Implications of Exchange Rate and Inflation Dynamics for FDI in Pakistan: An Econometric Analysis

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Key Words:
1. Exchange Rate
2. Inflation Dynamics
3. Error Correction Method

Abstract
Pakistan, like other developing countries across the world faces the resource constraint and attracts foreign capital in the form of foreign direct investment (FDI). This shortage of financial resources is caused due to gap between saving and investment. A number of factors affect the inflow of foreign direct investment, including variations in exchange rate and inflation rate in a country. The present study is conducted to explore the link between FDI and exchange rate and inflation rate. For empirical analysis it utilized annual data set ranging from 1975 to 2015 and applied econometric methodology of Vector Error Correction Method (VECM). The checking of time series characteristics of all variables is followed by testing the existence of long run relationship and finally estimation of short run and long run elasticities of the model. Major findings confirmed the existence of long run relationship between FDI and exchange rate and inflation. Major policy recommendations include the control on inflation rate and exchange rate volatility is important instruments to attract FDI inflows in Pakistan and hence raising the overall economic development standards.

INTRODUCTION

There are many factors which contribute towards enhancing the economic growth performance, and FDI is one of catalytic element and a vehicle of technological spell over from developed to developing nations. It accelerates the economic growth process through better investment, skills development in human capital, and improvement in institutions, as being a developing country, Pakistan faces the resource constraints, low economic growth compared to potential, lack of skilled manpower, and poor quality of institutions and governance structure. The importance of FDI has got attention of researchers and there is an intense debate on the issue of its importance, especially in the context of nations facing saving-investment gap. Sawyer & Sprinkle (2006) stated that economic growth in developing nations depends heavily upon their abilities and capacities to employ their resources like labor force, capital and technology. The countries which do not possess these resources within their territories depend on the others to bring the deficient volume of resources in their country in the form of foreign direct investment (FDI). A few more studies including Roy and Berg (2006), Iqbal et al. (2010) also supported that foreign direct investment is a growth propelling factor.

One strand of literature argues that FDI works through spillover effect where technology and skills (comprising of managerial and marketing expertise) are transmitted along with capital stock to the host country which lacks them domestically (Fedderke and Romm, 2006). Another view point of the same kind by Graham & Barry (2004) stated that FDI plays a bizarre and positive role in enhancing the economic activity and development. It is a source of provision of new markets, cheap production processes, technological spill over, innovative products, new management and production skills and facilities of financing for resource deficient countries, and collectively all these factors contribute to positive growth horizons for developing countries across the globe.

The relationship between FDI and exchange rate are justified on the base of existence of competition among the countries for attracting FDI. This competitiveness of FDI reinforced by exchange rate policy (Azam et al, 2012).

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the Although there are far reaching implications of FDI for economic growth and societal well being, but the small changes in its determinants cause great and frequent changes in it. Keeping in consideration the importance of FDI for economic growth, there are many factors which affect FDI such as stated by Zaman et al. (2012) that in an open economy framework, exchange rate and inflation affects directly to FDI and economic growth. This research study is aimed to find the nature of link between FDI, inflation and exchange rate. An econometric model has been developed to check the existence of long run relationship and estimating the short run and long run elasticities. The organization of study is as: Following introduction in section one, section two presents review of previous studies and section three includes theoretical and conceptual background along with brief trends of FDI in Pakistan. Data, estimation methods and variables are described in section four, interpretation of results is given in section five and final section concludes and provides policy recommendations and future direction of research.

REVIEW OF PREVIOUS STUDIES

A brief and comprehensive review of theoretical and empirical literature is a key factor of a research activity. It provides a deep insight into the problem statement and hence provides a clear understanding of research objectives.

Ullah et al. (2012) studied the nature of link between the FDI and exchange rate and exchange rate volatility for Pakistan economy. The study utilized annual time series data set from 1985 to 2010 on inflation rate, trade openness and volatility of exchange rate and applied econometric methodology. The findings suggested that volatility of exchange rate has a negative relationship with FDI, while rupee depreciation of currency positively affects FDI. The causality analysis conducted in addition resulted that exchange rate volatility granger causes FDI while the relation does not exist in reverse direction.

