

The Nexus between FDI, Economic Growth and Income Inequality in India: An Empirical Investigation

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Abstract:

This study examines the nexus between economic growth (GDP per capita Growth rate), Foreign Direct Investment (Net FDI inflow percent of GDP minus Net FDI outflow percent of GDP), and income inequality (Gini Index) in India over the period from 1991-2019 is investigated by using the Autoregressive Distributed Lag (ARDL) model, focusing on the period subsequent to economic reforms. By analyzing data spanning nearly three decades, the data analysis demonstrates that while both Foreign Direct Investment (FDI) and GDP growth have accelerated at a rapid pace, their impact on income inequality has been trivial, with marginal decline observed. The analysis shows that foreign direct investment inflow is greater than outflow which indicates that the country is attracting more foreign investment than it is investing abroad. This reflects India's appeal as an investment destination for foreign investors. Although, the analysis shows no significant long-term relationship between FDI and income inequality. Policymakers aiming to reduce income inequality should therefore consider these dynamics carefully, recognizing that short-term economic gains may not straightforwardly translate into reduced inequality. It's clear from the findings that despite the strong economic growth, the benefits haven't reached all population evenly, rethinking the usual assumption that increased FDI and GDP growth automatically lead to a reduction in income inequality.

Keywords: India, Income Inequality (Gini Index), Economic Growth, FDI, ARDL

1. Introduction

Economic growth per capita, a key indicator of a country's economic health, represents the per capita income in a country is determined by dividing its total gross domestic product (GDP) by the number of people living in the country. It reflects how well a nation's economy is growing relative to its population size and providing a gauge for the country's standard of living over time. When GDP per capita rises it suggests that an economy is expanding, potentially leading to higher incomes and improved living condition for the citizens. FDI is another crucial

component of economic growth, especially in developing countries such as India. Net FDI is calculated as the difference between FDI inflows and outflows, where inflows refer to investments made by foreign entities into the domestic economy, and outflows represent investments made by domestic entities into foreign economies. A positive net FDI indicates that a country is receiving more foreign investment than it is investing abroad, which is typically seen as a positive sign of investor confidence and economic stability.

In the context of India, since the liberalization of its economy in 1991, the

nation has experienced notable variations in both FDI inflows and outflows. The liberalization policies aimed at reducing trade barriers, easing regulations, and opening up various sectors to foreign investments have led to a substantial increase in FDI inflows. This inflow reflects growing international confidence in India's economic potential, driven by its large and young population, growing consumer market, and strategic location. Conversely, the rise in FDI outflows from India, signifying the expanding global footprint of Indian enterprises. The difference between inflows and outflows offers an understanding of how its appealing India's economic environment then other countries.

The influence of FDI and GDP per capita on income inequality in India is a multifaceted topic that has attracted significant attention from economists and policymakers alike. FDI can stimulate economic growth, job creation, and technology transfer, which may reduce income inequality by creating gateways to a broader section of nations population. However, if the upsides of FDI are concentrated in certain sectors or regions, it can exacerbate income disparities. Similarly, while rise in GDP pc is generally linked to better living standards, the distribution of this growth is critical. If economic benefits are distributed unevenly, with wealth accumulating among the already affluent, income inequality may rise. Increasing income inequality hinders economic growth by reducing low-income families' ability to invest in education, health, and skills, ultimately limiting the availability of skilled labor (Brian, 2015 & Deaton, 2003). Societies with lower income inequality tend to experience better health and educational outcomes, underscoring the need for policy interventions to promote equitable growth (Maurya & Kanaujiya, 2021).

2. Theoretical Background

In economics, the connection between income inequality, GDP growth, and FDI is complex and has been widely explored in both theoretical and empirical studies. Numerous theories have been proposed to explain how these factors interact, often with differing conclusions depending on the context, time period, and specific country or region being studied. In this context the most famous theory is Kuznets Hypothesis (1955). This theory proposed by Simon Kuznets, the Kuznets Curve hypothesizes an inverted U-shaped correlation between income inequality and economic development (GDP per capita). Theory clearly mentioned that, in the initial phases of economic growth, inequality rises as income increases, but after a certain level of development, inequality begins to decline as more of the population benefits from the growth. In the initial phases of GDP growth, the benefits are often concentrated among the wealthy, leading to increased inequality. However, as the economy matures, wealth distribution becomes more equitable, and inequality decreases. Despite its widespread acceptance, Kuznets curve has faced criticism regarding its empirical robustness, as certain studies suggest that inequality does not inherently decrease at higher levels of development, especially within globalization contexts.

