**International Journal of Commerce and Economics**
**Online ISSN: 2664-7540; Print ISSN: 2664-7532; Impact Factor: RJIF 5.42**
**Received: 07-01-2021; Accepted: 22-01-2021; Published: 22-03-2021**
**www.commercejournal.in**
**Volume 3; Issue 1; 2021; Page No. 20-26**

# Trends & determinants of foreign direct investment (FDI) in BRICS countries: Panel analysis

**Priynaka Sahni[1], Preeti Sharma[2]**
[1] Assistant Professor, Department of Economics, Hindu Kanya Mahavidalaya, Jind, Haryana, India
[2] Assistant Professor, Department of Economics, SNRL Jairam Girls College, Kurukshetra, Haryana, India

**Abstract**
The Present study examines the determinants of FDI inflows in BRICS countries by using annual time series data running from 20001-2018. The Study employs Panel Data Analysis and has taken Market size (measured by GDP), Economic Stability (measured by inflation), Trade Openness as potential determinant of FDI inflows. The Model provides a best as two of the variables i.e. Market Size and Economic Stability have taken the expected signs and are significant; but the unexpected sign in case of Trade Openness and its insignificance may indicate towards the need to undertake bold and systemic trade liberalization reforms in BRICS; strengthening the credibility of the reform process.

**Keywords:** panel data, foreign direct investment, economic stability

## Introduction

Foreign Direct Investment (FDI) is a category of investment which reflects the objective of establishing a lasting interest by a resident enterprise in one economy (direct investor) in an enterprise (direct investment enterprise) that is resident in an economy other than that of the direct investor (OECD, 2008). There is competition among developing countries to attract FDI since it is an important source of technology transfer, export development, job creation, labor skill creation, upgrading of management and improved productivity in local firms (World Bank, 2013) [17]. FDI is treated as a main engine of economic growth and technological development which provides ample opportunities in accelerating economic development. FDI contributes to exports directly and an enhanced export possibility contributes to the growth of the host economies by relaxing demand side constraints on economic growth. Encouragement of FDI is an integral part of the economic reforms process of developing nations because it is seen as an instrument of technology transfer, managerial skill, and augmentation of foreign exchange reserves and globalization of the economy. Economic growth, continuing trade regimes, and increased competition among firms are likely to derive the global expansion of MNC activity. Most of the developing economies are taking major steps to modify their policies to attract inward Foreign Direct Investment.

FDI eludes definition owing to the presence of many authorities: Organization for Economic Co-operation and Development (OECD), International Monetary Fund (IMF), International Bank for Reconstruction and Development (IBRD) and United Nations Conference on Trade and Development (UNCTAD). All these bodies attempt to illustrate the nature of FDI with certain measuring methodologies. Generally speaking FDI refers to capital inflows from abroad that invest in the production capacity of the economy and are:- "usually preferred over other forms of external finance because they are non-debt creating, non-volatile and their returns depend on the performance of the projects financed by the investors. FDI also facilitates international trade and transfer of knowledge, skills and technology."

It is furthermore described as a source of economic development, modernization, and employment generation, whereby the overall benefits (dependant on the policies of the host government)…triggers technology spillovers, assists human capital formation, contributes to international trade integration and particularly exports, helps create a more competitive business environment, enhances enterprise development, increases total factor productivity and, more generally, improves the efficiency of resource use.

There are various empirical studies which show that there is positive relationship between FDI and Economic Growth and FDI is a key component of the world's growth engine, hence countries try to create favorable conditions to attract more FDI inflows into their economies (Bhavanet.al 2011). To attract FDI the policymakers must facilitate the process, and becomes imperative to identify the major determinants of the FDI, hence lot of research has been happening with respect to determinants of FDI. These determinants enable policy makers to understand the scale and direction of FDI flows. The current study also gives important policy recommendations in connection with attracting FDI.

## Review of Literature

There are various studies available which investigate the determinants of FDI inflows across countries, few of them are as follows:

Lucas (1993) [10] examine the determinants of FDI inflows for the East and South Asian economies during the time period 1960-1987 by using a model based on traditional derived factor of multiple product monopolist. The study finds that

FDI inflows are more elastic with respect of cost of capital than wages and also more elastic with respect of aggregate demand in exports than domestic demand.

