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STRUCTURAL CHANGE OF THE INDIAN ECONOMY IN COMPARISON OF THE DEVELOPMENT EXPERIENCE OF THE TWENTY TWO MAJOR DEVELOPED AND DEVELOPING COUNTRIES WITH A SPECIFIC EMPHASIS TOWARDS IRRIGATION AND AGRICULTURAL DEVELOPMENT OF INDIA HIGHLIGHTING BIHAR AND WEST BENGAL

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ABSTRACT: Irrigation has lacked proper attention in India despite it's pivotal role in the agricultural development in India. Although we feed almost one fifth of World population (17.7 percent), being the Second most populous country of the World (after China) and to become the most populous country of the World by 2027, still more than 50 percent of our agricultural land is rainfed and deprived of Irrigational facilities. In these circumstances, how Bihar and West Bengal, two neighbor states, develop in terms of agricultural growth, through infrastructural reforms including Irrigation – is the matter of discussion. The importance of Structural Change in the course of agricultural development is also getting prime importance in this article.

Keywords: Structural Change, Comparison over Time Series, Trend Analysis, Cointegration, Panel Fixed Effect Regression.

JEL Classification: C11, C22, C23, O13, O14, O18, O50, O57.

INTRODUCTION: The situation of Irrigation is only moderate in India relative to the aggregate agricultural land in India. In 2013-14, only about 36.7 percent of total agricultural land in India was reliably irrigated and remaining 2/3-rd cultivatable land in India is dependent on monsoons. However, at present, irrigated area accounts for almost 50 percent of total agricultural land in India *(Ref: '**Trilochan Mohapatra**', **Director General, Indian Council of Agriculture Research (ICAR)** under the **Union Ministry of Agriculture**;'Growing gap in irrigation potential and usage major challenge': Jitendra, Published Friday, 06 September, 2019; https://www.downtoearth.org.in)*. Despite

that, considering the fact that we will be the most populous country of the world by 2027 and considering the volatile nature of monsoon that has led the country towards 'Cumulative Draught' on several occasions (Ref: Sinha, Biswas (2020) and Sinha, Biswas (2021)), the requirement of enhancement in the 'irrigation potential' is immense in India.

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, British Government of India was 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 12.1 percent (own calculations from 'Statistics on Indian Economy and Society: Irrigation' – 'Net Irrigated Area' Database, www.indianstatistics.org (2021); Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India) to relatively much higher level through the implementation of the Five Year Plan Programmes. At present, irrigated area accounts for almost 50 percent of total agricultural land in India. The First Five Year Plan gave massive importance to the development of agriculture and 'Irrigation' along with 'Land Reforms' as 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 during the First Plan in India. 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 favourable monsoon, despite of week implementation of the irrigational and institutional reforms. And here lay the crucial problem. For future Second Plan, it had been faultily assumed that significant achievements have been made in the First Plan regarding irrigation (Bhakra, Hirakud and Damodar Valley Dams) and naturally from the 'Second Plan' (1956-1961) onwards, the attention shifted heavily from agriculture as well as irrigation towards industry in terms of development and accordingly, agriculture paid the price through contributing only 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 ('Draught Cumulation' or 'Cumulative Draught' (Sinha and Biswas (2020) and Sinha and Biswas (2021)), showing the failure of the policies regarding irrigational reforms as well as institutional reforms (Datt and Mahajan (2018)).

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'. Lack of Irrigational infrastructure in front of 'Draught Cumulation' during 1962-1968 made the situation miserable. 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. Had there been a proper Irrigational Infrastructure, the severe attack of 'Draught Cumulation' could have been avoided, or at least reduced.

However, since 1960s decade, came 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. But, one basic requirement for the HYV Seeds is 'Proper Irrigation'. So, requirement of proper Irrigational Infrastructure could never been denied in India. Rather, it only grew 'pertinence'. 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, (not incorporating either Bihar or West Bengal depite having suitable agricultural conditons and depite remaining in the Indus-Gangetic-Brahmaputra plain, i.e., the 'Agricultural powerhouse of India), However, with the miserable failure of the 'Third Plan' (1961-1966) in the face of lack of Irrigational infrastructure in coupled with 'Draught Cumulation' or 'Cumulative Draught' during 1962-1968, the process of capitalization of agriculture through 'Green Revolution' got

sluggish 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). 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. 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, however, the important aspect is the continuation of the Green Revolution programme through applied research on main crops (Wheat, Rice etc.). However, targets of irrigation could not be fulfilled during the Fourth Plan (Ref: Harsh Aditya, 'Development of Agriculture under 5 Year Plans in India' (2020-2021)). During the 'Fifth Plan' (1974-1979), significant investment was done in irrigational infrastructure (20 percent of total plan outley was on development of agriculture and irrigation (Ref: Harsh Aditya, 'Development of Agriculture under 5 Year Plans in India', https://www.economicsdiscussion.net)). Although initially 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 as well as the physical capital intensive agricultural technique (Datt and Sundharam, 2009; Datt and Mahajan, 2018), however, due to the First Oil Price Shock of 1973-74 and Second Oil Price Shock of 1978-79, rapid inflationary pressure grew upon the whole economy mainly due to the inelastic demand for crude oil (total crude oil import contributing 25 percent or one-fourth of total import of the economy in 1978-79 (Ref: 'Economic Survey 1979-1980'). 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 (Ref: Harsh Aditya, 'Development of Agriculture under 5 Year Plans in India', https://www.economicsdiscussion.net). Lack of efforts towards implementation of enhancement of agricultural infrastructural facilities, especially 'Irrigation' was prominent. That also contributed towards dismal growth of agricultural sector.

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'.

*On an average, during the last 12 Plans, percentage of irrigated land had increased from mere 12.1 percent (own calculations from 'Statistics on Indian Economy and Society: Irrigation' – 'Net Irrigated Area' Database, www.indianstatistics.org (2021); Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India) to 36.7percent, i.e. by 22.9 percentage points, i.e., on an average per plan (and not per year), grown by paltry 1.9 percentage points. However, only during 2014-15 to 2017-18 period of only three years, it has grown by additional 12 percentage points up to 48.8 percent of the total agricultural land (Ref: '**Trilochan Mohapatra**', Director General, Indian Council of Agriculture Research (ICAR) under the Union Ministry of Agriculture; 'Growing gap in irrigation potential and usage major challenge': Jitendra, Published Friday, 06 September, 2019; https://www.downtoearth.org.in), i.e., 4 percentage points each year (and not per Plan); which is quite commendable and optimistic.*

In the next Section 1 (Step-1), we are going to prove that in order to get growing per capita gross value added (or income) from the agricultural sector, *structural change of the whole economy* is essential. In order to analyse the agricultural situations in Bihar and West Bengal, it is primary. In Section 2 (Step-2), we are going to inspect the dependence of irrigation, investment and rural credit creation upon the per capita agricultural value added across India. In Section 3 (Step-3), we are going to inspect the dependence of irrigation, investment and rural credit creation

upon the per capita agricultural value added for both Bihar and West Bengal to observe whether the same effects operate for these two states or not as has been occurred in case of India. In Section 4 (Step-4), we enquire whether Bihar and West Bengal are outliers in terms of irrigational facilities, if we compare them with other states through a Fixed Effect Panel Regression of agricultural net state value added (ANSVA) upon net irrigated area of state (NIRRIGS) and net fixed capital formation of states (NFCFS) with two additional irrigation dummies on Bihar and West Bengal (IRRIGDUMBIHAR and IRRIGDUMWB). Then in Section 5 (Step-5) we conclude.

