Chapter-5

EMPIRICAL ANALYSIS

One of the main objective of economic liberalization in India was to achieve the high economic growth. In this environment, enhancement of productivity, improvement in infrastructure facilities, etc have remained major concern for the policy makers. Empirical studies argued that foreign direct investment (FDI) is an important driving factor of economic growth in developing countries. FDI facilitates the process transferring the capital and knowledge from one country to another. It bridges the gap between saving and investment, brings additional resources and technology to the host country. In this phenomenon, industrialized and developing countries have offered various incentive to encourage foreign direct investments in their economies. The FDI inflows in India has increased significantly after the economic reforms. Moreover, the economy has achieved improved economic growth during this period. Such an environment surrounding the India economy motivated me to investigate the influence of FDIon the economic growth. For this purpose, study utilized two data sets: annual data from 1980 to 2009 and quarterly data from 1999 to 2010 as the quarterly data prior to 1999 is not available. The difference between two sets of data lies in the fact that inter- quarter differences are smoothened in the case of studies based on annual data.

5.1 Analysis for Annual Observation

5.1.1 Results of Unit root Test

In order to identify the role of FDI in economic growth, the study investigates the long run relationship between FDI and economic growth. For the purpose, cointegration model is utilized. Once identify the long run relationship, study diagnosis the short run relationship for the specified relationship. The first step to estimate the model requires to check the integration orders of the series. ADF and PP tests are utilized to check the integration order of the series. The test statistic for unit root test are exhibited in Table 5.1. the test statistic are computed for two models constant as well as constant and trend . Both the orders are performed on the level as well as first difference of the series. The stationarity behavior of the series is checked as the integration model requires the same. Also the series should not be integrated of order more than one.

Table-5.1 Unit Root Test Based on Annual observations (N = 30)

Variables	Model	ADF test statistic		PP test statistic	
		Level	1st Difference	Level	1st Difference
GDP	Intercept	2.29	-2.67**	2.84	-3.93*
	Trend and Intercept	-0.85	-3.25**	-0.43	-4.84*
FDI	Intercept	-0.42	-4.87*	-0.24	-6.00*
	Trend and Intercept	-3.77**	-4.88*	-3.21	-5.97*
DI	Intercept	-0.12	-3.40*	1.43	-4.85*
	Trend and Intercept	-1.42	-3.15*	-1.80	-5.05*
Open	Intercept	1.25	-2.97**	1.70	-4.34*
	Trend and Intercept	-1.39	-2.47	-1.94	-4.59*

Note: * and ** indicates significant of 1 and 5 percent level respectively.

The figures reported in table indicate that all the variables are non-stationary in level form whereas the first difference of the series reflect the stationary behavior either in ADF or PP test. It can be inferenced that the integration order of all the series are one. Hence, the cointegration model can be employed on the given series.

5.1.2 *Results of Cointegration Test*

The stationary behavior of the series fulfills the criteria of estimating the cointegration model. In the cointegration, study utilized the Johnson cointegration methodology. This technique is more robust in case of more than two variables. In this technique first number of cointegration equation are identified. The identification of cointegration equation can be checked with the help of trace

statistic and max statistic. The statistic of two tests is exhibited in Table-5.2. The figures of trace and max statistic as 27.27 and 18.02 respectivelypresented in table are lower than their critical value at 5 percent.It indicates that there is one cointegration equation for the given series. The result halts the presence of one cointegration relationship among the selected variables.

Table-5.2 Johansen Cointegration Test Based on Annual observations (N = 30)

No. of Cointegration	Eigenvalue	Trace statistic	Max statistic	Log Likelihood
r = 0	.	61.47 (47.21)	29.72 (27.07)	328.20
r = 1	0.69	27.27* (29.68)	18.02* (20.97)	344.18
r = 2	0.42	13.21* (15.41)	6.98* (14.07)	351.55

Notes: (1) * indicates null hypothesis of nocointegration has been rejected. (2) r is the cointegration rank or the number of cointegrating vectors. (3) Critical value at 5 percent is given in parenthesis of respective statistic. (4) Parenthesis shows the critical value at 5 percent for respective statistics.

Having established the cointegration among the specified variables, short run behavior of these variables areinvestigated. To serve the purpose, VECM model is employed.

