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

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Abstract

This paper empirically investigates the effect of exchange-rate volatility (EXRV) on foreign portfolio investment (FPI) in Pakistan. It also examines whether the lagged exchange rate (EXR) and lagged EXRV have any significant effect on FPI. To mitigate the problem of endogeneity, the robust two-step system-GMM estimator is applied. The results reveal that both EXR and EXRV have a negative and significant impact on FPI. Further, the results suggest that they have long-lasting effects on FPI. *These findings imply that increased EXR and its volatility are detrimental for FPI in Pakistan. The results show that sector size, profitability, liquidity, and the level of leverage are also significant in attracting FPI in Pakistan. On the other hand, the dividend payout ratio, sector growth, and retention in business have negative effects on FPI. Our results suggest that in order to attract FPI in Pakistan, it is necessary to effectively control unwanted variations in EXR.*

Keywords: Exchange-rate volatility, foreign portfolio investment, Sector-level panel data, System-GMM estimator

JEL classification: G11, D81

Introduction

Foreign portfolio investment is considered as one of the important segment of growth enhancing strategies, particularly in less developed and emerging countries. It is a vital source of fund to finance investments in countries having large saving-investment disparities. It escalates the liquidity of firms. It also facilitates to get better foreign reserves. In addition to these advantages, another key purpose of FPI is to safeguard and increase the value of portfolio. It also helps and encourages the existing business firms to enlarge their business by issuance of new securities. Indeed, the enhancement of efficiency due to internationalization leads to lower costs of capital in the host economy.

Reviewing the literature on foreign portfolio management we see that there is yet another advantage of FPI. It significantly reduces the cost of foreign capital by lowering risk premium. This is because FPI significantly and effectively reduces country-specific risk, as it can be more diversified across different international capital markets. According to the behavioral portfolio theory, FPI helps foreign investors to form their portfolios as per the desired investment needs in international markets (Shefrin &

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Statman, 2000). The selection of the portfolio in one international market is theoretically similar to the problem of sub-portfolio selection in a mental account with EXR risks. Therefore, EXR risk is considered as one of the fundamental factors in foreign portfolio selection (Finkelshtain, 1999; Fidora, Fratzcher, & Thaiman, 2007). Although numerous sector-specific factors, such as size, profitability, liquidity, leverage, sector growth, retention in business, and dividend payment influence FPI, EXRV has become the more important factor affecting FPI in this era of globalization, which significantly intensifies the flows of foreign funds to international capital markets (Mishkin, Matthews, & Giuliodori, 2016).

Several scholars are of the view that EXRV not only makes FPI more risky but it also strengthens the covariance of FPI with the domestic market rate of return. In fact, if FPI is positively correlated with the local market return, then EXRV further adds exposures to exchange-rate risk. However, one should note that EXRV not always adds risk to portfolio investments. Indeed, when the correlation between EXRV and returns on domestic securities is negative, then it can significantly decrease the risk associated with FPI. We therefore predict positive as well as negative effects of EXRV on FPI, largely depending on the sign of correlation between EXRV and the local market return. If the foreign investors are risk-neutral or risk-lover, then the risk of exchange-rate fluctuations may be considered an additional opportunity to get higher returns and thereby increases FPI. In contrast, for risk-avert foreign investors, the risk of exchange-rate fluctuations is an addition cost that tends to hinder foreign portfolio investments. Financial economists are generally of the view that the risk of EXR changes matters for asset pricing (Krugman, Obstfeld, & Melitz, 2015). However, the portfolio theory of finance suggests that in case of well-diversified portfolio, stock returns should not be adversely influenced by unpredictable variations in EXR, and thus, EXR risk should not be considered a price factor. Even though several economic and finance theories predict the significant role of EXR risk on asset pricing, the ambiguity of the impact of EXR risk on FPI is still remained. Therefore, we argue that the question whether EXRV really matters for FPI is mainly an empirical issue. We also theorize that not only the contemporaneous but also the lagged EXRV significantly affects FPI.

