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Sector-wise Impact of FDI and FPI on Industrial Development in India: A Critical Evaluation

Shweta Kumari[1*] | Dr. Narendra Singh[2]

[1]Department of Commerce and Business Management, Ranchi, Ranchi University, Ranchi, Jharkhand, India.
[2]Associate Professor, Head & Dean of Department of Commerce, St. Xavier's College Ranchi.

[*]Corresponding Author: shwetasanju525@gmail.com

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ABSTRACT

Recently, Indian economy has experienced strong Foreign investment flows through Foreign Direct Investment(FDI) and Foreign Portfolio Investment (FPI). It's long term trend highlighted economy has received $748.78 billion through FDI since 2014-2025 whereas FPI has been boosted by equity market gains with total FPI asset under custody hitting $858 billion. A healthy and vibrant industrial sectors of capital markets is important for development of a nation. In the present scenario, sectors of Foreign investment in Indian economy for instance Automotive, Pharmaceuticals, Information Technology (IT), Textiles, Construction, power, equity segment and assets under custody (AUC) have attracted attention of investors to invest in these Industries particularly. This paper attempted to analyse some of sectors and their impact on Industrial Development in India by foreign investors. The present study is based on quantitative data and used secondary data of annual time series. Data has been collected from the report of Reserve Bank of India, Department for Promotion of Industry and Internal Trade (DPIIT),world Bank report etc. To study the impact methods are practised such as comparative sectorial analysis, Autoregressive Distributed Lag (ARDL) and Garch model has been used to estimate volatility spillovers of FPI to sectoral output. The results indicated strong and positive long-run relationship with capital intensive, technology-based sectors hence leading to stable output growth and value addition. On the contrary, the FPI inflows showed a strong but volatile connection between FPI inflows and construction and power industries, which is highly vulnerable to market sentiment. However, it was observed from study that the investment activities in industrial sectors of FDI and FPI have had significant impact on Indian economy.

Keywords: *Foreign Direct Investment (FDI), Foreign Portfolio Investment (FPI), Industrial Development, Sectoral Analysis, ARDL TEST, GARCH TEST.*

Introduction

The Indian economy is integrated with the global financial markets, after the result of economic reforms 1991are through FDI and FPI. The process of FDI is defined as long-term ownership, managerial involvement, and dispersion of tangible and intangible resources and is often praised as being an engine of industrial modernization (Borensztein, De Gregorio, and Lee, 1998). Whereas FPI, which includes equities and bonds among other tradable securities, is helpful in increasing liquidity and seeks to add market depth, however, it is the classic hot money that can be stopped and reversed at any moment (Forbes & Warnock, 2012). These inflows are often touted as policy fora as indicators of economic dynamism.

Nonetheless, there is a complex fact behind such aggregate enthusiasm. Capital flows affect the industrial environment in an undistributed manner. A unit of FDI that ventures into the pharmaceutical industry would probably produce a different constellation of technological spillovers, employment creation and long run stability than would a similar unit of FPI that is pursuing yields in the construction industry. However, the sectoral peculiarities of such effects, especially comparative and active interactions between FDI and FPI, has not been well studied in the context of India. The existing literature finds that FDI and FPI studied separated way at a macro level thus the importance of inter sectoral heterogeneities ignored (Sahoo, 2006).

The policy gap shows an urgent need to address it: Does the government seek a unanimously liberal attitude to foreign capital, or should it be a strategy-differentiated approach? Does a search of FPI find financial markets bring industrial sectors into unnecessary volatility? The subtle conceptualization of industrial development in modern India would require the unweaving threads of influence in the sector of FDI and FPI. The future of sectors like automotive that has undergone a transformative growth due to the FDI is fundamental and different as compared to textiles that is still fragmented and less attractive to permanent foreign investment. Here the question is whether foreign capital is important or not? The burning question is how, where and what kind of capital matters in sustainable of industrial growth.

Objective of the study

The basic objectives of the study are:

- To determine the long-run and short-run effects of FDIinflows on the industrial output of selected industries in India.
- To test net FPI inflows are correlated with sectoral industrial output, it is more important to consider it's association and its stability.
- To determine the volatility of the FPI returns affects the output volatility.
- To draw a critical comparison of sectoral footprints of FDI and FPI.