Khan et al (2012) studied the effectiveness of exchange rate in Pakistan through an empirical analysis. The study developed a series of models to check the implications of exchange rate for FDI, trade openness, inflation and GDP growth rate. Econometric estimation results suggested that there is no long run relationship between exchange rate and inflation, while relationship exists for trade openness. In case of FDI, an indication of long run relationship has been recorded by the study and exchange rate and FDI granger cause each other.

Omankhanlen (2011) analyzed the relationship between FDI, inflation and exchange rate at one hand and checked the link of FDI with economic growth indicators on the other hand. The study conducted a two equation econometric model and carried out estimation with an application of linear regression analysis utilizing annual frequency data over thirty years. The findings showed that there FDI is neutral to changes in inflation structure of the Nigeria, while it is affected by exchange rate. With reference to economic growth model, it stated that high growth was responsible for attracting the direct foreign investment from abroad.

Asian economies are getting high volumes of FDI inflow from China, Salike (2009) explored the Impact of surging Chinese FDI inflows on in the context of Asian economies. The studies utilized a panel data over 1989 to 2004 and applied Generalized Method of Moments (GMM) estimation technique. Out of many determinants of FDI, study found Exchange rate volatility as a strongly significant factor that creates a negative impact on FDI from FDI inflows from US.

Uwubanmwen et al. (2012) studied the link between inflation, and FDI over the period, 1970 to 2009 for Nigerian economy. The study time series data set and econometric techniques and found that trade openness, exchange rate and inflation rate are major determinants of FDI. It utilized vector Error Correction Method (VECM) and granger causality techniques. The major recommendations include that government of host countries must take initiatives for macroeconomic development and environment creation to get more and more benefits of FDI.

Azam and Lukman (2011) investigated the determining factors of FDI for three countries including India, Indonesia and Pakistan. The analysis utilized a data set of annual frequency ranging from 1971 to 2005. Econometric estimations showed that for Pakistan and India the findings are approximately similar, where market size, infrastructure, openness of trade and investment have been found to be major factors that determine inflow and the outflow of FDI in the economy. The policy major policy outcomes of the research emphasized the need of ensuring security, law and order conditions along with political

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stability, i.e. overall governance and the quality of institutions. Furthermore, it also suggested the appropriateness of fiscal and monetary policy along with reducing external debt.

Abbas et al. (2011) examined the nexus between FDI and economic growth for all the SAARC countries utilizing a data set over 2001 to 2010 with the application of multiple regression models and panel data techniques. The study pointed towards a positive link between economic growth indicators and FDI, while a negative link has been detected between inflation and growth indices.

Zaman et al. (2006) conducted an empirical analysis to analyze the factors which affect FDI in Pakistan using a time series data set over 1970 to 2003. An application of Error Correction Mechanism (ECM) found that market size and trade balance had positive and robust link with FDI, inflation has positive while unit labor cost has found to have negative link with foreign direct investment. In addition the services sector had an insignificant link with FDI in long run.

Khrawish and Siam (2010) utilized the data set over the period 1997-2007 and tried to find the economic as well as financial determinants of foreign direct investment for the economy of Jordan. The major objective of this study was to find the impacts of economic as well as financial risks involved in affecting the foreign direct investment. A multiple linear regression analysis was applied to find the quantitative impacts of these risks. Major conclusion suggested that a robust link exists between the indicators of risk and foreign direct investment hence policy makers should focus on these incentives to enhance foreign direct investment in Jordan economy.

Dhakal et al. (2010) discussed the impact of uncertainty of exchange rate on behavior and volatility of foreign direct investment for China, Indonesia, Malaysia, Thailand, Philippines and South Korea. Different time periods of data set ranging for each country over 1970 to 2005 has been utilized by applying panel data techniques. The major findings include FDI is positively affected by the volatility and uncertainty of exchange rate for the sample countries. These findings were in line with theoretical assessments.

Udoh & Egwaikhide (2008) explored the nature of relationship between exchange rate volatility, uncertainty of inflation rate and FDI behavior for Nigeria. The study used a time series data ranging between 1970 to 2005, and estimated the model using applied Generalized Auto Regressive Conditional Hetroscedastic (GARCH) modeling approach. The findings suggested a negative and significant relationship between FDI, exchange rate volatility and inflation uncertainty. Furthermore the study located the development of infrastructure, international competitiveness and government size as major determinant of FDI.

