



Examining The Effect Of FDI On Economic Growth Of Developing Nations: A Comprehensive Analysis Of Indian Food Processing Industry Through ARDL Method

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ARTICLE INFO	ABSTRACT
	Role of foreign direct investment in promotion of economic and overall development can't be questioned. The level of FDI serves as a key indicator of a country's growth potential. In India, the agriculture and food processing sector plays a pivotal role, employing over 50 percent of the nation's workforce. Through extensive literature review it has been identified that no previous research studies the impact of FDI in food processing sector on economic development of India. This study establishes a connection between Foreign Direct Investment in the food processing industry and the overall economic development of India. The analysis employs co-integration and ARDL methods on data spanning from 2011 to 2022, focusing on the correlation between FDI in the food processing sector and the contribution of the food processing industry to India's Gross Domestic Product (GDP). The results show a long-term association between FDI in the food processing industry and economic growth, with FDI inflow in food processing industry having a positive and significant impact on growth. Keywords: FDI, Food Processing Industry, ARDL, Economic Growth JEL Code: E00, F60, F63,

I. Introduction

Over the past couple of decade foreign direct investments has emerged as one of the primary source of finance and gradually substitute domestic investment in all industrial sectors. FDI is also considered reliable option of fund on which major developed and developing economies have shown trust. Many nations have aggressively lowered barriers that draw foreign investment in the last few decades in an effort to increase tax receipts, create jobs, and absorb important knowledge from foreign businesses. (Kenh and Wei, 2023). Because through globalization circulation of money across borders has become more convenient as a result economists are paying more attention to the trends in foreign direct investment (FDI) movements. In other words it can be trusted that development of economic growth is a result of inflow of FDI (Karahane and Colak, 2022).

Economic development, local investment, and trade openness are the main variables that influence foreign direct investment (FDI) (Romdhane and et al, 2022). India being a developing nation major chunk of population directly or indirectly dependent on agriculture and allied activities. While foreign direct investment in enterprises related to agriculture contributes for approx 1.7% of total inflows, whereas contribution of agriculture and allied activities in India's GDP is limited to approx 18%.

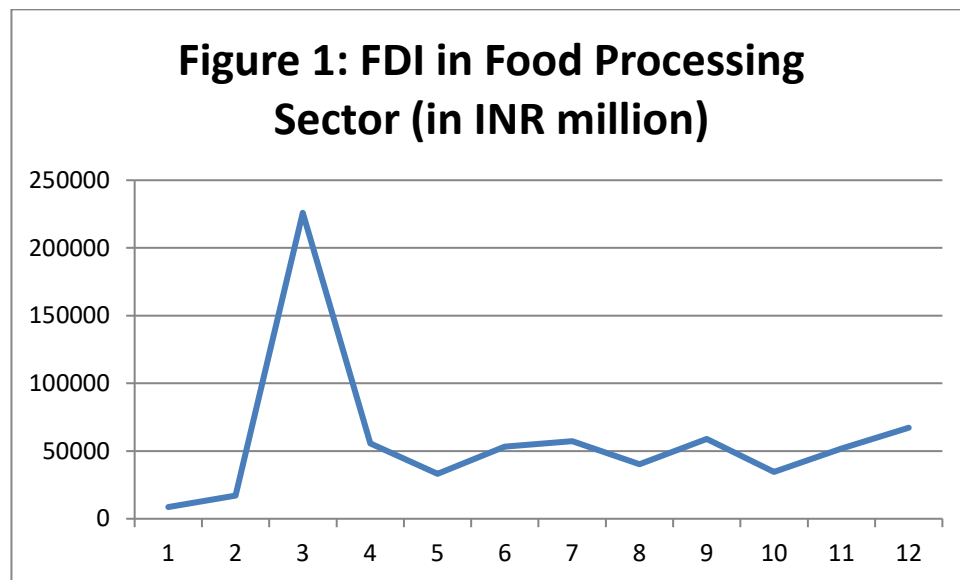
.Recent years have witnessed a step up appreciation in foreign investment in India's food processing industry of 8 times from 2011 to 2022(Figure-1). Even after increment of 8 times, FDI in food processing industry accounts for approx 1.6% of total FDI to India. It is evident either food processing industry is not considered

having high growth prospects or foreign investment policies need to be more open for attracting higher foreign investment. To address the later issue of previous statement GoI has allowed 100% foreign investment in food processing manufacturing through automatic route and 100% foreign investment through government approval route in retail trading of processed food products. Further to facilitate foreign investment Ministry of Food Processing Industry (MoFPI) has setup NiveshBandhu portal and investment facilitation cell (pib.gov.in, 2022).

