Macrothink Institute™

International Journal of Accounting and Financial Reporting
ISSN 2162-3082
2019, Vol. 9, No. 2

Modeling the Impact of Foreign Equity, Foreign Debt and FDI on Indian Economic Growth Through VECM Approach

Amar Singh (Corresponding author)

Research Scholar, Department of Management studies

Graphic Era (Deemed to be University)

Bell Road, Clement Town Dehradun, Uttarakhand, India

Tel: 91-983-7777-273 E-mail: connectamar@gmail.com

Arvind Mohan

Professor, Department of Management studies

Graphic Era (Deemed to be University)

Bell Road, Clement Town Dehradun, Uttarakhand, India

Tel: 91-983-7109885 E-mail: arvindmj99@gmail.com

Received: May 2, 2019 Accepted: May 20, 2019 Published: May 23, 2019

doi:10.5296/ijafr.v9i2.14737 URL: https://doi.org/10.5296/ijafr.v9i2. 14737

Abstract

Foreign portfolio investment and foreign direct investment are the backbone of any economy as well as contributing to the growth of all developing economies. Herein, it motivated to do the study by investigating the causality between foreign investment and economic growth in India. To find out the exact causation effectively, we have employed a vector error correction model method of causality. The testing time series data period is from 1993 to 2017. Here, in this study, we converted annual gross domestic product and foreign direct investment data into monthly figures. For this we used econometric disaggregation techniques know as linear spline interpolation method for monthly data conversion. ADF unit root test confirms the presence of unit root at level and stationary at first difference. Johansen co-integration test is done after achieving the stationarity and it shows those variables are co-integrated. Whereas

Granger causality test results show no-causality exists between (i) FDI and GDP (ii) GDP and FDI (iii) FE and GDP (iv) FD and GDP (v) FE and FDI (vi) FD and FDI (vii) FE and FD and uni-directional causality exist between GDP and FE (ii) GDP and FD (ii) FDI and FE (iv) FDI and FD (v) FD and FE. The results advocates that FDI, FE, FD boost the economic growth of India.

Keywords: Economic growth foreign investment (foreign equity & foreign debt), Foreign direct investment

JEL Classification: F21, F23, O00

1. Introduction

The inflow of foreign equity and debt investment is important for the developing nation to achieve rapid growth. Similarly, sustainable economic growth has a major concern for the developing nations. The foreign investor has been very volatile in the past year where we have seen a huge outflow of funds by the foreign investor after the demonetization done by the Indian government (Indian Express, 2018).

The foreign direct investments (FDI) registered a growth of 1.9 percent of GDP in 2016-17, which is the twice of the past decade to USD 42 billion. We have seen an increase of foreign direct investment in various sector like insurance, metallurgical industries, broadcasting sectors, cement, banking services, and electrical equipment, but the largest increase of foreign direct investment was registered in telecom sector (USD 4.2 billion) in 2016-17 (Economic Times, 2017). (Mukherjee, 2007) in his research done the comparison of Indian stock market and international market by seeing the trends, similarities, market patterns and market movements. He used comparative analysis, statistical analysis and efficiency test for his study. (Goel & Gupta, 2011)a researcher here examined the stock market development and the impact of globalization on it by using recognized indicators at the time testing the impact. (Aurangzeb, 2012) this study emphasizes the factor identification which affects the doing of share market in South Asia. (Shrivastav, 2013) researcher investigates the correlation between the FIIs investment and Sensex movement. The study also reveals that the Sensex movement influenced by FIIs investment. (Kulshrestha, 2014) the researcher examined the association of FIIs with ICM and these investors lead the market movement. (Mbulawa, 2015) in his research used VECM model to empirically examined the nexus between stock market performance, exchange rates, and interest rates. (Perera, 2016) researcher empirically investigate in an emerging market the foreign exchange rate volatility and its effects on stock market return volatility. (Giri & Joshi, 2017) the research paper examined the long and short run association between stock price and macro-economic variables of Indian economy.