Reviewing the existing literature on the EXRV effects on FPI we find that there are limited empirical studies investigating the underlying issue by considering firm- or sector-level dataset. Rather, most of the empirical work related to this issue has been done on aggregate (macro level) data. Yet, empirical evidence based on disaggregated data (either firm or sector level) will definitely enhance our understanding about how, when, and to what extent exchange-rate volatility affects foreign direct and indirect investments. Second, to the best of our knowledge, there is no study has been conducted

to investigate the influence of EXRV on FPI in Pakistan, neither at the aggregate level nor at the sector or firm level. Therefore, it would be worthwhile to examine how the level of EXR and its volatility affects FPI in Pakistan. There are several reasons why we consider Pakistan is a good case for providing the empirical evidence on the effects of EXRV on FPI. Pakistan is an emerging economy, which suffers from high-unexpected variations in EXR. The increased EXRV is attributed to several socio-economic factors. Examples of these factors include ongoing war against terrorism, movements against corruption, long-lasting energy shortage, permanent deficits in external balances, increasing amount of foreign and domestic debts, and inefficient as well as ineffective financial and economic policies may cause significant fluctuations in Pakistan rupee exchange rate. Like several other developing countries, firms operating in Pakistan may not be actively and effectively engaged in hedging exposures to EXR risks. Therefore, we hypothesize that EXRV significantly influences FPI inflows to Pakistan.

Keeping in view the existing vacuums in the literature, in this paper, we first examine the contemporaneous (level) effects of EXR and EXRV on FPI in Pakistan. After establishing these effects, we examine whether one- and two-period lagged EXR and EXRV affect FPI. While examining the effects of EXR and EXRV on FPI, we include several sector-specific variables as control variables in the specification. Specifically, sector size, profitability, dividend payment, liquidity, leverage, sector growth, and retention in business of a sector are considered as sector-specific explanatory variables. While achieving the aforementioned objectives of the study, the study aims at answering the following research questions. Does EXRV significantly and adversely influence FPI in Pakistan? How does EXR impact FPI in Pakistan? Do the lagged EXR and lagged EXRV significantly affect the current level of FPI? What are the sector-level variables that significantly affect the flow of FPI?

Literature Review

Numerous studies have been conducted on the effects of EXR risk on FPI. However, their findings are inconclusive at best. Some studies have provided empirical evidence of the positive impact of EXR risk on FPI, whereas, the others have reported the negative effects. There are also some studies that have been failed to report any significant effect of EXRV on FPI.

Eun & Resnick (1988) show that the risk of EXR fluctuations is largely non-diversifiable and thus, it significantly affects the performance of international portfolios. Darby, Hallett, Ireland, & Piscitelli (1999) find that heightened EXRV has a negative and significant effect on investment. However, they show that depending on different situations, EXRV affects investment differently. Further, they show that EXRV affects

investments in some industries positively, whereas, in others, the impact of EXRV is negative. Caporale, Ali, & Spagnolo (2015) investigate the effects of EXR risk on equity and bond flows for several developed countries including the euro area. They find that the impact of EXRV on equity flows is positive in Australia and negative in the United Kingdom, Sweden, and the European countries. They further show that the effect of EXRV on foreign investment in bonds is negative for all the countries included in the sample except Canada, where it is positive and significant.

Kodongo & Ojah (2012) investigate the inter-links between EXR and FPI. They use time-series data covering the period 1997-2009. They carry out the empirical analysis for four countries, namely Egypt, Morocco, Nigeria, and South Africa. Their empirical results reveal that the linkages between EXR and portfolio flows are both country-dependent and time-varying in nature. Aranyarat (2011) examines the association between EXR risks and FPI for Thai firms. The study covers the period 2005-2009. He finds that there is a negative relationship between EXRV and FPI. That is, increasing EXR risk will depress firm-specific FPI in Thailand.