Cuyvers et al. (2008) discussed and explored the determinants of foreign direct investment with reverence to country specific features. The major determinants under consideration include geographical, political and economic in nature affecting the economy of Cambodia. The study utilized data set of ten years ranging over 1995-2005 and applied panel data techniques. The major findings suggested that geographical distances has negative, while trade openness have positive impact on foreign direct investment. Furthermore the study pointed out the negative impact of Asian crisis on FDI. Policy implication suggested that institution improvement, removal of administrative barrier can help in attracting the FDI.

Kiat (2008) studied the relation between exchange rate, inflation rate and foreign direct investment and its link with economic growth for South Africa. A data on a sample of 30 countries has been selected and linear regression analysis was carried out. Major findings included that inflation rate has negative and significant impact on foreign direct investment, while the exchange rate link has found to be debated. Furthermore the study found that foreign direct investment follows the economic growth pattern.

Azam (2010) explored the determinants and nature of link between FDI and its determinants. A sample of three countries including Armenia, Kyrgyz Republic and Turkmenistan was selected. A secondary data set on these countries is utilized over the period 1991 to 2009. An econometric model is estimated by using Ordinary Least Squares method of estimation. The results were country specific pointing towards the positive link between market size and ODA while a negative impact of inflation rate on inflow of foreign direct investment was observed. Policy

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recommended that policy makers and government is required to development assistance and market size while the inflation rate must be controlled to raise the inflow of foreign direct investment. It would be a positive incentive to enhance the economic growth and economic development process for under consideration sample countries.

Dhakal (2007) estimated empirically the link between foreign direct investment and its determinants for transition economies of Eastern and Central European countries. A panel data technique of estimation has been employed on the data set over 1995-2004. Major findings suggested that trade openness; competitiveness, current account balance and exchange rate are the major determinants which affect foreign direct investment.

THEORETICAL FRAMEWORK AND TRENDS OF FDI IN PAKISTAN

Over the time, a number of empirical studies have been carried out to highlight the importance of FDI for economic growth and concluded that it acts as a catalyst and a growth enhancing factor. Agarwal (2000) analyzed the FDI and growth link for South Asian countries and found that FDI has negative impact before the globalization stream i.e. before 1980s, during the early eighties i.e. liberalization period, it was positive during liberalization period, and finally the results were found to be strong positive during the post liberalization period, the reason attributed towards the reforms taken by developing countries after liberalization move. Khaliq & Noy (2007) also examined the same link and concluded that composition of FDI is important for its impact on economic growth. FDI in most of the sectors have positive economic growth outcomes while for a very a few sectors it has negative impact on economic growth. Bande-Sbank. (2003) in their analysis conducted for 5 ASEAN economies found a positive and strong link between FDI and economic growth. On the same lines Tavakoli (2004), Balamurali and Bogahawatte (2004), Abbas et al. (2011), Kinaro (2006) found the positive link between growth and inflow of foreign direct investment in developing countries.

Contrary to the past ideas it is now a well admitted fact that buying and selling foreign capital and foreign assets is a mean to gain for economies Kiat, (2008). Blonigen (1997) argued that foreign firms get an opportunity to purchase assets at low rates when the currency of a specific country is devalued; it is only possible when the foreign investors have assets identification in that country. (Kamaly, 2002) stated that volatility of exchange rate causes uncertainty for the export oriented firms, which further causes reduction in productivity and profitability. Exchange rate appreciation causes reducing the magnitude of flow of foreign direct investment, depreciation of country's currency is associated with more FDI into that country Halicioglio (2001), Dewenter (1995) and Pan (2003). (Dhakal, Mixon, Upadhaya, 2008) also found empirically for Transition economies that real exchange rate is a primary factor which determines the FDI inflow in host countries, evaluating the channel they argued that exporting products is quite easier with depreciating exchange rate. While on the other hand an evidence of mixed impact of foreign exchange rate depreciation on FDI inflow has been reported by Tuman and Emmert (1999) Klein and Rosengren (1994).

