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WHICH INDIAN INDUSTRY BENEFITS FROM FDI? A PANEL CO-INTEGRATION APPROACH

ABSTRACT

Economic liberalization or market reforms have become the buzz word in economics all over the world in the recent years. Among various aspects of economic liberalization, foreign capital, particularly inflow of foreign direct investment (FDI) has been viewed as a main engine for economic development in the world economy. Thus this paper attempts to analyze the impact of FDI inflows on the performance of various Indian industries. Using Panel Co-integration tests namely Pedroni Residual Co-integration, Kao Residual Co-integration test and Johanson Fisher panel co-intergration tests, the presence of co-integration between FDI inflows and the performance variables of selected industries have been tested. The results of the paper reveals that there is a long run relationship between industry performance indicators and FDI only in case of services, telecom, computer software and hardware, real estate and automobile industries and in case of majority of other industries, there is no long run relationship between industry performance indicators and FDI inflow.

Key Words: foreign direct investment, industry performance indicators, long run relationship, panel co-integration

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INTRODUCTION

Globally, the last quarter of the 20th century witnessed a marked change in the attitude in most of the economies towards implementing neo-liberal economic policies. In the era of globalization, flow of capital between nations has become inevitable. Economists believed that foreign direct investment (FDI) plays a significant role in the development process of an economy through transfer of financial resources, innovative technology and improved management techniques. It has also been argued that developing countries like India need substantial amount of FDI to achieve the required investment in order to raise productivity, exports, and employment opportunities thereby accelerating economic growth and development. Furthermore, policy makers also emphasize that, FDI helps in speeding up economic activity and bringing along scarce productive factors. During the recent decade, FDI inflows continued to be high despite many financial crises and difficult economic scenarios in most parts of the world, especially in developing countries. Most of the economies tried to utilize FDI to fill the gap between savings and investment in order to supplement domestic investment. FDI has also been considered as a non-debt-creating source of additional external finance and it has become an attractive and preferred form of finance compared to formal contractual agreements for foreign loans, because it involves a risk sharing relationship with the investors from the home countries, which does not exist in case of foreign loans. FDI has also been considered by policy makers as a strategic component of investment which is required for achieving the objectives of second generation economic reforms and maintaining the current pace of growth in India.

On contrary to the general assumption about FDI, it has been argued that FDI inflows does not bring adequate resources, technology and employment opportunities to developing economies and the effects are mostly negative (Gorg and Greenaway, 2004; Hanson, 2001) by affirming that there is no consistent relationship between FDI inflows and economic growth (Lipsey, 2002). This shows it is extremely important to assess the effects of FDI on the host economy which receives sizable amount of FDI over a period of time in order to provide suggestions to its policies and strategies for effective utilization of FDI inflows. Even though many research reveals a common consensus that FDI is not the growth stimulant rather it is the growth resultant, the government is allowing more amount of FDI by increasing the sectoral cap and reducing the restrictions on FDI inflows. Thus it has raised an issue that, what is the necessity of inviting FDI into India? In order to answer such an issue, the impact of the FDI inflows in enhancing the performance of various industries which attracted sizable amount of FDI should be

evaluated. Hence, this paper analyzes the impact of FDI inflows on the performance of various Indian industries.

LITERATURE REVIEW

The contributions of FDI towards the development of certain economies have attracted widespread discussion among the economists and policymakers. FDI is expected to increase and improve the existing stock of knowledge in the recipient economy through labor training, skill acquisition and diffusion. It has also been anticipated that the introduction of new management practices and a more efficient organization of the production process adopted by the foreign investors will not only improve the productivity of the firms receiving FDI, but potentially improve the productivity of host countries and thus stimulate economic growth. A large body of literature exists related to the effect of FDI on the overall growth of the host economy. It has been studied by testing the macro-economic indicators namely gross domestic product, exports, exchange rate, employment generation and percapita income. Recently, more emphasis has been given to analyze the effect of FDI on the performance of industries that have received a sizable amount of FDI.

The literature on FDI suggests that, the positive relationship between FDI and economic growth is far less definitive than generally believed. For instance, a critical review on the number of firm-level studies on spillovers effects on productivity in manufacturing industries in developed, developing and transition economies concluded that out of 25 studies, only six studies have identified positive spillovers from foreign firms to domestic firms, but none of which are developing countries (Gorg and Greenaway, 2004). One among such studies had identified that foreign firms had reduced the productivity of domestic firms through competition effects in Venezuela (Aitken and Harrison, 1999). Furthermore, the widespread belief that, FDI generally has a positive impact on economic growth in developing countries had been challenged by the researchers and identified that, in the vast majority of countries, there existed neither a long-term nor a short-term effect of FDI on growth (Herzer and Klasen, 2008). In accordance, the economic growth of Pakistan is also not significantly influenced by the inflow of FDI (Rehman, 2016). Similarly, even in Australia, the inward FDI has not significantly influenced the productivity within the sector (Turnbull, Sun, and Anwar, 2016).

One of the most important aspects of the positive effects of FDI is the productivity spillover effects emanating from foreign-owned firms to domestic firms in the host country. The existence of positive correlation between the productivity of a multinational enterprise (MNEs) and average value added per worker of the domestic firms within the same sector was in many developed economies (Caves, 1974). Similarly, several positive effects of FDI such as productivity gains, technology transfers, managerial skills, employee training, access to markets and the introduction of new processes in the domestic market had also been observed in certain host economies (Caves, 1996). Especially, the foreign-owned firms in UK's manufacturing sector had a significant positive effect on the level of technical efficiency in domestic firms and also had a significant intra-industry and inter-industry spillovers which was identified from the industry-level panel data (Hubert and Pain, 2001).

Generally FDI is assumed to be more productive than domestic investment, because it encourages the incorporation of new technologies in the production function of the host economy. Similarly, it is believed that, FDI improved productivity of domestic firms of the host countries apart from receiving investments through technological spillovers (Rappaport, 2000). In addition, through a "contagion" effect FDI has increased the rate of technical progress in the host economy from the more advanced technology and managerial practices (Findlay, 1978). Thus, it may contribute to the economic growth, by way of transfer of technology to domestic firms which increases the output of the host economy.

A positive relationship between FDI and domestic investment was identified in China (Sun, 1998). While examining the inter-relationships between FDI, industrial output growth and other variables in China using the VAR model it was found that FDI has a significantly beneficial impact on the Chinese economy when the ratio of FDI to industrial output increases (Shan, 2002). But at the same time, the spillover effects were only positive for the most technologically advanced Chinese enterprises (Hale and Long, 2006). Thus, foreign firms may directly influence the average productivity level of the host economy by importing capital, advanced assets and technology and had driven international technology diffusion (Balasubramanyam, Salisu, Sapsford., 1996; Caves, 1996). The impact of FDI was greater when domestic firms and MNEs had similar levels of productivity and the absorption capacity of the domestic firms which was evident from UK's manufacturing industry (Driffield and Taylor, 2002; Girma, 2005). Similarly, in Ireland and Spain, positive spillovers of FDI seemed to depend on the firm's absorptive

capacity to capture technological spillovers, whereas FDI in Greece did not show the positive spillovers and was predominantly located in more traditional, low-technology sectors (Barrios, Dimelis, Louri, and Strobl, 2004). Interestingly in China, the role of human capital and research and development has been identified as the stimulus to capture the spillover effects from FDI to export quality of manufactured products (Tang and Zhang, 2016). Thus, the potential transfer of technology and the spillover effects from FDI to the rest of the economy depended on the economies that adequately have social capability to absorb advanced technologies (Abramovitz, 1986); if there is a large technology gap between the domestic and foreign firms then the foreign technology may be useless. Therefore, the host economy should possess a minimum of technological know-how and competence to benefit from the spillovers of FDI (Narula and Marin, 2003). Thus, the extent of influence of FDI, especially on the growth of transition economies is mainly stimulated by the technological and innovative efforts of the host economy (Silajdzic and Mehic, 2015). It has also suggested that the important productivity spillover effect of FDI was the result of competition effect in the host country. Increased competition forces local firms to take action and increase their innovative capacity which may lead to an increase in productivity (Driffield, 2001). However, few argued that this competition effect was not a spillover effect, as there were no technology flows involved.