Section 1: Significance of Structural Change on Agricultural Growth:

As Gulati and Saini (2021) proposes, *'Between 2000-01 and 2018-19, overall GDP in the country increased by 7.2% per annum and agricultural GDP grew only by 3.2% per annum, way below the target rate of 4% per annum. This underlines the urgent need to accelerate growth in the agricultural sector. Most experts agree on this position…'*.

But the 'experts' who disagree upon this 'position', may raise the point that this 'accelerated' growth of agriculture is not independent, especially in the context of Structural Change towards Industrialisation (Manufacturisation) and Tertiarisation (Services led Growth) of the Indian economy. Had it not been the case, then the targeted agricultural growth rate would have been well over and above 7 percent. As this is not the case,this means that, in the context of Structural Change, agriculture is not the key sector of development. Rather, agriculture can only grow with the precondition of growth of the key sectors, be it manufacturing or be it services. Now, if the driver key forces grow less than the average growth rate of GDPFC (GDP at Factor Cost), then that implies that growth rate of GDP would fall. It's a dynamic process. In India, Services have grown at an average rate of 9 percent, over and above the growth rate of GDPFC, which has prompted the growth rate of GDP to 7.2 percent.

As Gulati and Saini (2021) points out, agricultural GDP grew by 3.2 percent and the target rate is 4 percent, hence the target rate is just 0.8 percentage point higher, which means that the target rate is almost achieved. *Additionally, we are going to show here, that in the course of structural change, the countries, which have completed the structural change process, be it in the form of 'Tertiarisation, completing the phase of Manufacturisation' or be it in the form of 'joint significance of Manufacturisation and Tertiarisation' towards development, are much higher in terms of per capita agricultural GDP. Also the share of employment in agriculture is much lower for those countries if we observe the structural change of Employment following Kuznets' methodology*. India is nothing but a 'negative outlier' or underachiever on that account, being much more 'Agrarian' in nature. It is well known in the theory of Structural Change that growth is driven by the manufacturisation primarily and later through tertiarization (in some cases jointly by manufacturisation and tertiarization). Thus, never agriculture can be the driving force for growth in the course of 'Structural Change'. Rather, it's share and growth is bound to decrease relative to the Industrial sector and Services (Tertiary) sector. The following Table-1, Table-2, Table-3 entails the importance and significance of 'Worldwide Structural Change' following Simon Kuznets (1966, 1971). Table-4 adds to the significance of Structural Change for the Indian economy through analysis of sectoral growth rate of major sectors of the Indian economy and it's effect upon the growth rate of GDPFC. Since 1965, Trade has enunciated the speed of structural change (Krugman and Obstfeld (2011) in general. Table-5 shows this in terms of volumetric increase in Trade-GDP Ratio over time for 15 representative Developed and Developing countries including India. For India and China, period of 1970-1990 was the period of Autarky. That has been shown in Table-16 with bold figures. During 1970-1990, Trade Volume (as percentage of USA GDP) was quite low for both India and China. Their lies big jumps in Trade Volume (as percentage of USA GDP) for India and China since 2000. For other Countries, growth of Trade Volume is only gradual.

Actually, The idea behind the 'Stylized Facts of Manufacturing led Growth' proposed by Kuznets (1966, 1971), is based upon the 'Historical Development Experience' of 13 developed and 4 developing countries for more than 200 years. It states that at the initial stage of the historical development process, Agriculture acquires the predominant position in terms of its' contribution to Gross Domestic Product at Factor Cost (GDPFC) or Gross Value Added (GVA), with a paltry contribution of subsistence level of Manufacturing and basic Services in GDPFC or GVA initially, and along with the growth in per capita GDP, contribution of Manufacturing swells at the expense of the Agriculture in terms of the contribution in GDP, Services share remaining unchanged and along with further growth in per capita GDP, Manufacturing reaches to its' saturation in terms of demand and demand for capital intensive Services (like transport, communications, banking and finance, distributive trade, business services etc.) develop so that relative contribution of Services in GDPFC or GVA puff out at the expense of the labor intensive Manufacturing, the relative contribution of Agriculture becoming paltry. Relative contributions of the major sectors in GDP change along with the change in the structure of the final demand as the Engel's Law of Income Elasticity of Demand notifies that as per capita income (per capita GDPFC or per capita GVA) increases, the proportion of income spent on food grains decreases and proportion of income spent on Manufacturing and Services increases. As Kuznets argued, while inequality may increase at the early stages of structural transformation, beyond a certain level of structural transformation, inequality will decrease, giving rise to the famous inverted U-shaped relationship between income

and inequality – the so called Kuznets Curve. Table-17 shows that, following Kuznets' Hypothesis, China has moved far ahead than India in terms of Structural transformation through passing a phase of rising income inequality and then moving to the phase of decreasing income inequality. India, is moving through the first phase of rising income inequality. However, question rises against Kuznets' hypothesis of 'Inverted U-shape' (Kuznets Curve) as we observe the Gini Coefficients of USA since it is rising steeply. Indeed growing poverty of USA has become an issue of international interest. However, observing that USA has completed '200 years of Structural Change in the History of Development Experience' (Kuznets (1966, 1971)), if we observe the Picketty 2014 Figures on Income Inequality of USA, then we observe that from 1910 to 1980, income inequality of USA followed the inverted U shape of the Kuznets Curve. For USA, the Inverted U shape of the Kuznets Curve is indirectly substantiated through Table-18 which expresses growth of Per Capita Income of USA as a proxy to the Gini Coefficient when USA per capita Income over time is compared to other developed and developing countries, being one of the biggest Developed Country of the World not only in terms of total GDP ($21433.23 Billion in2019), but also in terms of land area (9833517 Square Kilometers) and population (332.3 Million Population) (highest population among the developed countries). Never to mention that both Table-17 and Table-18 illustrates the 'Structural Change in the Course of Historical Development Process' following Kuznets (1966, 1971).

The growth rate of 22 major Developed and Developing countries including India has been provided in Table-12. Again, Table-13 provides '(M+S)/GDP' share as the proxy to the per capita capital stock. As the theory of conditional convergence suggests, the growth rate becomes lower and lower, because of the operation of the law of diminishing returns, for a country, as the country moves towards it's own steady state through acquiring higher and higher per capita capital stock. The further a country is away from it's steady state, the greater is the rate of growth it shows. (Ref; Jones, C.I., 'Time Series Tests of Endogenous Growth Models', Quarterly Journal of Economics, 110, pp. 495-525; Barro, R.J. and X. SALA-I-MARTIN (1995), 'Economic Growth', New York, McGraw-Hill). This could be observed from Table-12 and Table-13 together. This is also accounts for the 'Structural Change' upon which India, relatively much 'Agrarian' in nature, is lagging behind.