Bevean and Estrin (2000) [2] establish the determinants of FDI inflows to transition economies (Central and Eastern Europe) by taking determinant factors as country risk, labour cost, host market size and gravity factors from 1994 to1998. The study observes that country risks are influenced by private sector development, Industrial development, the government balance, reserves and corruption. A dummy variable employed for capturing the key announcements of progress in EU accession seems to be directly influencing the FDI receipts.

Garibaldi et al (2002) [7] analyze the FDI and Portfolio investment flows to 26 transition economies in Eastern Europe including the former Soviet Union from 1990 to 1999. The regression estimation indicates that the FDI flows are well explained by standard economic fundamentals such as market size, fiscal deficit, inflation and exchange rate regime, risk analysis, economic reforms, trade openness, availability of natural resources, barriers to investments and bureaucracy. However, the portfolio flows are poorly explained by the fundamentals.

Bende-Nabende (2002) [5] discussed the determinants of FDI in a study using data on 19 SSA countries over the 1970–2000 and showed that the most dominant long-run determinants of FDI in SSA were market growth, a less restrictive export-orientation strategy, the FDI policy liberalization, real effective exchange rates, market size and openness of the economy.

Surak Camurdan and Ismail Cevis (2009) [6] developed an empirical framework to estimate the economic determinants of FDI inflows by employing a panel data set of 17 developing countries and transition economies for the period of 1989-2006. Seven independent variables were taken for this research namely, the previous period FDI, GDP growth rate, wage, trade rate, inflation rate and economic investment. The empirical results conclude that the previous period FDI is important as an economic determinant. Besides, it is also understood that the main determinants of FDI inflows are Inflation rate, the interest rate and trade (openness) rate.

Yunyun Duan (2009) [16] in his work "Foreign Direct Investment in BRICS: A Sector Level Analysis compared the overall trends and industrial patterns of inward Foreign Direct Investment in the BRICS and explaining their determinants. The study found that in Brazil, Russia and India the territory sector receives the most inward FDI on average over the least and secondary sectors in the middle but China has a special industrial pattern of inward FDI, that is the secondary dominant the majority of the inward FDI and the primary territory sector receives only a bit.

Vijaukumar Narayanmoorthy, and et al. (2010) Discussed the factors determining of FDI inflows in BRICS countries for the period 1975 to 2007 by using Panel data Model. According to the empirical results of study, Market size, Infrastructure, Labour cost, Currency value and Gross capital formation are potential determinants of FDI inflows but trade openness and economic stability are found to be insignificant determinant of FDI inflows.

Ranjan & Aggarwal (2011) [13] discussed the FDI inflow determinants in Brazil, Russia Federation, India and China (BRIC) countries by using the panel data estimation for the period 1975-2009. The empirical results show that market size, trade openness, labor cost, infrastructure facilities and macroeconomic stability and growth prospects are potential determinants of FDI inflow in BRIC where as gross capital formation and labor forces are insignificant, although macroeconomic stability and growth prospects have very little impact.

Jadhav (2012) [8] analyzed the role of economic, institutional and political factors in attracting foreign direct investment (FDI) in BRICS (Brazil, Russia, India, China & South Africa) economy and the comparative weight age of these factors in attracting FDI. The study uses panel data for a period of ten years (2000-2009) in order to examine the significant determinants of FDI in BRICS from a holistic approach. This study takes into account Market Size, Trade openness, natural resources as economic determinants and Macroeconomic Stability (Inflation Rate), Political stability/No violence, Government Effectiveness, Regulatory Quality, Control of corruption, Voice and accountability, Rule of Law as potential institutional and political determinants of FDI. The results indicate that market size measured by real GDP is a significant determinant of FDI which implies that most of the investment in BRICS is motivated by market-seeking purpose. Analysis of empirical data also indicates that trade openness, natural resource availability, rule of law and voice and accountability are statistically significant.

Jakhar Sonam (2017) [9] analyzed the economic determinant of Inward FDI in BRICS countries for the period 2000-2016. She used Panel data analysis for this purpose. The empirical results of her study found that while GDP, exchange rate and inflation had a significant effect on inward FDI but Balance of Payment and trade openness had insignificant effect on inward FDI.