Sirr, Garvey, & Gallagher (2011) analyze the relationship between foreign exchange rates and foreign equity portfolio investment in Argentina, Mexico, India, China, Brazil, and Russia to compare exchange-rate risk of these countries with the portfolio risk in the USA. They use monthly data covering the period 2003-2010. They show that foreign exchange-rate risk is significant in Brazil and Mexico, but it is less significant in China and Russia as compared to USA equity portfolios. Argentina and India have the same level of foreign exchange risk as of the USA. In the equity portfolio investment, EXR instability and the association between EXR return and foreign equity portfolio return are the significant contributing factors in foreign exchange risk.

Stancu (2010) examines the impact of foreign exchange risk on international well-diversified portfolio of assets by using the relative value-at-risk (RVaR) model. His empirical results support that the assets presented in the portfolio are not constant over time and the instability in foreign exchange rate works as a fourth asset, because its movement contributes approximately one fourth to the RVaR of the portfolio. Thus, EXRV makes financial instruments more risky. Further, his results indicate that the contribution of EXR risk into the value-at-risk portfolio is about 26.91%, on average. Nielsen (2012) examines the effect of EXRV on FPI for several sub-Saharan African markets. He carries out his empirical analysis using time-series data covering the period 1996-2010. He finds that countries with stable EXR policies have higher levels of FPI.

Fidora, Fratzcher, & Thaiman (2007) investigate the role of real EXRV in cross-country disparities in portfolio home bias for a large class of financial assets. They carry

out the empirical analysis for 70 countries using survey data collected for the years 1997, 2001, 2002, & 2003. They show that real EXRV is significantly related to bilateral portfolio home bias. They further show that as compared to equity home bias, bond home bias is considerably more affected by EXRV. There are also several studies in the literature that have documented empirical evidence of the positive impact of different variables on FPI. For example, Thapa & Poshakwale (2011) find that large and efficient financial markets attract more foreign investors. They also show that both liquidly and less trading costs also appear to be the significant factors to attract FPI. Lijebolum & Loflund (2000) show that foreign investment flows are significantly related to the dividend yield, liquidity, firm size, and, to some extent, to profitability.

Chai (2010) finds that firm size, export intensity, and the book to market ratio are significantly positively related to FPI. Makaew (2008) finds that the profitability of firms, export size, and foreign directors on board attract FPI. Other studies such as Aggarwal, Kearney, & Lucey (2012), Aggarwal, Klapper, & Wysocki (2005), and Giofre (2014) have successfully related the FPI inflows to some other factors such as, economic activity, shares of domestic market, corporate governance, legal framework, the stronger shareholder rights, etc.

On the other hand, a large number of studies have documented the negative effects of different variables on FPI. For instance, Ekeocha, Ekepcha, Malaolu, & Oduh (2012) find that market size, trade openness, and the quality of institutions are negatively related to FPI in Nigeria. Aron, Leape, & Thomas (2010) find that both inflation and long-term bond disparities are negatively and significantly related to FPI. Similarly, Ekeocha (2008) finds that market capitalization, real exchange rates, and trade openness have negative impacts on FPI. Chai (2010) finds that firm leverage is significantly negatively related to FPI in Korea. Durham (2003) finds the negative impact of economic growth and development of stock market on FPI, although it is statistically insignificant.

Data and Research Methodology

We use a balanced sector-level annual panel dataset covering the period 2006-2011 to investigate the effect of EXRV on FPI in Pakistan. Sector-wise data on FPI are taken from "International Investment Position of Pakistan" published by "State Bank of Pakistan". The sector-specific annual variables' data are obtained from State Bank of Pakistan, specifically from "Financial Statement Analysis of Companies (non-financial) listed at "Pakistan Stock Exchange (PSX)" formerly named "Karachi Stock Exchange (KSE)". Monthly data on exchange rates are taken from State Bank of Pakistan and IMF databases.

Empirical Model

Following Aranyarat (2011) and Ekeocha (2008), we estimate the following model to investigate the contemporaneous (level) effects of EXR and EXRV on FPI.

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

After examining the contemporaneous effects we estimate Eq. (2) in order to see how lagged EXR and lagged EXRV affect the current level of PFI.

