I J C R M
International Journal of Contemporary Research In Multidisciplinary

Research Article

India's Economic Growth Trajectory since 1991: An Analysis of Structural Breaks

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DOI: https://doi.org/10.5281/zenodo.18384582

Abstract

This paper examines the growth dynamics of the Indian economy and its structural change over the period since liberalization which is complemented by structural break analysis. It is true that the Indian economy has experienced a spurt in the growth of its real GDP, which has mainly been characterised by a service sector-dominated growth process coupled with a declining role of its primary and secondary sectors, albeit those two sectors provide major sources of employment opportunities to the vast majority of working-age populations in India. We find that during post liberalization period Indian economy has achieved a tremendous breakthrough in the growth of its real GDP, which hovers 6% to 9% per annum from 2007 to 2010, followed by a minor declining trend and again by an increasing trend. However, in the growth process service sector plays a dominant role whose contribution to real GDP ranges from 47.5% in 1990 to 61.2% in 2019, whereas the relative contribution of manufacturing sector to real GDP has been increased marginally from 19.82% in 1990 to 20.76% in 2019 which is followed by a fall in the contribution of agricultural and allied sector from 42.2% in 1990 to 18.02% in 2019. Therefore, it follows that the Indian economy has indeed achieved a structural change that is not compatible with the conventional development theoretical perspective. Interestingly, we also find a structural breakthrough of the growth of real GDP since 2007-08, while the agricultural and allied sector has experienced a structural break since 1998, and the manufacturing sector has experienced a structural break since 2009.

Manuscript Information

- **ISSN No:** 2583-7397
- **Received:** 09-08-2025
- **Accepted:** 27-09-2025
- **Published:** 30-10-2025
- **IJCRM:**4(5); 2025: 612-618

- **Plagiarism Checked:** Yes
- **Peer Review Process:** Yes

How to Cite this Article

Savithiri D, Anand M D, Mahalakshmi M. India's economic growth trajectory since 1991: An analysis of structural breaks. Int J Contemp Res Multidiscip. 2025;4(5):612-618.

Access this Article Online

www.multiarticlesjournal.com

KEYWORDS: Indian Economy, Growth, Structural Change, CUSUM test of structural break.

1. INTRODUCTION

It is well known that the real GDP and its growth in India mainly originate from primary sector (agricultural and allied sector), secondary sector (manufacturing sector) and finally from the service sector. It is also well recognized that India has achieved a leading position immediately next to China in respect of growth of her real GDP which has provided a cushion in the global growth process. Surprisingly, the growth process of Indian economy has been marked with such a pattern of structural composition of GDP which is incompatible with the conventional theory of development, which states that as the development proceeds the relative role of primary sector falls and that of the manufacturing and service sector should increase. Therefore there will be shifting of productive sources from agricultural to industry and then to services. But surprisingly, it is found that although the contribution of primary sector to our real GDP has fallen tremendously since independence from 56% to 18%, the proportion of population dependent on primary sector as source of their livelihood has declined at a smaller magnitude from 70% in the year 1950 to 57% at present. So, the simple arithmetic tells us that agricultural productivity per unit of labour has fallen tremendously nevertheless the vast majority of people are still dependent on agricultural and allied sector as source of their livelihood. In other words, this agricultural sector has still been a refuge sector for a vast majority of population in India. On the other hand, if we look at the industrial sector we find that as against the conventional perception of development the growth of manufacturing sector has not been up to the desired level such that its contribution to our real GDP has not increased up to the optimal level. Moreover, within the manufacturing sectors there has been anoverwhelming dominance of informal sector which does not follow any laws of wages, time of work and other social securities to be given to the workers. Astonishingly, there has been a tremendous spurt expansion of the service sector since the economic reforms such that it is claimed that Indian economy has achieved service sector revolutions because of her comparative advantage in service sector. However, it is also worth noting that the contribution of the service sector has increased tremendously which is also backed up by the dominance of the presence of informal service sector. Therefore, we can plausibly say that Indian economy has indeed achieved a breakthrough in its growth of real GDP coupled with a structural change and also with structural break in the composition of GDP.

