR (RVaR) model having 1-week time horizon with variance-covariance approach and with the assumption of non-normality of risk and conditional volatility. His empirical results support that the assets present in portfolio are not constant over time and the instability in foreign exchange rate work as forth asset, because its movement contribute approximately one forth to the relative value at risk (RVaR) of the portfolio, so it shouldn't be left unchecked. The exchange rate volatility creates risk in financial instruments, on average, foreign exchange risk contribute 26.91% in value at risk portfolio.

Gentalgerger, Loretan, Subhanij, and Chan (2009) provide the empirical evidence about the Thai exchange rate fluctuation due to international investors cross border portfolio rebalancing decision. The data of daily-frequency database of foreign exchange and equity market capital flows of nonresident investors in Thailand is ranging from January 2005 to 15 December 2006. The results support the linkage between portfolio rebalancing by non-residents to the exchange rate fluctuations. However, a very small decrease of Thai equity is associated with a depreciation of Baht.

Nielsen (2012) check the foreign investment portfolio level in sub-Saharan African countries and detect under or overinvestment from the year 1996 to 2010. This study also discusses the impact of foreign exchange rate on the foreign portfolio investment level of 42 countries' currencies to US dollar through Graphical representation and concludes that countries with stable exchange rate polices have the higher level of portfolio investment. Due to the financial crises and partial return potential in the developed countries, the investors are more enthusiastic to invest in the rising markets of sub-Saharan area because of the aspiring interest for investment.

Fidora, Fratzcher, and Thaiman (2006) focus on the real exchange rate volatility in cross-country differences in portfolio home bias across financial asset classes (bonds and equity). Data on global equity and bond holdings for the years 1997, 2001, 2002 and 2003 of 70 countries are collected through survey. The Markowitz-type portfolio selection model is used. They show that the real exchange rate volatility is an important factor behind bilateral portfolio home bias and monthly exchange rate volatility has the higher impact on bond home bias than equity home bias. Their model predicts that those assets, which have

comparatively high local currency, return volatility will react less to the real exchange rate volatility than those assets, which have the comparatively low local currency return volatility.

Chapter 4

Data and Research Methodology

4.1. Data description

The study is based on balanced sector-level annual panel data set to examine the impact of the exchange rate volatility on portfolio investment in Pakistan. The study covers the time period from 2006 to 2011. Foreign portfolio investment sector wise data have been taken from the State Bank of Pakistan's publication "International Investment Position of Pakistan". The sectors which our data set covers are Food, Textile, Chemicals, Cement, Paper & Pulp, Communication & Transport service, Transport Equipments, Power, Petroleum refining, and Fertilizers. The sector-specific annual variables data have been taken from the State Bank of Pakistan, specifically from "Financial Statement Analysis of Companies (non-financial) Listed at Karachi Stock Exchange". In addition, the exchange rate monthly data have been taken from the State Bank of Pakistan and IMF databases. The sample size of the study is based on the 600 observations.

4.2. Empirical model

In panel estimation, the variables included in standard regression framework differ both over time span and over the individual observations. In this study, for year *"t"* and for sectors *"i"* are used. The standard linear regression model is:

$$Y_{i,t} = \beta_o + X_{i,t}\beta + \mu_{i,t} \qquad (1)$$

The β_o and β are intercept and slope in the model are the same across all the years and sectors. The error $\mu_{i,t}$ varies across both years and sectors and accounts for the unobservable factors that affect the dependent variable. The $X_{i,t}$ is a vector containing the independent variables, which includes lag foreign portfolio investment, sector size, net profitability, leverage, liquidity, dividend payout, growth of sector, retention in business, the exchange rate, and the exchange rate volatility.

In order to find the relation between foreign portfolio investment at sector-specific level and the exchange rate risk, we constructed the model by following the study of Aranyarat (2011), Chukwuemeka and Ekeocha (2008) and Dua and Garg (2013). The empirical models are written as follows.

This equation includes sector-specific variables, the exchange rate, and the exchange rate volatility variables at their levels.

$$FPI_{i,t} = \alpha_i + \beta_1 FPI_{i,t-1} + \beta_2 SIZE_{i,t} + \beta_3 NP_{i,t} + \beta_4 LEV_{i,t} + \beta_5 LIQ_{i,t} + \beta_6 DIV_{i,t} + \beta_7 GROWTH_{i,t} + \beta_8 RIB_{i,t} + \beta_9 ER_t + \beta_{10}\sigma_t + \mu_{i,t} \quad (2)$$

Where

$FPI_{i,t}$ is foreign portfolio investment.

$SIZE_{i,t}$ represents the size of sector *i* at year *t*.

$NP_{i,t}$ represents net profit of sector *i* at year *t*.

$LEV_{i,t}$ is leverage of sector *i* at year *t*.

$LIQ_{i,t}$ is the liquidity of the sector *i* at year *t*.

$DIV_{i,t}$ is dividend of sector *i* at year *t*.

$GROWTH_{i,t}$ represents growth of sector *i* at year *t*.

$RIB_{i,t}$ is retention in business of sector *i* at year *t*.

ER_t is exchange rate at year *t*.

σ_t is exchange rate volatility.

Now we add the 1st lag of exchange rate and exchange rate volatility in the equation (2), as most of investor think the foreign portfolio investment as the hot money. So to check the one year deeper impact of exchange rate and its volatility on the FPI in Pakistan, 1st lag added in the equation, by replacing ER_t and σ_t to ER_{t-1} and σ_{t-1} , respectively, yields the following model:

$$FPI_{i,t} = \alpha_i + \beta_1 FPI_{i,t-1} + \beta_2 SIZE_{i,t} + \beta_3 NP_{i,t} + \beta_4 LEV_{i,t} + \beta_5 LIQ_{i,t} + \beta_6 DIV_{i,t} + \beta_7 GROWTH_{i,t} + \beta_8 RIB_{i,t} + \beta_9 ER_{t-1} + \beta_{10}\sigma_{t-1} + \mu_{i,t} \quad (3)$$

In the level equation (2) we replace the first lag with the second lag of the exchange rate and the exchange rate volatility, to check the 2nd year deeper impact of the exchange rate and its volatility on the decision of the foreign portfolio investor. In this regard ER_t and σ_t are replaced to ER_{t-2} and σ_{t-2} respectively.

$$FPI_{i,t} = \alpha_i + \beta_1 FPI_{i,t-1} + \beta_2 SIZE_{i,t} + \beta_3 NP_{i,t} + \beta_4 LEV_{i,t} + \beta_5 LIQ_{i,t} + \beta_6 DIV_{i,t} + \beta_7 GROWTH_{i,t} + \beta_8 RIB_{i,t} + \beta_9 ER_{t-2} + \beta_{10}\sigma_{t-2} + \mu_{i,t} \quad (4)$$

where variables are defined as follows; Foreign portfolio investment (FPI) is defined as foreign portfolio investment in a sector divided by total value of book assets of that specific sector in which foreign portfolio investment is made in that specific year. The lag value of FPI is also included as independent variable in the model i.e. $FPI_{i,t-1}$. α_i is the

fixed effects in analysis of panel data. One of the properties of fixed effect is that it confines the sector specific characteristics. In this thesis fixed effect clarify the different response of FPI by sector to exchange rate volatility. $SIZE_{i,t}$ represents the size of sector i in years t. The natural logarithm of total value of book assets of each sector is used as proxy for the size. Size of sector expected to influence the foreign portfolio investment in a positive manner (Thapa and Poshakwale, 2011, Lijebolum and Loflund, 2000, Gumus, Duru, and Gungor, 2013, and Chai, 2010) . But there are some studies in literature which show the negative impact of size on FPI (Ekeocha and Chukwuemeka, 2008 and Al-Khori, 2012).

