

Role of Foreign Direct Investment in Indian Agriculture

[http://doi.org/10.21272/fmir.6\(4\).15-31.2022](http://doi.org/10.21272/fmir.6(4).15-31.2022)

Debesh Bhowmik, ORCID: <https://orcid.org/0000-0002-0293-1066>

Dr, Professor, Lincoln University College, Malaysia

Email: debeshbhowmik269@gmail.com

Abstract. *The paper basically explains the nature and trends of FDI inflows in agriculture and subsectors of agriculture in India under two broad ways. In the first case, the linear trend was examined utilising linear semi-log regression model. In the second case, the nature of cycle and the cyclical trend were found out by applying H.P. Filter model. The linear trend, cycle and cyclical trend of FDI inflows in India in agriculture during 2000-01-2017-18, agricultural services during 2001-02-2021-22, agricultural machinery, tea and coffee, food processing, sugar and fertilisers respectively during 2005-2018 have been computed. Yet, the paper included the nature of global FDI inflows in agriculture very briefly. The paper observed that the linear trends in FDI in agriculture, agriculture service, food processing have been increasing significantly in which their cycle and cyclical trends are significantly meaningful. On the other hand, the linear trends of FDI in tea and coffee and agricultural machinery have been declining insignificantly in which their cycles and cyclical trends are significant in H.P. Filter model. However, the linear FDI trends in sugar and fertilisers sectors have been stepping up insignificantly. Their cycles and cyclical trends revealed insignificant. In the second part, the paper examined the nexus between the gross value added in agriculture and FDI inflows in agriculture from 2000-01-2017-18 and agricultural service during 2001-02-2021-22 using double-log regression model and found out that there is positive relation between them which indicated a stable model. The paper included some important policy measures for India.*

Keywords: FDI, agricultural sectors, agricultural services, gross value added in agriculture.

JEL Classification: C13, C32, N5, Q0, Q1.

Type of manuscript: research paper.

Received: 15.09.2022

Accepted: 25.10.2022

Published: 30.12.2022

Funding: There is no funding for this research.

Publisher: Sumy State University

Cite as: Bhowmik, D. (2022). Role of Foreign Direct Investment in Indian Agriculture. *Financial Markets, Institutions and Risks*, 6(4), 15-31. [http://doi.org/10.21272/fmir.6\(4\).15-31.2022](http://doi.org/10.21272/fmir.6(4).15-31.2022)



Copyright: © 2022 by the author. Licensee Sumy State University, Ukraine. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Introduction

India is principally an agricultural country. Agriculture and its allied activities provide a livelihood for more than half of the Indian population. In terms of gross domestic product (GDP), the sector accounts for 14% of India's GDP. Agriculture also serves as an input for other sectors by providing them raw materials. India is the largest producer of milk, jute, organic fibres and pulses and the second-largest producer of sugarcane, wheat, rice, vegetables, fruits, groundnuts, and cotton. The country is also the leading producer for certain plantation crops as well as spices. India is the second largest fruit producer in the world.

Presently, in India, FDI up to 100% is allowed under automatic route in specific area of agriculture and its allied sectors. The sectors are as follows: Floriculture, Horticulture, Apiculture, Cultivation of vegetables and mushrooms (under controlled conditions), Development and production of seeds, Planting material, Animal husbandry (including breeding of dogs), Pisciculture, Aquaculture (under controlled conditions), Services related to agro and allied sectors respectively. Plantation sectors namely tea, coffee, cardamom, rubber, olive, and palm oil tree penetrate 100% FDI under automatic route. FDI in agriculture sector is inevitable factor that drives agriculture to attain sustainability through foreign investment. Foreign

investment in agriculture also enables farmer to implement new techniques in farming that increase the yield and production capacity along with fund inflow (Glady,2019).

FDI inflows in agricultural sector has a great impact on employment opportunity as envisaged by Dhungana and Ghimire (2013). Contract farming ensures execution of concepts like Agro Credit, Insurance, development in agriculture have direct impact for FDI inflows in Indian agriculture. It has attractive opportunities such as interest for farming information sources and united administrations like warehousing and cold stockpiling in expanding in India at a quick pace. FDI in rural retailing has the capability of supporting agrarian development (Nedumaran &Manida,2019) but there needs to be a change in the regulatory framework to begin with if farmers are to enjoy the benefits of FDI in retail (Ray,2014). FDI plays a significant role in increasing productivity by offsetting the investment and technological gap (Tangade,2018). Even, foreign investment in agriculture additionally permits farmer to implement new techniques in farming that increase the yield and production capability in conjunction with fund influx (Arokiasamy,2021). It is a challenge for a developing country like India to channelize its capital inflow through FDI into a potential source of productivity gain for domestic firms especially into agriculture (Tangade,2018).

In this paper, author tried to show the behaviour of FDI inflows in agriculture and estimated the nexus between gross value added in agriculture and the FDI inflows of agriculture in India during 2000-01-2017-18 and agriculture services during 2001-02-2021-22 respectively.

Some important Literatures

Msuya (2007) observed that FDI has a positive impact on productivity especially to smallholder farmers who are linked in integrated producer schemes in Tanzania and recommended that rethinking of the smallholder institutional setup for increasing productivity and FDI flow to the agricultural sector.

Ray (2014) argued that the introduction of FDI would benefit the farmers in a number of different ways, notably by eliminating the exploitative middlemen and giving better prices to farmers. It has also been claimed that entry of retail giants will greatly improve the agricultural marketing infrastructure and wastage problems will be solved.

Singh and Walia (2015) studied that there is a strong need to adopt many measures to promote FDI inflow in agriculture sector in Indian economy to improve agriculture productivity and streamline it with manufacturing and services sector.

Chaudhury (2016) argued that FDI in agriculture will boost productivity and may bridge the technological gap.

Wadha and Wadha (2014) noted the main problems in the agricultural sector in challenging to utilise FDI inflows, as listed by the World Bank, are given below.

- India's large agricultural subsidies are hampering productivity-enhancing investment.
- Overregulation of agriculture has increased costs, price risks and uncertainty.
- Government interventions in labour, land, and credit markets.
- Inadequate infrastructure and services.

Franz and Muller (2015) described that in India the share of the agricultural sector in the total FDI volume is very low, but India's absolute FDI values are higher and allow for bigger transformation processes in retail and wholesale, food processing and input industries compared to SSA countries. India's investors, compared to those in SSA seem to be more interested in the domestic market compared to SSA. It is reported that (a) a considerable increase in FDI in agri-food networks has occurred in India and SSA, (b) a significant amount is invested by actors from Europe, (c) the FDI increases show an uneven spatial distribution, having effects on selected parts of the agri-food networks and the large variety of effects may counteract one another.

Haldar, Dhar and Srivastava (2017) stated that FDI in Indian agricultural sector is no doubt a necessity, however, any increase in equity stake of the foreign investors in existing joint ventures or purchase of a share of equity by them in domestic firms would not automatically change the orientation of the firm. That is, "the aim of FDI investors would be to benefit from the profit earned in the Indian market. As a result, in

such cases FDI inflows need not be accompanied by any substantial increase in exports, whether such investment leads to modernization of domestic capacity or not”.

Epaphra and Mwakalasya (2017) used econometric model and found that there is no significant effect of FDI inflows on agriculture value added-to-GDP ratio in Tanzania despite the fact that FDI inflows in economy have been outstanding particularly in past two decades. Unsurprisingly, the results show that FDI inflows-to-GDP ratio and real GDP growth rate are positively correlated. Notwithstanding, agriculture sector, which constitutes the largest proportion of the total labour force, contributes, on average, less than 30 percent, to total GDP. This suggests that the sector is inefficient and therefore, effort towards attracting more FDI aiming at improving productivity in agriculture sector, which in turn may reduce poverty, is much needed.