The contribution of food processing industry in GDP of India has increased at an average rate of 9.97% p.a. from 2014-15 to 2020-21, as a result food processing sector contributes 8% of India's GDP. With accelerated foreign investment and continuous increase in GDP contribution food processing sector is proving its vital role in overall growth of India. The goal of the food processing industry is be to raise its present 8% GDP contribution to 20% within the next five to ten years (ToI, 2023).

Food processing industry to its credit accounts for approximately 13% of India's entire exports and 6% of total industrial investment (The Hindu, 2023). This sector is expected to generate huge employment in next couple of years along with technology advancement. Food processing industry of India needs a comprehensive study to justify its contribution in nation's development.

In this study we are trying to look into the affect of foreign investment in food processing industry on the economic growth of India. This research comprises of five sections. Sector 2 is the brief review of literature. Section 3 is methodological approach, model specification and data sources. Section 4 is the analysis of data and section 5 is the summary of findings and conclusions.



II. Review of Literature

There is a large corpus of research examining how foreign direct investment affects economic expansion (see Edwards et al., 2016), and despite the fact that our study will be quite selective we will compile the pertinent effective literature of FDI and economic growth, food processing & agriculture sector and its role in economic growth and inflow of FDI in food processing & agriculture sector.

2.1 Foreign direct investment and its impact on economic development

Foreign direct investment (FDI) is widely acknowledged as the most important supplementary source of capital for the economic advancement of developing nations. However, the ability of recipient nations to absorb FDI determines its positive benefits on economic expansion. For foreign direct investment to have its growth-promoting impacts, there must be a strong financial system (**Hagan and Amoah, 2020**). Economic development is relatively and significantly impacted by foreign direct investment (FDI), provided that there is a sizable pool of highly skilled laborers (**Anetor, 2020**).

While economic policies and reforms serve as foundations for drawing in foreign direct investment (FDI), it's important to understand that depending only on them might not be sufficient. Achieving sustainable FDI also necessitates strategic marketing that highlights the nation's strengths and advantages (**Musila and Sigue, 2006**). Innovative industries play a crucial role in garnering Foreign Direct Investment (FDI) because of their greater capacity to embrace innovations, technology transfers, and educational outcomes. This is evident in the heightened productivity observed within these sectors (**Kosztowniak, 2022**). In another study by **Tahir and Alam, 2020**, discovered that the amount of Foreign Direct Investment (FDI) and the banking sector's performance are strongly interrelated. In order to attract more FDI, projects having FDI funding should be provided credit by domestic commercial banks.

Beyond a doubt, the cultural composition of a country influences how well foreign direct investment (FDI) streams. In nations with higher levels of traditionalism, the repercussions become negative; in more secular cultures, they become advantageous. Furthermore, we see that FDI has greater impact on growth in individualistic societies rather than collectivistic ones (**Romero and Edwards, 2020**).

Through productive spillovers, foreign direct investment (FDI) facilitates transfer of technology and knowledge, and in turn stimulates growth in the economy by increasing production returns. Thus, it becomes essential to have effective institutions that prioritize political stability, economic freedom, and the rule of law in order to accelerate this expansion (**Yusuf and et al, 2020**).

(**Abouelfarag and Abed, 2019**) in their study have discovered that, contrary to the manufacturing or agricultural sectors, foreign investment has significant impact on sectoral development of the services sector. Additionally, they have stated that FDI only helps with long-term economic growth. The study (**Shawl and Makina, 2022**) show that, by itself, foreign direct investment has little effect on growth. However when FDI interact with other characteristics of the host country that is functioning as an absorptive capacities, allowing the economy to gain benefits from spillovers brought about by FDI inflows and having a discernibly positive effect on GDP. In particular, the research found that FDI has a noteworthy and favorable impact on economic growth when it interacts with variables including trade openness, financial development, and human capital.

2.2 Foreign Direct Investment and Food Processing Sector

Inflow of FDI to agriculture depends on two determinants agriculture market size and agriculture import. Agriculture and allied activities market size has significant impact on the foreign investment. Government should strict the import of agriculture and device policies for attracting FDI in agriculture (**Lv et al 2010**). A study (**Djokoto et al 2014**) suggests that domestic investment in agriculture has positive impact on FDI to agriculture sector. It can be further stated that both domestic investment and agriculture are complimentary to each other.