The literature has also discussed about the effect of FDI on overall wage spillovers in the host economy. It had been ascertained that foreign investment had raised local industry wages to a large extent than domestic investment especially in the United States, namely South Carolina (Figlio and Blonigen, 2000). Even in China, higher wage rate in many industries are considered as one of the consequences of FDI inflows (Yeung and Ramasamy, 2005). On the contrary, in case of Mexico and Venezuela, a lack of wage spillover effect has been identified due to significant wage differences between foreign and domestic firms (Aitken, Harrison, and Lipsey, 1996). Especially in Mexico, rather than trade openness, FDI has a significant influence on inter-industry wage differences (Noria, 2015). Similarly, there was no overall wage spillover effect of FDI on wage levels in the UK, but a negative effect on wage growth (Girma, Greenaway, and Wakelin, 2001) and the presence of foreign investment had a negative effect on wages and productivity in domestic exporting firms in Ireland, as a result of the labor market crowding-out effect (Frank, Gorg, and Strobl, 2005). Interestingly, it has also been found that MNEs acquired the most productive plants previously operated by local enterprises in UK and had identified that productivity actually declined after acquisition. The positive correlation

between FDI and host country wages might be due to MNEs' acquisition of high-wage (productivity) firms, as FDI had no impact on host country wages. The wage spillover effect would be positive, if the foreign and domestic firms compete in the same labor market, because domestic firms had to pay higher wages to attract workers. However, negative productivity spillovers from multinationals led to negative wage spillovers (Harris and Robinson, 2002).

The literature on FDI inflows in India which provides varying results is not only minimal but still in its infancy. Among the existing literature, many studies had discussed about the pattern, trend, determinants and the overall impact of FDI on macro-economic indicators of India. From the existing studies, it has been identified that the optimum level of FDI, which generated substantial spillovers, enhanced learning on the job, and contributed to the growth of productivity that was much lower in India than in other developing countries including China (Balasubramanyam and Sapsford, 2007). Moreover, the magnitude of influence of FDI on imports is much higher than exports, it may lead to balance of payment (BOP) issue by causing current account deficit in the long-run (Kaur, Yadav, and Gautam, 2012). FDI stocks and output were mutually reinforcing in the manufacturing sector whereas, the relationship between FDI stocks and output was absent in the primary sector. Most strikingly, transitory effects of FDI on output in the service sector, which attracted the bulk of FDI in the post – reform era (Chakraborty and Nunnenkamp, 2008). Thus, the share of manufacturing activity in total FDI had considerably declined since 1997, whereas there had been substantial increase in the share of services in FDI. Another important issue which was put forth is that the initial flow of foreign resources could rapidly be counter-balanced by the foreign payments of various sectors in the form of returns, which were actually made because of MNC operations (Paramasivaiah and Kulkarni, 2004). Moreover, the effect of FDI appeared to have less effect on India's export performance compared to China (Mahalakshmi, Thiyagarajan, and Naresh, 2016; Sharma, 2003).

There is considerable controversy about the relative cost and benefits of foreign investments in developing countries, hence, what is true to one country may not be true to another country or economy. Though FDI helps to foster economic growth in certain nations, it cannot be generalized as a panacea for economic ills of all nations (Dunning, 2006). In this context, whether welcoming the foreign capital is good or bad is a debatable issue. In spite of contradictory arguments relating to the impact of FDI inflows on the host economies, there has been a growing interest and huge competition among

nations to strengthen the factors of attracting FDI as a part of globalization agenda during the past two decades. Therefore, an evaluation of the policy related to FDI inflows requires a comprehensive study on the effect of FDI inflows on the development of various sectors of the host economy.

METHODOLOGY

FDI is widely considered as a composite bundle of capital inflows even though it did not considerably accelerate the growth of India at the macro-level. In this context, analysing the role of FDI inflows on the performance of major industries where the strength of the economy lies has been felt essential and thereby this paper attempts to examine the influence of FDI inflows on the performance of selected Indian industries. By looking at the trend of FDI inflows received in various industries, the selection of industries has been made for the study. Industries which have received more than 0.5 percent of total FDI inflows received by India during the 20-year period since liberalization were considered. Based on this criterion, industries such as services (excluding telecom, transportation and hotel and tourism), computer hardware and software, real estate, telecommunications, construction activities, automobiles, power, metallurgy, petroleum products and natural gas, chemicals, trading, hotel and tourism, drugs and pharmaceuticals, electrical equipments, cement, industrial machinery, food processing, textiles, mechanical and engineering, electronics, fermentation and transportation have been selected for the study.

VARIABLES AND DATA SOURCE

Furthermore, data related to industry performance variables which are uncorrelated alone have been selected and the variables that explain similar dimension are not considered to avoid repetition of results. Thus, the uncorrelated variables namely gross output (GO) that reflects the efficiency of the industries production capacity, profit before interest and taxes (PBIT), exports (EXP), price-earnings ratio (PE), number of firms (NoF) and employment generation (EG) have been chosen to measure the extent of FDI inflows contribution towards the performance of selected industries.

The data relating to inflow of FDI for the above mentioned Indian industries have been collected from Department of Industrial Policy and Promotion under Ministry of Commerce, Government of India (DIPP) and the industry performance variables have

been collected from annual survey of industries published by the government of India and industry analysis services of CMIE for a period of 20years from 1991-92 to 2010-11.

DATA ANALYSIS

The effect of FDI inflows on the performance of various industries has been measured robustly by pooling the data of selected industries over a period of 20years. However, the pooled or panel data set which is a combination of time series and cross-section data has space as well as time dimension and thereby it gives more informative data, variability, degrees of freedom and efficiency (Gujarati and Sangeetha, 2007). Therefore, in order to better detect and measure the effect of FDI inflows on various spheres of the economy, panel data has been used instead of using time series data separately for each industry. The entry of FDI in all sector were not allowed at the same time period, whereas in case of certain industries, FDI was allowed at a latter period, so the study has used an unbalanced panel structure. But in order to apply panel data regression (i.e., either pooled regression or fixed effects model or random effects model), all the data in panel should be stationary, otherwise panel data regression models cannot be applied at their levels. Therefore, the study has applied different panel unit root tests namely, Levin, Lin and Chu (LLC), Breitung t-test (to check common unit root process) and Im, Pesaran and Shin, ADF-Fisher chi-square and PP-Fisher chi-square panel unit root tests (to verify individual unit root process of the panel data) to determine whether the selected industrylevel performance variables and FDI inflows are stationary at their levels. If the results of the panel unit root tests indicate that any of the variables in the panel form are non-stationary at levels, then it is mandatory to establish co-integration between the industry performance variables and FDI inflows. Thus the study has applied three panel co-integration tests namely, Pedroni Residual Co-integration, Kao Residual Co-integration test and Johanson Fisher panel cointergration tests to identify the presence of co-integration between FDI inflows and the performance variables of selected industries.

