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Sectoral Decomposition of FDI Impact on Market Indices in the Pre and Post-Crisis Period

P.K. Gupta* and Sankersan Sarkar**

Abstract

Foreign Domestic Investment has a positive impact on the economic performance of developing economies. Numerous researches have been conducted on the relationship between FDI and GDP. Globalisation has resulted in volatility in financial markets, particularly stock markets and indirect contribution to GDP growth rate simultaneously creating concerns for the government policy makers and regulators especially in a country like India. FII portfolio investments create a significant impact on the stock markets of a country like India evidenced from various researches. However, little research has been conducted to examine the relationship between the FDI investment through equity route in a given sector and the market indices of that sector. We select a sample of six sectors and examine the association between FDI investments through equity route and the respective NSE sectoral index for the period 2004-2015. We find that contrary to the general notions that FDI investments have a positive impact on the indices (sectoral), we find no co-integrating or causal relationship.

Keywords: foreign direct investment (FDI), gross domestic product (GDP), sectoral index, foreign institutional investors (FII)

* Professor, Centre for Management Studies, JMI University, New Delhi, India: pkgfms@gmail.com
** Associate Professor, TAPMI School of Business, Manipal University, Jaipur, Rajasthan, India: sankersansarkar@gmail.com

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1. INTRODUCTION

Foreign Direct Investment (FDI) is the process by which investors belonging to one country invest capital to acquire ownership and control of an enterprise in another country for the purpose of doing business and earning profits. So on the one hand it brings in foreign financing and on the other it results in the creation of productive enterprises in the host country. Typically the capital flows in an FDI come in the form of equity investments made by foreign investors for owning and controlling business enterprises in the host country. Owing to such nature of financing involved in FDIs they result in creation of new enterprises in the host country, which are less dependent on debt financing and hence less exposed to financial risks. Moreover because of the equity investment involved the foreign FDI investor generally has a long-term investment horizon in such investments – hence such investments by the foreign investors are generally stable in nature.

Apart from financing and establishment of new enterprises in the host country FDI also brings in new technology, technical know-how, new skills and knowledge, resulting both in new capital formation and in improvement of human capital by transfer of skills and knowledge in the host country. Blomstrom *et al.* (1994, 1996) lay emphasis on the augmentation of human capital that results from FDI. Moreover as demonstrated by Borensztein, Gregorio & Lee (1998) FDI impacts long run growth through technological diffusion. Chakraborty & Basu (2002) explain that FDI related spillover of knowledge promotes growth and growth in turn attracts more FDI. Rodan (1961), Chenery & Strout (1966) have explained that inflows of foreign capital have a favourable effect on the economic efficiency and growth in the developing countries through a favourable short-term effect on economic growth as it expands economic activity.

According to Feenstra & Markusen (1994) FDI can result in higher growth by bringing in new inputs and techniques. This generally happens because in order to carry out their operations effectively MNCs bring with them high levels of technology, as they recognize technology to be among the important factors that can strengthen their international competitiveness. In a recent study of the U.S. economy Kashibhatla & Sawhney (1996) have found evidence of a unidirectional causality from GDP to FDI; evidence of the reverse causation has not been found. This might be due to the fact that GDP acts as an indicator of the market size for a developed economy and FDI tends to follow GDP.

It is generally understood that FDI leads to economic growth and a two-way relationship is often suggested. As explained by various researchers, inflow of FDI is an important factor for accelerating economic growth (Jackson & Markowski, 1995; Aitken & Harrison, 1999; Cheng & Yum, 2000; and, Coughlin & Segev, 2000). Further, it is also explained by other researchers that a steady economic growth is also an essential factor for attracting inflows of FDI into an economy (Goldberg, 1972; Lunn, 1980; Schneider & Frey, 1985; Grubaugh, 1987; Lucas, 1993; Aziz, 1999; Zhang, 2001; and Globerman & Shapiro, 2003). While the former view implies economic growth resulting from FDI the latter

implies FDI inflows resulting from economic growth.

This suggests a two-way causality between FDI inflows and economic growth. Evidence of such bidirectional causality has also been found by Choe (2003) who has studied the relationships between economic growth and FDI using the Granger causality test in 80 countries during the period 1971 to 1995. It was found that FDI causes economic growth as well as economic growth also cause FDI. However, the evidence provided greater support for the effect of growth on FDI than the effect of FDI on growth.