$NP_{i,t}$ shows net profit of industry i in year t. The total profit before tax is divided by the total value of assets of each sector in specified year. It shows that as the amount of profitability increases in the sector the foreign portfolio investment also increases in that sector. Net profitability increases the volume of foreign portfolio investment according to previous studies (Aggarwal, Klapper, and Wysocki, 2000). $LEV_{i,t}$ is the leverage of sector i in year t. It is the debt to equity ratio used as a proxy for the leverage of each sector. In this study, the leverage is calculated by dividing the total liabilities to stockholders' equity. It determines the long run financial distress. Literature shows the positive impact of leverage on FPI (Lijebolum and Loflund, 2000). $LIQ_{i,t}$ is the liquidity of the industry i in year t. Here current ratio i.e. current asset to current liabilities is used as proxy for the liquidity of each sector in specified year. It determines the interim financial distress and financial health. Expected sign of liquidity is positive, as the sectors become more liquid the FPI is more attracted towards that specific sector (Lijebolum and Loflund, 2000 and Kang and Stulz, 1997, and Aron, Leape, and Thomas, 2010).

$DIV_{i,t}$ is dividend of *i*th industry at year *t*. Proxy for this is used by the total amount of dividend in each sector divided by its total value of book assets in each year. This dividend payout tries to confine the taxation disparity between native and distant investors. Some studies showed the positive impact while some shows the negative impact on the FPI (Lijebolum and Loflund, 2000, and Aggarwal, Klapper, and Wysocki, 2003). Excessive the dividend payment, the greater the fraction of income is taxable for the overseas investor. Foreign investors could be expected to avoid very high yield stocks. $GROWTH_{i,t}$ is the growth of industry *i* at year *t*. It is the difference natural logarithm of total sales used as proxy for the growth of the sector in each year. Some studies mention the positive impact of growth on FPI (Ekeocha and Chukwuemeka, 2008, Gumus, Duru, and Gungor, 2013), while some researches show the negative impact on FPI (Santis and Luhrmann, 2006, and Lijebolum and Loflund, 2000). Because investors prefer to invest in those sectors which are located in the developed economies, plus the investors also hesitate to invest in those sectors where the growth is temporary. $RIB_{i,t}$ is the retention in business of industry *i* at year *t*. Here total amount of retention in business in each sector is divided by its total value of assets of each year.

ER_t is exchange rate of Pak Rupee to US dollar at the end of each month taken for the specified years. Literature shows that exchange rate has the negative impact on the foreign portfolio investment (Stancu, 2010, Ekeocha and Chukwuemeka, 2008, Gumus, Duru, and Gungor, 2013, and Gyntelberg, Loretan, and Chan, 2009). σ_t is the exchange rate volatility, calculated through the ARCH/GARCH model. Following presented studies; we predict a negative impact of the exchange rate volatility on FPI (Dua and Garg, 2013, Stancu,

2010, Yma and Yan, 2012, Sirr, Garvey, and Gallagher, 2011, Sakuragawa and Watanabe, 2010, and Serven, 2002). Higher exchange rate volatility shows a higher amount of uncertainty within the returns earned by foreign investor. The unpredicted changes in exchange rate creates the uncertain situation for the foreign investors for their returns. The risk of uncertainty in exchange rate is higher the foreign investors demand higher return. This, in turn, decreases the opportunities of investment in a country or in the countries' sectors and firms.

$ER_{t-1}, ER_{t-2}, \sigma_{t-1}$ and σ_{t-2} are the lagged values of exchange rate and lagged values of exchange rate volatility. According to international investors' view, foreign portfolio investment is called the temporary investment or the hot money. Foreign investors typically allocate savings as the portfolio investment to get temporarily additional benefits from diversification. The previous year's values of the exchange rate movements plus its volatility are powerful to ascertain the foreign portfolio inflows (Aranyarat, 2011).

4.3. Estimation method

To examine the determinants of foreign portfolio investment and impact of exchange rate on FPI we employ a robust two-step system dynamic panel data (DPD) estimator, the generalized method of moments (GMM) approach, which was commenced by Blundell and Bond (1998), and Arellano and Bond (1991). The approach proposes by Arellano and Bond (1991) utilizes the inner instruments to handle the correlation between the endogenous variable having lagged values and time-steady components of disruption. This system takes the difference of primary equation and then employs the prearranged instruments lagged values of independent variables. Specifically, if the time varying components of the

disruption is consecutively uncorrelated, the second and higher array lags of the independent variables become valid instruments. The main disadvantage of this procedure is that, their lagged levels may be very poor instruments of their differences.

Therefore, Blundell and Bond (1998) confer a batter alternative in shape of system GMM estimator. This integrates the equations in differences that have the lagged degree of the independent variables, comprises the level equation, instrumented with lagged differences of the independent variables (Serven, 2002). Therefore, this study will use the J statistics to evaluate the stability of model, and to test the serial correlation in error term. For autocorrelation the Arellano and Bond (1991) test will be applied.

Baum, Schaffer, and Stilman (2003) explain the instrumental variable (IV) approach in GMM estimation. Roodman (2009) write the article on the system GMM and difference GMM. This study discusses how the limited data, fixed effect, and the endogenous regressor affect the estimators of the model. For this purpose, the Stata example is use, where xtabond2 is use for the estimators. For checking the autocorrelation the Arellano-Bond is use on panel data. Blundel and Bond (1997) discussed the two linear estimators. The first one is asymptotic efficiency and the second one is Monte Carlo simulations. They use labor demand equation of company panel data.

Arellano and Bond (1990) discussed the Dynamic panel data (DPD) by the GMM. The data of 140 UK companies from 1979 to 1984 use the regressors which are not strictly exogenous. Study uses the Sargan test and Husman test for the identification of serial autocorrelation. Bond (2002) discussed about the single equation dynamic panel data estimator on huge quantity of individuals and on the little number of time spans. Caglayan

and Rashid (2014) apply the two-step system GMM estimator for estimating the impact of uncertainty on UK public and nonpublic manufacturing firms' leverage.

Heid, Langer, and Larch (2011) use system GMM to find that the high amount of income can cause democracy in 150 countries. A result shows the positive link between both of these variables. Efendic, Pugh, and Adnett (2009) study apply the robust system GMM dynamic panel methodology on transition population countries to find the link between institutional development and economic performance.

4.4. GARCH model

In order to estimate the exchange rate volatility previous studies use the generalized autoregressive conditional heteroscedastic GARCH model to construct heteroscedastic conditional volatility and to capture the autocorrelation problems. In GARCH based exchange rate volatility measure the future as well as past information is employ, and hence its lagged values may be correlated with the time deviating disruptions. To remedy this, an "ingenious" measure of exchange rate uncertainty is constructed, from Auxiliary Regressive (AR) exchange rate equation, by using the current and lagged exchange rate information only (Serven, 2002).

Following the study of Aranyarat (2011) we construct the exchange rate volatility. The Auxiliary Regressive (AR) approach for exchange rate volatility in order to state the optimal AR lags, the model is formulated as:

$$ER_t = \alpha_o + \sum_{i=t}^{p} \alpha_i ER_{t-1} + \mu_{i,t}$$

Accordingly, the GARCH (1 1) model is demonstrated as follows:

$$\Delta ER_t = \sigma_o + \sigma_1 \Delta ER_{t-1} + \mu_t : \mu_t / \Psi_{t-1} \approx N(0, h_t), \Psi_{t-1}$$

$$h_t = \beta o + \beta_1 \mu^2_{t-1} + w_1 h_{t-1}$$

where ΔER_t is log of exchange rate, μ_t is error term, h_t is the contemporary conditional variance, and h_{t-1} is the one period lagged conditional variance. However, in GARCH model it is mandatory that the coefficient of exchange rate should be positive. Then this variable (ER) can be employ to formulate exchange rate conditional variance.