Structural change has significant impact upon the agricultural growth of both Bihar and West Bengal because in both of these states, structural change towards industrialisation as well as tertiarization has been neglected because of land acquisition problem for industries due to heavy sentiment towards agricultural land. Even Governments have been toppled because of clashes between the farmers and Government of Bihar as well as riots between Ranavir Sena militants and Maoist Militants regarding control and acquisition of agricultural lands in Bihar ; and tussles between Trinamool Congress and Jamiyat-Ulema-e-Hind on one side and Left Parties ruled Government of West Bengal (erstwhile) in West Bengal as Government of West Bengal (erstwhile) was trying to break the bottlenecks towards industrialisation. Now, Trinamool Congress , being at the Government of West Bengal, faces the hurdle of bottleneck regarding Land Acquisition. The recent movement in Bhangar, South 24 Parganas is one example. Also the Katwa NTPC Power Plant Project has been postponed in fear of agitation regarding Land Acquisition. Thus, even the present governments in Bihar and West Bengal also find it quite difficult to industrialise the two states, despite knowing the fact that structural change would benefit the agricultural sector also in addition to industrial sector and service sector which are very closely linked with each other through splintering effect (Bhagwati, (1984), Datta (1989)). [References: 1)Pranab Kumar Chowdhury, August 27, 2015, 'Land Acquisition a Major Hurdle', The Times of India; 2) Satish Kumar, Sanjay Mishra, 'Naxal Problem in Central Bihar' (2011) 'The Indian Journal of Political Science'; 3) Parthasarathi Banerjee (2006), 'Land Acquisition and Peasant Resistance at Singur', vol. 41, Issue No. 46, 18 Nov. 2006; 4) 'Jamiat Ulema-e-Hind planning to join active politics in WB', 25th March, (2007), The Newswire, 'Outlook', 5) Bose, 'Attachment to place and territoriality in Nandigram land struggle, India', 'Human Geography' (2020); 6) Various Reports on the above issue in Anandabazar Patrika, The Statesman, The Times of India, The Telegraph; The Hindustan Times.

Section 2: _Rural Development enhancement through the rise in per capita Agricultural Gross Value Added (PCAGVA) - importance of Irrigational Expenditure, Capital Investment and Loan Credit:

Here we observe the influence of Agricultural Net Irigated Area (LNAGNETIRIG), Agricultural Gross Fixed Capital Formation (LNAGFCF) and Agricultural Credit Issue (LNAGCRDISU) on Per Capita Agricultural Gross Value Added at Factor Cost (LNPCAGVAFC). 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-4 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 1953-54 to 2012-13.

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-1 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. Thus we conclude that Structural change is the key to the growth of the agricultural sector as has been substantiated in Section-1.

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 cointegration results show that the impact/influence of gross investment in agriculture (LNAGFCF) and irrigational expenditure(LNAGNETIRIG) (proxied by net irrigated area) are positive and significant at 1 percent level upon the per capita agricultural gross value added (LNPCAGVA). 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' in India 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/under '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' (A.V. Banerjee, S. Cole and E. Duflo (2004), 'Banking Reform in India', India Policy Forum, 2004, Brookings Institution, https://www.brookings.edu ; 'Nationalization of Commercial Banks: Need, Advantages, Disadvantages', https://investortonight.com) through the involvement of the informal lenders'.

Section 3: This section will focus it's attention upon the influence of Irrigation, Net Fixed Capital Formation and Rural Credit Creation upon Agricultural Net State Value Added for the period 1991-2018 for the two states Bihar and West Bengal through cointegration methodology.

Through the cointegration analysis, we come to the conclusion that is similar to the National Economy, in Bihar and in West Bengal also, *'Formal Credit Corruption through the involvement of the Informal Lenders'* in the *'Formal Agricultural Credit Issue Process'* remains the significant deadlock towards growth of Per Capita Agricultural Net State Value Added (as RUCREDEPRAT (Rural Credit Deposit Ratio) is negatively related to Per Capita Agricultural Net State Value Added (PCANSVA) at 1% significance level). However, as it has been observed for the 'Average State-India', the rural welfare, primarily based upon the growth of Per Capita Agricultural Net State Value Added (PCANSVA), is positively related to the growth of Net Irrigated Area (NIRRIGA) (at 1% significance level) and Net Fixed Capital Formation (NFCF (at 1% significance level); both for Bihar and West Bengal. Thus, no exception for either Bihar or West Bengal.

Section 4: Here, in this Step, we are going through a Fixed Effect Panel Regression of agricultural net state value added (ANSVA) upon net irrigated area of state (NIRRIGS) and net fixed capital formation of states (NFCFS), Agricultural terms of trade corresponding to Manufacturing (TOTMFG) and Agricultural Terms of Trade corresponding to Services (TOTSERV) with two additional irrigation dummies on Bihar and West Bengal (DUMIRRIGBIHAR and DUMIRRIGWB).

The Fixed Effect Regression signifies again the positive and significant (at 1% level) impact of *Irrigation* upon the welfare of rural India in terms of *agricultural net state value added (ANSVA)*. This is a significant point because the Introductory part of the present paper has signified the negligence thrusted upon the Indian Irrigational sector over the decades (or, over the Five Year Plans) despite having significantly positive impact of it upon the agricultural net state value added and per capita agricultural net state value added as well.

The Regression also signifies the positive and significant (at 1 % level) role played by *net state fixed capital formation (NFCF)* upon ANSVA. This, in one hand, signifies the importance of structural change to make the agricultural sector more productive through making it more capital intensive (through investment in infrastructure such as land reforms, formation of cooperatives, building Roadways (for example: 'Pradhan Mantri Gram Sadak Yojana') and Railways through Rural Areas, forming modern Agro-based Industries/Manufacturing, providing more 'Banking and Finance'

facilities at the Farmer's doors, eradicating 'Credit Corruption' (for example: 'Jana-Dhana Yojana') etc); and on the other hand, through direct investment in agriculture through HYV Seeds, improved fertilizers and new and improved technological tractors to the agricultural fields.

Astonishingly, the study signifies positive and significant (at 1% level) relation of ANSVA with TOTMFG. This can happen if and only if the 'Agricultural Lobby' is very powerful (so that 'Terms of Trade' always is tilted in favour of the Agricultural sector and against the Manufacturing sector) and the Industrial or Manufacturing sector is stagnant. Indeed, so is the case for India.

Interestingly, the study signifies negative and significant (at 1% level) relation of ANSVA with TOTSERV. This can happen if and only if the structural change happens in the Indian economy through the 'Services Led Growth', 'Tertiary Sector' being the engine of growth.