Another trickle-down effect, can trace its origins to the 19th Century, with the work of Rudolf von Jhering, who was the first to write about cultural diffusion. He traced how fashions filtered down from the upper classes to the lower classes. The key position of von Jhering's work was that the value of fashion is reduced to nothing when it has been adopted by everyone. As such, the upper classes are compelled to find and take up latest fashion trends that the lower classes will eventually adopt as well. After this it was used in the context of economics. Trickle-down theory suggests

that economic benefits provided to the wealthy, such as tax cuts or incentives for businesses (which can be a result of GDP growth and increased FDI), will eventually "trickle down" to the poorer segments of the economy. Post-1991 globalization in India has seen economic growth alongside rising income inequality, largely benefiting higher-income groups. Trickle-down theory suggests that benefits to top income earners eventually aid the broader economy through investment and job creation. However, this theory remains contentious, with limited empirical support, especially under conditions requiring significant investment, dependency on large industries, and low labor intensity (Kanaujiya & Gupta. 2021). When we see its implication for GDP Growth and Inequality, proponents argue that GDP growth fueled by investment from the wealthy will lead to overall economic improvement, reducing inequality. Critics contend that wealth does not truly trickle down and that, in fact, inequality may worsen, particularly given the absence of evidence to support this claim. Meanwhile, modernization aspect posits that FDI can lead to economic development and modernization, which in turn can reduce income inequality over time. The theory recommends that as countries modernize and industrialize, the benefits of the growth of the country's economy (which can be spurred by FDI) will eventually be distributed more evenly across society. When we discuss about the implication of FDI regarding Inequality, in early stages, FDI may increase inequality as it benefits the sectors that are closely connected with foreign investment. However, over time, as the economy develops, the benefits of FDI are expected to spread, reducing inequality. This study seeks to analyze the dual impact of FDI and GDP per capita on income inequality in India from 1991 to 2019 and beyond, examining the pathway through which these economic factors influence the

distribution of income across different portion of the population. Grasping these dynamics is essential for developing policies that ensure inclusive and equitable growth as India progresses towards achieving a five trillion-dollar economy.

Over the last few decades India has experienced significant economic growth, positioning itself as one of the world's fastest-growing economies. According to the finance ministry, India is projected to rise to the position of the 3rd biggest economy globally with a GDP of \$ 5 trillion by 2027 and touch \$ 7 trillion by 2030 on the back of continued reform, said by the finance ministry (The Hindu, 29 January, 2024). Ten-year ago, India was previously the 10th biggest economy globally with GDP of \$1.9 trillion at current market price. Now, it is the 5th largest with a GDP of \$ 3.7 trillion (estimate FY24), despite the pandemic, macro imbalances and a broken financial sector. During crises such as pandemics or natural calamities, the public sector plays a critical role in mitigating economic impacts. Following Keynesian principles, governments have implemented fiscal and monetary measures—such as stimulus packages and interest rate cuts—to counteract job losses, business closures, and supply chain disruptions. The effectiveness of public sector investment in such times depends on investment quality, robust frameworks, and stakeholder involvement (Kanaujiya & Singh, 2024). However, as the economy grows, the rich-poor gap is getting wider.

According to the HDRs, countries with lower human development levels tend to have higher income inequality (UNDP, 2010). For developing countries like India, this can mean a disparity between economic growth and real social progress, as inequality may reduce the effective gains reflected in HDI (Maurya & Kanaujiya, 2020). The article "Growth mania can be

injurious to society” (The Hindu, 30 January, 2024) aims to assess the relationship between economic development and income inequality in India, exploring whether the widening wealth gap is a consequence of rapid economic growth or not? India's economic expansion has been influenced by various factors, including globalization, liberalization, and technological advancements. Thus, the country has witnessed a significant rise in per capita GDP and overall prosperity. Despite economic growth, a substantial portion of the population being left behind. As stated in a report published by Oxfam, India's richest 1 percent possesses more than four times the wealth of the bottom 70 percent and is now own greater than 40 percent of the nation's total wealth, meanwhile the lower 50% of the population collectively holds a share just 3 percent of wealth.

For working on a whole, we should go from particular to general, in case of India the most populous state is Uttar Pradesh. A study highlights the disparities in employment and skill levels between different social groups, particularly SC/ST communities. Despite the economic growth in the region, structural issues like high unemployment, especially among educated and female workers, persist (Mamgain & Verick, 2017). It concludes that while economic policies have fostered growth, the benefits have not been equally distributed across social groups, indicating the need for targeted policies to address inequality (Kanaujiya, 2021), and it underscores how growth alone may not reduce inequality without targeted measures. The persistence of inequality, despite economic expansion, suggests that FDI and growth need to be managed with inclusivity in mind to benefit marginalized groups effectively.