Following the studies of Zakaria and Abdalla (2012), Baala and Asemota (2013), Anlas (2012), Dua and Garg (2013), Aranyarat (2011), and Serven (2002), this study uses ARCH(1) specification with autoregressive-moving average ARMA(1 1) process, to construct the conditional variance. ARMA use to predict the future values in the series. It consist of two parts; one is autoregressive (AR) and second is moving average (MA). On the initial regression ARMA is employed to obtain the residuals, which can be autoregressive or moving average, then we check whether ARCH effect is present in the residual series or not.

Chapter 5

Empirical Analysis

In this chapter, we present empirical results and their interpretations. Specifically, the chapter first displays the results of unit root test and the results of the ARCH model that we use to generate exchange rate volatility. The chapter then presents the summary statistics of the variables to examine their distribution. Next, the correlation estimates are also given in this chapter. Finally, we present the results of the two-step system GMM estimation to examine the impact of the exchange rate and its volatility on sector-level foreign portfolio investment.

5.1. Summery statistics of exchange rate returns series

To identify the properties of the monthly exchange rates returns, different descriptive statistics calculated and given in Table 2.[1] Kurtosis measure the flatness and peakness of data. When we see Table 2, positive skewness and high kurtosis are observed for the monthly series for Pak rupees, which suggest departure from normality. Similarly, the Jarque-Bera (J-B) statistic, that is an experiment for normality and test the goodness of fit of data, also confirms that the null hypothesis of normality for the monthly series should be rejected. In addition to that, a highly leptokurtic distribution is observed for all series. The mean value of exchange rate, which is 0.173, is significantly greater than its median value.

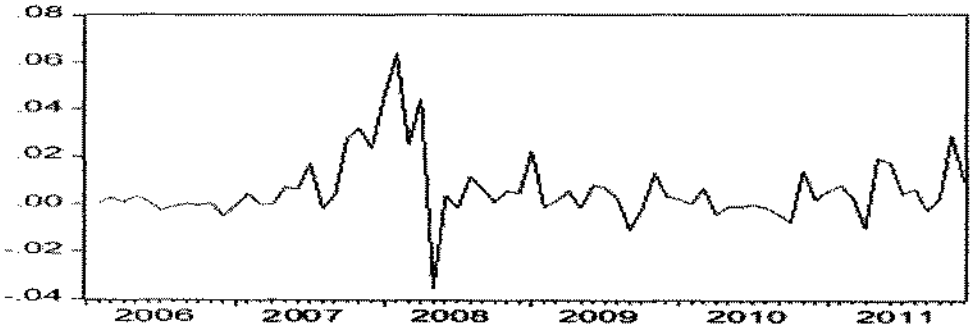
[1] We find the exchange rate returns by taking the first difference of the log of exchange rate.

Table 2: Summary statistics of exchange rate returns

Mean	0.173
Median	-0.059
Maximum	4.035
Minimum	-2.092
Std. Dev	0.989
Skewness	1.679
Kurtosis	7.484
Jarque-Bera	93.82
Probability	0.000

Figure 2 shows monthly trends of the exchange rate returns from the year 2006 to 2011. Vertical axises are the value of difference log of exchange rate, while on horizontal axises, years are mentioned. According to this figure, in 2007 and 2008, a drastic change can be seen the exchange rate values. However, the figure does not show any time trend. We can also see a significant variation during the period of 2007-2008. These variations may attribute to 2007-2008 financial crises. One can expect that the financial crises may influence the response of foreign portfolio investment. However, in this study, we do not take into account such possibility. But one can extend our study by considering the impact of financial crises on the relationship between FPI and the exchange rate.

Figure 2: Exchange rate trend from 2006 to 2011



5.2. Testing Stationarity

When the values of mean and the variance are stable with the passage of time, then the exchange rate returns is stationary. To scrutinize the stationarity of the exchange rate series Augmented Dickey-Fuller (ADF) test is applied. The ADF equation includes only intercept. We do not include time trend in the equation, as the exchange rate returns do not exhibit any time linear return. The optimal lag order for unit root test is selected by using AIC. We find that the null hypothesis of unit root is rejected at the 5% significance level, and infer that unit root does not exist in the exchange rate returns. That is, the series is integrated of order zero, I(0). This implies that exchange rate returns are stationary.

Table 3: Augmented Dickey-Fuller Test for exchange rate returns

		T-statistics	Prob*
Augmented Dickey-Fuller test statistic		-3.325	0.016
Test critical values:	1% level	-3.499	
	5% level	-2.891	
	10% level	-2.582	

*MacKinnon (1996) one-sided p-value

5.3. Test for Heteroscedasticity

The major issue before using the generalized autoregressive conditional heteroscedasticity (GARCH) method is to firstly analyze the exchange rate's returns series' residuals for checking the existence of heteroscedasticity. In order to test the heteroscedasticity, the test suggested by Engle (1982) the Lagrange Multiplier (LM) is applied. Specifically, the ARCH-LM test used to test the heteroscedasticity in the exchange rate residual series. The null hypothesis is no ARCH effect endures in the series. The results are presented in Table 4. The P-value suggest that we reject that the null hypothesis i.e. no ARCH effects in the residuals.

Therefore, in the following section, we apply the ARCH(1) model to generate the exchange rate volatility.

Table 4: ARCH-LM test for the exchange rate

F-statistic	2.446	Probability	0.069
Obs*R-squared	7.064	Probability	0.070

Notes: H_0 : There are no ARCH effects in the residual series.

5.4. Measuring volatility of exchange rate

Following the studies of Zakaria and Abdalla (2012), Baala and Asemota (2013), Anlas (2012), Dua and Garg (2013), Aranyarat (2011), and Serven (2002), this study uses ARCH(1) specification with ARMA(1 1) process, to construct the conditional variance. Difference log exchange rate used in the mean and variance equation. The results are present in Table 5. The estimates of ARMA(1 1) are significant at the 1% and 5% significance level, respectively and ARCH(1) is also significant at the 1% level. Further, the coefficient of ARCH term is less than one (0.663). The coefficient of ARCH is less than 1 and significant at 1%, which shows that the past values of exchange rate volatility affect the present value of the volatility and its shocks are pretty much persistent. The lower panel of the Table illustrates the diagnostic test of ARCH effect.[2]

The estimates of diagnostic tests show that there is no remaining ARCH/GARCH effect in the residuals. The obtained series of conditional hetroscedasticity we use as a proxy for the exchange rate volatility in our empirical analysis. To match the frequency of the conditional variance series to our annual data, we annualize it by taking its average over twelve months.

[2] The coefficient of GARCH (1 1) on this exchange rate series are not significant. So we used the ARCH(1) method. In the appendix, GARCH (1 1) results are shown.

Table 5: ARCH/GARCH estimates for the Exchange rate

	Coefficient	Std. Error	Z-Statistics	Probability
Constant	0.002	0.003	0.732	0.464
AR(1)	0.930	0.171	5.447	0.000
MA(1)	0.905	0.207	4.381	0.000
		Variance Equation		
Constant	4.34E-05	5.22E-06	8.308	0.000
ARCH(1)	0.663	0.232	3.497	0.000
		Diagnostic tests for remaining GARCH effect		
Log likelihood				219.3
Q(8)				6.684
P-value				0.351
LM-test(4)				0.810
P-value				0.590

Note: This Table shows the results obtained by estimating the ARCH model for exchange rate series. The lower panel presents the results of log likelihood, Q-statistics, and LM test. These tests are used to check the remaining ARCH/GARCH effect in the residual series.