Pedroni Residual Co-integration test is one of the important tests that examine the existence of co-integration between the variables in the panel form. In case of Pedroni Residual Co-integration test seven different co-integration statistics have been estimated to establish co-integration between variables. These seven co-integration statistics have been calculated using the residuals of the following hypothesized cointegrating regression for each cross section.

$$y_{i,t} = a_i + \delta_i t + \beta_{1i} x_{1i,t} + \beta_{2i} x_{2i,t} + \ldots\ldots\ldots + \beta_{Mi} x_{Mi,t} + e_{i,t}$$

where, t- time period, i- individual cross sections and M – number of variables. Among the following seven statistics the first four are based on within-dimension and the remaining three are based on between-dimensions.

1. Panel v-statistics:$T^2 N^{3/2} Z_{\hat{v}N,T} \equiv T^2 N^{3/2} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2 \right)^{-1}$
2. Panel ρ - Statistics: $T\sqrt{N} Z_{\widehat{\rho N,T^{-1}}} \equiv$

   $T\sqrt{N} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2 \right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right)$
3. Panel t-statistics:$Z_{tN,T} \equiv$

   $\left(\tilde{\sigma}_{N,T}^2 \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^2 \right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right)$

   (Non-Parametric)
4. Panel t-statistics:$Z_{tN,T}^* \equiv \left(\tilde{s}_{N,T}^{*2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^{*2} \right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{L}_{11i}^{-2} \hat{e}_{i,t-1}^* \Delta \hat{e}_{i,t}^*$

   (Parametric)
5. Group ρ-Statistics: $TN^{-1/2} \tilde{Z}_{\widehat{\rho N,T^{-1}}} \equiv$

   $TN^{-1/2} \sum_{i=1}^{N} \left(\sum_{t=1}^{T} \hat{e}_{i,t-1}^2 \right)^{-1} \sum_{t=1}^{T} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right)$
6. Group t-statistics: $N^{-1/2} \tilde{Z}_{tN,T} \equiv N^{-1/2} \sum_{i=1}^{N} \left(\hat{\sigma}_i^2 \sum_{t=1}^{T} \hat{e}_{i,t-1}^2 \right)^{-1/2} \sum_{t=1}^{T} \left(\hat{e}_{i,t-1} \Delta \hat{e}_{i,t} - \hat{\lambda}_i \right)$

   (Non-Parametric)
7. Group t-statistics:$N^{-1/2} \tilde{Z}_{tN,T}^* \equiv N^{-1/2} \sum_{i=1}^{N} \left(\hat{s}_i^{*2} \sum_{t=1}^{T} \hat{e}_{i,t-1}^{*2} \right)^{-1} \sum_{t=1}^{T} \hat{e}_{i,t-1}^* \Delta \hat{e}_{i,t}^*$

   (Parametric)

Where, $\hat{\lambda}_i = \frac{1}{T}\sum_{s=1}^{k_i}\left(1-\frac{s}{k_i+1}\right)\sum_{t=s+1}^{T}\hat{\mu}_{i,t}\,\hat{\mu}_{i,t-s}$; $\hat{s}_i^2 \equiv \frac{1}{T}\sum_{t=1}^{T}\hat{\mu}_{i,t}^2$; $\widehat{\sigma}_i^2 = \hat{s}_i^2 +$

$2\hat{\lambda}_i$; $\tilde{\sigma}_{N,T}^2 \equiv \frac{1}{N}\sum_{i=1}^{N}\hat{L}_{11i}^{-2}\hat{\sigma}_i^2$; $\hat{s}_i^{*2} \equiv \frac{1}{t}\sum_{t=1}^{T}\hat{\mu}_{i,t}^{*2}$; $\tilde{s}_{N,T}^{*2} \equiv \frac{1}{N}\sum_{i=1}^{N}\hat{s}_i^{*2}$; $\widehat{L}_{11i}^{-2} = \frac{1}{T}\sum_{T}^{1}\hat{\eta}_{i,t}^2 +$

$\frac{2}{T}\sum_{s=1}^{k_i}\left(1-\frac{s}{k_i+1}\right)\sum_{t=s+1}^{T}\hat{\eta}_{i,t}\,\hat{\eta}_{i,t-s}$

The residuals $\hat{u}_{i,t}, \hat{\mu}_{i,t}^{*}\hat{\eta}_{i,t}$ are obtained from the following regressions:

$$\hat{e}_{i,t} = \hat{\gamma}_i\hat{e}_{i,t-1} + \hat{u}_{i,t};\;\; \hat{e}_{i,t} = \hat{\gamma}_i\hat{e}_{i,t-1} + \sum_{k=1}^{K_i}\hat{\rho}_{i,k}\,\Delta\hat{e}_{i,t-k} + \hat{\mu}_{i,t}^{*}\;;\;\; \Delta y_{i,t}$$
$$= \sum_{m=1}^{M}\hat{b}_{mi,t}\,\Delta x_{mi,t} + \hat{\eta}_{i,t}$$

The within-dimension statistics of the panel *υ*-Statistics is a type of non-parametric variance of statistics. The panel *ϱ*, non- parametric panel *t* and parametric panel *t* statistics are analogous to the Phillips-Perron (PP) *ϱ* statistic, PP *t* statistic and ADF *t* statistic, respectively. The between-dimension based statistics are just the group mean approach extensions of the within-dimension based statistics. The group *ϱ,* non-parametric group *t* and parametric group *t* are similar to (PP) *ϱ* statistic, PP *t* statistic and ADF *t* statistic, respectively.

The null hypothesis of no co-integration for the panel co-integration test is the same for each statistic.

$$H_0: \quad \gamma_i = 1 \text{ for all } i=1.....N,$$

whereas, the alternative hypothesis for the between-dimension-based and within-dimension-based panel co-integration tests differs. The alternative hypothesis for the between-dimension-based statistics is

$$H_a: \quad \gamma_i < 1 \text{ for all } i=1.....N,$$

But, a common value for $\gamma_i = \gamma$is not required. The alternative hypothesis for within-dimension-based statistics which assumes a common value for $\gamma_i = \gamma$is

$$H_a: \quad \gamma_i = \gamma < 1 \text{ for all } i=1.....N,$$

The test statistics are asymptotically standard normally distributed because the co-integration test applied appropriate mean and variance adjustment terms. The existence of co-integration between variables can be proved, if the test statistics are significant. Under the alternative hypothesis, all the panel co-integration test statistics diverge to negative infinity. Thus, the left tail of the standard normal distribution is used to reject the null hypothesis. (Pedroni, 1999; Pedroni, 2004)

Similarly, the existence of co-integration between the industry performance variable and FDI inflows in panel form has also been tested using Kao Residual Co-integration Test (ADF type). The Kao Residual Co-integration test has been calculated using the residuals of the following hypothesized cointegrating regression.

$$y_{it} = a_i + \beta_{1i} x_{1i,t} + \beta_{2i} x_{2i,t} + ...+ \beta_{Mi} x_{Mi,t} + e_{i,t}$$

where, t- time period, i- individual cross sections and M – no. of variables.