3. Literature Review

The widening wealth gap in India can be attributed to various factors, including Income inequality, wealth concentration, Technological advancement, Globalization and trading, unequal access to education, healthcare, resources and employment opportunities, Inheritance, Discrimination, political connections, corruption, etc. Additionally, the wealth accumulation among a limited number of individuals and corporations has further leads to minimal or even negligible decline in the income disparity. If we talk about the Tax system in India it is progressive where high-income individuals contribute a proportion of their income to taxes, which leads to reduce income inequality along with economic growth (as this tax system leads to reduce disposable income of individuals and businesses to invest in growth-enhancing activities), so we can say that despite India's rapid economic growth, the pace of income inequality reduction has been disappointingly slow. The disparity remains stubbornly persistent, with any progress in narrowing the gap being minimal or even negligible.

Extensive scholarly research examines the correlation between income disparities and economic growth, with the Kuznets Curve being one of the most notable theories. Simon Kuznets, in 1955, proposed that this relationship follows a U-shaped curve drawing from data collected on United States, England, and Germany. According to Kuznets, during the initial phase of economic growth, income inequality increases. However, as the economy matures, income inequality decreases. Kuznets acknowledged that his data measured household incomes before taxes and government contributions. He suggested that the transformation from an agricultural to an industrial economy plays an important role in reducing income inequality, as urbanization provides more

opportunities for lower-income groups and one of the sources of urbanization or industrialization is inward FDI (Patra, 2019). Further Scripcar and Ciobanu (2021) also agreed with the existing belief that urbanization and openness to foreign trade leads to decrease the income inequality but not as significant as education. In a study Wang, Xu, Liu and Sun (2023) the empirical test, relying on the dataset taken from 126 countries found that FDI inflows reduce income inequality in emerging market countries (like India) but increase income inequality in developed countries. Nicholas Martin (2023) assesses the relation between income disparity and macroeconomic variables in developed (US, Italy) and developing (Peru, Belarus, Indonesia) countries. Regression analysis shows no significant impact of Gini index on GDP growth. However, macroeconomic variables especially GDP growth explain the significant variations in Gini index across countries (73%-84%).

Country-specific factors drive income inequality. The findings of Luan and Zhou (2017), study indicated that the Gini index is more influenced by GDP per capita (PPP) than GDP growth. Higher PPP correlates with lower income inequality, suggesting that economic development reduces inequality through factors like improved social welfare and higher minimum wages. Keskin (2017) found there is a complexity between income distribution and economic growth, building on Kuznets' (1950s) foundational work. Results show income inequality's impact varies between developed and developing countries. Extreme income inequality hinders growth in developing countries, while optimal inequality (Gini coefficient ≈ 0.45) fosters growth. Government intervention and altruistic behaviors can promote equitable income distribution. Developing countries should decrease inequality, while developed countries should increase it to optimize growth.

Further research is needed to fully understand this multifaceted relationship. Contrary to the existing hypothesis Scripcar & Ciobanu (2021) came with the conclusion that economic growth is positively correlated with the Gini index.

An increase in GDP growth or GDP per capita will worsen the gap generated by the income inequality. Kuznets also noted that in the early phases of economic growth, especially in older countries, income inequality might initially widen due to the disruptive effects of industrialization on pre-existing economic and social structures. This transformation from pre-industrial to industrial economies explains why income structures are more unequal in underdeveloped countries compared to more advanced ones. As stated in classical approach, it has been posited that income inequality and wealth accumulation in a small proportion of individuals would result in higher growth in the future. There may be three reasons for positive relationship (Dadkhah, 2006): First, the rich consume proportionately less of their income and a higher propensity to save stimulate a faster growth rate. Second, indivisibility of investment project makes the concentration of resources in a few hands a prerequisite for investment and growth. Finally, workers and employers require incentive to exert their utmost efforts. A society committed to equality would not provide the incentive system necessary for growth.

