

Foreign Direct Investment and Macroeconomic Indicators in India: A Granger Causality Analysis

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Abstract

Foreign Direct Investment (FDI) has emerged as one of the most significant sources of capital formation and economic development in emerging economies such as India. The relationship between FDI and macroeconomic variables is dynamic and often characterized by feedback effects. This study investigates the causal relationship between Foreign Direct Investment (FDI) and selected macroeconomic variables, namely Gross Domestic Product (GDP), Gross Domestic Savings (GDS), Gross Fixed Capital Formation (GFCF), Exports (EXP), Imports (IMP), Gross National Income (GNI), Net National Income (NNI), and Per Capita Income (PCI), using annual time-series data for India. The study employs the Granger causality framework after testing the stationarity and long-run equilibrium relationship among the variables. The empirical findings reveal both bidirectional and unidirectional causal relationships, suggesting that macroeconomic fundamentals significantly influence FDI inflows while FDI also contributes to economic growth.

Keywords: Foreign Direct Investment, Granger Causality, India, GDP, Exports, GDS

Introduction

Foreign Direct Investment (FDI) has become one of the most important drivers of globalization and economic integration. For developing economies like India, FDI serves as a major source of capital formation, technological advancement, employment generation, productivity enhancement, and export promotion. (Borensztein et al., 1998)¹ This relationship indicates that an increase in foreign investment enhances productive capacity through capital accumulation, technology transfer, managerial efficiency, and productivity improvements. The empirical relationship between FDI and macroeconomic variables may therefore be represented as

$$FDI=f(GDP,GDS,GFCF,EXP,IMP,GNI,NNI,PCI)$$

Literature Review

One of the earliest studies examining the causal impact of FDI on economic growth was conducted by **Borensztein, De Gregorio, and Lee (1998)**. Using panel data for 69 developing countries during 1970–1989, the authors employed cross-country regression techniques and found that FDI significantly enhances economic growth by facilitating technology transfer. However, the positive impact depends on the host country's human capital. Their findings imply that FDI Granger causes economic growth only when adequate absorptive capacity exists.

De Mello (1999) investigated the relationship between FDI and economic growth in both OECD and non-OECD countries. Applying endogenous growth models, the study concluded that FDI contributes positively to productivity

growth through capital accumulation and technological spillovers. The study emphasized that the growth-enhancing effect of FDI is stronger in developing economies with stable macroeconomic environments.

Chakraborty and Basu (2002) analyzed India's post-liberalization period using cointegration and Granger causality techniques. Their findings indicated a unidirectional causality running from GDP to FDI rather than from FDI to GDP. However, the study acknowledged that FDI positively influences productivity and industrial output over the long run.

Alfaro et al. (2004) by using a panel of developing economies demonstrated that FDI positively affects economic growth when supported by well-developed financial markets. The study highlighted that financial development strengthens the transmission mechanism through which FDI influences macroeconomic performance.

Agrawal (2015) examined the impact of FDI on economic growth using Johansen cointegration and Granger causality analysis for the period 1993–2013. The results revealed long-run cointegration and unidirectional causality from FDI to GDP, confirming that foreign investment contributes significantly to India's economic expansion.

Dunning (1993) proposed the Eclectic (OLI) Paradigm, emphasizing that market size, infrastructure, trade openness, and macroeconomic stability are major determinants of FDI. According to this framework, multinational enterprises invest in countries offering location-specific advantages supported by stable macroeconomic conditions.

Asiedu (2002) investigated FDI determinants in developing countries and found that infrastructure development, openness to trade, and macroeconomic stability significantly attract foreign investors. The study concluded that policy reforms improving macroeconomic fundamentals substantially increase FDI inflows.

Pradhan (2009) examined the relationship between FDI, exports, and economic growth using cointegration and Granger causality tests. The study reported that GDP growth and exports Granger cause FDI, indicating that foreign investors are attracted by expanding markets and strong export performance.

Dash and Parida (2013) analyzed India's macroeconomic indicators and observed that GDP growth, domestic savings, inflation, exchange rate stability, and infrastructure development significantly determine FDI inflows. Their results suggested that improvements in macroeconomic fundamentals create a conducive environment for foreign investment.