5.5. The robust two-step system GMM estimation

The robust two-step system dynamic panel data system GMM estimator is used in the study. This method use equations in first differences and equations in levels together. The complication of endogeneity is eradicated by taking the lags of the variables as instruments. The Hensan test (1982) is applied to scrutinize the validity of the instruments. The Arelleno-Bond test (AR (2)) is also applied to inquire, the existence of the autocorrelation in the model. Usually, the 1st order autocorrelation prevails in the model having a dynamic nature, but the 2nd order autocorrelation should not be present in the residuals for the robustness of the estimates.

5.5.1. Summery statistics

Table 6 shows the summary statistics of the entire variables used in the models. Mean, Standard deviation, Skewness, Kurtosis, Minima, and Maxima values of FPI, sector size, net profitability, leverage, liquidity, growth, dividend payout, and retention in business, the exchange rate, and the exchange rate volatility are given in the Table 6. The negative skewness values of size, growth, the exchange rate and the exchange rate volatility show that these variables' distributions are skewed left, whereas, the variables i.e. FPI, net profitability, leverage, liquidity, dividend, and retention in business are rightly skewed. Kurtosis is used to check the peakness of a distribution. The kurtosis values of sector size, the exchange rate, and the exchange rate volatility show that these variables have the flatter distribution. The minimum and maximum values show the ranges of variables. Like, size ranges from 15.9 to 20.8. Similarly the exchange rate ranges from 60.62 to 89.67 and its average is 76.91. The standard deviation shows the spread or dispersion of the variables around its mean value. The standard deviation of exchange rate (11.3) shows the highest dispersion amongst all the variables, while retention in business has the lowest dispersion i.e. 0.04, in Table 6. These statistics show that there is considerable variation in the variables across time and across different sectors.

Table 3: Summery Statistics

Variables	Mean	Std. Dev	Skewness	Kurtosis	Min	Max
$FPI_{i,t}$	0.026	0.052	3.613	19.410	-0.001	0.344
$SIZE_{i,t}$	18.77	1.344	-0.621	2.361	15.98	20.87
$NP_{i,t}$	0.107	0.125	2.488	12.86	-0.104	0.786
$LEV_{i,t}$	1.794	1.834	2.715	14.97	-0.775	6.240
$LIQ_{i,t}$	1.258	0.555	1.245	4.176	0.460	3.040
$DIV_{i,t}$	0.044	0.051	2.204	8.315	0.001	0.249
$GROWTH_{i,t}$	0.126	0.170	-2.638	15.77	-0.813	0.454
$RIB_{i,t}$	0.025	0.045	0.871	5.793	-0.109	0.193
ER_t	76.91	11.33	-0.478	1.516	60.620	89.67
σ_t	0.157	0.046	-1.372	3.327	0.060	0.191

Note: Table 6 reports the mean, standard deviation, skewness, kurtosis, minimum and maxima of the variables used in the model. The foreign portfolio investment ($FPI_{i,t}$) is dependent variable but its lag value is used as independent variable in the model. $SIZE_{i,t}$ here represents the total assets of the sector, $NP_{i,t}$ is net profitability of the sector, $LEV_{i,t}$ is leverage (debt/equity ratio) of the sector, $LIQ_{i,t}$ is the liquidity (current asset/current liabilities) of the sector, $DIV_{i,t}$ is the dividend payout of the sector, $GROWTH_{i,t}$ is the net sales of the sector, $RIB_{i,t}$ is the retention in business of the sector, ER_t is the exchange rate, and σ_t is the volatility of the exchange rate. Analysis covers the balance data from 2006 to 2011 on the panel data of sectors specific variables and on exchange rate uncertainty. The instruments used the 5th lag for differenced equation. The method used for estimating the volatility mentioned in Table 5.

5.5.2. Correlation matrix

The correlation between FPI and sector-specific factors and between FPI and the exchange rate and its volatility provide some primarily evidences on the response of FPI and sector-specific determinants, the exchange rate, and its volatility.

Table 7 shows that the sector size and foreign portfolio investment in the sector is positively correlated. Specifically, the correlation coefficient is 0.054. We find that net profitability of a sector and FPI in the sector is significantly positively correlated i.e. 0.288, which is significantly different from zero. The correlation coefficient of liquidity is 0.484, which suggests that the liquidity is highly correlated with the FPI. One can also observe that liquidity is more strongly related to the FPI as compared to other sector-specific variables. Similarly, the sector leverage, dividend payment, and retention in business are also positively correlated with the foreign portfolio investment in the sector. The correlation value of growth (-0.038) shows a negative correlation with the FPI of the sector. However, this correlation is not statistically significant.

In addition, the result in the correlation matrix explains that the exchange rate is negatively correlated with the foreign portfolio investment i.e. -0.117. The correlation coefficient of exchange rate volatility is -0.013, which shows the negative relationship between the FPI and exchange rate volatility. However, both of these correlation estimates are not statistically different from zero. One should note that this does not mean that these variables have a weaker impact on the FPI. The correlation estimates the relationship between two variables without considering which one is leading and which one is following. Further, it does not take into account the effects of other determinants. Therefore, in order to get a clear cut picture of the association between the exchange rate,

its volatility, and the FPI, we should run a regression where other variables should also present. There is also significant correlation between other sector-specific variables. This correlation gives indication of somewhat multicollinearity problem. However, the estimation method that we use here converts the whole data into different form and thus to some extent mitigate the problem of multicollinearity in the model.

Table 4: Correlation Matrix

	$FPI_{i,t}$	$SIZE_{i,t}$	$NP_{i,t}$	$LEV_{i,t}$	$LIQ_{i,t}$	$DIV_{i,t}$	$GROWTH_{i,t}$	$RIB_{i,t}$	ER_t
$SIZE_{i,t}$	0.054								
$NP_{i,t}$	0.288***	-0.274***							
$LEV_{i,t}$	0.259***	0.022	-0.006						
$LIQ_{i,t}$	0.484***	-0.271***	0.446***	0.238**					
$DIV_{i,t}$	0.047	-0.135	0.218*	-0.117	0.327**				
$GROWTH_{i,t}$	-0.038	0.240**	0.012	0.159	0.044	-0.048			
$RIB_{i,t}$	0.224**	-0.192*	0.530**	-0.158	0.466*	0.544***	0.128		
ER_t	-0.117	-0.053	0.125	-0.074	-0.063	0.280	-0.155	-0.191	
σ_t	-0.013	0.195*	-0.191*	0.194*	0.021	-0.220*	0.160	-0.346**	0.032

Note: Table 7 shows the correlation between the lag of foreign portfolio investment, the sector specific variables and exchange rate and its volatility. The foreign portfolio investment ($FPI_{i,t}$) is dependent variable but its lag value is used as independent variable in the model. $SIZE_{i,t}$ here represents the total assets of the sector, $NP_{i,t}$ is net profitability of the sector, $LEV_{i,t}$ is leverage (debt/equity ratio) of the sector, $LIQ_{i,t}$ is the liquidity (current asset/current liabilities) of the sector, $DIV_{i,t}$ is the dividend payout of the sector, $GROWTH_{i,t}$ is the net sales of the sector, $RIB_{i,t}$ is the retention in business of the sector, ER_t is the exchange rate, and σ_t is the volatility of the exchange rate. Analysis covers the balance data from 2006 to 2011 on the panel data of sectors specific variables and on exchange rate uncertainty. The instruments used the 5th lag for differenced equation. The method used for estimating the volatility mentioned in Table 5. Level of significance at the 1%, 5%, and 10% indicated by *, ** and *** asterisks, respectively.