The inter relationship among economic growth and foreign investors has drawn huge importance among researchers in theoretical and in practical aspect. Numerous studies have been performed to examine the function of economic growth and foreign investments as well as the rapport subsist among them. (Amoateng & Amoako-Adu, 1996) observed the casual association between exports, external debt and economic growth in 35 African Countries with the help of Granger Causality Test and concluded that there exist a unidirectional casual

relationship among variables i.e., debt service and economic growth. The existence of foreign investors and economic growth implicated a great significance in the expansion and progress for developing countries. (Bello & Adeniyi, 2010) emphasized that FDI does not possess positive impact on economic growth.

2. Theoretical Literature Review

Various studies have been done to analyze the effect of foreign investment and FDI on economic growth of developed as well developing countries. Some of the researches have been reviewed in the current paper by eminent researchers. (Rai & Bhanumurthy, 2004) examined that FII inflow is depend on stock market returns, inflation rate, stabilized stock market volatility and minimized ex-ante risk. (Chakravarty, 2005) researcher investigates the nexus between stock price and important macro-economic variables in India. (Poshakwale & Thapa, 2007) the researcher examined the short and long run association of IEM, US equity market, and UK equity market and explaining this relationship with the consideration of foreign institutional investments influence on the market. (Saha, 2009) the researcher investigated the participation of FIIs and other financial institutions in India.

(Goudarzi, 2010) in this paper the researcher investigated the main risk which is posed by large & volatile capital inflows, resulting in the form of crisis and destabilizing macroeconomic management. (Gourdarzi, 2011) This paper studied the positive and negative news effects on the volatility of Indian stock markets by applying asymmetric ARCH test when the Indian stock market had witnessed the global financial crisis of 2008-09.(Paramati & Gupta, 2011) researcher in his paper investigated that the economic growth follows stock market performance or vice versa. Research also works on short and long-run dynamics of the stock market (Anayochukwu, 2012).

This research conducted in Nigeria with the objective to investigate the consequences of stock market returns on FPI. (Sultana & Pardhasaradhi, 2012) researcher in his study examined the influence and relationship of FDI & FII on ISM by using statistical tools such as correlation coefficient and multi-regression. (Loomba, 2012) research worked to evolve an understanding the tendency of trading behavior of FIIs and its consequence on the IEM. (Arcabic, 2013) this paper investigated the presence and distinctive of the pair of long- and short-term association among FDI and stock market of Croatia. (Bhowmik, 2013) evaluated the multidimensional framework of stock market volatility with the help of economic literature including measurement and nature of the impact of volatility. (Agarwal, 2013) researcher investigates the association of FIIs total Investment to Sensex & MFs total Investment. (Babatunde, 2013) examined that volatility shock is never-ending activity in Nigeria and this can alter the economy growth. A researcher used the Exponential Generalized Autoregressive Conditional Heteroskedasticity model (EGARCH). (Prasanna & Bansal, 2014) the researcher examined the effect of FIIs on the liquidity of ISM. (Madhvi, 2014**)** This paper analyzed the state of the stock market and risk management measures along with their respective returns. (Venkatraja, 2014) researcher in his paper examined the association among the Indian stock market performance represented by Sensex index and few important macroeconomic variables such as IIP, WPI, Gold Price, FIIs and real effective

exchange rate. (Ahmad, et al., 2015) in this study of empirical investigation, the researcher has a focus to raise the potential of an economic indicator in analyzing the performance of the stock market by using ARDL and VAR in Nigeria. (Bhatia & Gurloveleen, 2015) a researcher had examined the influence of macro-economic variables on the operating of the Indian Stock Market. (Goel & Kaur, 2015) in his paper studied the connection between the flow of FIIs and Indian share market. It was opened for the all the world investors after the reforms in 1991. (Mohan & Prasad, 2015) a researcher here in this paper investigated the volatility due to FIIs investment in the Sensex and nifty and the assistance of FIIs in Sensex and nifty in the period of 1993-2014. (Birau & Trivedi, 2015) the researcher examined the long-term volatility of NSE of India based by applying the GARCH model. (Jebran & Iqbal, 2016) the researcher examined the volatility spillover effects among the stock market and forex market in the Asian countries including India, Hong Kong, Japan, Pakistan, China, and Sri Lanka. (Mukherjee & Roy, 2016) in this paper, the researcher examined the aspect of the FIIs and DIIs in guiding the return on the IEM and also the influence of financial variables (domestic and international) on the market returns. (Izunobi et al., 2017) This study examines the volatility among interest rate, inflation rate, and stock market return by employing the GARCH and E-GARCH model techniques. This study also determines the vastness and way of behaving pattern of the above variables. (Hasan & Zaman, 2017) the researcher examined the volatility of call exchange rate, crude oil price, call money rate, (BSE index) Sensex and the Dhaka stock exchange in reply to the volatility of the above macro-economic variables. (Batra & Thakkar, 2017) researchers in their paper studied the influence of FIIs on the Indian capital markets by taking the time series data of twenty years from 1996 to 2016.