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

FPI is defined as foreign portfolio investment in a sector divided by total value of book assets of that specific sector. α_i is sector-specific fixed effects. $SIZE_{i,t}$ represents the size of sector. The log of book assets of each sector is used as a proxy for size. $NP_{i,t}$ is the net profit of the underlying sector, which is defined as the ratio of total profit before tax to total assets. $LEV_{i,t}$ is the leverage of sector *i*. It is defined as the debt to equity ratio. $LIQ_{i,t}$ refers the liquidity, which is proxied by the current ratio. $DIV_{i,t}$ is the ratio of total dividends to total assets. $GROWTH_{i,t}$ is the first difference of log of total sales. $RIB_{i,t}$ is defined as the total amount of retention in business in each sector divided by the total book value of assets of the sector. ER_t is the exchange rate of US dollar to Pak rupee. σ_t is ARCH-based EXRV.

Estimation Method

To study the effects of EXR and EXRV, we employ the robust two-step system dynamic panel data (DPD) estimator, also known as system-GMM (generalized method of moments), which is developed by Blundell and Bond (1998). To measure EXRV, we estimate the ARCH(1) specification with the autoregressive-moving average ARMA(1 1) process. To ensure the validity of our set of instruments, we apply Hansen (1982) test. Further, to ensure that the residuals do not suffer from the problem of second order serial correlation, we apply the Arelleno-Bond test (AR (2)).

Empirical Analysis

To examine whether the EXR series is stationary at its level or first difference, we apply the Augmented Dickey-Fuller (ADF) unit root test on the level as well as on the first difference.[2] We find that although the EXR series appears nonstationary at its level,

[2] The results are not given here to economize on space.

the first differenced series of log EXR does not follow unit root. This implies that exchange rate returns are stationary.

After testing for the presence of unit root, the ARCH-LM test is applied to test the presence of heteroskedasticity in the underlying series. The results are presented in Table 1. The p-values suggest that we reject the null hypothesis of no ARCH effects in the residuals, although at the 7% level of significance. Therefore, in the following section, we apply the ARCH model to generate exchange-rate volatility.

Table 1: *ARCH-LM test for exchange rate returns*

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.

This study uses ARCH(1) specification of the first differenced exchange rate series with the ARMA(1 1) process to obtain the conditional variance. The results are present in Table 2. The model specification is selected based on AIC. The estimates of ARMA(1 1) are significant. The results of variance equation suggest that the estimated coefficient of the ARCH term is statistically significant. Further, the size of the coefficient is less than one (0.663), implying that the past values of EXRV affect the present value of the volatility. The estimates of diagnostic tests show that there is no remaining ARCH/GARCH effect in the residuals. We use the obtained series of conditional hetroscedasticity as a proxy for EXRV 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.

Table 2: *ARCH/GARCH estimates for exchange rate returns*

	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	0.432	0.124	3.484	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	

Table 3 shows the summary statistics. 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, namely FPI, net profitability, leverage, liquidity, dividend, and retention in business are rightly skewed. The kurtosis values of sector size, EXR, and EXRV show that these variables have the flatter distribution. The minimum and maximum values show the range of the variables. The standard deviation shows the spread or dispersion of the variables around its mean value. The standard deviation of EXR (11.3) shows the highest dispersion amongst all the variables. These statistics show that there is a 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	0.620	89.670
σ_t	0.157	0.046	-1.372	3.327	0.060	0.191

Level Effect of EXR and EXRV on FPI

Table 4 presents the estimation results. We include one-period lagged 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 that there is no 2nd order serial correlation in the estimated residuals. The Hansen test having p-value of 0.652 suggests that the instruments we use in our empirical estimation are appropriate.

The coefficient of lagged FPI is 0.332 and statistically significant; indicating that the previous level of FPI plays an important role in attracting FPI in the current period. The coefficient of sector size is 0.118, which is statistically significant, suggesting that large sector size encourages FPI. Specifically, the estimated coefficient indicates that a one-unit increase in sector size will increase FPI by 0.118 units. This finding is consistent with the notion that large-sized firms/sectors are generally considered less risky and investors prefer to invest in large stocks. The profitability coefficient is positive and significant (coefficient = 0.686; p-value = 0.000). This finding suggests that foreign investors are more likely to invest in stocks of more profitable sectors. Profitable sectors are generally viewed as cash rich sectors and expected to have stable future cash flow

streams. Such characteristics attract investors to invest in these sectors. These results are in line with the previous studies of Liljebolm & Loflund (2000), and Aggarwal, Klapper, & Wysocki (2000).

