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EXCHANGE RATE VOLATILITY AND CAPITAL INFLOWS IN DEVELOPING ECONOMIES

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ABSTRACT

The developing economies require inflow of capital for their economic development. The current study attempts to estimate that to what extent the capital inflows are influenced by exchange rate and volatility in exchange rate in the developing economies. Generalized Method of Moment (GMM) is applied on panel data-set of 34 developing countries for the years 1978-2015. The GARCH model is employed to measure volatility in exchange rate while capital inflows are captured by net foreign direct investment (FDI) and foreign portfolio investment (FPI). The findings explain that when the capital inflows are measured by FDI it is positively affected by exchange rate and negatively by volatility in exchange rate. The GDP growth has shown positive while terms of trade and interest rate have shown negative effect on capital inflows. The inflation has negative but negligible effect on FDI inflow. When the capital inflows are measured by FPI the results depicts that exchange rate, volatility in exchange rate and terms of trade have negative effect on FPI. The economic growth, interest rate and industrialization have shown positive effect on capital inflows captured by FPI. The volatility in exchange rate has shown negative effect on capital inflows (measured by FDI as well as FPI) so exchange rate fluctuations should be minimized in order to enhance the capital inflows in developing economies.

Contribution/ Originality: This paper contributes to the literature by estimating the impact of exchange rate volatility on capital inflows captured by FDI and foreign portfolio investment. The uniqueness of the study is estimation of FDI and foreign portfolio investment on the same panel data set of developing economies.

1. INTRODUCTION

The developing economies frequently face the situation of a gap between the domestic savings and the financing funds to meet the needs of investment. This gap is filled by capital inflows. Capital inflows make the host countries to invest and consume more than what they can do without foreign capital inflows. A number of social and macroeconomic indicators like foreign reserves, technology transfer, savings and investment are favorably influenced by the foreign capital inflows so capital inflows are necessary for developing economies to maintain the macroeconomic growth and stability (Levine, 2001).

The capital inflows particularly for developing economies are considered as driver of economic growth (Lin, Andrews, Ghosh, & Ratasuk, 2014). They may support the developing economies in financial investment and strengthening the stock market which accelerate the economic growth (Boudias, 2014). Furthermore, the capital inflows boost up the market size, as foreign investors invest in local market the market size tends to increase.

Foreign direct investment as an instrument not only helps the recipient countries in provision of capital but transfer of technology along with management resources as well. Such type of transfers boost the economic growth of the recipient nations (Osano & Koine, 2016). Jenkins and Thomas (2002) opined that capital inflows in the form of FDI enhance the growth of GDP directly by provision of foreign capital as well as through crowding in effect on domestic investment which additionally increases the impact of FDI on economic growth. Bosworth, Collins, and Reinhart (1999) also provided the evidence of the effect of capital inflows on domestic investment in developing countries. Borensztein, De Gregorio, and Lee (1998) evidenced the "crowding-in" effect of FDI by stating that "FDI is complementary to domestic investment". Feldstein (2000) disclosed a number of macroeconomic benefits of capital inflows like spreading the good practices in corporate governance, employing the best management and accounting regulations along with litigation and legal norms. The transfer of technology through FDI increases the productivity in the FDI recipient sectors as well as other sectors which boots the GDP growth rate (Mendoza, Milesi-Ferretti, & Asea, 1997). On the other hand, the researchers believe that a bulk of inflow of foreign capital accelerates the pace of economic growth but its volatility may be dangerous for economic stability of the host economies (Boudias, 2014). In this situation the host economies need to adjust the exchange rate policies for smoothening the inflow of foreign capital. The inflow of foreign capital in the form of portfolio investment may have serious consequences in the perspective of economic instability in host economies as it is comparatively more uncertain due to non-commitment of investors for such type of investment in the long run as compared to foreign direct investment. Furthermore, Grabel (1996) under the post-Keynesian theoretical grounds opined that there may be two kinds of negative impacts of foreign portfolio investment, i.e. it may restrict the policy autonomy of the host country and increase the vulnerability of risk in the economy along with volatility in financial system and financial crisis. The policy makers also believe that a strong tendency of foreign capital inflows restrict the independent flourishing of industrialization needed to be pursued for developing countries (Chigbu Ezeji & Promise, 2015). Despite all these disadvantages attached to foreign capital inflows they are needed by the developing economies while keeping the volatility controlled for which exchange rate policy may be one of the instruments.