A study examined by (William, 2012) about FDI, exports and economic growth in the period 1960-2009 by using VECM resulted that FDI acts as a vital element in promoting export in the long run while GDP and exports strengthen both variables in the short run. (Bayar, 2014) in his research investigate the association among unemployment, economic growth, export and Foreign Direct Investment (FDI) in Turkey. He used Bound testing approach based on autoregressive distributed lag during the period of 2000: Q1 to 2013:Q3. It was found by the test that there exists a log run correlation among the variables. Empirically, it demonstrated that there was an unfavorable association among unemployment and economic growth, export on the other hand; favorable association was found among unemployment and FDI inflows.

The focus of this study is to estimate the association of specifically foreign equity, foreign debt and foreign direct investment on the economic growth. This study has taken up the importance of foreign equity and debt investment separately to investigate it on individual level not the total foreign investment so we can see the impact each of one and can give the suggestion on the basis of the result. It will be an add-on in the past studies. In various past studies the focus given on FII, stock market returns and FPI foreign exchange and index returns. Through this study, we would like to establish the relationship among the variables particularly by focusing on foreign equity and debt and also investigated the bilateral and unilateral causalities between them. This is different from the past studies. Further studies can be done by considering venture capital investment funds and so on.

3. Data and Methodology

3.1 Model Specification

The theoretical framework is based on a new growth theory. The new growth theory is an economic growth theory that posits humans' desire and unlimited wants foster ever-increasing productivity and economic growth (Cortright, 2001). The new growth theory argues that real GDP per person will perpetually increase because of people's pursuit of profits.

$$Y = F(Kit, Nit, At) \quad (1)$$

It will be seen from the equation (1) that the level of aggregate output depends on the quantities of capital (Kit), and labour (Nit) used in the production as well as on technology which is treated as endogenous factor and therefore appears inside the production function as an input. However, the relationship between output and technology is not the same as between output and other inputs, capital and labour.

To accomplish the research objective we have transformed the equation in logarithm form and added the FE and FD variables. Therefore, equation included variables like GDP, FE, FD, and FDI.

$$\log GDP_t = \alpha_0 + \alpha_1 \log FDI + \alpha_2 \log FE + \alpha_3 \log FD + e_t \quad (2)$$

Where GDP is a gross domestic product, FDI is a foreign direct investment, FE is foreign equity and FD is foreign debt, α……., α3 is the explanatory power of the variable, e_t is the stochastic-error term.

3.2 Variable Explanation

In this part of a research, the variable explanation is included where GDP is a gross domestic product at the current price, FDI is foreign direct investment coming in, FE is the inflow of foreign equity, and FD is the inflow of foreign debt. Both foreign equity and debt is a part of foreign portfolio investment which shows the inflow of foreign equity and debt. Herein, we are expecting a positive relationship from all the variables to economic growth.

3.3 Estimation Procedure

3.3.1 Unit Root Test

We started with estimation of unit root test the first step to achieve the stationarity by employing the most suitable ADF test. Herein, a researcher is testing that variables are integrated in the same order. This is one of the popular tests used by researchers. To perform this ADF test researcher used the following statement:

$$\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + \chi \sum_{i-1}^{m} \Delta Y_{t-1} + \varepsilon_t \quad (3)$$

Where ΔY is the first difference of series Y variable which is to be tested, t is the time trend with coefficient β, parameters are denoted by γ and χ, ε_t represent the stochastic error term.