Medhi (2017) found out that FDI can be one of the best ways to boost the agricultural sector in India by improving agricultural productivity and farm income. FDI inflows to agricultural sector is a good driver to boost the developmental process in this sector. There is a significant relationship between FDI inflows in agricultural sector and agricultural GDP in India. The co-efficient of correlation between FDI in agricultural sector and agricultural GDP is 0.49 which implies that there is a positive correlation between the two which is significant at 0.05 or 5% level of significance.

The study of Hampel-Milagrosa et.al. (2017) contributes to filling an important research gap. It provides an answer on the extent to which traditional and supermarket-driven vegetable value chains differ, and on how retail FDI liberalisation will impact the governance and efficiency of each value chain. Using the parameters of profits and crowding out, this paper evaluates how retail FDI liberalisation could impact on the income and the future of farmers, middlemen and retailers, in one of the world’s largest economies. It observed that the Indian liberalisation of retail FDI has not yet any major impact on the profits and outlook of farmers, intermediaries and retailers. About Andhra Pradesh, the paper concluded that retail FDI liberalisation is not negatively impacting traditional agricultural value chains in the state and in fact, in its current form, is providing financial benefits to producers who supply to supermarkets.

Wable, Nimbarkar, Kudale and Jadhav (2018) examined statistically that there is positive relation between agricultural GDP and FDI in agriculture during 2000-01-2012-13 in India and it is positively significant in one period lag and even FDI is positively significant with agricultural export.

Jana, Sahu and Pandey (2019) studied the first of its kind in India which makes an endeavour to device the distinguish impact of sector-wise decomposed FDI inflows on the growth of three of its economic sectors. The study documents remarkably different findings for different sectors as expected. First, the study evidences a positive short- and long-run unidirectional causality from agricultural output to FDI inflow in the sector. However, the study finds agricultural output to be strongly exogenous. Interestingly, the impulse response function analysis even suggests a negative impact of agricultural FDI on the output growth of the sector in the first few years. Therefore, FDI in agricultural sector fails to exert any favourable impact on the growth of this sector of Indian economy. This is mainly because the primary sector in India, even after much government intervention and policy implications, is still suffering from feeble infrastructure and technology base resulting in poor investment absorptive capacity and weak linkages among the intra-sectoral components.

The econometric analysis of Kubik and Husmann (2019) during 2003 – 2017 reveals that market potential is one of the main drivers of FDI in food and agriculture sector in Africa. Specifically, population size consistently has a significant impact on sectoral FDI inflows, irrespective of the model specification. However, the weight of supply-side factors in attracting foreign investment is also high. Countries’ natural endowments, proxied here by the logarithm of the size of agricultural land, turn out a significant predictor of FDI inflows into the food and beverage cluster in Africa. Not surprisingly, the magnitude of the impact is the highest in 2008-12 period when foreign investors sought to capitalize on high food prices. Agglomeration effects are also observed, with a lagged volume of FDI inflows having a very strong impact on the level of current FDI.

Solomon (2021) argued that Foreign Direct Investment (FDI) Policy in Agriculture aims at attracting investment in technology, machinery, equipment, seeds/ planting material, warehousing and cold storages and other infrastructure logistics. It complements public and private investments necessary to bring knowledge, technologies and services to farmers. FDI is important for India because it is an important

economic growth driver and has the potential to transfer knowledge and technologies, create jobs and eradicate poverty through economic development of different regions.

Objectives of the paper

The paper endeavours to focus on the nature of FDI inflows in agriculture and some sub-sectors in agriculture in India. The paper consists of two parts. In the first part, the paper examined the nature of linear trend, non-linear cycle and cyclical trend of FDI inflows in agriculture during 2000-01-2017-18, agricultural services during 2001-02-2021-22, tea and coffee, agricultural machinery, food processing and sugar and fertilizer respectively by applying semi-log linear regression trend and H.P. Filter models during 2005-2018 respectively. Although, the paper focussed the nature of global FDI inflows in agriculture in brief. Moreover, in the second part, the paper empirically verified the econometric relation between the FDI inflows in agriculture during 2000-01-2017-18, agricultural services and the gross value added in agriculture in India during 2001-02-2021-22 by using the double-log regression model.

The methodology and the source of data

The linear trend line has been fitted through semi-log regression model, e.g., $\log(y)=a+bt+u_i$ where y is the variable to be fitted, a and b are constants and t is the time, u_i is random error. The double log regression model was used to show relationship between two variables here, e.g., $\log(y)=a+b\log(x)+u_i$ where y and x are the variables to be related, a and b are the constants and u_i is the random error. The decomposition of trend and cycles were done through using H.P. Filter model (1997).

The data of total FDI inflows in agriculture was collected from Directorate of Economics and Statistics. The data of FDI inflows of agricultural services were collected from the DPIIT, Ministry of Commerce & Industry. Moreover, the data of FDI inflows of tea and coffee sector, agricultural machinery sector, food processing sector, sugar and fertilisers sectors have been obtained from ([India Foreign Direct Investment: Inflow: Annual: by Industry](#)).

FDI flows in Agriculture

FAOSTAT Analytical Brief 34 stated that total Foreign Direct Investments (FDI) inflows increased by 4.0 percent from USD 1.46 trillion to USD 1.52 trillion during 2010-2019. FDI's fluctuated around USD 1.45 trillion between 2010 and 2014. They spiked in 2015 and 2016 due to a swell in cross-border mergers and acquisitions in line with the large corporate reconfigurations by multinationals (total FDI inflows soared by 61 percent between 2014 and 2016 to USD 2.2 trillion, reaching the highest level since 2010) and then stabilized around USD 1.5 trillion in 2017–2019 (Figure 1). The share of FDI in agricultural sector is shown by yellow line which has two peaks and two troughs.

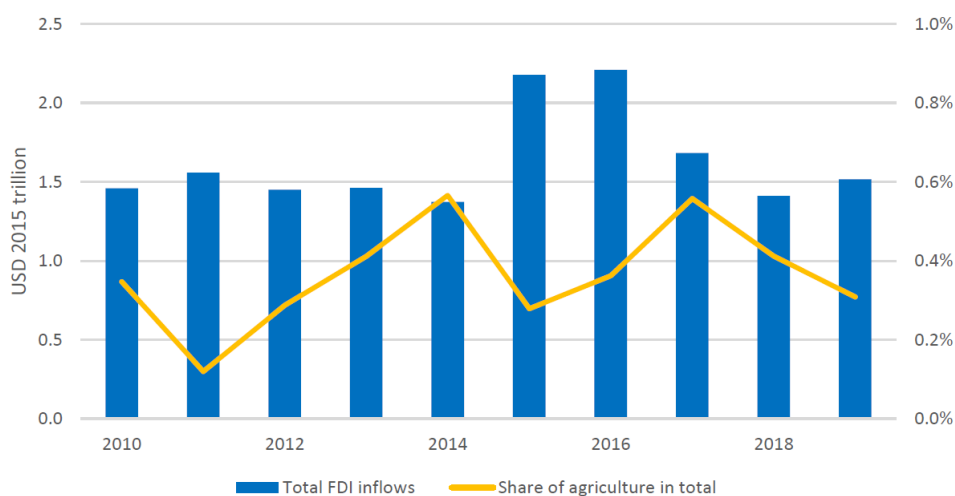


Figure 1. Global FDI inflows

Source: FAO. (2022). FAOSTAT: Foreign Direct Investment (FDI). In: FAO. Rome. [\[Link\]](#)

Total FDI outflows fell by 16.6 percent from USD 1.4 trillion to USD 1.2 trillion between 2010 and 2019. They peaked at USD 1.8 trillion in 2015, stabilized at USD 1.6 trillion in 2016–2017 before falling to USD

0.8 trillion in 2018 and rebounding to USD 1.2 trillion in 2019 (Figure 2). The yellow line showed the agricultural share of FDI which is cyclical consisting of 4 peaks and 3 troughs and finally it is downward.

Agriculture accounts for a small share of global FDI inflows and outflows compared to other economic sectors: it represented less than 1 percent of the total FDI inflows between 2010 and 2019, and its share in total FDI outflows was also below 1 percent between 2010 and 2019, except in 2014 when it peaked at 1.1 percent.