Now, it is to be recalled that in India, 'S' sector is the only major sector that has shown a consistently increasing trend throughout the post independence period of the Indian economy. Therefore the structural break points may be regarded as growth rate shifting points towards higher and even higher growth (Sinha (October, 2021), Sinha (September, 2021)). During 1951-1961 the growth rate of S sector is 4.6 percent and it become just somewhat lower at 4.5 percent during the regime 1961-1978, possibly because of the indirect effect of 'Industrial Deceleration' and 'Severe and Continuous Draught' ongoing at that time. 'S' sector shifted its average rate of growth to 6.6 percent during 1978-2000 and growth rate enhanced close to 9 percent during 2001-2013. There are several explanations behind this exceptionally rising growth of the Services. Services sector is steadily growing since 1978. One possible explanation behind this exceptional growth trajectory is that since the industrial sector was tied up in the red tape of the 'Industrial Regulation' of the pre-reform period of the Indian economy (officially the period before 1991-92) (see Table-16), the relatively unregulated 'Services activities' has become an alternative area of expansion and it expanded. Further, the worldwide spread of science and technologies and advent of modern computers and communication technologies (including satellite technologies) have started to show its spill over effect through trade liberalization and through increasing international cooperation between the developed and developing countries 1970 onwards (that is also in terms of international trade, see Table-5) (Sinha, (2015), Sinha (September, 2021)). Actually, we can observe a worldwide significant structural change towards Services around 1970s (Sinha (2015)). India has started to become influenced by it well before (at least a decade before) its' official admission to 'LPG' regime (Sinha, 2014, 2015) and (Sinha (2014); Sinha ((2021), October); Sinha ((2021),September, InfoKara); Sinha ((2021),September); Sinha((2021),October, InfoKara)).

To produce the most significant reason as well as fact behind the 'Services-Led Growth' of India in front of you, the 'International Splintering of the Manufacturing Sector' which is named 'Outsourcing' of USA and other OECD Countries towards India, in the face of 'Manufacturing Cost Competition' of China with the Rest of the World (obviously competition with USA and OECD Countries), was primely responsible for 'Services Led Spurt' in India. China has long been outcompeted the Rest of the World, and obviously the OECD Countries including United States of America (USA) in the line of comparative advantage of *''Manufacturing-Productive Services' Combo'* (see Table-16). Productive Services include IT and ITES, Trade, Hotels and Restaurants, Advertising, Transport and Communications, Banking and Finance, Dwelling, Real Estate and Business Services, Education and Research etc. (Bhagwati (1984); Datta (1989)). In order to compete in this line of 'Combo', the significant reduction of the wage cost was a must for the USA and other OECD Countries (Sinha (2015). 'Splintering' refers to the fact that with the expansion of the manufacturing sector, creation of productive services from manufactured goods. Several improved productive services activities associated with manufacturing such as transport, communication, trade, advertising, banking and finance activities were improved technologically and accordingly subcontracted to different service industries. So, Productive Services expanded. However, the problem remained for the OECD Countries – *'How to compete with China?' Because, China produces 'Cheapest Cost Manufacturing in the World and alone contributes to almost half (50%) of Aggregate Global Manufacturing. Thus, for the OECD Countries (including USA), the cost of the* ***''Manufacturing-Productive Services' Combo'****, was much more costlier than that of China and thus got outcompeted.* So USA and other OECD Countries thought, why not to try India as the *'Backoffice'* of 'Productive Services' which supplies the cheapest skilled Human Capital in the World. They tried and they succeeded because indeed Indian Human Capital costs 1/10 (one-tenth) of the human capital of USA. Massive cost advantage! They availed the benefit of it and expanded Productive Services of India through excess demand regarding it. It is called 'Outsourcing'. India became a significant exporter of Productive Services to USA and other OECD Countries. India's Productive Services became the *'Sandwich'* of USA and other OECD countries' *''Manufacturing-Productive Services' Combo'* (Raychowdhury, De (2012)), Sinha (2015)). Now they came at the position to combat China's comparative advantage. India also reaped the benefit of it. It's average growth rate of GDP became 7.2 percent and average growth rate of Services became 9.3 percent during 2000-01 to 2018-19. It's Productive Services grew in

Splintering of, not domestic Manufacturing, but of USA and other OECD Countries' Manufacturing. This was meant by 'Outsourcing' (i.e., International 'Splintering'). It refers to the subcontracting a part of the total production chain (Sinha, 2015). In case of India, the subcontracted part is 'Productive Services'. However, since 2008 'World Financial Crisis', as the outsourcing has slowed down, the 'Services Led Growth' of India tapered off towards 'Hindu Rate of Growth' again. In that sense, it seems that the 'Services-Led Growth' was ***'Parasitic Growth'*** based upon the Manufacturing Sector of USA and other OECD Countries. Once the *'Outsourcing'* fled away, Growth started tapering off, probably suggesting that there has been lacuna in 'Internal Strength of Structural Change because of 'Stagnated Domestic Manufacturing Sector'. In 2018-19, growth rate of GDP has fallen just to a paltry '4 percent (*Hindu Rate of Growth was **3.5** percent*). So, Simon Kuznets' Theory of development gets ***'Champion'***. There cannot be any 'Ahistorical Growth' based upon 'Services Revolution' without having a vibrant manufacturing sector. Normally, in the course of development, Services grow based upon a vibrant domestic manufacturing sector, as it has been in case of China (see Table-2, Table-3, Table-16, Table-12 and Table-13), *even at the absence of trade or 'Autarky'* (if we look around 1970-1990 of China in Table-16). So, 'Structural Change' in China happened internally that backed ***China's 'Services Revolution'*** (see Table-2 and Table-3). *Thus **China's 'Services Revolution'** has been backed by it's inherent structural change through vibrant 'Manufacturisation' within the domestic economy of China.* However, if domestic manufacturing sector is *'weak'* or *'stagnant'*, (as in case of India), then also the 'Services' especially 'Productive Services' can grow. But the condition is: 'Services' can grow in that case with the help of the vibrant and expanded Manufacturing of the Developed or other Emerging Developing Countries (as has happened in case of India, through trade with USA and other OECD Countries). Without that help, 'Services-Led Growth' cannot sustain, whatever the extent of 'Ahistoricity' may be in the growth path. As has been argued before, in 2018-19, growth rate of GDP of India has fallen just to a paltry '4 percent (*Hindu Rate of Growth was **3.5** percent*). In that sense, there cannot be any 'Ahistorical Growth'. It may be said that 'Growth' is ***'Export Led Growth'***.

The Panel Fixed Effect Regression signifies Bihar to be a 'negative outlier' (at 1% level of significance) from the perspective of irrigational facilities. Lack of 'irrigational facilities' have resulted in both 'Cumulative Draught' and 'Massive Flood' in Bihar, thereby leading to volatility in Agricultural growth relative to National Average Growth Rate (Hoda, Gulati et.al. (2021)).

West Bengal is 'positive outlier' (at 1% level of significance) in terms of irrigational facilities mainly owing to significant attention towards agriculture through 'Land Reforms'.

Section 5: Conclusion:

Thus, from the above analysis, we may conclude that -

1. *'Structural Change'* is utmost necessary for agricultural growth, without 'Structural Change' agricultural growth is bound to be stagnated.
2. Investment in Irrigational Infrastructure is crucial for agricultural growth of India.
3. Irrigational development is a key factor that has to be addressed in case of Bihar's agricultural economy.
4. West Bengal has reaped the benefits of 'Land Reforms' through significant attention towards 'Irrigational Facilities'. Being a neighbour state, Bihar has the opportunity to apply West Bengal's prescription for agricultural development.
5. 'Services Revolution' has happened both for India and China. But, Whether there can be 'Ahistorical' 'Services-Led Growth' without having - a) internal structural change in terms of 'Manufacturisation' (example- China) or b) external assistance of foreign body of vibrant 'Manufacturisation' (example- India); is definitely questionable.