Determining the direction of causality between FDI and macroeconomic variables remains one of the most debated issues in international economics. **Hsiao and Hsiao (2006)** analyzed East Asian economies using panel Granger causality tests and found bidirectional causality between FDI and GDP in several countries, indicating a mutually reinforcing relationship.

Herzer, Klasen, and Nowak-Lehmann (2008) investigated developing economies and concluded that bidirectional causality exists between FDI and economic growth in countries with higher institutional quality and financial development.

Srinivasan, Kalaivani, and Ibrahim (2011) examined FDI and economic growth using Johansen cointegration and Vector Error Correction Models. Their findings suggested bidirectional causality between FDI and GDP in both the short and long run, implying that economic growth attracts foreign investment while FDI simultaneously stimulates growth.

Pradhan, Arvin, and Hall (2014) extended this analysis by incorporating exports and financial development into the causal framework. Their results revealed bidirectional relationships among FDI, exports, and economic growth, emphasizing the interconnectedness of macroeconomic variables.

Balasubramanyam, Salisu, and Sapsford (1996) concluded that countries pursuing export-oriented trade policies derive greater benefits from FDI than those following import substitution strategies. Their findings support policies promoting trade liberalization.

Alfaro et al. (2004) recommended strengthening financial institutions to maximize the growth-enhancing effects of FDI. They argued that domestic financial market development enables efficient allocation of foreign capital.

Kumar and Pradhan (2002) emphasized improving infrastructure, simplifying regulatory procedures, and enhancing institutional quality to attract sustainable FDI inflows into India. They argued that policy consistency significantly influences investor confidence.

OECD (2008) highlighted the importance of transparent investment policies, good governance, legal certainty, and macroeconomic stability in attracting long-term FDI. The report stressed that FDI contributes more effectively to development when supported by strong domestic institutions.

UNCTAD (2023) observed that countries emphasizing digital infrastructure, renewable energy, manufacturing competitiveness, and policy stability continue to attract larger FDI inflows despite global economic uncertainties. The report recommended strengthening institutional quality and investment facilitation mechanisms to sustain long-term foreign investment.

Objectives of the Study

The study has the following objectives:

1. To examine whether FDI Granger causes selected macroeconomic variables.
2. To investigate whether macroeconomic variables Granger cause FDI.
3. To identify the direction of causality between FDI and major macroeconomic indicators of the Indian economy.

The Hypotheses are

1. Null hypothesis: FDI does not causes Export in Indian economy
2. Null hypothesis: FDI does not causes GFCF in Indian economy
3. Null hypothesis: FDI does not causes GDP in Indian economy
4. Null hypothesis: FDI does not causes GDS in Indian economy
5. Null hypothesis: FDI does not causes GDP per capita in Indian economy
6. Null hypothesis: FDI causes GNI in Indian economy
7. Null hypothesis: FDI does not causes Imports in Indian economy
8. Null hypothesis: FDI does not causes NNI in Indian economy
9. Null hypothesis: FDI does not causes PCI in Indian economy

Methodology

The study adopts a quantitative and explanatory research design to examine the causal relationship between Foreign Direct Investment (FDI) and selected macroeconomic indicators in India using annual time-series data from 1991–92 to 2021–22. Secondary data are obtained from DPIIT, RBI, NSO, MoSPI, and the World Bank. The variables include

FDI, GDP, GDS, GFCF, Exports, Imports, GNI, NNI, and Per Capita Income, all transformed into natural logarithms to improve statistical properties. The Granger Causality Test is employed to analyze the direction of causality between FDI and each macroeconomic variable. The analysis is conducted using EViews software, with the optimal lag length selected based on standard criteria and statistical significance assessed at the 1%, 5%, and 10% levels.