3.1 Research Gap

In reviewing the existing literature on income inequality, GDP, and FDI, a significant research gap emerges. The majorities of studies rely on older datasets and primarily focus on cross-country analyses, which, while informative, do not capture the unique dynamics within India. Additionally, these studies have primarily examined the effect of income inequality on GDP, rather than exploring how

fluctuations in GDP, whether increases or decreases, influence income inequality specifically within India. Additionally, while some research has considered the function of FDI, there's a noticeable absence of studies that specifically assess the effect of FDI on income inequality in India during the critical period from 1991 to 2019—a period marked by significant economic reforms and globalization. Moreover, the methodologies employed in previous studies, such as OLS, 2SLS and GMM models, are limited in their ability to distinguish between short-run and long-run effects. This study examines these gaps by focusing solely on India, using up-to-date data from 1991 to 2019, and employing the ARDL model to provide a deep analysis of the short-run and long-run impacts of GDP and FDI on income inequality, offering new insights on unexplored aspects in the literature.

4. Objectives

This study intends to delve into the complex link between Net FDI, GDP per capita, and income inequality. By examining how these economic factors influence income distribution in India, this study aims to provide in-depth detailed insight of the mechanisms through which FDI and GDP growth can either alleviate or exacerbate income disparities. The objectives of this research are designed to uncover the multifaceted impacts of these economic variables, offering insights that could inform more equitable economic policies. Therefore some specific objectives include in the present study are:

- To examine the effect of GDP per capita growth rate on income inequality in India.
- To analyze the effect of net FDI on income inequality in India.
- To investigate the short-term and long-term relationships between net FDI, GDP per capita growth rate,

and income inequality using the ARDL model.

- To provide policy recommendations aimed at mitigating income inequality.

5. Methodology: Hypothesis, Data and Model

5.1 Hypothesis

This study's hypotheses are prediction about the correlation between GDP per capita growth rate, net FDI as percent of GDP and Income Inequality. It serves as the foundation for research and a critical part of the research process, providing a clear direction for the study and a framework for interpreting the results. The period from 1991 to 2019 in India has been marked by significant economic reforms, increased FDI inflows, and substantial economic growth. However, the distributional impacts of these factors remain a subject of debate. The following hypotheses are proposed to test the potential effects of FDI and GDP on income inequality in India during this period:

H1: The GDP per capita growth rate significantly influences income inequality in India.

H2: Net FDI has a significant effect on income inequality in India

H3: There exists a long-term equilibrium relationship between net FDI, GDP per capita growth rate, and income inequality in India as captured by the ARDL model.

H4: The short-term dynamics between net FDI, GDP per capita growth rate, and income inequality differ from their long-term effects in India.

5.2 DATA Source and Description

The primary objective of this research is to investigate how factors like GDP growth rate and Net FDI, affect income inequality

in India. The research focuses on annual data collected from 1991 to 2019 for India.

The brief overviews of each variable of analysis are outlined in Table 1.

Table 1: Description of Variable and Data Source

Variable Name	Variable	Description	Data source
Income Inequality	GINI Index	Range from zero to a hundred, the index near to zero shows high equality, while near to a hundred shows high unequal distribution of income.	UNU-WIDER-WIID
Economic Growth	PCGDP Growth Rate %	% annual growth rate of per capita GDP	WBG-WDI
Economic Integration	Net FDI % of GDP	The Net FDI inflow % of GDP minus Net FDI outflow % of GDP.	WBG-WDI

Source: Authors compilation

Table 2 presents a comprehensive dataset spanning 29 years, from 1991 to 2019, capturing the key indicators of income disparity and growth of economy in India. The table includes the Gini coefficient, is a measure of income inequality, alongside the GDP per capita growth rate and Net Foreign Direct Investment (FDI). This data

provides the foundation for analyzing the relationship between economic growth, FDI and income inequality in the Indian context, particularly in the post-liberalization era. The trends observed across these variables will be further explored in the subsequent sections of this paper to understand the dynamics between FDI, GDP, and income inequality over time.

Table 2: Gini Index, GDPpc Growth %, Net FDI as a % of GDP in India

YEAR	GINI Index	GDP per capita growth	Net FDI in India % of GDP
1991	47.73	-1.04511	0.031298
1992	47.47	3.316866	0.087615
1993	47.49	2.627466	0.196931
1994	47.51	4.525134	0.272153
1995	47.78	5.452946	0.562459
1996	48.05	5.471108	0.556566
1997	48.33	2.071873	0.833056
1998	48.6	4.198921	0.613991

1999	48.87	6.851333	0.455348
2000	49.14	1.965952	0.656429
2001	49.41	2.945319	0.83923
2002	49.69	1.975908	0.766672
2003	49.96	6.016521	0.402194
2003	50.23	6.132606	0.506546
2005	50.5	6.206011	0.564206
2006	50.61	6.426045	0.637301
2007	50.73	6.093626	0.674068
2008	50.84	1.630781	2.014334
2009	50.95	6.371709	1.452117
2010	51.06	7.013175	0.682065
2011	51.24	3.818074	1.310476
2012	51.42	4.060822	0.84494
2013	51.42	5.014612	1.421219
2014	51.42	6.08618	1.122547
2015	51.42	6.721068	1.734903
2016	51.42	6.98099	1.717419
2017	51.42	5.568334	1.089052
2018	51.42	5.302409	1.135792
2019	51.42	2.811873	1.321409

Source: Authors Computation from World Bank.