There are three major components of capital inflows, i.e. FDI, foreign aid, and foreign portfolio investment, although in some of the economies foreign remittances constitute a major part of capital inflows. In the literature capital inflows are frequently measured by FDI and foreign portfolio investment. A number of studies has measured capital inflow by FDI (Azhar, Ullah, & Malik, 2015; Chigbu Ezeji & Promise, 2015; Ifeakachukwu & Ditimi, 2014; Ogunleye, 2008; Osinubi & Amaghionyeodiwe, 2009). Some of the studies has measured capital inflows by foreign portfolio investment (Rashid & Husain, 2013; Udoh & Egwaikhide, 2008). Jehan and Hamid (2017) have measured the capital inflows by FDI as well as remittances inflow.

The high marginal productivity of capital in capital scarce countries as compared to capital rich countries instigate the investors to invest in developing economies. The literature has identified a variety of factors of capital inflows other than marginal productivity, for instance, Calvo., Leiderman, and Reinhart (1993) evidenced that inflow of capital in Latin America in 1980s was basically due to the recession and very low rate of interest in USA. In developing economies the higher economic growth rate generally attracts the inflow of capital (Sharifi-Renani & Mirfatah, 2012). Foreign capital reaches in the economies which offer higher returns on investment via attractive interest rates, developed and well managed financial markets as well as higher GDP growth rates. If the stock markets are working well with lesser volatility and uncertainty, and countries are offering attractive interests the resource rich corporations and nations prefer to send their resources to these economies (Le & Ataullah, 2010). Energy is one of vital determinant of FDI. The countries which have more energy resources (electricity, oil, gas and coal), they attract more FDI as compared to those with less energy resources (Shahbaz & Rahman, 2010).

Similarly, the factors of capital inflow identified in the literature are: human capital and trade openness (Bianco & Loan, 2017; Sharifi-Renani & Mirfatah, 2012) gross domestic product (Sharifi-Renani & Mirfatah, 2012) quality of life (Rehman, 2016) exchange rate (Sharifi-Renani & Mirfatah, 2012) exchange rate differential (Ahmed & Zlate,

2014) political stability (Ashraf, Herzer, & Nunnenkamp, 2016) economic freedom (Ullah, Haider, & Azim, 2012) corruption (Lambsdorff, 2002) access to free trade areas (Stiglitz, 2000) political rights (Rehman, 2016) structural adjustment program (Ellahi, 2011) global risk appetite (Ahmed & Zlate, 2014) domestic economic uncertainty (Canh, Binh, Thanh, & Schinckus, 2020) world crude oil prices (Sharifi-Renani & Mirfatah, 2012) world uncertainty (Canh et al., 2020) and exchange rate volatility (Azhar et al., 2015; Bianco & Loan, 2017; Ellahi, 2011; Ullah et al., 2012). The core objectives of the current analysis is to probe the influence of exchange rate and its uncertainty on capital inflows captured by FDI and foreign portfolio investment in developing economies so that some policy proposals may be framed for developing economies for smoothening the capital inflows.

2. LITERATURE REVIEW

The literature has evidenced different kinds of effects of exchange rate and exchange rate volatility on different measures of capital inflows covering various economies individually and groups of the economies.

Yip and Yao (2006) examined the exchange rate risk to foreign investors and foreign direct investments in developing economies and concluded that foreign investors make the investment decisions irrespective of depreciation or appreciation of exchange rate. Ellahi (2011) estimated the impact of exchange rate volatility on FDI in Pakistan. The short run results showed that FDI is influenced negatively by volatility in exchange rate but in the long run it is positively impacted by volatility in exchange rate. Sharifi-Renani and Mirfatah (2012) investigated the influence of volatility in exchange rate on FDI in Iran and revealed that FDI is positively affected by volatility in exchange rate. Chaudhary, Shah, and Bagram (2012) probed the effect of volatility in exchange rate on FDI in some selected Asian economies. The results showed that for six economies (Pakistan, India, Sri Lanka, South Korea, Turkey and Israel) the volatility in exchange rate influences FDI but for seven economies (Bangladesh, China, Malaysia, Indonesia, Thailand, Singapore and Iran) such type of results are found statistically insignificant.