Blomstrom *et al.* (1994), Ghosh Roy & Van der Berg (2006), and Xu & Wang (2007) found that FDIs positively influence economic growth in host countries. Borensztein, De Gregorio, & Lee (1998), have found evidence in developing countries over a period of two decades which shows that FDI is a medium for transfer of technology from the industrialized countries to the developing ones, leading to comparatively higher economic growth than domestic investments. This is subject to the condition that the host country has a threshold level of human capital. Further FDI results in an increase in the total investment in the host country, which indicates complementary effects with the domestic firms. The positive impact of FDI on growth has been found in studies in different contexts by several researchers (Sharma & Abekah, 2008; Khaliq & Noy, 2007). However at the same time it has also been found that domestic investment is also important in this matter.

The trickling down of benefits such as the spillover of technology from MNCs to the local firms is another aspect of FDI that has been an important matter of study. According to Blomstrom & Kokko (2003) such benefits can only be realized if local firms attain a minimum threshold level for absorbing the spillover and effective intervention of state policy happens to streamline the spillover from MNCs to the domestic firms. Further, the existence of quality infrastructure, scientific knowledge, human capital, research and development, etc., is critical in the trickle down of benefits from MNCs to local firms (Porter, 1986; and Dunning & Lundan, 2008). Hence in this regard the factor endowment of the country is a pre-requisite for the trickle down to happen. Further according to World Investment Report (UNCTAD, 1997), the entry of foreign investment may lead to crowding out of local investment without adequate factor endowment and effective intervention by the regulatory authority.

Romer (1993) explains that in transfer of technology, foreign investment can facilitate the transfer of technological and business philosophy to poorer countries. Such transfers in turn may have significant spillover effects for the entire economy. Various studies have found positive effects of FDI on economic growth in the long run, which arise out of accumulation of capital and technological or knowledge transfers, especially under open trade conditions (e.g., Basu *et al.*, 2003). According to Dash & Sharma (2011) virtually all countries have provide facilities for the expansion of foreign investment through changes in their regulatory environments. According to them the economic rationale for offering special incentives for attracting FDI generally arises out of the belief that foreign investment produces externalities in the form of technology transfers and spillovers.

According to a study by Sahoo & Mathiyazhagan (2003) during the period 1979 to 2001 in the Indian context, there is a existence of a long run relationship between Gross Domestic Product (GDP), FDI, and exports. Chakraborty & Basu (2002) have studied aggregate data on Indian economy from 1974 to 1996 and have found a one-way causality that runs from GDP to FDI. FDI is positively related to GDP and openness to trade in the long-run. Chen, Chang & Zhang (1995) have carried out a study of the Chinese economy using time series data during the period 1979 to 1993, and have found that there is a significant positive relationship between FDI and GNP.

According to World Investment Report 2002 by UNCTAD (2003) trade policy reform by countries generally involves extensive investment by the governments for attracting FDI, this partly happens because of a supposed linkage between FDI and the improvement in export competitiveness of the host country. Various country-specific studies have recognized the significance of the export enhancing role of FDI in the host countries (Blake & Pain, 1994 in UK; Cabral, 1995 in Portugal, Pain & Wakelin, 1998 in Europe; Barry & Bradley, 1997 in Ireland; Sun, 2001 and Zhang, 2005 in China; Oliveira, 2001 in Brazil) and World Investment Report 1999 by UNCTAD (2000).

Aitken, *et al.* (1997) have shown the external effect of FDI on export, with the example of Bangladesh, where the entry of a single Korean multinational in garment exports resulted in the establishment of a number of domestic export firms; this in turn created the country's largest export industry. Hu & Khan (1997) have studied the Chinese economy during the period 1952 to 1994 and have explained that the spectacular growth rate of the Chinese economy has been mainly due to the productivity gains resulting from market oriented reforms, such as the expansion of the non-state sector and the "open-door" policy of China, which has led to a remarkable expansion in foreign trade and FDI.

