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The exploring research of foreign direct investment on the economic development in India -evidence from ADF- ARDL

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Abstract---Foreign direct investment (FDI) inflows are regularly seen as an important catalyst for economic growth in developing countries. The study objectives are to analyze the current status of Foreign Direct Investment and Economic Development in India and to determine the impact of Foreign Direct Investment and Macro Economic Factors. The study has been used data from 2000-01 to 2018-19 by using Augmented Dickey-Fuller (ADF) and Auto-Regressive Distributive Lag (ARDL) the results have been estimated. The study results indicate the positives relationship can be a result of sufficient foreign direct investment invest in India's economy which has been able to exert sufficient consequence to make it develop the economy.

Keywords---FDI, economic development, GDP, FER.

Introduction

Foreign Direct Investment is a crucially important role for economic development and is a mainly monetary source for Indian economic development. Foreign companies directly in rapidly growing private Indian entities too are benefits of cheaper wages and changing the business environment of India. FDI also stimulates domestic investment and facilities improvements in human capital and institutions in the host countries. International trade is also known to be an instrument of economic growth. The Indian government's favorable policy regime and robust business environment have ensured that foreign capital keeps growing into the country. The government has taken many initiatives in recent years such

as relaxing FDI norms across sectors such as defense, PSU oil refineries, telecom, and power exchange, among others. Foreign direct investment inflow during the period April 2014 to December 2019 has been US\$ 335.33 Billion which is nearly 51 percent of cumulative foreign direct investment in India till April 2000. Foreign direct investment inflow stood at a record of US\$ 62 billion, the highest recorded for a fiscal year ever.

Economic growth is a priority for all countries. There has been active research to form of economic growth. According to world investment report UNCTAD-1984, several factors facilitate in the economic growth of a country, the first factor is the large supplies of investment capital, the second factor is sophisticated technology, and the next factor is competent workforce, the fourth set of factor is robust transportation and communication facilities, the next factor is established political and social institutions, low tax rates and favorable regulatory environment. The step of growth is determined by the variation in these factors and besides these, foreign direct investment (FDI) is an instrument in influences Indian economic growth.

Statement of the problem

In the Indian economy, sector-wise distribution of foreign direct investment shows a very uneven pattern. Foreign direct investment is concentrated in export-import oriented, manufacturing industries and sector-related contribution, such as agriculture, infrastructure, service sector such as (financial services, business services, communication services, computer services, miscellaneous services), transport, restaurants and hotels, education research and development, trading, etc. foreign direct investment limits in different sector in India 2020. India has been attracted to the total FDI amount of US\$ 62001 million in 2018-19. The highest share of in India's FDI shares amounted to be US\$ 80,670.79 during the year from April 2000 to December 2019 in the service sectors only. In the Indian government permission granted 100 percent FDI through the automatic route to the e-commerce activities, agricultural animal husbandry, and auto components.

Review of literature

Most of the research studies have been done in the field of foreign direct investment and macroeconomic development in many countries. Some of the research studies are received as the following.

- Abbes, S.M. Mostefa, B., Seghri, G., & Zakarya G.Y (2015) in this study to analyze the empirical studies the effect of the investment on economic development of countries. This research study determines the relationship between foreign direct investment and economic development based on 65 countries, using cointegration and panel granger causality tests in panel data. The result found a disparity in terms of the relationship between the co-integration of the panel study, and the study indicates a unidirectional causality from FDI to GDP, which could be a good tool to prioritize the allocation of resources across sectors to support FDI.
- Khun Sokang (2018) in this research study found the positive impact of foreign direct investment and economic growth of Cambodia. This study has been utilized the time series data during the period from 2006-2016.

The researcher has used statistics such as correlation matrix and multiple regression for the collected data. The result of the study has a positive impact on FDI and economic growth in Cambodia.

- Muthusamy & Kalpana, (2019) in their research study to investigate the influence between FDI in civil aviation sector and GDP. The researchers have been taken the study period from 2009-10 to 2018-19. Statistical analysis was used such as correlation, regression analysis. The study found a positive influence between FDI inflows in the aviation industry and GDP.
- Bhuvya Malhotra (2014) in her research study has been examined the impact of FDI on the Indian Economy, particularly after two decades of economic reforms and analyses the challenges to position itself favorably in the global competition for FDI. The paper provides the major policy implications from this analysis, besides drawing attention to the complexities in interpreting FDI data in India.

Objectives of the study

The present study has been set out to accomplish the following objectives.