Ullah et al. (2012) evaluated the effect of volatility in exchange rate on foreign direct investment in Pakistan and concluded that foreign direct investment is negatively influenced by exchange rate volatility. The study recommended that policy makers should focus to maintain the stability in exchange rate through exchange rate policy for attracting FDI through competitiveness in the international market.

Payaslioglu and Polat (2013) analyzed the effect of uncertainty in exchange rate on inward inflow of foreign direct investment in Turkey. The results reveled that there is no statistically significant impact of real exchange rate and volatility in exchange rate on monthly inflow of FDI.

Bilawal et al. (2014) analyzed the effect of exchange rate and its volatility on inflow of FDI and concluded that FDI in Pakistan is positively affected by exchange rate and negatively but insignificantly by volatility in exchange rate. Azhar et al. (2015) probed the impact of volatility in exchange rate on foreign direct investment for a panel of SAARC economies (Pakistan, India and Sri Lanka). The results showed that exchange rate volatility adversely affects foreign direct investment.

Bianco and Loan (2017) examined the effect of prices and exchange rate volatility on foreign direct investment for a panel of ten Latin American and Caribbean countries. They concluded that FDI was negatively influenced by volatility in exchange rate but price volatility has shown no significant impact on foreign direct investment.

Jehan and Hamid (2017) have probed the impact of exchange rate volatility on financial and physical capital inflow for a panel of developing economies incorporating the impact of financial development. They concluded that exchange rate volatility adversely affects both kinds of capital inflows however; financial development can mitigate this negative impact. Some of the studies have seen the causal implications of exchange rate and capital inflows captured by FDI and foreign portfolio investment. Dua and Sen (2006) probed the casual relationship between the real exchange rate and capital inflows for India. They found that real exchange rate granger causes capital flows in India. Rashid and Husain (2013) probed the volatility in exchange rate and capital inflows in Pakistan and found a causal effect of volatility in exchange rate on capital inflows. Ifeakachukwu and Ditimi (2014) investigated the

causal relationship between exchange rate and capital inflows for Nigeria. The results explained that there exists no causal link between capital inflow (FDI as well as foreign portfolio investment) and exchange rate. However, results of long run regression revealed that FDI has appreciating impact on exchange rate but foreign portfolio investment has depreciating impact on exchange rate.

Similarly, Kiliçarslan (2018) has also estimated the causal linkage between exchange rate volatility and capital inflows using Toda-Yamamoto technique and concluded that one way causality from FDI to exchange rate volatility exists in Turkey. A bulk of literature exists on estimation of link between exchange rate its volatility and capital inflows measured by FDI, foreign portfolio investment, remittances and foreign aid particularly for industrialized and emerging economies but comparatively limited number of studies are existed on developing economies. The literature has shown mixed results. The current study attempts to see the effect of exchange rate and its volatility on capital inflows captured by FDI and foreign capital inflows for a panel of developing economies to make the results robust. It will be an addition to the existing literature.

3. METHODOLOGY

The function created to see the impact of exchange rate and its uncertainty on capital inflows is given as:

$$FDI = f(EXR, VEXR, GDP, INT, CPI, TOT)$$

$$FPI = f(EXR, VEXR, GDP, INT, IND, TOT)$$

The operational definitions and measurement of the variables have been given in Table 1.

Table-1. Definitions and Measurement of Variables.

Variable	Unit of measurement
FDI (Foreign direct investment)	Foreign direct investment (net inflows as percentage of GDP)
FPI (Foreign portfolio investment)	Net foreign portfolio investment (current US$)
EXR (Exchange rate)	Official exchange rate (LCU per US$)
VEXP (Volatility in exchange rate)	Exchange rate volatility measured by GARCH model
GDP (Gross domestic	GDP per capita growth (constant 2010 US$)
IND (Industrialization)	[Industrial value added (annual growth)] / [Agricultural value added (annual growth)] * 100
CPI (Consumer price index)	Consumer prices index
INT (Interest rate)	Real interest rate
TOT (Term of trade)	[Exports of goods and services (annual growth)] / [Imports of goods and services (annual growth)] * 100

The Generalized Method of Moments (GMM), which produces consistent parameters, is employed due to various endogeneity problems in least squares based inference methods, i.e. fixed effects or random effects estimators may be biased and inconsistent.