A study by **Padhi 2022**, suggests that FDI originated from developed nation in food processing sector of emerging countries depends on highly skilled worked forces. Although India has open policy for FDI in food processing sector but lack of specialized labour has negative impact on FDI inflow **Chandio et al 2019**, according to their research, FDI is a leading predictor of economic development. Dedicated policies, incentive schemes for foreign investment and industrial structure of farmers and agriculture & allied activities promotes FDI Jiang et al 2018, in their study mentioned that FDI in agriculture sector has fulfilled development requirement of developing nation. FDI on the other has also enables farmers to earn profit and explore new market.

III. Methodological approach and data source

3.1 Methodological approach

3.1.1 Engle-Granger Co-integration Test

To determine the long-term relationship between two variables in a time series, the Engle-Granger cointegration test is used. To ascertain the stationarity of time series data, the unit root test is run in the first stage. If both the variables found to be non-stationary then regressing one variable over other is performed. The cointegration equation is

$$Y_t = \alpha + \beta X_t + \epsilon_t$$

Where,

Y_t and X_t are the non-stationary variables,

α is a constant term,

β is the cointegrating coefficient, and

ϵ_t is the error term.

Then unit root test is applied on the residuals from the cointegration regression, if the residuals found to be stationary it suggests that cointegration relation exists between variables. The study (Chandio et al, 2019) suggests usage of co-integration test in analyzing relationship between FDI in agriculture and economic growth.

3.1.2 Autoregressive Distributive Lag (ARDL)

The long term link between variables is examined using Autoregressive Distributive Lag (ARDL) model, particularly when variables may be integrated of different orders. When co-integration is present ARDL model includes error correction term (ECM). The ECM captures short run adjustments to correct deviation from the long-run. ARDL model used to predict the short run and long run values of dependent variables. The study by Shittu et al (2020) employed autoregressive distributive lag model is analyzing impact of FDI on economic growth.

Equation for ARDL:

$$Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \dots + \beta_p Y_{t-p} + \gamma_0 X_t + \gamma_1 X_{t-1} + \gamma_2 X_{t-2} + \dots + \gamma_q X_{t-q} + \epsilon_t$$

Where:

Y_t is the dependent variable at time t .

X_t is an independent variable at time t .

β_0 is the intercept term.

$\beta_1, \beta_2, \dots, \beta_p$ are the coefficients for the lagged values of the dependent variable.

$\gamma_0, \gamma_1, \gamma_2, \dots, \gamma_q$ are the coefficients for the lagged values of the independent variable.

ϵ_t is the error term.

3.2 Data source

In this study secondary data from 2011 to 2022 has been analyzed. Major source of data are hand book on statistics of India published by Reserve Bank of India, data released by department for promotion of industry and internal trade (DPIIT) of India and statistics published by Ministry of Statistics and Programme Implementation of India. Dependent variable is total gross domestic value (at constant price) of India and independent variable is inflow of foreign direct investment in food processing sector of India. Table-1 represents extended meaning of abbreviation used in study.

Table-1: Meaning of abbreviations

Abreviation	Extended Meaning
FDI	Inflow of FDI in Food Processing Sector of India
GDP	Total Gross Domestic Product of India (at constant price)

IV. Analysis

4.1 Engle-Granger Co-integration Test

Table-2 exhibits results of Engle-Granger Co-integration test. This test is used to determine the presence of co-integrating relationship among FDI and GDP. The value in the table represents the test statistics and critical value at 5% level of significance. For $R \leq 1$ the test statistics is 1.72 and critical value at 5% level of significance is 8.18. Since the t-statistics value (1.72) is less than the 5% level significance value (8.18) hence null hypothesis cannot be rejected, which means that at least one co-integrating relationship exists between FDI in food processing sector and GDP of India. For $R = 0$ the test statistics is 36.04 and critical value at 5% level of significance is 17.95. Since the t-statistics value (36.04) is more than the 5% level significance value (17.95) hence null hypothesis that is zero co-integrating relationship between FDI in food processing sector and GDP of India can be rejected.

Table-2: Co-integration Test Result

Null Hypothesis	t-statistics	p-value (at 5% significance level)
The number of co-integrating equation is zero ($R=0$)	36.04	17.95
The number of co-integrating equation is zero ($R \leq 0$)	1.72	8.18

4.2 Autoregressive Distributive Lag (ARDL)

Table-3 displays the result of ARDL. Autoregressive distributive lag estimates the impact of lags of independent variables on dependent variables. This result shows that the dependent variable, GDP, is regressed on both its own lagged values and the independent variable's lagged values (FDI). Multiple and adjusted R square measures how well the independent variables explain the variability in dependent variable. Result suggests that lag of GDP is highly significant and lag of FDI is relatively significant. As per table-4 value of multiple and adjusted R square is 1, it means model is perfect fit.