5.3 Model Specification

According to the stated objectives of this study, to analyze the effect of PCGDP growth (proxy variable for economic growth) and Net FDI (proxy variable for economic integration) on GINI Index (proxy variable for Income inequality), the following econometric model is specified:

$$Gini_t = \beta_0 + \beta_1 GDP_t + \beta_2 FDI_t + u_t$$

Where:

$Gini_t$ = represent the Gini coefficient at time (t)

GDP_t = represent the per capita GDP growth rate at time (t)

FDI_t = represent the net FDI inflow % of GDP – net FDI outflow of % of GDP at time (t)

B_0 = constant term, B_1 = coefficient of GDP, B_2 = coefficient of FDI, u_t = error term

6. Analysis and Discussion

6.1. Descriptive Statistics

Before any further proceeding we need to analyze and describe our data (Table-3), in order to have some basic early results.

Table 3: Summary of Descriptive Statistics for all the variables

	GINI Index	GDPpc Growth Rate	NET FDI % of GDP
No. of observations	29	29	29
No. of missing values	0	0	0
Minimum value	47.47	-1.0451	0.031298
Maximum value	51.42	7.0132	2.014334
1 st quartile	48.60	2.9454	.556566
3 rd quartile	51.42	6.1326	1.135792
Mean	49.9155	4.57285	0.844908
Median	50.50	5.3024	0.682065
Sum	1447.55	132.613	24.50234
Standard error of the mean	0.27498	0.3770	0.0939
Lower confidence limit of the mean	49.3523	3.8006	0.6524
Upper confidence limit of the mean	50.4788	5.3451	1.0374
Variance	2.19277	4.1219	0.2560
Standard Deviation	1.48080	2.0303	0.5059
Skewness	-0.4612	-0.7826	0.5137
Kurtosis	-1.4296	-0.1469	-0.5844

Source: Authors Calculation on R Studio

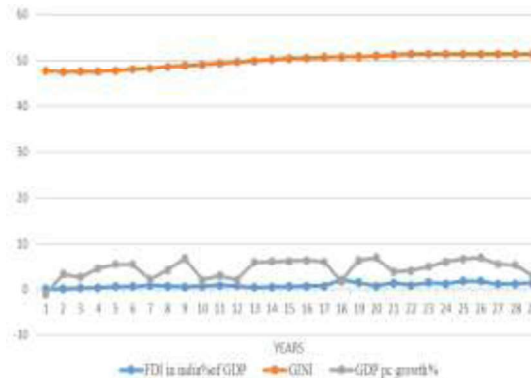
Income Inequality (Gini index): The moderate and stable Gini values indicate that income inequality remains fairly consistent over time, with no significant upward or downward trends.

Economic Growth (GDP per capita Growth Rate): The moderate economic growth with

some variability suggests that while the economy is growing, there are periods of slower growth. The left-skewed nature indicates a tendency towards more frequent slower growth periods.

Foreign Direct Investment (Net FDI as % of GDP): The relatively low but stable and positive FDI inflow minus outflow suggests that foreign direct investment inflow is greater than outflow which indicates that the country is attracting more foreign investment than it is investing abroad. This reflects India's appeal as an investment destination, contributing positively to economic growth and development. It also improves the capital account of the balance of payments and suggests greater foreign confidence in India's economic prospects compared to the level of Indian investment overseas.

Figure 1: Trend line of Gini Index, GDPpc growth and FDI as % of GDP



Source: Authors Construction

Table 4 represent the stationarity check by unit-root test based on the Augmented Dickey Fuller Test (ADF) and it results depicts that GDP per capita growth rate and Net FDI percent of GDP are stationary at level, while Gini Index is stationary at first difference. As our variables are stationary at I(0) or I(1), the ARDL method is appropriate for testing short- and long-run relationship between the concerned variables.

