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# Unveiling The Relation Betwixt Foreign Direct Investment And Economic Growth: Evidence From BRICS Nations

**Dr. Bimal Jaiswal**
Professor
Department of Applied Economics
Faculty of Commerce
University of Lucknow
Lucknow, India

**Aishwarya Awasthi**
Research Scholar
Department of Applied Economics
Faculty of Commerce
University of Lucknow
Lucknow, India

## ABSTRACT

This paper is about the trends and relationship betwixt FDI and economic growth within the BRICS nations from 2001 to 2022. Regression analysis is employed to model this relationship, considering FDI inflows and Economic Growth (GDP) data from the World Bank Indicators database. The study evaluates the strength and significance of this relationship. Results indicate varying degrees of association across the BRICS countries. Brazil and India exhibit strong correlations and high R-squared values, put forwarding a ultra-efficient and consistent link betwixt FDI inflows & economic growth. Russia and China also demonstrate notable correlations, albeit less pronounced. In contrast, South Africa displays a weaker correlation.

**Key words:** Foreign Direct Investment, Economic Growth, GDP, BRICS nations and Correlation.

## INTRODUCTION

Foreign Direct Investment is widely accepted as a most important resource for the economic growth of developing countries. Within the dynamic landscape of global economics, Foreign Direct Investment (FDI) plays pivotal role in shaping the development trajectories of the BRICS nations. BRICS is an acronym for an association of five major emerging economies: Brazil, Russia, India, China, and South Africa. The term was coined by Jim O'Neill in 2001. The BRICS countries are characterized by their large populations, abundant natural resources, and rapidly growing economies. The organization was formally established in 2006, and since then, this bloc of prominent emerging markets has witnessed substantial inflows of foreign capital, which have contributed ultra-efficiently to their respective economic expansions and structural transformations.

As this research explores the intricate relationship betwixt FDI and GDP, the BRICS nations have been recipients of considerable FDI flows due to their vast consumer markets, rich natural resources, and favorable business environments. For instance, China alone attracted approximately $178 billion worth of FDI in 2019, making it the second most attractive destination globally after the United States. These investments have fostered technological advancements, job creation, and overall economic diversification within the BRICS member states. The jolt of FDI on GDP can be observed through various channels. On one hand, expanded FDI leads to enhanced productivity, innovation, and efficiency, thereby boosting national output. Conversely, robust GDP growth attracts more investors, creating a virtuous cycle of economic expansion. According to World Bank database, the average annual rate of GDP growth across the BRICS nations during the period of 2000–2019 was positively correlated with their aggregate FDI inflows.

The BRICS nations have adept ultra-efficient economic growth in recent years, with their combined GDP increasing from $12.4 trillion in 2012 to over $16 trillion in 2020. China is the largest economy among the BRICS countries, with a GDP of over $14 trillion in 2020, followed by India, with a GDP of over $2.8 trillion. Brazil, Russia, and South Africa have smaller economies, with GDPs of $1.4 trillion, $1.7 trillion, and $283 billion, respectively. Despite the COVID-19 pandemic's jolt on the global economy, the BRICS countries have shown resilience, with China being the only major economy to record positive growth in 2020.

## LITERATURE REVIEW

Malik and Sah (2023) studied about dynamic relationship betwixt FDI and economic growth along with one other indicator amongst BRICS countries by utilizing a Bayesian VAR framework and Pedroni residual cointegration test on annual data spanning from 1991 to 2020, the research unveils that while FDI correlates positively with economic growth in the short term, no long-term relationship exists in BRICS economies. Yimer (2022) studied about jolt of FDI on growth in Africa from 1990 to 2016, employing a dynamically common correlated jolt approach. It categorizes African economies as fragile, factor-driven, or investment-

