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A Study on Economic Determinants of Inward FDI in BRICS Countries: Panel Data Regression Approach

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Abstract

Many studies attempted in the past on the factors determining inflow of FDI into various countries, with a diversity of convergence and divergence in methodologies and findings. This study examined the significance of relationship that the economic determinants – Balance of Payment, GDP, Inflation, and Exchange Rate – have on FDI inflow in five fastest growing emerging economies, commonly known as BRICS, which are appealing destinations for investment opportunities. Panel data regression models were applied on UNCTAD data from the year 1993 to 2015. This study came to this finding that while GDP and inflation had been having a significant positive effect on inward FDI, balance of payment and exchange rate had no significant role in attracting FDI in BRICS countries.

Keywords: BRICS, GDP, Inflation, Inward FDI, Panel Data Regression

1. Introduction

A key catalyst to overall economic growth of the country is FDI (Foreign Direct Investment), since the overseas firms bring expertise and technological knowhow to the host economies. There are a number of studies attempted in the past by different scholars on factors determining FDI inflow into various countries. These include political, economical, social, technological, and natural environmental factors. Yet, there are convergence and divergence in their methodologies and findings. This study examined the significance of relationship that the economic determinants (marked as key economic indicators by UNCTAD) – Exchange Rate, GDP (Gross Domestic Product), Inflation, and BOP (Balance of Payment) – have on FDI inflow from 1993 to 2015 in the BRICS countries, which are Brazil, Russia, India, China, South Africa. Panel Data Regression (pooled OLS and fixed effects) is applied on UNCTAD data from the year 1993 to 2015. The factors GDP and inflation emerged to have had a significant relationship with FDI. Quite interestingly BOP (Balance of Payment) and exchange rate had an insignificant relationship with inward FDI in these countries.

2. Literature Review

2.1 FDI

Eclectic OLI (Ownership, Location, and Internalization) paradigm provides best theoretical understanding of the FDI. It describes country, industry, firm level characteristics with OLI, and

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explores different modes of entry with the competitive advantage of the Firm (Dunning1977). Ownership (O) factors include intangible and tangible assets, size of economy, and monopolistic advantages. Location (L) is influenced by economic, socio-cultural, political, and environmental factors. Internalization (I) explains the mode of entry used by an MNE to access international market. According to OECD (1992), “meaning of FDI is termed as a foreign firm gets more than 10 percent or more ordinary shares or voting power by investing in foreign entity”.

In circumstances where a country is void of the requisite resources, technologies, and skills, the inflow of FDI happens through the spillover effect (Fedderke and Romm, 2006). However, the competence of the country in terms of how well it can utilize the FDI and available resources to generate growth depends on its policy and regulatory environment. This study is used data on annual flow of inward FDI (in millions), for a one-year period. The data (flow or stock) selection decision is critical, and we selected FDI inward flow data, as it is a dynamic entity, where as stock is static. Past researchers have preferred flow to stock, as it is also ideal for explaining the characteristics leading to locational determination of FDI. (Galan *et al.*, 2007)

2.2 GDP

GDP can be defined as “an aggregate measure of production equal to the sum of the gross values added of all resident and institutional units engaged in production (plus any taxes, and minus any subsidies, on products not included in the value of their outputs)” OECD (1992). IMF states that “GDP measures the monetary value of final goods and services - that is, those that are bought by the final user - produced in a country in a given period of time (say a quarter or a year).” GDP reflects the market size existing in that country for MNEs, which can efficiently employ the resources to attain economies of scale by attracting higher FDI inflow in the country (Agarwal, 1980; Culem, 1988; Tsai, 1991; Uddin and Boateng, 2011). GDP used for this study is given in Total Current Prices (in Millions) on yearly basis.

2.3 Inflation

High inflation negatively impacts the real earnings of a firm in a local currency in a country (Buckley *et al.*, 2007). Lower inflation is good for host economy and it brings constant inward FDI due to macroeconomic stability in the host country, (Scott-Green and Clegg, 1999; Coskun, 2001). Inflation is often found to significantly impact inward FDI (Nonnenberg *et.al* (2004). Inflation is calculated from consumer price index data. In this study, the measurement of inflation is annual change in percent.

2.4 Balance of Payments

In its 5th edition BOP manual, IMF mentioned BOP as, “a statistical statement that systematically summarizes, for a specific time period, the economic transactions of an economy with the rest of the world. Transactions between residents and nonresidents consist of goods, services, income, financial claims, and those classified as transfers (such as gifts), which involve offsetting entries to balance, in an accounting sense”. The measurement of BOP in this study is the difference between total Current Prices (in Millions) and Current Account Net.

