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IMPACT OF AGRICULTURE ON RURAL DEVELOPMENT AND POPULATION DENSITY OF THE INDIAN ECONOMY SINCE INDEPENDENCE

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ABSTRACT: Indian agriculture has shown a steadily rising trend in Per Capita Agricultural Gross Value Added (PCAGVA) despite facing considerable barriers since independence. If compared with other nations, the trend of per capita agricultural value added may be ordinary. However, the role of the 'Green Revolution has remained helpful to achieve a modesty regarding per capita agricultural value added trend in India. Reasons of worries and limitations remain still. This paper tries to address towards those worries.

Keywords: Structural Change in the Development Process, Endogenous Structural Break Test (Zivott-Andrews and Amit Sen's Test), Test of Cointegration.

JEL Classification: C22, O14, O50.

SECTION 1: INTRODUCTION:

During the colonial era, due to existence of the stagnant agriculture especially corresponding to the food grains sector, India had to import lots of food grains (also as 'Aid'), especially, wheat from outside due to negligence of the 'GOI', British Government of India, especially having thrust upon the cash crops production. Even after independence, this trend of stagnancy in agro sector sustained so that importing food grains from outside continued because of very low or poor productivity of the agricultural sector mainly due to the lack of irrigational facilities even to the agricultural lands close to the rivers. Indian agriculture was severely monsoon dependent and there was not much knowledge regarding the conservation of rain water for agricultural purposes. So, independent Government of India had no option but to develop the agricultural sector

firstly through the irrigational facilities to the agricultural lands and secondly through creating infrastructural transformation of the agricultural sector through land reforms.

Corresponding to 'Irrigation', the objective of the government was to increase the percentage area of irrigation facilitated arable land out of total arable land from just/mere 13.8 percent in 1951 (source: Wikipedia) to relatively much higher level through the implementation of the Five Year Plan Programmes.

Corresponding to 'Land Reforms', the objective of the government was to ensure the stepwise implementation of the 'Land Reforms' through the processes of (i) Abolition of intermediaries, (ii) Tenancy Regulation, (iii) Celing on Land Holdings, (iv) Attemts to consolidate disperate land holdings, (v) Proposition for Cooperative Farming. (The First 5-Year Plan gave a predominant importance to the development of agriculture and irrigation out of a total actual investment of Rs. 1960 crores made in the first plan. Rs. 601 crores i.e. 31% was allocated for agriculture) also through adopting the Five Year Plan Programmes.

In the 'First Plan' (1951-1956), the target of the Indian government was to ensure the increase in agricultural production through adoption of the policies oriented towards irrigational and institutional reforms, by spending almost 31 percent of the total 'Plan Outlay' on agricultural sector alone. At the end of the 'First Plan', the target of the agricultural production was more than fulfilled, solely because of favorable monsoon, despite of week implementation of the irrigational and institutional reforms. And here lied the crucial problem regarding the plan implementation towards agriculture, because, from the 'Second Plan' (1956-1961), the attention shifted heavily from agriculture towards industry in terms of development and accordingly, agriculture paid the price in terms of modest production in 'Second Plan', but miserable production during the 'Third Plan' (1961-1966) (for instance, during 1961, India was on the brink/verge of 'Mass Famine' (Source: Wikipedia, 2019)), mainly due to unfavourable monsoon, showing the failure of the policies regarding irrigational reforms as well as institutional reforms (Datt and Mahajan (2018)).

However, some important points are to be kept in mind regarding the institutional reforms in agricultutre. Firstly, from the 'distributional aspect' of land reform, the objective of the land reform was to convert the small land holdings to the large land holdings by unifying them through the 'Cooperative Farming', so that (i) share cropping can be promoted and (ii) capital intensive farming (and new technologies) can be implemented. The same objectives are there if it is observed from the standpoint of efficiency. The only point of departure between the two aspects is regarding the extent of profit maximization and the extent of mass distribution of the benefits of revenue from agriculture and there lies the role of the state.

Failure of the 'Third Plan' (1961-1966) in terms of failure of both the industrialization and agriculture had raised many questions regarding the reasons of failure. One of the most important explanation behind the failure was lack of purchasing power of the rural mass due to low agricultural production and heavy informal debt orientation of the farmers during the 'Third Plan', leading to excess supply of the industrial produce and correspondingly, decaying profits in the industrial production and loss of employment opportunities, slowly leading towards 'Industrial Deceleration'.

In these circumstances, 'Plan Holiday' or 'Yearly Plans' for the three years viz., 1966-1967, 1967-1968 and 1968-1969 were introduced, but gone in vain in terms of objectivity.

Here comes the role of the 'Capital Intensive Agricultural Production Methods' in India as an alternative of 'Institutional Reforms' as booster of agricultural production and the growth of agricultural sector itself and as a whole, as well as rural development (in terms of increment in per capita purchasing power and improvement in the standard of living as a whole of the rural India) through a stepwise process over decades.

Although, the process of 'Green Revolution' actually started from the end margin of the Second Plan (1956-1961), i.e., from 1960, with selection of seven districts out of the seven states, especially Punjab, Haryana, Delhi, Rajasthan and Uttar Pradesh, specially taking 'Wheat' as the experiment crop, however, with the miserable failure of the 'Third Plan' (1961-1966), the process of capitalization of agriculture through 'Green Revolution' got sluggish during during that period. From mid 1960s (say, 1965), with the development of the High Yielding Variety (HYV) seeds of wheat by Professor Norman Borlaug of Mexico and

its' implementation in India in 1965 and introduction of High Yielding Variety Programme (HYVP) for the khariff crops (Rice) since 1966, the process of research and its application was in progress, but in a limited manner, especially due to the consequences of the failure of the 'Third Plan' (1961-1966).

Now, in this context, the capital intensity of the 'Green Revolution' has to be analyzed in brief. Green Revolution implies the incorporation of improved High Yielding Variety (HYV) Seeds, improved fertilizers and pesticides, improved machines for agricultural purposes etc. Now, use of the improved machineries in agriculture entails the physical capital intensity in agriculture and use of HYV seeds, improved fertilizers and pesticides through research and development entails the human capital intensity in agriculture. Now, relative to the previous labour intensive method utilization during 1947-1960, agricultural output was low per hectre. However, incorporation of capital intensive 'New Agricultural Strategy' of Green Revolution, had raised the agricultural output per hectre, step by step, especially in a condition of slowly growing irrigational facilities and heavy monsoon dependence of agricultural sector post 1960s, stepwise. This explains briefly the capital intensity of Green Revolution and its impact on the agro sector of the Indian economy.

However, from 1969, with the start of the 'Fourth Plan' (1969-1974), the process of 'Green Revolution' through capital intensive technology, got a sustained progress. A new orientation was imparted to agricultural policy. Modest targets were fixed for agricultural production and realistic allocations were made for agriculture and irrigation. Although the 'Fourth Plan' (1969-1974) failed to achieve its target in terms of agricultural production almost as a whole, however, the important aspect is the continuation of the Green Revolution programme through applied research on main crops (Wheat, Rice etc.).

During the 'Fifth Plan' (1974-1979), the fruits of the 'Green Revolution' started to provide benefits in terms of producing in excess of target for the main crops (Wheat and Rice) for the first time since the failure of the 'Third Plan' (1961-1966), showing the inner strength of the human capital intensive agricultural technique (Datt and Sundharam, 2009; Datt and Mahajan, 2018). However, due to the First Oil Price Shock of 1973-74, rapid inflationary pressure grew upon the whole economy mainly due to the inelastic demand for crude oil (total crude oil import contributing 53 percent of total import of the economy). For that reason, firstly, huge trade deficit emerged, secondly, in order to maintain continuation of Plan Outlays, Government had to reach to the World Bank for loans, thirdly, due to inflation, wage costs surged up, leading to inflation of food items and other necessary goods, thereby, leading further to the demand deficiency for industrial durable goods especially and agricultural commodities in general. As a result, even during the phase of 'industrial deceleration', the relative over production than demand had led to unemployment as well as reduction in industrial production especially, with further dampening impact upon per capita purchasing power. Due to the effects of First and Second Oil Price Shocks, the average rate of growth of the agricultural sector was just 1.7 percent.

Since the 'Fifth Plan' (1974-1979), for the next two consecutive Plans, viz., 'Sixth Plan' (1980-1985) and 'Seventh Plan' (1985-1990), the trend continued. From 1983-1984, the Second Phase of Green Revolution started exclusively and has shown a steady growth in agricultural production. However, the trend reversed to deceleration in agriculture after 1990-1991 (the phase of adoption of the policies of 'Liberalization, Privatization and Globalization (LPG)'), having slow growth rates of 2.8 percent during 1991-2001 and 2.1 percent during 2002-2007 corresponding to the 'Plans'.

However, regarding the structural change of the Indian Economy, we have to observe the change from 1950-1951 to 2013-2014. In 1950-1951, the share of the agricultural sector was just 51.61 percent in 2004-05 constant price and 50.05 percent at the current price, but then it has fallen to 15.16 percent at 2004-05 constant price and 17.39 percent at current price. This can be shown from the following Table-1.

TABLE 1: SECTORAL SHARES OF THE PRIME SECTORS OF GDP AT FACTOR COST (AT CONSTANT 2004-05 PRICES & AT CURRENT PRICES

	CONSTANT 2004-05 ESTIMATE			CURRENT PRICE ESTIMATE		
YEAR	A	I (incl. Construction)	S (excl. Construction)	A	I (incl. Construction)	S (excl. Construction)
1952-53	51.61	16.22	29.71	50.05	14.38	35.22
1962-63	44.39	21.76	31.92	39.89	20.61	39.92
1972-73	38.56	24.92	35.25	40.28	21.29	38.27
1982-83	34.25	25.85	39.03	32.88	25.19	41.53
1992-93	28.89	26.77	44.05	28.74	25.77	45.22
2002-03	20.13	27.39	52.48	20.75	26.23	53.02
2012-13	13.69	26.76	59.59	17.39	25.75	56.86
2016-17*	15.16	23.16	61.67	17.35	21.23	61.42

* Denotes the Base Year as 2011-12 and Industry incl. Construction and Services excludes Construction.

Source: Own Calculations from RBI Indian Economy Database 2014.