Under this backdrop our paper centers round the following questions:

1. What has been the nature of growth and structural change in Indian economy?
2. Does growth of Indian economy obey conventional theory of development?
3. When does exactly the structural break in the overall growth of real GDP and its sectoral composition occurs?

Our study is based on secondary data which are available from database of Asian Productivity organization, World Bank database and World Economic Outlook. For the statistical and econometric analysis we use software STATA version 16.

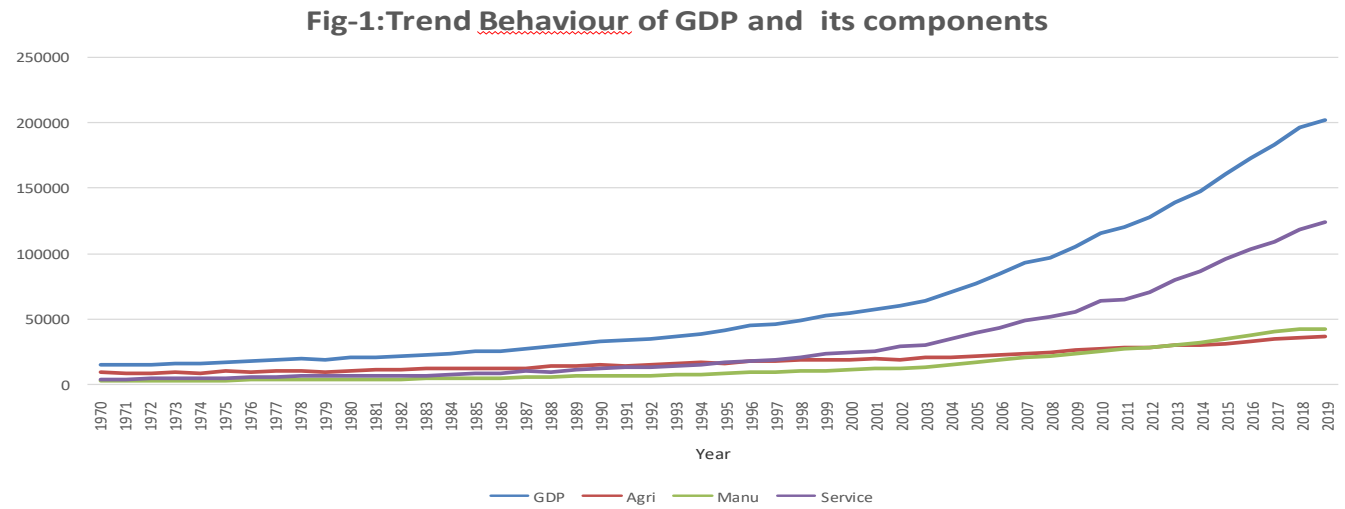
Although the primary focus of our analysis of the growth dynamics of Indian economy is on the post reform period, we have started our analysis from 1970 as the nature of the post reform behavior cannot be fully conceivable without having some insight about the pre-reform trend behavior of our GDP and its components.

The rest of this paper is structured as follows: Section II presents the analysis of the trend behavior of growth and its structural composition; section III presents the results of the analysis of structural break since liberalization; section IV represents concluding observations.

Section II. Analysis of the dynamics of Growth of GDP and its structural compositions:

It is true that the growth performance of Indian economy immediately after independence and especially upto the mid 80's was lackluster. Basically India experienced Hindu growth rate as christened by Raj Krishna and it was averaged around 4% during the period from 1950'sto 1980's. During this period the major contribution to our GDP came from primary sector (agriculture and allied) which was followed by manufacturing and service sector. However, with the inception of the process of economic reforms whose primary characteristics has been the liberalization, privatization and globalization, the policy of which was dictated by IMF and World Bank. Gradually, this policy has been converted into the liberalization of trade, investment and finance. As a fall out there has been a massive change in the role of external sector in the growth of Indian economy coupled with inflow of modern technologies and modern goods and services which have over flooded our domestic economy. Conversely, there has also been outflow of goods and services which has mainly been marked as the massive expansion in the demand for export of software and other domestic services so that the dependence of Indian economy on foreign demand has also been increased and India has continued to follow export led import substitution policy. Gradually this structure of the growth has been continued to be marked by falling trend in the contribution of primary sector coupled with stagnation in the industrial sector especially during the 60's and 70's. This process of development of Indian economy has not been able to make much dent on the abject poverty situation in India albeit agricultural sector has continued to experience rapid technological change in the form of green revolution since 1966 and the financial sector has also experienced a radical change since the inception of bank nationalization in 1969. Given this scenario the temporal behavior of growth of GDP and its three major sectors can be described in terms of the diagram below

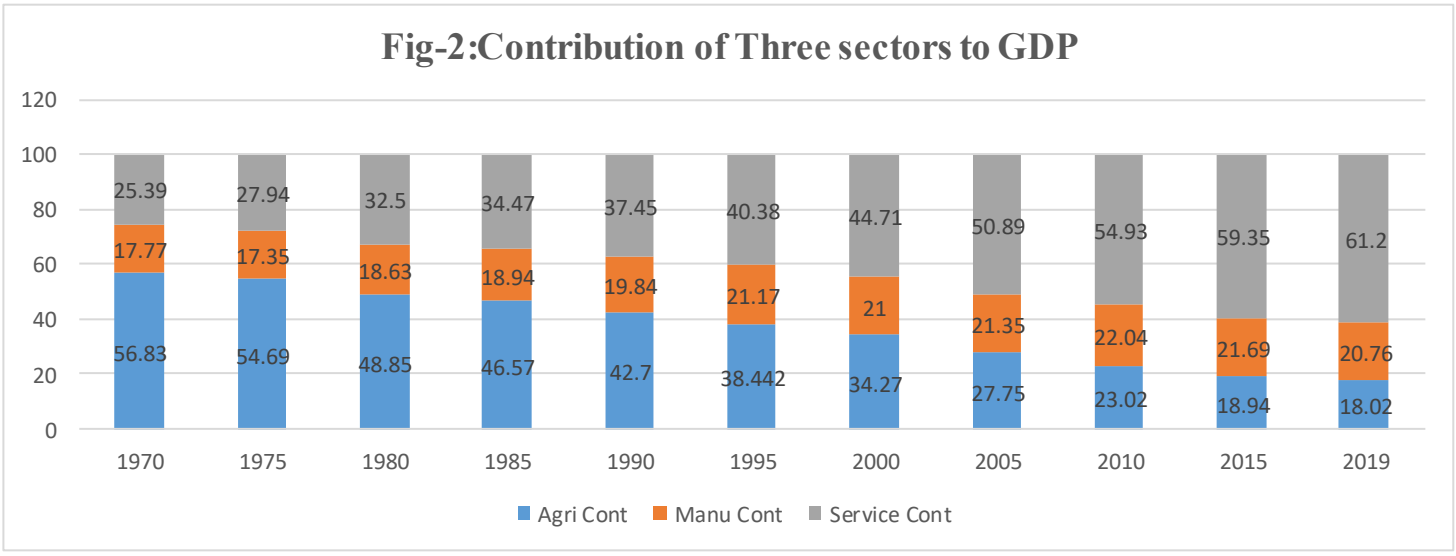
Temporal Behaviour of Gdp and Its Components (At 2019 US$ Constant)



Source: Author's construction

It follows from the diagram that the increasing trend in the growth of GDP started out after the initiation of reform process since 1991 which is followed by moderately steady upward trend since 2002 and again by tremendous increasing trend since 2007. Surprisingly, it is observed in the diagram that service sector has also experienced mild increase in trend since 1999 which is followed by steady increase in trend since 2007-08. However, a mild increase in trend in the manufacturing sector has been observed since 2003 and it offsets the very slow increasing trend of agricultural GDP since 2012. Interestingly, the agricultural sector which provides the major source of livelihood to the vast majority of the rural Indian population continued to experience a mild increasing trend since 2003.