Literature Review

The academic literature on foreign capital is quite voluminous but tends to be divided into two directions: FDI and FPI. The FDI literature is supported by endogenous growth theories which frame it as a channel through which technology transfer, increased human capital and global value chain (GVCs) integration occur.

Borensztein et al. (1998) explained that FDI was more efficient in stimulating growth than local investment as long as the host nation has a certain minimum level of human capital to internalize the technology. A critical idea to analysis industries at sectorial level is so-called absorptive capacity: a technology-intensive sector for instance IT sector gain significant advantages out of FDI whereas a low-skill, labour-intensive sector might not.

Obstfeld (1994) States the FPI literature is largely placed under financial economics and at macro stability. FPI provides the much needed liquidity and risk-sharing to the emerging market, its tendency to herd and exit quickly during risk-off incidents is a known phenomenon.

Calvo (1998) and Forbes and Warnock (2012) explained surges and sudden halts in cross-border portfolio flows causes severe macroeconomic volatility, that impacts on exchange rates, credit conditions and hence real economic activity. Inspite of this fact it is superficially investigated at a disaggregated sectoral specific level and this financial volatility is transmitted to the real sector.

Empirical research in Indian economy regarding FDI and FPI has given an ambivalent outlook, which is frequently limited by aggregate statistics.

Chakraborty and Nunnenkamp (2008) have found positive but relatively weak growth on account of foreign direct investment (FDI) regarding sectoral composition effective growth.

Mukherjee and Bose (2008) proved Foreign Portfolio Investment fluctuating character and correlation with the movements in the stock-market, but failed to extend to its sector-industrial implications.

Narayanan and Vashisht (2008) Recently there has been seen a shift of focus to FDI in the sectorial industry. For instance Indian automotive industry always reflected the transformational aspect of FDI within supporting local clusters, increased productivity, and boosted exports. Similarly, the

emergence of information technology industry is inevitably associated with FDI as well as global integration promotion.

The earlier studies discussed above reveal that the authors have confirmed the flows of FDI and FPI through different means like automatic route and government route and it helped economy to attract capital, technology mechanism formation of human n capital resources. A number of studies have been conducted for estimating the volatility of the Indian stock market, but the studies which identified the impact of the investment activities of FPIs and FDI into the Indian industries at sectorial level are negligible. The present study was conducted to fill this research gap. Moreover, the study is based on time series data rather than monthly data.

Variables

The paper uses data from 2000-01 to 2022-23 annual time-series. The industries are Automotive, Pharmaceuticals, IT & ITeS, Textiles, Construction, Power and Energy, and it has highlighted industrial economic importance at different levels of capital intensity and foreign investment exposure.

- **Dependent Variables:** Dependent variable of Sectoral industrial performance
  - **IIP_s:** Index of Industrial Production in the industry in question (Base 2011-12 =100). Source: Ministry of Statistics and Programme Implementation (MoSPI).
  - **GVA_s:** Gross Value Added for the sector at constant prices. Source: MoSPI/National Accounts Statistics.
- **Independent Variables**
  - **FDI_s:** Gross FDI equity inflows (in USD million converted to INR based on average exchange rate of the fiscal-year to year-end) into the corresponding sector. Source: DPIIT, RBI.
  - **FPI_s:** There is a lack of perfect data regarding sector-specific FPI, so a proxy is used. We use the net FPI equity inflow in the fiscal year and distribute it based on its weight in each sector of the BSE market capitalization- a typical methodology workaround (Sensarma & Ghosh, 2013). RBI is a source of Net FPI data.
  - **VOL_FPI:** FPI returns volatility, which is the annualised standard deviation of net FPI inflows in a month, estimated using a GARCH (1,1) model.
- **Control Variable**
  - **GFCF_s:** Gross Fixed Capital Formation in the industry (constant prices), to manage domestic investment. Source: MoSPI.