Regarding the effect of leverage, the results reveal that the leverage of sectors has a positive and significant impact on FPI. This finding is consistent with the notion that the use of debt serves as a device to monitor managers and thus, lessens the possibility information asymmetries arising between firm managers and outside investors, which, in turn, attracts more FPI inflows to Pakistan. Similarly, the positive and statistically significant coefficient of liquidity (0.078) indicates that FPI is more attracted towards more liquid sectors. This finding is in line with the idea that firms or sectors facing liquidity constraints are generally viewed risky and thus, investors avoid investing in less liquid stocks. The coefficient of dividend (-0.997) is negative and highly significant. This finding implies that the foreign investor may avoid dividends because of payment of withholding tax on dividend payouts. Unexpectedly, the variable retention of business has a significant and negative effect on FPI. A possible explanation of this finding is that foreign investors may view the sectors that grow by reinvesting increasing amount of profit as riskiest and avoid investing in those sectors. The significant negative effects of dividend and retention in business are in line with the findings of Chai (2010) and Liljeblom & Loflund (2000). Consistent with De Santis & Luhrmann (2009) and Liljeblom & Loflund (2000), the effect of sector growth on FPI is negative, although it is statistically insignificant. This finding implies that growing sectors may invest more in risky projects, which increases their overall level of risk. Therefore, foreign investors do less investment in stocks of growing sectors.

Table 4: *Two-step system GMM estimation results for level effects*

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 AR(2) test	- 0.162	P-value = 0.155	
Hansen test	0.850	P-value = 0.652	

Turning to the effects of the variables of interest we find that the coefficients of both EXR and EXRV are negative. Specifically, they are -0.003 and -3.306, respectively. Both of these coefficients are highly statistically significant. The negative sign of the EXR implies that higher EXR will reduce FPI in Pakistan. In particularly, the estimated magnitude of the coefficient implies that FPI will decrease by 0.003 units on average when the EXR will increase by one unit. This finding implies that increasing exchange rate is considered as an additional risk to FPI and thus, foreign investors decrease their investments in periods of increased EXR. Higher exchange rates may affect adversely the profitability of sectors and thus, such exchange rate exposures may discourage foreign investors to invest in stocks of the sectors that are more exposed to the EXR risk. The negative impact of EXR that we report here is consistent with several previous studies including Gyntelberg, Loretan, & Chan (2009), Gumus, Duru, & Gungor (2013), and Ekeocha (2008).

Consistent with our conjecture, the results indicate that the volatility of EXR has also a negative and statistically significant impact on FPI. This finding implies that unpredictable variations in the EXR significantly reduce FPI in different sectors of Pakistan. Further, the negative effect of EXRV suggests that the risk of EXR fluctuations is non-diversifiable and makes the portfolio investment riskier for foreign investors. Thus, in periods of rising EXR uncertainty, risk-averse foreign investors do significantly less portfolio investment. Further, unexpected exchange rate variations may be a detrimental to the performance of firms, resulting unfavorable effects on cash flow streams and profitability of different sectors. Such detrimental effects of exchange rate variations may hinder foreign investors to invest in stocks. Serven (2003) and Aranyarat (2011) also document the evidence of the negative effect of EXRV on FPI.

Lagged Effect of EXR and EXRV on FPI

To quantify the impact of a one-period lag of EXR and EXRV, we estimate Eq. (2). We do this analysis because there is a general perception that investors need time to incorporate information about the exchange rate and its variations. As in the literature, to avoid the problem of multicollinearity, we do not include the current value of EXR and EXRV in the model. The results of this estimation are given in Table 5.