When the phenomenon of endogeneity exists then most appropriate technique is GMM. GMM approach is a second best identification strategy compared to IV approach in case of endogeneity of the explanatory variables (Sevestre & Trognon, 1985).

The Housman test (Hausman, 1978) detects endogenous repressors (predictor variables) in a regression model. Before deciding the best regression method it becomes necessary to find out that whether the predictor variables are endogenous or not. For the purpose Housman test is applied.

As concerned the data, all the data for 34 developing economies covering the time period of 1975-2015 are collected from World Development Indicator (World Bank, 2017). The inclusion of countries in the sample is based on availability of data.

4. RESULTS AND DISCUSSION

Summary statistics of the variables are shown in Table 2.

Table-2. Summary of Descriptive Statistics.

Variables	OBS	Mean	Std. Dev.	Min	Max
FDI	1292	-7.457	6.6309	-20.63321	15.59413
FPI	1026	-1087.32	5717.925	-66912.9	23960.72
EXR	1292	270.140	1183.93	0.000782	13.38943
VEXR	1292	13.757	76.00050	0	1578.3
GDP	1292	4021.22	3385.534	351.8368	15510.02
INT	1292	17.622	123.672	-136.6900	2018.294
CPI	1292	68.17071	578.491	-18.97402	11749.64
TOT	1292	242473	3.2810017	-4.26081	6.06432

The GMM results to explain the effect of exchange rate and its volatility on FDI are shown in Table 3.

Table-3. GMM Results for FDI.

Dependent variable = FDI		
Variable	**Coefficient**	**Prob.**
EXR	0.1739*	0.000
VEXR	-0.0415*	0.000
GDP	1.9953*	0.000
INT	-0.0017*	0.000
CPI	-0.0000**	0.065
TOT	-0.9617	0.897
Constant	12.1243*	0.000
Model Diagnostics		
Observations = 1292		
No of groups = 34		
Hausman test	$Chi^2 = 16329.55$	0.0000

Note: * and ** indicate one percent and ten percent level of significance respectively.

Majority of the results are in line with theory. The results have shown that exchange rate has shown positive impact on net capital inflows measured by net inflow of FDI. In the literature both types of evidences regarding the impact of exchange rate on capital inflows exist that is of positive and negative impact. For instance, Ahmed and Zlate (2014) and Dhakal, Nag, Pradhan, and Upadhyaya (2010) have found negative impact of exchange rate on capital inflows. However, some of the studies have found positive impact of exchange rate on capital inflows. Ifeakachukwu and Ditimi (2014) through time series analysis for Nigeria and Goldberg and Kolstad (1994) again through time series analyses for USA have found positive impact of exchange rate on capital inflows.

The results of current study support the explanation that increase in exchange rate enhances the value of domestic currency which makes the exports cheaper and enlarged demand in the international market. The foreign investors invest in the high exchange rate countries to take the advantages of cheap exports and earn profit.

It is theoretically expected that exchange rate volatility negatively impacts capital inflows captured by FDI. As exchange rate volatility increases the capital inflows decrease because mostly the investors in developing economies have risk averse behavior. They avoid investing in the economies having risk. The results of the current study support the theoretical relationship that is exchange rate volatility negatively affects capital inflows. The increase in volatility of exchange rate decreases capital inflows in developing economies because volatility means higher risk to investors. The rick averse investors do not invest in the economies having higher volatility in exchange rate (Kiliçarslan, 2018). They move to risk free economies that are why volatility has a negative impact on capital inflows. The results are supported by a number of studies like Ellahi (2011), Ditimi, Ifeakachukwu, and Mary (2014), Ellahi (2011) and Kiliçarslan (2018) which found a negative impact of exchange rate volatility on capital

inflows. The theory explains that economic growth increases capital inflows as rapidly growing economies have good prospects for flourishing the business and opportunities of expanded market. The results of current study have shown that economic growth (measured by GDP per capita growth) has a positive impact on capital inflows captured by FDI in developing economies. The economic growth reflects the high human capital, liberalized market, economic stability and improved infrastructure which instigate the foreign investors for FDI. The results are supported by the literature. For instance, Reisen and Soto (2001); Hermes and Lensink (2003); Buch, Kleinert, Lipponer, and Toubal (2005); Adams (2009), Azman-Saini, Law, and Ahmad (2010) and Ahmed and Zlate (2014) have found positive impact of economic growth on capital inflows. It explains that growing economies are more attractive to foreign investors.