3.3.2 Johansen Co-integration Test

After performing the unit root test and achieving the same order of integration, we employed Johansen-Juselius maximum likelihood method of co-integration to confirm that variables are cointegrated or not. Herein, we will examine the presence of a long-run equilibrium relationship between the variables and it is significant not to adopting the risk of spurious regression. When the model confirms the co-integration, VECM will be applied and a lack of co-integration will to a restricted form of a VAR model. Johansen-Juselius multivariate co-integration is given below:

$$\Delta Y_t = \sum_{i-1}^{p-1} \Gamma i \Delta Y_{t-1} + \Pi Y_{t-1} + \Phi t \tag{4}$$

Where Y_t is the (4*1) vector (GDP, FDI, FE, FD) respectively, Δ is denoting the difference operator, Φt is a (4*1) vector of residuals. The VECM model provides the clue for short and long-run adjustment to change in Y_t with the estimated parameters Γ_i & Π respectively.

3.3.3 Vector Error Correction Model

Co-integration presence is the reason for practicing the VECM for this study. VECM have given preference over the VAR due to the co-integration among the variables. The basis of co-integration presence the VECM model can be indicated by the below statement:

$$\Delta GDP_t = \alpha_1 + \sum_{i-1}^{p} \theta_1 \Delta GDP_{t-1} + \sum_{i-1}^{p} \omega_1 \Delta FDI_{t-1} + \sum_{i-1}^{p} \psi_1 \Delta FE_{t-1} + \sum_{i-1}^{p} \xi_1 \Delta FD_{t-1} + \pi_1 ECT_{t-1} + \varepsilon_{1t} \tag{5}$$

$$\Delta FDI_t = \alpha_2 + \sum_{i-1}^{p} \theta_2 \Delta GDP_{t-1} + \sum_{i-1}^{p} \omega_2 \Delta FDI_{t-1} + \sum_{i-1}^{p} \psi_2 \Delta FE_{t-1} + \sum_{i-1}^{p} \xi_2 \Delta FD_{t-1} + \pi_2 ECT_{t-1} + \varepsilon_{1t} \tag{6}$$

$$\Delta FE_t = \alpha_3 + \sum_{i-1}^{p} \theta_3 \Delta GDP_{t-1} + \sum_{i-1}^{p} \omega_3 \Delta FDI_{t-1} + \sum_{i-1}^{p} \psi_3 \Delta FE_{t-1} + \sum_{i-1}^{p} \xi_3 \Delta FD_{t-1} + \pi_3 ECT_{t-1} + \varepsilon_{1t} \tag{7}$$

$$\Delta FD_t = \alpha_4 + \sum_{i-1}^{p} \theta_4 \Delta GDP_{t-1} + \sum_{i-1}^{p} \omega_4 \Delta FDI_{t-1} + \sum_{i-1}^{p} \psi_4 \Delta FE_{t-1} + \sum_{i-1}^{p} \xi_4 \Delta FD_{t-1} + \pi_4 ECT_{t-1} + \varepsilon_{1t} \tag{8}$$

4. Result

4.1 Unit root Test

Table 1. Augmented dickey-fuller unit root tests results

	Level (5%)			**First Difference (5%)**		
	Test Statistic	Critical Value	P-Value	Test Statistic	Critical Value	P-value
GDP	-0.4802	-2.8719	0.8915	-3.5724	-2.8719	0.0010
FE	-2.4594	-2.8850	0.1280	-3.7347	-2.8719	0.0041
FD	-1.7326	-2.8959	0.4113	-9.1999	-2.8959	0.0000
FDI	-1.5071	-2.8719	0.5287	-3.7347	-2.8719	0.0041

Note. * indicates significance at 5 percent level.

Source: Researcher's computation, 2018, using E-view 9.0.

A time series variables are non-stationary and therefore unit root test is the useful to investigate the order of integration. Table 1 results are representing the unit root test (ADF), where GDP, FDI, FE, and FD all are non-stationary at the level and stationary at first difference. It is required the condition to test the Johansen co-integration test.

4.2 Johansen Co-integration Test

Table 2. Johansen co-integration test

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.458845	51.51662	47.85613	0.0218
At most 1	0.193297	15.90171	29.79707	0.7192
At most 2	0.057620	3.443304	15.49471	0.9432
At most 3	2.04E-05	0.001182	3.841466	0.9718

Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.458845	35.61491	27.58434	0.0038
At most 1	0.193297	12.45841	21.13162	0.5031
At most 2	0.057620	3.442123	14.26460	0.9130
At most 3	2.04E-05	0.001182	3.841466	0.9718

Note. * indicates significance at 5 percent level.

