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Structural breakdowns and revival of the Indian economy: Evidence of Granger Causality on time series data of Foreign direct investment inflow and macroeconomic factors

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Abstract
Globalization and liberalization bring many new and innovative products to the world, with foreign direct investment being innovative products and several different forms of foreign direct investment currently available. Foreign direct investment is a single, great tool to attract international economic integration in any economy. This signifies the relationship between FDI and GDP, GDP Per Capita, Export, and Inflation. Many developing countries, such as India, face savings deficits. This problem can be solved with the help of foreign direct investments. This research paper aims to examine the impact of foreign direct investment on the Indian economy, particularly after 20 years of economic reform, and analyses the challenges of actively establishing a position in the global competition for foreign direct investment. In this study author explained the impact of foreign direct investment on the macroeconomic indicators of India. It is attempting to analyse the benefits and allocation of foreign direct investment in terms of the implementation of Indian domestic markets.
Keywords: *FDI, GDP, GDP per capita, Inflation*

I. Introduction

Foreign Direct Investment (FDI) has been instrumental in driving India's economic expansion and progress over recent decades. Serving as a key source of external funding, FDI has greatly aided in capital accumulation, technological progress, and job creation across various sectors of the Indian economy. The liberalization of economic policies in India during the 1990s opened the door for increased FDI inflows, which in turn boosted competitiveness and productivity in numerous industries. This surge of foreign investment has had a particularly significant impact on sectors like manufacturing, services, and infrastructure development. FDI brings not only financial resources but also valuable expertise, management practices, and cutting-edge technologies. For enhancing the capabilities of local firms and creating a more vibrant business environment, the exchange of knowledge and skills plays a crucial role in India. The Indian government has consistently endeavoured to create a conducive investment climate to attract FDI. Reforms such as easing regulations, streamlining approval processes, and providing tax incentives have been introduced to make India a more appealing destination for foreign investors. The government initiatives like “Make in India" and "Digital India" have strengthened the country's attractiveness to international businesses seeking to expand their operations.

FDI has also been pivotal in integrating India into global value chains. As foreign companies establish manufacturing units and research and development centres in India, the nation has become a vital part of international production networks. This integration has exposed Indian companies to global best practices and quality standards. Foreign investments have generated both direct and indirect employment opportunities across various skill levels. This has been particularly advantageous in addressing India's demographic dividend by providing jobs to its large young workforce. However, the distribution of FDI across different regions and sectors in India has been uneven. While some states and industries have attracted substantial foreign investments, others have lagged. Addressing this disparity remains a challenge for policymakers as they work to ensure inclusive growth and development throughout the country. Looking forward, India's potential to attract FDI remains robust. The country's large and expanding consumer market, skilled workforce, and ongoing economic reforms continue

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to make it an attractive destination for foreign investors. As India aims to become a $5 trillion economy, FDI is expected to play an even more critical role in driving innovation, enhancing productivity, and fostering sustainable economic growth.