In Africa, FDI focuses largely on rice, wheat, oil crops and floriculture production, in Asia, the focus is on rice, wheat, meat and poultry production; and in South America, the focus is on fruits, sugar cane, flower and soybean production

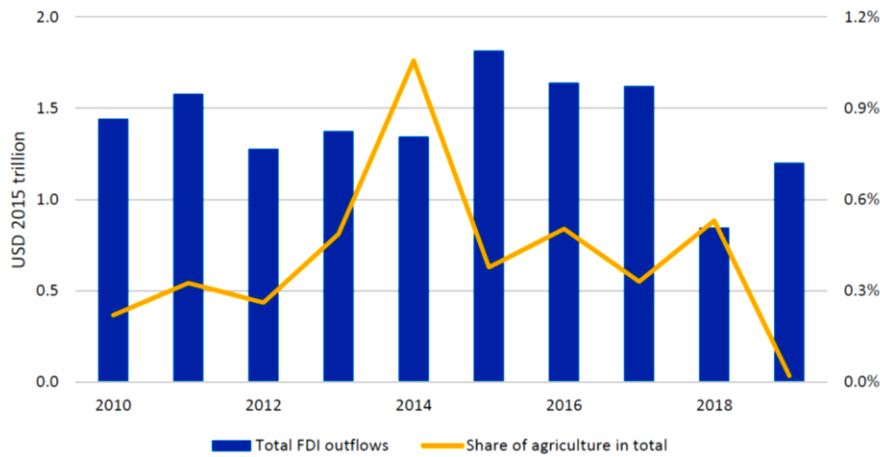


Figure 2. Global FDI outflows in agriculture

Source: FAO. (2022). FAOSTAT: Foreign Direct Investment (FDI). In: FAO. Rome. [\[Link\]](#)

Indonesia was the top recipient country of FDI inflows to agriculture from 2015 to 2019, with USD 3.1 billion per year on average. Norway was the second, with USD 940 million per year on average, followed by Oman with USD 816 million per year on average. The large amount of FDI inflows to agriculture in Indonesia can be related to the relaxation on its FDI regulations in recent years, which allowed foreign entities to own a larger stake in domestic enterprises: in the case of the palm oil production industry, foreign entities can own 95 percent of local companies (Oxford Business Group, 2019).

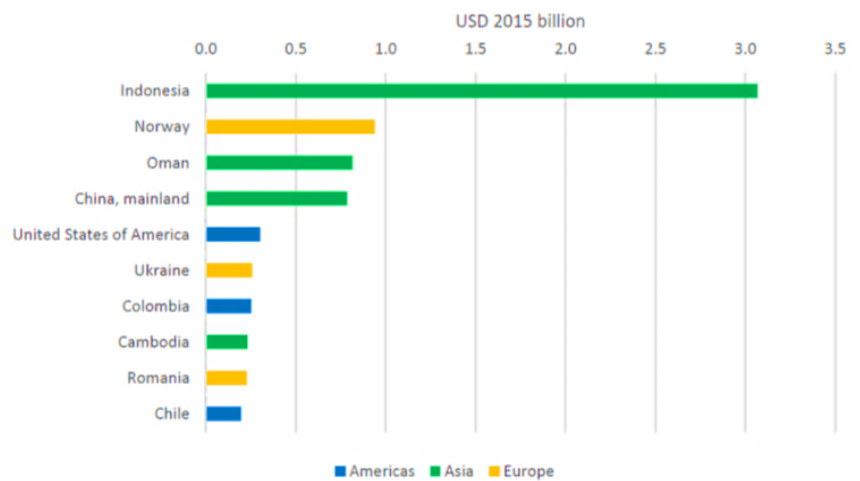


Figure 3. The recipient of FDI

Source: FAO. (2022). FAOSTAT: Foreign Direct Investment (FDI). In: FAO. Rome. [\[Link\]](#)

China, mainland was the top country providing FDI outflows to agriculture from 2015 to 2019, with USD 2.77 billion per year on average. India was the second, with USD 2.72 billion per year on average, followed by Norway with USD 302 million per year on average.

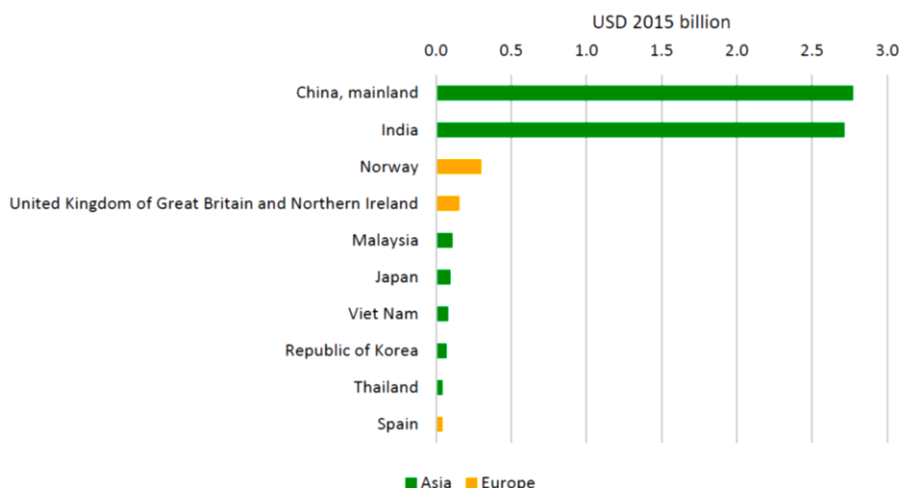


Figure 4. Annual FDI outflows to agriculture, top 10 countries (2015–2019 average)

Source: FAO. (2022). FAOSTAT: Foreign Direct Investment (FDI). In: FAO. Rome. [\[Link\]](#)

Nature of foreign direct investment in agriculture in India

Indian agriculture opened the door for foreign direct investment in different sectors of the agriculture. Presently government approved 100% entry of FDI in agriculture which has a direct impact in production and services in the sector so that gross value added in agriculture may enhance and can flourish growth rate in the development process. However, the FDI in agriculture could not increase steadily where it consists of ups and downs. In Table 1, the FDI inflows in agriculture is shown from 2000-01 to 2017-18 where it starts from 267 billion rupees which increased to 4650 billion rupees in 2017-18 but it abruptly fell in 2008-09 due to financial crisis. Similarly, FDI in agricultural services has not shown steady increase. In 2003-04, 2008-09, 2019-20 the values have insignificantly fallen in which financial crisis in 2008-09 and in 2019-20 covid-19 were the primary reasons to drop down.

Table 1. FDI inflows in Agriculture

	Total FDI flows in Agriculture (billion Rs)	FDI inflows in Agricultural services (US \$ m)
2000-01	267	
2001-02	319	14.06
2002-03	201	11.01
2003-04	628	0.59
2004-05	581	3.83
2005-06	688	9.08
2006-07	668	12.53
2007-08	1744	58.13
2008-09	351	5.35
2009-10	1014	1222.22
2010-11	1823	43.9
2011-12	1888	4902
2012-13	8759	161.47
2013-14	5596	91.01
2014-2015	3523	59.75
2015-16	5725	84.65
2016-2017	4125	76.43
2017-2018	4650	110.19
2018-2019		88.76
2019-2020		52.19
2020-2021		117.1
2021-2022		41.63

Source: First Column-Directorate of Economics & Statistics; For second column-DPIIT, Ministry of Commerce & Industry.

In Table 1, foreign direct investment inflows in Indian agriculture have been cited where it is found that the values showed ups and downs during the available period from 2000-01-2017-18 and there is no steady path. However, Foreign direct investment in Indian agriculture has been growing at the rate of 20.02% per year during 2000-01-2017-18 significantly at 5% level. The estimated trendline is given below.

$$\text{Log}(x_1) = 5.269 + 0.2002t$$

$$(19.99) * (8.22) *$$

$R^2 = 0.808$, $F = 67.69*$, $DW = 2.00$, $x_1 = \text{FDI in agriculture}$, $t = \text{year}$, $*$ = significant at 5% level

In Figure 5, the fitted and actual FDI trend line in agriculture have been shown below where the linear trendline is upward although the actual line showed many upswings and downswings phases.