Actually the compound average rate of growth (CAGR), from 1950-1951 to 1960-1961 period up to 2000-2001 to 2007-2008 period, remained stagnant at close to 3 percent, mainly due to the split phases of agricultural deceleration during 1970-1971 to 1980-1981 and during 1990-1991 to 2000-2001 and 2000-2001 to 2007-2008. However, even then, maintenance of a stagnant average rate of growth with rapidly falling share of agriculture seems to provide the required explanation for steady performance of the agricultural sector despite phases of deceleration.

TABLE 2: DECADAL AVERAGE GROWTH RATE OF GDP AT FACTOR COST (AT 2004-05 PRICES) & ITS' PRIME SECTORS (AT 2004-05 PRICES)

Decades	1953-54 to 1962-63	1963-64 to 1972-73	1973-74 to 1982-83	1983-84 to 1992-93	1993-94 to 2002-03	2003-04 to 2012-13
Av. Growth Rate of GDPFC	3.95	3.3	3.94	5.22	5.97	7.92
Av. GR of A	2.46	2.04	2.96	3.56	2.31	3.87
Av. GR of I (excl. CONSTR.)	6.95	4.49	5.01	5.67	6.43	7.07
Av. GR of I (incl. CONSTR.)	7.06	4.67	4.32	5.6	6.23	7.7
Av. GR of M	6.98	4.43	4.52	5.15	6.94	7.75
Av. GR of S (incl. CONSTR.)	5.06	4.42	4.55	6.32	7.58	9.31
Av. GR of S (excl. CONSTR.)	4.66	4.27	4.94	6.48	7.85	9.3
Av. GR of CONSTR.	7.52	5.15	2.86	5.4	5.74	9.48
Av. GR of THRTSC	6.02	4.18	5.5	5.54	8.81	9.9
Av. GR of BIDRB	3.09	3.56	4.95	8.96	7.71	10.51
Av. GR of CSP	4.32	4.89	4.29	5.8	6.65	6.81

NOTE: A=Agriculture & Allied, I=Industry (excl. Construction), M=Manufacturing, S=Services (incl. Construction), CONSTR.=Construction; Source: Own Calculations from RBI Database (2014), India.

Now, in this paper, next, we are going to conduct a time series study of structural change of each of the twenty nine (29) states for 64 years in terms of the value added and sectoral share of agriculture through both the Zivott-Andrews Method and Amit Sen's Method in Section 2. Then, we are going to discuss how rural development enhances by the rise in agricultural Gross Value Added through capital investment in agriculture, availability of loan credit and irrigational expenditure by the government of India. Finally, conclusion follows.

SECTION 2: STRUCTURAL CHANGE OF THE VALUE ADDED OF THE AGRICULTURAL SECTOR FOR THE COUNTRY AND ACROSS THE STATE:

In this section we are going to discuss the structural change of the value added of the agricultural sector, industrial sector and services sector for the Indian economy. For that, we need to follow the 'Endogenous Structural Change Methodology' of Zivott and Andrews (1992) and Amit Sen (2003).

Endogenous Structural Break Methodology: Nelson and Plosser (1982) opine that most of the macroeconomic variables are difference stationary (DS) rather than trend stationary (TS). For a TS process, the effect of random shock is temporary around a trend whereas for a DS process, permanent effect is generated by the random shock. In addition, for a DS process, the variance of the series depends on time.

The Augmented Dickey Fuller (ADF) Test is an unit root test that is conducted to detect whether a series is TS or DS. The ADF test here consists of estimating the following regression:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta Y_{t-i} + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Where ε_i is a pure white noise error term and where $\Delta Y_{t-i} = (Y_{t-i} - Y_{t-i+1})$. The test procedure is as follows:

The null hypothesis is H_0 : δ =0. Rejection of the null hypothesis implies that the underlying series is TS and failure of the rejection that the underlying series is DS. Here it is important to note that the coefficient of Y_{t-1} does not follow the standard 't-distribution' which was solved by Fuller by getting limiting distribution of this coefficient and finally these distributions were approximated empirically by Dickey (1976). From a much larger set of replications, the relevant critical values are being derived by McKinnon (1990). Now, if β_2 in equation (1) is found to be significant then there exists trend in the series. Further, if β_1 is significant then there exists drift in the model. In the ADF test, ΔY_t depends also on ΔY_{t-i} (where i=1,2,3…m; m<T).

As Perron (1989) has shown that in the presence of structural break, even a trend stationary series may be mis-identified as an unit root process though the standard unit root test. Therefore he has suggested a procedure that is appropriate for test of unit root in the presence of one time structural break in the series which is assumed to be exogenously determined from consideration of visual examination of the plots of the data.

Zivot and Andrews (1992) has shown that Perron's methodology of finding out the structural break is based primarily on visual observation and monitoring of the data structure and therefore the break point is determined exogenously and not endogenously. They have shown that in order to determine the break point endogenously, the following models are to be explained and used up:

$$\Delta Y_t = \beta_1^A + \beta_2^A DU_t + \beta_3^A t + \delta^A Y_{t-1} + \sum_{i=1}^{m} \alpha_i^A \Delta Y_{t-i} + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

$$\Delta Y_t = \beta_1^B + \beta_2^B DT_t + \beta_3^B t + \delta^B Y_{t-1} + \sum_{i=1}^{m} \alpha_i^B \Delta Y_{t-i} + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3)$$

$$\Delta Y_t = \beta_1^C + \beta_2^C DU_t + \beta_3^C DT_t + \beta_4^C t + \delta^C Y_{t-1} + \sum_{i=1}^{m} \alpha_i^C \Delta Y_{t-i} + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4)$$

Here, DU_t =1 if t<TY

And DU_t =0 if otherwise.

Further, here, DT_t = t – TϒΥ if t<TϒΥ

And DT_t = 0 otherwise.

The following points are important:

Model A, exhibited by equation (2) allows an endogenous break in the level of the series (Crash Model). Model B, exhibited by equation (3) allows an endogenous break in rate of growth of the series (Changing Growth Model) and Model C allows endogenous break in both level and growth of the series (Mixed Model). Here, if DT_t is positive (negative) and significant, then there is acceleration (deceleration) in the growth. T stands for total time period and ϒ stands for time break, i.e., ϒ=T_B/T where T_B refers to the break period. The above three equations (2), (3) and (4) can be estimated by OLS method and with the break fraction ϒ ranging from 2/T to (T-1)/T. Regarding the choice of the lag, Perron (1989) has suggested that lag lengths (i.e., the value of 'm') are determined using t-tests on the coefficients α_i. The value 'm' is selected if the t-statistics on α_i for i>m is less than 1.64.

However, the present paper does not follow Perron's procedure as this procedure is sensitive to a particular value of 't'-statistic around 10 percent level of significance. Rather this paper uses visual descriptions of the series and the correlogram. All the series are of AR(2) type and so only the second order lags are being considered here.

Now from the estimated regression of each model, the value of the t-statistics for testing the null hypothesis δ =0 can be obtained. Zivot and Andrews (1992) proved that for each model, among the overall (T-2) regressions one can choose that year as break year which gives the minimum value of t-statistics corresponding to the coefficient of Y_{t-1}. Further, that model (among the three models) seems to be the best fitted model that gives the minimum 't'-statistics value of the coefficient of Y_{t-1}. The estimated results are compared with the critical values given by Zivot and Andrews to determine whether the series is TS or DS.

Further Amit Sen (2003) has stated that Zivot and Andrews (1992) could be improved by considering the maximum 'F' statistics instead of taking the minimum 't'-statistics and also argued that model 'C' has a higher power than model 'A' or model 'B'. So Sen (2003) has considered model 'C' and suggested the following test:

$$F^{Max} = Max_{T_B \in \{[\lambda_0 T],[\lambda_0 T]+1,\ldots T-[\lambda_0 T]\}} F_B(T_B) \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

ENDOGENOUS STRUCTURAL BREAK POINTS FOR THE INDIAN ECONOMY (THREE MAJOR SECTORS) :

From the economic standpoint of view, the points of structural change is quite important for an economy and in that respect, single endogenous structural break point analysis is important in this respect that it shows the most crucial point of departure from one trend of production to another trend.

According to our estimation procedure, A sector includes Agriculture and Allied activities, I sector includes Mining and Quarrying, Manufacturing, Construction, Electricity, Gas and Warehouse (EGWs) and S sector includes Trade, Hotels and Restaurants (THR), Transport, Storage and Communication (TSC), Banking and Insurance (B&I), Dwellings, Real Estate and and Business Services (DRB), Other Private Services, Public Administration and Defence (PA&D) etc.. In Table-3, we can observe the relevant break dates corresponding to the three major sectors.

In that respect, in case of Indian Agriculture, the most crucial structural break point is in 1967, (following both Zivott & Andrews Test and Amit Sen's Test of Structural Break) i.e. the effective start of the (human) capital intensive 'Green Revolution', showing the fact that even without having sufficient attention towards the institutional reforms in the form of

'Land Reforms' and towards 'Irrigation', the country has been able to transform its agricultural productivity to a great extent, even in the phases of 'Industrial Deceleration' of 1960s to 1970s and low purchasing power of the agriculture oriented mass. In addition to that, the first and second oil price shocks have made the economic situation more difficult. The significant point is that the research and development in agriculture to boost up the process of green revolution has continued without hindrance to enhance agricultural production, mainly due to sincere government assistance to encourage this issue. Later on, however, agricultural productivity has grown during the 1980s along with industrial growth to create a relatively comfortable atmosphere.

In case of Indian Industry sector, the most crucial structural break point is in 2009 according to the Zivott and Andrews Test and it is in 2008 according to the Amit Sen's test. Due to the worldwide depression because of 'Global Financial Crisis, 2008', India's trade collapsed alongside global trade, especially in the industrial front and for the manufactured items that had created perhaps a massive shock upon the industrial production during this period so that there happened a sudden and steep fall in the share of the industrial sector.

In the case of Indian Services sector, the most crucial structural break point is in 2008 according to the Zivott Andrews Test and the Amit Sen's test. This is again the contribution of the 'Global Financial Crisis, 2008'. Both the exports of the Information Technology (IT) and Information Technology Enabled Services (ITES) and Communications had collapsed and 'Outsourcing' got dampened leading to the fall in the 'Invisibles' exports, thereby leading to the worsening of the balance of trade deficit, current account deficit and balance of payments deficit.