5.5.3. Impact of exchange rate volatility (at level) on FPI

Table 8 presents the results for the impact of the exchange rate, its volatility and the sector-specific variables on the foreign portfolio investment, when all variables are in their levels except the 1st lag value of foreign portfolio investment (FPI), which uses as the dependent variable in the equation. We include one period lagged value of FPI in the regression to control for dynamic effects. The value of the Arrelano-Bond AR (2) test does not provide any significant evidence of the rejection of the null hypothesis, i.e. there is no 2nd order serial correlation presents in the errors. This implies that the model specification is valid. The Hansen test is used to check the validity of the instruments, use in the two-step system GMM. The estimated value of Hansen test (0.652) also does not allow us to reject the null hypothesis and indicates that the instruments used in the model are valid. Thus, the instruments we use in our empirical estimation are appropriate and our results are robust. These tests also suggest that the residuals are free from the problem of 2nd order serial correlation.

Table 8 shows that the coefficient of 1st lag of foreign portfolio investment is 0.332 indicating that the existing level of FPI plays important role in attracting FPI in the current period. In the sector-specific variables the coefficient of sector size is 0.118, which is positive and statistically significant at the 5% level of significance, suggesting that size encourages FPI. It implies that the one unit increase in the size of the sector increases the 0.118 units of foreign portfolio investment in those sectors. The profitability coefficient is positive and significant i.e. 0.686. It shows that as the amount of profitability increases in the sector the foreign portfolio investment also increases in that sector. These results are in line with the previous studies of Liljebolm (2000), Kang and

Stulz (1997), and Aggarwal, Klapper, and Wysocki (2000). In addition, our results explains that the leverage of the sector has also a positive and significant impact on the FPI i.e. 0.003. Similarly, the positive and statistically significant coefficient of liquidity (0.078) indicates that as the sectors become more liquid the FPI is more attracted towards that specific sector.

In the remaining sector-specific variables the coefficient of the dividend (-0.997) is negative and highly significant. This implies that the foreign investor avoids substantial amount, of dividend because of payment of with-holding tax on the amount of dividend. Retention of business is significant having negative coefficient (-1.026), which explains that the sectors that grasp huge amount of profit in the business, does not attract the foreign portfolio investment. These significant negative results of dividend and retention in business are common with the studies of Chai (2010), Roertson (2001), and Liljeblom (2000). Similarly, the negative sign with the coefficient of growth (-0.026) supports the view that investors prefer to invest in those sectors which are located in the developed economies. Plus the investors also hesitate to invest in those sectors where the growth is temporary. Studies of Santis and Lihermann (2006) and Liljeblom (2000) also support this result.

In addition, the results indicate that the coefficients of exchange rate and the exchange rate volatility both are negative. That is, they are -0.003 and -3.306, respectively. Both of these coefficients are highly statistically significant, at the 1% level of significance. The negative sign of the exchange rate implies that the one unit increase in exchange rate curtails the portfolio investment by 0.003 units in the economy.

Table 5: Two step system GMM results for the impact of ER and its volatility (at level) on FPI

Variables	Coefficients	Std. Error	P-value
$FPI_{i,t-1}$	0.332	0.153	0.000
$SIZE_{i,t}$	0.118	0.033	0.000
$NP_{i,t}$	0.686	0.069	0.000
$LEV_{i,t}$	0.003	0.001	0.082
$LIQ_{i,t}$	0.078	0.027	0.004
$DIV_{i,t}$	-0.997	0.279	0.000
$GROWTH_{i,t}$	-0.026	0.030	0.389
$RIB_{i,t}$	-1.026	0.158	0.000
ER_t	-0.003	0.001	0.001
σ_t	-3.306	1.668	0.048
Constant	-1.432	0.430	0.001
Arellano-Bond test for AR (2)		- 0.162	P-value = 0.155
Hansen test		0.850	P-value = 0.652

Note: Table 8 reports the estimate calculated from system GMM. Model 1 includes the level values of all the variables. The foreign portfolio investment ($FPI_{i,t}$) is dependent variable but its lag value is used as independent variable in the model. $SIZE_{i,t}$ here represents the total assets of the sector, $NP_{i,t}$ is net profitability of the sector, $LEV_{i,t}$ is leverage (debt/equity ratio) of the sector, $LIQ_{i,t}$ is the liquidity (current asset/current liabilities) of the sector, $DIV_{i,t}$ is the dividend payout of the sector, $GROWTH_{i,t}$ is the net sales of the sector, $RIB_{i,t}$ is the retention in business of the sector, ER_t is the exchange rate, and σ_t is the volatility of the exchange rate. Analysis covers the balance data from 2006 to 2011 on the panel data of sectors specific variables and on exchange rate uncertainty. The method used for estimating the volatility mentioned in Table 5.

The appreciation in the Pak rupee captivates the foreign portfolio investment in different sectors. The negative impact of exchange rate that we report here is consistent with the previous studies including Gyntelberg, Loretan, and chan (2009), Gumus and Duru (2013), and Ekeocha and Chukwuemeka (2008). Similarly the negative sign with the exchange rate volatility suggests that the unpredictable variations in the exchange rate have a significant negative impact on FPI. Such uncertainty will attract the speculative flows relatively to the productive and perpetuate foreign investment. This risk is non diversifiable and made the portfolio investment riskier for the foreign investor. So this shows that if the exchange rate volatility is higher, the inflows of foreign portfolio investment are low. The studies of Serven (2003) and Aranyarat (2011) also presents the same result.

5.5.4. Impact of exchange rate volatility (at 1st lag) on FPI

To quantify the impact of one period lagged value of the exchange rate and the one period lagged value of the exchange rate volatility, we estimate equation (3) given in the methodology chapter. We also include the lagged value FPI as independent variable to capture the dynamic effects. Rests of the variables are included at their levels in the model. We do this analysis because there is general perspective, that investors need time to incorporate information about the exchange rates and variations in the exchange rate. In other words, foreign portfolio investors are likely to respond not only to the current value but also to the lagged values of exchange rate and its volatility. To avoid the problem of multicollinearity we do not include the current value of exchange rate and its volatility in the model. The result of this analysis is given in Table 9.

In Table 9, the Arrelano-Bond AR (2) test does not provide any significant evidence of the rejection of the null hypothesis, i.e. Ho: No 2nd order serial correlation. This shows that the model specification is valid. The Hansen test is applied to ensure the validity of the instruments used in the robust two-step system GMM estimators. The estimated value of Hansen test (0.299) also does not provide any evidence in favor of rejecting the null hypothesis and indicates that the instruments used in the model are valid. Thus, we can say that our instruments are appropriate and robust. These tests also explain that the residuals are free from the problem of 2nd order serial correlation.

The coefficient signs of other sector-specific variables, that are sector size, net profitability, leverage, liquidity, dividend payout, growth of the sector, and retention in business, are as same as presented in Table 8. Therefore, we take into the consideration only the 1st lag of the exchange rate and its volatility. The one period lag coefficient of exchange rate is positive. This means that the foreign portfolio investors invest more in the current period if the exchange rate is higher in the preceding period. The negative sign with the 1st lag coefficient of the exchange rate volatility (i.e. -9.368) interprets that the investor does not like to invest in those sectors where the exchange rate volatility is outrageous. This effect is significant at the 1% level. The past information about the volatility of exchange rate significantly affects the decisions of the foreign portfolio investor, who want to invest in the equity of any sector in Pakistan. This risk is non diversifiable and made the portfolio investment riskier for the foreign investor. So this shows that the exchange rate uncertainty curtails the FPI in Pakistan's sectors.