Equation (1): Effect on Macroeconomic Variable on FDI

$$\ln FDI_t = \alpha_0 + \sum \alpha_i \ln FDI_{t-1} + \sum \alpha_i \ln X_{t-1} + \epsilon_t$$

$$\ln X_t = \delta_0 + \sum \alpha_i \ln X_{t-1} + \sum \alpha_i \ln FDI_{t-1} + \epsilon_t$$

Where X=(GDP, GDS, GFCF,EXP,IMP,GNI,NNI,PCI)

Data:

Table - 1: FDI inflow and Macro Economic Variables (GDP, GDS, GNI, NNI, RES, PCI, GFCF, EXP & IMP) in India from 1990 to 2023

Year	FDI	GDP	GDS	GNI	NNI	RES	PCI	GFCF	EXP	IMP
1990	191	2514549	134420	568564	513966	11416	6126	568475	32553	43198
1991	375	2541123	143176	652153	585053	23850	6835	524681	44041	47851
1992	1051	2680438	164940	749551	672722	30744	7715	580298	53688	63375
1993	2041	2807779	194278	863912	777894	60420	8721	575503	69751	73101
1994	4241	2994747	247177	1014487	914377	79780	10048	608647	82674	89971
1995	7317	3221584	288646	1192099	1075501	74384	11589	682415	106353	122678
1996	10170	3464798	318126	1381734	1247350	94932	13186	714510	118817	138920
1997	13317	3605116	379062	1532089	1379581	115905	14311	779519	130100	154176
1998	10550	3828072	420622	1757329	1587076	138005	16151	862295	139752	178332
1999	9409	4166694	523256	1972831	1779304	165913	17775	1006654	159095	215529
2000	18727	4326736	531523	2117153	1902148	197204	18667	988594	201356	228307
2001	29741	4535456	603110	2295175	2057006	264036	19779	1207966	209018	245200
2002	25036	4707984	668328	2475924	2219107	361470	21014	1199300	255137	297206
2003	20484	5078049	826056	2771822	2487363	490129	23203	1260657	293367	359108
2004	27392	5480380	1108167	3163957	2829998	619116	25987	1405052	375340	501065
2005	40690	5914614	1278387	3606009	322604	67638	29169	1636060	456418	660409

					0	7				
2006	103610	6391375	1485991	4221395	3783068	868222	33717	1863060	571779	840506
2007	140240	6881007	1852643	4878150	4369214	1237965	38394	2167264	655864	1012312
2008	164487	7093403	1986268	5481229	4887836	1283865	42356	2236602	840755	1374436
2009	180432	7651078	2292696	6328407	5638126	1259665	48189	2408303	845534	1363736
2010	150131	8301235	2817807	7552665	6756720	1361013	56971	2674328	1136964	1683467
2011	232000	8736329	3026837	8659505	7742330	1506139	63462	2997733	1465959	2345463
2012	216737	9213017	3369202	9827250	8766345	1588418	70983	3145793	1634319	2669162
2013	263894	9801370	3608193	11093638	9897663	1828375	79118	3194924	1905011	2715434
2014	317087	10527674	4019957	12320529	10978238	2137647	86647	3278096	1896348	2737087
2015	392422	11369493	4282259	13612095	12162398	2378740	94797	3492183	1716384	2490306
2016	474811	12308193	4825113	15215268	13623936	2398193	104880	3787568	1849434	2577675
2017	415421	13144582	5480741	16905230	15140418	2760849	115224	4083079	1956515	3001033
2018	453100	13992914	6000390	18697344	16713054	2855882	125946	4540509	2307726	3594675
2019	551647	14534641	5941135	19910479	17746868	3602155	132341	4592579	2219854	3360954
2020	639521	13694869	5786929	19587409	17246821	4218953	127244	4266684	2159043	2915958
2021	657396	15021846	7363103	23319590	20652786	4598819	150906	5014263	3147021	4572775
2022	602635	16071429	8150008	26579339	23439442	4754264	169496	5346423	3621550	5749801
2023	617346	17381722	8160008	29104354	25696663	5391255	184205	5826880	3619292	5592877

Source: HANDBOOK OF STATISTICS ON INDIAN ECONOMY (Base Year: 2011-12) (Constant Prices) (Amount in Rs Crore) and Economic Survey 2023-24 Statistical

Empirical Results

The pairwise Granger causality test was conducted using 31 annual observations to examine the causal relationship between Foreign Direct Investment (FDI) and selected macroeconomic variables in India. The test assesses whether past values of one variable significantly predict another. The findings reveal both bidirectional and unidirectional causal relationships between FDI and the selected macroeconomic indicators, highlighting the dynamic interaction between foreign investment and India's macroeconomic performance.