- To analyze the current status of Foreign Direct Investment and the Economic Development in India.
- To determine the impact of Foreign Direct Investment and Macro Economic Factors.

Methodology

The present study is based on the empirical and the explaining various concepts related to Foreign Direct Investment, Macro Economic Factors such as Inflation Rate (Consumer Price Index), Gross Domestic Product, Foreign Exchange Rate, and Unemployment Rate. The analysis is enhanced with the help of tables and figures wherever needed. The research study purely secondary data was collected from various sources such as journals, Magazines, FDI related websites, www.bseindia.com, www.sebi.gov.in and nseindia.com, World Bank, RBI handbook was used. The statistical analysis has been used such as Correlation Matrix, Augment Dickey-Fuller (ADF), and Auto-Regressive Distributive Lag (ARDL).

Scope of the study

This research study will benefit the Indian economy through exhaustively and detailed research on various macroeconomic variables. It can help us all to establish common grounds and point out the factors responsible for the economic development in India. The research paper has been analyzed the impact of foreign direct investment on the economic development in India and the influence between the Foreign Direct Investment and Macro Economic Variables such as Inflation Rate (Consumer Price Index), Gross Domestic Product, Foreign Exchange Rate and Unemployment Rate.

Period of the study

The present study covers 19 years, taken from the year 2000-2001 to 2018-2019.

Hypothesis of the study

H01: There is no relationship between Foreign Direct Investment and Macro Economic Variables (GDP, CPI, FOREX, and UER)

Data analysis and interpretation

The following table highlight the Growth of the Foreign Direct Investment during the period from 2000-01 to 2018-19

Table 1
Growth of Foreign Direct Investment during the year from 2000-01 to 2018-19

Year	Foreign Direct Investment (In US\$ Million)	Increase /Decrease	Growth Rate %
2000-01	3584.22	--	--
2001-02	5128.09	0.4307	43.07
2002-03	5208.97	0.0157	1.57
2003-04	3681.98	-0.2931	-29.31
2004-05	5429.25	0.4745	47.45
2005-06	7269.41	0.3389	33.89
2006-07	20029.12	1.7552	175.52
2007-08	25227.74	0.2595	25.95
2008-09	43406.28	0.7205	72.05
2009-10	35581.37	-0.1802	-18.02
2010-11	27396.89	-0.2300	-23.00
2011-12	36498.65	0.3322	33.22
2012-13	23995.69	-0.3425	-34.2
2013-14	28153.03	0.1732	17.32
2014-15	34576.64	0.2281	22.81
2015-16	44009.49	0.2728	27.28
2016-17	44458.57	0.0102	1.02
2017-18	39966.09	-0.1010	-10.10
2018-19	42117.45	0.0538	5.38

Source: Computed data received from RBI

The above table 1 shows that the Foreign Direct Investment growth performance for the study period from 2000-01 to 2018-19. In the initial year 2000-01 to 2018-19 the Foreign Direct Investment was grown with a fluctuation trend was 3584.22 million to 42117.45 million. The next followed year's fluctuation trend till 2018-19. The highest annual growth rate of Foreign Direct Investment varied between 175.52 percent in the year 2005-06 among the study period. The lowest annual growth rate of Foreign Direct Investment was -29.31 in the year 2003-04. The following table highlight the Consumer Price Index (Inflation Rates) during the year from 2000-01 to 2018-19

Table 2
Consumer Price Index (Inflation Rates) during the year from 2000-01 to 2018-19

Year	Consumer Price Index (Inflation Rates)	Increase /Decrease	Growth Rate %
2000-01	2123.60	--	--
2001-02	2153.60	0.0141	1.41
2002-03	2392.01	0.1107	11.07
2003-04	2266.60	-0.0524	-5.24
2004-05	2343.50	0.0339	3.39
2005-06	2419.11	0.0322	3.22
2006-07	2487.963	0.0284	2.84
2007-08	2583.432	0.0383	3.83
2008-09	2574.274	-0.0035	-0.35
2009-10	2616.665	0.0164	1.64
2010-11	2699.27	0.0315	3.15
2011-12	2755.13	0.0206	2.06
2012-13	2795.485	0.0146	1.46
2013-14	2841.33	0.0164	1.63
2014-15	2844.195	0.0010	0.10
2015-16	2880.09	0.0126	1.26
2016-17	2941.37	0.0212	2.12
2017-18	3264.64	0.1099	10.99
2018-19	4546.14	0.3925	39.25