The effects of the sector-specific variables are generally similar, in terms of sign and statistical significance, to those presented in Table 4. Therefore, we only focus on the interpretation of the coefficients of the 1st lag of EXR and EXRV. The coefficient of one-period lagged EXR is positive. That is, the foreign portfolio investors invest more in the current period if the EXR is higher in the preceding period. One should note that although the current period EXR has a negative effect, the one-period lagged value of EXR has a

positive impact on FPI. The positive effect of the one-period lag of EXR on FPI is justified as firms operating in different sectors may require time to design strategies to mitigate the adverse effects of increased EXR and to harvest the benefits of the depreciations of home currency (increased exchange rate).

Consistent with the contemporaneous effect of EXRV, one-period lagged EXRV has a significant and negative impact on FPI. It is worth noting, however, that the one-period lagged effect of EXR uncertainty is considerably higher than the level effect of EXR uncertainty. This finding implies that EXRV has a negative long-lasting effect on FPI in Pakistan. This finding also suggests that FPI inflows to Pakistan take time to fully reflect the adverse impact of EXRV. Further, the negative and lasting effect of EXRV on FPI suggests that the exchange-rate risk is significant in adding risk to the portfolio investment, which, in turn, negatively affects sector-level FPI inflows to Pakistan. These findings imply that unexpected EXR variations not only adversely affect FPI in the current period but also in the following period. In fact, the size of the estimated coefficients suggests that FPI-deterring effects of EXRV intensify over time.

Table 5: *Two-Step system GMM estimation results for one-period lagged effects*

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	

We re-estimated Eq. (2) by considering the second lagged of EXR and EXRV to examine whether the effects are persistent over time. The results, not reported here, reveal that the two-period lagged value of EXR and EXRV have significant and negative effects on the current level of FPI in Pakistan.[3] Taken together, our results show that current values as well as lagged values of EXR and EXRV have significant

[3] These results are available from the authors.

impacts on FPI in Pakistan. The results also suggest that the effects of both EXR and EXRV are very persistent. The impact of EXR on FPI is negative at its level, positive at the one-period lagged value, and again turns negative at the second-period lagged value. This implies that increasing EXR discourages the foreign investors in the current period, but motivates them to invest more in the following period. However, a continuous increase in the EXR gives a negative signal to foreign investors and thus, they cut off their portfolio investments.

On the other hand, the results regarding the contemporaneous (level) and lagged impact of EXRV on FPI reveal that the effect is always negative and remains statistically significant. That is, the negative impact of EXRV is persistent and lasts for a longer period of time. This finding implies that EXRV does not only 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 strongly support the findings of the previous studies that have reported the negative effects of exchange-rate risk on portfolio investments. These effects are also consistent with well-known finance theories, particularly with the predictions of the portfolio balance approach and the behavioral portfolio theory. Both of these theories postulate significant effects of EXR and EXRV on the investment decisions of (both domestic as well as foreign) investors.

Conclusion and Policy Recommendation

In this paper, we examine the contemporaneous (current) and lagged effects of EXR and EXRV on FPI in Pakistan using a sector-level annual panel dataset. We apply the two-step system GMM estimator. The volatility of EXR is proxied by estimating the ARCH(1) model on monthly exchange rates. The results reveal that the level as well as the second-period-lagged effect of EXR on FPI is negative and significant. However, the one-period-lagged effect of EXR on FPI appears positive. In contrast, the current and all lagged effects of EXRV on FPI are negative and statistically significant. These results suggest that the effects of both EXR and EXRV are long-lasting. That is, they decrease FPI in Pakistan in the current period as well as in the following periods. These findings imply that increased EXR and higher EXRV both are a detriment to FPI inflows to Pakistan. Moreover, these results suggest that under the assumption of risk version, the current as well as lagged EXR and EXRV increase costs of risk, and thus, cause foreign investors to reduce their financial activities to minimize exposures to exchange-rate risk. The findings on the effects of sector-specific factors indicate that sector size, net profitability, liquidity, and leverage have positive and significant impacts on foreign portfolio investment. In contrast, we show that dividend payments, retention in business, and sector growth have negative impacts on FPI.