2. NEGATIVE EFFECTS OF FDI

According to Bornschier (1980), however, in the long run the growth rate reduces due to "decapitalization". This happens in the long run because the foreign investors repatriate their investment by contracting the economic activities. Further as explained by several experts the growth effect of FDI is dependent upon the sectors that receive the same and that the sectoral flows reinforce the positive effects compared to the negative ones (Wei, 1996; Dutt, 1997; and Kathuria, 1998).

According to Nanda (2009) the evidence of impact of FDI on the economic growth of the developing countries as well as their experience in attracting FDI inflows is not conclusive at all; moreover there have not been enough studies for drawing any conclusions on growth effects of FDI. Nanda further explains that it would be naive to expect homogeneous growth effects even in similar situations. According to the author a comparison across Brazil, China and India, suggests that although Brazil attracted greater amounts of FDI than India, it had remained stagnant while India has performed better in terms of economic growth; on the other hand China has been able to attract FDI inflows as well as maintain a high economic growth.

According to some researchers the empirical evidence available on the impact of FDIs in terms of economic growth is mixed (Nunnenkamp 2002; Fontainer 2007). The findings of Agosin &

Mayer (2000) indicate that the effects of FDI on overall capital formation differed considerably across regions and host economies. While FDI induced additional local investment in Asian economies, it was found in Latin America that FDI resulted in the crowding-out of local investment. According to Kumar & Pradhan (2005) the crowding-out effect of FDI in Latin America may have happened because FDI in that region was largely in the form of M&As. Mencinger (2003) attempts to explain that the negative relationship between growth and FDI found in the Central European host countries has been possibly due to the predominance of M&As in those regions.

Alfaro & Charlton (2007) have studied various indicators of quality of FDI based on industry and sector characteristics and have shown that the growth effect of FDI is significantly dependant on the quality of FDI. In an earlier study Alfaro *et al* (2003) have found that the empirical evidence of the contribution of FDI alone to economic growth is not clear.

Moreover the existence of a positive relationship between the FDI and economic growth, that varies across various regions and over time, depends critically on the absorptive capacity of the host country (Borzenstein et al. 1998; Edison et al. 2002; Alfaro *et al*. 2003; Durham 2004). Such absorptive capacity arise out of the presence of certain conditions such as: the initial level of development (Blomstrom et al. 1992), trade policy (Balasubramanyam et al. 1996), the existing level of human capital development (Borensztein et al. 1998), government policy (Edison et al. 2002), extent of financial development (Alfaro et al. 2003; Durham 2003), and the legal system (Durham 2004; Edison et al. 2002).

Some of the researchers have also explained that the quality of FDI is of greater importance than the quantity. According to Enderwick (2005) FDI is considered to be of higher quality if it is export-oriented, leads to transfer of foreign technologies to the host country and results in economic spillover that benefits local enterprises. Pradhan (2002) has estimated a Cobb-Douglas production function using aggregate data during the period 1969–97, and has found that FDI has no significant impact on growth.

Kumar & Pradhan (2002) have found that the relationship between FDI and growth is Granger neutral for India because the direction of causation is not clear. Similar findings have been reported by Bhat et al. (2004) by applying Granger causality test. Agrawal (2005) has analysed panel data for five South Asian countries including India, during the period 1965 to 1996 and have reported that the growth impact of FDI is negligible. It has also been explained that FDI may have adverse effect on growth if it crowds out domestic saving (McCombie & Thirlwall, 1994; Fry, 1995).

3. EVIDENCES FROM INDIA

Dua & Rashid (1998) do not find support for the unidirectional causality from FDI to economic growth; the Index of Industrial Production (IIP) is taken as a proxy for GDP. Alam (2000) has carried out a comparative study of the relationship between FDI and economic growth for India and Bangladesh, and has found that though the impact of FDI on economic growth is more in case of India, it is not satisfactory. Sharma (2000) has attempted to evaluate the role of FDI in the export performance of India. The study has not found a statistically significant role of FDI in export promotion in the Indian context.

Chakraborty & Basu (2002) have attempted to study the short run dynamics of FDI and growth in the Indian economy. Their study shows that in India GDP is not Granger caused by FDI. The causation tends to run from GDP to FDI; moreover the trade liberalization policy of the Indian government appears to have some positive impact on the FDI flow in the short run. According to Sahoo & Mathiyazhagan (2003) the common consensus of the studies in the Indian context is that FDI is not growth stimulant rather it is growth resultant.