Table 1: Descriptive Statistics of Key Variables (2000-2023)

Variable	Mean	Std. Dev.	Min	Max	Data Source
IIP_Automotive	132.5	41.2	62.1	211.7	MoSPI
FDI_Automotive (₹ Cr)	12,450	9,880	850	38,200	DPIIT, RBI
FPI_Proxy_Auto (₹ Cr)	8,225	15,320	-12,400	45,600	RBI, BSE
IIP_Pharmaceuticals	155.8	52.4	78.9	245.0	MoSPI
FDI_Pharma (₹ Cr)	7,890	6,540	520	22,100	DPIIT, RBI
IIP_Textiles	108.3	22.1	71.5	158.9	MoSPI
FDI_Textiles (₹ Cr)	1,120	980	95	4,250	DPIIT, RBI
GVA_Construction (₹ Lakh Cr)	15.2	5.8	6.1	26.4	MoSPI
FPI_Proxy_Const (₹ Cr)	14,520	21,450	-18,900	62,300	RBI, BSE

Models of the Study

To address the objectives, two primary econometric models are formulated.

Model 1: ARDL Bounds Test for Long-Run Relationship

For each sector *s*, we specify an ARDL(*p, q*) model:

$$\Delta \ln (Output_{s,t}) = \alpha_0 + \sum_{i=1}^{p} \beta_i \, \Delta \ln (Output_{s,t-i}) + \sum_{j=0}^{q1} \gamma_j \, \Delta \ln (FDI_{s,t-j}) + \sum_{k=0}^{q2} \delta_k \, \Delta \ln (FPI_{s,t-k}) + \sum_{l=0}^{q3} \theta_l \, \Delta \ln (GFCF_{s,t-l}) + \lambda_1 \ln (Output_{s,t-1}) + \lambda_2 \ln (FDI_{s,t-1}) + \lambda_3 \ln (FPI_{s,t-1}) + \lambda_4 \ln (GFCF_{s,t-1}) + \epsilon_t$$

Cointegration is determined by the bounds test (Pesaran, Shin, and Smith, 2001) on the coefficients l 1 to l 4. The Short-term dynamics and the rate at which the short-run equilibrium is reached is reflected in the Error Correction Term (ECT) obtained using this model.

Model 2: GARCH Model of Volatility Spillover

In order to estimate the volatility transmission between FPI and sectoral output, we estimate a GARCH(1,1) model of each sector:

$$\Delta \ln (Output_{s,t}) = \mu + \phi \Delta \ln (Output_{s,t-1}) + \psi VOL\_FPI_t + u_t$$

$$\sigma_t^2 = \omega + \alpha u_{t-1}^2 + \beta \sigma_{t-1}^2 + \rho VOL\_FPI_t$$

Where σ_t^2 is the conditional variance of sectoral output growth. A statistically significant and positive ρ would mean that FPI volatility increases the output volatility in sector *s*.

Our tests are based on theoretical and empirical foundations..

- FDI inflows have a strong positive effect on the industrial output in capital-intensive and technology-intensive industries (Automotive, Pharma, IT) and a small or negligible impact in the traditional industries (Textiles).

Justification: This is based on absorptive-capacity theory; high-skill sectors are in a better position to benefit in technology and management spill-overs of FDI.

- FPI inflows have a large positive short-run effect on output, but do not have a long-run cointegrating effect, in particular in asset-linked industries (Construction, Realty- proxy).

Justification: FPI is an emotional and a capital investment in liquid and high-momentum securities. Its impact is either modern or retrospective, however, it does not mean a long-term developmental relationship.

- Greater volatility of FPI inflows (VOLFPI) Granger-causes greater volatility in sectoral growth of industrial output.

Justification: This is a probe of the financial-real volatility spill-over. The abrupt FPI changes may cause credit tightening, currency, and financial instabilities to companies, triggering real-output instabilities.

Methodology of the Study

The methods is carried out in various steps. First, Identify the time-series data in a sequence manner. Augmented Dickey Perron (ADF) and Phillips Perron (PP) tests of unit root are used. The ARDL model has been applied to both I(0) and I(1) variables, this step was necessary to exclude I(2) series.

After that estimaion of of data has been done by aplying the ARDL model (Model 1) of each sector. The Akaike Information Criterion (AIC) is used to choose the best lag structure (*p, q 1, q 2, q 3*). The Pesaran et. al. (2001) cointegration bounds F -test method applied. When the computed F -statistic is greater than the upper critical value, this rejected the null equation of no cointegration and estimated the coefficients in the long-run and the Error -Correction Mechanism (ECM). The coefficient of the ECT was significant and negative and measured the economy returns to equilibrium.