Subsequently, co-integration between variables has been tested by estimating the following augmented Dickey Fuller regression.

$$\hat{e}_{it} = \rho \hat{e}_{it-1} + \sum_{j=1}^{p} \varphi_{j,} \Delta \hat{e}_{it-1} + \upsilon_{itp}$$

H_0: $\varrho_i = 1$; *There is no co-integration between variables*

H_a: $\varrho_i < 1$; *There is co-integration between variables*

Under the null hypothesis of no co-integration, the ADF test statistics can be constructed as:

$$ADF = \frac{t_{\hat{\rho}} + \sqrt{6N}\hat{\sigma}_{\upsilon} / (2\hat{\sigma}_{0\upsilon})}{\sqrt{\hat{\sigma}_{0\upsilon}^2 / (2\hat{\sigma}_{\upsilon}^2) + 3\,\hat{\sigma}_{\upsilon}^2 / (10\hat{\sigma}_{0\upsilon}^2)}}$$

The asymptotic distributions of ADF converge to a standard normal distribution N(0,1). If the computed ADF test statistic of Kao Residual co-integration test is more than the critical value, then the null hypothesis of no co-integration between variables can be rejected (Kao, 1999).

Furthermore, the study has also applied the Johansen-Fisher Panel Co-integration test in order to confirm the existence of co-integration between industry performance variables and FDI inflows. The Johansen Fisher panel conintegration test is the panel version of individual Johansen co-integration test proposed by Maddala and Wu (1999) who consider Fisher's (1932) suggestion to combine individual tests. Thus, at the first step Johansen test for co-integration has been estimated to determine the presence of co-integrating vectors in non-stationary time-series using two different approaches such as the likelihood ratio trace statistics and the maximum eigenvalue statistics (Johansen, 1988). The trace statistics and the maximum eigenvalue statistics are calculated by estimating the following equations.

$$\lambda_{trace}(r) = -r \sum_{i=r+1}^{n} ln(1-\hat{\lambda}_i)$$

$$\lambda_{max}(r, r+1) = -Tln(1-\hat{\lambda}_{r+1})$$

where T = sample size, n = variables, *ln*-log, $\hat{\lambda}_i$ = *i*th largest canonical correlation between residuals from the three dimensional processes and residual from the three dimensional differentiate processes.

The trace test checks the null hypothesis of at most *r* co-integration vector against the alternative hypothesis of full rank *r* = *n* co-integration relationships. In case of the maximum eigenvalue statistics, the null hypothesis tests the *r* co-integrating relationships against the alternative hypothesis of *r + 1* co-integrating relationships.

At the second step, the Johansen individual cross-section tests for co-integration have been combined in order to test the existence of co-integration in the full panel (Maddala and Wu, 1999). If π_i is the *p*-value from an individual co-integration test for cross-section *i*, under the null hypothesis for the panel,

$$P = -2\sum_{i=1}^{N} log\,(\pi_i) \sim \chi^2_{2N}$$

The χ^2 value is based on *p*-values for Johansen's co-integration trace test and maximum eigenvalue test. The existence of co-integration between variables has been explained by the two hypotheses of Johansen-Fisher panel co-intergration that is, none of the variables are co-integrated and at most one variable is co-integrated. The null hypotheses of the Johansen – Fisher Panel co-integration test can be rejected if the calculated test statistics is more than the critical value. Therefore, if the null hypothesis of "none of the variables are co-integrated" has been rejected and "at most one variable is co-integrated" has been accepted, then there exists co-integration between the variables. On the contrary, if the null hypotheses of "none of the variables are co-integrated" has been accepted and "at most one variable is co-integrated" has been rejected, then there is no co-integration exists between the variables (Johansen, 1988).

RESULTS AND DISCUSSION

Ahead of analyzing the impact of FDI on the performance of various Indian industries, the presence of unit root has been checked in case of all the variables selected for the study both at their levels and first differences. The results of Levin, Lin, and Chu test and Breitung t-test which explain the presence of common unit root process clearly indicate that all the selected variables such as the FDI inflows, gross output, profit before interest and tax, exports, price-earning ratio, employment generation and number of firms are non-stationary at their levels as their values are not significant even at 10 percent level. Thus the null hypothesis of the presence of common unit process cannot be rejected at levels in case of all the above mentioned variables. The other three tests (i.e., Im, Pesaran and Shin, ADF-Fisher chi-square and PP-Fisher Chi square panel unit root tests) which explain the individual unit root process of the panel data also identified the presence of unit root in almost all the variables. The test statistics of IPS and ADF-Fisher tests are not significant even at 10 percent level, thereforethe null hypothesis that the presence of individual unit root process cannot be rejected. Similarly, the chi square value of PP-Fisher test is also not significant in case of most of the variables at their levels except number of firms in operation which is significant at 10 percent and 5 percent level respectively. Even though the chi square value of PP-Fisher test is significant in case of number of firms, it cannot be considered stationary at levels, because the test statistics of other panel unit root tests do not reject the null hypothesis of the presence of unit root in this case. Whereas, the results of all the panel unit root tests confirm that, all the variables are stationary at their first differences, because the null hypothesis of existence of unit

root has been rejected by all panel unit root tests. Thereby, it can be concluded that the, industry-level inflow of FDI and all the selected industry performance variables in panel form are non-stationary at levels and becomes stationary at their first differences (Table 1).

Table 1. Panel unit root tests (industry performance variables)

Variables	Levels / First Differences	Levin, Lin & Chu t statistics		Breitung t-statistics		Im, Pesaran and Shin W-statistics		ADF - Fisher Chi –square		PP - Fisher Chi-square	
FDI	Level	2.074		0.050		1.735		57.706		23.251	
	First Difference	-4.328	***	-1.427	*	-13.729	***	287.030	***	380.095	***
GO	Level	0.989		2.007		0.945		59.118		43.200	
	First Difference	-6.302	***	-7.650	***	-7.245	***	149.499	***	387.769	***
PBIT	Level	2.039		0.527		-0.995		43.149		66.658	
	First Difference	-6.517	***	-5.122	***	-7.579	***	153.107	***	379.119	***
EXP	Level	6.656		10.109		10.617		29.161		15.326	
	First Difference	-9.463	***	-3.117	***	-10.706	***	226.472	***	300.400	***
PE	Level	5.837		8.015		7.591		27.050		21.560	
	First Difference	-3.499	***	-2.708	***	-3.881	***	105.219	***	191.161	***
NoF	Level	-0.003		-0.226		0.160		47.307		75.886	**
	First Difference	-1.753	**	-4.325	***	-5.827	***	109.618	***	408.214	***
EG	Level	2.619		-0.307		2.072		53.713		13.840	
	First Difference	-8.213	***	-11.779	***	-8.072	***	158.593	***	163.618	***

***, **, * 1%, 5%, 10% level of significance respectively. Null: Unit root. LLC & Breitung t -Assumes common unit root. IPS, ADF-F & PP-F – Assumes individual unit root.

Verification of Co-integration

Since all the performance variables and FDI inflows of selected industries are non-stationary at levels, the study has applied three panel co-integration tests namely Pedroni Residual Co-integration test, Kao Residual Co-integration test and Johansen Fisher Panel Co-integration test to examine the presence of co-integration between variables. Panel non stationary variables may also face the problem of spurious regression, if there is no co-integration exists between the variables. So, if the variables are non-stationary, it is mandatory to establish co-integration between them, or else the relationship between the variables is considered as spurious or nonsensical. Thus, the effect of FDI inflows on the performance of selected industries have been examined by looking at the presence of co-integration between FDI inflows and the selected six industry performance variables (namely gross output, profit before interest and tax, exports, price-earning ratio, existence of number of firms and employment generation). Thus, all the above mentioned co-integration tests have been applied in case of each performance variable separately.