Table - 2: Granger causality between FDI and EXP

Pair	Null Hypothesis.	F-Statistic.	Prob.
FDI and EXP	lnFDI does not Granger Cause lnEXP.	2.1885**	0.0293
	lnEXP does not Granger Cause lnFDI	5.7559***	0.0085

Source: Author's Computation

Note: *, **, *** implies significant at 10%, 5%, & 1% respectively

The following pairwise equations were estimated:

$$\ln FDI_t = \alpha_0 + \sum \alpha_i \ln FDI_{t-1} + \sum \alpha_i \ln EXP_{t-1} + \epsilon_t$$

$$\ln EXP_t = \alpha_0 + \sum \alpha_i \ln EXP_{t-1} + \sum \alpha_i \ln FDI_{t-1} + \epsilon_t$$

where, ln FDI denotes Foreign Direct Investment,

ln EXP denotes Exports,

The results indicate **bidirectional Granger causality** between the two variables. Specifically, lnFDI was found to Granger cause lnEXP, $F(X, Y) = 2.19$, $p = .0293$, suggesting that past values of FDI have a statistically significant influence on current levels of exports. Conversely, lnEXP was also found to Granger cause lnFDI, $F(X, Y) = 5.76$, $p = .0085$, indicating that exports also play a predictive role in determining future FDI inflows. These findings imply a **mutually reinforcing relationship** between exports and foreign investment. Higher FDI may enhance production capacity, competitiveness, and infrastructure leading to increased exports. Simultaneously, robust export performance may attract more FDI by signaling market openness and business potential. This result supports the theoretical assertion that trade openness and capital flows are closely interconnected in an open economy (Krugman & Obstfeld, 2009)⁴³.

Table - 3: Granger causality between FDI and GFCF

Pair	Null Hypothesis.	F-Statistic.	Prob.
FDI and GFCF	lnGFCF does not Granger Cause lnFDI	3.9349**	0.0321
	lnFDI does not Granger Cause lnGFCF	1.7922	0.1866

Source: Author's Computation

Note: *, **, *** implies significant at 10%, 5%, & 1% respectively

The following equations were estimated.

$$\ln FDI_t = \alpha_0 + \sum \alpha_i \ln FDI_{t-1} + \sum \alpha_i \ln GFCF_{t-1} + \epsilon_t$$

$$\ln GFCF_t = \alpha_0 + \sum \alpha_i \ln GFCF_{t-1} + \sum \alpha_i \ln FDI_{t-1} + \epsilon_t$$

where,

ln FDI denotes Foreign Direct Investment,

ln GFCF denotes Gross Fixed Capital Formation,

A Granger causality analysis was conducted to explore the directional relationship between gross fixed capital formation (lnGFCF) and foreign direct investment (lnFDI) using 31 observations. The results reveal **unidirectional causality** from lnGFCF to lnFDI. Specifically, lnGFCF was found to Granger cause lnFDI, $F(X, Y) = 3.93, p = .0321$, indicating that past levels of capital formation significantly help predict foreign direct investment. However, the reverse was not true, lnFDI did not Granger cause lnGFCF, $F(X, Y) = 1.79, p = .1866$, suggesting no predictive influence of FDI on gross fixed capital formation. This outcome suggests that **domestic investment in physical capital plays a leading role** in attracting foreign investment. In other words, higher levels of capital formation (e.g., infrastructure, machinery, industrial capacity) may create a favorable environment for foreign investors by improving production potential and reducing operational risk. These findings align with development theory, which posits that domestic investment can serve as a signal of stability and growth prospects, encouraging FDI inflows (Todaro & Smith, 2015)⁴⁴.