Source: Computed data received from RBI

The above table 2 shows that the Consumer Price Index (Inflation Rates) growth performance for the study period from 2000-01 to 2018-19. In the initial year 2000-01 to 2018-19, the Consumer Price Index (Inflation Rates) was a grown-up performance (2123.60 to 4546.14). The highest annual growth rate of Consumer Price Index (Inflation Rates) varied between 39.25 percent in the year 2018-19. The lowest annual growth rate of Consumer Price Index (Inflation Rates) was -5.24 in the year 2003-04. The following table highlight the Foreign Exchange Rate during the year from 2000-01 to 2018-19

Table 3
Foreign Exchange Rate during the year from 2000-01 to 2018-19

Year	Foreign Exchange Rate	Increase /Decrease	Growth Rate %
2000-01	47.1857	--	--
2001-02	48.5993	0.0299	2.99
2002-03	46.5819	-0.0415	-4.15
2003-04	45.3165	-0.0271	-2.71
2004-05	44.1000	-0.0268	-2.68
2005-06	45.3070	0.0273	2.73
2006-07	41.3485	-0.0873	-8.73
2007-08	43.5049	0.0521	5.21
2008-09	48.4049	0.1126	11.26
2009-10	45.7262	-0.0553	-5.53

2010-11	46.6723	0.0206	2.06
2011-12	53.4376	0.1449	14.49
2012-13	58.5978	0.0965	9.65
2013-14	61.0295	0.0414	4.14
2014-15	64.1519	0.0511	5.11
2015-16	67.1953	0.0474	4.74
2016-17	65.1216	-0.0308	-3.08
2017-18	68.3895	0.0501	5.01
2018-19	68.4220	0.0004	0.04

Source: Computed data received from RBI

Table 3 shows that the Foreign Exchange Rate growth performance for the study period from 2000-01 to 2018-19. In the initial year 2000-01 to 2018-19 every year, the Foreign Exchange Rate was grown performance (47.1857 to 68.4220). The highest annual growth rate of the Foreign Exchange Rate varied between 14.49 percent in the year 2011-12 among the study period. The lowest annual growth rate of the Foreign Exchange Rate was -8.73 in the year 2006-07. The following table highlight the Gross Domestic Product during the year from 2000-01 to 2018-19

Table 4
Gross Domestic Product during the year from 2000-01 to 2018-19

Year	Gross Domestic Product (In Million US\$)	Increase /Decrease	Growth Rate %
2000-01	468394.95	--	--
2001-02	485441.03	0.0363	3.63
2002-03	514937.96	0.0607	6.07
2003-04	607699.30	0.1801	18.01
2004-05	709148.53	0.1669	16.69
2005-06	820381.67	0.1568	15.68
2006-07	940259.89	0.1461	14.61
2007-08	1216735.43	0.2940	29.40
2008-09	1198895.50	-0.0146	-1.46
2009-10	1341886.70	0.1192	11.92
2010-11	1675615.31	0.2487	24.87
2011-12	1823049.93	0.0879	8.79
2012-13	1827637.86	0.0025	0.25
2013-14	1856722.12	0.0159	1.59
2014-15	2039127.45	0.0982	9.82
2015-16	2103587.81	0.0316	3.16
2016-17	2290432.08	0.0888	8.88
2017-18	2650725.34	0.1573	15.73
2018-19	2718732.23	0.0256	2.56

Source: Computed data received from RBI

Table 4 shows that the Gross Domestic Product growth performance for the study period from 2000-01 to 2018-19. In the initial year 2000-01 to 2018-19 the Gross Domestic Product was grown performance 468394.95, US\$ Million, to 2718732.23 US\$ Million). The highest annual growth rate of Gross Domestic

Product varied between 29.40 percent in the year 2007-08 among the study period. The lowest annual growth rate of Gross Domestic Product was -12.3 in the year 2007-08. The following table highlight the Unemployment Rate during the year from 2000-01 to 2018-19