Initially, Pedroni Residual Co-integration test which is an important test that drives seven panel co-integration test statistics and Kao Residual Co-integration test have been applied to test the following null hypothesis.

H_0: There is no co-integration between the performance variables (GO, PBIT, EXP, PE, NoF, EG) and FDI inflows of selected industries.

The results of the seven statistics of Pedroni Residual Co-integration test indicate that, there is no presence of co-integration between FDI inflows and any of the industry performance variables of selected industries. The test statistics of panel-v, panel rho, panel PP and panel ADF which explain the dimensions within each panel and the test statistics of Group rho, Group PP and Group ADF that explain the dimension between panels among FDI and the industry performance variables are not significant even at 10 percent level in case of all the industry performance variables. Thus the null hypothesis of no co-integration between the industry performance variables and FDI inflows cannot be rejected (Table 2).

Table 2. Pedroni residual co-integration test between industry-level performance variables and FDI inflows

Pedroni Residual Co-integration Test														
Variables	Common AR coefficients (within-dimension)								Individual AR coefficients (between-dimension)					
	Panel v Statistic		Panel rho Statistic		Panel PP Statistic		Panel ADF Statistic		Group rho Statistic		Group PP Statistic		Group ADF Statistic	
	Test Statistic	P Value	Test Statistic	P Value	Test Statistic	P Value	Test Statistic	P Value	Test Statistic	P Value	Test Statistic	P Value	Test Statistic	P Value
Gross output and FDI inflows	-1.5090	0.1278	0.6131	0.3306	-0.3727	0.3722	-1.4345	0.1426	-0.3084	0.3804	-0.9734	0.2484	-0.5187	0.3487
PBIT and FDI inflows	-0.4459	0.3612	-0.5007	0.3519	-1.5787	0.1147	-1.6245	0.1066	-0.0094	0.3989	-0.0392	0.3986	-0.3781	0.3714
Exports and FDI inflows	-0.8043	0.2887	0.6695	0.3188	0.2966	0.3818	-1.2080	0.1923	1.6559	0.1013	1.2699	0.1781	-1.0887	0.2206
PE Ratio and FDI inflows	1.2933	0.1729	-0.6074	0.3317	-0.3386	0.3767	-0.2911	0.3824	-0.9165	0.2621	-1.0001	0.2420	-1.2294	0.1874
Number of firms and FDI inflows	-1.0339	0.2338	-0.6640	0.3200	-1.3964	0.1505	-0.5363	0.3455	-0.5426	0.3443	-1.4543	0.1386	-0.6352	0.3261
Employment Generation and FDI inflows	-0.3834	0.3707	-1.4402	0.1414	-0.5489	0.3431	-1.5342	0.1230	-0.8879	0.2690	-0.2525	0.3864	-0.9526	0.2534

Similarly, the results of Kao Residual Co-integration test show non existence of co-integration between industry performance variables and FDI inflows of selected industries. It is proved from the ADF test statistic of the Kao Residual Co-integration test which is not significant even at 10 percent level, thus the null hypothesis of no co-integration between the industry performance variables and FDI inflows of the industry panel cannot be rejected. Therefore, the Kao Residual Co-integration test does not show evidence to prove the existence of long run relationship between any of the industry performance variables and FDI inflows of selected industries (Table 3).

Table 3. Kao residual co-integration test between industry performance variables and FDI inflows

Variables	ADF	
	Test-Statistic	Probability value
Gross output and FDI inflows	1.2240	0.1105
PBIT and FDI inflows	1.2454	0.1065
Exports and FDI inflows	-0.2403	0.4051
PE ratio and FDI inflows	0.5449	0.2929
Number of firms and FDI inflows	-1.0727	0.1417
Employment generation and FDI inflows	-1.2724	0.1016

Subsequently, the study has also applied Johansen Fisher Panel Co-integration test to determine the presence of co-integration between each of the performance variables and FDI inflows of selected industries using two approaches such as the likelihood ratio trace statistics and maximum eigenvalue statistics. It is the panel version of individual Johansen co-integration test based on Fisher's suggestion to combine individual tests. Moreover, the presence of co-integrating relationship between the variables has been examined by testing the following two sets of hypotheses in case of each variable separately.

H_{01}: There is no cointegrating relationship between performance variables (GO,PBIT,EXP,PE,NoF,EG) and FDI inflows of selected industries.

H_{02}: There is at most one co-integrating relationship between performance variables (GO,PBIT,EXP,PE, NoF,EG) and FDI inflows of selected industries.

If the null hypotheses of "none of the variables are cointegrated" has been rejected and "at most one variable is cointegrated" has been accepted, then there exists co-integration between the variables.

Moreover, the Johansen Fisher panel co-integration test result (Table 4) is also similar to the above results of Pedroni Residual Co-integration Test and Kao Residual Co-integration test. In case of testing co-integration between the industry performance variables and FDI inflows, the null hypothesis that none of the variables are co-integrated cannot be rejected, because the test statistics of Fisher's trace test and maximum eigenvalue test are not significant even at 10 percent level. Whereas, the null hypothesis that at most one variable is co-integrated has been rejected, as the Fisher's trace and maximum eigenvalue test statistics is highly significant at 1 percent level. Therefore, even the Johansen Fisher Panel Co-integration test has not able to prove the existence of co-integration between the any of the industry performance variables and FDI inflows of panel industries (Table 4).

Table 4. Johansen Fisher Panel Co-integration test between industry-level performance variables and FDI inflows

Variables	Johansen Fisher Panel Co-integration test							
	Hypothesis of no co-integration relationship				Hypothesis of at most 1 co-integration relationship			
	Fisher Statistics (from trace test)	P- value	Fisher Statistics (from max-eigen test)	P- value	Fisher Statistics (from trace test)	P- value	Fisher Statistics (from max-eigen test)	P- value
Gross output and FDI inflows	55.63	0.1123	47.55	0.3302	88.40	0.000	88.40	0.000
PBIT and FDI inflows	49.83	0.2526	44.22	0.4622	70.41	0.0069	70.41	0.0069
Exports and FDI inflows	38.69	0.6981	32.61	0.8505	99.17	0.0000	99.17	0.000
PE Ratio and FDI inflows	46.36	0.3752	43.43	0.4959	103.1	0.0000	103.1	0.000
Number of firms and FDI inflows	41.6	0.5748	39.44	0.6671	109.7	0.0000	109.7	0.0000
Employment Generation and FDI inflows	33.97	0.6561	30.78	0.9343	164.40	0.0000	164.40	0.0000

The results of all the three co-integration tests clarified that, there is no presence of long run relationship or co-integration between the industry-level performance variables and FDI inflows. Hence it can be concluded that there is no enough evidence to prove that FDI inflows have created sufficient contribution towards the performance of selected industries jointly in a panel form.

Since there is no existence of co-integration between FDI inflows and most of the performance variables of selected industries in panel form, the individual co-integration tests (which have been used to calculate Johansen Fisher Panel Co-integration test) have been looked at to identify the existence of co-integration between FDI inflows and performance variables of selected industries individually.