Table 4: Stationarity check by Augmented Dickey Fuller Unit Root Test At Level

Trend (C&T)	GINI	GDP pc Growth	Net FDI % of GDP
Test-Statistics	-0.4202	-3.8869**	-3.7852**
At First Difference			
Trend (C&T)	GINI	GDP pc Growth	Net FDI % of GDP
Test-Statistics	-3.8378**	-5.3279***	-5.3781***
Critical value	10% *	5% **	1% ***
	-3.18	-3.50	-4.15
Null Hypothesis		Stationary	

Source: Authors Calculation on R Studio **Note:** ***1%, ** 5%, *10%Significance

The ARDL Bound Cointegration test is applied to know the long run cointegration of model and results shows (table 6) that F statistics (6.18) is higher than the upper

bound critical value (5.473) at a 5 percent significance level. These findings clears that there is a long-run relationship between the variable. It implies that despite short-term fluctuations, a stable long-term equilibrium exists among the variable.

Table 5: Bound Test Result - Cointegration Test (Pesaran, Shin, and Smith)

Bound Test	F-Statistic		
F-Test	6.183		
Critical Value I (0)	10%	5%	1%
	3.437	4.267	6.183
Critical Value I (1)	10%	5%	1%
	4.47	5.473	7.873

Source: Authors Calculation on R Studio.

The table 6 ARDL Error Correction Model is estimated and ECM results indicate the speed at which variables adjust to long-term equilibrium after a shock. Significant short-run dynamics were found in variables such as GDP per capita and FDI, while certain long-run coefficients were estimated to be significant, highlighting their impact on the dependent variable. The coefficient of the error correction term (ec.1) is negative and significant, mean that

fluctuations from the long-run equilibrium correct over time. The high R-squared values indicate that the model explains a substantial portion of the variance in the dependent variable. A value of 0.9189 suggests a very good fit. Residual Standard Error measures the average amount by which the model's predictions deviate from the actual values, here lower Residual standard error indicates a better fit. The low p-value of the F-statistic indicates that the overall model is statistically significant.

Table 6: ARDL Error Correction Model

	Estimate/ coefficient	Std. Error	T-Value	Pr(> t)
(Intercept)	1.914318	0.337465	5.673	0.0000443***
ECT.1	-0.030782	0.005508	-5.588	0.0000518***
R-squared	0.9189	Adjusted R-squared		0.8702
Residual Std. Error	0.04218			
F-statistic	18.88	P-value	0.000001241	

Source: Authors Calculation on R Studio. **Note:** ***1%, ** 5%, *10% Significance

Coefficient in Table 7 represents the estimated effects of each variable on the dependent variable. For instance, the coefficient for dgdppc.t is -0.013100 with a p-value 0.035288, indicating that a one-unit increase in dgdppc.t (GDPpc %) is associated with a decrease of 0.013100 units income inequality in the short run, holding all other variables constant, this relationship is statistically significant at the 5 percent level. 1st Lag (dgdppc.1) coefficient is 0.028685 with a p-value of

0.000350, indicating that a 1 percent increase in GDP per capita growth in the previous period leads to a 0.028685-unit increase in income inequality. This effect is statistically significant at the 1 percent level. 2nd Lag (dgdppc.2) coefficient is 0.024437 with a p-value of 0.000611, suggesting that 1 percent GDP per capita growth two periods prior leads to a 0.024437-unit increase in income inequality, also statistically significant at the 1percent level.

Table 7: ARDL Short-Run Model

	Estimate/ coefficient	Std. Error	T-Value	Pr(> t)
dgdppc.t	-0.013100	0.005662	-2.314	0.035288 **
dgdppc.1	0.028685	0.006241	4.596	0.000350 ***
dgdppc.2	0.024437	0.005661	4.317	0.000611 ***
dgdppc.3	0.008815	0.004755	1.854	0.083553*
dfdi.t	-0.054768	0.025213	-2.172	0.046278 **
dginii.1	0.252345	0.167465	1.507	0.152617
dginii.2	-0.018765	0.164144	-0.114	0.910499
dginii.3	0.098368	0.129890	0.757	0.460589

Source: Authors Calculation on R Studio. **Note:** ***1%, ** 5%, *10%Significance

In 3rd Lag (dgdppc.3) coefficient is 0.008815 with a p-value of 0.083553, indicating a positive but statistically insignificant effect on income inequality. While GDP growth has a small immediate effect in reducing inequality, its lagged positive effects suggest that the overall short-run impact could lead to a net

increase in income inequality. This highlights a potentially complex and non-linear relationship where short-term benefits may be offset by longer-term repercussions. The coefficient for the immediate effect of FDI (dfdi.t) on income inequality is -0.054768 with a p-value of 0.046278. This implies that a 1 percent

increase in FDI results in a 0.0548-unit decrease in income inequality in the short run, this relationship is statistically significant at 5 percent level. The magnitude of FDI's effect indicating a

reduction in inequality in short-run, suggesting that FDI play a substantial role in shaping income inequality in the short term.