We argue that most of the developing economies are passing through phases of economic reforms, which aim to attract FDI for the purpose of achieving economic growth. However, so far the evidence of the impact of FDI on economic growth is not clear enough to be conclusive. FII portfolio investments create a significant impact on the stock markets of a country like India evidenced from various researches. We are therefore motivated to examine the relationship between the FDI investment through equity route in a give sector and the indices of that sector.

4. METHODOLOGY

We have selected six industrial sectors represented by NSE indices namely (a) Auto, (b) IT, (c) Realty, (d) Pharma (e) Energy and (f) Services. These sectors majorly represent a significant market capitalisation and suitable to the research construct. We assume a period of 2004-2015 covering the *pre* and *post* crisis period. We examine the two way casualty between FDI and sectoral indices by pooling the data into 72 data points using the popular causality test as proposed by Granger (1969). To examine the relationship between the sectoral indices and respective sectoral FDI we use the cross-section random effects with index as the dependent variable and FDI as the explanatory variable and their reversals. Also, we have conducted two-way random effects with FDI as the dependent variable and index as the independent variable.

In order to estimate long run coefficients of the co integration relationship we have used FMOLS is a between-dimension approach proposed by Pedroni (2001) compared to the conventional OLS estimator, which is a biased and inconsistent estimator when applied to co integrated variables. It can handle the likely endogeneity of the regressors and serial correlation and also the form in which the data are pooled allows for greater flexibility in the presence of heterogeneous co integrating vectors. FMOLS can be derived from the following equation -

$$y_{it} = a_i + x_{it}\beta + u_{it}, i = 1, \dots\dots, N; t = 1, \dots\dots, T$$

$$x_{it} = x_{it-1} + \varepsilon_{it}$$

Where y is the dependent variable (FDI/ INDEX) and x is the regressor and the vector of error $\xi_{it} = (\mu_{it}, \varepsilon_{it})'$ process is stationary with asymptotic covariance matrix Ω_i , which can be decomposed as $\Omega_i = \Omega_i^0 + \Gamma_i + \Gamma_i$.

Here, Ω_i^0 is the contemporaneous covariance and is a weighted sum of autocovariances. Thus, the variables $y_i x_i$ are said to be cointegrated for each member of the panel, with cointegrating vector β if y_i is integrated of order one. The term allows the cointegrating relationship to include member specified effects. If y_i and x_i are cointegrated, the between-dimension panel FMOLS estimator can be expressed as:

$$\hat{\beta}_{FMOLS,i} = \left[\sum_{t=1}^{T} x_{it}^{*} x_{it}^{*\prime}\right]^{-1} \left[\sum_{t=1}^{T} x_{it}^{*} y_{it}^{*} - T\hat{\gamma}_i\right]$$

where $y_{it}^{*} = (y_{it} - \bar{y}_i); x_{it}^{*} = (x_{it} - \bar{x}_i)$

$$\bar{y}_{it} = N^{-1}\sum_{t=1}^{T} y_{it}; \bar{x}_{it} = N^{-1}\sum_{t=1}^{T} x_{it};$$

$$\hat{y}_{it}^{*} = y_{ij}^{*} - \hat{\Omega}_{iu\varepsilon}\hat{\Omega}_{\varepsilon}^{-1}\hat{\Omega}_{i\varepsilon u}; \hat{\gamma}_i = \hat{\Gamma}_{iu}\hat{\Omega}_{\varepsilon}^{-1}\hat{\Gamma}_{iu\varepsilon}$$

Dynamic OLS Estimator equation of co-integrated system for a panel of i=1, . . . , N members is -

$$y_{it} = \alpha_i + \beta x_{it} + \mu_{it}$$
$$x_{ii} = x_{ii} + \beta x_{it} + \mu_{it}$$

where the vector error process $\xi_{it} = (\mu_{it}, \varepsilon_{it})'$ is stationary with asymptotic covariance matrix Ω_i

Thus, the variables x_i, y_i are said to co integrate for each member of the panel with co integrating vector β if y_i is integrated of order α_i allows the co integrating relationship to include member specific fixed effects.

