Capturing Trends and Patterns of FDI in Agricultural Sector, Agricultural Production, Employment, Income and Trade in India in an Econometric Framework

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Abstract

Foreign Direct Investment(FDI) in developing economies in general and Indian economy in particular acted as a crucial pillar of growth. It acts as a leading indicator to spur employment, Income, capital expenditure, technological knowhow and demand. Henceforth the government has taken several reforms via FDI in various sectors, to get rid from the vicious circle of recession. On the other hand, the structure of Indian economy is highly dependent on the agricultural sector. The backward integration of the manufacturing and service sector in the agricultural sector is significantly high. This makes the sector prominent and considered as a key sector in generating employment, income and exports. The study captures the trends and patterns of FDI in the agricultural sector, since 1991 to 2020. The motive of the study is to prepare a background work of the mega study on FDI in the agricultural sector and its impact on various macro variables. Henceforth, the study has done preliminary study on capturing the trend and patterns of FDI in the agricultural sector, agricultural productivity, employment, income and trade in an econometric based growth model.

Keywords: FDI, Agricultural Sector, Macro Variables, Econometric-Growth Model.

Background and Motivation to Study

FDI has been considered as a leading indicator of economic growth as it spurs demand, employment, standard of living, infusion of capital, improving technology and growth. FDI in India proved to be a growth accelerator in various sectors like Railways, Pharma, Financial institutions, Agricultural etc. The government continuously widens the limits of FDI via automated route in various sectors to trigger its growth. There are various literature available of FDI in India and its determinants and FDI in various sectors but very scant literature is available on FDI in agricultural sector. The structure of Indian economy is highly dependent on the agricultural sector. The backward integration of the manufacturing and service sector in the agricultural sector is significantly high. This makes the sector prominent and considered as a key sector in generating employment, income and exports. Henceforth, the importance of the sector in Indian economy and further scant literature available on FDI in the agriculture sector motivates to underpin the understanding of FDI in the agricultural sector and its effect on various macro variables. Before addressing the major objective to analyze the impact of FDI in the agricultural sector on Agricultural productivity, Income, Employment and Trade, it is imperative to understand the variables well. Thus the paper is able to capture the trend of FDI in the agricultural sector in India. The scope of the paper is wider as the paper is not only limited to FDI in the agricultural sector but captures the trend of other macro variables. The study captures the trends and patterns by the application of econometric based growth curves. The econometric based growth curve is considered as a proxy indicator of Compounded Annual Growth Rates (CAGR). The econometric based growth model has been applied on log

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values of the variables undertaken that are FDI in the Agricultural Sector, Agricultural Productivity, Income, Employment and Trade. The econometric based CAGR model is not based on any a priori assumption to run the model. The growth model is nothing but Ordinary least square and where time is an independent variable. Thus, the log series of the variables has been regressed on time and the coefficient of time provides the growth rate of the variable. Next the study understands the nature of the variables undertaken. For this, descriptive has applied and the preliminary understanding of the variables under study has been done by applying mean, median, variance, skewness, Kurtosis and Jarque Berra test.

Literature Review

There is various literature found on FDI in Indian economy, its determinants and sector FDI. Thus this section highlights certain study that comes in this broad framework. Kaur et al. (2013) established interrelation among FDI and economic growth. Venkatachalam (2000) has analysed the determinants of FDI in India. Singhania (2011), Sultana (2016) and Jena (2018) have identified the trends of various macroeconomic factors as significant determinants of FDI in India. Singh (2016) has the trends and patterns of FDI in India. Das (2018) has analysed the causal nexus among exports, FDI and growth of economy. Bhasin (2016) has done a unique contribution by adding some unconventional variables like labour cost etc. with macro variables as determinant of FDI. Gupta et al. (2008) has done FDI in various sectors of India. Anantaram (2004) had considered wide variables based on social, economic and political factors affecting FDI in India. Woodward and Rolfe (1993) has analysed FDI as a leading indicator of growth.