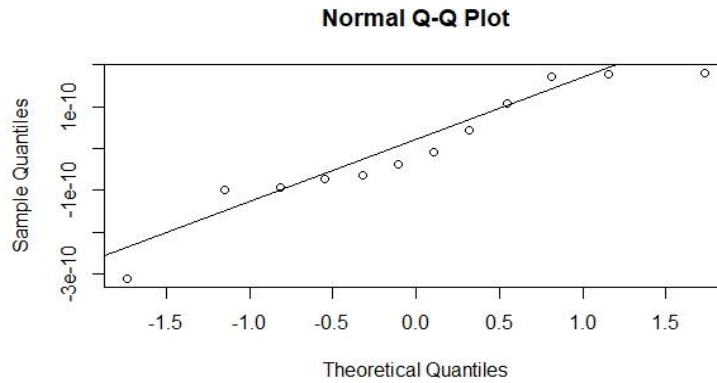
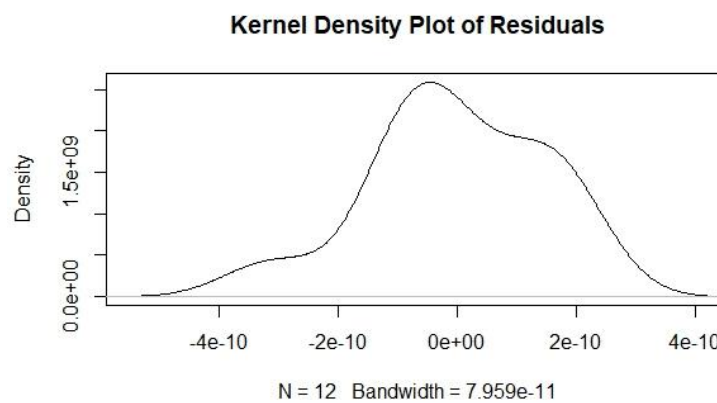
Since the model is perfect fit, Shaprio-Wilk test for normal distribution test has been applied. Figure-2 exhibits normal q-q plot that demonstrate that residuals are closer to model fit line, hence it can be trusted that model is fit. Further figure-3 exhibits Kernel Density Plot that demonstrates that residuals are normal distributed. Table-4 displays Shaprio-Wilk test result, weight value (0.9182) is closer to 1 it suggests that distribution is closer to normal. Null hypothesis for Shaprio_Wilk test is that data follow normal distribution. P-value (0.2714) is greater than 0.05 significance level, hence we failed to reject the null hypothesis, it can be trusted that data is normal distributed.

Table-3: ARDL Test Result

Variables	t-statistics	p-value	Significance Level
Lag-GDP	4.251e+16	2e-16	.001
Lag-FDI	2.520	0.0328	.05
Multiple R Square	1		
Adjusted R Square	1		

Table-4: Shaprio-Wilk Test Result

Data	Residuals
Weight	0.9182
p-value	0.2714

Figure-2**Figure-3**

Further to validate the model Ramsey Test (Chandio et al 2019) has been applied. The primary objective of Ramsey test is to confirm the model validity by detecting misspecification error in the model. The null hypothesis for Ramsey test is that the model is correctly specified. Table-5 exhibits results if Ramsey test, p-value is 0.4097 which is greater than the significance level (0.05) hence null hypothesis is accepted.

Table-5: Ramsey Test Result

Data	Model
Coefficient	0.74769
p-value	0.4097

V. Conclusion

As essential component of promoting a country's scientific and economic progress is foreign direct investment. This paper explores the impact of foreign direct investment (FDI) and economic development, concentrating on the food processing industry of India. By employing the Engle-Granger co-integration test, we have established a long-run connection between FDI in the food processing industry and India's Gross Domestic Product (GDP).

To ascertain the impact of FDI on GDP, the Autoregressive Distributive Lag (ARDL) method was applied. The results of this analysis reveal a significant and positive influence of FDI in the food processing sector on India's economic growth. The ARDL model not only demonstrates a precise fit but also underwent validation through the Shapiro-Wilk test, confirming the normal distribution of residuals and Ramsey test confirming validity of model.

The comprehensive analysis affirms that the influx of FDI into the food processing sector significantly contributes to the overall economic expansion of India. Notably, the food processing sector accounts for approximately 1.7% of the total FDI inflow to India. This study serves as a validation of the direct impact of FDI in the food processing sector on India's GDP.

In light of these findings, we recommend that the Government of India should formulate strategic policies to actively promote and facilitate FDI inflow into the food processing sector. Such proactive measures can enhance the sector's growth, thereby further boosting India's overall economic development.

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