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TABLES :

TABLE 1: PER CAPITA AGRICULTURAL GROSS VALUE ADDED AT AT CONSTANT 2010 PRICES US DOLLARS							
Country	**YEAR**	**1970**	**1980**	**1990**	**2000**	**2010**	**2017**
Argentina	PCAGVA	516.360368	540.510816	526.2965807	610.2486063	737.8682297	719.32077
Australia	PCAGVA	822.533377	823.19886	1013.067189	1290.823025	1337.375311	1404.86915
Brazil	**PCAGVA**	**226.332321**	**282.538307**	**291.8940859**	**358.1646364**	**461.9518359**	**477.422836**
Canada	PCAGVA	663.259564	610.636542	688.7989228	664.9946912	628.8194997	723.92387
Chile	PCAGVA	137.145219	145.248385	221.6776632	305.8375352	465.0098621	512.002981
China	**PCAGVA**	**148.200945**	**150.266033**	**232.3769961**	**308.4471766**	**440.2607613**	**560.769576**
Egypt	PCAGVA	235.796869	242.330364	255.7039289	288.3014269	340.4255608	361.180762
France	**PCAGVA**	**385.153792**	**457.677089**	**581.6985093**	**648.9674517**	**650.6668708**	**621.565028**
Germany	PCAGVA	319.024912	360.977552	427.0609988	279.8129684	273.4155041	247.725924
Greece	PCAGVA	893.111645	1032.04523	858.3382623	907.4815593	754.2963797	871.20247
India	**PCAGVA**	**186.795575**	**172.152369**	**194.015859**	**203.0694977**	**230.9361546**	**266.855362**
Iraq	PCAGVA	406.263589	342.929437	415.8442115	342.6614918	232.4446066	165.595159
Italy	PCAGVA	483.786148	483.826908	548.301315	694.1161345	630.0995866	624.930375
Japan	**PCAGVA**	**799.152284**	**697.584208**	**733.3114333**	**641.8095042**	**488.7512705**	**386.164013**
Mexico	PCAGVA	299.864584	314.6301	289.3475477	281.8992847	290.2535175	312.239429
Netherlands	PCAGVA	215.788807	456.690959	747.4364211	840.5085662	902.4834937	893.817108
Portugal	PCAGVA	422.806533	472.909393	470.7960225	450.9128368	430.6093617	477.35128
Republic of Korea (S)	PCAGVA	300.548411	308.804933	400.5541341	450.3603409	493.9660561	484.07709
Spain	PCAGVA	445.29844	548.210043	647.6817868	851.3754816	714.8251786	848.152645
Sweden	PCAGVA	654.776209	611.664583	766.2107281	660.7395331	742.7763286	713.028954
Switzerland	PCAGVA	823.500444	954.769345	740.1256136	619.953588	521.1121274	471.206408
United States	**PCAGVA**	**264.517052**	**242.001664**	**345.8893203**	**432.9347532**	**474.0128974**	**518.574235**
Source: Own Calculations from United Nations Statistical Division (UNSD, 2018)							

TABLE 2: 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	8.5	8.0	10.1	8.6	8.5	8.2
Argentina	I (incl. CONSTR.)	36.0	33.9	29.7	29.8	30.1	27.6
Argentina	S (excl. CONSTR.)	55.5	58.1	60.2	61.6	61.4	64.2
Argentina	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
Australia	A	3.2	2.6	2.7	2.7	2.4	2.4
Australia	I (incl. CONSTR.)	37.3	35.2	32.7	29.2	28.2	26.4
Australia	S (excl. CONSTR.)	59.5	62.2	64.6	68.1	69.4	71.2
Australia	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
Brazil	A	5.9	3.9	4.1	4.7	4.8	5.4
Brazil	I (incl. CONSTR.)	33.8	34.3	29.0	28.6	27.4	24.4
Brazil	S (excl. CONSTR.)	60.4	61.8	66.9	66.7	67.8	70.2
Brazil	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
Canada	A	2.4	1.8	1.8	1.4	1.3	1.4
Canada	I (incl. CONSTR.)	46.7	44.2	42.2	42.8	35.7	35.2
Canada	S (excl. CONSTR.)	50.9	54.0	56.0	55.8	63.1	63.5
Canada	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
Chile	A	2.4	2.3	3.2	2.9	3.5	3.4
Chile	I (incl. CONSTR.)	56.6	51.2	52.9	53.2	45.2	41.5
Chile	S (excl. CONSTR.)	40.9	46.4	43.9	43.9	51.3	55.1
Chile	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
China	A	53.3	40.7	30.7	17.5	9.8	7.8
China	I (incl. CONSTR.)	21.0	30.3	30.7	42.1	46.6	46.6
China	S (excl. CONSTR.)	25.7	29.1	38.5	40.4	43.6	45.7
China	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
Egypt	A	37.2	22.2	16.9	15.7	14.0	14.3
Egypt	I (incl. CONSTR.)	34.1	41.0	38.2	36.2	37.5	33.7
Egypt	S (excl. CONSTR.)	28.7	36.8	44.9	48.0	48.5	52.1
Egypt	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
France	A	2.0	1.8	2.0	1.9	1.8	1.6
France	I (incl. CONSTR.)	26.5	24.9	22.8	21.7	19.8	18.7
France	S (excl. CONSTR.)	71.5	73.3	75.2	76.4	78.4	79.7
France	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
Germany	A	1.8	1.5	1.5	0.8	0.7	0.6
Germany	I (incl. CONSTR.)	46.4	40.5	36.2	30.9	30.2	31.6
Germany	S (excl. CONSTR.)	51.8	58.0	62.4	68.2	69.1	67.8
Germany	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
Greece	A	8.5	6.7	4.9	4.5	3.3	4.4
Greece	I (incl. CONSTR.)	23.0	22.7	20.4	19.3	15.7	14.8
Greece	S (excl. CONSTR.)	68.6	70.6	74.7	76.2	81.1	80.8
Greece	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
India	A	49.1	42.6	35.0	26.4	18.4	14.9
India	I (incl. CONSTR.)	23.1	25.6	29.5	29.7	33.1	31.4
India	S (excl. CONSTR.)	27.8	31.8	35.5	43.9	48.5	53.8
India	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
Iraq	A	10.7	5.7	10.0	7.4	5.1	3.2
Iraq	I (incl. CONSTR.)	76.3	72.7	62.2	66.7	55.4	65.0
Iraq	S (excl. CONSTR.)	13.0	21.6	27.8	25.9	39.4	31.8
Iraq	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
Italy	A	3.0	2.2	2.0	2.1	2.0	1.9
Italy	I (incl. CONSTR.)	30.6	30.3	28.0	26.3	24.4	23.7
Italy	S (excl. CONSTR.)	66.4	67.5	70.0	71.5	73.7	74.3
Italy	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
Japan	A	4.4	2.6	1.9	1.5	1.1	0.8
Japan	I (incl. CONSTR.)	38.4	33.8	33.9	29.7	28.5	29.0
Japan	S (excl. CONSTR.)	57.3	63.6	64.2	68.8	70.4	70.2
Japan	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
Mexico	A	5.8	4.2	3.9	3.3	3.4	3.3
Mexico	I (incl. CONSTR.)	35.7	38.7	37.9	37.3	33.7	30.6
Mexico	S (excl. CONSTR.)	58.5	57.1	58.1	59.4	62.9	66.2
Mexico	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
Netherlands	A	0.9	1.6	2.3	2.0	2.0	1.8
Netherlands	I (incl. CONSTR.)	37.5	29.1	26.6	24.2	21.9	20.8
Netherlands	S (excl. CONSTR.)	61.6	69.3	71.1	73.8	76.1	77.4
Netherlands	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
Portugal	A	5.1	4.4	3.2	2.4	2.2	2.3
Portugal	I (incl. CONSTR.)	25.7	27.1	27.9	27.6	22.6	21.8
Portugal	S (excl. CONSTR.)	69.2	68.5	68.9	70.0	75.2	75.8
Portugal	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
Republic of Korea (S)	A	15.4	8.5	5.1	3.3	2.5	2.0
Republic of Korea (S)	I (incl. CONSTR.)	20.7	29.6	33.7	34.5	38.3	39.2
Republic of Korea (S)	S (excl. CONSTR.)	63.9	61.9	61.2	62.2	59.3	58.7
Republic of Korea (S)	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
Spain	A	3.5	3.3	3.1	3.3	2.6	2.9
Spain	I (incl. CONSTR.)	36.9	33.5	32.4	31.5	26.0	24.0
Spain	S (excl. CONSTR.)	59.6	63.1	64.5	65.1	71.4	73.2
Spain	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
Sweden	A	2.7	2.1	2.2	1.7	1.6	1.4
Sweden	I (incl. CONSTR.)	28.0	25.6	25.5	28.3	28.9	24.5
Sweden	S (excl. CONSTR.)	69.2	72.3	72.3	70.0	69.5	74.1
Sweden	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
Switzerland	A	1.7	1.8	1.2	0.9	0.7	0.6
Switzerland	I (incl. CONSTR.)	29.3	29.8	27.7	26.2	26.6	25.6
Switzerland	S (excl. CONSTR.)	69.0	68.4	71.2	72.8	72.7	73.8
Switzerland	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0
United States	A	1.0	0.8	0.9	0.9	1.0	1.0
United States	I (incl. CONSTR.)	28.2	24.1	22.3	22.1	19.7	19.0
United States	S (excl. CONSTR.)	70.8	75.1	76.8	77.0	79.3	80.1
United States	Total Per Capita Value Added	100.0	100.0	100.0	100.0	100.0	100.0