So, in general, the 'Global Financial Crisis, 2008' had adversely affected both the Secondary (Industrial) as well as Tertiary (Services) sectors of the economy. Even then, it is an admitted fact that the economic growth of India remained steady despite the shocks created by 'Global Financial Crisis, 2008'.

In this context, the reasons behind the 'Global Financial Crisis 2008' can be explained in nutshell. The epicenter of the 'Global Financial Crisis 2008' was United States of America. The main reason of the 'Crisis' was 'Burst of the Asset Bubble'. Especially from 1996-97 onwards, the asset market in United States started to inflate mainly because of excessive monetary flow in the economy due to the adverse selection in loan sanctioning (showing lethargy in monitoring by the Central Bank, i.e., Federal Reserve), specifically by the private banks and due to huge monetary capital inflow from outside to the US economy in order to create massive capital account surplus to combat growing current account deficit in the external front.

Now, in the face of falling rate of interest and massive money supply in the economy, people as well as different investor groups have found the real estate market and the derivatives market much lucrative in terms of profit through capital gains, than the bond market. Obviously, this scenario attracted many other investors so that demand for these assets raised the asset prices as well as general price level. Surely, in order to buy these assets, demand for bank loans raised rapidly because generally people/ investors do not invest the money from their home. However, as most of the banks in the economy were private ownership oriented, hence they were run by the profiteering motive firstly, and secondly, the loan regulations were quite weak for them due to the low intervention by the Federal Reserve. This implies that banks will provide loans to those persons or investors who will conform to the loan rate of interest of the bank. But here existed the problem of adverse selection, because, to focus upon the profit, banks have compromised with the 'high risk' individuals in terms of loan provisions rather than the 'low risk' individuals. This can also be called 'Lemon's Problem'. This had created the growing probability of non-return of loans and growing non-performing assets. Again, these assets were subject to the insurance market due to property damage and losses.

From 1996-97 till 2003-04, subprime market started to grow. A subprime loan market is a market is a market where loans are made to persons with high risk of defaults, e.g., unemployed people, divorcees, people with medical emergencies etc., at very high rate of interest. Secondly, the real estate and derivative markets have grown owing to the growth of demand for these assets and that has led to the inflation of these assests so that the assets were sold at a much higher and inflated price than it's real value. This is called the 'Asset Price Bubble'. So this 'Asset Price Bubble' in these markets is the cause of rise in the general price level in the economy. As a result, from 2004 onwards, when the demand for these assets collapsed suddenly due

to exorbitant inflationary pressure upon the whole economy leading to the 'Asset Price Bubble Burst' due to deficient demand, then the demand for these assets started falling and corresponding to that, demand deficiency was created in the economy. In addition to that, moral hazard problem was created in the subprime loan market regarding loan repayment. The problem became grave since 2007 onwards.

Now, this means the end of 'Being a greater full Theory' in a sense, because this asset bubble process is a process by which in the secondary market, lots of assets were bought and sold at a much higher price than the initial buying and selling prices depending upon different conditionalities. As a result, when, finally, the demand for these assets has collapsed, many people with these assets have become 'bad debts'. Hence, they, firstly claimed upon their insurances to pay the debts to the banks, showing different reasons, leading to the moral hazard problem in absence of proper monitoring. This had happened in case of the insurance companies. As a result, in the face of steep fall in demand for these assets, insurance markets faced exorbitant claims much above their claim provision capacity. So, they demanded loans from the banks and assistance from the government. Again, the people, being 'bad debts', were subject to non-performing assets of the bank, there by leading to the growing insolvency of the banking system. These two together, led to the bailout of the banks. This was the case of 'Lehmann Brothers'. For that reason, banks like 'Lehmann Brothers' also demanded the help of the federal reserve as well as the government. Thus, excessive defaults in the banks corresponding to the asset markets and excessive claims in the insurance market were responsible for the loss of many jobs in formal and informal sectors, leading to overall fall in the level of output and exports, hence a massive depression was created by the 'Financial Crisis 2008' that effectively spreaded throughout the world (especially upon European Union (EU) and South American continent (e.g., Brazil, Argentina, Venezuela etc.) mainly because of the fact that USA was one of the greatest debtors in the world in terms of imports. The only two exceptions in the world in terms of steady growth were India and China in the face of 'Financial Crisis 2008'. (The Zivott-Andrews Test and Amit Sen's Test is in Table-3.

TABLE 3: STRUCTURAL BREAKS POINTS FOR THREE MAJOR SECTORS

PERIOD (1950-2016)	LEVEL	
INDIA	ZIVOTT ANDREWS BREAKPOINT	AMIT SEN'S BREAKPOINT
SHARE OF AGRICULTURE IN GVAFC (SHAG)	1967	1967
SHARE OF INDUSTRY (incl. CONSTRUCTION) IN GVAFC (SHIND)	2009	2008
SHARE OF SERVICES (excl. CONSTRUCTION) IN GVAFC (SHSERV)	2008	2008

SOURCE: OWN CALCULATIONS FROM CSO DATA

STATE-WISE ENDOGENOUS STRUCTURAL BREAK POINTS FOR THE AGRICULTURAL SECTOR OF THE INDIAN ECONOMY (TWENTY BIG STATES):

Corresponding to the analysis of the twenty big states, we have to acknowledge the fact that Central Statistical Office does not provide the historical data of the states regarding Net State Value Added and its' major sectoral components (i.e., Agriculture and Allied Sector, Industrial Sector and Services Sector) before 1980. Therefore, we are finding out and analyzing the structural break for twenty (20) big states for the time period 1980-81 to 2016-17 (the relevant structural break points are shown in Table-3).

TABLE 4: STRUCTURAL BREAKS POINTS FOR TWENTY (20) STATES		
PERIOD (1980-2016)	LEVEL	
STATES (SHARE OF AGRICULTUR	ZIVOTT ANDREWS BREAKPOINT	AMIT SEN'S BREAKPOINT
ANDHRA PRADESH	1994 M	1994
ASSAM	2003 M	2003
BIHAR	1992 M	1992
GOA	2003 M	2003
GUJRAT	1987 M	1988
HARYANA	2011 T	2008
HIMACHAL PRADESH	2003 M	2003
JAMMU & KASHMIR	1987 C	2003
KARNATAKA	1999 M	1999
KERALA	1999 C	1999
MADHAYA PRADESH	2012 C	2008
MAHARASHTRA	2005 M	2005
ORISSA	2005 M	2005
PUNJAB	2003 C	2003
RAJASTHAN	1998 M	1998
SIKKIM	2007 M	2007
TAMILNADU	2012 C	2007
TRIPURA	2007 M	2003
UTTAR PRADESH	2006 M	2006
WEST BENGAL	1997 M	1998
SOURCE: OWN CALCULATIONS FROM CSO DATA		

For Andhra Pradesh (AP) and Bihar, the relevant structural breaks are around early 1990s. For AP, the relevant structural break is on 1994 (by the methods of both Zivott-Andrews Test and Amit Sen's Test). For Bihar, the relevant structural break is on 1992 (both Zivott-Andrews Test and Amit Sen's Test).

For AP, the 'agrarian distress', especially in irrigation deprived areas in Telengana and Rayalseema areas of AP, and especially in the cotton production along with chillies and groundnut production, was probably the main reason that led to suicides among the farmers due to massive indebtness (much above their capacity to repay), in the state. This is the most probable reason of structural break on 1994 because, since 1980s, AP was ranked one among the medium growth states but beset with regional inequalities, between Coastal AP and Telengana and Rayalseema in general, as the coastal areas are intensively irrigated whereas the Telengana and Rayalseema are 'irrigation deprived'. In this context, it is to be remembered that The monsoon delivers 70 percent of India's annual rainfall and is the lifeblood of India's $2 trillion economy with the farm sector contributing 14 percent of its economic output.

Nearly half of Indian farmland lacks irrigation, making the monsoon critical for 263 million farmers who grow rice, sugarcane, corn, cotton and soybean. Thus it is obvious that both lack of monsoon as well as lack of irrigation in the Telengana and Rayalseema region are the main reasons for this break.

During 1980 - 1992, Bihar's agriculture and allied sector grew at 1.6 per cent per annum, compared with the national average of 3.1 per cent. In fact the structural break of the agro sector of Bihar is on 1992, because although up to 1992, the growth rate of agricultural GSDP of Bihar was at 1.6 percent on an average and it was the lowest among most of the states, compared with the national average of 3.1 per cent, however, since 1993, growth in Bihar's agricultural GSDP has accelerated at an average of 2.7 percent against the national average of 2.2 percent, i.e., to say, before 1992, Bihar was a below average state in terms of growth of agricultural GSDP and/but since 1993 upto 2003, Bihar became an above average state in terms of growth of agricultural GSDP (Bihar's Agriculture Development: Opportunities & Challenges, A Report Of The Special Task Force On

Bihar, Government Of India New Delhi April, 2008). Now, since the mid 1980s up to 1992-1993, the rising costs of diesel prices, leading to cost push inflation, had led to low growth in the agricultural sector of bihar.

For Assam, Goa, Himachal Pradesh, Jammu & Kashmir, Maharashtra, Orissa and Punjab, the structural break is around early to mid 2000-2010 period (i.e., 2003 to 2005).

For Assam, Goa, Himachal Pradesh and Punjab, the breakpoint is on 2003 by both Zivott-Andrews Test and Amit Sen's Test.

For Assam, In the year 2001-2002, the economy grew in 1993-94 constant prices at 4.5 percent, falling to 3.4 percent in the next financial year 2002-2003. During 2003-2004 and 2004-2005, in the same constant prices, the economy grew more satisfactorily at 5.5 and 5.3 percent respectively. The advanced estimates placed the growth rate for the year 2005-2006 at above 6 percent. Thus it is clear that in terms of overall growth of NSVA/NSDP, 2003 is a significant year in terms of lowest growth during the regime. May be the severe flood of 22 districts in Assam in 2003 has remained the chief cause of diminution in agricultural production in Assam.