Saini and Singhania (2017) [14] investigated the potential determinants of FDI in developed and developing countries based on panel data analysis using static and dynamic modeling for 20 countries (11 developed and 9 developing), over the period 2004–2013. They found that real GDP growth, per capita income, domestic inflation, commercial interest rates, trade openness, exchange rate and external indebtedness play a significant role in shaping the trends of foreign capital inflows.

Biyase & Rooderick (2018) [4] empirically analyzed the factors that affect the FDI inflows in BRICS countries for the period 1990-2015. They used Panel Heckman two-step estimator model for this purpose. The results show that infrastructure and GDP is an important driver for attracting FDI inflows.

**Trends of FDI Inflows in BRICS (2001-2018)**

The world has experienced a massive transformation in terms of geopolitics, economics and in organization and distribution of production. For several reasons, emerging economies of Brazil, Russia, India and China (BRIC) have acquired important role in the world economy as producers of goods and services. BRICS countries prominently attract larger capital because of their larger potential consumer market having the common characteristic of large population. Brazil,

Russia, India and China have emerged as major destination for Foreign Direct Investment (FDI) inflows, resulting in BRIC - a strong constructive term which was coined in 2001 by Jim O'Neill from investment bank Goldman Sachs in a paper entitled "Building Better Global Economic BRICs." These four countries are among the biggest and fastest-growing emerging markets. After being formally invited by the group to join the BRIC countries, South Africa officially became a member on 24 December 2010. The group was renamed BRICS, with "S" to the end, to reflect the accession of South Africa to the expanded group. According to the World Bank statistics, the BRICS countries hold more than 40% of the world population and occupy a quarter of the world's land area. It follows that, Brazil, Russia, India, China and South Africa together are a powerful economic force. FDI are considered an active factor for the economic development and an important asset for adapting to market requirements, competitiveness, representing for emerging economies an important element for economic development. (Nistor, 2011). In these circumstances Brazil, Russia, India, China and South Africa, can evolve with the help of foreign direct investment to reach the developed economies Over a period of time, BRICS (Brazil, Russia, India, China, South Africa) are increasingly becoming competitive in terms of providing a favorable environment to attract foreign investors and are growing strong in attracting global investors attention and are widely recognized as fastest growing economies and has started receiving greater FDI inflows. BRICS countries have always remained keen to attract FDI.

**Table 1:** Percentage Share of BRICS FDI inflows in World FDI Inflows (2001-2018)

| Year | World's FDI Inflows (Million of dollars) | BRICS FDI Inflows (Million of dollars) | Percentage Share of BRICS FDI in World FDI |
|---|---|---|---|
| 2001 | 825925 | 84405 | 10.22 |
| 2002 | 716128 | 79957 | 11.17 |
| 2003 | 632599 | 76459 | 12.09 |
| 2004 | 734892 | 100636 | 13.69 |
| 2005 | 973329 | 116116 | 11.93 |
| 2006 | 1461074 | 149618 | 10.24 |
| 2007 | 1978838 | 204916 | 10.36 |
| 2008 | 1697353 | 285537 | 16.82 |
| 2009 | 1114189 | 191837 | 17.22 |
| 2010 | 1388821 | 261204 | 18.81 |
| 2011 | 1591146 | 297438 | 18.69 |
| 2012 | 1592598 | 256121 | 16.08 |
| 2013 | 1443230 | 266867 | 18.49 |
| 2014 | 1323863 | 271091 | 20.48 |
| 2015 | 1774001 | 257528 | 14.52 |
| 2016 | 1746423 | 276804 | 15.85 |
| 2017 | 1497371 | 269511 | 17.99 |
| 2018 | 1297153 | 261218 | 20.13 |