Our findings have several important policy implications. First, the results suggest that in order to attract FPI in Pakistan, it is essential to effectively control unwanted variations in exchange rates. Exhibiting strong exchange rate commitments and designing and implementing more transparent and effective exchange rate and monetary policies will help in achieving the objective of exchange-rate stability. Pakistan also needs to formulate strong investment policy and create investment friendly environment to encourage foreign investors to invest in bond and equity portfolios. As in Rashid and Waqar (2017), better management of foreign reserves and interest rate arrangements, increasing exporting activities, and reducing import dependency will also help in lessening exchange-rate uncertainty. Second, since the findings suggest that the size and profitability of sectors have a positive role to play in attracting FPI, the government should adopt policies encouraging different industries to expand their businesses and to increase their profitability by reducing costs of production or increasing efficiency. Finally, the finding indicating the positive effect of leverage on FPI suggests that government should work on reducing capital market – particularly bond market – frictions to stimulate firms to use more debt in their capital structure, which, in turns, serving as a monitoring device and lessening the information asymmetry will attract more FPI in different sectors of Pakistan.

Although we present robust evidence, some caveats must be mentioned. The unavailability of sector level data for longer time period on FPI in Pakistan is the main limitation of the study. Further, it would be desirable to examine the exchange-rate volatility effects on FPI using firm-level data of Pakistan. One can also extend our analysis by taking into account the political risk and institutional setup along with the exchange-rate risk. We do not consider the impact of macroeconomic factors on FPI. Nevertheless, one can also include macroeconomic indicators such as GDP and government expenditures while examining the effects of exchange-rate volatility on FPI.

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.

Aranyarat, C. (2011). *The effect of exchange rate volatility on foreign direct investment and portfolio flows to Thailand. Working paper, Bank of Thailand, Thailand*.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *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, the UK.*

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

Caporale, G. M., Ali, F. M., and Spagnolo, N. (2015). Exchange rate uncertainty and international portfolio flows: A multivariate GARCH-in-mean approach. *Journal of International Money and Finance*, 54(6), 70-92.

Chai, D. H. (2010). *Foreign corporate ownership and dividends. Working paper No. 40, Centre for Business Research, University of Cambridge, the UK.*

Darby, J., Hallett, A. H., Ireland, J., and Piscitelli, L. (1999). The impact of exchange rate uncertainty on the level of investment. *The Economic Journal*, 109(454), 55-67.

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.

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

Ekeocha, P. C. (2008). *Modelling the long run determinants of foreign portfolio investment in an emerging market: Evidence from Nigeria. Paper presented at International conference on Applied Economic ICOAE.*

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

Eun, C. S. and Resnick, B. G. (1988). Exchange rate uncertainty, forward contracts, and international portfolio selection. *The Journal of Finance*, 43(1), 197-215.

Fidora, M. Fratzcher, M. and Thaiman, C. (2007). 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.

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

Giofre, M. (2014). Domestic investor protection and foreign portfolio investment. *Journal of Banking & Finance*, 46(9), 355-371.

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.

Hansen, L. P. (1982). Large sample properties of generalized method of moments estimators. *Econometrica*, 50(4), 1029–1054.

Kodongo, O. and Ojah, K. (2012). The dynamic relation between foreign exchange rates and international portfolio flows: Evidence from Africa's capital markets. *International Review of Economics & Finance*, 24(9), 71-87.

Krugman, P., Obstfeld, M., and Melitz, M. (2015). International Trade: Theory and Policy: Global Edition, Pearson Higher Education.

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. Working paper, University of Maryland, Washington, D.C, the USA.*

Mishkin, F.S., Matthews, K., and Giuliodori, M. (2016). The Economics of Money, Banking and Financial Markets, European Edition, Pearson Education.

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

Rashid, A and Waqar, S. M. (2017). Exchange rate fluctuations, firm size, and export behavior: An empirical investigation. *Small Business Economics*, 49(3), 609-625.

Serven, L. (2003). Real-exchange-rate uncertainty and private investment in LDCs. *The Review of Economics and Statistics*, 85(1), 212-218.

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.