At the same time, the GARCH model (Model 2) is estimated. The importance of the coefficients of the mean and variance equations respectively, of the variables of the model, represented by the terms: ψ and ρ, assessed. Further, this analysis would be supplemented by Granger causality tests in a Vector Autoregression (VAR) model, which determined the direction of influence in a direction of FPI volatility or output volatility.

The proposed methodology meant to be both rigorous and pragmatic in the sense of understanding data constraints (e.g., FPI proxy) but employed effective methodologies to come up with credible inferences. The use of ARDL (long-run/level relationships) and GARCH (second-moment volatility effects) provided an overall picture of the effective foreign capital.

Data Analysis and Results

The initial stage of analysis confirmed that all the series are either I(0) or I(1), therefore, allowed the use of the ARDL bounds test. Table 1 gives descriptive statistics that suggest the narration. The FDI inflow into Automotive is more than an order of magnitude greater than the FDI inflow into Textiles. The FPI proxy of Construction has the greatest standard deviation, and this fact supports the volatile character of the proxy.

Results of ARDL Bounds Tests and Long-Run Estimation

The core findings from Model 1 are summarized below.

Table 2: ARDL Bounds Test Results and Long-Run Coefficients (Selected Sectors)

Sector	Cointegration (F-Stat)	ECT (Speed of Adjustment)	Long-Run Coeff. for Ln(FDI)	Long-Run Coeff. for Ln(FPI)	Results
Automotive	6.89** (U.B=5.06)	-0.42**	0.31**	0.08 (ns)	**Supported.** FDI has strong positive long-run impact. FPI no long-run link.
Pharmaceuticals	5.67** (U.B=5.06)	-0.38**	0.26**	0.05 (ns)	**Supported.** Similar to Automotive.
IT & ITeS	7.23** (U.B=5.06)	-0.51**	0.35**	0.12*	**Supported.** Strongest FDI link. Weak FPI long-run link possible due to stock-market nexus.
Textiles	2.45 (ns) (U.B=5.06)	-	-	-	**Supported.** No cointegration found. FDI/FPI lack systematic long-run relationship with output.
Construction	5.12* (U.B=5.06)	-0.29*	0.11 (ns)	0.23**	**Supported.** FPI has a significant positive long-run coefficient; FDI is insignificant.
Power	4.98* (U.B=5.06)	-0.33*	0.18*	0.19**	Mixed. Both show significance, likely reflecting FPI in power stocks and FDI in infra projects.

Note: / denote significance at 5%/10% level. U.B = Upper Bound Critical Value at 5%. ns = not significant.

The long-run coefficient of Foreign Direct Investment (FDI) is positive, statistically significant, and most important the magnitude of the economy in terms of technology is intensive industries like Automotive, Pharmaceuticals, and Information Technology. To be precise, an increment of FDI by 10% is associated with a 2.6-3.5% increase in the sectorial output in the long run. The error-correction term

(ECT) is significant and negative which supports the fact that there is a stable equilibrium relationship. On the contrary, Foreign Portfolio Investment (FPI) becomes very ineffective when specifying these sectors in the long-run.

The opposite of the dynamics in the construction industry. The long-run determinant of FPI and FDI woulb be statistically insignificant. The trend showed entire inherent nature of the construction business, highly levered and aggravated to equity-market valuations and liquidity states are induced by flows of portfolio. Textiles, on the contrary, showed an isolated behaviour. it showed no trace of long-run nexus with conduit of foreign capital, hence it is reliable on domestic demand forces, labour legislation and the global trade accords.

Results of Volatility Spillover Analysis (GARCH Model)

The estimation of Model 2 yielded critical insights-

Table 3: GARCH (1,1) Results for Volatility Spillover (VOL_FPI -> Sector Output Volatility)

Sector	ψ in Mean Eq. (Impact on Output Growth)	ρ in Variance Eq. (Impact on Output Volatility)	Granger Causality F-Stat (VOL_FPI → ΔOutput)
Automotive	-0.15*	0.42**	5.23**
Pharmaceuticals	-0.08 (ns)	0.31**	4.67**
IT & ITeS	0.10 (ns)	0.58**	7.12**
Construction	-0.22**	0.71**	9.45**
Power	-0.17*	0.49**	6.88**

Note: **/* denote significance at 5%/10% level.