The test results suggest that there is no co-integration between the selected industry performance variables and FDI inflows in case of most of the selected industries individually, which is evident from the test statistics of trace test and maximum eigen value test of the null hypotheses that there is no co-integration and at most one co-integration. The null hypothesis of no co-integration cannot be rejected in case of most of the industries. Furthermore, the null hypothesis of at most one co-integration has been rejected, as the test statistics is significant in case of most of the industries except few industries.

The presence of co-integration has been identified between FDI inflows and gross output, PBIT, price-earnings ratio in case of automobile, computer software and hardware, real estate, services and telecom industries (Table 5, Table 6, and Table 8). Similarly, there exists co-integration between FDI inflows and exports, number of firms in operation and employment generation only in case of computer software and hardware, services and telecom industries (Table 7, Table 9, and Table 10). Because only in these cases, the null hypothesis of no co-integration can be rejected and the null hypothesis of at most one co-integration cannot been rejected.

Table 5. Industry-level individual co-integration tests between gross output and FDI inflows

Cross Section	Hypothesis of no co-integrationrelationship				Hypothesis of at most 1 co-integration relationship			
	Trace test		Max-Eign test		Trace test		Max-Eign test	
	Statistics	p-value	Statistics	p-value	Statistics	p-value	Statistics	p-value
Automobiles	14.4918	0.0704	13.3900	0.0684	2.7689	0.0953	2.7689	0.0953
Cement	7.4926	0.5211	7.3571	0.4478	12.7613	0.0004	12.7613	0.0004
Chemical	11.6713	0.1734	11.6493	0.1245	8.1897	0.0042	8.1897	0.0042
Computer hardware &software	15.7490	0.0458	15.6128	0.0304	2.4406	0.1182	2.4406	0.1182
Construction	12.1923	0.1479	9.8988	0.2187	7.3053	0.0069	7.3053	0.0069
Drugs & pharma	12.3532	0.1408	8.3339	0.3458	6.6237	0.0101	6.6237	0.0101
Electrical equipments	9.0937	0.3568	9.0932	0.2785	11.8757	0.0006	11.8757	0.0006
Electronics	9.7366	0.3016	9.7303	0.2302	9.1191	0.0025	9.1191	0.0025
Fermentation	4.0138	0.9024	3.4108	0.9157	16.8348	0.0000	16.8348	0.0000
Food processing	12.0281	0.1556	11.9930	0.1109	7.4914	0.0062	7.4914	0.0062
Hotel and tourism	9.3162	0.3369	9.3150	0.2609	10.5193	0.0012	10.5193	0.0012
Industrial machinery	8.9878	0.3665	8.5915	0.3217	12.309	0.0005	12.3090	0.0005
Metallurgy	12.4050	0.1385	11.4566	0.1328	5.0715	0.0243	5.0715	0.0243
Misc mech. & eng.	6.2113	0.6705	5.8102	0.6377	13.9218	0.0002	13.9218	0.0002
Petroleum products & natural gas	11.3598	0.1903	7.7174	0.4082	8.9792	0.0027	8.9792	0.0027
Power	9.2977	0.3386	8.6933	0.3126	10.9554	0.0009	10.9554	0.0009
Real estate	14.6917	0.0658	13.0382	0.0774	2.3391	0.1262	2.3391	0.1262
Services	22.6369	0.0035	17.9507	0.0125	0.3963	0.5290	0.3963	0.5290
Telcom	18.1318	0.0196	12.1982	0.1034	1.1883	0.2757	1.1883	0.2757
Textiles	5.3743	0.7678	5.3077	0.7026	14.7846	0.0001	14.7846	0.0001
Trading	8.2973	0.4342	8.2801	0.3509	12.5992	0.0004	12.5992	0.0004
Transport services	4.3510	0.8733	4.3030	0.8261	15.8595	0.0001	15.8595	0.0001

Table 6. Industry-level individual co-integration tests between PBIT and FDI inflows

Cross Section	Hypothesis of no co-integration				Hypothesis of at most 1 co-integration relationship			
	Trace test		Max-Eign test		Trace test		Max-Eign test	
	Statistics	p-value	Statistics	p-value	Statistics	p-value	Statistics	p-value
Automobiles	14.1944	0.0778	14.0907	0.0532	2.9807	0.0843	2.9807	0.0843
Cement	5.9125	0.7059	3.4052	0.9162	11.7900	0.1673	11.7900	0.1673
Chemical	9.3403	0.3348	7.7619	0.4034	6.0473	0.0139	6.0473	0.0139
Computer hardware & software	24.1771	0.0019	18.1249	0.0117	1.4070	0.2356	1.4070	0.2356
Construction	11.3969	0.1882	11.2181	0.1436	5.1283	0.0235	5.1283	0.0235
Drugs & pharma	11.9661	0.1586	8.3597	0.3433	4.9119	0.0267	4.9119	0.0267
Electrical equipments	7.0073	0.5768	6.8303	0.5094	9.3450	0.0022	9.3450	0.0022
Electronics	8.1811	0.4462	7.2783	0.4567	7.7572	0.0054	7.7572	0.0054
Fermentation	3.8784	0.9131	2.4714	0.9756	15.0137	0.0590	15.0137	0.0590
Food processing	10.8803	0.2189	7.7463	0.4051	5.2146	0.0224	5.2146	0.0224
Hotel and tourism	7.9397	0.4719	7.0490	0.4834	7.8434	0.0051	7.8434	0.0051
Industrial machinery	6.7676	0.6048	6.5116	0.5485	9.6886	0.0019	9.6886	0.0019
Metallurgy	12.1391	0.1504	9.1584	0.2732	3.7511	0.0528	3.7511	0.0528
Misc. mech. &eng.	5.5094	0.7526	4.7204	0.7766	11.9966	0.0005	11.9966	0.0005
Petroleum products & natural gas	8.8092	0.3833	6.3084	0.5740	6.6965	0.0097	6.6965	0.0097
Power	7.8812	0.4782	7.5703	0.4241	8.5096	0.0035	8.5096	0.0035
Real estate	16.2293	0.0387	13.7429	0.0603	1.9621	0.1613	1.9621	0.1613
Services	30.2152	0.0002	24.8549	0.0008	0.0251	0.8742	0.0251	0.8742
Telcom	27.4110	0.0005	18.9014	0.0086	0.1788	0.6724	0.1788	0.6724
Textiles	4.6339	0.8464	4.5162	0.8012	12.3441	0.0004	12.3441	0.0004
Trading	6.0403	0.6908	6.0392	0.6082	10.9377	0.0009	10.9377	0.0009
Transport services	4.1379	0.8921	3.6797	0.8915	12.4734	0.0004	12.4734	0.0004

Table 7. Industry-level individual co-integration tests between exports and FDI inflows