Table 8: ARDL Long-Run Model

	Estimate/ coefficient	Std. Error	T-Value	Pr(> t)
intercept	-0.030782	0.014405	-2.137	0.0522*
gdppc.l	-0.047955	0.017699	-2.709	0.0179**
fdi.l	-0.036010	0.049272	-0.731	0.4778

Source: Authors Calculation on R Studio. **Note:** ***1%, ** 5%, *10%Significance

In Table 8 coefficients suggest the long-term relationships between the dependent variable and the corresponding variables. For instance, the coefficient for gdppc.l is -0.0480, indicates that, in the long run a 1percent increase in GDP is associated with a reduction in income inequality by approximately 0.0479 units. Although this effect is negative, the magnitude is relatively small, suggesting that GDP growth has a minimal impact on reducing income inequality in India over the long run. The P-value of 0.0179 is below the common significance level of 0.05, indicating that the relationship between GDP and income inequality is statistically significant. This means that, despite the small magnitude, we can be reasonably

confident that GDP does have a genuine, albeit minor, effect on income inequality. The coefficient of fdi.l is -0.036 suggests that a 1percent increase in net FDI is associated with a decrease in income inequality by approximately 0.036 units in the long run. Similar to GDP, this effect is also small, indicating that FDI's influence on income inequality is quite limited. However, the P-value of 0.4778 is much higher than the typical significance level of 0.05. This implies that the relationship between FDI and income inequality is not statistically significant, mean that we cannot confidently assert that FDI has a meaningful long-run effect on income inequality in India.

Table 9: Diagnostic Test for checking Autocorrelation, Heteroskedasticity, Normality and Biasness

Test	Test Statistics	Degrees of Freedom	P-Value	Null Hypothesis	Accept /Reject	Result
Breusch-Godfrey Test for Autocorrelation	LM test = 1.048	df1 = 1, df2 = 12	0.3262	No Autocorrelation	Accept	No Significant Serial Correlation in the residuals of the model.
Ljung-Box Test for Autocorrelation	X=squared =1.2032	df = 1	0.2727	No Autocorrelation	Accept	No Significant Autocorrelation in the residuals up to lag 1.
Breusch-Pagan Test for Homoskedasticity	BP = 8.2306	df = 11	0.6925	No Heteroskedasticity	Accept	No Significant evidence of Heteroskedasticity, the residuals

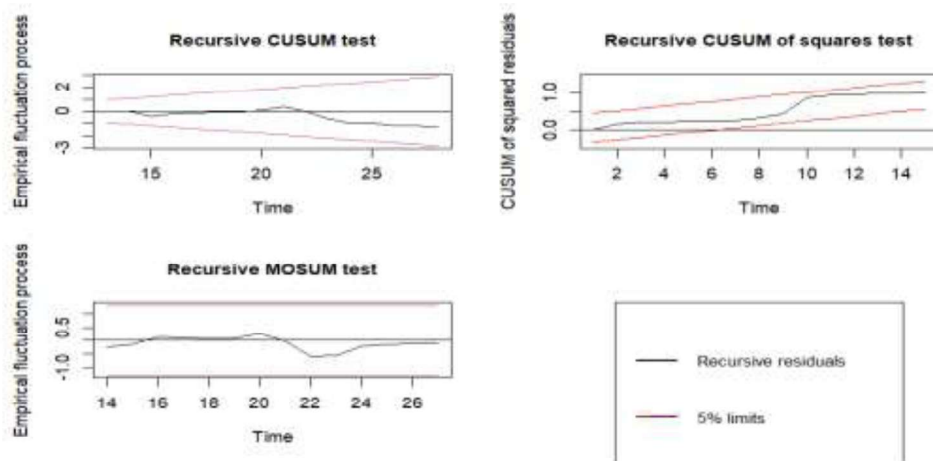
						have constant variance.
Shapiro-Wilk Test of Normality	W = 0.96282	None	0.4734	Data is Normally Distributed	Accept	Residuals are Normally Distributed.
Ramsey's RESET Test for Model Specification	RESET = 4.3509	df1 = 2, df2 = 13	0.03576	Model is Unbiased	Reject	mis-specified, potentially missing important variables or relationships

Source: Authors Calculation on R Studio

ARDL (Autoregressive Distributed Lag) bounds testing model involves examining several key outputs to assess model validity, stationarity, and the relationship between variables with detailed interpretation has been given in table 9. The ARDL model was specified with autoregressive and distributed lags, with appropriate orders determined by the data. Diagnostic tests confirmed that the model

residuals are free from significant autocorrelation, heteroskedasticity, and non-normality. However, the Ramsey RESET test suggests potential model specification issue. After ARDL model formation and specification we are going to check the stability of ARDL model with the help of CUSUM, CUSUM SQ, and MOSUM test. Fig. 2 shows the stability plots of the model.