The long-term relationship between FDI and sectoral indices in the panel data has been analysed using Pedroni residual co-integration Test. Karaman (2004) explains Pedroni residual co-integration Test as follows. The starting point of the residual-based panel co integration test statistics of Pedroni (2001) is the computation of the residuals of the hypothesised co-integrating regression.

$$y_{i,t} = \alpha_i + \beta_{1i} x_{1i,t} + \ldots + \beta_M x_{M,t} + e_{i,t}$$
$$t = 1,\ldots.T; i = 1,\ldots, N; m = 1,\ldots., M$$

where T is the number of observations over time, N denotes the number of individual members in the panel, and M is the number of dependent variables. It is assumed here that the slope of co-efficients $\beta_{1i},\ldots.\beta_M^j$ and the member specific intercept can vary across each section.

5. RESULTS

Our findings do not have prior evidence from earlier research on FDI. Earlier researches on FDI have been carried out in relation to other economic variables such as GDP or exports or industrial production or other economic variables. Therefore, a direct comparison of our findings cannot be made with the findings of the prior studies. However as an evidence of the impact of FDI on various economic variables we refer to their findings in this paper.

Chakraborty & Basu (2002) find that at a parsimonious lag length (change in GDP with a lag of one period) GDP Granger causes FDI. Kamath (2008) has analysed the impact of FDI on economic growth in the Indian context, using GDP as an indicator of economic growth and find evidence of a positive and statistically significant impact of FDI on GDP, with high coefficient of determination.

Further evidence on causality between FDI and GDP in the Indian economy has been found in Pradhan (2010). Pradhan(2010) has applied Granger causality test to find out whether causality runs from FDI to GDP or from GDP to FDI, in the Indian economy. The evidences found by the authors show that there is unidirectional causality between FDI and GDP and the direction of causality is from FDI to GDP; in other words FDI Granger causes GDP. So literature reveals causal relationships between FDI and other economic variables such as FDI.

Therefore, there is no prior evidence of any granger causality existing between sectoral indices and FDI. If the sectoral indices can be supposed to reflect the changes in GDP then this opens up the scope of further investigation on this matter. We attempt to link the Sectoral indices

with the FDI in that sector. Results indicate that the FDI through equity route does not have any significant effect on the sectoral indices in the post-crisis period. The results of pair-wise granger causality test shows that no significant causality exists between Sectoral indices and FDI in both directions (Table 1 for pooled data and Table 2 for panel data). The recent volatility as observed by various authors is on account of portfolio investments by Foreign Institutional Investors (Calvo and Mendoza, 2000, Jain, 2012). We find no significant relationship on OLS (Table 3 and 4).

Table 1: Pairwise Granger Causality Tests - Pooled Data

Null Hypothesis:	Obs	F-Statistic	Prob.
INDEX does not Granger Cause FDI	56	2.27495	0.1255
FDI does not Granger Cause INDEX		0.14316	0.8674
Sample: 1 70, Lags: 2			

Table 2: Pairwise Granger Causality Tests – Sectoral Panel data

Null Hypothesis:	Obs	F-Statistic	Prob.
FDI does not Granger Cause INDEX	36	0.47305	0.6334
INDEX does not Granger Cause FDI		0.43399	0.6570
Sample: 2004 2015, Lags: 2			

Table 3: Panel Least Squares Regression (Dependent Variable: INDEX)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4652.894	497.5089	9.352385	0.0000
FDI	-0.019359	0.181993	-0.106374	0.9162
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.800962	Mean dependent var		4607.066
Adjusted R-squared	0.749040	S.D. dependent var		2720.376
S.E. of regression	1362.798	Akaike info criterion		17.47343
Sum squared resid	42716044	Schwarz criterion		17.80038
Log likelihood	-255.1015	Hannan-Quinn criter.		17.57802
F-statistic	15.42601	Durbin-Watson stat		1.892717
Prob(F-statistic)	0.000000			
Sample: 2004 2015, Periods included: 12, Cross-sections included: 6, Total panel (balanced) observations: 70				

Table 4: Panel Least Squares Regression (Dependent Variable: FDI)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2484.265	1136.407	2.186069	0.0392
INDEX	-0.025400	0.238783	-0.106374	0.9162
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.515646	Mean dependent var		2367.243
Adjusted R-squared	0.389293	S.D. dependent var		1997.511
S.E. of regression	1561.010	Akaike info criterion		17.74502
Sum squared resid	56045310	Schwarz criterion		18.07196
Log likelihood	-259.1753	Hannan-Quinn criter.		17.84961
F-statistic	4.080986	Durbin-Watson stat		2.137364
Prob(F-statistic)	0.006238			
Sample: 2004 2015, Periods included: 12, Cross-sections included: 6, Total panel (balanced) observations: 72				