**Source:** World Investment Report (Various issues) &

**Author's Calculations**

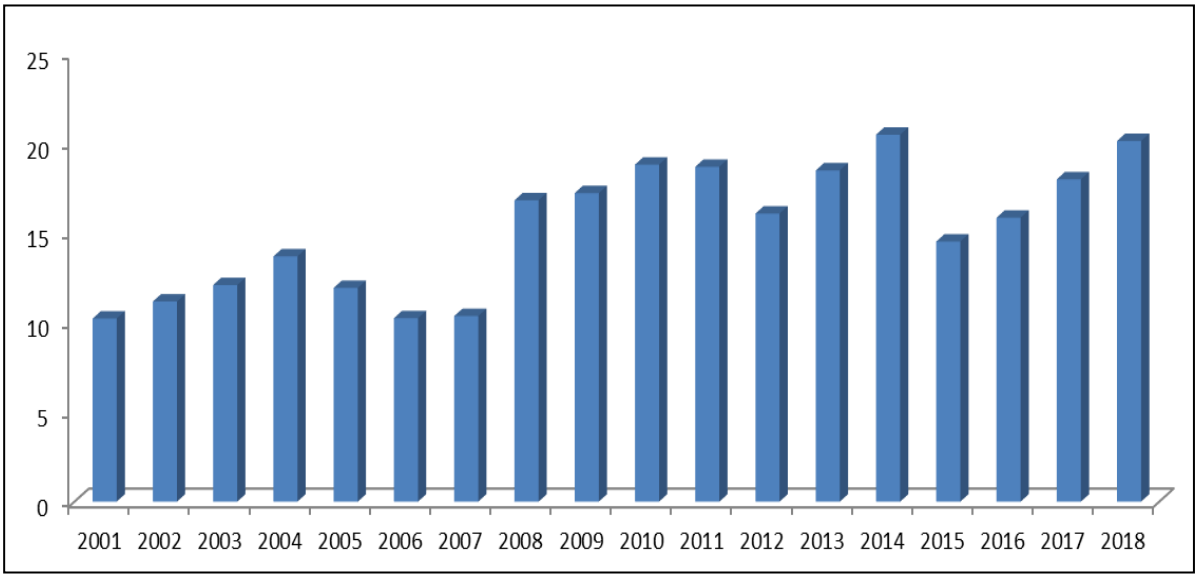


**Fig:** 1.3.1 Percentage Share of BRICS FDI inflows in World FDI inflows (2001-2018)

The above table (2.1) and Fig. (2.1) reveals that Percentage share of BRICS countries' FDI in world's total FDI has increased from 10.22 percent in 2001 to 20.48 percentage in 2014. But the share declined to 14.52 percent in 2015 and 15.85 percent in 2016.The reason may be attributed to global slowdown. But the share again rose to 20.13 percent in 2018.