Cross Section	Hypothesis of no co-integration				Hypothesis of at most 1 co-integration relationship			
	Trace test		Max-Eign test		Trace test		Max-Eign test	
	Statistics	p-value	Statistics	p-value	Statistics	p-value	Statistics	p-value
Automobiles	12.7812	0.1231	9.842	0.2225	2.9391	0.0865	2.9391	0.0865
Cement	5.7851	0.7207	4.2435	0.8328	10.9093	0.0010	10.9093	0.0010
Chemical	9.7898	0.2973	9.4000	0.2544	6.6838	0.0097	6.6838	0.0097
Computer hardware &software	17.4337	0.0252	17.2994	0.0161	1.3373	0.2475	1.3373	0.2475
Construction	10.5138	0.2433	9.1765	0.2718	5.6635	0.0173	5.6635	0.0173
Drugs & pharmacy	11.1159	0.2045	8.3716	0.3422	4.8100	0.0283	4.8100	0.0283
Electrical equipments	6.8606	0.5939	6.8439	0.5078	9.3853	0.0022	9.3853	0.0022
Electronics	8.1717	0.4472	7.6364	0.4169	7.5939	0.0059	7.5939	0.0059
Fermentation	2.8532	0.9731	2.7469	0.9621	13.7246	0.0002	13.7246	0.0002
Food processing	9.8572	0.2919	9.4581	0.2500	5.7132	0.0168	5.7132	0.0168
Hotel and tourism	7.8542	0.4811	6.3563	0.5679	8.1875	0.0042	8.1875	0.0042
Industrial machinery	6.5079	0.6355	4.4914	0.8042	9.4498	0.0021	9.4498	0.0021
Metallurgy	12.3562	0.1406	12.1446	0.1053	3.7102	0.0541	3.7102	0.0541
Misc mech. &eng.	5.0824	0.8000	3.7752	0.8823	11.8709	0.0006	11.8709	0.0006
Petroleum products & natural gas	9.1950	0.3477	8.4791	0.3321	6.7127	0.0096	6.7127	0.0096
Power	7.0542	0.5713	6.906	0.5003	8.9667	0.0028	8.9667	0.0028
Real estate	13.2712	0.1052	11.8852	0.1150	4.3672	0.0366	4.3672	0.0366
Services	22.0897	0.0044	15.4076	0.0328	0.7160	0.3975	0.7160	0.3975
Telcom	15.0345	0.0586	13.9629	0.0557	1.8231	0.1769	1.8231	0.1769
Textiles	5.0626	0.8021	3.9956	0.8598	12.5951	0.0004	12.5951	0.0004
Trading	6.3715	0.6516	5.4589	0.6831	10.1400	0.0014	10.1400	0.0014
Transport services	3.9148	0.9103	3.9138	0.8683	12.2418	0.0005	12.2418	0.0005

Table 8. Industry-level individual co-integration tests between PE ratio and FDI inflows

	Hypothesis of no co-integration				Hypothesis of at most 1 co-integration			
	Trace test		Max-Eign test		Trace test		Max-Eign test	
Cross Section	Statistics	p-value	Statistics	p-value	Statistics	p-value	Statistics	p-value
Automobiles	15.7049	0.0465	12.3267	0.0990	2.4454	0.1179	2.4454	0.1179
Cement	6.7699	0.6045	6.4962	0.5504	9.1919	0.0024	9.1919	0.0024
Chemical	9.9963	0.2810	7.0002	0.4891	3.6620	0.0557	3.6620	0.0557
Computer hardware &software	32.1018	0.0001	23.2879	0.0015	1.0494	0.3056	1.0494	0.3056
Construction	12.0879	0.1528	9.4752	0.2487	2.6858	0.1012	2.6858	0.1012
Drugs & pharma	13.3391	0.1029	10.7193	0.1688	5.9044	0.0151	5.9044	0.0151
Electrical equipments	7.6755	0.5007	5.9145	0.6242	7.7035	0.0055	7.7035	0.0055
Electronics	8.7138	0.3925	5.2928	0.7045	6.8032	0.0091	6.8032	0.0091
Fermentation	2.1935	0.9919	2.1782	0.9861	14.9218	0.0001	14.9218	0.0001
Food processing	10.9099	0.2171	9.2598	0.2652	5.0560	0.0245	5.0560	0.0245
Hotel and tourism	8.4989	0.4137	7.8771	0.3913	7.4290	0.0064	7.4290	0.0064
Industrial machinery	7.5785	0.5115	6.6015	0.5373	8.4662	0.0036	8.4662	0.0036
Metallurgy	13.8861	0.0861	8.5517	0.3254	4.9187	0.0266	4.9187	0.0266
Misc mech. &eng.	5.9822	0.6977	5.8802	0.6286	9.6330	0.0019	9.6330	0.0019
Petroleum Products & natural gas	9.0914	0.3570	7.6989	0.4101	6.3171	0.0120	6.3171	0.0120
Power	8.3812	0.4256	7.4770	0.4344	7.6380	0.0057	7.6380	0.0057
Real estate	17.9398	0.0210	14.6368	0.0437	2.0824	0.1490	2.0824	0.1490
Services	44.8509	0.0000	39.7599	0.0000	0.0153	0.9013	0.0153	0.9013
Telcom	27.1953	0.0006	16.6327	0.0207	1.8824	0.1701	1.8824	0.1701
Textiles	5.1762	0.7898	5.0246	0.7387	10.5626	0.0012	10.5626	0.0012
Trading	7.2100	0.5534	6.9349	0.4969	8.9726	0.0027	8.9726	0.0027
Transport services	5.1259	0.7953	4.1640	0.8417	13.8903	0.0002	13.8903	0.0002

Table 9. Industry-level individual co-integration tests between number of firms and FDI inflows in selected industries

Cross Section	Hypothesis of no co-integration				Hypothesis of at most 1 co-integration relationship			
	Trace test		Max-Eigen test		Trace test		Max-Eigen test	
	Statistics	p-value	Statistics	p-value	Statistics	p-value	Statistics	p-value
Automobiles	13.5202	0.0971	7.3834	0.4448	3.5908	0.0581	3.5908	0.0581
Cement	5.7695	0.7226	5.7103	0.6506	10.7525	0.0010	10.7525	0.0010
Chemical	11.7152	0.1711	9.9457	0.2155	4.9190	0.0266	4.9190	0.0266
Computer hardware &software	25.6945	0.0011	20.7754	0.0041	0.4360	0.5091	0.4360	0.5091
Construction	11.7924	0.1672	10.9087	0.1588	4.6263	0.0315	4.6263	0.0315
Drugs & pharma	10.0514	0.2768	8.9191	0.293	5.1069	0.0238	5.1069	0.0238
Electrical equipments	7.7473	0.4928	6.9887	0.4905	8.8015	0.0030	8.8015	0.0030
Electronics	9.1104	0.3553	9.1019	0.2778	12.2340	0.0005	12.2340	0.0005
Fermentation	3.8546	0.9149	3.8217	0.8777	16.7168	0.0000	16.7168	0.0000
Food processing	12.7270	0.1252	7.4416	0.4383	4.0525	0.0441	4.0525	0.0441
Hotel and tourism	8.5495	0.4087	8.1135	0.3673	7.5749	0.0059	7.5749	0.0059
Industrial machinery	7.2990	0.5431	5.8818	0.6284	9.8509	0.0017	9.8509	0.0017
Metallurgy	13.3739	0.1018	9.2696	0.2644	3.4038	0.0650	3.4038	0.0650
Misc mech. &eng.	5.0665	0.8017	4.6733	0.7824	12.1784	0.0005	12.1784	0.0005
Petroleum products & natural gas	10.3844	0.2523	10.3736	0.1885	5.7751	0.0162	5.7751	0.0162
Power	8.0689	0.4581	7.4976	0.4321	8.0182	0.0046	8.0182	0.0046
Real estate	13.4199	0.1003	11.9791	0.1114	2.9956	0.0835	2.9956	0.0835
Services	28.1601	0.0004	22.9112	0.0017	0.0325	0.8568	0.0325	0.8568
Telcom	20.5568	0.0079	17.5612	0.0145	0.9380	0.3328	0.9380	0.3328
Textiles	4.9155	0.8177	4.4411	0.8101	13.3491	0.0003	13.3491	0.0003
Trading	6.9632	0.5819	6.7967	0.5135	10.2534	0.0014	10.2534	0.0014
Transport services	4.4008	0.8686	4.3849	0.8166	14.2174	0.0002	14.2174	0.0002