Source: Own Calculations from United Nations Statistical Division, 2018

TABLE 3: 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
FRANCE, 1991	5.3	30.4	65.5	ARGENTINA, 1991	0.3	34	66.8
2001	4.1	27.1	69.9	2001	0.8	22.9	77.2
2011	2.9	23.8	74.9	2011	0.6	25.4	75.4
2017	2.9	21.9	76.8	2017	0.5	25.1	76.1
NETHERLANDS, 1991	4.4	26.3	70.7	MEXICO, 1991	26.8	24.3	50.1
2001	3.1	22.1	75.3	2001	17.7	26.9	56.3
2011	2.8	18.2	80.1	2011	13.4	25.6	62
2017	2.2	17.5	81.3	2017	13.1	26.9	61.1
GERMANY, 1991	4.1	43.1	55	EGYPT, 1991	31.3	26.1	43.8
2001	2.6	34	64.6	2001	28.6	22.8	50.2
2011	1.7	30	70.1	2011	29.2	25.6	47.2
2017	1.3	28.8	71.5	2017	24.8	27.7	49.6
SWITZERLAND, 1991	4.3	29.6	67.1	INDIA, 1991	63.6	16	21.6
2001	4.4	25.3	71.2	2001	60.3	16.8	23.8
2011	3.5	23.3	74.2	2011	48.8	24.5	27.8
2017	3.5	21.8	75.8	2017	42.7	25	33.5
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	BRAZIL, 1991	22.43	22.48	55.09
2001	5.2	32.8	63.1	2001	19.88	21.04	59.08
2011	3.7	30	68	2011	15.43	21.77	62.79
2017	3.9	28.1	69.8	2017	9.51	20.46	70.04
JAPAN, 1991	6.7	35.2	58.7	IRAQ, 1991	25.68	23.11	51.21
2001	4.9	31.3	64.4	2001	23.89	24.31	51.81
2011	4	26.3	70.5	2011	21.13	24.27	54.61
2017	3.5	26.6	70.9	2017	19.01	23.46	57.53
CANADA, 1991	4.4	25.5	72.7				
2001	2.8	24.4	74.8				
2011	2.3	22.2	77.9				
2017	2	21.8	78.4				
USA, 1991	2.8	26.4	72.6				
2001	1.7	23.9	75.7				
2011	1.7	20.1	79.8				
2017	1.7	20.3	79.5				
AUSTRALIA, 1991	5.5	26.3	70.7				
2001	4.8	22.5	74.5				
2011	2.8	24.1	76.4				
2017	2.6	22.2	78.3				
SPAIN, 1991	10.3	34.7	56.2				
2001	6.6	32.5	62				
2011	4.1	23.2	74.1				
2017	4.1	20.8	76.4				
CHILE, 1991	19.1	28.9	54.6				
2001	13.6	25.8	62.5				
2011	10.3	27.1	66.4				
2017	9.6	26.1	67.6				
GREECE,1991	21.49	24.71	53.8				
2001	15.87	23.06	61.07				
2011	12.35	17.69	69.96				
2017	12.08	15.41	72.51				
PORTUGAL,1991	11.72	33.34	54.95				
2001	13.17	33.45	53.38				
2011	10.21	26.86	62.94				
2017	6.4	24.74	68.86				
KOREA REPUB (S),1991	16.37	15.39	47.68				
2001	9.96	18.22	62.56				
2011	6.37	24.85	68.77				
2017	4.78	14.2	70.14				

Source: international Labour Organisation (ILO, 2018)

TABLE 4: DECADAL AVERAGE GROWTH RATE OF GDP AT FACTOR COST (AT 2004-05 PRICES) & IT'S 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. Growth Rate of A	2.46	2.04	2.96	3.56	2.31	3.87
Av. Growth Rate of I (excl. Constr.)	6.95	4.49	5.01	5.67	6.43	7.07
Av. Growth Rate of I (incl. Constr.)	7.06	4.67	4.32	5.6	6.23	7.7
Av. Growth Rate of M	6.98	4.43	4.52	5.15	6.94	7.75
Av. Growth Rate of S (incl. Constr.)	5.06	4.42	4.55	6.32	7.58	9.31
Av. Growth Rate of S (excl. Constr.)	4.66	4.27	4.94	6.48	7.85	9.3
Av. Growth Rate of Constr.	7.52	5.15	2.86	5.4	5.74	9.48
Av. Growth Rate of THRTSC	6.02	4.18	5.5	5.54	8.81	9.9
Av. Growth Rate of BIDRB	3.09	3.56	4.95	8.96	7.71	10.51
Av. Growth Rate of CSP	4.32	4.89	4.29	5.8	6.65	6.81