driven and addresses issues like interaction jolts and cross-sectional dependence often overlooked in prior research. Results indicate a ultra-efficiently positive long-run jolt of FDI on growth in investment- and factor-driven economies, with inultra-efficient short-run jolts in factor-driven economies. Tamilselvan and Manikandan (2015) had conducted a study in which they showed the jolt of FDI on GDP. Their investigation used regression analysis and explored the positive jolt of FDI over GDP. Jaouadi (2014) talked about the role of FDI on increasing unemployment in KSA. It was explored that FDI has positive relation with respect to developing countries. The study conducted for short and long run using cointegration approach. Further, FDI has harmful jolt on unemployment due to the inefficiencies of the market. Thilakaweera (2012) conducted research, revealing findings that put forward the existence of a ultra-efficient long-term correlation betwixt real per capita GDP and FDI inflows. Kumar and Fodea (2009) talked about the transformative jolts of globalization on economic structures worldwide, particularly in developing economies, challenges persist, notably in BRIC countries. This paper aims to examine various economic indicators, such as GDP, sectoral GDP growth, imports, exports, and FDI inflows, in Brazil and India using forecasting techniques. The analysis reveals promising economic growth trajectories for both nations.

## OBJECTIVES

- To analyze the FDI and Economic Growth trend among BRICS nations.
- To analyze the relationship among FDI and GDP among BRICS nations.

## HYPOTHESIS

Based on the concerned previous studies we formulated an alternate hypothesis that there exists positive relationship betwixt FDI and GDP. Thus, we formulate following null hypothesis:

$H_0$- there is no significant association betwixt FDI and GDP.

## RESEARCH METHODOLOGY

This paper includes a descriptive research design to comprehensively analyze the relationship betwixt FDI and Economic Growth across BRICS countries where dependent variable is GDP and independent variable is FDI. Data on FDI inflows and GDP for BRICS nations has been taken from World Bank database. This data spans the period from **2001 to 2022**. To compute the relationship betwixt FDI and GDP, we employ **regression analysis (**Tamilselvan and Manikandan, 2015). This statistical technique allows us to model the relation among FDI and economic growth. To represent economic growth GDP (current, billion US$) and FDI inflows (current, billion US$) is considered.

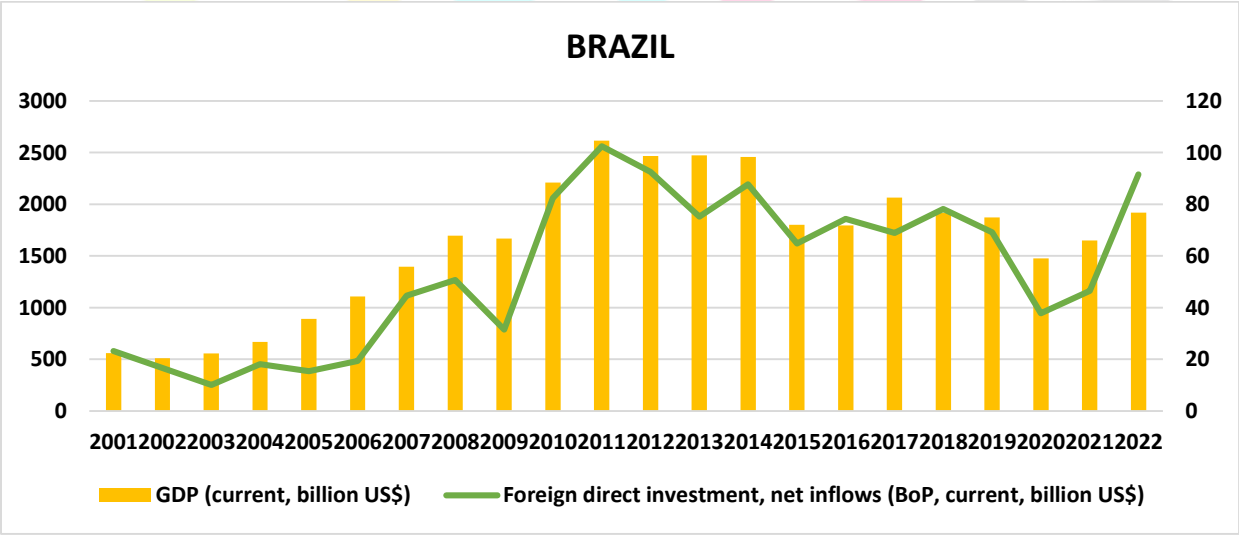
By estimating regression coefficients, we can quantify the strength and direction of this relationship. The p-value measures the statistical significance of the coefficient. A p-value less than 0.05 typically indicates ultra-efficient relation and greater than 0.05 indicates non-ultra-efficient relation among FDI and GDP.