The scenario of temporal behavior of compositional change in the contributions of three major sectors to real GDP is discernable from the following component bar diagram.



Source: Author's construction

This is evident from the figure-2 that over the years from 1970 to 1990, the contributions of agriculture and allied sector to real GDP of India were maximum. In the year 1970 the The ratio of the agricultural sector to real GDP was 57%, and the same has been found to be almost 43% in 1990. Moreover, a massive decline in the rate of contribution of the primary sector of India to GDPhas been observed between the periods from 1995 to 2015. On the other hand, from the mid of decade 90 the

contribution of service sector of India to its real GDP has experienced a remarkable increasing trend since 2000 which reach the figure 61.2% in 2019. Interestingly, our analysis reveals that the secondary sector i.e. the manufacturing sector has occupied third place in terms of its contribution to real GDP over the period from 1970 to 2010 and after that the same has come to second place in terms of its contribution to real GDP of India. Now the plausible explanations behind such temporal behavior i.e. spurt in tertiary sector growth coupled with lackluster performance of primary and secondary sector of Indian economy can be given in terms of the following factors: (i) operation of external factors and pervasive segmentation of financial market; (ii) False Presumption of "Comparative Advantage" in service sector by the policy makers and treating of agricultural and manufacturing sectors as refuge sectors which has resulted into the shifting of more resources to the tertiary sector;(iii) the operation of demand side factors i.e. increase in service intensity, increase in the export of services coupled with role of supply side factors i.e. increase in the growth of total factor productivity etc. and finally (iv) the tremendous increase in service sector at the cost of primary and secondary sector, the outcome of which has been the excess capacity persisting in both the primary and secondary sectors.

Now if we consider the phase-wise annual compound growth of real GDP we find from the table-1 that while the growth rate of real GDP during 1970-79 was 2.33% per annum , the same reaches the figure of 4.26% during 1980-89. Further, the annual compound growth rate of real GDP reached peak level of 6.74% per annum during 2000-09 which is followed by a declining trend of 5.7% during 20010-2019. But if we look at the growth annual compound growth rate of real GDP during post reform period the table tells us that it was 6.19%. Further, what is interesting is that during the phase 2000-09 the annual compound growth of manufacturing sector was 7.4% and during this phase the annual compound growth rate of agriculture and allied sector was also highest (3.23%). Both these sectors have also achieved remarkable increase in annual compound growth rates during the said period. Therefore, one can plausibly say that the modernization of agricultural sector i.e. use of modern technology and knowledge coupled with expansion of irrigation facility and use of chemical fertilizers and pesticides seems to be the proximate explanatory factors for the spurt in agricultural growth. On the other hand, the service sector in India got its momentum in the annual compound growth rate during the phase of 1990-99 and reaches its peak during the phase 2000-09 reaching the figure of 8.59% p.a.

Table-1: Phase-Wise Annual Compound Growth of Gdp and Its Components

PERIODS	GDP (%)	Agriculture (%)	Manufacturing (%)	Service (%)
1970-79	2.32852	0.20067	3.06785	5.6161
1980-89	4.25949	3.1857	5.01109	5.30684
1990-99	4.60037	2.79504	4.6326	6.35069
2000-09	6.74003	3.23065	7.40165	8.59374
2010-2019	5.70699	3.15299	5.0766	6.85657
1970-89	3.627828	2.316315	4.247531	5.440878
1990-2019	6.18529	3.17626	6.347209	7.937469
1970-2019	5.310852	2.91983	5.639256	7.180249