Table - 4: Granger causality between FDI and GDP

Pair	Null Hypothesis.	F-Statistic.	Prob.
FDI and GDP	lnGDP does not Granger Cause lnFDI	3.8096**	0.0354
	lnFDI does not Granger Cause lnGDP	5.5711***	0.0018

Source: Author's Computation

*Note: *, **, *** implies significant at 10%, 5%, & 1% respectively*

The following equations were estimated.

$$\ln \text{FDI}_t = \alpha_0 + \sum \alpha_i \ln \text{FDI}_{t-1} + \sum \alpha_i \ln \text{GDP}_{t-1} + \varepsilon_t$$

$$\ln \text{GDP}_t = \alpha_0 + \sum \alpha_i \ln \text{GDP}_{t-1} + \sum \alpha_i \ln \text{FDI}_{t-1} + \varepsilon_t$$

where

ln FDI denotes Foreign Direct Investment,

ln GDP denotes Gross Domestic Product,

A Granger causality test was conducted to assess the directional relationship between gross domestic product (lnGDP) and foreign direct investment (lnFDI) using 31 observations. The results indicate a **bidirectional Granger causality** between lnGDP and lnFDI. Specifically, lnGDP was found to Granger cause lnFDI, $F(X, Y) = 3.81, p = .0354$, suggesting that previous levels of GDP significantly predict foreign direct investment. Additionally, lnFDI was also found to Granger cause lnGDP, $F(X, Y) = 5.57, p = .0018$, indicating that past foreign investment contributes significantly to predicting economic growth. This bidirectional causality suggests a **reinforcing feedback loop** between economic output and foreign capital inflows. On one hand, stronger GDP performance may signal macroeconomic stability and market potential, thereby attracting more foreign investment. On the other hand, increased FDI can boost productivity, employment, and capital accumulation, thus stimulating GDP growth. These results support endogenous growth theories, which emphasize the role of external investment and economic scale in driving sustained development (Barro & Sala-i-Martin, 2004)⁴⁵.

Table - 5: Granger causality between FDI and GDS

Pair	Null Hypothesis.	F-Statistic.	Prob.
FDI and GDS	lnGDS does not Granger Cause lnFDI	8.5691***	0.0015
	lnFDI does not Granger Cause lnGDS	0.0980	0.907

Source: Author's Computation

Note: *, **, *** implies significant at 10%, 5%, & 1% respectively

The following equations were estimated.

$$\ln \text{FDI}_t = \alpha_0 + \sum \alpha_i \ln \text{FDI}_{t-1} + \sum \alpha_i \ln \text{GDS}_{t-1} + \epsilon_t$$

$$\ln \text{GDS}_t = \alpha_0 + \sum \alpha_i \ln \text{GDS}_{t-1} + \sum \alpha_i \ln \text{FDI}_{t-1} + \epsilon_t$$

where

ln FDI denotes Foreign Direct Investment,

ln GDS denotes Gross Domestic Savings

A Granger causality test was performed to examine the direction of causality between gross domestic savings (lnGDS) and foreign direct investment (lnFDI) using 31 observations. The results show **unidirectional Granger causality** from lnGDS to lnFDI. Specifically, lnGDS was found to Granger cause lnFDI, $F(X, Y) = 8.57, p = .0015$, indicating a statistically significant predictive influence of past domestic savings on foreign investment inflows. However, lnFDI does not Granger cause lnGDS, $F(X, Y) = 0.10, p = .9070$, showing no evidence of reverse causality. This finding suggests that **higher domestic savings may create conditions conducive to attracting foreign direct investment**. A strong savings base can reflect macroeconomic stability, a higher capacity for domestic investment, and reduced reliance on external debt—all of which may signal a favorable investment climate to foreign investors. The lack of causality from FDI to savings indicates that inflows of foreign capital may not significantly influence the domestic savings rate in the short run. These results are consistent with capital accumulation theories that emphasize the role of internal financial resources in supporting external investment flows (Feldstein & Horioka, 1980)⁴⁶.