Table 6: Two step system GMM results for the impact of ER and its volatility (at 1st lag) on FPI

Variables	Coefficients	Std. Error	P-Value
$FPI_{i,t-1}$	0.400	0.206	0.000
$SIZE_{i,t}$	0.105	0.036	0.004
$NP_{i,t}$	0.724	0.065	0.000
$LEV_{i,t}$	0.003	0.001	0.009
$LIQ_{i,t}$	0.100	0.026	0.000
$DIV_{i,t}$	-0.833	0.184	0.000
$GROWTH_{i,t}$	-0.001	0.029	0.985
$RIB_{i,t}$	-1.129	0.179	0.000
ER_{t-1}	0.015	0.006	0.021
σ_{t-1}	-9.368	3.170	0.003
Constant	-1.798	0.570	0.002
Arellano-Bond test for AR(2)		-0.94	P-value = 0.347
Hansen test		2.420	P-value = 0.299

Note: Table 9 reports the estimate calculated from system GMM. Model 2 includes the level values of all the variables except than the FPI, exchange rate and the volatility of ER, the 1st lag is used of these variables in this model. The foreign portfolio investment ($FPI_{i,t}$) is dependent variable but its lag value is used as independent variable in the model. $SIZE_{i,t}$ here represents the total assets of the sector, $NP_{i,t}$ is net profitability of the sector, $LEV_{i,t}$ is leverage (debt/equity ratio) of the sector, $LIQ_{i,t}$ is the liquidity (current asset/current liabilities) of the sector, $DIV_{i,t}$ is the dividend payout of the sector, $GROWTH_{i,t}$ is the net sales of the sector, $RIB_{i,t}$ is the retention in business of the sector, ER_t is the exchange rate, and σ_t is the volatility of the exchange rate. Analysis covers the balance data from 2006 to 2011 on the panel data of sectors specific variables and on exchange rate uncertainty. The method used for estimating the volatility mentioned in Table 5.

5.5.5. Impact of exchange rate volatility (at 2nd lag) on FPI

Now we check the impact of 2nd period lagged value of exchange rate and the 2nd period lagged of the exchange rate volatility. For this purpose we estimate equation (4) given in the methodology chapter. The 1st lag of FPI is also use as independent variable to see the dynamic effects. The other sector-specific variables are included at their level values in the model. This analysis applies to see the deeper impact of exchange rate and its volatility because it's a general perception that investors need time to incorporate the information about the exchange rate and its volatility. To avoid the issue of multicollinearity we do not include the current values of exchange rate and its volatility with the 2nd lags in model.

As presented in the previous two models, Table 10 also shows that the value of Arrelano-Bond AR (2) test fails to reject the null hypothesis, and prove that the model specification is valid. The Hansen test value (0.277) also does not show the significant evidence to reject the null hypothesis and indicates that the instruments used in the model are appropriate and our results are robust. It also explains that the problem of 2nd order serial correlation is not present in the residuals. The other sector-specific variables again shows the same results as were presented in Tables 8 and 9.

The 2nd lag coefficient of exchange rate and the exchange rate volatility carries the negative signs, i.e. -0.002 and -4.778, respectively (see Table 10). Both of the coefficients are significant at the 5% level. The negative sign with the 2nd lag of exchange rate implies that the one unit increase in exchange rate decreases the portfolio investment by 0.003 units in Pakistan, as Pak rupee value is depreciated.

Table 7: Two step system GMM results for the impact of ER and its volatility (at 2nd lag) on FPI

Variables	Coefficients	Std. Error	P-Value
$FPI_{i,t-1}$	0.429	0.185	0.000
$SIZE_{i,t}$	0.143	0.044	0.001
$NP_{i,t}$	0.787	0.091	0.000
$LEV_{i,t}$	0.002	0.001	0.071
$LIQ_{i,t}$	0.062	0.029	0.032
$DIV_{i,t}$	-1.225	0.291	0.000
$GROWTH_{i,t}$	-0.004	0.031	0.891
$RIB_{i,t}$	-1.008	0.229	0.000
ER_{t-2}	-0.003	0.001	0.047
σ_{t-2}	-4.778	2.329	0.040
Constant	-2.482	0.751	0.001
Arellano-Bond test for AR(2)		-1.390	P-value = 0.163
Hansen test		2.57	P-value = 0.277

Note: Table 10 Reports the estimate calculated from system GMM. Model 3 includes the level values of all the variables except than the FPI, exchange rate and the volatility of ER, 1st lag of FPI and the 2st lag is used of exchange rate and volatility in this model. The foreign portfolio investment ($FPI_{i,t}$) is dependent variable but its lag value is used as independent variable in the model. $SIZE_{i,t}$ here represents the total assets of the sector, $NP_{i,t}$ is net profitability of the sector, $LEV_{i,t}$ is leverage (debt/equity ratio) of the sector, $LIQ_{i,t}$ is the liquidity (current asset/current liabilities) of the sector, $DIV_{i,t}$ is the dividend payout of the sector, $GROWTH_{i,t}$ is the net sales of the sector, $RIB_{i,t}$ is the retention in business of the sector, ER_t is the exchange rate, and σ_t is the volatility of the exchange rate. Analysis covers the balance data from 2006 to 2011 on the panel data of sectors specific variables and on exchange rate uncertainty. The method used for estimating the volatility mentioned in Table 3.

The escalation in Pak rupee changes the foreign portfolio investment in sectors; this result is similar to the findings presented in the studies of Gyntelberg, Loretan, and Chan (2009) and Gumus and Duru (2013). Similarly the negative sign with the 2nd lag of exchange rate volatility interprets that the investor does not like to invest in those sectors where exchange rate volatility is high. As results reveal one unit elevation in volatility of exchange rate curtails 4.778 units of foreign portfolio investment. This menace is non diversifiable and made the portfolio investment riskier for the foreign investor. This suggests that if the exchange rate is volatile and suffer from unpredictable changes, the foreign portfolio investment would be lower.

These all results shows that current values as well as lag values of the exchange rate and its volatility have significant impacts on the foreign portfolio investment in Pakistan. Our results suggest that the effects of both the exchange rate and its volatility are very persistent. The impact of the exchange rate on FPI is negative at its level, positive at lagged values and again negative at the second period lagged value. This implies that the higher exchange rate discourage the foreign investors in the period, but motivates them to invest in the following period. However, continuous increase in exchange rate give a negative signal to foreign investors and thus, they cut off their investment in domestic financial securities.

On the other hand, the results regarding the level and lagged impact of the exchange rate volatility on foreign portfolio investment is always negative and remains statistically significant. That is, the negative impact of the exchange rate volatility is persistent and lasts for the next periods. This finding implies that the exchange rate volatility does not negatively affect the FPI in the current period but it also affects

negatively in the following periods. These results are consistent with our prediction and fully support the findings of the previous studies in their area of research. Many studies in literature support these results, as well as these results are in line with the economic theories i.e. portfolio balance approach and behavioral portfolio theory. These two theories also support the view about the effect of exchange rate and its variation on the investors' decision. As this rises risk and investors hesitate to invest in the portfolio securities, because of the uncertain returns.

Chapter 6

Conclusion and Policy Recommendation

The main objective of this thesis is to examine the influence of the exchange rate and its volatility on the foreign portfolio investment at sector level in Pakistan. The study also takes into the consideration the impact of several sector-specific variables on the foreign portfolio investment. For this purpose the data of ten different sectors of Pakistan have used for empirical analysis. The robust two-step system GMM technique is utilized for estimation of the empirical models. The ARCH model is used to construct the exchange rate volatility.

6.1. Key Findings

We find that both the exchange rate and the exchange rate volatility at their levels and at 2^{nd} lags have the negative and statistically significant impact on the foreign portfolio investment. We also show that although the impact of the exchange rate volatility on the FPI is negative at the 1^{st} lag, the impact of the exchange rate turns positive at its 1^{st} lag. This shows that the exchange rate and its volatility lower the sector-specific FPI in Pakistan. Our results suggest that the effects of both the exchange rate and its volatility are persistent. That is, they decrease the FPI in Pakistan in the current period as well as in the following periods. These results are in accordance with our hypothesis and confirm the findings of pervious empirical studies.