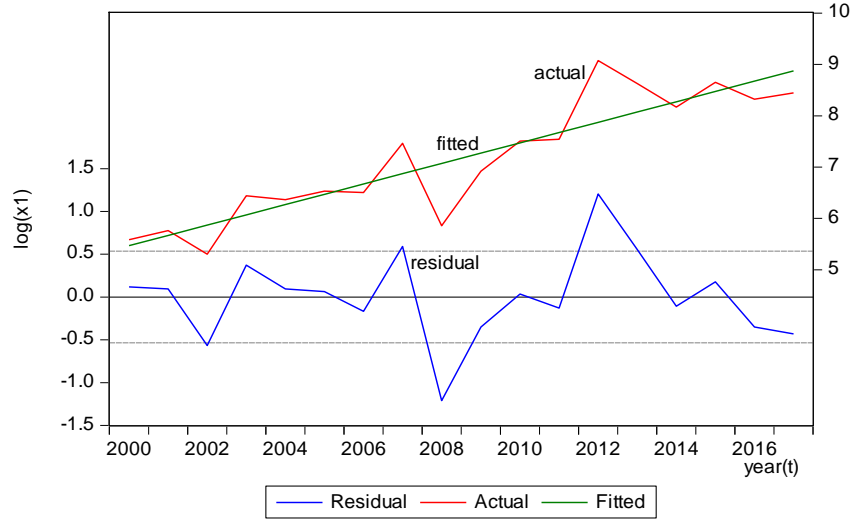


Figure 5. The trendline of FDI in agriculture.

Source: Plotted by author.

The estimated trend line is a stable model because its CUSUM line lies between $\pm 5\%$ level which is shown below in Figure 6.

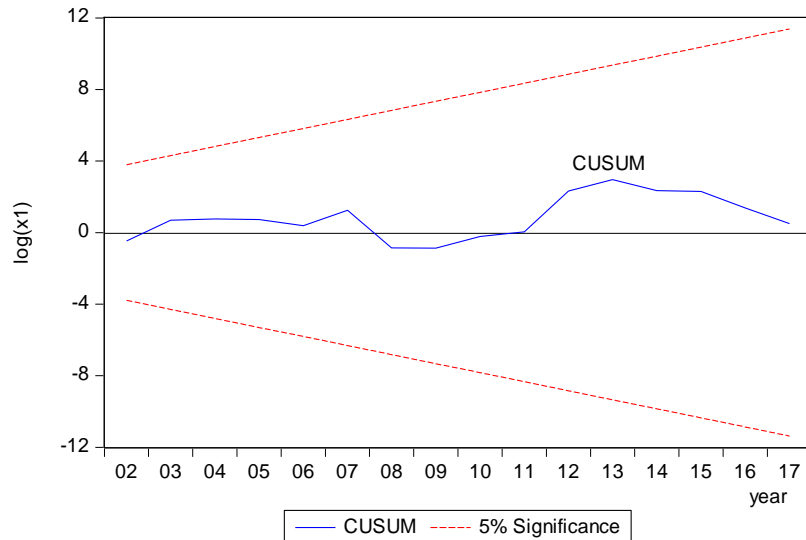


Figure 6. Stability of trendline

Source: Plotted by author.

In Table 1, column 2, the data of FDI inflows in agricultural services in India from 2001-02 to 2021-22 have been arranged where it is observed that the values have not shown spontaneous increase. On the other hand, the foreign direct investment in agricultural service in India has been growing at the rate of 15.43% per year significantly at 5% level of significance. The estimated trendline is given below.

$$\text{Log}(x_2) = 1.948 + 15.436t$$

(1)

$$(2.32)^* (2.48)^*$$

$R^2=0.24$, $F=6.15^*$, $DW=1.73$, $x_2=$ FDI in agricultural services, $t=$ year, $n=20$, $^*=$ significant at 5% level.

In Figure 7, the linear trend line is shown below where the trendline is upward, but the actual path is consisting of 6 peaks and 6 troughs.

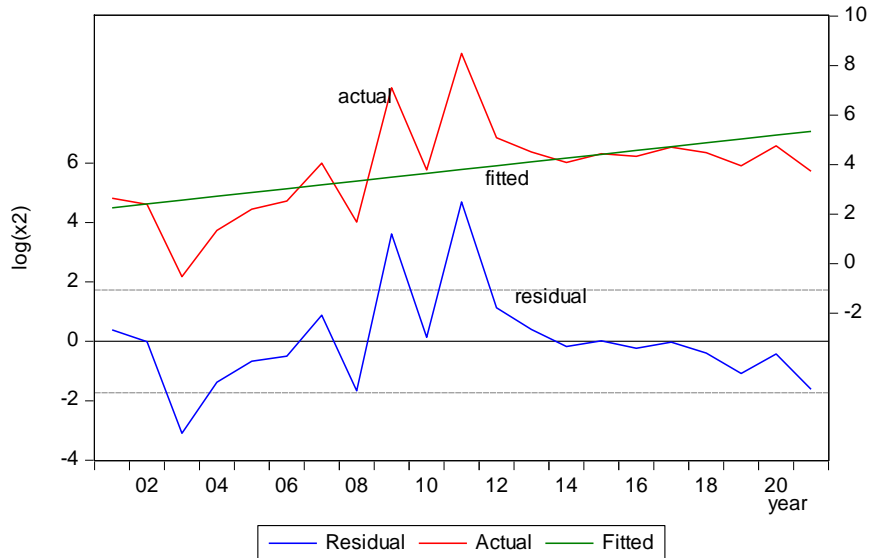


Figure 7. Trendline of FDI in agricultural services

Source: Plotted by author.

This trend line is stable since its CUSUM lies between $\pm 5\%$ significant level which is shown below in Figure 8.

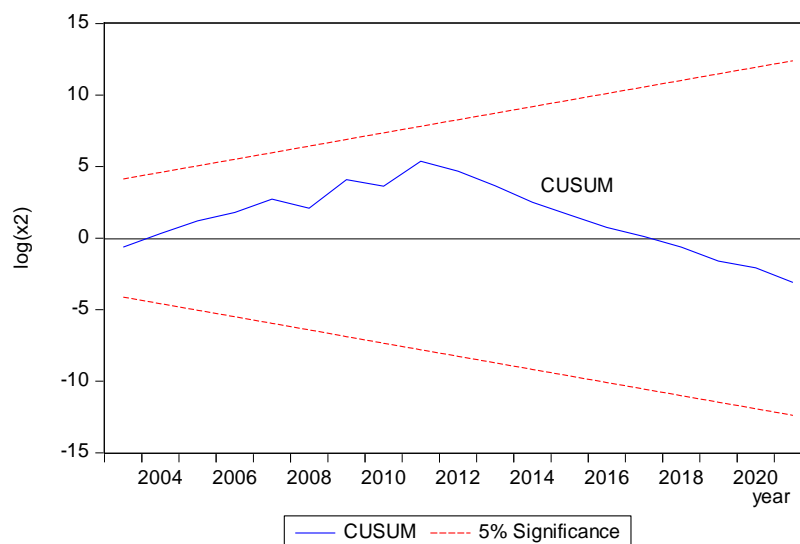


Figure 8. Stability of FDI in agri-services

Source: Plotted by author.

In Table 2, FDI inflows in 5 sectors of agriculture were shown from 2005 to 2018 respectively in which food processing sector consumed the lion’s share of the FDI inflows followed by fertiliser, tea and coffee, machinery, and sugar etc. All the sectors did not show in steady progress where in 2009 the flows abruptly fell due to financial crisis. Besides that, the irregular movement of FDI has hampered the planning and research of the said sectors.