Table - 6: Granger causality between FDI and GNI

Pair	Null Hypothesis.	F-Statistic.	Prob.
FDI and GNI	lnGNI does not Granger Cause lnFDI	3.0788**	0.0431
	lnFDI does not Granger Cause lnGNI	0.5271	0.5965

Source: Author's Computation

Note: *, **, *** implies significant at 10%, 5%, & 1% respectively

The following equations were estimated.

$$\ln \text{FDI}_t = \alpha_0 + \sum \alpha_i \ln \text{FDI}_{t-1} + \sum \alpha_i \ln \text{GNI}_{t-1} + \epsilon_t$$

$$\ln \text{GNI}_t = \alpha_0 + \sum \alpha_i \ln \text{GNI}_{t-1} + \sum \alpha_i \ln \text{FDI}_{t-1} + \epsilon_t$$

where

lnFDI denotes Foreign Direct Investment,

lnGDI denotes Gross National Income

A Granger causality test was conducted to investigate the directional relationship between gross national income (lnGNI) and foreign direct investment (lnFDI) based on 31 observations. The results indicate a **unidirectional Granger causality** from lnGNI to lnFDI. Specifically, lnGNI was found to Granger cause lnFDI, $F(X, Y) = 3.08, p = .0431$, suggesting that past values of gross national income have a statistically significant predictive influence on foreign direct investment. In contrast, lnFDI did not Granger cause lnGNI, $F(X, Y) = 0.53, p = .5965$, indicating no evidence of feedback from foreign investment to national income in this context. This finding implies that **higher national income levels may serve as a key determinant for attracting foreign investment**, likely by signalling economic strength, purchasing power, and stability. Countries with growing GNI tend to offer better market potential and reduced investment risk, thus appealing to foreign investors. However, the absence of causality from lnFDI to lnGNI suggests that, in the short run, foreign investment inflows do not significantly impact the national income level. This outcome aligns with the idea that while income growth can attract investment, the macroeconomic effects of FDI may take longer to materialize in terms of income generation (UNCTAD, 2015)⁴⁷.

Table - 7: Granger causality between FDI and IMP

Pair	Null Hypothesis.	F-Statistic.	Prob.
FDI and IMP	lnIMP does not Granger Cause lnFDI	7.0585***	0.0036
	lnFDI does not Granger Cause lnIMP	1.0602	0.3609

Source: Author's Computation

*Note: *, **, *** implies significant at 10%, 5%, & 1% respectively*

The following equations were estimated.

$$\ln \text{FDI}_t = \alpha_0 + \sum \alpha_i \ln \text{FDI}_{t-1} + \sum \alpha_i \ln \text{IMP}_{t-1} + \epsilon_t$$

$$\ln \text{IMP}_t = \alpha_0 + \sum \alpha_i \ln \text{IMP}_{t-1} + \sum \alpha_i \ln \text{FDI}_{t-1} + \epsilon_t$$

where

lnFDI denotes Foreign Direct Investment,

lnIMP denotes Imports

A Granger causality analysis was conducted to examine the direction of influence between imports (lnIMP) and foreign direct investment (lnFDI), based on 31 observations. The results reveal a **unidirectional Granger causality** from lnIMP to lnFDI. Specifically, the null hypothesis that lnIMP does not Granger cause lnFDI was rejected at the 1% level of significance, $F(X, Y) = 7.06, p = .0036$. This implies that past values of imports significantly predict future levels of foreign direct investment. Conversely, the null hypothesis that lnFDI does not Granger cause lnIMP could not be rejected ($F = 1.06, p = .3609$), indicating no significant predictive influence of FDI on imports. The result suggests that **higher levels of imports precede and potentially encourage future foreign investment**. One plausible explanation is that a growing volume of imports may reflect rising domestic demand, technological needs, or industrial expansion factors that often attract multinational corporations seeking new markets or production opportunities. The absence of reverse causality implies that although FDI might impact imports in the long term, such an effect is not

immediate or consistent in the short-run dynamics captured by the Granger framework. These findings support the idea that trade openness, particularly through imports, plays a strategic role in signaling market potential and investment climate to foreign investors. They are also consistent with empirical literature emphasizing the complementary nature of trade and FDI in the context of globalization and international business cycles.