The present literature provides significance of FDI in the agricultural sector and thus leaves scope to capture the trend and understand the causal nexus among FDI in agricultural sector and various other macro variables.

Research Methodology

Objective of the Data

The objective of the study is to capture the trends and patterns of FDI in the agricultural sector and the key proxy macro indicator of growth.

Variables and Data Profile

The study considers the five variables out of which two are of FDI in agricultural sector and Agricultural productivity and rest three are macro variables that are the proxy and important pillar of growth i.e. Income, Employment and Trade. The data has considered the period of study from 1991 to 2020 from Indian stats database.

Methods and Models

The paper has applied two broad preliminarily models to understand the pattern and trends that are descriptive and econometric based growth models. The models applied are discussed as hereunder:

Descriptive Statistics

The preliminary exercise to understand the data well is required before application of the methods and models. For the understanding of the data has been done with descriptive statistics by using mean, median, model and

skewness. The descriptive has been taken of six variables considered in study that are FDI in agricultural sector, Agricultural production, Income, Employment, Exports and Imports.

CAGR – GROWTH CURVES Econometric models

To understand the trend and captures the growth of variables from 1991 to 2020 i.e. almost three decades the data of six variables that are FDI in agricultural sector, Agricultural production, Income, Employment, Exports and Imports have been analysed from the econometric based Compounded Annual Growth Rate Model. The Growth model of the variable considered has been regressed on time. The six models of growth curves in an econometric framework have been developed. The study has considered the annual time series which is free from seasonality. For the implementation of the growth curve, time has been considered as an independent variable and log values of the dependent variables are considered. Since the study has considered six variables thus, the six growth models have been formulated. That are explained as hereunder as:

Ordinary least squares (OLS) estimates of annual compound growth rates are derived from the following growth curve:

$Y_t = a\, e^{bx+u}$ .....(1)

$\ln FDI\_Agri_t = \alpha + bt + \epsilon_t$ .....(2)

$\ln Agri\_Prod_t = \alpha + bt + \epsilon_t$ .....(3)

$\ln Income_t = \alpha + bt + \epsilon_t$ .....(4)

$\ln Employment_t = \alpha + bt + \epsilon_t$ .....(5)

$\ln Exports_t = \alpha + bt + \epsilon_t$ .....(6)

$\ln Imports_t = \alpha + bt + \epsilon_t$ .....(7)

α is an intercept of the equation and is interpreted as Compound Annual Growth Rate, where FDI in agriculture, Agricultural productivity, Income, Employment, Exports and Imports are the dependent variables.

Empirical Results

The empirical results of the paper discussed the growth curves of variables undertaken in study. The study has applied econometric based growth curves. The results are encapsulated in Table 1.1. Finally, descriptive statistics has been done and the results are displayed in Table 1.2.

Discussion on Results of Growth Curves

The results of growth curves provide very useful insights that are encapsulated hereunder:

1. The R square value of the growth curves varies from 0.194 to 0.965. It means the value explained by the growth curves ranging from 19.4% to 96.5%. In all the variables growth curves fit the data well as the F value is greater than F significance.

2. The beta coefficient ranging from -0.01 to 0.33. It means the CAGR ranging from -1% to 33%. Employment has shown negative growth i.e. -1% and Agricultural production has shown the highest growth rate among all.

3. All variables under study have shown significant growth except employment. FDI in agricultural sector, Agricultural Production, Income, Exports and Imports are having significant growth as they are having t values that are 2.322, 7.154, 17.226, 19.791 and 17.937. The t value is greater than 1.96 at the 0.05 significance level.

4. The negative growth rate of employment has been apparently captured by the growth curves and this is the major concern for the economy and the policy makers.

5. The results of the growth curves have shown that the economy is currently facing the situation of Growth led unemployment. This the major concern.