An economic instability in the host country causes the uncertainty in the profit expectations of foreign firms. Inflation is a source of economic instability which has very adverse outcomes for the inflow of foreign direct investment in host country. Apergis & Katrakilios (1998), Shamsuddin (1994) and Mamun &Nath (2005) also reported a negative link between high inflation rate and foreign direct investment. However Nnadozie (2000) argued that there is insignificant impact of inflation on FDI inflow. Azam (2010) stated that high inflation rate is not favorable for foreign investors because in it presence they require more energy and more resources to bring the prices stability in the long run. Kinaro (2006), Sun et al. (2002), Naude & Kruegell (2007) also reported that high inflation rate is indicating economic instability and causes foreign direct investment to be low in its presence. Romer (1990) stated that inflation rate causes tax distortions and creates money illusion with which foreign investors are not comfortable in the host country.

In Pakistan, the last decade has marked a tremendous increase in attracting the FDI from abroad. For successful results the reforming of macroeconomic environment is necessary. FDI also depends on the political system of the country. The trade policy can encourage FDI to capture the domestic market and facilitate national population; in countries following research inward Hassan and Mahmood

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(2013).

FDI has been a great source of capital available in an economy. Its trends seem to be very much increasing all around the world and especially in the developing countries during the post-liberalization era. FDI affects positively to economic growth through its technological spillover effects, and filling the gap of shortage of financial resources. It highlighted that investment policies taken after the post liberalization era have not proved to be productive because of choosing among the different heads. The FDI trends in Pakistan rose right after the liberalization regime because of investment friendly policies for foreign investors. However, the trend was declining due to instability of political sector and weak infrastructure.

METHODOLOGY, DATA AND VARIABLES DESCRIPTION

This empirical study is based on annual time series data set ranging over 1985-2015. The major data sources are secondary in nature and include Pakistan Economic Survey (Various issues), International Financial Statistics (IFS) CD Rom, (2010) and World Development Indicators (WDI). :

The econometric estimation includes the following variables.

Real FDI	Real Foreign Direct investment is inflow of foreign direct investment as a share of GDP measures on annual basis. Here the units of measurement are millions of US Dollar.
Real Exchange Rate (ER)	The rate at which one currency can be exchanged for another, or the number of units of domestic currency available against one unit of the foreign currency, is called the exchange rate. Real Exchange rate is calculated as official nominal exchange rate and its ratio taken by consumer price index (CPI) with base 2005.
Inflation Rate (INFLATION)	Inflation is an obstinate increase in the general price level of both goods and services overtime. It is measured by the consumer price index (CPI), the wholesale price index (WPI) and the GDP deflator. The CPI reflects the annual percentage change in the cost to the average consumer in acquiring a given basket of commodities that may be fixed or variable at specific intervals. We have used the CPI version of inflation rate since the data is available.

Methodology

The time series properties of data have been checked by applying Augmented Dicky Fuller (ADF) test. Further the existence of long run relationship is checked by applying the cointegration test. While, the long run and short run estimates by ECM are found. This method has been considered to be most robust because it contains least errors of specification. It is easy to compute and its estimators possess optimal properties such as linearity, unbiased and minimum variance among a class of unbiased estimators (Madalla, 1999).

Specification of Model

Following Cushman (1985 and 1987) and Wei and Liu (2001), Cuywers (2008), Omankhanlen (2011) we used real exchange rate in our research study rather than nominal exchange rate. Following the models of Omankhanlen (2011) we constructed model for Pakistan. The symbolic form of models is given belo

$$\ln(RFDI) = \alpha + \beta \ln(INFR) + \gamma RER + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

The ECM representation of the Model given in equation 1 is below; it estimates the short run elasticities along with error correction term. The *ECM* $_{(t-1)}$ finds the speed of adjustment after a shock.

$$\Delta \ln RFDI_t = \alpha_\circ + \alpha_1 EC_{t-1} + \sum_{i=1}^{n} \beta_1 \Delta \ln INFR_{t-i} + \sum_{i=1}^{n} \beta_2 \Delta \ln REXCR_{t-i} + \sum_{i=1}^{n} \beta_5 \Delta \ln RFDI_{t-1} + e_t$$

Where RFDI is real foreign direct investment, INFR is inflation rate, REXC is real exchange rate.

Analysis of Results and Conclusion

Estimation requires the checking of time series properties of data, where the stationarity of data is pre-requisite for time series analysis. This study has applied Augmented Dicky Fuller (ADF) test to diagnose the stationarity of data. Results are given below in Table 1. Results show that share of FDI in GDP (LRFDI), inflation rate (INFR), and real and exchange rate (REXC are non-stationary at their level but become stationary on taking first difference. The order of integration determined here are helpful further during the estimation of both models.