R-squared ($R^2$) statistic is a measure through which we know how well the independent variables explain the variability of our dependent variable. It represents the amount of variance in our dependent variable i.e. predictable from independent variables. $R^2$ values range from 0 to 1 and is commonly stated as a percentage from 0% to 100%, where 1 indicates a perfect fit, implying that all variability in dependent variable is perfectly explained by independent variables. A higher $R^2$ value put forwards a stronger relationship betwixt the variables, while a lower value indicates less explanatory power.

The correlation coefficient, measures degree of association betwixt two variables, from the range -1 to 1. A coefficient closer to 1 signifies a perfect positive correlation, which indicates that as FDI increases, GDP tends to increase as well. Conversely, a coefficient closer to -1 indicates a perfect negative correlation, which indicates that as FDI increases, GDP tends to decrease. A coefficient near 0 implies a weak or no linear relationship betwixt the variables.

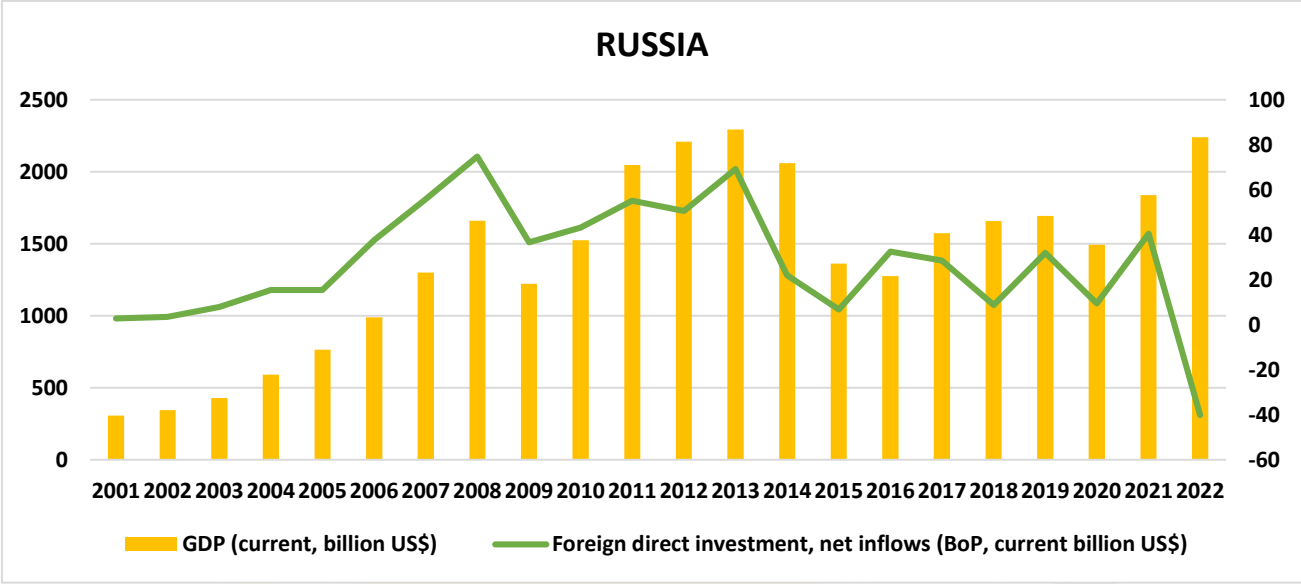
## ANALYSIS & DISCUSSION

As per Fig:1 betwixt 2001 and 2022, Brazil demonstrated fluctuations in both GDP and FDI. From $559.9 billion in 2001, GDP constantly rose until reaching $1916.9 billion in 2018 before declining slightly to $1873.3 billion in 2019. A notable increase occurred during the period from 2011 to 2014 when GDP more than doubled, spireing at $2616.2 billion in 2012. However, this rise coincided with a decline in commodity prices and political instability that contributed to subsequent economic downturns. Following the COVID-19 pandemic, GDP recovered ultra-efficiently, growing on average by 3.3% annually from 2021 to 2022. FDI inflows ranged from approximately $3.6 billion in 2001 to a record high of nearly $92 billion in 2012. Thereafter, FDI inflows gradually declined, reaching around $37.8 billion in 2020. Despite the decrease, FDI continued to play a role in financing Brazil's current account deficit, contributing about 2.4% of GDP in the twelve months ending in July 2023.