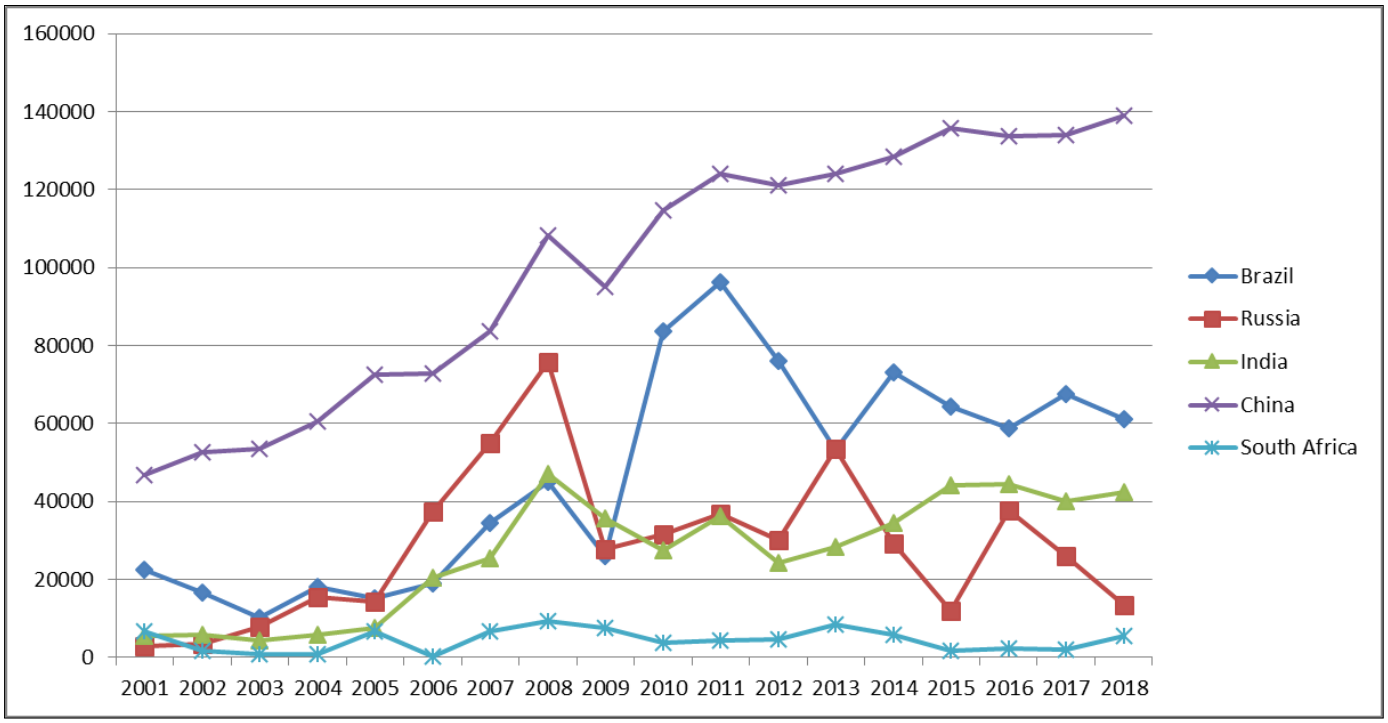


**Fig:** 1.3.2 FDI Inflows in BRICS Countries (2001- 2018)

The above Fig. (2.2) shows that BRICS countries have attracted largest inflows of FDI during the period under study i.e. from 2001 to 2018. China's cheap labor force, the young population of India, Russia and Brazil's natural resources were some of the advantages who had the effect of attracting an increasing amount of FDI in the BRICS economies. In 2001, FDI inflows to China had a relatively higher level of around 46 billion. FDI inflows to Brazil also had a higher level of around 22 billion although it was very low as compared to china in 2001. But Brazil's level of FDI inflows was ten times higher than in Russia and four times higher than in India for the period 2001. In 2002 and 2003, FDI inflows had lower values compared with the rest period, due to the global slowdown of FDI flows. From 2003 to 2008, the FDI inflows grow from 77 Billion to 281 billion dollars, with China and the Russian for the lion's share accounting of growth (UNCTAD 2013). South Africa experienced negative FDI inflows in the period 2006 except all the countries in BRICS group but has also registered higher values from 2007. All the BRICS countries have attracted highest FDI inflows for the period 2007 and 2008.FDI inflows have begun to record higher values after the year 2000 in all the BRICS group countries, with slight declines from 2002 to 2005 due to the worldwide slowdown of these flows. As can be seen in Figure 2.2, China leads attracting the highest FDI in the period 2000-2016. In 2015, when many world economies are still in decline, China's recorded the biggest level of inward FDI, a level of 135610 million dollars.

**Table 2:** Percentage Share of BRICS FDI inflows in World FDI inflows (2001-2018)

| Year | Brazil | Russia | India | China | South Africa |
|---|---|---|---|---|---|
| 2001 | 2.72 | 0.34 | 0.66 | 5.68 | 0.8 |
| 2002 | 2.32 | 0.48 | 0.79 | 7.37 | 0.2 |
| 2003 | 1.60 | 1.23 | 0.68 | 8.46 | 0.1 |
| 2004 | 2.47 | 2.08 | 0.79 | 8.25 | 0.1 |
| 2005 | 1.55 | 1.48 | 0.78 | 7.44 | 0.7 |
| 2006 | 1.29 | 2.56 | 1.39 | 4.98 | 0.02 |
| 2007 | 1.75 | 2.78 | 1.28 | 4.22 | 0.3 |
| 2008 | 2.65 | 4.47 | 2.78 | 6.38 | 0.5 |
| 2009 | 2.33 | 2.49 | 3.20 | 8.53 | 0.7 |
| 2010 | 6.03 | 2.28 | 1.97 | 8.26 | 0.3 |
| 2011 | 6.04 | 2.32 | 2.27 | 7.79 | 0.3 |
| 2012 | 4.78 | 1.9 | 1.52 | 7.60 | 0.3 |
| 2013 | 3.68 | 3.7 | 1.95 | 8.59 | 0.6 |

| | | | | | |
|---|---|---|---|---|---|
| 2014 | 5.52 | 2.2 | 2.61 | 9.71 | 0.4 |
| 2015 | 3.62 | 0.67 | 2.48 | 7.64 | 0.1 |
| 2016 | 3.36 | 2.16 | 2.55 | 7.66 | 0.1 |
| 2017 | 4.51 | 1.73 | 2.66 | 8.95 | 0.13 |
| 2018 | 4.71 | 1.02 | 3.25 | 10.71 | 0.41 |