For Goa, the breakpoint is on 2003, by both Zivott Andrews Method and Amit Sen's Method in terms of the agricultural contribution to NSVA. Draught mainly due to deficit rainfall is probably the main cause of this break because the draught situation in Goa started from 2000 onwards and became worse since 2004. It is to be noted that this climatic as well as geographical belt of Maharashtra, Goa and Karnataka is the most draught-prone area after Rajasthan.

Corresponding to Himachal Pradesh (HP), the breakpoint is on 2003, by both Zivott Andrews Method and Amit Sen's Method in terms of the agricultural contribution to NSVA of HP. Himachal Pradesh is the source of several perennial rivers and can be perceived as water suficient but meteorological drought is a regular feature here ('Drought in Himachal Pradesh, India: A Historical-Geographical Perspective, 1901-2009'; Vishwa B.S. Chandel and Karanjot Kaur Brar Chandigarh, Punjab). Persistent draught conditions existed during the period 2000-2010 (aforesaid reference in this paragraph). The year 2002-2003 belongs to moderate to severe draught which may be the cause of diminution in the agricultural production of Himachal Pradesh.

For Jammu & Kashmir, the breakpoint is on 1987 according to Zivott-Andrews Test and 2000 according to Amit Sen's test, (the relevant series follows Difference Stationarity). May be the severe political unrest created by the separatist movement in Jammu and Kashmir was responsible for this break.

For Karnataka, the relevant break point is on 1999, both by Zivott and Andrews Method and Amit Sen's Method. Global Recessions due to Asian Financial Crisis had created massive deflation in food prices in particular all around the world. Karnataka was also affected by that and as a result, it led to economic distress in the state and caused farmer's suicides. Karnataka ranks second, next only to Rajsthan in India, in terms of total geographical area prone to drought (due to failure of monsoon). Among its 27 districts, 18 are drought prone. During the years, 1999 to 2003 it faced consecutive droughts leading to farmer suicide, low crop production, debt burden and low price realization (Consequences of 2003 Drought in Karnataka with Particular Reference to Livestock and Fodder Nagaratna Biradar and K. Sridhar, 2009; Karnataka steps up measures to support drought-hit farmers, S. Rajendran, 11 May 2016 17:59 IST, The Hindu Centre, for Politics and Public Policy).

For Kerala, the relevant break point is on 1999, both by Zivott and Andrews Method and Amit Sen's Method. Global Recessions due to Asian Financial Crisis had created massive deflation in food prices in particular all around the world. Kerala was also affected by that and as a result, it led to economic distress in the state and caused farmer's suicides (Analysis of Farmer's Suicides in Kerala, S. Mohanakumar, R.K. Sharma, 2006).

For Maharashtra, the relevant break point is on 2005, both by Zivott and Andrews Method and Amit Sen's Method. Draught mainly due to deficit rainfall (due to failure of monsoon) is probably the main cause of this break because the draught situation in Maharashtra started from 2000 onwards and became worse since 2004 ('Problems and Prospects of Agriculture in Draught Prone Area in Maharashtra'- Dr. Anna Kaka Patil, 2012). It is to be noted that this climatic as well as geographical belt of Maharashtra, Goa and Karnataka is the most draught-prone area of India after Rajasthan.

For Orissa also, the relevant break point is on 2005, both by Zivott and Andrews Method and Amit Sen's Method. Naturally, Orissa is subject to the incidences of draught, flood and cyclones and incidentally, 2005 is the year when draught, flood and cyclone (as well as depressions) have occurred in Orissa, and those, taken together, may be regarded as the prime reason of the structural break.

For Punjab, the relevant break point is on 2003, both by Zivott and Andrews Method and Amit Sen's Method. May the flood be the responsible factor behind the breakpoint.

For Rajasthan, the relevant breakpoint is on 1998 according to both Zivott and Andrews Method and Amit Sen's Method. Draught may be the primary cause behind this breakpoint. In this context, it may be stated that 'Indira Canal' has contributed a lot in the agriculture and drinking water supply of the Western Rajasthan. Practically, it has become the lifeline of western Rajasthan to fight draught. Thus, It is an example of revolutionary contribution of irrigation to mould the structure of dessert area towards arability.

For West Bengal, the break point is on 1997 according to the Zivott and Andrews Method and the break point is on 1998 according to the Amit Sen's Method, i.e., around 1997-1998. The reason of this break point on 1997 may be Global Recessions due to Asian Financial Crisis had created massive deflation in food prices in particular all around the world. Like Kerala, West Bengal was also affected by that and as a result, it led to economic distress in the state (Analysis of Farmer's Suicides in Kerala, S. Mohanakumar, R.K. Sharma, 2006).

For Sikkim and Uttar Pradesh, the break dates are the same corresponding to both methods. For Tripura and Tamilnadu, the break dates differ corresponding to the two different tests.

In the next section, we are going to discuss how rural development enhances by the rise in agricultural Gross Value Added through capital investment in agriculture, availability of loan credit and irrigational expenditure by the government of India.

SECTION 3: RURAL DEVELOPMENT ENHANCEMENT THROUGH THE RISE IN PER CAPITA AGRICULTURAL GROSS VALUE ADDED (PCAGVA): IMPORTANCE OF CAPITAL INVESTMENT, LOAN CREDIT AND IRRIGATIONAL EXPENDITURE: EMPIRICAL STUDY: RESULT AND ANALYSIS:

The objective here is to observe the influence of Per Capita Agricultural Gross Fixed Capital Formation (PCAGFCF), Per Capita Agricultural Credit Issue (PCAGCRDISU) and Agricultural Net Irigated Area (AGNETIRIG) Per Capita Agricultural Gross Value Added at Factor Cost (PCAGVAFC). PCAGVAFC implies the value added distributed to an average rural man. So, improvement or growth (over time) in the PCAGVAFC implies the enhancement in the welfare of the rural mass at the most basic sense of development. Table-2 has shown that the average compound growth rate of Agricultural GDP has remained at almost 3 percent whereas the same of GDPFC has remained at 5 percent. If we observe the growth rate of population, then we can find that the average compound rate of growth of population is 2 percent. So, the growth rate of PCGDPFC is 3 percent and the growth rate of PCAGVAFC is 1 percent (net of population growth). So, on an average, 2 percentage points difference has been maintained by the Agricultural sector's per capita value added growth, behind PCGDPFC growth since 1950-51 to 2011-12.

It is observable from the statistics that the standard of living of the rural mass In india, if the most basic criterion of development is chosen, is improving over time in terms of PCAGVA. The Table-5 shows this through the rising trend of PCAGVA in 2010 US$ constant prices. But, seeing the Table, we may become dissatisfied, may be agitated within ourselves, especially when we compare our trend of PCAGVA with other representative developed and developing countries like Argentina, Chile, Australia, Canada, France, Netherlands, Spain etc.. because not only their PCAGVA is higher than India, but also, the rate of increase of PCAGVA is higher than us in general. However, if we inspect deeply into this matter, then it will be clear that low population (absolute) as well as low population growth is, in general the prime reason of their higher PCAGVA and it's steady growth. India, although has admirable GDP rank in the World (third largest by Purchasing power parity GDP), but, when it gets normalized by population, it gets paultry. Even, although China is more populous than us and is the highest population country in the world, the gap between the aggregate population between India and China is narrowing and soon we will be the highest population country in the world, surpassing China (see Table-6). Thus, it may be said that the rate of

growth in PCAGVA has been eroded by the population growth steadily over time. (In addition, it is to be mentioned that the PCAGVA of United Kingdom, Germany, Japan, Mexico, other SAARC Countries have trended towards comparability with Indian PCAGVA to 2017.)

However, if we compare ourselves with China, accepting the fact that China has shown a modest trend in PCAGVA (comparable with United States), despite being highest populous country, then we have to admit the fact that, China has performed the structural change from agriculture to industry (manufacturing) and towards services (engined by production services related to manufacturing (Datta, 1989, Sinha, 2015), corresponding to per capita value added as well as employment. The share in value added (per capita) and employment is highest for the services and lowest for the agriculture in China (see Table-7 and Table-8). India, although has, performed the structural change towards services, in terms of it's share in per capita value added, however, the rate of structural change towards industry as well as services is very slow compared to It's position in world development. Whereas in China, only 17.5 percent of the aggregate employment is employed in the Agricultural sector, in India, 42.7 percent of the aggregate employment is directly employed in agriculture in 2017. In Services, China contributes 56 percent of it's aggregate employment, but India contributes only 34 percent (roughly).

As the largest section of the aggregate employment is directly related to agriculture in a highly populous country like India, hence, naturally that has led to 'overmanning' in agriculture to a great extent, if it is observedrelative to the Industrial sector and/or Services Sector. As a result, the PCAGVA has risen at a very slow rate. Recognising that the rural literacy rate is 71 percent in India (NSSO Survey, 2018), (moderate, when compared to other developing nations), a chunk of rural employes (skilled and educated), if moved from Agriculture to Industry (Manufacturing) and/or Services for employment, may have shed the load of overmanning in agriculture, raising the PCAGVA from relatively subsistent average level towards higher level corresponding to the marginal productivity of the primary inputs labour and capital taken together. But it could not happen mainly because of 'Stickiness', especially of rural people towards land despite subsistence wage availability over time. In this sense, a steadily rising trend of PCAGVA in rural India, despite all sorts of debarments and barriers, shows considerable attention of Rural Poverty Alleviation Programmes (like MGNREGA, Food for Work Programme, Digital India Programme, Pradhanmantri Kaushal Vikash Yojona, Pradhanmantri Jan Dhan Yojona, Sukanya Samriddhi Yojona, Swavalamban, National Career Service, etc.) through infrastructure building (like PMGSY,Pradhanmantri Gramin Awaas Yojana, Rashtriya Krishi Vikash Yojana etc.). The rigid Industrial labour laws, providing industries and services taken together much higher PCGVA than their marginal productivity, has remained also the prime reason of debarment behind rural-urban migration for employment (Lewis Model, Analytical Development Economics, Basu (2003).