Table 5
Unemployment Rate during the year from 2000-01 to 2018-19

Year	Unemployment Rate (In Billion US\$)	Increase /Decrease	Growth Rate %
2000-01	2.7309	--	--
2001-02	2.8680	0.0501	5.01
2002-03	3.0520	0.0641	6.41
2003-04	3.1819	0.0425	4.25
2004-05	3.0980	-0.0264	-2.63
2005-06	3.1019	0.0012	0.12
2006-07	2.7369	-0.1176	-11.7
2007-08	2.3989	-0.1234	-12.3
2008-09	2.2679	-0.0546	-5.46
2009-10	2.4749	0.0912	9.12
2010-11	2.4440	-0.0125	-1.25
2011-12	2.5190	0.0306	3.06
2012-13	2.6900	0.0678	6.78
2013-14	2.8229	0.0494	4.94
2014-15	2.7650	-0.0205	-2.05
2015-16	2.7820	0.0061	0.61
2016-17	2.7300	-0.018	-1.86
2017-18	2.5569	-0.0633	-6.33
2018-19	2.5510	-0.0023	-0.23

Source: Computed data received from RBI

Table 5 shows that the Unemployment Rate growth performance for the study period from 2000-01 to 2018-19. In the initial year 2000-01 to 2005-06, the unemployment rate was grown performance (2.7309 to 3.1019). The next followed year's fluctuation trend till 2018-19. The highest annual growth rate of the unemployment rate varied between 9.12 percent in the year 2009-10 among the study period. The lowest annual growth rate of the unemployment rate was -12.3 in the year 2007-08.

Table 6
Descriptive analysis

	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
FDI	3584.22	44458.57	25037.83	15581.62	-.268	-1.548
CPI	2123.60	4546.14	2712.0213	530.65449	2.397	7.888
EXR	41.35	68.42	53.1101	9.64658	.564	-1.426
GDP	468394.95	2718732.23	1436284.79	739313.80	.209	-1.184
UER	2.27	3.18	2.7248	.25722	.196	-.671

Source: Computed

The above table 6 indicates the descriptive analysis of studied variables throughout from 2000-01 to 2018-19. The minimum value of FDI 3584.22 US\$ Million in the year 2000-01 while the maximum value of FDI 44458.57 US\$ Million in the year 2016-17. The mean value is 25037.83 US\$ Million. The SD of FDI was 15581.62. The minimum value of GDP was 468394.95 US\$ Million in the year 2000-01. The maximum value of GDP was 2718732.23 US\$ Million in the year 2018-19. The mean value GDP was 1436284.79 US\$ Million. The three control variables are Inflation Rate, Foreign Exchange Rate, and Unemployment Rate with the mean values which are 2123.60 and 4546.14, respectively. The standard value of CPI is 530.65449. The minimum value of EXR is 41.35 and the maximum value 68.42. The maximum value while the minimum and maximum values of Unemployment are 2.27 and 3.18, respectively.

Table 7
Correlation matrix of economic growth indicators during the period from 2000-01 to 2018-19

		FDI	CPI	EXR	UER	GDP
FDI	Pearson Correlation	1	.664**	.674**	-.707**	.863**
	Sig. (2-tailed)		.002	.002	.001	.000
CPI	Pearson Correlation	.664**	1	.728**	-.368	.836**
	Sig. (2-tailed)	.002		.000	.121	.000
EXR	Pearson Correlation	.674**	.728**	1	-.163	.874**
	Sig. (2-tailed)	.002	.000		.504	.000
UER	Pearson Correlation	-.707**	-.368	-.163	1	-.470*
	Sig. (2-tailed)	.001	.121	.504		.043
GDP	Pearson Correlation	.863**	.836**	.874**	-.470*	1
	Sig. (2-tailed)	.000	.000	.000	.043	

Source: Computed

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

The above table 7 indicates the relationship between foreign direct investment and macroeconomic variables (Gross Domestic Product, Consumer Price Index, Foreign Exchange Rate and Unemployment Rate), the foreign direct investment is significantly positively correlated with GDP, CPI, EXR, and UER. There is a relationship between FDI and GDP, CPI, EXR, UER.

Augment Dickey-Fuller (ADF)

The augmented Dickey-Fuller (ADF) statistic, used in the test, is a negative number. The more negative it is, the stronger the rejection of the hypothesis there is a unit root at some level of confidence.

$$y_i = \beta_1 x_{1i} + \dots + \beta_p x_{pi} + \varepsilon_i$$

Where x_{ij} is the i th observation on the j th dependant variable b_1, \dots, b_p are the regression coefficient and ε is the error term. The below table 7 indicates the

result of the significant relationship between foreign direct investment and macroeconomic factors.