Source: Researcher's computation, 2018, using E-view 9.0.

Herein, variable are integrated of the same order, so we have applied the Johansen-Juselius Maximum likelihood method of co-integration to obtaining the numbers of co-integrating vectors. Table 2 is demonstrating the Johansen co-integration test results, where the trace statistic 51.5166 is greater than the critical value of 47.8561 and maximum eigenvalue statistics also indicating the higher value than the critical value of 27.5843. It is showing 1 co-integration at the 5% level of significance. It's confirming the long run co-integration relationship between GDP, FDI, FE, and FD. Co-integration exhibits causality existence but is unable to present the direction of the causal relationship.

4.3 Granger Causality Test

Table 3. Pairwise granger causality test results

Null Hypothesis	**Obsd.**	**F-Statistic**	**Prob.**	**Type of Causality**
LFDI does not Granger Cause LGDP	272	0.94309	0.3907	No-Causality
LGDP does not Granger Cause LFDI		2.62926	0.0740	No-Causality
LFE does not Granger Cause LGDP	142	1.99867	0.1394	No-Causality
LGDP does not Granger Cause LFE		20.7293	1.E-08	Uni-directional
LFD does not Granger Cause LGDP	118	1.05315	0.3522	No-Causality
LGDP does not Granger Cause LFD		14.6010	2.E-06	Uni-directional

LFE does not Granger Cause LFDI	142	0.11438	0.8920	No-Causality
LFDI does not Granger Cause LFE		17.4520	2.E-07	Uni-directional
LFD does not Granger Cause LFDI	118	1.69713	0.1878	No-Causality
LFDI does not Granger Cause LFD		7.97829	0.0006	Uni-directional
LFD does not Granger Cause LFE	89	9.79765	0.0001	Uni-directional
LFE does not Granger Cause LFD		0.13803	0.8713	No-Causality

Note. * indicates significance at 5 percent level.

Source: Researcher's computation, 2018, using E-view 9.0.

According to Engel & Granger, if co-integration occur among two variables in the long run then there must be either unidirectional or bidirectional causality. The Granger causality test shows that no-causality exists between (i) FDI and GDP (ii) GDP and FDI (iii) FE and GDP(iv) FD and GDP(v) FE and FDI(vi) FD and FDI (vii) FE and FD as p-value is higher than 0.05, therefore we cannot reject the null hypothesis. In the case of (i) GDP and FE (ii) GDP and FD (ii) FDI and FE (iv) FDI and FD (v) FD and FE p-value is less than 0.05, therefore null hypothesis can be rejected and alternative hypothesis accepted. So, here we have uni-directional causality exist between) GDP and FE (ii) GDP and FD (ii) FDI and FE (iv) FDI and FD (v) FD and FE.

4.4 Vector Error Correctional Model

Table 4. The result of the vector error correction model (long-run effects)

Cointegrating Eq.	CointEq1	Standard Error	t-vaule
LGDP (-1)	1.000000		
LFDI(-1	- 0.204774	0.04663	4.39185
LFE (-1)	-0.234973	0.0405	5.79765
LFD (-1)	-0.227961	0.02999	7.60177
C	-8.320344		

Table 5. The result of vector error correction model (short run effects)