In these circumstances, we will focus upon the role played by gross investment in agriculture, loan credit issue and and irrigational expenditure (proxied by net irrigated area) upon the per capita agricultural gross value added (PCAGVA) through a log-linear model. The regression results show that the impact/influence of gross investment in agriculture and irrigational expenditure (proxied by net irrigated area) (one period lagged) are positive and significant at 1 percent level upon the per capita agricultural gross value added (PCAGVA). But the effect of an increase in aggregate loan credit issue upon the PCAGVA is negative and significant at 1 percent level. The objective of the 'Bank Nationalisation was to reach to every marginal farmer, marginal entity through credit fecilities in order to employ them in agriculture or other self-employment schemes. However, certainly, there was 'Formal Credit Corruption through the involvement of the informal lenders' in the 'Formal Agricultural Credit Issue Process' including various self-employment schemes related to agriculture. So, the issue had a long standing demand for a practical solution. Since 2014, through the Direct Benefit of Transfers (DBT) Schemes and 'Pradhanmantri Jan Dhan Yojona, the situations are changing. Hopefully, there will be a positive continuous effort from the end of Reserve Bank of India (RBI) towards minimizing this phenomenon of 'Formal Credit Corruption through the involvement of the informal lenders'.

APPENDIX:

TABLE 5: PER CAPITA AGRICULTURAL GROSS VALUE ADDED AT AT CONSTANT 2010 PRICES US DOLLARS

Country	YEAR	1970	1980	1990	2000	2010	2017
Argentina	PCAGVA	516.3604	540.5108	526.2966	610.2486	737.8682	719.3208
Australia	PCAGVA	822.5334	823.1989	1013.067	1290.823	1337.375	1404.869
Bangladesh	PCAGVA	122.6646	95.29565	92.90308	101.7994	127.9513	148.7911
Belgium	PCAGVA	194.3348	206.3702	245.7379	323.0757	337.0286	272.6108
Bhutan	PCAGVA	236.7291	262.1937	342.3045	377.194	366.0086	408.7922
Brazil	PCAGVA	226.3323	282.5383	291.8941	358.1646	461.9518	477.4228
Canada	PCAGVA	663.2596	610.6365	688.7989	664.9947	628.8195	723.9239
Chile	PCAGVA	137.1452	145.2484	221.6777	305.8375	465.0099	512.003
China	PCAGVA	148.2009	150.266	232.377	308.4472	440.2608	560.7696
D.P.R. of Korea (N)	PCAGVA	98.52144	162.9145	141.7057	109.4566	118.7318	129.7078
Egypt	PCAGVA	235.7969	242.3304	255.7039	288.3014	340.4256	361.1808
France	PCAGVA	385.1538	457.6771	581.6985	648.9675	650.6669	621.565
Germany	PCAGVA	319.0249	360.9776	427.061	279.813	273.4155	247.7259
Greece	PCAGVA	893.1116	1032.045	858.3383	907.4816	754.2964	871.2025
India	PCAGVA	186.7956	172.1524	194.0159	203.0695	230.9362	266.8554
Iran	PCAGVA	4.781225	5.994952	4.424062	4.468823	3.266255	3.264699
Iraq	PCAGVA	406.2636	342.9294	415.8442	342.6615	232.4446	165.5952
Italy	PCAGVA	483.7861	483.8269	548.3013	694.1161	630.0996	624.9304
Japan	PCAGVA	799.1523	697.5842	733.3114	641.8095	488.7513	386.164
Mexico	PCAGVA	299.8646	314.6301	289.3475	281.8993	290.2535	312.2394
Nepal	PCAGVA	159.4483	131.2742	162.917	163.3509	199.8986	226.8332
Netherlands	PCAGVA	215.7888	456.691	747.4364	840.5086	902.4835	893.8171
Pakistan	PCAGVA	188.2407	176.2968	189.2511	227.0948	238.2046	242.9526
Portugal	PCAGVA	422.8065	472.9094	470.796	450.9128	430.6094	477.3513
Republic of Korea (S	PCAGVA	300.5484	308.8049	400.5541	450.3603	493.9661	484.0771
Spain	PCAGVA	445.2984	548.21	647.6818	851.3755	714.8252	848.1526
Sri Lanka	PCAGVA	146.168	157.9429	167.7427	193.7217	238.6084	270.8307
Sweden	PCAGVA	654.7762	611.6646	766.2107	660.7395	742.7763	713.029
Switzerland	PCAGVA	823.5004	954.7693	740.1256	619.9536	521.1121	471.2064
United Kingdom	PCAGVA	171.0516	216.0188	269.5673	281.7406	255.5229	278.0933
United States	PCAGVA	264.5171	242.0017	345.8893	432.9348	474.0129	518.5742

Source: United Nations Statistical Division (UNSD, 2018)

TABLE 6: POPULATION TREND OF THE DEVELOPED & DEVELOPING COUNTRIES

Country	YEAR	1970	1980	1990	2000	2010	2017
Argentina	Population	23973058	28105888	32729739	37057452	41223889	44271041
Australia	Population	12842907	14649114	17041431	19065837	22120064	24450561
Bangladesh	Population	65047770	81470860	106188642	131581243	152149102	164669751
Belgium	Population	9632180	9868995	10006544	10282033	10938739	11429336
Bhutan	Population	298301	409172	537280	573416	727641	807610
Brazil	Population	95326793	121159761	149352145	175287587	196796269	209288278
Canada	Population	21452737	24537422	27692680	30735773	34168668	36624199
Chile	Population	9563865	11266226	13242132	15262754	16993354	18054726
China	Population	824788457	993877310	1172445200	1283198970	1359755102	1409517397
D.P.R. of Korea	Population	12761875	15473357	20007000	22963000	24469832	25364745
Egypt	Population	35046273	44099142	57412215	69905988	84107606	97553151
France	Population	52035098	55357827	58526312	61470057	65145786	67226350
Germany	Population	78572984	78300650	79118326	81487757	80894785	82114224
Greece	Population	8659795	9634504	10248537	11142119	11446005	11159773
India	Population	553578513	696783517	870133480	1053050912	1230980691	1339180127
Iran	Population	28514010	38668220	56226185	66131854	74567511	81162788
Iraq	Population	9917983	13653356	17469005	23565413	30762701	38274618
Italy	Population	53578683	56419278	57127120	57293721	59729807	59359900
Japan	Population	104925645	117827355	124515561	127533934	128551873	127484450
Mexico	Population	52029861	69360871	85357874	101719673	117318941	129163276
Nepal	Population	11997929	14902163	18749406	23740911	27023137	29304998
Netherlands	Population	13001943	14148415	14965448	15926188	16682917	17035938
Pakistan	Population	58090759	78068144	107678614	138523285	170560182	197015955
Portugal	Population	8701855	9804851	9953327	10355117	10652321	10329506
Republic of Kore	Population	32209314	38050424	42923131	47386312	49552855	50982212
Spain	Population	33980276	37796795	39306102	40903711	46788630	46354321
Sri Lanka	Population	12485756	15035856	17329713	18781938	20198353	20876917
Sweden	Population	8054916	8316338	8567384	8881640	9390168	9910701
Switzerland	Population	6169358	6303610	6674890	7167250	7831971	8476005
United Kingdom	Population	55634935	56265475	57183331	58950848	63306843	66181585
United States	Population	209588150	229763052	252529950	281982778	308641391	324459463

Source: United Nations Statistical Division (UNSD, 2018)

TABLE 7: SHARE IN PER CAPITA VALUE ADDED OF THE THREE MAJOR SECTORS (DCs & LDCs) (AT CONSTANT 2010 PRICES US DOLLARS)