We have estimated the regression relationship between index and FDI using panel EGLS- cross-sectional random effects and panel EGLS- two way random effects using Swamy and Arora estimator of component variances. The results of both panel regressions indicate that coefficient for FDI is insignificant (Table 5 and 6). Our results differ from Sahoo and Mathiyazhagan (2003) who find that in their OLS estimation that FDI has a significant impact both on GDP and index of industrial production. Also, the panel regression with random effects (Table 7) show no relationship. It is derived that there may be a relationship of FDI with GDP and index of industrial production, but not with any Sectoral indices.

Table 5: Panel EGLS (Cross-section random effects, Dependent Variable: FDI)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2649.553	1094.347	2.421126	0.0222
INDEX	-0.061277	0.184073	-0.332898	0.7417
Effects Specification				
			S.D.	Rho
Cross-section random			1543.774	0.4944
Idiosyncratic random			1561.010	0.5056
Weighted Statistics				
R-squared	0.004079	Mean dependent var		975.3896
Adjusted R-squared	-0.031489	S.D. dependent var		1510.857
S.E. of regression	1534.460	Sum squared resid		65927898
F-statistic	0.114689	Durbin-Watson stat		1.898572
Prob(F-statistic)	0.737394			
Unweighted Statistics				
R-squared	0.014906	Mean dependent var		2367.243
Sum squared resid	1.14E+08	Durbin-Watson stat		1.266280
Sample: 2004 2015, Periods included: 12, Cross-sections included: 6, Total panel (balanced) observations: 72, Swamy and Arora estimator of component variances				

Table 6: Panel EGLS (Cross-section random effects, Dependent Variable: INDEX)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4686.198	1247.385	3.756819	0.0008
FDI	-0.033428	0.177797	-0.188011	0.8522
Effects Specification				
			S.D.	Rho
Cross-section random			2810.957	0.8097
Idiosyncratic random			1362.798	0.1903
Weighted Statistics				
R-squared	0.001301	Mean dependent var		976.2062
Adjusted R-squared	-0.034367	S.D. dependent var		1319.013
S.E. of regression	1341.487	Sum squared resid		50388423
F-statistic	0.036480	Durbin-Watson stat		1.514364
Prob(F-statistic)	0.849905			
Unweighted Statistics				
R-squared	0.005830	Mean dependent var		4607.066
Sum squared resid	2.13E+08	Durbin-Watson stat		0.527205

Sample: 2004 2015, Periods included: 12, Cross-sections included: 6, Total panel (balanced) observations: 72, Swamy and Arora estimator of component variances

Table 7: Method: Panel EGLS (Two-way random effects, Dependent Variable: FDI)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2650.328	1073.641	2.468542	0.0199
INDEX	-0.061446	0.180759	-0.339933	0.7364
Effects Specification				
			S.D.	Rho
Cross-section random			1542.524	0.4921
Period random			0.000000	0.0000
Idiosyncratic random			1567.179	0.5079
Weighted Statistics				
R-squared	0.004110	Mean dependent var		979.2443
Adjusted R-squared	-0.031458	S.D. dependent var		1511.771
S.E. of regression	1535.366	Sum squared resid		66005726
F-statistic	0.115554	Durbin-Watson stat		1.896776
Prob(F-statistic)	0.736444			
Unweighted Statistics				
R-squared	0.014928	Mean dependent var		2367.243
Sum squared resid	1.14E+08	Durbin-Watson stat		1.266158

Sample: 2004 2015, Periods included: 10, Cross-sections included: 6, Total panel (balanced) observations: 60, Swamy and Arora estimator of component variances

We have created a series of unstructured data by pooling the data points of FDI and indices for all the sampled sectors. Our results of Panel Fully Modified Least Squares (FMOLS) by reversing FDI and index as dependent and independent variables further show insignificant regression coefficients. This implies that neither FDI nor index of a given sector significantly affect each other (Table 5 and 6). Therefore the future investments via FDI through equity route are not likely to directly affect the movements in the respective Sectoral indices. However there may be existence of multi-colinearity in the regression relationships.