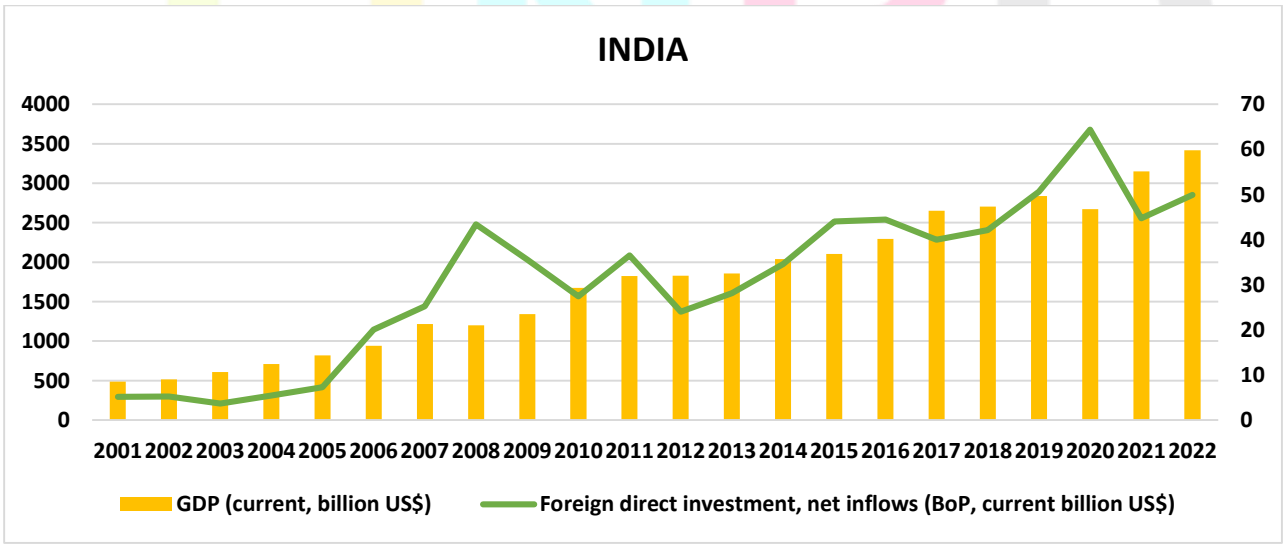

Source: Author's creation using World Bank data. (fig:1)

The GDP and FDI data for Russia shows ultra-efficient economic changes. The GDP of Russia has experienced fluctuations, with a constant rise from 2001 to 2013, gaining spire of 2292.47 billion US dollars in 2013. However, it declined in the following years, with evident drop in 2015 to 1363.48 billion US dollars, before gradually recovering and reaching 2240.42 billion US dollars in 2022. In lieu, the FDI inflows also varied concurrently, with 74.78 billion US dollars in 2008 and -40.0435 billion US dollars in 2022. It shows negative FDI net inflow in 2022, which could be a point of concern for the country's economy (fig:2).