5.1.3 Results of Error Correction Model

We examine the impact of FDI and other controlling variables like domestic investment and openness on economic growth as given in equation (9). All the variables except openness are having positively bearings on economic growth, which is presented in Table 5.3. The variables FDI and DI enter statistically significant at 1 percent. The coefficient values of these variables are 0.05 and 0.56 respectively. It implies that 1 percent increase in FDI and DI leads to 0.05 and 0.56 percent increase in economic growth. The trade openness is not showing the statistically significant value in the long run behavior.

Table- 5.3 Long run *Relation Based on Annual observations (N = 30)*

Dependent variable GDP

Regressor	Coefficient	Standard Error	Z statistic	Probability
FDI	0.05*	0.01	9.33	0.00
DI	0.56*	0.04	11.85	0.00
OP	0.21	0.15	1.42	0.15
Constant	5.15			

Notes: (1) Figures in the parenthesis are the probability values of LR statistic. (2) * indicates significant of 1 percent level. (3) The restricted cointegrating vector (EC = GDP- (5.15 + 0.05 FDI + 0.56 DI) is obtained after normalisation, i.e. after putting the coefficient of GDP = 1. (4) The OP is not included in the cointegration vector as it is insignificant.

The result for short run adjustment are presented in the Table-5.4. The past error correction term is negatively while considering GDP as the dependent variable. The coefficient value suits well to the theoretical model. The coefficient value of error term is negative 0.29. it implies that past error is adjusted back to the short run equilibrium. The result suggests that it takes almost four quarters to adjust the long run disequilibrium in the short run adjustment.

Table 5.4 Short run Dynamic Based on Annual observations (N = 30)

Regressor	GDP	FDI	DI	OP
EC_{t-1}	-0.35*	0.31*	0.11	-0.01
	(-2.83)	(4.00)	(0.98)	(0.06)
Constant	0.06*	0.00	0.09**	0.03
	(4.70)	(0.00)	(1.78)	(3.04)
ΔGDP_{t-1}	-0.21	0.15	-0.36	-0.89*
	(0.78)	(0.54)	(-0.36)	(-4.24)
ΔGDP_{t-2}	-0.29	-0.23	-0.27	0.08
	(1.26)	(-0.34)	(-0.33)	(0.56)
ΔFDI_{t-1}	-0.01***	0.47**	0.00	0.03*
	(1.66)	(2.04)	(-0.06)	(2.84)
ΔFDI_{t-2}	-0.02**	0.04	0.02	-0.05
	(-1.98)	(0.25)	(0.11)	(-0.40)
ΔDI_{t-1}	0.02	.36	-0.00	0.38*
	(0.25)	(0.63)	(-0.00)	(5.62)
ΔDI_{t-2}	-0.05	0.65	-0.07	-0.08
	(-0.44)	(1.40)	(-0.18)	(-0.95)
ΔOP_{t-1}	0.54*	-0.96	0.17	-0.33
	(2.72)	(0.87)	(1.62)	(-2.36)
ΔOP_{t-2}	-0.29	-0.88	0.72	0.03

| | (-1.07) | (-0.36) | (0.71) | (3.04) |

Notes: (1) * and ** indicates 1 percent and 5 percent level of significant. (2) "Z" value is presented in parenthesis. (3) EC_{t-1} shows feedback effect or the adjustment effect and shows how much disequilibrium is being corrected. (4) The positive sign of the error-correction term with ΔFDI as the dependent variable is correct as it enters the cointegrating vector with a negative sign.

5.2 Analysis for Quarterly Observation

Since the performance of Indian economics has changed significantly in recent years. The amount of FDI has included significantly for the same period. It is considered as the outcome of liberalization policies of the government toward foreign investment. Such economic phenomenon prompts to investigate the role of FDI in economic growth for recent periods. It will also make robust empirical results obtained by using the annual observations. To examine relationship between FDI and economic growth in ongoing environment, a quarterly observation is utilized.

5.2.1 Result of Unit root Test

The same set of methodology is employed to investigate the relationship between FDI and economic growth for quarterly observation as we have used earlier for annual observation. The ADF and PP tests have been performed to test the stationarity nature of the series. The unit root test results is presented in Table 5.5.

Table-5.5 Unit Root Test Based on Quarterly Observations (N = 44)

Variable	Model	ADF test statistic		PP test statistic	
		Level	1st Difference	Level	1st Difference
GDP	Intercept	-1.07	-16.74*	0.18	-13.55*
	Trend and Intercept	-9.46*	-16.70*	-5.90*	-13.26*
FDI	Intercept	-1.09	-5.14*	-1.42	-8.53*
	Trend and Intercept	-2.03	-5.11*	-2.63	-8.46*
DI	Intercept	0.89	-5.60*	1.65	-11.11*
	Trend and Intercept	-2.46	-5.80*	3.12	-11.92*

| Open | Intercept | -1.61 | -7.91* | -1.50 | -7.37* |
| | Trend and Intercept | -4.55* | -7.84* | 3.37 | -7.22* |

Note: * indicates significant level of 1 percent.