2.5 Exchange Rate

Exchange rate means the comparison of One country’s currency with another country’s currency with its equivalent value that are determined by numerous factors.US Dollar (USD) is used as common currency for calculating exchange rate as it is accepted as stable currency by most of the countries after second world war. Depreciation of local currency bring in more inward FDI as the local production cost becomes lower and results in increased profit (Tolentino, 2010). Studies conducted by Caves (1988) Contractor (1990) showed exchange rate had a negative

effect towards inward FDI; this has been reaffirmed by Blonigen (1995) Blonigen and Feenstra (1996). While a study conducted by Edwards (1990) concluded the positive Effect between Exchange Rate and Inward FDI. Studies by Calderon-Rossell (1985) and Sader (1991) concluded the insignificant relationship between Exchange Rate and Inward FDI. The same is reaffirmed by Blonigen (1997), Tuman and Emmert (1999). In fact, till today, there has been no conclusive theory on the association between volatility of exchange rate and the fluctuation of FDI (Kosteletou and Liargovas, 2000).

2.6 BRICS

BRIC is the acronym created by American Economist Jim O'Neill in 2001, representing Brazil, Russia, India, China. O'Neill postulated that these countries together have more than 40% of the population of the world, 25% of the size of the world's land and perhaps the fastest growing economies in the globe have the potential to become economic power house in coming years. South Africa was inducted into BRIC after a formal invitation from the member countries in 2010. BRICS countries appear to be having tremendous strengths, which can challenge the dominance of the economic growth of the developed country in coming decades (Goldman Sachs Investment Report, 2013). In this study, we consider only selective economic factors for our study, Balance of Payment (BOP), Gross Domestic Product (GDP), Inflation, and Exchange Rate and study the significance of the relationship that these variables have with inward FDI among BRICS Countries.

3. Research Questions and Hypothesis

The study examined the significance of relationship that the economic determinants (marked as key economic indicators by UNCTAD) – GDP, Inflation, BOP, and Exchange Rate – have on the inflow of FDI in BRICS (Brazil, Russia, India, China, South Africa) Countries, from 1993 to 2015. Panel Data Regression (pooled OLS and fixed effects) on UNCTAD data from the year 1993 to 2015. The research questions of this study were:

RQ 1: What is the nature of the relationship between GDP and FDI inflow in BRICS?

RQ 2: What is the nature of relationship between inflation and FDI inflow in BRICS?

RQ 3: What is the nature of relationship between exchange rate and FDI inflow in BRICS?

RQ 4: What is the nature of relationship between BOP and FDI inflow in BRICS?

The quest for the answers to these questions, with the support of literature review, led to the following hypothesis:

H 1. The relationship between GDP and FDI inflow is positive in BRICS.

H 2. The relationship between inflation and FDI is positive in BRICS.

H 3. The appreciation of the exchange rate leads to decrease in FDI inflows in BRICS.

H 4. The appreciation of the BOP leads to decrease in FDI inflows in BRICS.

4. Research Method, Data Analysis and Results

4.1 Sources of Data

The paper used both pooled OLS and fixed effects – two panel data techniques – on the data of BRICS countries for the period 1993–2015, as available publicly on the online database of United Nations Conference on Trade and Development (UNCTAD). BRICS countries were purposefully chosen as they are among the fastest growing emerging markets for international investment opportunities (Khan *et. al*). The data available in UNCTAD for these counties prior to 1993 was unbalanced. Therefore, data from 1993 to 2015 time frame was chosen to adopt

balanced panel data approach. Based on the data availability, macroeconomic factors were studied and their effect on inward FDI was recorded.

4.2 Preliminary Data Analysis

Table 1 presents a summary of the statistics and the VIF values of the variables. As total of 5 countries were considered for the study for the period of 1993 to 2015, the total number of observations were 115. The VIF values indicated no multicollinearity between the variables. Figure 1 represents the heterogeneity across countries.

Table 1: Summary Statistics

Variable	No. of Observations	Mean	Standard Deviation	Minimum	Maximum	VIF
FDI	115	29442.83	33730.28	10.09	135610	
GDP	115	1409327	2000777	115481.9	1.12e+07	2.19
BoP	115	24586.160	85992	-104181	420569	1.97
Inflation	115	102.053	48.560	.849	246.58	1.19
Exchange Rate	115	16.772	17.389	0.038	64.15	1.02

4.3. Models, Estimations and Results

Model Specification

The Hausman test was used to check whether fixed or random effect estimation is to be used. The test favored the fixed effects over the random effects estimations. Breusch Test was applied to check for heteroskedasticity in the data. It was found that the data suffered from heteroskedasticity; hence robust standard errors were reported so as to relax the assumption.