Table 2. FDI inflows in Agricultural sector (in million Rupees)

	Agricultural service	Tea & Coffee	Agricultural machinery	Food processing	Sugar	Fertiliser
2005			2777.52			
2006			2527.51			
2007	4869.26	147.34	240.44	2836.83	446.65	48.33
2008	442.22	2352.17	6426.65	6360.28	226.80	1414.31
2009	63377.29	39.45	00	9661.89	2.40	584.81
2010	2289.10	460.08	68.81	9751.02	10.29	857.98
2011	2387.10	169.19		8648.41	199.50	1609.58
2012	2407.01	79.40		17158.98	563.60	2289.72
2013	10544.22	224.12		225963.30	213.52	1123.69
2014	3989.4	125.70	4576.70	55677.80	489.30	
2015	6325.06	159.66	619.18	33095.02	8093.45	774.82
2016	2084.53	97.27	1551.74	52511.13	114.60	722.87
2017	9586.73	1046.25	1320.79	57271.47	1413.80	1725.15
2018	5931.03	891.47	404.86	40169.97	132.56	5962.84
2019	6687					
2020	3966					
2021	8899					

Source: www.ceicdata.com

In Table 2, the data on FDI in tea and coffee sectors is included which have many ups and downs. The linear trend line of the FDI of tea and coffee sector is insignificantly decreasing at the rate of 0.96% per year during 2007-08-2017-2018.

$$\text{Log}(x_3) = 5.481 - 0.0096t \quad (2)$$

$$(3.46) * (-0.08)$$

$R^2=0.007$, $F=0.0066$, $DW=2.84$, $x_3=$ FDI in tea and coffee sector, $t=$ year, $n=11$, $*$ =significant at 5% level.

This insignificant linear trendline is given below in Figure 9 where the trendline is downward sloping marginally and the actual path consists of many upward and downward changes which were clear in the diagram.

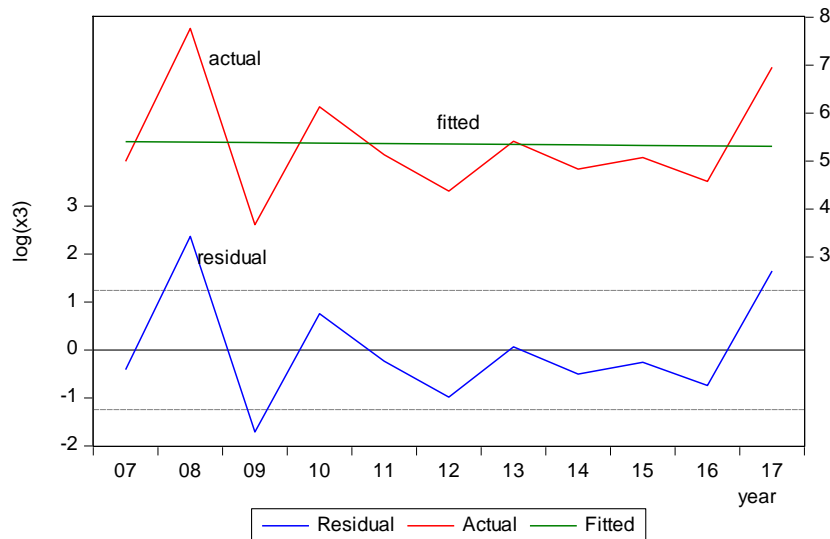


Figure 9. Trendline of FDI in tea and coffee

Source: Plotted by author.

The H.P.Filter trend line and cycle of the FDI in tea and coffee(x_3) have been depicted in Figure 10 which showed that the trend line is declining and is moving upward marginally and the cycle consists of peaks and troughs.

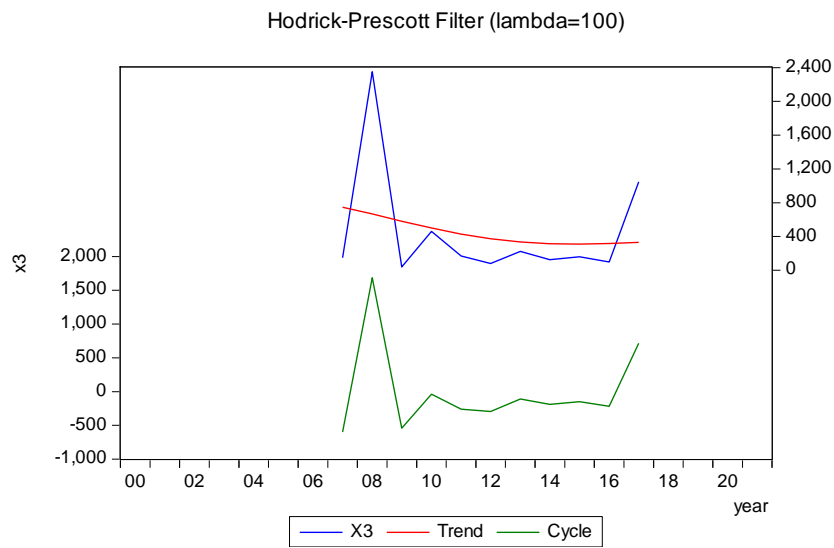


Figure 10. HP filter of FDI in tea and coffee sector

Source: Plotted by author.

In Table 2, the FDI in agricultural machinery sector have been shown. The data has shown irregular movement of increases and decreases. The foreign direct investment in the sector of agriculture machinery has been decreasing insignificantly at the rate of 3.0% per year during 2005-06-2017-18 which is estimated below.

$$\text{Log}(x_4) = 5.393 - 0.03008t \tag{3}$$

(1.62) (-0.11)

$R^2 = 0.001$, $F = 0.0130$, $DW = 1.35$, $x_4 = \text{FDI in agricultural machinery}$, $t = \text{year}$, $n = 13$.

This insignificant linear trend line is depicted in Figure 11 below where the fitted trend is downward.

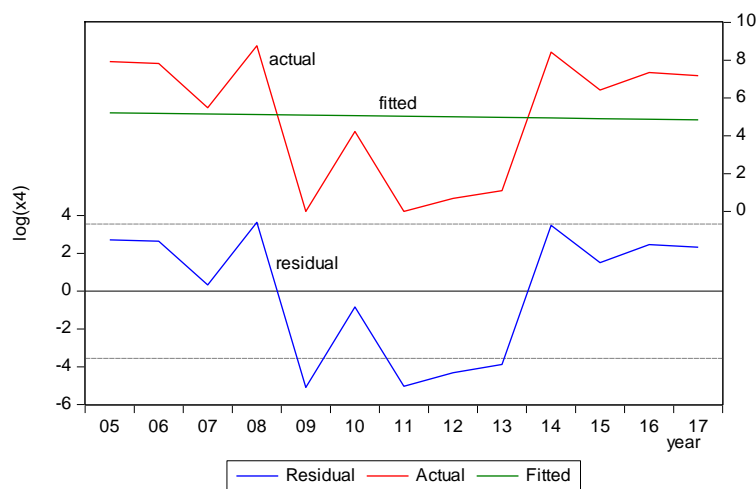


Figure 11. Trendline of FDI in agricultural machinery

Source: Plotted by author.

The H.P.filter model of FDI in agricultural machinery assured that its trend is decreasing but it has cycles of 3 peaks and troughs which are showed in the Figure12 below.