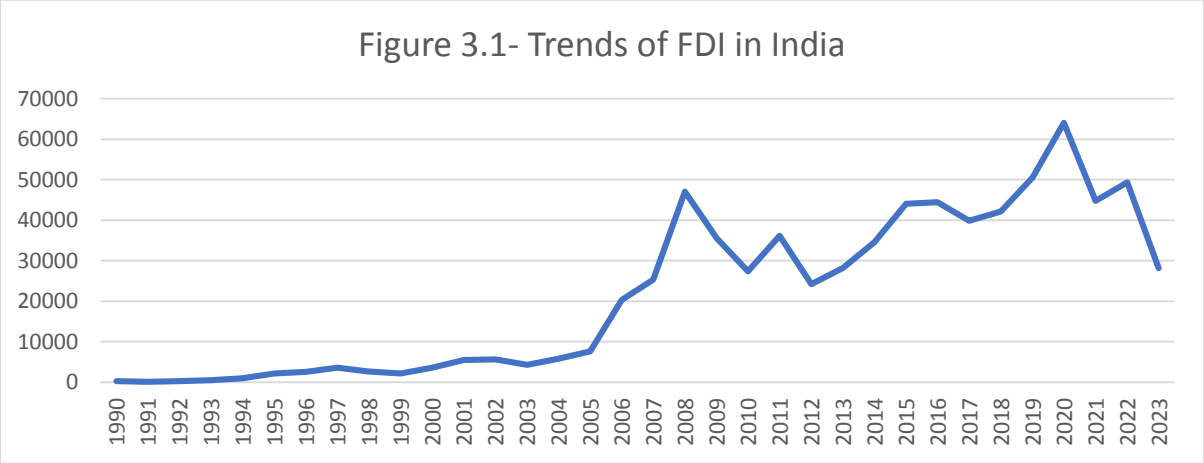
II. Existing studies

The patterns of FDI inflows have been examined broadly in a verifiable point of view and the conventional body of literature. In this viewpoint, Ana (1997) looked into the past prove on the scale of FDI to low-income nations over the period 1970-96 and major components deciding remote companies' choice to invest in a specific nation. Laura Alfaro (2003) examined the impacts of sectoral patterns of FDI streams into distinctive divisions of the economy such as essential, manufacturing and services, on financial development. He concluded that FDI inflows into the essential segment tend to have a negative impact on development, though FDI inflows in the fabricating segment have a positive one and the effect on benefit division is equivocal. In this respect, Kulwinder Singh (2005) conducted a study on sectoral patterns of FDI streams between 1991-2005 in arrange to uncover the impact of FDI, which appears to be a slow increment, has gotten to be a staple of victory in India, the advance is empty. He contended that the victory of the foundation depends upon media transmission and control division. He finds that in the comparative ponders, the idea of foundation has undergone a definitional alteration. FDI in divisions is held up essentially by media transmission, and control is not equally dispersed. A panel co-integration test was conducted on major determinants of FDI, such as advertising expenditure, labour-driven development, the framework list, and exchange openness in South Asia. The findings of this ponder suggest that FDI has a positive and critical effect on development for four South Asian nations (Sahoo, 2006). In expansion, Jayashree Bose (2007) highlighted in his book the sectoral drift of FDI inflows in India and China. The book gives data on FDI in India and China, rising issues, globalization, outside variables, patterns, and issues in FDI inflows. A comparative consider has moreover been conducted on FDI surges from India and China. This book moreover uncovers the potential and opportunities in different divisions in India that would outperform FDI inflows in India as compared to China. Jaya Gupta (2007) looked into the changing sectoral designs in India due to FDI Inflows since liberalization. She moreover endeavours to look at the effect of approach change suggestions on sectoral development and financial improvement of India as a whole. Rajan et al. (2008) contended on FDI influx that India shows up to be an appropriate area in terms of FDI investment and for harvesting tremendous benefits may be due to a well-developed budgetary sector, strong industrial base, and huge taught specialist constraint. Shiralashetti. A.S and S.S. Huger (2009) conducted a comparative consider on country-wise, sector-wise, and region-wise FDI inflows during the pre- and post-liberalization period in India. They found that unstable development in FDI influx amid post-liberalization is due to the policy change and huge advertising expenditure of India. H. Sapna (2011) analyzed the effect of FDI on the financial development of the Indian economy. Her consider uncovers that outside Coordinate Speculation (FDI) is a crucial and critical factor affecting the level of development in the Indian economy. encourages that exchange GDP, Inquire about and Advancement GDP, Monetary position, trade rate, and GDP the critical macroeconomic determinants of FDI Inflows in India. Chaturvedi Ila (2011) emphasized on sectoral drift of FDI inflows in India. He moreover inspected in his consider that there is tall degree of relationship between FDI and Financial Advancement. M. Ansari and M. Ranga (2010) assessed that India advanced as one of the most favored goal for speculation in the benefit segment due to compensation and wide demand-supply gap in budgetary administrations especially in managing an account, protections and media transmission. Steadily India has ended up critical hub for back-office preparing, call centers, specialized back, restorative translations, data preparation outsourcing (KPOs), money related examination and commerce handling centers for financial services and insurance. In differentiation Laura Alfaro (2003) and Jaya Gupta (2007) ,the work detailed in the following segment centered on strategy system for helping the expressive investigation of patterns of FDI influx. This approach tends to create a few valuable outcome suit that might be accommodating in connection to beneficial alteration in FDI approach suggestion of India.