The result of unit root presented in Table-4.5, accept the null hypothesis of unit root for most of the variables in level form, whereas in case of first differencethe null hypothesis of unit root is rejected. It is indicates that all the series are integrated of order one either based on ADF or PP test.

5.2.2 Result of Cointegration Test

Johansen cointegration has been employed to examine the number of cointegrationequation in the model. The trace and max statistic presented in Table-5.6, reject the null hypothesis of no cointegration and accept the hypothesis of one cointegration equation (i.e. $r = 1$). It suggests the presence of long run relationship among the specified variables. Moreover, the lag length criteria has been decided with the help of AIC, we used AIC to select 2 as the orders of VAR.

Table-5.6 Johansen Cointegration Test Based on Quarterly Observations (N = 44)

No. of Cointegration	Eigenvalue	Trace statistic	Max statistic	Log Likelihood
$r = 0$	.	55.16 (47.21)	30.51 (27.07)	291.48
$r = 1$	0.52	24.65* (29.70)	13.55* (20.97)	306.73
$r = 2$	0.29	11.09 (15.41)	7.76 (14.07)	313.51
$r = 3$	0.18	3.32	3.32	317.40

| | (3.76) | (3.76) | Notes: |

null hypothesis of nocointegration has been rejected. (2) r is the cointegration rank or the number of cointegrating vectors. (3) Parentheses shows the critical value at 5 percent for respective statistics.

5.2.3 Result of Error Correction Model

Similar to the annual observation results, an attempt is made to identify the impact of FDI on economic growth. The long run behavior of the selected variables is presented in Table-5.7. It is found that FDI enters statistically significant in the long run process. The other controlling variables such as domestic investment and trade openness also have positive bearings on economic growth. The coefficient values indicate that 1 percent increase in FDI, DI and OP leads to 0.05, 0.31 and 0.96 percent increase in economic growth respectively.

Table- 5.7 Long run Relation Based on Quarterly Observations (N = 44)

Dependent variable GDP				
Regressor	Coefficient	Standard Error	Z statistic	Probability
FDI	0.05*	0.06	5.13	0.00
DI	0.31*	0.01	3.13	0.00
OP	0.96*	0.24	3.93	0.00
Constant	8.85			

Noes: (1) The restricted cointegrating vector (EC = GDP-(8.85 + 0.05 FDI + 0.31 DI + 0.96 OP) is obtained after normalization, i.e. after putting the coefficient of GDP = 1. (2) * indicates 1 percent level of significant.

The short run behavior of FDI and economic growth is presented in Table-5.8. The error correction term is negatively significant for 10 percent level. The value is consistent to the theoretical model in the series that past disequilibrium is adjusted back in the short run and it takes threequarters to adjust the disequilibrium process. Based on the below estimated results, it can be inferenced that there is long run equilibrium relationship between FDI and economic growth in India. The results also indicates the presence of short run relationship between the two indicators. It can be suggested that FDI has significant role in determining the economic growth.

Table- 5.8 Short runDynamic Based on Quarterly Observations (N = 44)

Regressor	ΔGDP	ΔFDI	ΔDI	ΔOP
EC$_{t-1}$	-0.31***	-0.69	0.66*	0.36*
	(-1.83)	(-1.15)	(2.63)	(2.58)
Constant	0.02***	0.02	0.06	0.01
	(1.70)	(0.17)	(3.71)	(0.92)
ΔGDP$_{t-1}$	0.01	0.51	-0.03	-0.03
	(0.03)	(1.08)	(-0.16)	(-0.24)
ΔGDP$_{t-2}$	-0.84*	0.23	-0.57	0.06
	(6.82)	(0.99)	(-3.12)	(0.60)
ΔFDI$_{t-1}$	0.01	-0.36***	0.00	0.03
	(0.70)	(-1.71)	(-0.06)	(1.52)
ΔFDI$_{t-2}$	-0.02	-0.15	0.02	0.05*
	(-0.89)	(-0.76)	(0.72)	(2.86)
ΔDI$_{t-1}$	0.28**	-0.85	-0.29	0.35**
	(2.08)	(-0.93)	(-1.47)	(2.23)
ΔDI$_{t-2}$	-0.08	-0.45	0.12	-0.06
	(-0.64)	(-0.66)	(0.65)	(-0.32)
ΔOP$_{t-1}$	0.02	-0.96	0.63**	-0.02
	(0.11)	(-0.71)	(2.23)	(-0.14)
ΔOP$_{t-2}$	-0.40***	-0.88	0.72**	0.11