The inflation measured by consumer price index has shown a negative impact on capital inflows. Several studies has shown that inflation negatively impacts capital inflow (Rehman, 2016). The explanation of the results may be that high rate of inflation signifies economic instability associated with inappropriate government policies, especially the monetary and fiscal policy mix. The high inflation rate distorts the economic activity leading to lesser inflows of capital. It is theoretically speculated that interest rate has negative effect on capital inflows. The results of the current study revealed the negative effect of interest rate on capital inflows, i.e. an increase in interest rate decreases the capital inflows measured by net inflow of FDI. A number of studies has shown negative effect of interest rate on capital inflows. For instance (Siddiqui & Aumeboonsuke, 2014) for panel data analysis and Hooda (2011) for time series analysis of India found negative influence of interest rate on capital inflows. The results explain that as interest rate decreases the domestic investors invest progressively at low interest rate which decreases the space for foreign investors that is why interest rate has negative affect on capital inflows.

We have also used foreign portfolio investment as a measurement of capital inflows to check the impact of exchange rate and its uncertainty on capital inflows. The results of GMM estimation for foreign portfolio investment are shown in Table 4.

Table-4. GMM Results for Foreign Portfolio Investment.

Dependent Variable = Foreign Portfolio Investment		
Variables	**Coefficient**	**Prob**
EXR	-5.4102**	0.026
VEXR	-0.9354*	0.0849
GDP	8.2058***	0.000
INT	22.3873*	0.100
IND	8.1423**	0.040
TOT	-0.0000	0.709
Constant	230.8288***	0.000
Model Diagnostics		
Observations = 1026		
No of groups = 27		
Hausman test	$Chi^2 = 276.25$	0.0000

Note: ***; ** and * indicates one, five and ten percent level of significance respectively.

The GMM results for foreign portfolio investment in Table 4 show that exchange rate negatively impacts capital inflows measured by foreign portfolio investment. There exists a variety of literature showing such type of results (Ahmed & Zlate, 2014; Dhakal et al., 2010).

The volatility in exchange rate negatively impacts the capital inflow measured by foreign portfolio investment. The results are corroborated by the previous regression for FDI and are supported by the literature as discussed earlier. The economic growth (measured by GDP per capita growth) has shown a positive impact on capital inflows measured by foreign portfolio investment. It is again the same type of result as given by the regression for FDI as a measure of capital inflow. The explanation for both type of results may be the same which has been discussed earlier.

The interest rate as an explanatory variable has also shown positive impact on capital inflows measured by foreign portfolio investment. Industrialization is the variable included in the analysis which was not included in the regression for FDI. It is measured as whether the economy is producing more industrial output as compared to the agricultural output. The industrialization is assumed to have a positive impact on capital inflows measured by foreign portfolio investment. The foreign portfolio investors generally tend to invest in the economies having strong industrial base. These economies are assumed economically stable and well-growing as compared to the economies having agricultural background and dependency. The industrial economies generally have better information technology based structure and have sophisticated technology. They have better system of transfer of funds along with well-established stock markets. The results of the current study confirm that industrialization positively impacts the capital inflows in the form of foreign portfolio investment. A number of studies have found such type of results. Markusen and Venables (1999) found positive impact of industrialization on capital inflows.

5. CONCLUSION AND POLICY RECOMMENDATIONS

The purpose the current study was to see the impact of exchange rate and exchange rate volatility on capital inflows measured by FDI and foreign portfolio investment. For the purpose GMM was applied on panel data of 34 developing economies. The major finding of the study is that exchange rate volatility has a negative impact on capital inflows either measured by FDI or foreign portfolio investment. In this regard a clear policy emerged that is to attract foreign capital inflows the policy makers need to focus on smothering the exchange rate. In the control variables, the economic growth has been emerged as an important variable to enhance capital inflows both in the form of FDI and FPI. Similarly, the interest rate has also shown encouraging effect on capital inflows measured by both measures.

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