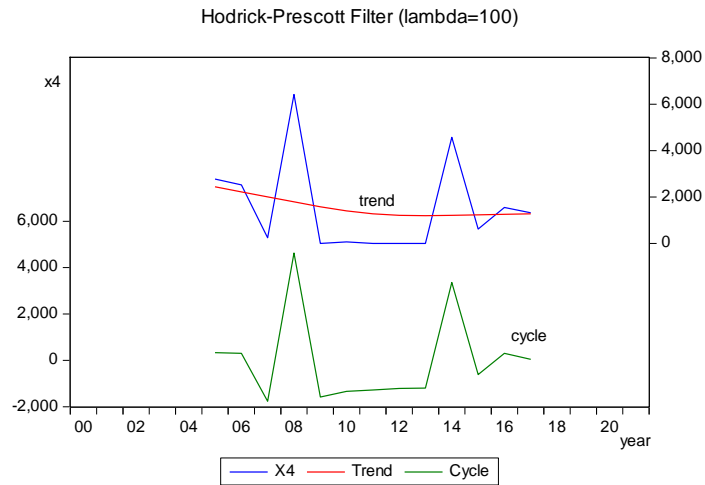


Figure 12. HP filter of FDI in agricultural machinery

Source: Plotted by author

In Table 2, the FDI inflows in the sector of food processing have been given where in some years the values have fallen. The FDI in food processing sector has been significantly increasing at the rate of 30.82% per year during 2007-08-2017-18 which is estimated below.

$$\text{Log}(x_5) = 5.935 + 0.3082t \quad (4)$$

$$(5.87)^* (4.08)^*$$

$R^2=0.64$, $F=16.66^*$, $DW=1.68$, $n=11$, x_5 =FDI in food processing, t =year, $n=11$, $*$ =significant at 5% level.

The significant linear trend line is depicted below in Figure 13 where the linear trendline is found upward from left to right although the actual line showed two peaks and 2 troughs.

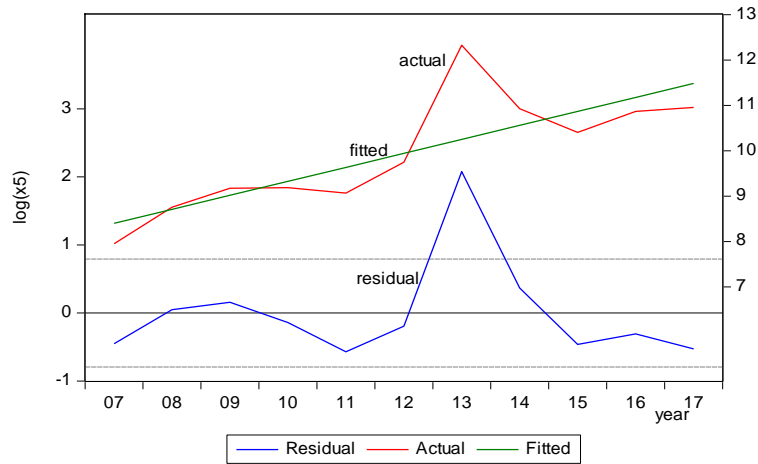


Figure 13. Trendline of FDI in food processing

Source: Plotted by author.

This estimation trendline model is stable since its CUSUM passes through $\pm 5\%$ significant level which is shown below in Figure 14.

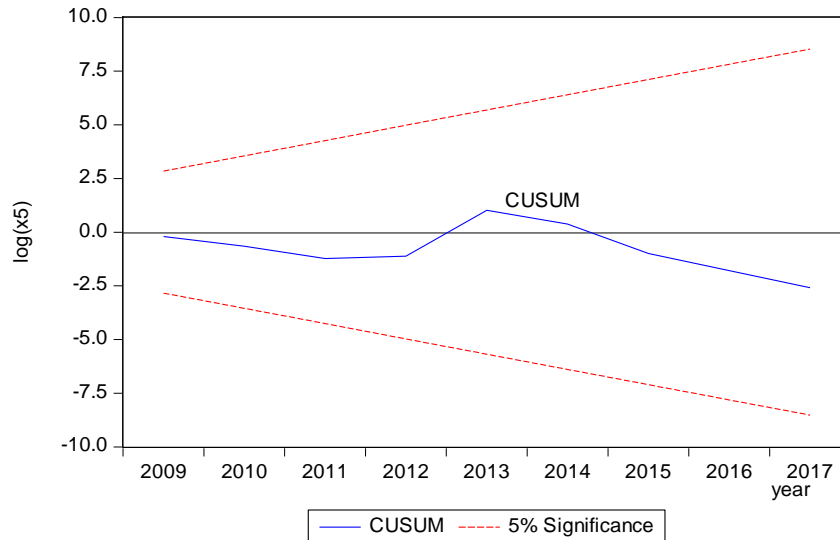


Figure 14. Stability of trendline

Source: Plotted by author.

In Table 2, the data on FDI on sugar sector is shown where in many years the values have been fallen. No continuous increase was observed. The FDI in sugar sector has been insignificantly increasing at the rate of 31.99% per year during 2007-08-2017-18 which is estimated below.

$$\text{Log}(x_6) = 1.196 + 0.3199t \tag{5}$$

$$(0.45) \quad (1.64)$$

$R^2=0.23$, $F=2.70$, $DW=1.79$, $n=11$, x_6 =FDI inflows in sugar sector, t =year

This insignificant upward linear trend line is plotted in Figure 15 below.

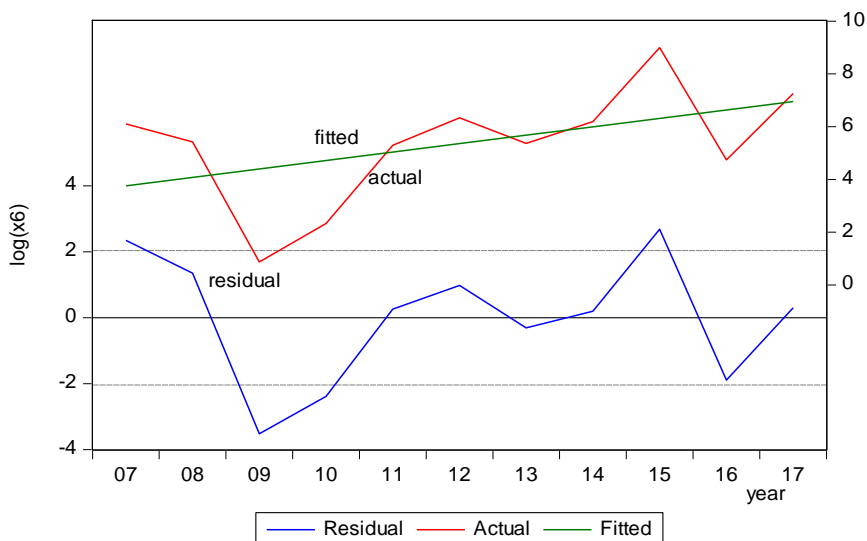


Figure 15. The trend line of FDI in sugar

Source: Plotted by author.

The decomposition in HP filter model in FDI in sugar sector states that its trend line is upward, but it has cycle of two peaks and two troughs which are shown in Figure 16 below.

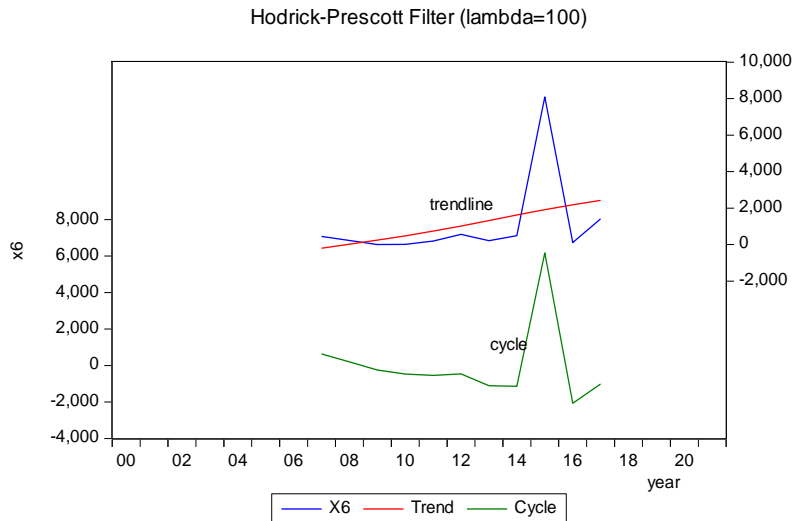


Figure 16. HP filter of FDI in sugar sector

Source: Plotted by author.