Country	IndicatorName	1970	1980	1990	2000	2010	2017
Argentina	A	8.53056	7.992162	10.11731	8.606251	8.502202	8.22421
Argentina	I (incl. CONSTR.)	35.98296	33.93595	29.68185	29.82726	30.11079	27.59021
Argentina	S (excl. CONSTR.)	55.48648	58.07189	60.20083	61.56649	61.38701	64.18558
Argentina	Total Per Capita Value Added	100	100	100	100	100	100
Australia	A	3.179123	2.619543	2.723145	2.730803	2.440678	2.375133
Australia	I (incl. CONSTR.)	37.34207	35.15227	32.71389	29.19427	28.19434	26.42855
Australia	S (excl. CONSTR.)	59.47881	62.22818	64.56297	68.07493	69.36498	71.19632
Australia	Total Per Capita Value Added	100	100	100	100	100	100
Bangladesh	A	34.32254	29.4912	24.97003	21.44518	17.8105	14.29937
Bangladesh	I (incl. CONSTR.)	17.44448	17.24806	17.65378	21.88865	26.14449	31.68659
Bangladesh	S (excl. CONSTR.)	48.23298	53.26074	57.37619	56.66617	56.045	54.01404
Bangladesh	Total Per Capita Value Added	100	100	100	100	100	100
Belgium	A	1.148332	0.870062	0.839937	0.899793	0.852469	0.662661
Belgium	I (incl. CONSTR.)	24.95928	25.12278	24.15543	23.72847	23.17629	23.00321
Belgium	S (excl. CONSTR.)	73.89239	74.00716	75.00464	75.37173	75.97124	76.33413
Belgium	Total Per Capita Value Added	100	100	100	100	100	100
Bhutan	A	63.41453	64.83134	44.63222	30.97463	17.49648	14.35092
Bhutan	I (incl. CONSTR.)	8.124285	5.742788	24.40349	34.58141	44.55863	44.4843
Bhutan	S (excl. CONSTR.)	28.46118	29.42587	30.9643	34.44397	37.94489	41.16479
Bhutan	Total Per Capita Value Added	100	100	100	100	100	100
Brazil	A	5.867982	3.886945	4.093258	4.689432	4.842257	5.353783
Brazil	I (incl. CONSTR.)	33.76593	34.26656	29.00659	28.56589	27.37517	24.40792
Brazil	S (excl. CONSTR.)	60.36609	61.84649	66.90015	66.74467	67.78257	70.23829
Brazil	Total Per Capita Value Added	100	100	100	100	100	100
Canada	A	2.407985	1.77713	1.767788	1.411465	1.281513	1.350263
Canada	I (incl. CONSTR.)	46.67044	44.18802	42.23181	42.80229	35.66797	35.15909
Canada	S (excl. CONSTR.)	50.92157	54.03485	56.0004	55.78624	63.05052	63.49065
Canada	Total Per Capita Value Added	100	100	100	100	100	100
Chile	A	2.432259	2.332656	3.207545	2.940338	3.515287	3.367919
Chile	I (incl. CONSTR.)	56.62124	51.23039	52.93965	53.16047	45.17478	41.50646
Chile	S (excl. CONSTR.)	40.9465	46.43695	43.85281	43.89919	51.30993	55.12563
Chile	Total Per Capita Value Added	100	100	100	100	100	100
China	A	53.29965	40.66811	30.73914	17.52347	9.812839	7.783406
China	I (incl. CONSTR.)	20.98852	30.25418	30.71486	42.065	46.57908	46.56441
China	S (excl. CONSTR.)	25.71183	29.07772	38.54601	40.41153	43.60808	45.65218
China	Total Per Capita Value Added	100	100	100	100	100	100
D.P.R. of Korea	A	18.17373	18.17373	16.75114	20.12594	20.834	22.90886
D.P.R. of Korea	I (incl. CONSTR.)	56.64933	56.64933	61.71479	47.32576	48.2095	45.86517
D.P.R. of Korea	S (excl. CONSTR.)	25.17694	25.17694	21.53407	32.5483	30.95649	31.22597
D.P.R. of Korea	Total Per Capita Value Added	100	100	100	100	100	100
Egypt	A	37.16329	22.23057	16.87743	15.73979	13.99018	14.2909
Egypt	I (incl. CONSTR.)	34.11532	41.00119	38.17814	36.21979	37.5265	33.65332
Egypt	S (excl. CONSTR.)	28.72139	36.76825	44.94443	48.04042	48.48332	52.05578
Egypt	Total Per Capita Value Added	100	100	100	100	100	100
France	A	2.047796	1.825309	1.962002	1.890183	1.780242	1.611973
France	I (incl. CONSTR.)	26.45096	24.89991	22.8035	21.70512	19.80622	18.72954
France	S (excl. CONSTR.)	71.50125	73.27478	75.2345	76.40469	78.41354	79.65849
France	Total Per Capita Value Added	100	100	100	100	100	100
Germany	A	1.813894	1.531003	1.456848	0.809135	0.719302	0.582785
Germany	I (incl. CONSTR.)	46.37459	40.4808	36.18974	30.94683	30.16253	31.57017
Germany	S (excl. CONSTR.)	51.81151	57.9882	62.35341	68.24404	69.11817	67.84704
Germany	Total Per Capita Value Added	100	100	100	100	100	100
Greece	A	8.468268	6.689318	4.891756	4.499125	3.265225	4.376787
Greece	I (incl. CONSTR.)	22.97316	22.72585	20.36453	19.26227	15.65553	14.83226
Greece	S (excl. CONSTR.)	68.55858	70.58483	74.74371	76.2386	81.07925	80.79095
Greece	Total Per Capita Value Added	100	100	100	100	100	100
India	A	49.11443	42.64143	35.03054	26.39624	18.35043	14.85593
India	I (incl. CONSTR.)	23.12968	25.59029	29.48825	29.69915	33.11416	31.36054
India	S (excl. CONSTR.)	27.75589	31.76827	35.48121	43.90461	48.53541	53.78353
India	Total Per Capita Value Added	100	100	100	100	100	100
Iran	A	3.391307	5.116102	7.676639	7.492534	6.381581	7.669678
Iran	I (incl. CONSTR.)	70.58595	27.86371	47.38171	46.03008	43.40803	40.64314
Iran	S (excl. CONSTR.)	26.02274	67.02019	44.94165	46.47738	50.21039	51.68718
Iran	Total Per Capita Value Added	100	100	100	100	100	100

Iraq	A	10.69586	5.666332	9.95876	7.37027	5.129363	3.153797
Iraq	I (incl. CONSTR.)	76.26682	72.74667	62.24625	66.74828	55.43772	65.0015
Iraq	S (excl. CONSTR.)	13.03732	21.587	27.79499	25.88145	39.43292	31.8447
Iraq	Total Per Capita Value Added	100	100	100	100	100	100
Italy	A	2.97211	2.213098	1.958403	2.143611	1.968941	1.931663
Italy	I (incl. CONSTR.)	30.58588	30.27976	28.02225	26.31311	24.37467	23.74287
Italy	S (excl. CONSTR.)	66.44201	67.50714	70.01934	71.54328	73.65639	74.32546
Italy	Total Per Capita Value Added	100	100	100	100	100	100
Japan	A	4.368472	2.568524	1.933131	1.500345	1.104949	0.811978
Japan	I (incl. CONSTR.)	38.35496	33.84333	33.89237	29.68516	28.51401	29.0168
Japan	S (excl. CONSTR.)	57.27657	63.58814	64.1745	68.81449	70.38104	70.17122
Japan	Total Per Capita Value Added	100	100	100	100	100	100
Mexico	A	5.800629	4.203889	3.939976	3.263742	3.355271	3.280854
Mexico	I (incl. CONSTR.)	35.73371	38.73234	37.93452	37.30403	33.73771	30.55516
Mexico	S (excl. CONSTR.)	58.46566	57.06377	58.12551	59.43222	62.90701	66.16399
Mexico	Total Per Capita Value Added	100	100	100	100	100	100
Nepal	A	53.3099	47.70455	46.90861	36.63566	35.38044	33.1762
Nepal	I (incl. CONSTR.)	8.287874	9.102681	12.55917	16.77562	15.14282	14.41798
Nepal	S (excl. CONSTR.)	38.40223	43.19276	40.53222	46.58872	49.47674	52.40582
Nepal	Total Per Capita Value Added	100	100	100	100	100	100
Netherlands	A	0.916648	1.625145	2.289002	2.021716	1.979522	1.827638
Netherlands	I (incl. CONSTR.)	37.5322	29.07993	26.6456	24.17944	21.92014	20.78391
Netherlands	S (excl. CONSTR.)	61.55115	69.29493	71.0654	73.79884	76.10033	77.38845
Netherlands	Total Per Capita Value Added	100	100	100	100	100	100
Norway	A	2.593306	1.829194	1.494159	1.314977	1.759669	1.604706
Norway	I (incl. CONSTR.)	33.38602	39.24245	43.49213	46.51786	39.00328	36.61173
Norway	S (excl. CONSTR.)	64.02067	58.92836	55.01372	52.16717	59.23705	61.78356
Norway	Total Per Capita Value Added	100	100	100	100	100	100
Pakistan	A	42.3898	34.69341	28.57714	29.01755	24.29211	21.6522
Pakistan	I (incl. CONSTR.)	13.68302	15.68435	18.78777	18.19404	20.5754	20.51654
Pakistan	S (excl. CONSTR.)	43.92718	49.62225	52.63509	52.78841	55.13249	57.83126
Pakistan	Total Per Capita Value Added	100	100	100	100	100	100
Portugal	A	5.138943	4.383111	3.204492	2.42071	2.187503	2.33266
Portugal	I (incl. CONSTR.)	25.66671	27.11441	27.9094	27.58623	22.62417	21.83918
Portugal	S (excl. CONSTR.)	69.19435	68.50248	68.8861	69.99306	75.18832	75.82816
Portugal	Total Per Capita Value Added	100	100	100	100	100	100
Republic of Korea	A	15.40509	8.498856	5.071884	3.343669	2.47112	2.034145
Republic of Korea	I (incl. CONSTR.)	20.74124	29.63034	33.69931	34.46752	38.26972	39.23178
Republic of Korea	S (excl. CONSTR.)	63.85367	61.8708	61.2288	62.18881	59.25916	58.73407
Republic of Korea	Total Per Capita Value Added	100	100	100	100	100	100
Spain	A	3.498852	3.348296	3.050795	3.31943	2.55111	2.850044
Spain	I (incl. CONSTR.)	36.90752	33.5091	32.44788	31.54809	26.01358	23.96216
Spain	S (excl. CONSTR.)	59.59363	63.1426	64.50132	65.13248	71.43531	73.1878
Spain	Total Per Capita Value Added	100	100	100	100	100	100
Sri Lanka	A	21.82955	18.87577	15.60611	11.71084	9.463431	7.575728
Sri Lanka	I (incl. CONSTR.)	21.74438	22.66069	24.54342	29.8412	29.67759	29.74254
Sri Lanka	S (excl. CONSTR.)	56.42607	58.46354	59.85047	58.44796	60.85898	62.68173
Sri Lanka	Total Per Capita Value Added	100	100	100	100	100	100
Sweden	A	2.730885	2.058035	2.202364	1.654021	1.622369	1.407121
Sweden	I (incl. CONSTR.)	28.0464	25.62443	25.49322	28.31744	28.91019	24.45504
Sweden	S (excl. CONSTR.)	69.22272	72.31753	72.30442	70.02854	69.46744	74.13784
Sweden	Total Per Capita Value Added	100	100	100	100	100	100
Switzerland	A	1.716592	1.79474	1.163783	0.947448	0.725943	0.636753
Switzerland	I (incl. CONSTR.)	29.28785	29.76176	27.65891	26.20778	26.58283	25.58444
Switzerland	S (excl. CONSTR.)	68.99556	68.4435	71.17731	72.84478	72.69122	73.77881
Switzerland	Total Per Capita Value Added	100	100	100	100	100	100
United Kingdom	A	1.053954	1.142815	1.06414	0.8723	0.732292	0.727668
United Kingdom	I (incl. CONSTR.)	34.93774	31.18958	29.76042	24.26835	19.91059	18.63061
United Kingdom	S (excl. CONSTR.)	64.00831	67.6676	69.17544	74.85935	79.35712	80.64172
United Kingdom	Total Per Capita Value Added	100	100	100	100	100	100
United States	A	1.007612	0.777551	0.912854	0.945119	0.97586	0.979949
United States	I (incl. CONSTR.)	28.22722	24.13778	22.28704	22.08515	19.70731	18.9571
United States	S (excl. CONSTR.)	70.76516	75.08467	76.80011	76.96973	79.31683	80.06295
United States	Total Per Capita Value Added	100	100	100	100	100	100
Source: United Nations Statistical Division, 2018							