Figure 2: Stability Test of Auto Regressive Distributed Lag Model



Source: Authors Construction.

6.2 Interpretation of Results

The short-run impact of GDP per capita growth on income inequality in India appears complex. While the immediate effect suggests a small reduction in inequality, the lagged effects show a statistically significant increase in income

inequality. This could depict that even while GDP growth may initially lead to reduce inequality, its effects may reverse in subsequent periods, potentially exacerbating inequality in the short run which leads to very slow decrease in income inequality in long run. In the short run, the impact of Net FDI on income

inequality is negative, suggesting that increased FDI might help reduce inequality. GDP and FDI both appear to have very small effects on income inequality in India over the long run as well. GDP shows a statistically significant but minor impact, suggesting that while economic growth contributes slightly to reducing income inequality, its influence is minimal. On the other hand, the effect of FDI is both small in magnitude and statistically insignificant, indicating that Net FDI does not play a substantial role in affecting income inequality in the long run. The outcome suggests that while economic growth and foreign investment are often touted as mechanisms to reduce inequality, their actual long-term impacts on income inequality in India may be limited.

The relationship between income inequality, GDP growth, and FDI is complex and context-dependent. Theories like the Kuznets Curve and Trickle-Down Economics offer differing views on how GDP growth might influence inequality, with the former suggesting a potential decrease in inequality at higher stages of development and the latter assuming benefits will eventually spread to lower-income groups. So, it is clear after interpreting the whole model that India is somehow in between the top point and declining phase of Kuznets Inverted-U shape curve. Due to which we may interpret that in future inequality may decline, but as we let to know through previous work that the outcomes depend heavily on the specific circumstances of the country or region, so, in respect of India after doing the empirical analysis (from 1991-2019) with the help of ARDL model we interpret that the lag values of GDP per capita growth rate effecting positively the current income inequality.

According to Trickle-Down Economics as the wealth increases of the richest population of the economy (may be due to

by tax cut, FDI, GDP) this will lead to trickle down the poverty and income inequality. So, we can say income inequality is itself correcting the income inequality, that's why the empirical analysis of this study shows the negative relation between the net FDI and GDP pc growth rate with income inequality as in India the richest 1 percent of the Indian population holds more than four times the wealth of the bottom 70 percent and is now own greater than 40 percent of the nation's total wealth, while the lowest 50 percent of the population together share just 3 percent of wealth estimated by Oxfam. But the long-run relation between net FDI and income inequality is not statistically significant, indicates that we cannot confidently assert a meaningful impact of Net FDI on income inequality, so, we can say this theory may be not that much relevant in respect of India. Meanwhile, the impact of FDI on inequality is explained by an optimistic theory called Modernization Theory, which sees FDI as a driver of development and eventual equality. This study follows the modernization theory in short-run but in long-run the results is not statistically significant.

7. Conclusion

These findings can help to draw conclusions about the relation of GDP growth, FDI and income inequality, that while GDP growth and FDI are critical economic factors, the effects of moderate GDP growth and low net FDI on income inequality may require further investigation could argue that may not be sufficient to significantly reduce income inequality (stable Gini coefficients). The short-run dynamics between GDP growth, FDI, and income inequality in India from 1991 to 2019, as revealed by the ARDL model, indicate nuanced relationships. GDP growth has mixed effects, initially reduces inequality but potentially increasing it over time due to lagged effects, so, in case of

India this rapid GDP growth to make it a \$ 5 trillion economy by 2027 and touch \$ 7 trillion by 2030 may adversely affect the income equality in India. On the other hand, while FDI seems to reduce inequality, its impact is statistically significant in short term but minimal and not statistically significant in the long term. These findings propose that while economic growth and foreign investment are often touted as mechanisms to reduce inequality, their actual long-term impacts on income inequality in India may be limited. Other factors or policies might be more crucial in addressing income disparity. Policymakers aiming to reduce income inequality should therefore consider these dynamics carefully, recognizing that short-term economic gains may not straightforwardly translate into reduced inequality. They need to be mindful of these dynamics when devising policies for economic advancement and attracting FDI, to ensure that the outcomes of development are shared equitably across society.

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