**Source:** World Investment Report (Various issues) & Author's Calculations

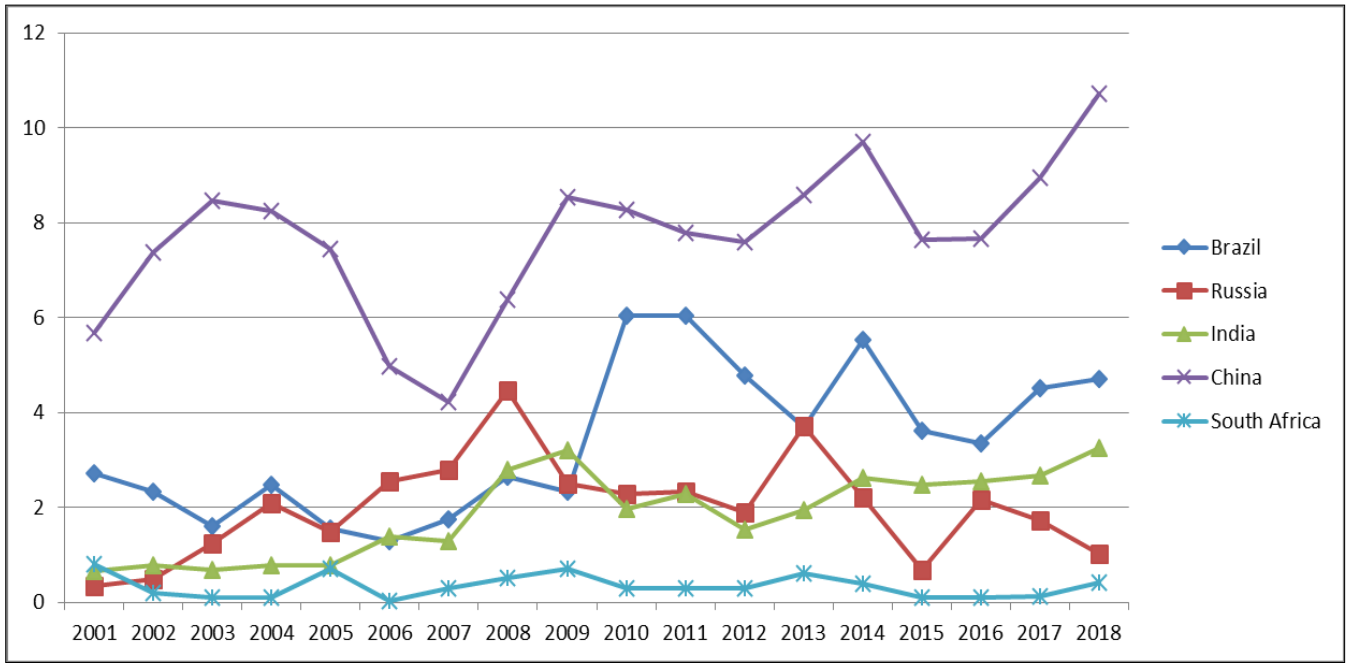


**Fig 3:** Percentage Share of BRICS FDI inflows in World FDI inflows (2001-2018)

The above table (2.2) and Fig. (2.3) shows that China has experienced largest percentage share of FDI inflows among the BRICS countries for the period 2001-2018. Its share declined in 2006 and 2007 but later its share increased to more than 8%. In 2014 China received 9.71 % of world's FDI inflows and 10.71 % in 2018. Brazil has shown a fluctuating trend until 2006.But thereafter its share increased from 1.75% in 2007 to 5.52 % in 2014. It declined to 3.62 Percentage and 3.32 Percentage in 2015 & 2016 and 4.71 % in 2018. Russia's share increased from 1.60% in 2003 to 4.47% in 2008.In 2009, it has drastically declined to 3% but later it had managed to improve gradually to 3.7% in 2013.But during the year 2015 its share fell to 0.67%. As compared to other BRIC countries, India's share in total world's FDI inflows was very less in 2004 & 200. India's share increased to 3% in 2009 but because of post global crisis its share fell to 1.52% in2012. Since 2012 there is reverse trend and India's share has increased to 2.5% in the year 2016 and 3.25 % in 2018. South Africa captures a very small percentage of FDI inflows during the period under study i.e. 2001-2018.