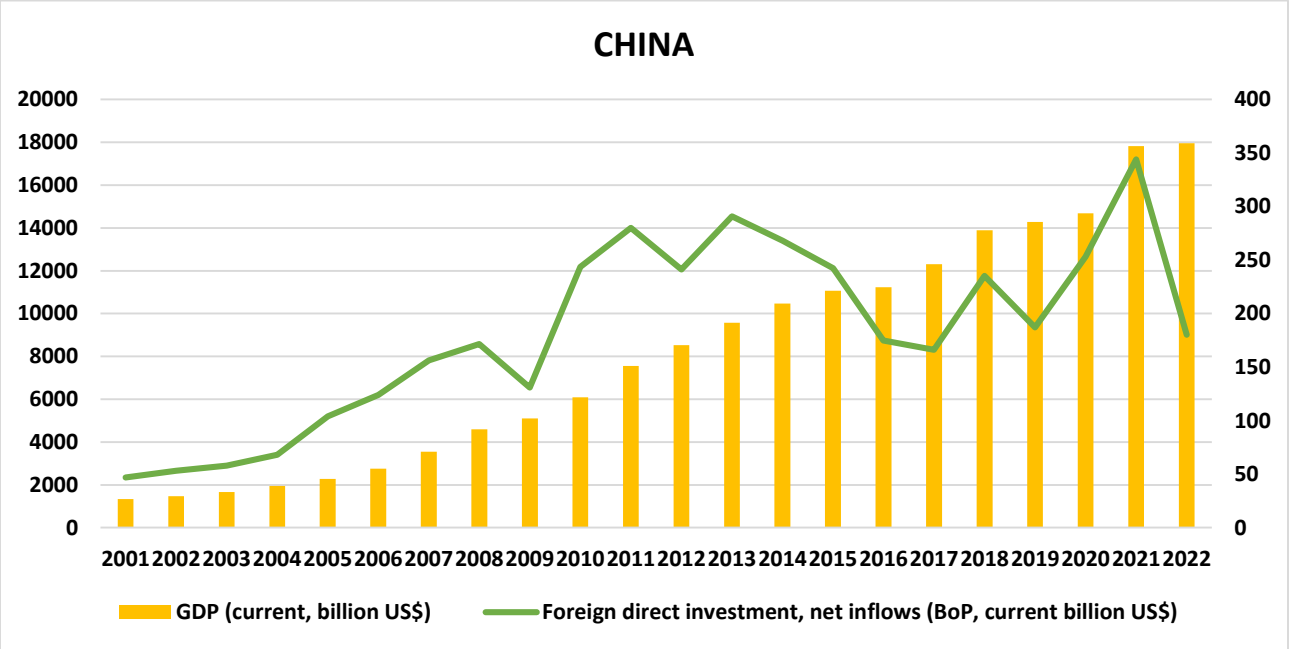

Source: Author's creation using World Bank data. (fig:2)

The data provided shows the GDP and FDI inflows in India from 2001 to 2022. India's GDP has constantly expanded from $485.44 billion in 2001 to $3416.65 billion in 2022. FDI net inflows have also expanded many moons, with a fall in 2003 and 2010. The highest FDI net inflows were recorded in 2020 at $64.36 billion. In 2021, FDI net inflows were $44.73 billion, and GDP was $3150.31 billion (fig:3). The data put forwards that India's economy has been growing, and FDI has played a crucial role in growth.



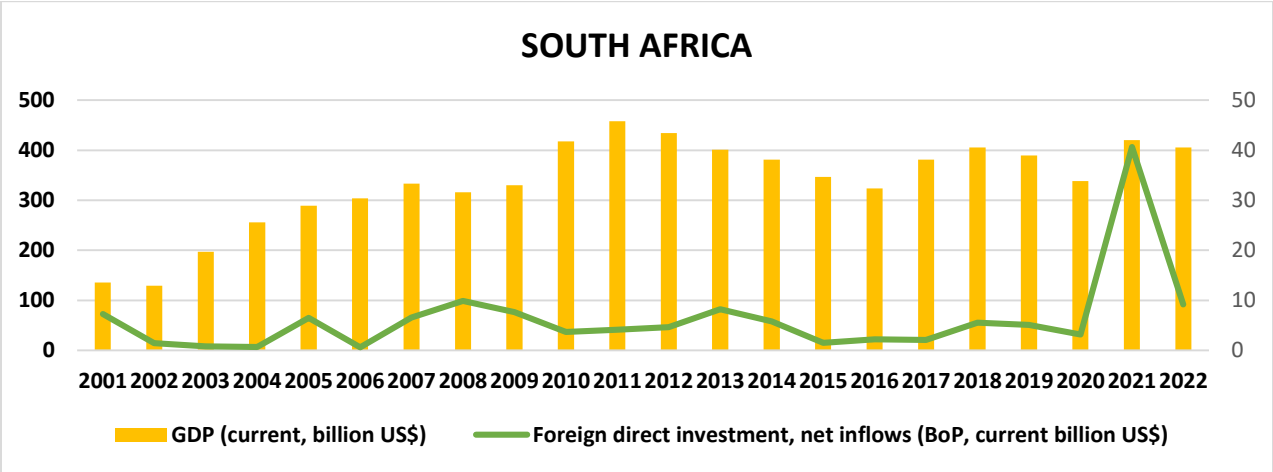

Source: Author's creation using World Bank data. (fig:3)