TABLE 8: LONG TERM CHANGES IN SHARES OF MAJOR SECTORS IN LABOR FORCE

DEVELOPED COUNTRIES	SHARES IN TOTAL LABOR FORCE			LESS DEVELOPED COUNTRIES	SHARES IN TOTAL LABOR FORCE		
COUNTRY	A	I	S	COUNTRY	A	I	S
UNITED KINGDOM, 1991	2.3	33.4	66.5	ARGENTINA, 1991	0.3	34	66.8
2001	1.4	25.8	74	2001	0.8	22.9	77.2
2011	1.2	21	79.6	2011	0.6	25.4	75.4
2017	1.1	20	80.5	2017	0.5	25.1	76.1
FRANCE, 1991	5.3	30.4	65.5	MEXICO, 1991	26.8	24.3	50.1
2001	4.1	27.1	69.9	2001	17.7	26.9	56.3
2011	2.9	23.8	74.9	2011	13.4	25.6	62
2017	2.9	21.9	76.8	2017	13.1	26.9	61.1
BELGIUM,1991	2.7	32.4	66	EGYPT, 1991	31.3	26.1	43.8
2001	1.4	26.2	73.1	2001	28.6	22.8	50.2
2011	1.3	24.8	75.5	2011	29.2	25.6	47.2
2017	1.3	22.9	77.4	2017	24.8	27.7	49.6
NETHERLANDS, 1991	4.4	26.3	70.7	PHILIPPINES,1991	45.3	17.1	38.7
2001	3.1	22.1	75.3	2001	37.2	16.9	46.6
2011	2.8	18.2	80.1	2011	33	15.8	52.2
2017	2.2	17.5	81.3	2017	26	18.7	56.3
GERMANY, 1991	4.1	43.1	55	INDIA, 1991	63.6	16	21.6
2001	2.6	34	64.6	2001	60.3	16.8	23.8
2011	1.7	30	70.1	2011	48.8	24.5	27.8
2017	1.3	28.8	71.5	2017	42.7	25	33.5
SWITZERLAND, 1991	4.3	29.6	67.1	SRI LANKA, 1991	42.8	28.6	30.6
2001	4.4	25.3	71.2	2001	40.9	24.5	36.3
2011	3.5	23.3	74.2	2011	33.1	25.1	42.8
2017	3.5	21.8	75.8	2017	26.7	27	47.7
SWEDEN, 1991	3.2	25.6	72.1	CHINA,1991	55.3	27.7	17.4
2001	2.3	23.2	75.4	2001	42.6	28.5	29.3
2011	2	21.1	78.1	2011	24.5	30.6	45.5
2017	1.9	19.4	80	2017	17.5	27.4	55.9
ITALY, 1991	8.5	36.6	56.5	BANGLADESH,1991	69.51	13.58	16.91
2001	5.2	32.8	63.1	2001	62.34	11.27	26.39
2011	3.7	30	68	2011	46.57	18.07	35.35
2017	3.9	28.1	69.8	2017	40.59	20.41	38.98
JAPAN, 1991	6.7	35.2	58.7	BRAZIL, 1991	22.43	22.48	55.09
2001	4.9	31.3	64.4	2001	19.88	21.04	59.08
2011	4	26.3	70.5	2011	15.43	21.77	62.79
2017	3.5	26.6	70.9	2017	9.51	20.46	70.04
CANADA, 1991	4.4	25.5	72.7	BHUTAN,1991	68.88	5.95	25.17
2001	2.8	24.4	74.8	2001	64.84	7.36	27.79
2011	2.3	22.2	77.9	2011	60.15	9.2	30.65
2017	2	21.8	78.4	2017	57.21	9.75	33.04
USA, 1991	2.8	26.4	72.6	KOREA REPUB (S),1991	16.37	15.39	47.68
2001	1.7	23.9	75.7	2001	9.96	18.22	62.56
2011	1.7	20.1	79.8	2011	6.37	24.85	68.77
2017	1.7	20.3	79.5	2017	4.78	14.2	70.14
AUSTRALIA, 1991	5.5	26.3	70.7	D.P.R. KOREA (N), 1991	59.23	21.46	19.3
2001	4.8	22.5	74.5	2001	60.16	19.61	20.23
2011	2.8	24.1	76.4	2011	60.05	18.1	21.85
2017	2.6	22.2	78.3	2017	59.94	17.17	22.88
SPAIN, 1991	10.3	34.7	56.2	IRAN, 1991	24.35	31.29	44.36
2001	6.6	32.5	62	2001	24.15	30.85	45.03
2011	4.1	23.2	74.1	2011	18.71	32.71	48.57
2017	4.1	20.8	76.4	2017	17.58	32.03	50.38
CHILE, 1991	19.1	28.9	54.6	IRAQ, 1991	25.68	23.11	51.21
2001	13.6	25.8	62.5	2001	23.89	24.31	51.81
2011	10.3	27.1	66.4	2011	21.13	24.27	54.61
2017	9.6	26.1	67.6	2017	19.01	23.46	57.53
GREECE,1991	21.49	24.71	53.8	NEPAL, 1991	82.33	2.76	14.91
2001	15.87	23.06	61.07	2001	75.39	10.25	14.42
2011	12.35	17.69	69.96	2011	72.72	11.72	15.56
2017	12.08	15.41	72.51	2017	70.43	12.73	16.83
PORTUGAL,1991	11.72	33.34	54.95	PAKISTAN, 1991	44.06	21.18	34.76
2001	13.17	33.45	53.38	2001	42.51	20.83	36.65
2011	10.21	26.86	62.94	2011	43.49	23.77	34.74
2017	6.4	24.74	68.86	2017	41.97	23.62	34.41

Source: United Nations Statistical Division (UNSD, 2018)

TABLE 9: COINTEGRATION STUDY				
Johansen Jesulious Unrestricted Cointegration Rank Test				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.590927	67.20762	47.85613	0.0003
At most 1 *	0.359443	34.13474	29.79707	0.0149
At most 2 *	0.330831	17.65428	15.49471	0.0233
At most 3	0.07265	2.790692	3.841466	0.0948
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
		0.330831	17.65428	15.49471 0.0233
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.590927	33.07288	27.58434	0.0089
At most 1	0.359443	16.48046	21.13162	0.198
At most 2 *	0.330831	14.86359	14.2646	0.0402
At most 3	0.07265	2.790692	3.841466	0.0948
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
1 Cointegrating Equation(s):		Log likelihood	264.8843	
1 Cointegrating Equation(s):		Log likelihood	264.1776	
Normalized cointegrating coefficients (standard error in parentheses)				
LNPCAGVA	LNAGCRDISU	LNAGFCF	LNAGNETIRIG(-1)	
1	0.361028	-0.89001	-1.543614	
	-0.10889	-0.19625	-0.46598	
Source: Own Calculations from CSO, RBI, INFRASTRUCTURE DEVELOPMENT REPORT, INDIA				

TABLE 10: Vector Error Correction Estimates
Sample (adjusted): 1976 2012
Included observations: 37 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1			
LNPCAGVA(-1)	1			
LNAGCRDISU(-1)	0.361028			
	-0.10889			
	[3.31546]			
LNAGFCF(-1)	-0.89001			
	-0.19625			
	[-4.53515]			
LNAGNETIRIG(-2)	-1.543614			
	-0.46598			
	[-3.31264]			
C	5.60969			
Error Correction:	D(LNPCAGVA)	D(LNAGCRDISU)	D(LNAGFCF)	D(LNAGNETIRIG(-1))
CointEq1	-0.163573	-0.423933	0.944746	-0.002807
	-0.12286	-0.20528	-0.33363	-0.05574
	[-1.33137]	[-2.06519]	[2.83168]	[-0.05035]
D(LNPCAGVA(-1))	-0.588379	0.813517	-0.679645	0.159075
	-0.21545	-0.35997	-0.58506	-0.09774
	[-2.73096]	[2.25994]	[-1.16166]	[1.62747]
D(LNPCAGVA(-2))	-0.444303	0.162186	0.034333	0.001972
	-0.26318	-0.43973	-0.71469	-0.1194
	[-1.68818]	[0.36883]	[0.04804]	[0.01651]
D(LNPCAGVA(-3))	-0.202079	0.917155	0.536791	-0.139384
	-0.28456	-0.47545	-0.77274	-0.1291
	[-0.71015]	[1.92904]	[0.69466]	[-1.07967]
D(LNPCAGVA(-4))	-0.186467	0.132041	-0.127809	-0.11789
	-0.26729	-0.44658	-0.72583	-0.12126
	[-0.69763]	[0.29567]	[-0.17609]	[-0.97220]
D(LNAGCRDISU(-1))	-0.013222	0.174579	0.056523	-0.015725
	-0.12557	-0.20981	-0.341	-0.05697
	[-0.10529]	[0.83210]	[0.16576]	[-0.27604]
D(LNAGCRDISU(-2))	0.096294	0.129285	0.044196	-0.075803
	-0.11541	-0.19283	-0.3134	-0.05236
	[0.83436]	[0.67046]	[0.14102]	[-1.44775]
D(LNAGCRDISU(-3))	0.015194	0.069907	0.404325	0.010073
	-0.10611	-0.17728	-0.28814	-0.04814
	[0.14319]	[0.39432]	[1.40325]	[0.20925]
D(LNAGCRDISU(-4))	-0.131474	0.114059	-0.008756	-0.01351
	-0.10618	-0.17741	-0.28834	-0.04817
	[-1.23819]	[0.64291]	[-0.03037]	[-0.28046]
D(LNAGFCF(-1))	-0.068901	-0.286391	0.069482	-0.000542
	-0.10088	-0.16854	-0.27393	-0.04576
	[-0.68303]	[-1.69921]	[0.25364]	[-0.01185]
D(LNAGFCF(-2))	-0.037406	-0.189931	0.523129	-0.027418
	-0.09309	-0.15553	-0.25279	-0.04223
	[-0.40184]	[-1.22117]	[2.06946]	[-0.64922]
D(LNAGFCF(-3))	-0.163546	-0.227485	0.661307	-0.017629
	-0.09264	-0.15478	-0.25156	-0.04203
	[-1.76543]	[-1.46972]	[2.62878]	[-0.41947]
D(LNAGFCF(-4))	-0.10105	-0.043396	0.337298	-0.040758
	-0.08813	-0.14725	-0.23932	-0.03998
	[-1.14661]	[-0.29471]	[1.40939]	[-1.01939]
D(LNAGNETIRIG(-2))	0.237853	-0.471232	1.424294	-0.121518
	-0.43924	-0.73389	-1.19279	-0.19927
	[0.54151]	[-0.64210]	[1.19408]	[-0.60980]
D(LNAGNETIRIG(-3))	-0.40597	-2.077145	-0.181201	0.190767
	-0.4348	-0.72647	-1.18072	-0.19726
	[-0.93370]	[-2.85924]	[-0.15347]	[0.96710]
D(LNAGNETIRIG(-4))	-0.253975	-0.770438	-0.23925	0.008504
	-0.51577	-0.86175	-1.40059	-0.23399
	[-0.49242]	[-0.89404]	[-0.17082]	[0.03634]
D(LNAGNETIRIG(-5))	-0.16726	0.135047	-0.656319	-0.423616
	-0.43369	-0.72462	-1.17772	-0.19676
	[-0.38566]	[0.18637]	[-0.55728]	[-2.15300]
C	0.054041	0.161785	-0.100266	0.04351
	-0.04272	-0.07137	-0.116	-0.01938
	[1.26515]	[2.26687]	[-0.86439]	[2.24520]
R-squared	0.566138	0.577639	0.564295	0.55431
Adj. R-squared	0.177946	0.199737	0.174453	0.155535
Sum sq. resids	0.047247	0.131895	0.348411	0.009724
S.E. equation	0.049867	0.083318	0.135416	0.022623
F-statistic	1.458396	1.528541	1.447498	1.390033
Log likelihood	70.77008	51.77759	33.80713	100.0138
Akaike AIC	-2.852437	-1.825816	-0.854439	-4.433179
Schwarz SC	-2.068747	-1.042126	-0.07075	-3.64949
Mean dependent	0.00804	0.161484	0.04951	0.018035
S.D. dependent	0.055	0.093137	0.149038	0.024619
Determinant resid covariance (dof adj.)		1.06E-10		
Determinant resid covariance		7.39E-12		
Log likelihood		264.1776		
Akaike information criterion		-10.17176		
Schwarz criterion		-6.862852		