**Determinants of FDI in BRICS (2001-2018)**

In the present section, we have empirically examined the major factors which have determined the inflows of FDI in BRICS during the period under study i.e. 2001-2018. The variable that measures the economic stability and growth are Market size measured by Gross Domestic Product (GDP), Macro Economic Stability (inflation rates) and Trade Openness and Real Effective Exchange rate. Investors prefer to invest in more stable economies that reflect a lesser degree of uncertainty and risk.

**Market Size (GDP)**

Market size plays an important role in attracting Foreign Direct Investment (FDI) from abroad and it is measured by GDP. Market size tend to influence the inflows, as an increased customer base signifies more opportunities of being successful and also the fact that with the rampant development the purchasing power of the people has also been greatly influenced moving to many levels higher in comparison to what it was before the economic growth.

**Trade Openness**

Trade openness is also considered to be one of the key determinants of FDI as represented in the past literature; much of FDI is export oriented and may also require the import of complementary, intermediate and capital goods. Thus, trade openness is generally expected to be a positive and significant determinant of Foreign Direct Investment (FDI).

**Macro-Economic Stability**

A country which has a stable macroeconomic condition with high and sustained growth rates will receive more FDI inflows than a more volatile economy. When inflation is taken as proxy for the level of economic stability, it is expected that it would influence FDI inflows negatively.

**Econometric Methodology and Model Building**

The Present study is based on secondary data for the BRICS countries (Brazil, Russia, India, China, South Africa) for the time period 2001 -2018. Data have been collected from UNCTAD statistics (various issues) and World Investment Report (various issue). The dependent variable in the present study is FDI and independent variables are GDP, Inflation rates, REER & Trade Openness. We have employed Panel data estimation in the present study to capture the dynamic behavior of the parameters and to provide more efficient estimation and information of the parameters. Panel data techniques are used because of their advantages over cross-section and time series in using all the information available, which are not detectable in pure cross-sections or in pure time series [Baltagi and Kao (2000)]. Hausman test has also been used to check that whether the Fixed Effect or Random effect Model is appropriate for present study. There are three types of panel data Model:

1. **Pooled Regression:** In this Model, we pool all the observations together and run regression model, neglecting cross-section and time series nature of data. Here, we deny the heterogeneity or individuality among countries.

2. **Fixed Effect or LSDV Model:** Fixed effect Model allows for heterogeneity or individuality among five countries by allowing them to have its own intercept value. The term fixed effect is due to the fact that although intercept may differ across countries but intercept does not vary over time, that is it is time variant.

3. **Random Effect Model:** The rationale behind random effects model is that, unlike the fixed effects model, the variation across entities is assumed to be random and uncorrelated with the predictor or independent variables included in the model. We will use all the three models in our analysis and our panel equation is as follows:

$\text{Log FDI}_{it} = a_{oi} + a_1 \text{ Log GDP}_{it} + a_2 \text{ Log INF}_{it} + a_3 \text{ log TOI}_{it} + U_{it}$

Where, FDI = Foreign Direct Investment

GDP = Gross Domestic Product

INF = Inflation measured by CPI

TOI = Trade Openness

**Countries (i) = Brazil, Russia, India, China, South Africa**

**Period (t) = 2001 to 2018**

In order to see out of LSDV or Random effect model which model is appropriate model to accept, we have applied Hausman test statistics. The test estimates the significance of an estimator against alternative estimator. It helps the researcher to find out whether the statistical Model corresponds to data or not. This test compares the Fixed Effects versus Random Effects under the hypothesis that individual effects are uncorrelated with other independent variables in the model (Hausman, 1978).

**Interpretation of Empirical Results**

In the present study, we have estimated Panel Data Analysis including OLS Pooled Regression, Fixed Effect Model and Random Effect Model for the time period 2001-2018. The robustness of parameter coefficients are used to explain the relationship between FDI inflows, GDP, inflation and trade Openness. We have rejected the Fixed effect Model on the basis of Hausman test statistics. We have shown OLS Pooled Regression results also in the paper but we will discuss only the effects of Random Effect Model as it is the suitable model as per the Hausman test.