Table - 8: Granger causality between FDI and NNI

Pair	Null Hypothesis.	F-Statistic.	Prob.
FDI and NNI	lnNNI does not Granger Cause lnFDI	3.0516*	0.0645
	lnFDI does not Granger Cause lnNNI	0.5375	0.5905

Source: Author's Computation

*Note: *, **, *** implies significant at 10%, 5%, & 1% respectively*

The following equations were estimated.

$$\ln \text{FDI}_t = \alpha_0 + \sum \alpha_i \ln \text{FDI}_{t-1} + \sum \alpha_i \ln \text{NNI}_{t-1} + \epsilon_t$$

$$\ln \text{NNI}_t = \alpha_0 + \sum \alpha_i \ln \text{NNI}_{t-1} + \sum \alpha_i \ln \text{FDI}_{t-1} + \epsilon_t$$

where

lnFDI denotes Foreign Direct Investment,

lnNNI denotes Net National Income

A Granger causality test was conducted to assess the directional relationship between net national income (lnNNI) and foreign direct investment (lnFDI) based on 31 observations. The results indicate **unidirectional Granger causality** from lnNNI to lnFDI, but the relationship is statistically marginal. Specifically, lnNNI was found to Granger cause lnFDI, $F(X, Y) = 3.05$, $p = .0645$, which is close to the 10% significance level but does not meet the conventional 5% threshold for statistical significance. On the other hand, lnFDI was not found to Granger cause lnNNI, $F = 0.54$, $p = .5905$, suggesting no causal relationship from foreign direct investment to net national income. These results suggest that **increases in net national income might lead to greater foreign direct investment** due to factors such as increased purchasing power, economic stability, or greater market potential. The finding that the causality is only marginally significant indicates that the link between lnNNI and lnFDI may be weaker or context-dependent, potentially influenced by other macroeconomic variables not captured in the model. Additionally, the absence of reverse causality suggests that foreign direct investment does not have an immediate or significant effect on national income in the context of this dataset. This finding is consistent with literature suggesting that while FDI is an important source of capital and technology transfer, the impact of FDI on national income may take time to materialize and is influenced by factors such as domestic economic policies, infrastructure, and human capital development.

Table -9: Granger causality between FDI and PCI

Pair	Null Hypothesis.	F-Statistic.	Prob.
FDI and PCI	lnPCI does not Granger Cause lnFDI	2.9338**	0.031
	lnFDI does not Granger Cause lnPCI	0.6378	0.5365

Source: Author's Computation

Note: *, **, *** implies significant at 10%, 5%, & 1% respectively

The following equations were estimated.

$$\ln FDI_t = \alpha_0 + \sum \alpha_i \ln FDI_{t-1} + \sum \alpha_i \ln PCI_{t-1} + \epsilon_t$$

$$\ln PCI_t = \alpha_0 + \sum \alpha_i \ln PCI_{t-1} + \sum \alpha_i \ln FDI_{t-1} + \epsilon_t$$

where

ln FDI denotes Foreign Direct Investment,

ln PCI denotes Per Capita Income

A Granger causality analysis was conducted to explore the direction of causality between per capita income (lnPCI) and foreign direct investment (lnFDI) using 31 observations. The results reveal **unidirectional Granger causality** from lnPCI to lnFDI. Specifically, lnPCI was found to Granger cause lnFDI, $F(X, Y) = 2.93, p = .0310$, suggesting that past values of per capita income significantly predict future foreign direct investment inflows. Conversely, lnFDI does not Granger cause lnPCI, $F = 0.64, p = .5365$, indicating no predictive relationship from FDI to per capita income. This finding suggests that **higher levels of per capita income may serve as an important determinant for attracting foreign direct investment**. A rising per capita income generally reflects improvements in living standards, purchasing power, and overall economic development, all of which can make a country more attractive to foreign investors. On the other hand, the absence of causality from lnFDI to lnPCI suggests that while foreign investment may contribute to economic growth, its impact on per capita income may not be immediate or significant within the observed time frame. These results are consistent with economic growth models, which argue that a higher standard of living and greater income levels create favorable conditions for foreign capital inflows by signaling a growing and stable market.