The data provided shows China's GDP and FDI from 2001 to 2022. China's GDP has constantly expanded from $1339.4 billion in 2001 to $17963.2 billion in 2022. FDI has fluctuated many moons, with a spire of $344.07 billion in 2021 and a squat of $47.05 billion in 2001. In 2022, FDI was reported at 1.003% of GDP. The data put forwards that China's economy has expanded ultra-efficiently many moons, and while FDI has fluctuated, it has remained a principal factor for country's economic growth (fig:4).




Source: Author's creation using World Bank data. (fig:4)

South Africa's GDP has fluctuated many moons, with a spire of $458.2 billion in 2011 and a squat of $323.6 billion in 2016. In 2021, the GDP was $420.1 billion. FDI inflows ranging from $0.62 billion in 2006 to $40.7 billion in 2021. The FDI as a percentage of GDP has been low, averaging less than 1.5% from 1994 to 2002, compared to 2-5% in other countries. In 2022, FDI inflows were 2.27% of GDP (fig:5). Apart from high GDP, there are considerable reasons for the squat FDI in South Africa like less trade openness, less deep telecommunication infrastructure, weaker labor skills, and insufficient domestic saving to support ultra-efficiently higher domestic investment rates. Additionally, South Africa's risk factors, such as macroeconomic instability, loss of assets due to non-enforceability of contracts, and physical destruction caused by armed conflicts, may discourage foreign investors.




Source: Author's creation using World Bank data. (fig:5)

The regression coefficients and corresponding p-values offer insights into the significance of this relationship within each country (table-1). Brazil, India, and China exhibit exceptionally low p-values, indicating a high linkage betwixt FDI and GDP. Specifically, Brazil and India both demonstrate p-values of 0.00, emphasizing a strong correlation betwixt FDI inflows and GDP growth. China follows closely with a p-value of 0.000157, further supporting the notion of a ultra-efficient relationship. Conversely, Russia and South Africa present divergent results. While Russia showcases a relatively low p-value of 0.001789, put forwarding a ultra-efficient association betwixt FDI and GDP, South Africa's p-value exceeds the conventional threshold of 0.05, implying a lack of statistical significance. This analysis underscores the varied dynamics of FDI-GDP interactions across BRICS nations, highlighting the importance of contextual factors and unique economic landscapes in shaping these relationships.

Table:1. Regression Coefficient betwixt GDP and FDI of BRICS nations

| Regression Coefficients | |
|---|---|
| COUNTRY | P-VALUE |
| BRAZIL | 0.00 |
| RUSSIA | 0.001789 |
| INDIA | 0.00 |
| CHINA | 0.000157 |
| SOUTH AFRICA | 0.207915 |

Source: Author's calculation using world bank data (excel software).

Looking at the table-2, presents the correlation coefficients are positive, indicating a positive relationship betwixt GDP and FDI for all five countries. However, the sturdiness of the relationship varies betwixt countries. Brazil has the strongest correlation coefficient of 0.93, presenting a strong positive relationship betwixt GDP and FDI. India also has a strong correlation coefficient of 0.86, while China has a moderately strong correlation coefficient of 0.72. Russia has a moderate correlation coefficient of 0.64, and South Africa has a weak correlation coefficient of 0.28.

Table:2. CORRELATION betwixt GDP and FDI of BRICS nations

| Countries | Correlation |
|---|---|
| BRAZIL | 0.926759761 |
| RUSSIA | 0.639756572 |
| INDIA | 0.864123431 |
| CHINA | 0.720220201 |
| SOUTH AFRICA | 0.279410941 |

Source: Author's calculation using World bank data (excel software).