Further, these findings are also confirming the prediction of economic theories, namely, portfolio balance approach and behavioral portfolio theory. Along with the

findings of previous studies, such as Rashid (2011), that shows that variations in exchange rate dampen the performance of domestic stock markets. Our findings suggest that the exchange rate volatility is not only harmful for domestic stock markets but also negative affect the inflows of foreign portfolio investment in different sector of the economy. This study also examines the effect of sector-specific variables on FPI. These sector-specific factors are size, net profitability, liquidity, leverage, dividend payment, retention in business, and growth in sectors. The results reveal that size of the sector, net profitability, liquidity, and leverage have the positive and significant impact of the foreign portfolio investment. While the dividend payment, retention in business, and growths in sector have negative impacts on the foreign portfolio investment in Pakistan.

6.2. Policy Implications

Pakistan needs to formulate stronger policies to captivate the foreign portfolio in sectors. Government can explore new sectors for stimulating investment, like mining, quarrying, tourism, and construction. Other than this, policy makers put more emphasis on those sectors which are attracting FPI in major proportion rather than others, like; fertilizer, cement, communication. Some sectors which are not good in attracting FPI, the policy maker should pay emphasis on their size, leverage, liquidity, and profitability; as these are FPI attracting factors. The oil & gas sector have the potential to appeal the FPI, as they have capacity for more expedition and production. Telecommunication sector working very well and has very bright future in Pakistan, emphasized should be placed to attract foreign investor toward this sector for investment. Similarly food, tobacco and other consumer items sectors to keep influencing higher (FPI) inflows in respect of the enlarging middle class and expanding consumerism in system.

As we report the negative impact of the exchange rate and its volatility on the FPI, our results suggest that there is a need to stabilize the unwanted exchange rate variations. The stability of exchange rate would build the confidence of foreign investors and thus, they invest more in the economy. Our results also suggest the need of appropriate hedging strategies to hedge the risk associated with exchange rate. Investment may reduce the overall risk by design well diversified portfolio. The negative impact of both the exchange rate and its volatility on the FPI also suggests that foreign investors require higher permission to compensate this risk. Finally, our analysis suggests that the impacts of the exchange rate and its volatility are very persistent and they affect the inflows of FPI in current period as well as in the following periods. The government should take some steps to weaken such persistent exchange rate and its volatility effects.

6.3. Limitations and further research areas

The unavailability of sector level data for longer time period on the foreign portfolio investment in Pakistan is the main limitation of the study. Further research can be made on the firm level data of Pakistan. One can also extend our analysis by taking into account the political risk and institutional step along with exchange rate risk. We do not consider the impact of macroeconomic factors. One can also include macroeconomic indicators such as GDP and PPI.

References

Aggarwal, R., Klapper, L., and Wysocki, P. D. (2005). Portfolio preferences of foreign institutional investors. *Journal of Banking & Finance, 29*(12), 2919-2946.

Aggarwal, R., Kearney, C., and Lucey, B. (2012). Gravity and culture in foreign portfolio investment. *Journal of Banking & Finance, 36*(2), 525-538.

Anlas, T. (2012). The effects of changes in foreign exchange rates On ISE-100 index. *Journal of Applied Economics & Business Research, 2*(1), 34-45

Aranyarat, C. (2011). The effect of exchange rate volatility on foreign direct investment and portfolio flows to Thailand. (http://www.bot.or.th/Thai/AboutBOT/project/DocLib_Settha_ME_2554/M_Doc_Prize3_2554.pdf)

Arellano, M., and Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies, 58*(2), 277-297.

Aron, J., Leape, J., and Thomas, L. (2010). Foreign portfolio investment and capital markets in South Africa. *CSAE Conference: Economic and Social Research Council, U.K. St Catherine's College, Oxford, UK.*

Bala, D. A., and Asemota, J. O. (2003). Exchange rates volatility in Nigeria: Application of GARCH models with exogenous break. *CBN Journal of Applied Statistics,* 4(1), 89-116.

Baum, C. F., Schaffer, M. E., and Stillman, S. (2003). Instrumental variables and GMM: Estimation and testing. *Stata Journal, 3*(1), 1-31.

Bartrum, S. M. and Duefy, G. (2001). International portfolio investment: Theory, evidence and institutional framework. *Financial Markets, Institutions and Instruments*, 10(3), 85-155.

Black, S. and Salemi, M. (1988). FIML estimation of the Dollar-Deutschemark risk premium in a portfolio model. *Journal of International Economics*. 25(1), 250-270.

Blundell, R., and Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics, 87*(1), 115-143.

Blundell-Wignall, A. (1991). Increasing financial market integration, real exchange rates and macroeconomic adjustment. *OECD Working Paper, no, 96.*

Blundell, R., and Bond, S. (2000). GMM estimation with persistent panel data: An application to production functions. *Econometric Reviews, 19*(3), 321-340.

Bond, S. R. (2002). Dynamic panel data models: A guide to micro data methods and practice. *Portuguese Economic Journal, 1*(2), 141-162.

Bruno, G. S. (2005). Estimation and inference in dynamic unbalanced panel-data models with a small number of individuals. *Stata Journal, 5*(4), 473-500.

Caglayan, M. and Rashid, A. (2014). The response of firms' leverage to uncertainty: Evidence from UK public versus non-public firms. *Economic Inquiry, 52(1), 341-363*

Chai, D. H. (2010). Foreign corporate ownership and dividends. *Centre for Business Research, University of Cambridge Working Paper No.*401

Chukwuemeka, P. Malaolu, S. Oduh, V. and Onyema, M. (2012). Modelling the long run determinants of foreign portfolio investment in Nigeria. *Journal of Economics and Sustainable Development*, 3(8), 194-205.

Das, S. Markowitz, H. Scheid, J. and Statman, M. (2010). Portfolio optimization with mental accounts. *Journal of Financial and Quantative Analysis*, 45(2), 1-24

David, O. C. (2003). A portfolio balance approach to the Canadian/US exchange rate. *Review of Financial Economics*, 16(3), 305-320.

De Santis, R. A., and Lührmann, M. (2009). On the determinants of net international portfolio flows: A global perspective. *Journal of International Money and Finance, 28*(5), 880-901.

Dooley, M. P. and Isard, P. (1978). A portfolio balance rational expectations model of the dollar mark rate. *International Finance Discussion Papers*, 123.

Dreyer, J. S. (1974). The portfolio balance approach to payment adjustment theory: A survey of literature. *C.V. Starr Center for Applied Economics Working Paper*, 74-19.

Dua, P. and Garg, R. (2013). Foreign portfolio investment flows to India: Determinants and analysis. *Center of Economics working paper, no.* 225.

Durham, B. J. (2003). Foreign portfolio investment, foreign bank lending, and economic growth. *International Finance Discussion Papers,* 757.

Ekeocha, and Chukwuemeka, P. (2008). Modelling the long run determinants of foreign portfolio investment in Nigeria. *International Conference on Applied Economics*, 289.

Engle, R. F. Focardi, S. M. and Fabozzi, F. J. (2007). ARCH/GARCH models in applied financial econometrics. *JWPR026-Fabozzi* c114-NP Book.

Eun, C. and Resnick, B. (1998). Exchange rate uncertainty, forward contracts and international portfolio selection. *Journal of Finance*, 43(1), 197-216.

Fernandez-Arias, E. (1994). The new wave of private capital Inflows: Push or pull? *World Bank Working Paper,* 1312.