Table 10. Industry-level individual co-integration tests between employment generation and FDI inflows

	Hypothesis of no co-integration				Hypothesis of at most 1 co-integration relationship			
	Trace test		Max-Eigen test		Trace test		Max-Eigen test	
Cross Section	Statistics	p-value	Statistics	p-value	Statistics	p-value	Statistics	p-value
Automobiles	12.9923	0.1151	12.1812	0.104	2.4263	0.1193	2.4263	0.1193
Cement	5.7170	0.7287	3.9334	0.8663	10.3939	0.0013	10.3939	0.0013
Chemical	7.7512	0.4924	7.4963	0.4322	7.7196	0.0495	7.7196	0.0495
Computer hardware &software	15.6986	0.0466	14.5519	0.045	1.2816	0.2576	1.2816	0.2576
Construction	11.8292	0.1653	9.1928	0.2705	3.2603	0.071	3.2603	0.071
Drugs & pharma	10.1877	0.2666	7.6425	0.4162	4.9394	0.0262	4.9394	0.0262
Electrical equipments	7.6657	0.5018	4.9276	0.751	8.2947	0.004	8.2947	0.004
Electronics	8.4666	0.4169	8.1727	0.3614	6.4399	0.0112	6.4399	0.0112
Fermentation	4.262	0.8813	4.2619	0.8307	13.7886	0.0002	13.7886	0.0002
Food processing	9.8622	0.2915	8.1117	0.3675	5.4985	0.019	5.4985	0.019
Hotel and tourism	7.913	0.4747	6.6314	0.5336	6.9677	0.0083	6.9677	0.0083
Industrial machinery	6.8867	0.5909	4.8077	0.7659	9.9167	0.0016	9.9167	0.0016
Metallurgy	9.4419	0.3261	9.3961	0.2547	5.8375	0.0157	5.8375	0.0157
Misc mech. &eng.	5.3465	0.771	5.3291	0.6999	11.26	0.0008	11.26	0.0008
Petroleum products &natural gas	11.4212	0.1869	8.1153	0.3671	4.1523	0.0416	4.1523	0.0416
Power	9.1264	0.3538	8.8032	0.3029	6.0927	0.0136	6.0927	0.0136
Real estate	11.6052	0.1769	11.1057	0.149	3.671	0.0554	3.671	0.0554
Services	16.9196	0.0303	10.5382	0.1789	0.8111	0.3678	0.8111	0.3678
Telcom	13.6038	0.0945	12.5705	0.091	2.6364	0.1044	2.6364	0.1044
Textiles	4.9171	0.8176	4.4233	0.8122	11.6729	0.0006	11.6729	0.0006
Trading	6.0806	0.686	4.3611	0.8194	10.1039	0.0015	10.1039	0.0015
Transport services	4.3096	0.877	3.5555	0.903	12.1886	0.0005	12.1886	0.0005

Therefore, the result of the individual co-integration test reveals that, there is long run relationship between industry performance indicators and FDI inflow only in case of services, telecom, computer software and hardware, real estate and automobile industries and in case of majority of other industries, there is no long run relationship between industry performance indicators and FDI inflow. Thus, there is no sufficient evidence to prove the considerable contribution of FDI inflows in improving the overall performance of Indian industries except very few industries.

To sum up, the widespread belief that FDI improves the performance of host economy's industries by way of increasing the overall output, income, exports and number of units of an industry which in turn generates huge employment opportunities has not been achieved in India. This is evident from the overall results of the panel co-integration tests between FDI inflows and selected performance variables of industries which have received sizable amount of FDI over a period of twenty years. FDI inflow does not have any co-integrating relationship with gross output, profit before interest and tax, exports, price-earning ratio, existence of number of firms and employment generation. This is mainly because only five among the selected industries namely services, computer hardware and software, telecom, real estate and automobile have showed the existence of co-integration between FDI inflows and gross output, profit before interest and tax and price-earnings ratio. Whereas, there is further reduction in the number of industries which show co-integration between FDI inflows and exports, existence of number of firms and employment generation to three industries namely services, computer hardware and software and telecom The main reason for this result is that, much of the inflow of FDI has been obtained only by very few industries such as services, telecom, computer hardware and software, automobile, real estate and construction, even though 100 percent FDI is allowed under automatic route in many other industries (Nagaraj,2003). This is because these industries provide huge returns within a short span of time when compared to other industries. Moreover, majority of the FDI inflows received by India are brownfield investments in the form mergers and acquisition rather than greenfield investments, thereby the establishment of new firms and sizable amount of employment generation has not been achieved by most of the Indian industries through the inflows of FDI.

CONCLUSIONS

In spite of liberal policy on attracting FDI inflows, India has not been able to bring substantial FDI inflows. Even though there is growth in absolute figures, percentage of GDP reamins meager. Whatever FDI inflows, India experienced is on account of its growth prospects and its rupee value. Even these inflows of FDI have not caused significant impact on the desired direction. Besides some selected industries alone enjoyed the benefits of FDI inflows because, much of the inflow of FDI concentrated around few industries. Moreover, a large amount of FDI inflows received by India are brownfield investments in the form of mergers and acquisition rather than greenfield investments, thus the establishment of new firms and sizable amount of employment generation has not been achieved. Furthermore, India has received maximum number of horizontal FDI which seeks market access when compared to vertical FDI which is export-oriented. This may be due to the fact that, the Indian government has not utilized all of its FDI absorptivecapacity and also failed to direct and spread FDI into almost all industries and export oriented units. So it is clear that FDI inflows are here to reap the benefits for foreign investors quickly rather than by carrying development impact in the desired direction.

Government needs to look at the outcome of its policies. Why does its policy have not produced desired results and fulfilled objectives set forth? It has to learn from its own experience and the experience of other developing countries. If the FDI inflows are not yielding desired results, what is the point in promoting and encouraging FDI through liberal policies? Thus, the government should take policy initiatives to attract potential greenfield investments. It should actively direct these investments to the required areas and should also promote FDI in export-oriented units. The policies should be designed in such way that FDI inflows can be utilised as means of enhancing domestic production, exports, technology diffusion and access to the external market. Furthermore, specific types of FDI which are capable of generating spillovers effects in the domestic industries have to be encouraged. More importantly its liberal policies should reflect its intensions and expectations. The study's limitations can be taken as opportunities for future researchers in this area. State-level spillover effects of FDI was not looked into due to non-availability of consistent data. Moreover, the firm-specific effect of FDI also was not examined. These could be seen as future scope and studied in the future. To conclude, the study has explicitly contributed to the existing literature on the impact of FDI on industrial performance using a panel co-integration approach, which was not studied

much in the Indian context. The finding not only contributes to the existing literature but also provides an insight to the policy makers on how the potential benefits of FDI can be maximized by strengthening the host-industry's absorptive capacity.

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