The GARCH coefficient (ρ) showed positive and statistically significant in all the above sectors, which implies on the periods of increased FPI volatility , a direct translation in increased conditional volatility in company output growth. The impact is highly significant in Construction (0.71) and Information Technology (0.58). Further, the Granger causality test also indicated, FPI volatility has a predictive effect on output. The mean equation, the regressor (ps) signs of the automotive, construction and power industries are negative which indicated high FPI volatility and also correlates with decreases in contemporaneous output growth thus strongly supported.

Discussion and Contributions

The empirical data provided a critical and subtle description of the role of foreign capital in the Indian industrial sector. It echoes positive statement that FDI and FPI are not substitutable tools but having different ecological niches of the industrial ecosystem and put forward differential costs and benefits.

FDI serves as the pillar of long-term, quality development in the spheres where India has made the efforts of becoming competitive in the world. The strong long-run connection that has been observed in the automotive and pharmaceutical industry is not a mere coincidence, rather it is an indication of strong supply-chain connections, technology-spillovers, e.g., industry alliances, Suzuki automotive joint ventures and the rise of the multinational corporation in pharmaceuticals and an augmented export competitive advantage. This relates to the results of Narayanan and Vashisht (2008), but also extends them in comparison with the stability that was observed against turbulence that defines FPI. The comparably fast rate of adjustment (ECT ~ -0.4 to -0.5) that was found in these sectors also indicates an efficient absorption of FDI-induced shocks and a rapid recovery to sustainable growth path.

On the other hand, FPI showed its dual nature. It offered the liquidity in the long run relationship with construction and power. But this comes at a very high cost and systemic volatility. The most important contribution of the study regarding Indian context is arguably the strong volatility spillover that GARCH model captures. It measured a risk that is sometimes talked in the macroeconomic sphere but seldom attributed to the particular industry consequences. The construction industry is highly reliant on FPI-related funding and thus it is an ideal vessel that can transmit global financial shocks directly to the actual economy.

There is something interesting regarding the case of information technology. It showed best expression of strongest FDI impact but it is very sensitive to FPI volatility. This shows the dual nature of the industry: it is the exporter of services, based on a steady FDI foundation and international integration,

but it is also a stock market pet, where its valuations, and extension ability raise capital and finance growth, at the mercies of it's portfolio investors.

The policy contributions are high and urgent. The portrayal of the net capital inflows as a single positive figure is a falsehood, and even poses harm. Billion-dollar FPI inflow to the equity market can actually strengthen headline forex reserves and the Sensex, but it also increases the exposure of the other industries connected to it to external financial shocks. On the contrary, a slower yet gradual stream of FDI in the manufacturing provides deeper and more stable developmental impacts.

Hence, industrial and capital-account policies can not be ghettoized. The push of the area of manufacture in India in developed industries needs to be intrinsically attached to entice FDI, not simply generic abroad money. Further liberalisation of FDI flows in specific, technology-intensive areas should be actively differentiated by policies, which may also take into account macroprudential action, such as that suggested by IMF, to deal with the volatility of some forms of FPI, particularly in systemically important areas such as construction and banking. The biggest aim is to cushion the actual agenda of industrial development against the natural volatility of international portfolio flows.

Limitations and Future Research

This paper has limitations which opens the way to future work. The fact that a market-cap based proxy of sectoral FPI was used in spite of its methodological soundness is flawed. Finer insights would be made available through access to proprietary, transaction-level FPI data. The analysis performed is at sector level; firm level panel analysis would help to reveal the heterogeneity in sectors i.e. the large firms attract FDI and the smaller ones are prone to domestic credit environment affected by FPI. Moreover, we are concerned with the output and volatility. The outcome variables that may be incorporated into future work would be more outcome variables, e.g., the quality of employment, the sophistication of exports, or the intensity of R&D, in order to create a more complete picture of the effect of development. It will also be interesting to expand sectoral pattern into other emerging economies and give it comparative study.

Conclusion

This article has exposed the homogenised perception of foreign capital with critical analysis. By referring to a sector-based approach, it identifies the roles of FDI and FPI regarding development of the Indian industry. FDI is a long-term partner, which throw light to the areas with high absorptive capacity stable growth and upgrades FPI, which is a required source of liquidity in the market, acts like a volatile financier, its volatility directly seeps into the industrial production.

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