Table 1: ADF Unit Root Test Results

Variables	ADF at Level	ADF at First Difference	Decision
L(RFDI)	-1.885715	-2.348408	I(1)
L(INFR)	-1.739776	-2.490701	I(1)
RER	-1.571472	-2.453705	I(1)

Note: Null hypothesis of testing unit root states that series is non-stationary or contains a unit root. *shows significance at 5% level of significance.

After the diagnosis of time series properties next step is finding the coefficients of model given in equation (1) above. The estimation output for Model 1, is given in Table 2 below. It shows that there exists a long run relationship between Foreign Direct Investment (RFDI), inflation rate (INFR) and real exchange rate (REXC). Furthermore, it states that there are three co-integrating equations expressing long run relationship between dependent and independent variables. The long run relationship is further shown below, where inflation rate has negative relationship with foreign direct investment and exchange rate is also showing negative and statistically significant link with capital inflow in the form of FDI. Next table states the short run ECM model, the ECM(t-1) is estimated to be -0.46, negative and highly significant term is indicating a moderate speed of adjustment. It represents that 46% of disturbance in the previous period adjusts back to original equilibrium. The findings are however in line with the findings of Khan (2005) and Khawaja (2009) for Pakistan.

Table 2: Johansen Co-integration Test

Maximum Eigen value	Like hood Ratio	5% Critical value	Hypothesis No of CE(s)
0.695	88.103	59.658	None **
0.615	51.564	49.457	At most 1**
0.394	24.819	29.68	At most 2
0.215	9.678	14.267	At most 3
0.056	1.875	2.88	At most 4
LRFDI = 14.867 **-** 1.88 **INFR -**0.964 **EXCR**			
t- value 2.37**	4.28**	2.29**	

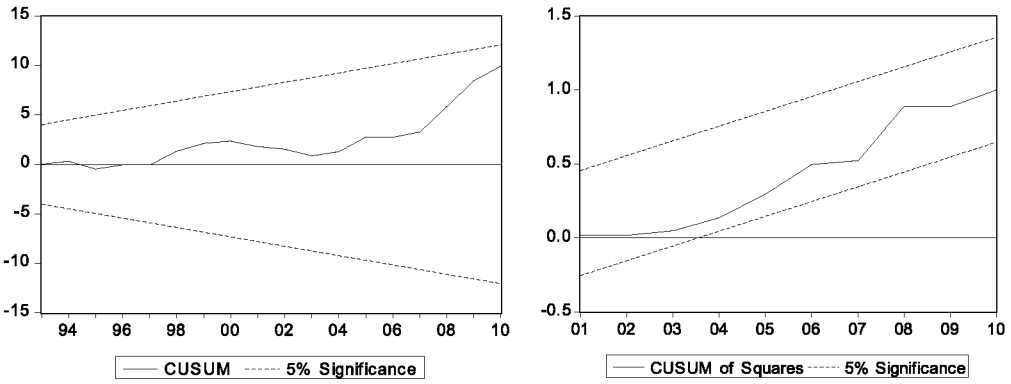
Table 3: Error Correction Model Estimation

Variables	Co-efficient	Std-Error	t-statistics
?LRFDI$_{(t-1)}$	-0.244	0.139	(-1.800)**
?INFR$_{(t-1)}$	0.664	0.350	1.885**
?REXCR$_{(t-1)}$	0.048	0.440	0.1102
EC $_{(t-1)}$	-0.4619	(0.0633)	-3.6454**

** shows significance at 5% level of significance

Figures below show the cumulative sum and cumulative sum of square terms. The graphs are inside the 5% critical bound lines. These graphs show that overall model is significant and correctly specified.

Figure 1: Graphs of CUSUM and CUSUMSQ of Model 1



CONCLUSION

The present study conducted for finding the link between foreign direct investment, exchange rate and inflation. The major findings suggested that Exchange rate volatility and inflation has a negative link with inflow of foreign direct investment (FDI). Major policy recommendations include controlling the inflation through the market operations performed by central bank of country, in order to attract more and more FDI in the country. Moreover, government must ensure to provide a sound macroeconomic policy environment before implementing the reforms in order to attract FDI. In addition, there is a need of government expenditures and efforts for better institutional structure and improve the governance status of the country.

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