The FDI inflows in fertiliser sector in India is shown in Table 2 where its values are mostly irregular. Therefore, the linear estimated trend line of FDI in fertiliser sector is insignificant increasing trend which increases at the rate of 1.96% per year during 2007-08-2017-08.

$$\text{Log}(x_7) = 5.843 + 0.0196t \quad (6)$$

(1.91) (0.08)

$$R^2 = 0.00082, F = 0.0074, DW = 2.08, x_7 = \text{FDI in fertiliser sector}, t = \text{year}, n = 11$$

In Figure 17, it is plotted where the fitted trend line and the actual line of FDI in fertiliser sector have been shown.

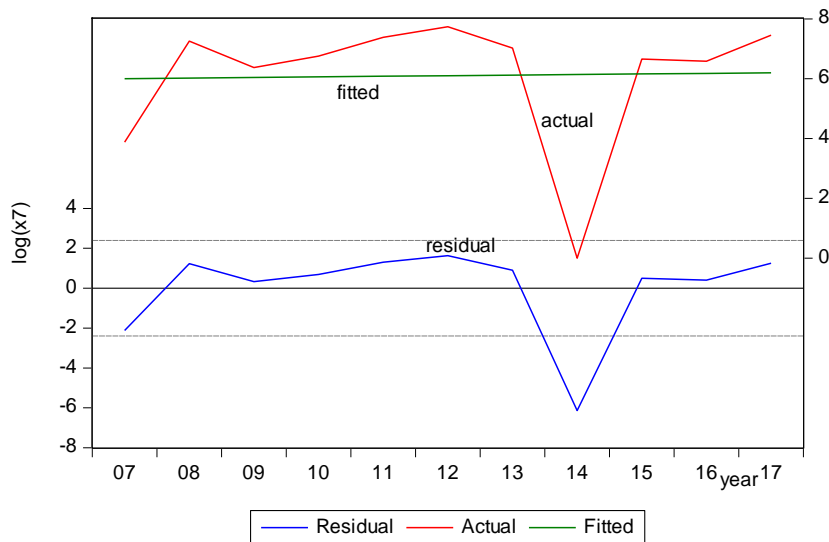


Figure 17. The trendline of FDI in fertiliser

Source: Plotted by author.

In HP filter model, it is found that FDI in fertiliser sector during 2007-08-2017-08 has shown an increasing trend and a cycle of 3 peaks and troughs respectively which is plotted in Figure 18 below.

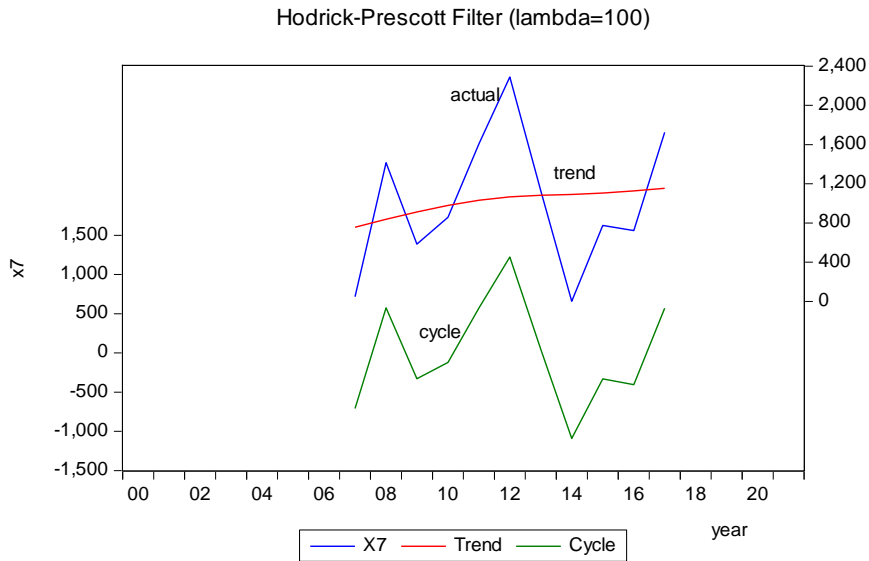


Figure 18. HP filter of FDI in fertiliser

Source: Plotted by author.

Relation between gross value added in agriculture and the FDI inflows in agriculture

There is a positive relation between the gross value added in agriculture and the FDI inflows in agriculture in India during 2000-01-2017-18 which is estimated by double log regression model given below.

$$\text{Log}(y)=10.4966+0.4694\text{log}(x_1) \tag{7}$$

(25.80)* (8.38)*

$R^2=0.81$, $F=70.26^*$, $DW=1.605$, $n=18$, y =gross value added in agriculture, x_1 = FDI inflows in agriculture, *=significant at 5% level.

This equation states that one percent increase in FDI inflows in agriculture per year induced to increase 0.469% per year in gross value added in agriculture in India during the specified period and this result is statistically significant at 5% level.

This model is stable in the sense that the CUSUM of squares line passes through the $\pm 5\%$ level of significance which is shown in Figure 19 below.

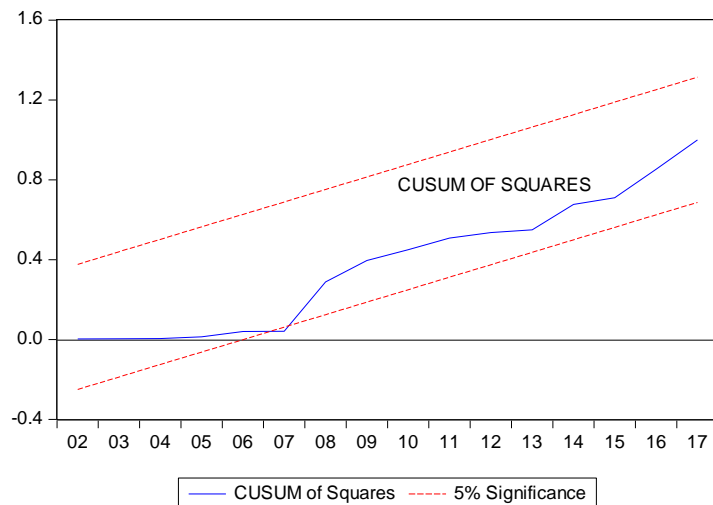


Figure 19. Stability of the relation

Source: Plotted by author.

Moreover, it is understood that the FDI inflows in agricultural services influenced the gross value added in agriculture in India during 2001-02-2021-22 which was found from the double log regression model. The estimated model is given below.

$$\text{Log}(y)=13.352+0.1908\text{log}(x_2) \quad (8)$$

(46.15)* (2.81)*

$R^2=0.305$, $F=7.927^*$, $DW=0.611$, $n=20$, y =gross value added in agriculture, x_2 =FDI inflows in agricultural services, $*$ =significant at 5% level.

The estimated equation states that one percent increase in FDI inflows in agricultural services per year led to 0.19% increase per year in gross value added in agriculture in India during the said period. It is statistically significant although its R^2 value is low and DW is low because there may be autocorrelation problem. Therefore, the stability model diverged in some periods from 2009-2015 and then it backed into the significant level of $\pm 5\%$ level which is shown in Figure 20 where the line of CUSUM of squares was not significant for the entire period but it converged.

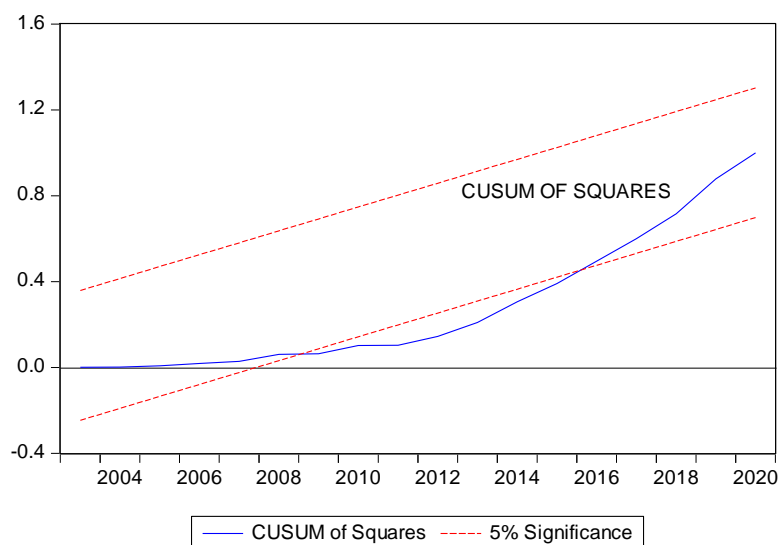


Figure 20. Stability of FDI inflows in agri-services and gross value added in agriculture

Source: Plotted by author.