III. Trends of FDI in India

year	FDI	GDP	GDP PER CAPITA	EXPORT	Inflation Rate (%)
1990	236.69	329139.4	380.5	226.4	8.97
1991	75.00	291200.4	329.4	229.4	13.87
1992	252.00	293693.0	325.3	254.9	11.79
1993	532.00	287273.8	311.5	274.7	6.33
1994	974.00	327525.5	348.0	323.6	10.25

1995	2151.00	371782.7	387.2	390.7	10.22
1996	2525.00	393646.9	401.8	408	8.98
1997	3619.00	425545.0	425.9	444.6	7.16
1998	2633.00	429550.2	421.7	464.3	13.23
1999	2168.00	461791.1	444.8	525.4	4.67
2000	3587.99	476148.0	450.1	608.8	4.01
2001	5477.64	490658.8	455.2	609.6	3.78
2002	5629.67	512774.6	467.2	734.5	4.3
2003	4321.08	599470.4	536.8	908.4	3.81
2004	5777.81	703129.0	619.0	1266.5	3.77
2005	7621.77	823611.6	713.3	1608.4	4.25
2006	20327.76	939066.4	800.7	1999.7	5.8
2007	25349.89	1184724.5	995.0	2530.8	6.37
2008	47102.42	1267470.1	1049.3	2889	8.35
2009	35633.94	1315230.2	1073.2	2737.5	10.88
2010	27417.08	1669619.8	1342.7	3753.5	11.99
2011	36190.46	1871918.0	1484.2	4473.8	8.91
2012	24195.77	1860877.2	1455.3	4484	9.48
2013	28199.42	1917053.7	1479.4	4721.8	10.02
2014	34582.10	2042939.3	1556.8	4683.5	6.67
2015	44064.10	2146758.6	1616.5	4167.9	4.91
2016	44480.57	2290591.0	1704.4	4396.4	4.95
2017	39903.84	2624329.0	1930.1	4982.6	3.33
2018	42156.20	2763196.7	2010.1	5386.4	3.94
2019	50558.33	2854814.2	2055.3	5292.5	3.73
2020	64072.24	2676119.2	1907.9	4997.3	6.62
2021	44762.68	3175276.4	2245.3	6777.7	5.13
2022	49379.81	3465541.4	2431.2	7780.2	6.7
2023	28163.26	3581559.8	2490.5	7771.4	5.65



In Figure 3.1, it has been explained the trends of FDI from 1990 to 2023. are explained. The remaining FDI remains in sequence till 200,0. After this, the drastic change came in FDI inflow since 2011. From 2012, FDI inflow rose rapidly till year 2023.

IV. Research Methodology

The author applied secondary sources (UNCTAD, World Bank) of data for computing the exact figure of macroeconomic indicators. For this descriptive analysis is being done than to get the data stationery author used unit root statistics, to find out the co-integration author applied Johansen cointegration statistics. Finally Granger causality test is used to measure the directional relationship among variables.

V. Results and Discussion

The results of descriptive analysis (Table:5.1) are in Favor, revealing the acceptable range of mean, median, and std deviation of FDI, GDP, GDPPC, Export, and Inflation. The results of descriptive analysis motivated us to further study in this research.

Table 5.1 Descriptive statistics

	EXPORT	FDI	GDP	GDP_PER_CAPITA	INFLATION_RATE____
Mean	2738.4	21591.8	1378354.0	1077.8	7.1
Median	2265.3	22261.8	1061895.0	897.8	6.5
Maximum	7780.2	64072.2	3581560.0	2490.5	13.9
Minimum	226.4	75.0	287273.8	311.5	3.3
Std. Dev.	2385.4	19647.9	1056620.0	710.9	3.1
Skewness	0.5	0.4	0.6	0.5	0.6
Kurtosis	2.1	1.7	2.0	1.9	2.2
Jarque-Bera	2.9	3.0	3.5	3.3	2.8
Probability	0.2	0.2	0.2	0.2	0.2
Sum	93104.2	734121.5	46864026.0	36645.5	242.8
Sum Sq.	4.43E+08	2.86E+10	1.01E+14	56176612	2042.131
Sum Sq. Dev.	1.88E+08	1.27E+10	3.68E+13	16679786	307.9677
Observations	34	34	34	34	34

After conducting descriptive analysis, we want to estimate the data property in terms of stationery. For this, we conducted a unit root test using ADF statistics and PP statistics. The results presented in Table 5.2 show that the variables are non-stationary at the level form, but when we checked at First difference, the variables became stationary. These results lead to the conduct of a co-integration analysis of Variables.