Source: Author's computation

Section III: analysis of structural break since liberalization

This section centers round the estimation of structural breaks of the real GDP and its components over the period from 1970 to 2019. To this end we have used a popular statistical technique i.e. CUSUM test to detect significant changes in a data sequence from its random background noise. This test has been widely used to identify the unknown structural breaks. The CUSUM test is actually based on cumulative sums of residuals resulting from recursive regressions and this is used to measure the stability of the regression coefficients and assumed that the residuals are normally distributed with mean=0 and constant variance. In our study we have estimated the points of structural breaks of real GDP and its components i.e. the GDP originated from agriculture and allied sector, manufacturing sector and service sector. We use the functional form $GDP_t = F(GDP_{t-1})$ and regress by assuming a linear relation. The same process is used for agricultural GDP, GDP from manufacturing sector and service sector GDP for the period ranging from 1970 to 2019. The results of the regression analysis of recursive residuals are give in table -2 which reveals that the null hypothesis that there is no structural break is rejected at 1% level of significance implying that there is structural break in GDP . The plots recursive residuals are given in figure-3 where it is found that the structural break in real GDP occurs approximately in 2007-08 .

Table-2: Cumulative sum test for parameter stability (GDP)

Number of observations = 50
Ho: No structural break

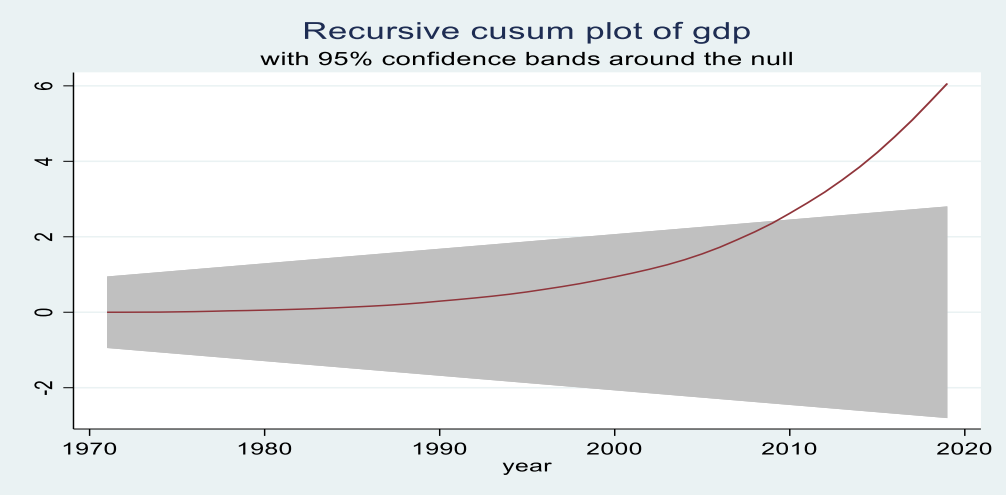
Test Type	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Recursive	2.0210	1.1430	0.9479	0.850

Source: Author's estimation

In the Figure we actually plot the cumulative sum of the recursive residuals with its normal distribution with mean=0 and constant variance which gives 95% confidence interval bands (upper and lower) around the null hypothesis that there

is no structural break with the shaded area. Further, if the red line lies in the shaded area there is no structural break. The point of year where the line crosses the upper band we use that year as year of structural break. It is obvious from the figure that the trend in real GDP has experienced structural break in 2008-09. Further the result of regression which is reproduced in table-2 reveal that computed value of test statistic is greater than the critical value so there is no sufficient evidence to accept the null hypothesis. So this result indicates the existence of a structural break.

Fig 3: Recursive Cusum Plot of Gdp



Source: Author's estimation

Similarly,in case of agricultural GDP we find from the result of CUSUM test given in Table : -4 that the time series data are not stable since the computed value of test statistic is greater than that of the critical value at 1% level of significance. So the null hypothesis is rejected and there is also structural break in the agricultural GDP.