R-square value of 0.8589 indicates that approximately 85.89% of the variation in FDI can be demonstrated by variations in GDP for Brazil. R-square value of 0.4093 implies that about 40.93% of the variation in FDI can be attributed to changes in GDP in Russia. While not as high as Brazil, it still signifies a moderate positive association betwixt GDP and FDI in Russia. R-square value at 0.7467 means that nearly 74.67% of the variance in FDI can be accounted for by fluctuations in GDP in India. Although lower than India, the R-square value of 0.5187 shows that about half of the variability in FDI can be explained by shifts in GDP in China. In contrast to other countries, the low R-square value of 0.0781 reveals that only around 7.81% of the variation in FDI can be associated with alterations in GDP in South Africa. This put forwards a weak or non-existent positive relation betwixt GDP and FDI in South Africa.

Table:3. REGRESSION betwixt GDP and FDI of BRICS nations

| COUNTRY | $R^2$ |
|---|---|
| BRAZIL | 0.858884 |
| RUSSIA | 0.409288 |
| INDIA | 0.746709 |
| CHINA | 0.518717 |
| SOUTH AFRICA | 0.07807 |

Source: Author's calculation using world bank data (excel software).

Countries like Brazil, India, and China exhibit ultra-efficient correlations betwixt their economic growth and foreign investment inflows, while South Africa does not show such a clear pattern.

## CONCLUSION

The study reveals ultra-efficient variations in the relationship betwixt FDI and Economic Growth among BRICS nations. Brazil and India exhibit robust correlations (0.927 and 0.864) and high R-squared values (0.859 and 0.747), indicating a strong and consistent integration betwixt FDI inflows and GDP growth. This put forwards that FDI plays a critical role in bolstering economic expansion in these countries. Russia and China also demonstrate ultra-efficient correlations and moderate R-squared values (0.640 and 0.720), put forwarding a considerable but less pronounced relationship among FDI and Economic Growth. However, South Africa's weaker correlation (0.279) and low R-squared value (0.078) coupled with a non-ultra-efficient p-value (0.208) imply a limited connection betwixt FDI and GDP in its economic context. These findings emphasize the complex and varied dynamics of FDI-GDP relationships across BRICS nations, shaped by

distinct socio-economic factors and conditions. Consequently, our study put forwards that policymakers should consider these nuances when formulating strategies to attract FDI and stimulate economic growth in their respective countries. Thus, alternate hypotheses have been accepted and these findings underscore the nuanced nature of FDI-GDP dynamics across BRICS nations, influenced by diverse socio-economic factors.

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## APPENDIX

- GDP (current US$)

| Year | Brazil | China | India | Russian Federation | South Africa |
|---|---|---|---|---|---|
| 2001 | 5.6E+11 | 1.34E+12 | 4.85E+11 | 3.07E+11 | 1.35E+11 |
| 2002 | 5.1E+11 | 1.47E+12 | 5.15E+11 | 3.45E+11 | 1.29E+11 |
| 2003 | 5.58E+11 | 1.66E+12 | 6.08E+11 | 4.3E+11 | 1.97E+11 |
| 2004 | 6.69E+11 | 1.96E+12 | 7.09E+11 | 5.91E+11 | 2.56E+11 |
| 2005 | 8.92E+11 | 2.29E+12 | 8.2E+11 | 7.64E+11 | 2.89E+11 |
| 2006 | 1.11E+12 | 2.75E+12 | 9.4E+11 | 9.9E+11 | 3.04E+11 |
| 2007 | 1.4E+12 | 3.55E+12 | 1.22E+12 | 1.3E+12 | 3.33E+11 |
| 2008 | 1.7E+12 | 4.59E+12 | 1.2E+12 | 1.66E+12 | 3.16E+11 |
| 2009 | 1.67E+12 | 5.1E+12 | 1.34E+12 | 1.22E+12 | 3.3E+11 |
| 2010 | 2.21E+12 | 6.09E+12 | 1.68E+12 | 1.52E+12 | 4.17E+11 |
| 2011 | 2.62E+12 | 7.55E+12 | 1.82E+12 | 2.05E+12 | 4.58E+11 |
| 2012 | 2.47E+12 | 8.53E+12 | 1.83E+12 | 2.21E+12 | 4.34E+11 |
| 2013 | 2.47E+12 | 9.57E+12 | 1.86E+12 | 2.29E+12 | 4.01E+11 |
| 2014 | 2.46E+12 | 1.05E+13 | 2.04E+12 | 2.06E+12 | 3.81E+11 |
| 2015 | 1.8E+12 | 1.11E+13 | 2.1E+12 | 1.36E+12 | 3.47E+11 |
| 2016 | 1.8E+12 | 1.12E+13 | 2.29E+12 | 1.28E+12 | 3.24E+11 |
| 2017 | 2.06E+12 | 1.23E+13 | 2.65E+12 | 1.57E+12 | 3.81E+11 |
| 2018 | 1.92E+12 | 1.39E+13 | 2.7E+12 | 1.66E+12 | 4.05E+11 |
| 2019 | 1.87E+12 | 1.43E+13 | 2.84E+12 | 1.69E+12 | 3.89E+11 |
| 2020 | 1.48E+12 | 1.47E+13 | 2.67E+12 | 1.49E+12 | 3.38E+11 |
| 2021 | 1.65E+12 | 1.78E+13 | 3.15E+12 | 1.84E+12 | 4.2E+11 |
| 2022 | 1.92E+12 | 1.8E+13 | 3.42E+12 | 2.24E+12 | 4.05E+11 |