Table 5.2 ADF and PP Unit Root Test

	ADF Statics		PP Statics	
Economic Indicators	Level	Ist	Level	Ist
FDI	-1.46108	-6.2282	-1.39454	-6.2534
	-0.5404	0.000	0.573	0.0000
GDP	2.443721	-4.86926	3.981097	-4.84185
	0.9999	0.0004	1.0000	0.0005
EXPORT	1.270895	-4.90304	1.586834	-4.50638
	0.9979	0.0004	0.9992	0.0011
GDPPC	1.817298	-5.13435	2.329379	-5.12547
	0.9996	0.0002	0.9999	0.0002
INFLATION	-2.80545	-8.04295	-2.7416	-8.31863
	0.0684	0.00000	0.0779	0.0000

Now we have moved to co-integration statistics using the Johansen co-integration test, which is presented in Table 5.3. The results show that the maximum Trace value and maximum eigen value are reflective more than critical value, as well as their p value is less than 5%, which signifies the variables are co-integrated in the long run. Now we move to the Granger Causality test to find the directional relationship among variables.

Table 5.3 Johansen co-integration test

Unrestricted Cointegration Rank Test				
No. of CE(s)	**Trace Statistic**	**P-Value**	**Max-Eigen Statistic**	**P-Value**
None *	81.87	0	43.47	0
At most 1	38.4	0.29	20.66	0.3
At most 2	17.74	0.59	9.69	0.77
At most 3	8.05	0.46	8.05	0.37
At most 4	0	0.97	0	0.97
Trace test indicates 1 cointegrating equation(s) at the 0.05 level				
Max-eigenvalue test indicates 1 cointegrating equation(s) at the 0.05 level				

Table 5.4 represents the results of Granger causality statistics on the basis of the Value of P, which states FDI does not Granger cause Export. Statistically, the volume of exports, GDP, and GDP per capita rise if the FDI continues in India. On the other hand, a rise in the level of inflation adversely influences the amount of FDI in India.

Table 5.4 **Granger Causality Tests**

Null Hypothesis:	**F-Statistic**	**Prob.**
FDI does not Granger Cause EXPORT	11.63	0.00
EXPORT does not Granger Cause FDI	0.35	0.71
GDP does not Granger Cause EXPORT	2.19	0.13
EXPORT does not Granger Cause GDP	0.34	0.72
GDP_PER_CAPITA does not Granger Cause EXPORT	2.26	0.12
EXPORT does not Granger Cause GDP_PER_CAPITA	0.20	0.82
INFLATION_RATE____ does not Granger Cause EXPORT	1.04	0.37
EXPORT does not Granger Cause INFLATION_RATE____	0.07	0.93
GDP does not Granger Cause FDI	1.71	0.20
FDI does not Granger Cause GDP	6.40	0.01
GDP_PER_CAPITA does not Granger Cause FDI	2.10	0.14
FDI does not Granger Cause GDP_PER_CAPITA	6.92	0.00
INFLATION_RATE____ does not Granger Cause FDI	0.90	0.42
FDI does not Granger Cause INFLATION_RATE____	0.05	0.95
GDP_PER_CAPITA does not Granger Cause GDP	0.81	0.46
GDP does not Granger Cause GDP_PER_CAPITA	0.94	0.40
INFLATION_RATE____ does not Granger Cause GDP	0.78	0.47
GDP does not Granger Cause INFLATION_RATE____	0.11	0.89
INFLATION_RATE____ does not Granger Cause GDP_PER_CAPITA	0.97	0.39
GDP_PER_CAPITA does not Granger Cause INFLATION_RATE____	0.10	0.91

VI. Conclusion

Foreign Direct Investment (FDI) has been instrumental in driving India's economic expansion and progress over recent decades. Serving as a key source of external funding, FDI has greatly aided in capital accumulation, technological progress, and job creation across various sectors of the Indian economy. For this descriptive analysis is being done than to get the data stationery author used unit root statistics, to find out the co-integration author applied Johansen cointegration statistics. Finally Granger causality test is used to measure the directional relationship among variables. The variables became stationary at first difference, which signifies the variables are co-integrated in the long run. The Granger Causality test explains the volume of exports, GDP, and

GDP per capita rise if the FDI continues in India. On the other hand, a rise in the level of inflation adversely influences the amount of FDI in India.

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