Table 8
Foreign Direct Investment and Macro Economic Factors in India during the period from 2000-2001 to 2018-2019

Variables	Coefficient	Std. Error	t-Statistic	P-value
Foreign direct investment	-0.143614	0.118006	1.217005	0.0241
Gross Domestic Product	0.033555	0.038714	0.866753	0.0398
Consumer Price Index (Inflation Rate)	0.606105	0.239185	2.534039	0.0026
Foreign Exchange Rate	0.021077	0.080936	0.260413	0.0597
Unemployment Rate	0.599025	0.210121	2.850855	0.0128

Source: Computed based on data received from the World Bank

Table 8 represents the Augmented Dicky Filler test of the foreign direct investment and macroeconomic variables. The foreign direct investments have the stationarity at first difference level. The gross domestic product and selected macroeconomic variables have the stationarity at first difference. ADF test has the p-values which are less than 0.05 percent. Hence the null hypothesis has been rejected. Therefore, all the macroeconomic variables have the stationarity at first difference level. So, the data is suitable for further analysis.

Auto-Regressive Distributive Lag (ARDL)

Auto-Regressive Distributed Lag is a time series model where the dependent variable is a function of its lags, other variables, and their lags. ARDL is convenient for modeling I(0) and I(1) variables together and for cointegration testing. ARDL stands for "Autoregressive-Distributed Lag". In its basic form, an ARDL regression model looks like this:

$$y_t = \beta_0 + \beta_1 y_{t-1} + \dots + \beta_p y_{t-p} + \alpha_0 x_t + \alpha_1 x_{t-1} + \dots + \alpha_q x_{t-q} + \varepsilon_t$$

Where ε_t is a random "disturbance" term.

The model is "autoregressive", in the sense that y_t is "explained (in part) by lagged values of itself. It also has a "distributed lag" component, in the form of successive lags of the x_t explanatory variable. Sometimes, the current value of x_t itself is excluded from the distributed lag part of the model's structure.

Table 9
Foreign Direct Investment and Macro Economic Factors in India during the period from 2000-2001 to 2018-2019

Variables	Coefficient	Std. Error	t-Statistic	Prob.*
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CPI(-1)	1.011200	0.510818	1.979572	0.1046
FDI	-0.027590	0.006248	-4.415697	0.0069
FDI(-1)	-0.022410	0.008242	-2.719119	0.0418
FOREX	-65.64224	16.19727	-4.052673	0.0098
FOREX(-1)	96.57158	13.84525	6.975069	0.0009
GDP	0.000640	0.000418	1.529775	0.1866
GDP(-1)	0.001265	0.000551	2.295063	0.0702
GDP(-2)	-0.001422	0.000406	-3.501119	0.0173
UER	-318.0732	410.0211	-0.775748	0.4730
UER(-1)	-1877.299	502.1909	-3.738218	0.0135
UER(-2)	782.3418	259.8791	3.010407	0.0297
C	2786.712	1468.929	1.897105	0.1163
R-squared	0.987429			
Adjusted R-squared	0.959773			
S.E. of regression	104.3772			
Sum squared resid	54472.97			
Log-likelihood	-92.73605			
F-statistic	35.70395			
Prob(F-statistic)	0.000493			
Mean dependent var	2779.483			
S.D. dependent var	520.4117			
Akaike info criterion	12.32189			
Schwarz criterion	12.91004			
Hannan-Quinn criteria.	12.38035			
Durbin-Watson stat	2.193183			

Source: Computed based on data received from world bank/RBI

The above table 9 shows that the causal relationship between foreign direct investment and macroeconomic factors (Gross Domestic Product, Consumer Price Index (Inflation Rate), Foreign Exchange Rate, and Unemployment Rate). The result is the foreign direct investment direct relationship with the Gross domestic product (GDP), foreign direct investment direct relationship with the foreign exchange rate (EXR), foreign direct investment direct relationship with the consumer price index (CPI), and foreign direct investment direct relationship with the Unemployment rate. From the results, four variables have a direct relationship between the five variables. The remaining variable does not cause any other variables.

Conclusion

The study concludes to investigate the consequence of foreign direct investment on economic development in India. The study has been used data from 2000-01 to 2018-19 by using Augmented Dickey-Fuller (ADF) and Auto-Regressive Distributive Lag (ARDL) the results have been estimated. Generally, the analytical result shows that there is a positive relationship between foreign direct investment and macroeconomic factors (Gross Domestic Product, Consumer Price Index (Inflation Rate), Foreign Exchange Rate and Unemployment Rate) this study indicates the positives relationship can be as a result sufficient foreign direct

investment fund invest into India's economy which have been able to exert sufficient consequence to make it develop the economy.

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