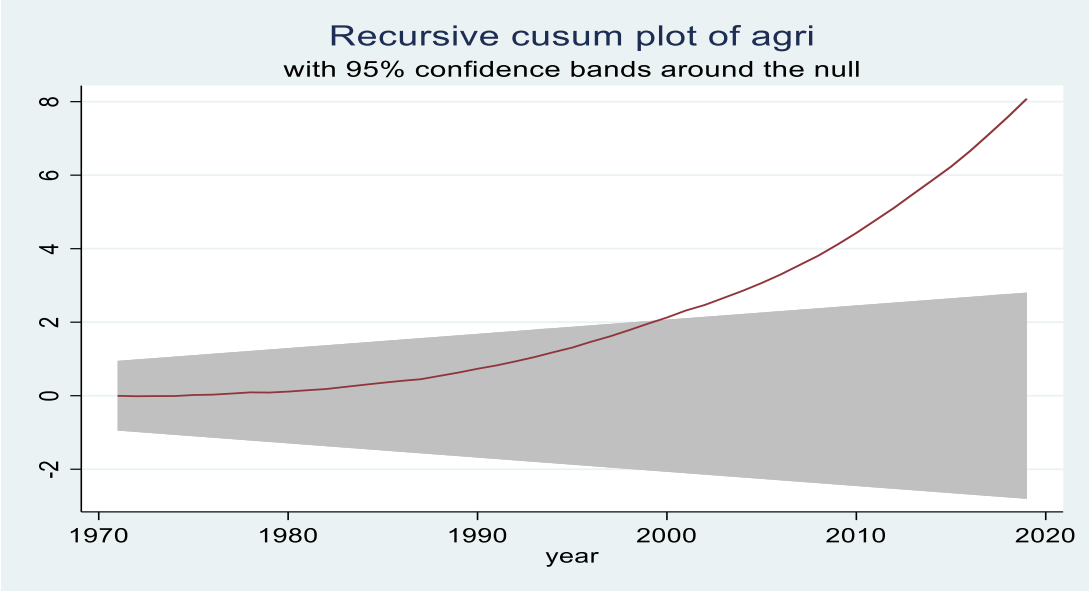
Table-4: Result of Cumulative Sum Test (AGRICULTURE)

Number of observations = 50
Ho: No structural break

Test Type	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Recursive	2.6934	1.1430	0.9479	0.850

Source: Author's estimation

Fig-4: Recursive Cusum Plot of Agricultural Sector



Source: Author's estimation

Now the recursive CUSUM plot of agricultural and allied sector GDP reveal that the line crosses the 95% confidence upper bands at 1998-99. So it quite obvious that agrictural sector has also experienced structural break. On the other hand, the regression result of GDP from manufacturing sector with its one period lag level give in thable-5 reveals that the structural break has occurred as the computed value of test statistic is greater than that of the critical value at 1% level of significance Further, the occurrence of structural break of manufacturing

Table-5: Cumulative Sum Test for Parameter Stability (MANUFACTURING SECTOR)

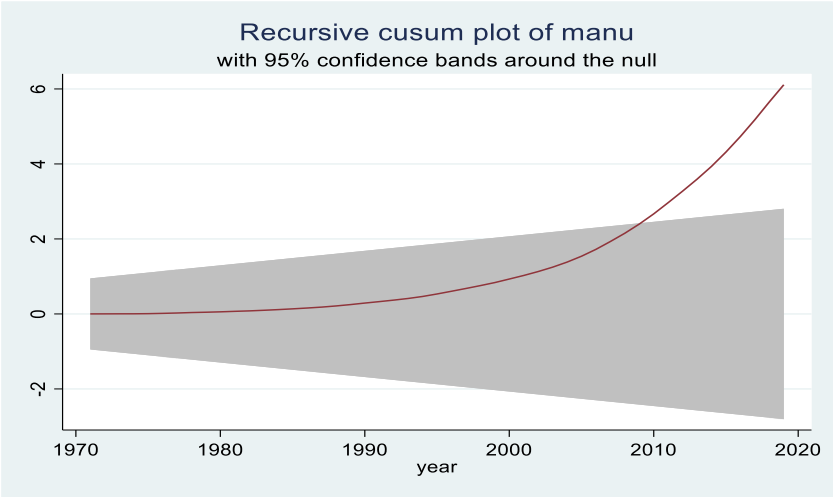
The sector approximately in the year 2011-12 is clearly discernible
from the recursive CUSUM plots given in Figure -5.