Note: A=Agriculture & Allied; I=Industry; M=Manufacturing; S=Services; Constr.=Construction;

Source: Own Calculations from RBI Database (2014)

TABLE 5: TRADE-GDP RATIO OF 15 MAJOR 'REPRESENTATIVE' DEVELOPED & DEVELOPING COUNTRIES			
DEVELOPED		DEVELOPING	
At 2005 constant US Dollars		At 2005 constant US Dollars	
NATIONS	(Trade/GDP)*100	NATIONS	(Trade/GDP)*100
FRANCE, GDP, 2005prices-1970	0.198411688	India, GDP, 2005 prices-1970	0.092889746
1980	0.276584741	1980	0.140486638
1990	0.330257291	1990	0.137765086
2000	0.506921308	2000	0.267082488
2010	0.546261613	2010	0.468129125
NETHERLANDS,GDP,2005prices-1970	0.551653781	Brazil, GDP, 2005 prices-1970	0.110199084
1980	0.650675718	1980	0.112591419
1990	0.780344539	1990	0.13717108
2000	1.182311652	2000	0.227610499
2010	1.450774023	2010	0.320818437
GERMANY,GDP,2005prices-1970	0.262218066	Mexico, 2005 prices-1970	0.1187558
1980	0.327872337	1980	0.161234201
1990	0.409789347	1990	0.204241991
2000	0.620741803	2000	0.510235692
2010	0.896658266	2010	0.645791748
SWEDEN,GDP,2005prices-1970	0.408471544	Egypt, 2005 prices-1970	0.890945584
1980	0.452018174	1980	1.061442448
1990	0.54178936	1990	0.679230382
2000	0.844296078	2000	0.52533836
2010	0.962748048	2010	0.762313225
ITALY,GDP,2005prices-1970	0.243134274	Argentina, 2005 prices-1970	0.132017577
1980	0.284568506	1980	0.212421926
1990	0.365357563	1990	0.221929754
2000	0.509558296	2000	0.413561389
2010	0.515899665	2010	0.468308094
JAPAN, GDP, 2005 prices-1970	0.113782374	China, 2005 prices-1970	0.06212687
1980	0.152861006	1980	0.177263373
1990	0.172152207	1990	0.215380717
2000	0.229319258	2000	0.446661303
2010	0.289527702	2010	0.786634279
US,GDP,2005prices-1970	0.097712062		
1980	0.120057277		
1990	0.159784493		
2000	0.253277888		
2010	0.287946531		
CANADA,GDP,2005prices-1970	0.370053985		
1980	0.384827249		
1990	0.479240285		
2000	0.749839512		
2010	0.671591102		
AUSTRALIA,GDP,2005prices-1970	0.187149575		
1980	0.20074583		
1990	0.263496635		
2000	0.377614827		
2010	0.474708275		
Source: Own Calculations from United Nations Statistical Database (UNSD)			

TABLE 6: 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 7: 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 8: COINTEGRATION STUDY : BIHAR				
Date: 11/07/21 Time: 19:44				
Sample (adjusted): 1995 2018				
Included observations: 24 after adjustments				
Trend assumption: No deterministic trend				
Series: PCANSVABIHAR RUCREDEPRATBIHAR(-1) NFCFBIHAR(-1) NIRRIGABIHAR				
Lags interval (in first differences): 1 to 2				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.896507	74.58603	40.17493	0
At most 1	0.496675	20.14789	24.27596	0.152
At most 2	0.125241	3.67143	12.3209	0.7577
At most 3	0.018987	0.460074	4.129906	0.5609
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				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.896507	54.43814	24.15921	0
At most 1	0.496675	16.47646	17.7973	0.0781
At most 2	0.125241	3.211356	11.2248	0.7547
At most 3	0.018987	0.460074	4.129906	0.5609
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				
Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):				
PCANSVABIHAR	RUCREDEPRATBI	NFCFBIHA	NIRRIGABIHAR	
-0.025818	-0.079603	2.90E-05	0.000835	
-0.086305	0.088927	5.40E-05	-0.000425	
-0.020322	-0.056164	7.13E-05	0.000923	
0.034077	-0.08058	0.000205	8.78E-05	
Unrestricted Adjustment Coefficients (alpha):				
D(PCANSVABIHAR)	2.053943	0.669638	2.010097	0.32759
D(RUCREDEPRATBIHAR(-1	1.11231	-1.03162	-0.023406	0.177344
D(NFCFBIHAR(-1))	-11651.93	-3816.89	560.3206	345.9192
D(NIRRIGABIHAR)	-31.88828	32.08644	-3.426855	15.94319
1 Cointegrating Equation(s):		Log likelih	-516.1848	
Normalized cointegrating coefficients (standard error in parentheses)				
PCANSVABIHAR	RUCREDEPRATBI	NFCFBIHA	NIRRIGABIHAR	
1	3.083237	-0.00112	-0.032338	
	-0.46224	-0.00077	-0.00448	

TABLE 9: COINTEGRATION STUDY : BIHAR				
Vector Error Correction Estimates				
Date: 11/07/21 Time: 19:32				
Sample (adjusted): 1995 2018				
Included observations: 24 after adjustments				
Standard errors in ( ) & t-statistics in [ ]				
Cointegrating Eq:	CointEq1			
PCANSVABIHAR(-1)	1			
RUCREDEPRATBIHAR(-2)	3.083237			
	-0.46224			
	[6.67022]			
NFCFBIHAR(-2)	-0.001122			
	-0.00077			
	[-1.46451]			
NIRRIGABIHAR(-1)	-0.032338			
	-0.00448			
	[-7.21978]			
Error Correction:	D(PCANSVABIHAR)	D(RUCREDEPRATBIHAR(-1)	D(NFCFBIHAR(-1))	D(NIRRIGABIHAR)
CointEq1	-0.053028	-0.028717	300.8278	0.823287
	-0.04179	-0.01324	-48.9016	-0.8345
	[-1.26887]	[-2.16856]	[6.15169]	[0.98656]
D(PCANSVABIHAR(-1))	0.05857	0.212574	-929.0598	-14.08955
	-0.29819	-0.09449	-348.917	-5.95422
	[0.19642]	[2.24977]	[-2.66269]	[-2.36631]
D(PCANSVABIHAR(-2))	0.841154	0.152583	-3224.062	-7.827521
	-0.37752	-0.11963	-441.747	-7.53835
	[2.22810]	[1.27551]	[-7.29843]	[-1.03836]
D(RUCREDEPRATBIHAR(-2))	-0.85005	0.561974	-363.6513	-11.93409
	-0.77304	-0.24495	-904.549	-15.436
	[-1.09963]	[2.29422]	[-0.40203]	[-0.77313]
D(RUCREDEPRATBIHAR(-3))	0.76197	0.28271	226.6699	13.29132
	-0.83161	-0.26351	-973.088	-16.6056
	[0.91626]	[1.07285]	[0.23294]	[0.80041]
D(NFCFBIHAR(-2))	0.000102	2.47E-05	-0.106183	-0.006384
	-0.00017	-5.50E-05	-0.20196	-0.00345
	[0.58997]	[0.45102]	[-0.52575]	[-1.85245]
D(NFCFBIHAR(-3))	0.000511	4.81E-05	-0.552141	-0.004655
	-0.00019	-5.90E-05	-0.21905	-0.00374
	[2.73070]	[0.81110]	[-2.52063]	[-1.24536]
D(NIRRIGABIHAR(-1))	0.007491	-0.005382	-18.31402	0.190902
	-0.0114	-0.00361	-13.3363	-0.22758
	[0.65726]	[-1.49033]	[-1.37325]	[0.83883]
D(NIRRIGABIHAR(-2))	-0.023946	-0.005195	32.8606	-0.273168
	-0.01289	-0.00408	-15.0841	-0.25741
	[-1.85756]	[-1.27181]	[2.17849]	[-1.06123]
R-squared	0.3688	0.723151	0.877334	0.418401
Adj. R-squared	0.032161	0.575497	0.811913	0.108215
Sum sq. resids	943.2872	94.71287	1.29E+09	376109.6
S.E. equation	7.930057	2.512805	9279.169	158.3476
F-statistic	1.095534	4.897633	13.41046	1.348871
Log likelihood	-78.11033	-50.52808	-247.6671	-149.9695
Akaike AIC	7.259194	4.960673	21.38893	13.24746
Schwarz SC	7.700964	5.402443	21.8307	13.68923
Mean dependent	1.653152	-0.429167	5731.917	-14.5
S.D. dependent	8.060735	3.856725	21395.84	167.6801
Determinant resid covariance (dof adj.)		3.70E+14		
Determinant resid covariance		5.64E+13		
Log likelihood		-516.1848		
Akaike information criterion		46.34874		
Schwarz criterion		48.31216		