(-1.82)	(-0.66)	(2.25)	(0.96)

Notes: (1) *, * and *** indicates significant level of 1 5 and 10 percent respectively. (2) parenthesis value indicates "Z" statistic.(3) The positive sign of the error-correction term with ΔDI and ΔOP as the dependent variable is correct as it enters the cointegrating vector with a negative sign. (4) EC_{t-1} shows feedback effect or the adjustment effect and shows how much disequilibrium is being corrected.

Appendix A-5.1 Descriptive statistic for yearly observation

	GDP	FDI	DI	OP
Mean	10.45	4.27	8.96	0.24
Median	10.41	4.94	8.90	0.21
Maximum	11.38	7.52	10.16	0.52
Minimum	9.67	0.48	8.06	0.12
S. D.	0.50	2.14	0.64	0.11
Skewness	0.19	-0.17	0.38	0.99
Kurtosis	1.91	1.62	2.05	2.80
J-B test	1.65	2.52	1.85	4.99
Probability	0.43	0.28	0.39	0.08
No of observations	30	30	30	30

Appendix A-5.2 Descriptive statistic for quarterly observation

	GDP	OP	FDI	DI
Mean	13.32	0.31	9.24	12.04
Median	13.30	0.30	9.00	12.03
Maximum	13.78	0.55	10.95	12.83
Minimum	12.89	0.19	7.46	11.58
S. D.	0.24	0.08	0.96	0.36
Skewness	0.13	0.65	0.26	0.19
Kurtosis	1.86	3.06	1.94	1.72
J-B test	2.48	3.16	2.54	3.27
Probability	0.28	0.20	0.28	0.19
No of observations	44	44	44	44

Chapter 6

CONCLUSION

The evidences regardingthe impact of FDI on economic growth of a host country is far from conclusive due to which a lot of confusion has been generated in the developing countries about foreign investment. A careful investigation of the potential impact of foreign investment is requiredso that implicationscan be drawn for the action of government and further investment for the investor. Moreover, country can maximize welfare from such investment.

In profile chapter, apart from government policy towards FDI and composition of FDI, we discussed the country-wise distribution and sector wise inflow of FDI. In country wise distribution Mauritius is the major source of FDI inflow to India, who alone contribute around 40 percent of total flow. The double taxation treaty between India and Mauritius could help to attract FDI inflow through this route. In sector wise inflow, manufacturing sectors like engineering goods, electrical equipment, chemical and Allied Product and food & beverage ware the major destination during 1990s. but the trend has been changed significantly in recent years. While service sector is the most FDI attracting sector.where sectors like service (included finance and non-finance), computer soft ware, telecommunication and power are dominating the FDI shares.

The time series study on growth impact of FDI in India strongly supports the earlier literature that FDI promotes economic growth of recipient country. We found positive and significant long run relationship between domestic investment and FDI with economic growth for both yearly and quarterly observations. In long run, however, openness is found to be insignificant for yearly observation. But in case of quarterly observations, it was found to have positive and significant impact on economic growth. It conveys that Indian trade openness has benefited the Indian economy in recent years. Earlier studies like Balasurbranyanet .al (1996) and Agrawal (2005) revealed that countries adopting export promoting strategy are more benefited from FDI than thoseadopting policy of import substitution. The export promoting strategy is more trade flexible than import substitution.

The study also check the short run dynamic among the variables employing error correction mechanism. The speed of adjustment coefficient for yearly observation is 35 percent in a years, while 31 percent in quarterly observation.

6.1 Policy Suggestion

A positive and significant effect of FDI on economic growth suggests that theIndian government should not only encourage FDI inflows, but should also impose regulation on MNCs to urge them to undertake export obligations or encourage investing in high-risk area where domestic investment is limited. One of the options before the government can be to offer tax exemptions to foreign investors or can open organized retail sector for FDI. The country wise distribution of FDI is quite skewed, while around 40 percent flow sourced from single country mainly, Mauritius. This finding implies that government should formulate and exercise policies, which lead to diversification of FDI sources.