Findings

The overall Granger causality analysis demonstrates that the relationship between Foreign Direct Investment and macroeconomic variables in India is characterized by both **bidirectional and unidirectional causal mechanisms**. Bidirectional causality exists between **FDI and GDP** as well as **FDI and exports**, highlighting a mutually reinforcing relationship between economic growth, international trade, and foreign investment. In contrast, **Gross Fixed Capital Formation, Gross Domestic Savings, Gross National Income, Imports, Net National Income, and Per Capita Income primarily Granger-cause FDI**, suggesting that strong domestic macroeconomic fundamentals are important prerequisites for attracting foreign investment.

These findings imply that while FDI contributes to economic development, its sustainability depends largely on the strength of domestic economic conditions. Therefore, policies aimed at increasing infrastructure investment, domestic savings, industrial productivity, export competitiveness, and income growth are likely to create a more attractive environment for foreign investors. Simultaneously, policies encouraging high-quality FDI can further stimulate economic growth and strengthen India's integration into the global economy.

Table -10: Findings of Granger causality between FDI and Macro Economic Variables

Variables	F-statistic	p-value	Decision	Direction
GDP ↔ FDI	5.57	0.0018	Reject	Bidirectional
EXP ↔ FDI	5.76	0.0085	Reject	Bidirectional

GDS → FDI	8.57	0.0015	Reject	Unidirectional
GFCF → FDI	3.93	0.0321	Reject	Unidirectional
GNI → FDI	3.08	0.0431	Reject	Unidirectional
IMP → FDI	7.06	0.0036	Reject	Unidirectional
PCI → FDI	2.93	0.031	Reject	Unidirectional
NNI → FDI	3.05	0.0645	Weak	Unidirectional

The Granger causality analysis reveals significant causal relationships between Foreign Direct Investment (FDI) and key macroeconomic variables in India. The results indicate a **bidirectional causal relationship** between **Gross Domestic Product (GDP) and FDI** ($F = 5.57$, $p = 0.0018$), suggesting that economic growth attracts foreign investment while FDI simultaneously contributes to economic expansion. Similarly, **Exports (EXP) and FDI** exhibit **bidirectional causality** ($F = 5.76$, $p = 0.0085$), implying that higher exports attract foreign investors and FDI further enhances export performance through improvements in production capacity, technology, and global competitiveness.

The findings further reveal several **unidirectional causal relationships** running from macroeconomic variables to FDI. **Gross Domestic Savings (GDS)** exerts a strong causal influence on FDI ($F = 8.57$, $p = 0.0015$), indicating that a higher domestic savings rate strengthens the investment climate and attracts foreign capital. Likewise, **Gross Fixed Capital Formation (GFCF)** ($F = 3.93$, $p = 0.0321$), **Gross National Income (GNI)** ($F = 3.08$, $p = 0.0431$), **Imports (IMP)** ($F = 7.06$, $p = 0.0036$), and **Per Capita Income (PCI)** ($F = 2.93$, $p = 0.0310$) each demonstrate significant unidirectional causality towards FDI, suggesting that improvements in investment, national income, trade openness, and living standards play an important role in attracting foreign direct investment into the Indian economy.

In the case of **Net National Income (NNI)**, the causality test provides **weak evidence** of a unidirectional relationship with FDI ($F = 3.05$, $p = 0.0645$). Although the result is statistically significant only at the 10 percent level, it indicates that NNI may have a limited influence on FDI inflows compared with the other macroeconomic variables. Overall, the findings suggest that while GDP and exports maintain a mutually reinforcing relationship with FDI, most other macroeconomic indicators primarily act as determinants that influence foreign investment inflows rather than being affected by them.

The empirical results support endogenous growth theory, suggesting that FDI and economic growth reinforce each other. Furthermore, higher domestic savings, capital formation, income levels, and trade openness create a favorable investment climate for foreign investors. The bidirectional relationships between FDI, GDP, and exports highlight the importance of integrating investment and trade policies to achieve sustainable economic growth.

Conclusion

The study concludes that the relationship between FDI and macroeconomic variables in India is characterized by both feedback and one-way causal mechanisms. While GDP and exports maintain a mutually reinforcing relationship with FDI, domestic savings, capital formation, national income, imports, and per capita income primarily act as determinants of foreign investment inflows. Policymakers should therefore focus on strengthening domestic macroeconomic fundamentals to attract stable and sustainable FDI, which, in turn, contributes to long-term economic growth and development

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