Error Correction:	D(LGDP)	D(LFDI)	D(LFE)	D(LFD)
CointEq1	-0.001161	-0.001367	1.390830	2.506927
	(0.00050)	(0.00846)	(0.27683)	(0.30751)
	[-2.31429]	[-0.16156]	[5.02405]	[8.15244]
D(LGDP(-1))	0.922585	-1.009008	83.05873	183.9840
	(0.16766)	(2.82836)	(92.5595)	(102.815)
	[5.50265]	[-0.35675]	[0.89736]	[1.78948]
D(LGDP(-2))	-0.125892	-0.203633	25.36721	13.29690
	(0.16546)	(2.79114)	(91.3417)	(101.462)
	[-0.76088]	[-0.07296]	[0.27772]	[0.13105]
D(LFDI(-1))	-0.000902	0.911587	-3.354808	10.90223
	(0.00978)	(0.16501)	(5.40015)	(5.99845)
	[-0.09222]	[5.52433]	[-0.62124]	[1.81751]
D(LFDI(-2))	-0.003784	-0.035271	8.407734	1.518170
	(0.00997)	(0.16825)	(5.50594)	(6.11597)
	[-0.37942]	[-0.20964]	[1.52703]	[0.24823]
D(LFE(-1))	0.000100	0.000627	-0.184652	0.381757
	(0.00017)	(0.00293)	(0.09592)	(0.10655)
	[0.57762]	[0.21377]	[-1.92504]	[3.58294]
D(LFE(-2))	3.94E-05	0.001352	-0.226566	0.190049
	(0.00014)	(0.00235)	(0.07696)	(0.08548)
	[0.28236]	[0.57501]	[-2.94410]	[2.22325]
D(LFD(-1))	-0.000136	-0.001410	0.116661	-0.434626
	(0.00014)	(0.00235)	(0.07700)	(0.08554)
	[-0.97480]	[-0.59904]	[1.51498]	[-5.08118]
D(LFD(-2))	1.01E-05	0.000364	0.205563	-0.194565
	(0.00012)	(0.00197)	(0.06441)	(0.07154)
	[0.08657]	[0.18482]	[3.19167]	[-2.71961]
C	0.002460	0.016987	-1.306028	-2.502941
	(0.00084)	(0.01421)	(0.46511)	(0.51664)
	[2.92019]	[1.19521]	[-2.80802]	[-4.84467]
R-squared	0.842939	0.729084	0.489909	0.658863
Adj. R-squared	0.821521	0.692141	0.420352	0.612344
Sum sq. resids	4.35E-05	0.012376	13.25475	16.35454
S.E. equation	0.000812	0.013694	0.448140	0.497791
F-statistic	39.35759	19.73532	7.043200	14.16339
Log likelihood	438.3610	223.6229	-41.47698	-49.46267
Akaike AIC	-11.27266	-5.621654	1.354657	1.564807
Schwarz SC	-10.96598	-5.314979	1.661333	1.871483
Mean dependent	0.011446	0.026615	0.097583	0.038630
S.D. dependent	0.001921	0.024680	0.588615	0.799510

A previous result of the test (Co-integration between the variables) allowing us to estimate the VECM Model. The model has fitted the observed data accurately as it is shown by the adjusted R^2 for GDP and FDI as 0.821521 and 0.692141 respectively.

The error correction coefficient (0.001161) representing a negative sign which is expected from it and it is significant at 5% level. The value is also less than one which is perfect. Vector error correction model results shows that GDP, FDI, FE and FD are having long term association or co-integrated in long run.

5. Conclusion and Policy Implication

The aim of this paper was to find out that foreign equity, foreign debt and foreign direct investment numbers could use to improve the prediction of economic growth in India. In this research, the long run relationship between GDP, FDI, FE, and FD in India have been examined. The time series data of last twenty-four years (1993-2016) has been used to get the

results. The estimation started with the unit root test to confirm the stationarity of the data.GDP, FDI, FE, and FD are stationary at first difference. Therefore, Johansen's co-integration test applied. Test outcome exhibits the rejection of the null hypothesis of no cointegration. It shows a long term association between GDP, FDI, FE and FD, and all variables are co-integrated.

After achieving the co-integration between the variables, we have tested the Granger causality test and test exhibits the no-causality between (i) FDI and GDP (ii) GDP and FDI (iii) FE and GDP(iv) FD and GDP(v) FE and FDI(vi) FD and FDI (vii) FE and FD and uni-directional between (i) GDP and FE (ii) GDP and FD (ii) FDI and FE (iv) FDI and FD (v) FD and FE. The presence of uni-directional is the sign of long-run equilibrium relationship. VECM results also confirm the long term relationship between the selected variables.

The study formed the evidence of long run relationship between GDP, FDI, FE and FD in India. The results suggested that government could give emphasis on aggressive trade policy reforms to promote the foreign equity and debt investment in India. This will give confidence to new investor's and attract them to invest in the India, which will increase Indian economic growth.

Furthermore, the significance of attracting the foreign equity and foreign debt will improve the productivity of the Indian companies and which attract more inflow of FDI into the country. Further studies can be done by researcher in this particular field by looking into more areas of foreign investment like venture capital funds and private equity.

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