Source: Own Calculations from CSO, RBI, INFRASTRUCTURE DEVELOPMENT REPORT, INDIA

TABLE 11: ZIVOTT-ANDREWS TEST OF STRUCTURAL BREAK FOR THREE (3) MAJOR SECTORS OF INDIA

	INDIA	CONSTANT	TREND	INTBRKDUM	TRENDBRKUM	BREAKDUM	DY(t-1)	DY(t-2)	supermin t	F STAT	BREAK YEAR	SERIES TYPE
	SHAG	0.200027	-0.176411	1.720155	0.171938	2.761694	-0.446276	-				
BFM	t statistic	0.350175	-2.747751	2.763429	2.650181	2.515799	-4.080201	-	-13.22298	6.038568	1967	DS
	SHIND	0.182606	-	-0.36413	-	6.903011	-0.012163	-				
BFM	t statistic	2.282819	-	-1.504555	-	10.71473	-0.160882	-	-13.38819	41.35577	2009	DS
	SHSERV	0.522683	-	0.097882	-	-8.797907	-0.085586	-				
BFM	t statistic	4.226509	-	0.267012	-	-9.09684	-1.043148	-	-13.23139	32.6755	2008	DS

Source: Own Calculations based on CSO Data, 2018

TABLE 12: AMIT SEN'S TEST OF STRUCTURAL BREAK FOR THREE (3) MAJOR SECTORS OF INDIA

	INDIA	CONSTANT	TREND	INTBRKDUM	TRENDBRKUM	BREAKDUM	DY(t-1)	DY(t-2)	D(SHIND(-1),2)	D(SHIND(-2),2)	D(SHIND(-3),2)	D(SHIND(-4),2)	supermin t	F STAT	BREAK YEAR	SERIES TYPE
	SHAG	0.200027	-0.176411	1.720155	0.171938	2.761694	-0.446276	-	-	-	-	-				
BFM	t statistic	0.350175	-2.747751	2.763429	2.650181	2.515799	-4.080201	-	-	-	-	-	-13.22298	6.038568	1967	DS
	SHIND	1.220315	-0.025129	6.819093	-0.89084	-6.228428	-1.613576	-	1.079085	0.65004	0.290699	-				
BFM	t statistic	5.38588	-3.751307	8.457222	-7.438599	-6.516363	-6.491831	-	5.361948	4.381756	3.108647	-	-10.36931	9.904262	2009	DS
	SHSERV	0.493987	0.03952	-10.7908	1.235065	10.05511	-2.139173	-	1.485103	0.976475	0.565588	0.220862				
BFM	t statistic	2.2052	4.88825	-11.55981	8.95223	9.064619	-8.294988	-	6.685572	5.465756	4.197126	2.700244	-12.06668	32.6755	2008	DS

Source: Own Calculations based on CSO Data, 2018

TABLE-9: Vector Error Correction Estimates
Date: 11/28/19 Time: 09:35
Sample (adjusted): 1976 2012
Included observations: 37 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1			
LNPCAGVA(-1)	1			
LNAGCRDISU(-1)	0.361028			
	-0.10889			
	[3.31546]			
LNAGFCF(-1)	-0.89001			
	-0.19625			
	[-4.53515]			
LNAGNETIRIG(-2)	-1.54361			
	-0.46598			
	[-3.31264]			
C	5.60969			
Error Correction:	D(LNPCAGV	D(LNAGCRI	D(LNAGFCF	D(LNAGNETIRIG(-1))
CointEq1	-0.16357	-0.42393	0.944746	-0.002807
	-0.12286	-0.20528	-0.33363	-0.05574
	[-1.33137]	[-2.06519]	[2.83168]	[-0.05035]
D(LNPCAGVA(-1))	-0.58838	0.813517	-0.67965	0.159075
	-0.21545	-0.35997	-0.58506	-0.09774
	[-2.73096]	[2.25994]	[-1.16166]	[1.62747]
D(LNPCAGVA(-2))	-0.4443	0.162186	0.034333	0.001972
	-0.26318	-0.43973	-0.71469	-0.1194
	[-1.68818]	[0.36883]	[0.04804]	[0.01651]
D(LNPCAGVA(-3))	-0.20208	0.917155	0.536791	-0.139384
	-0.28456	-0.47545	-0.77274	-0.1291
	[-0.71015]	[1.92904]	[0.69466]	[-1.07967]
D(LNPCAGVA(-4))	-0.18647	0.132041	-0.12781	-0.11789
	-0.26729	-0.44658	-0.72583	-0.12126
	[-0.69763]	[0.29567]	[-0.17609]	[-0.97220]
D(LNAGCRDISU(-1))	-0.01322	0.174579	0.056523	-0.015725
	-0.12557	-0.20981	-0.341	-0.05697
	[-0.10529]	[0.83210]	[0.16576]	[-0.27604]
D(LNAGCRDISU(-2))	0.096294	0.129285	0.044196	-0.075803
	-0.11541	-0.19283	-0.3134	-0.05236
	[0.83436]	[0.67046]	[0.14102]	[-1.44775]
D(LNAGCRDISU(-3))	0.015194	0.069907	0.404325	0.010073
	-0.10611	-0.17728	-0.28814	-0.04814
	[0.14319]	[0.39432]	[1.40325]	[0.20925]
D(LNAGCRDISU(-4))	-0.13147	0.114059	-0.00876	-0.01351
	-0.10618	-0.17741	-0.28834	-0.04817
	[-1.23819]	[0.64291]	[-0.03037]	[-0.28046]
D(LNAGFCF(-1))	-0.0689	-0.28639	0.069482	-0.000542
	-0.10088	-0.16854	-0.27393	-0.04576
	[-0.68303]	[-1.69921]	[0.25364]	[-0.01185]
D(LNAGFCF(-2))	-0.03741	-0.18993	0.523129	-0.027418
	-0.09309	-0.15553	-0.25279	-0.04223
	[-0.40184]	[-1.22117]	[2.06946]	[-0.64922]
D(LNAGFCF(-3))	-0.16355	-0.22749	0.661307	-0.017629
	-0.09264	-0.15478	-0.25156	-0.04203
	[-1.76543]	[-1.46972]	[2.62878]	[-0.41947]
D(LNAGFCF(-4))	-0.10105	-0.0434	0.337298	-0.040758
	-0.08813	-0.14725	-0.23932	-0.03998
	[-1.14661]	[-0.29471]	[1.40939]	[-1.01939]
D(LNAGNETIRIG(-2))	0.237853	-0.47123	1.424294	-0.121518
	-0.43924	-0.73389	-1.19279	-0.19927
	[0.54151]	[-0.64210]	[1.19408]	[-0.60980]
D(LNAGNETIRIG(-3))	-0.40597	-2.07715	-0.1812	0.190767
	-0.4348	-0.72647	-1.18072	-0.19726
	[-0.93370]	[-2.85924]	[-0.15347]	[0.96710]
D(LNAGNETIRIG(-4))	-0.25398	-0.77044	-0.23925	0.008504
	-0.51577	-0.86175	-1.40059	-0.23399
	[-0.49242]	[-0.89404]	[-0.17082]	[0.03634]
D(LNAGNETIRIG(-5))	-0.16726	0.135047	-0.65632	-0.423616
	-0.43369	-0.72462	-1.17772	-0.19676
	[-0.38566]	[0.18637]	[-0.55728]	[-2.15300]
C	0.054041	0.161785	-0.10027	0.04351
	-0.04272	-0.07137	-0.116	-0.01938
	[1.26515]	[2.26687]	[-0.86439]	[2.24520]
R-squared	0.566138	0.577639	0.564295	0.55431
Adj. R-squared	0.177946	0.199737	0.174453	0.155535
Sum sq. resids	0.047247	0.131895	0.348411	0.009724
S.E. equation	0.049867	0.083318	0.135416	0.022623
F-statistic	1.458396	1.528541	1.447498	1.390033
Log likelihood	70.77008	51.77759	33.80713	100.0138
Akaike AIC	-2.85244	-1.82582	-0.85444	-4.433179
Schwarz SC	-2.06875	-1.04213	-0.07075	-3.64949
Mean dependent	0.00804	0.161484	0.04951	0.018035
S.D. dependent	0.055	0.093137	0.149038	0.024619

Determinant resid covariance (dof a	1.06E-10	
Determinant resid covariance	7.39E-12	
Log likelihood	264.1776	
Akaike information criterion	-10.1718	
Schwarz criterion	-6.86285	

Source: Own Calculations