Number of observations = 50
Ho: No structural break

Test Type	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Recursive	2.0370	1.1430	0.9479	0.850

Source: Author's estimation

Fig. 5: Recursive Cusum Plot of Manufacturing Sector



Source: Author's estimation

Further,the regression result of service sector GDP with its one period lag level reveal that there is structural break as the computed value of test statistic is greater than that of the critical value at 1% level of significance (see table-6). Now from diagram 6 of recursive CUSUM plost we can see that the structural break in service sector occurs approximately in 2012-13.

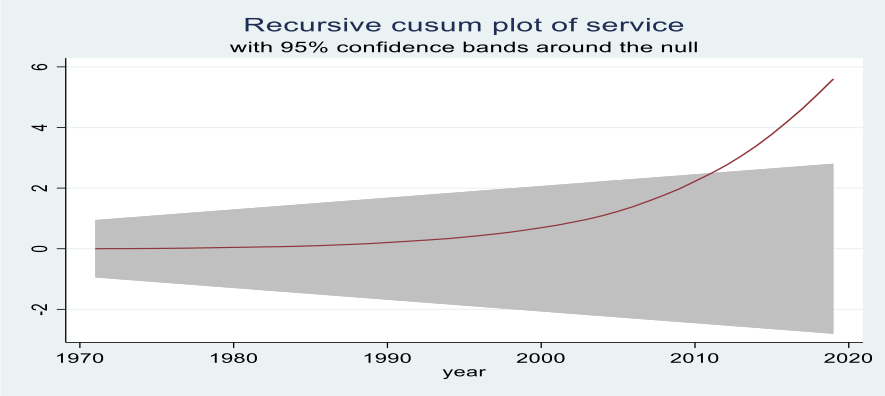
Table-6: Cumulative Sum Test for Parameter Stability (SERVICE SECTOR)

Number of observations = 50
Ho: No structural break

Test Type	Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
Recursive	1.8669	1.1430	0.9479	0.850

Source: Author's estimation

Fig. 6: Recursive Cusum Plot of the Service Sector



Source: Author's estimation

Therefore we can conclude that the real GDP and its different components originatin from agricultural sector, manufacturing sector as well as service sector have experienced structural breaks at different points of time.

IV. CONCLUDING OBSERVATIONS

The following conclusions emerge out of our study. First, as far as the growth of real GDP of Indian economy is concerned we find almost lackluster growth of GDP including its different sectors during 70's and 80's which is followed by spurt in the growth process during the post reform period especially since the new millennium. However, agricultural sector continues to maintain a growth rate which hovers between 2.5% to 3.5%. On the other hand, the growth rate of manufacturing sector whose contribution to GDP higher than that of agriculture since 2007-08 and that has continued to maintain more or less stable growth 6.35% per annum. However, we find a tremendous spurt in the growth rate of service sector and its contribution to GDP during the post reform period so that it is claimed that India has made service sector revolution. Secondly, we find that Indian economy has indeed achieved a structural break in her growth process such that there has been a remarkable structural break in the growth of real GDP since 2007-08 which is mainly been dominated by the growth of service sector. It is worth noting that the continuous upward trend in the growth of GDP has occurred since post reform period albeit with occasional fluctuations. On the other hand, the service sector of Indian economy has attained the structural break with strong positive trend since 2011-12. However, the agricultural sector has attained the structural break in its growth since 1998-99. Finally, although we find a more or less stagnancy growth rate of manufacturing sector the same has also achieved a positive structural break since 2011-12. Therefore, it is plausible to conclude that both the agricultural and manufacturing sectors, which are mainly the informal sector in India and provide sources of livelihood of vast majority of its population have still been acting as a refuge sector. It means that shifting of resources to the service sector relative to that of agriculture and manufacturing sector and the revolutionary change of modern technology, ICT, AI which are yet to be adequately applied to agriculture and manufacturing are the possible reason behind the lackluster performance of manufacturing and agricultural sectors in India.

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