6. It has also been captured that the growth rate of Agricultural production is greater than the growth of FDI in the agricultural sector. At this stage it could be inferred that the FDI done in the agricultural sector could be one of the reasons for accelerated agricultural production.

7. The growth rate of the variable has shown that Agricultural production has highest growth rate i.e. 33.78%, followed by Imports i.e. 15.14%, followed by Exports i.e. 14.09%, then by Income i.e. 11.55%, then FDI in agriculture sector i.e. 6.4% and lastly negative growth of employment i.e. -1.01%.

8. The state of trade deficit in the economy is perceived in the economy as the growth rate of Imports (i.e. 15%) is higher than the growth rate of exports (i.e. 14%).

Table 1.1 Results of Growth Curve

S.No.	Variable	R square	Alpha	Beta	t0	t1	F	Fsig
1	***FDI_Agri***	0.491	11.064	0.0640	35.182	2.322***	5.393	0.0329
2	***Agi_Prod***	0.866	9.698	0.3378	18.012	7.154***	51.180	0.0000
3	***Income***	0.954	13.226	0.1155	107.606	17.226***	296.741	0.0000
4	***Employment***	0.194	6.067	-0.0101	36.577	-1.007	1.016	0.3228
5	***Exports***	0.965	10.651	0.1409	81.645	19.791***	391.704	0.0000
6	***Imports***	0.958	10.771	0.1514	69.599	17.937***	321.736	0.0000

Discussion on Results of Descriptive

The results of descriptive statistics captured in Table 1.2. For understanding the data well the study has done descriptive in the form of Mean, Median, Standard deviation, Skewness, Kurtosis, Minimum & Maximum. The total number of observations under study is 31. The mean value of Agricultural production is 1390100 million; FDI in agricultural sector is 155446 million; Income is 5983375 Crore; Exports is 789600 and Imports are 1160089 million. The mean value of employment is 392 Lakhs. The Kurtosis is ranging from -1.050 to 18.760. The employment has shown high peakedness in the data set. The skewness of employment is highly negatively

skewed i.e. -3.906. It shows the economy is suffering a high unemployment rate and that should be inferred from the basic statistics. The inference drawn for employment should be the major concern for the state of the economy.

Table 1.2 Results of Descriptive Statistics

	Agri_Prod	FDI_Agri	*Income*	Exports	Imports	Employment
Mean	1390100	155446	5983375	789600	1160089	392
Standard Error	266952	26748	1069692	138785	210810	14
Median	1229195	115966	3390503	456418	660409	401
Standard Deviation	1163615	116591	5955794	772723	1173743	75
Kurtosis	-1.000	1.549	0.152	-1.030	-1.050	18.760
Skewness	0.405	1.399	1.159	0.739	0.725	-3.906
Range	3523466	399846	19808035	2281871	3504811	439
Minimum	12117	35050	531814	32558	43193	44
Maximum	3535584	434896	20339849	2314429	3548004	483
Sum	26411900	2953477	185484635	24477585	35962771	10967
Count	31	31	31	31	31	31

Conclusion

The paper focuses to capture the trends of the variables under study. The trend of the variables captured by econometric based growth curves and visualization of the variables has been done by descriptive statistics. The results are captured in this paper and need to strengthen further by applying more methods and models. The results of the CAGR model and descriptive statistics have shown the actual state of the economy. The results showed that the growth curves in all variables fit the data and all variables have shown positive and significant growth rates except Employment. Agricultural production has shown the highest growth rate over time and the growth of productivity of farms is greater than the growth of FDI in the agricultural sector. Further, employment projected the negative growth rate where income has shown positive and significant growth that reveals the state of unemployment led growth of the economy. Further, the state of trade deficit is also captured by the growth rates of exports and imports. The inferences drawn from basic statistics has shown that employment is negatively skewed and the skewness is high, where rest variables have shown positively skewed distribution.

The inferences drawn in this paper is important for regulators and policy makers for the formulation of reforms to trigger the growth of the economy.

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