**Empirical Results**

**Hausman Test for selection of Appropriate Model**

Null Hypothesis: Random Effect Model is appropriate

Alternative Hypothesis: Fixed Effect Model is appropriate

**Table 3:** Hausman Test Results

| **Correlated Random Effects - Hausman Test** | | | | |
|---|---|---|---|---|
| Equation: Untitled | | | | |
| Test Cross-Section Random Effects | | | | |
| | | | | |
| | | | | |
| Test Summary | | Chi-Sq. Statistic | Chi-Sq. d.f. | Prob. |
| | | | | |
| | | | | |
| Cross-section random | | 16.288532 | 3 | 0.0010 |
| | | | | |
| | | | | |
| | | | | |
| Cross-section random effects test comparisons: | | | | |
| | | | | |
| Variable | Fixed | Random | Var(Diff.) | Prob. |
| | | | | |
| | | | | |
| GDP | 0.007859 | 0.009109 | 0.000000 | 0.0159 |
| TOI | 23.075522 | -9.999375 | 24062.395600 | 0.8312 |
| Inflation | 125.396730 | 97.115006 | 118.437847 | 0.0094 |

The results of Hausman test show that p-value is less than 5% percent level; therefore we cannot reject the Null Hypothesis and conclude that Random Effect Model is appropriate for the present study.

**Table 4:** Regression Results (Panel Data Analysis), 2001-2018

| **Variable** | **Pooled OLS Model** | **Random Effect Model** |
|---|---|---|
| Constant Term | 20860.22 (0.01)** | 11523.65 (0.23)** |
| GDP | 0.011 (0.00)** | 0.009 (0.00)** |
| Inflation | 33.81 ( 0.57) | 97.11 (0.04)** |
| Trade Openness | -241.03 (0.92) | -9.99 (0.95) |
| No. of Observations | 90 | 90 |
| $R^2$ Value | 0.73 | 0.75 |
| F-Statistics | 109.28* | 55.48* |

Figure in Parenthesis includes Probability Value

** Significant at 1% and 10% level of significance

The results of Random Effect Model shows that Market size determined by Gross Domestic Product (GDP) has a positive

sign and is found to be statistically significant at 1% and 5% level of significance. It shows that GDP is a significant determinant of FDI inflows which implies that most of the investment in BRICS countries is motivated by market-seeking purpose. The second determinant Economic Stability measure by inflation also has expected positive sign and is found to be significant at 1% and 5% level of significance. This shows that Economic stability i.e. inflation is also a critical factor in attracting FDI inflows, which helps to make appropriate policies for improving the performance of domestic economy in the BRICS. The coefficient of trade openness is found to be negative and statistically insignificant in the present empirical study in case of BRICS countries for the period 2001-18. It may be due to existence of trade barriers in the BRICS countries. This implies that the wave of liberalization in BRICS except China seems to be weak and inconsistent which many be causing this particular result. "the trade liberalization reform process must be strong, consistent and comprehensive as well as supported by conducive environment in order to be positive and significant economic growth.'' Therefore, the BRICS nations as developing countries have to involve themselves in the continuous process of economic reforms and liberalization activities. Overall Model is also significant as the F-statistics is found to be significant at 5% level of significance and the value of $R^2$ is quite high.

## Conclusion

The present study reveals that the percentage share of BRICS countries FDI inflows has shown a rising trend during the period under study i.e. 2001-2018 except few years. BRICS countries also have attracted largest flows of FDI inflows during the period under study i.e. from 2001 to 2018. China's cheap labor force, the young population of India, Russia and Brazil's natural resources were some of the advantages who had the effect of attracting an increasing amount of FDI in the BRICS economies. The empirical outcomes of this study are in conformity with other similar studies as reflected by the results of our study. The GDP and Inflation as a proxy for Market size and Economic stability have taken the expected positive and significant signs. The unexpected and insignificant sign in case of trade openness suggest the need of more studies especially case studies of individual BRICS countries. It is also recommended that the trade liberalization reform process in most of the BRICS countries need to be strong and consistent.

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