Fidora, M. Fratzcher, M. and Thaiman, C. (2006). Home bias in global bond and equity markets: The role of real exchange rate volatility. *Journal of International Money and Finance,* 26(4), 631-655.

Finkelshtain, I. and Kella, O. (1999). On risk aversion with two risks. *Journal of Mathematical Economics,* 31(2), 239-250.

Fitzgerald, E. (1999). Capital surges, investment instability and income distribution after financial liberalization. *Finance and Developing Working Paper*, no, 5.

Frankel, J.A. (1987). Monetry and portfolio-balance models of exchange rate determination. Book of university of California.

Gentalgerger, J. Loretan, M. Subhanij, T. and Chan, E. (2009). International portfolio rebalancing and exchange rate fluctuations in Thailand. *BIS Working Papers*, 287.

Giofre, M. (2012). Investor protection rights and foreign investment. *Journal of Comparative Economics*, *41*(2), 506-526.

Goyal, A. and Arora, S. (2010). A GARCH analysis of exchange rate volatility and the effectiveness of central bank actions. *Indira Gandhi Institute of Development Research.*

Gourinchas, P. and Rey, H. (2005). International financial adjustment. *Journal of Political Economy.* 115(4), 665-703

Grabel, I. (1998). Portfolio investment, foreign policy in focus. *Hemispheric Resource Center and Institute for Policy Studies*, 3(13), 1-49

Gumus, G. K. Duru, A. and Gungor, B. (2013). The relationship between foreign portfolio investment and macroeconomic variables. *European Scientific Journal,* 9(34), 209-226.

Han, C. and Phillips, C. B. (2010). GMM estimation for dynamic panels with fixed effects and strong instruments at unity. *Cowles Foundation Paper,* 1290, 119–151.

Heid, B. Langer, J. and Larch, M. (2011). Income and democracy: Evidence from system GMM estimates. *IFO Working Paper*, 118.

Hernandez, L. and Rudolph, H. (1997). Sustanibility of private capital flows to developing countries: Is a generalized reversal likely? *Journal of Economics*. 34(102), 237-266.

Holland, M. Vieira, F. V. Silva, C. G. and Bottecchia, L. C. (2011). Growth and exchange rate volatility: A panel data analysis. *Textos Working Paper*, 296.

Huang, B. N. Yang, C. W. and Hwang, M. J. (2004). New evidence on demand for cigarettes: A panel data approach. *International Journal of Applied Economics*, 1(1), 81-97.

Jiang, C. Ma, Y. and An, Y. (2012). International portfolio selection with exchange risk: A behavioural portfolio theory perspective. *Journal of Banking & Finance*, 37(2), 648-659.

Judson, R. A. and Owen, A. L. (1996). Estimating dynamic panel data models: A practical guide for macroeconomists. *Journal of Banking & Finance*, 22(12), 648-659.

Lijebolum, E. and Loflund, A. (2000). Determinants of International portfolio investment flows to a small market: Empirical evidence. *Journal of Multinational Financial Management,* 15(3), 211-233.

Makaew, T. (2008). Do small firms benefit more from foreign portfolio investment? Evidence from a natural experiment. *University of Maryland.*

M. E. olotu, and K. Jegbefume, (2011). The place of foreign capital flows in the Nigerian economic growth equation: Evidence from foreign portfolio investment. *International Journal of Economic Development Research and Investment, 2(3).*

Mileva, E. (2007). Using Arellano – Bond dynamic panel GMM estimators in Stata tutorial with examples using Stata 9.0 (xtabond and xtabond2). *Fordham University.*

Neilson, N. S. (2012). Foreign portfolio investments in Sub – Saharan Africa - why foreign investors might not seek the optimal opportunity. *Aarhus School of Business and Social Sciences.*

Obstfeld, M. (1980). Portfolio balance, monetary policy, and the dollar-Deulsche mark exchange rate. *Columbia U. Discussion Paper, 62.*

Ramos, R. A. (2012). Financial flows and exchange rates: Challenges faced by developing countries. *International Policy Center for Inclusive Growth Working Paper*, 97.

Roodman, D. (2006). How to do xtabond2: An introduction to "Difference" and "System" GMM in Stata. *Center for Global Development Working Paper,* 103.

Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *Stata Journal*, 9(1), 86-136.

Serven, L. (2002). Real exchange rate uncertainty and private investment in developing countries. *Policy Research Working Paper,* 2823.

Sirr, G. Garvey, J. and Gallagher, L. (2011). Emerging markets and portfolio foreign exchange risk: An empirical investigation using a value-at-risk decomposition technique. *Journal of International Money and Finance,* 30(8), 1749–1772.

Shefrin, H. and Statman, M. (2000). Behavioral portfolio theory. *Journal of Financial and Quantative Analysis,* 35(2), 127-155.

Stancu, A. T. (2010). Impact of foreign exchange risk on international portfolios. *The Romanian Economic Journal,* 13(37), 179-203.

Thapa, C. and Poshakwale, S. (2011). Country-specific equity market characteristics and foreign equity portfolio allocation. *Journal of International Money and Finance,* 31 (2), 189–211.

Uctum, M. and Uctum, R. (2011). Crises, portfolio flows and foreign direct investment: An applicaton to Turkey. *Economic Systems,* 35(4), 462-480.

Yaziz, S. R. Azizan, N. A. Zakaria, R. and Ahmad, M. H. (2013). The performance of hybrid ARIMA-GARCH modeling in forecasting gold prices. *20th International Congress on Modeling and Simulation, Adelaide, Australia,* 1201-1207.

Zakria M. (2009). Investment in Pakistan: A critical review. *Journal of Managerial Sciences,* 4(2), 120-136.

Zakria S. and Abdalla S. (2012). Modelling exchange rate volatility using GARCH models: Empirical evidence from Arab countries. *International Journal of Economics and Finance,* 4(3), 216.

Appendix

Variables Definition

Variables	Definitions
Foreign Portfolio Investment (FPI)	Foreign portfolio investment of a sector divided by total value of assets of the sector
Size (size)	Natural logarithm of total value of assets of each sector
Profitability (NP)	Total profit before tax is divided by the total book assets
Liquidity (LIQ)	Current ratio i.e. the ratio of current asset to current liabilities
Leverage (LEV)	Debt to equity ratio
Dividend Payout (DIV)	Total amount of dividend in each sector is divided by its total value of book assets
Retention in Business (RIB)	Total amount of retention in business in each sector divided by its total value of book assets
Growth (GROWTH)	Difference natural logarithm of total sales
Exchange Rate (ER)	Exchange rate of Pak Rupee to US dollar at the end of each month
Volatility (VOL)	Conditional variance of exchange rate calculated through ARCH & GARCH by the author

Data of foreign portfolio investment collected from State Bank of Pakistan (SBP) under the publication "International investment position of Pakistan".

Link: (www.sbp.org.pk/publications/iipp)

Data of sector specific variables are collected through the State Bank of Pakistan (SBP) under the publication "Financial statement analysis of companies (non financial) listed at Karachi Stock Exchange 2006-2011".

Link: (www.sbp.org.pk/publications/index2.asp)

Data of exchange rate collected from the State Bank of Pakistan (SBP).

Link: (www.sbp.org.pk/eco**data**/HER-USDollar.xls)

Table 11: ARCH/GARCH results of exchange rate volatility

	Coefficient	**Std.Error**	**z-statistics**	**Probability**
Constant	0.004	0.002	2.355	0.018
AR(1)	0.102	0.172	0.590	0.555
		Variance Equation		
Constant	3.95E-05	2.47E-05	1.596	0.110
ARCH(1)	0.410	0.231	1.771	0.076
GARCH(1)	0.310	0.298	1.039	0.298

Note: This Table shows the results obtained by estimating GARCH (1 1) model for exchange rate series.