We find no co integration between index and FDI for the pooled data set of 60 observations (Table 10). This implies that there is no relationship between the Sectoral indices and FDI during the post-crisis period. Chakraborty & Basu (2002) find in their co integration tests that there is a long-run positive relationship between FDI and GDP. Further they find that in the short-run, FDI in India adjusts to equilibrium through changes in GDP only. They also find that in the short run other variables like unit labour cost and import duty in total tax revenue do not have significant impact in the adjustment process. Moreover they find that the liberalization measures introduced in the mid-1980s did have some positive effect on the FDI inflows in the Indian economy. However, they have assumed that the degree of trade liberalization is weakly exogenous to the co integrating relationship between FDI and GDP.

Table 8: Panel Fully Modified Least Squares (Dependent Variable: FDI)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INDEX	0.506232	0.558104	0.907057	0.3771
R-squared	0.447307	Mean dependent var		2319.350
Adjusted R-squared	0.252238	S.D. dependent var		1954.572
S.E. of regression	1690.181	Sum squared resid		48564096
Durbin-Watson stat	3.120727	Long-run variance		1513066

Sample (adjusted): 2005 2015, Periods included: 10 Cross-sections included: 6, Total panel (balanced) observations: 60, Panel method: Pooled estimation, Cointegrating equation deterministics: C, Coefficient covariance computed using default method, Long-run covariance estimates (Bartlett kernel, Newey-West fixed bandwidth)

Table 9: Panel Fully Modified Least Squares (Dependent Variable: INDEX)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI	0.010520	0.153524	0.068524	0.9462
R-squared	0.958059	Mean dependent var		5090.013
Adjusted R-squared	0.943256	S.D. dependent var		2662.718
S.E. of regression	634.2873	Sum squared resid		6839446.
Durbin-Watson stat	1.828438	Long-run variance		801408.9

Sample (adjusted): 2005 2015, Periods included: 10, Cross-sections included: 6, Total panel (balanced) observations: 60, Panel method: Pooled estimation, Cointegrating equation deterministics: C, Coefficient covariance computed using default method, Long-run covariance estimates (Bartlett kernel, Newey-West fixed bandwidth)

Table 10: Pedroni Residual Cointegration Test (INDEX FDI)

	Statistic	Prob.	Statistic	Prob.
Panel v-Statistic	-0.233931	0.5925	-0.379069	0.6477
Panel rho-Statistic	0.385080	0.6499	0.354519	0.6385
Panel PP-Statistic	-2.017402	0.0218	-2.221596	0.0132
Panel ADF-Statistic	NA	NA	NA	NA
Alternative hypothesis: individual AR coefs. (between-dimension)				
	Statistic	Prob.		
Group rho-Statistic	1.535458	0.9377		
Group PP-Statistic	-1.942348	0.0260		
Group ADF-Statistic	NA	NA		

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
1	0.257	350446.2	589519.3	1.00	4
2	-0.404	651612.6	515982.4	1.00	4
3	-0.254	3387.298	3387.298	0.00	4
4	-0.106	793158.0	666969.8	1.00	4
5	-0.131	624735.7	873919.6	1.00	4
6	0.382	491571.1	491571.1	0.00	4

Sample: 2004 2015, Included observations: 40, Cross-sections included: 6 in non-parametric (PP) test; 0 (6 dropped), parametric (ADF) test, Null Hypothesis: No cointegration, Trend assumption: No deterministic trend, User-specified lag length: 1, Newey-West automatic bandwidth selection and Bartlett kernel, Alternative hypothesis: common AR coefs. (within-dimension)

6. CONCLUSION

FDI has a positive as well as negative impact on the stock market as evidence from the large literature on the subject. Various researchers have examined the relationship between FDI and GDP and find some positive association in short and long run. Our motivation is to find that actual FDI through equity in a particular sector has any level or lag impact on the market valuation of the sector. We find no relationship between sectoral indices and FDI – equity route investments. We conclude that changes in FDI policy creates a direct impact on the individual stocks and indices in the form of FII investments, but no evidence to believe that after effect investment through equity route in a given sector has any significant impact on the market capitalisation of that sector.

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