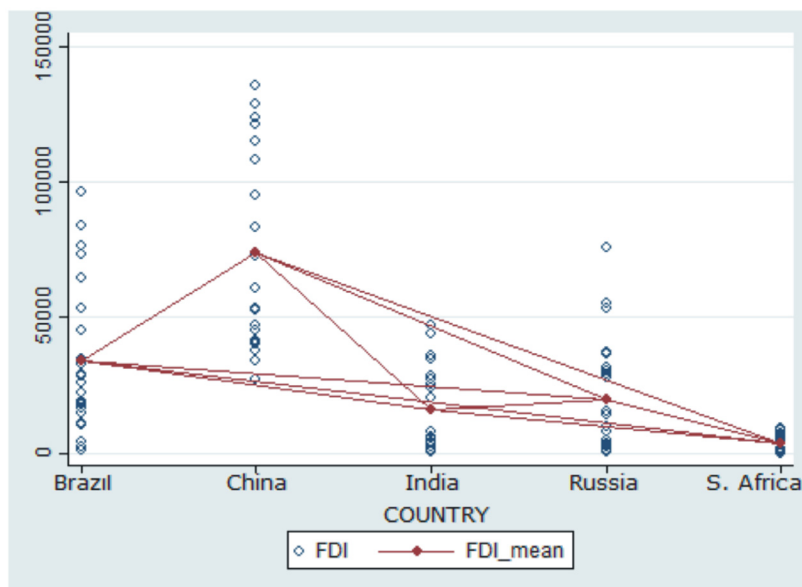


Figure 1: Heterogeneity across Countries

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Further, unit root test and co-integration tests are not viable for this study as the time period employed in this study is small. These tests give better results when studies have longer time frame. Hence, the absence of these tests would not bias any results obtained.

To test the hypotheses, following equation was estimated to test for the effects of the macroeconomic variables on inward FDI using fixed effects model:

$$FDI_{it} = \beta_0 + \beta_1 X_{it} + \epsilon_{it}$$

Here FDI_{it} is the dependent variable FDI, namely BRICS FDI inflows, X_{it} is a set of other explanatory variables, such as GDP, Balance of Payment (BoP), Exchange Rate, Rate of Inflation. β_0 and β_1 are coefficients, i and t are indices for individual and time; ϵ_{it} is the error term.

Results

The results of the regression with Pooled OLS and fixed effects are presented in table 3. The effect of macroeconomic variables was tested and the findings produced surprising results in the case of Exchange rate and Balance of Payments (BoP). The results of both the models are quite similar in some aspects. In model 2, the coefficient of determination (R^2) of 75.7 % indicates that variations in FDI is explained by GDP, Balance of Payments, Inflation, and Exchange Rate. The F-value is also large with a p-value less than 0.001, thus the relation is highly significant and indicates that the explanatory variables together explain changes in the dependent variable and significant at 1 per cent. Thus, it can be concluded that macroeconomic variables together has a significant effect of Inward FDI.

The coefficient of the GDP of BRICS countries proves to be positive and highly significant at 5% level. Hence a significant positive relation exists between GDP and FDI. If GDP increases by 1% then FDI would increase by 0.01%. This result is supported with the findings of Amal *et al.* (2010), Bhavan *et al.* (2011), Hakro *et al.* (2011). This proves that H1 is acceptable. BOP was found insignificant in both the models; thereby suggesting that balance of payment doesn't have significant effect on Inward FDI. The insignificance can be attributed to the fact that the present study have smaller time frame. Hence, H4 fails to be accepted. Inflation was positive and significant in both the models. This finding is consistent with the results of Kinuthiaa and Murshed (2015). The hypothesis of relationship between Inflation and FDI is accepted. If inflation increases by 1% then FDI would increase by 137.39 %. This proves that H2 is acceptable. The results further suggest that exchange rate has insignificant relation with inward FDI. The results are in line with the study by Tsikata *et al.* (2000), where a negative but insignificant relation was observed between exchange rate and FDI flows. The results are contrary to the results obtained by Froot and Stein (1991), who found that FDI inflows are negatively related to exchange rate. H3 is not accepted in this study. This study come to this eventuality that while GDP and inflation had been having a significant positive effect on inward FDI, balance of payment and exchange rate had not been significant in attracting FDI to BRICS countries.

5. Conclusion

This study is limited to balanced data. Application of panel data regression models on unbalanced data would be an extension of this research in order to include more time series data for the countries so as to reach to more conclusive results. From this study, researchers can figure out that compared to exchange rates and balance of payments, GDP and inflation circumstances in the emerging markets are significant factors influencing FDI decisions. Similar kind of studies can be conducted on ECOWAS, COMESA, ASEAN, MERCOSUR and CIS.

Table 3: Regression Results (Robust Standard Errors Are In Parentheses)

FDI	Pooled OLSModel 1 All Sample Countries	Fixed EffectModel 2 All Sample Countries
GDP	0.013***[0.001]	0.010** [0.003]
BoP	0.026 [0.037]	0.004 [0.073]
Inflation	76.35***[33.556]	137.39** [45.100]
Exchange Rate	-64.29 [74.918]	62.66 [58.58]
Cons.	3099.605[2710.314]	64.17 [4836.599]
No. of observation	115	115
F stat.	48.67	13740.62
Prob. > F	0.0000	0.0000
R Square	0.7871	0.7579

** At 5% significant level.

*** At 1% significant level.

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