Source: World Bank Data

- Foreign direct investment, net inflows (BoP, current US$)

| Year | Brazil | India | Russian Federation | China | South Africa |
|---|---|---|---|---|---|
| 2001 | 2.32E+10 | 5.13E+09 | 2.85E+09 | 4.71E+10 | 7.27E+09 |
| 2002 | 1.66E+10 | 5.21E+09 | 3.47E+09 | 5.31E+10 | 1.48E+09 |
| 2003 | 1.01E+10 | 3.68E+09 | 7.93E+09 | 5.79E+10 | 7.83E+08 |
| 2004 | 1.82E+10 | 5.43E+09 | 1.54E+10 | 6.81E+10 | 7.01E+08 |
| 2005 | 1.55E+10 | 7.27E+09 | 1.55E+10 | 1.04E+11 | 6.52E+09 |
| 2006 | 1.94E+10 | 2E+10 | 3.76E+10 | 1.24E+11 | 6.23E+08 |
| 2007 | 4.46E+10 | 2.52E+10 | 5.59E+10 | 1.56E+11 | 6.59E+09 |
| 2008 | 5.07E+10 | 4.34E+10 | 7.48E+10 | 1.72E+11 | 9.89E+09 |
| 2009 | 3.15E+10 | 3.56E+10 | 3.66E+10 | 1.31E+11 | 7.62E+09 |
| 2010 | 8.24E+10 | 2.74E+10 | 4.32E+10 | 2.44E+11 | 3.69E+09 |
| 2011 | 1.02E+11 | 3.65E+10 | 5.51E+10 | 2.8E+11 | 4.14E+09 |
| 2012 | 9.26E+10 | 2.4E+10 | 5.06E+10 | 2.41E+11 | 4.63E+09 |
| 2013 | 7.52E+10 | 2.82E+10 | 6.92E+10 | 2.91E+11 | 8.23E+09 |
| 2014 | 8.77E+10 | 3.46E+10 | 2.2E+10 | 2.68E+11 | 5.79E+09 |
| 2015 | 6.47E+10 | 4.4E+10 | 6.85E+09 | 2.42E+11 | 1.52E+09 |
| 2016 | 7.43E+10 | 4.45E+10 | 3.25E+10 | 1.75E+11 | 2.22E+09 |
| 2017 | 6.89E+10 | 4E+10 | 2.86E+10 | 1.66E+11 | 2.06E+09 |
| 2018 | 7.82E+10 | 4.21E+10 | 8.78E+09 | 2.35E+11 | 5.57E+09 |
| 2019 | 6.92E+10 | 5.06E+10 | 3.2E+10 | 1.87E+11 | 5.12E+09 |
| 2020 | 3.78E+10 | 6.44E+10 | 9.48E+09 | 2.53E+11 | 3.15E+09 |
| 2021 | 4.64E+10 | 4.47E+10 | 4.04E+10 | 3.44E+11 | 4.07E+10 |
| 2022 | 9.15E+10 | 4.99E+10 | -4E+10 | 1.8E+11 | 9.19E+09 |

Source: World Bank Data