Limitations of the analysis

The trend line analysis and decomposition of FDI in agriculture were done to show the nature of data of FDI in agriculture and other sectors in agriculture in India during a very short period as per availability of data. Due to irregular nature of data, the incomplete behaviour of all sectors in agriculture FDI inflows were analysed. The traditional method of double log regression model was analysed to show the relationships avoiding cointegration and VAR models due to short period time series data. However, the results are justifiable and meaningful.

Suggested policies

There are many negative impacts on the economy for 100% approval of FDI in agriculture which should be scrutinised carefully in all sectors of agriculture. A pilot project may be conducted to find out the outflow of home currency by converting foreign currencies and how much it has relevance in trade and exchanges. The scopes of home private investment have been facing competition with FDI inflows which is to be reformed. The report of Hampel-Milagrosa et.al. (2017) suggested Indian government to carefully continue with the liberalisation of retail FDI and to ensure adequate policy space to shape the liberalisation process in an inclusive manner. Even to create sufficient policy space in which to tailor retail FDI to be more inclusive and sustainable should form part of the government's primary agenda. The Indian FDI policy also requires international investors to procure at least one-third of their product portfolio from small farms, or agricultural co-operatives whose investment in plant and machinery does not exceed USD 2 million. This

important provision will help to link smaller farms to supermarkets directly. Singh and Walia (2015) suggested that Union government should frame FDI policies with state government which should be free from bureaucratic procedure, outdated laws & traditions, corruption and non- transparency which will lead to fair production in economy. Proper attention should be given to all allied activities if we want faster, sustainable and more inclusive growth in agriculture. Solomon (2021) expected that the Indian government should promote sustainable agricultural development through FDI.

Conclusion and remarks

The paper concludes that the FDI inflows in agriculture, agricultural services, food processing sector have showed significant upward trendlines but the sectors of tea and coffee, agricultural machinery, sugar and fertilisers have not shown significant trendlines rather they produced cyclical patterns during the specified period. The FDI inflows in agriculture and agricultural services have positive impacts on the gross value added in agriculture in India significantly during 2000-01-2017-18 and 2001-02-2021-22 respectively.

It is argued that the FDI in retail in agriculture may have negative impact on small farmers in India because Indian agriculture is dominated by small farms which constituted 83% of total farms which are less likely to have access to technology in order to meet the quality standard required by corporations and thus may worse off in income. Most of the cases, it is difficult to get the right price for their products and are often forced to sell their products at a loss. The reform of the regulatory framework may solve this problem (Ray,2014). A few challenges for FDI in farming such as [i] inadequate awareness, [ii] inadequate technology and knowledge, [iii] loans and lack of financing support, [iv] lack of regulatory requirements, [v] inadequate coordination and alignment should be incorporated for consideration in enabling sustainable development in Indian agriculture.

References

1. Arokiasamy, P. (2021). A Study on FDI in Agriculture Sector in India. *Science, Technology and Development*, 10(9), 276-282. [\[Link\]](#)
2. Chaudhary, A. (2016). Role of FDI in the growth of Indian Agriculture Sector: A post reform study. *Global Journal of Finance and Management*, 8(2). [\[Link\]](#)
3. Dhungana, B. R., & Ghimire, R. (2013). The Role of FDI on agriculture sector in India. Conference Paper: Foreign Direct Investment in India's Retail Sector: Issues and Options, National Seminar organized by Department of Business Administration, Deen Dayal Upadhyaya University, Gorakhpur, India. [\[Link\]](#)
4. Epaphra, M. & Mwakalasya, A.H. (2017, January). Analysis of Foreign Direct Investment, Agricultural Sector and Economic Growth in Tanzania. *Modern Economy*, 8(1), 111-140. [\[Link\]](#)
5. FAO. (2022). Foreign Direct Investment flows to Agriculture 2010-2019. *FAOSTAT Analytical Brief N0-34*. [\[Link\]](#)
6. FAO. (2022). FAOSTAT: Foreign Direct Investment (FDI). In: FAO. Rome. [\[Link\]](#)
7. Hampel-Milagrosa, A., Brankamp, H., Cremer, T., Haddad, A., Pannwitz, K., Wehinger, F., Agasty, S. & Sarkar, T. (2017, May). Retail foreign direct investment liberalisation and the transformation of agrifood value chains in India. [\[Link\]](#)
8. Khokan Halder K., Dhar, P. & Shrivastava, K. (2017). The role of foreign direct investment (FDI) in Indian agriculture sector: An analysis of opportunities and challenges. *International Journal of Academic Research and Development*, 2(6). [\[Link\]](#)
9. Kubik, Z. & Husmann, C. (2019). Determinants of foreign direct investment in the African food and agriculture sector. [\[Link\]](#)
10. Jana, S.K., Sahu, T.N. & Pandey, K.D. (2019). Foreign Direct Investment and Economic Growth in India: A Sector-specific Analysis. *Asia-Pacific Journal of Management Research and Innovation*, 15(1–2), 53–67. [\[Link\]](#)
11. Franz, M. & Müller, P. (2015). Foreign Direct Investment in Agri-Food Networks in India and Sub-Saharan Africa. [\[Link\]](#)
12. Glady, V. (2019, September). FDI in Agriculture Sector in India with Special Reference to Academicians. *International Journal of Recent Technology and Engineering*, 8 (2s10). [\[Link\]](#)
13. Hodrick, P., & Prescott, E.C. (1997). Post-War US Business Cycles: An Empirical investigation. *Journal of Money, Credit and Banking*, 29(1), 1-16. [\[Link\]](#)
14. Medhi, J. (2017). Relationship Between Foreign Direct Investment (FDI) Inflows in Agricultural Sector and Agricultural GDP in India: A Time Series Analysis. [\[Link\]](#)

15. Msuya, E. (2007). The Impact of Foreign Direct Investment on Agricultural Productivity and Poverty Reduction in Tanzania. (MPRA Paper No. 3671). [\[Link\]](#)
16. Nedumaran,G., & Manida,M.(2019). Impact of FDI in Agriculture Sector in India: Opportunities and Challenges. *International Journal of Recent Technology and Engineering*, 8(3s),380-383. DOI: 10.35940/ijrte.C1081.1083S19
17. Oxford Business Group. (2019). Indonesian economy to expand further by attracting domestic and foreign investment. [\[Link\]](#)
18. Ray, D. (2014). Impact Of FDI in Retail on Indian Agriculture. [\[Link\]](#) [\[CrossRef\]](#)
19. Singh, &Walia, R.K. (2015, March). Foreign Direct Investment (FDI) & Agriculture. *Indian Journal of research*, 4(3), 6-8. [\[Link\]](#)
20. Solomon, S.K. (2021). FDI In Agricultural Sector in India: Status and Challenges. *International Journal of Advance Research and Innovative Ideas in Education*, 7(1). [\[Link\]](#)
21. Tangade, S. (2018). A study on the impact of Foreign Direct Investment on Indian Agriculture. *International Journal of Innovative Research in Technology*, 5(7), 378-382. [\[Link\]](#)
22. Wable, N.B., Nimbarkar, G.G., Kudale, M.B. & Jadhav, M.C. (2018). Foreign Direct Investment in Indian Agricultural Sector for agribusiness growth. *Trends in Biosciences*, 11(13), 2374-2376. [\[Link\]](#)
23. Wadhwa, S., & Wadhwa,S.A.(2014.). FDI in Agricultural Sector in India: Issues and Challenges. [\[Link\]](#)