TABLE 10: COINTEGRATION STUDY - WEST BENGAL

Date: 11/10/21 Time: 17:55
Sample (adjusted): 1996 2018
Included observations: 23 after adjustments
Trend assumption: No deterministic trend
Series: PCANSVAWB RUCREDEPRATWB(-1) NFCFWB(-2) NIRRIGAWB(-2)
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.867544	64.81032	40.17493	0
At most 1	0.461607	18.31576	24.27596	0.2344
At most 2	0.15005	4.074932	12.3209	0.7001
At most 3	0.014487	0.335646	4.129906	0.6249

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

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.867544	46.49456	24.15921	0
At most 1	0.461607	14.24083	17.7973	0.1585
At most 2	0.15005	3.739286	11.2248	0.6702
At most 3	0.014487	0.335646	4.129906	0.6249

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

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

PCANSVAWB	RUCREDEPRAT	NFCFWB(-	NIRRIGAWB(-2)
-0.040358	-0.066765	6.89E-05	0.001644
0.015031	0.107299	-4.23E-06	-0.001812
-0.005184	0.050953	-3.07E-05	-0.000116
-0.037584	0.056075	2.56E-05	-0.000322

Unrestricted Adjustment Coefficients (alpha):

D(PCANSVAWB)	8.225927	1.164778	2.607114	0.320699
D(RUCREDEPRAT\	0.311961	-1.23457	-0.098127	0.00131
D(NFCFWB(-2))	-10591.84	-10614.3	6357.149	1260.148
D(NIRRIGAWB(-2)	18.09637	-4.91692	30.17064	-20.6972

1 Cointegrating Equation(s): Log likelih -531.0975

Normalized cointegrating coefficients (standard error in parentheses)

PCANSVAWB	RUCREDEPRAT	NFCFWB(-	NIRRIGAWB(-2)
1	1.654301	-0.00171	-0.040745
	-0.37115	-0.00012	-0.00525

Adjustment coefficients (standard error in parentheses)

D(PCANSVAWB)	-0.331985			
	-0.08741			
D(RUCREDEPRAT\	-0.01259			
	-0.01983			
D(NFCFWB(-2))	427.4698			
	-272.902			
D(NIRRIGAWB(-2)	-0.730341			
	-2.03908			

2 Cointegrating Equation(s): Log likelih -523.9771

Normalized cointegrating coefficients (standard error in parentheses)

PCANSVAWB	RUCREDEPRAT	NFCFWB(-	NIRRIGAWB(-2)
1	0	-0.00214	-0.016672
		-0.00029	-0.0036
0	1	0.00026	-0.014552
		-0.00015	-0.0019

Adjustment coefficients (standard error in parentheses)

D(PCANSVAWB)	-0.314477	-0.42422		
	-0.0923	-0.27086		
D(RUCREDEPRAT\	-0.031147	-0.1533		
	-0.01568	-0.04602		
D(NFCFWB(-2))	267.9266	-431.744		
	-264.349	-775.711		
D(NIRRIGAWB(-2)	-0.804247	-1.73579		
	-2.17517	-6.38286		

3 Cointegrating Equation(s): Log likelih -522.1074

Normalized cointegrating coefficients (standard error in parentheses)

PCANSVAWB	RUCREDEPRAT	NFCFWB(-	NIRRIGAWB(-2)
1	0	0	-0.037591
			-0.01037
0	1	0	-0.012008
			-0.00164
0	0	1	-9.781355
			-5.07581

Adjustment coefficients (standard error in parentheses)

D(PCANSVAWB)	-0.327993	-0.29138	0.000482	
	-0.08792	-0.27618	-0.00015	
D(RUCREDEPRAT\	-0.030638	-0.1583	2.97E-05	
	-0.01576	-0.0495	-2.70E-05	
D(NFCFWB(-2))	234.9712	-107.83	-0.880614	
	-255.854	-803.709	-0.4459	
D(NIRRIGAWB(-2)	-0.960651	-0.19851	0.000342	
	-2.16277	-6.79386	-0.00377	

TABLE 11 : COINTEGRATION STUDY - WEST BENGAL					
Vector Error Correction Estimates					
Date: 11/10/21 Time: 18:03					
Sample (adjusted): 1996 2018					
Included observations: 23 after adjustments					
Standard errors in ( ) & t-statistics in [ ]					
Cointegrating Eq:	CointEq1				
PCANSVAWB(-1)	1				
RUCREDEPRATWB(-2)	1.654301				
	-0.37115				
	[4.45722]				
NFCFWB(-3)	-0.00171				
	-0.00012				
	[-13.6799]				
NIRRIGAWB(-3)	-0.04075				
	-0.00525				
	[-7.75854]				
Error Correction:	D(PCANSV	D(RUCRED	D(NFCFWE	D(NIRRIGAWB(-2))	
CointEq1	-0.33199	-0.01259	427.4698	-0.73034	
	-0.08741	-0.01983	-272.902	-2.03908	
	[-3.79815]	[-0.63480]	[1.56638]	[-0.35817]	
D(PCANSVAWB(-1))	-0.04755	-0.03195	-154.06	2.709369	
	-0.19093	-0.04332	-596.131	-4.45418	
	[-0.24905]	[-0.73739]	[-0.25843]	[0.60828]	
D(PCANSVAWB(-2))	-0.15116	0.063435	1542.367	1.123143	
	-0.18708	-0.04245	-584.115	-4.3644	
	[-0.80796]	[1.49433]	[2.64052]	[0.25734]	
D(RUCREDEPRATWB(-2)	-1.75405	0.762604	2498.953	-46.5751	
	-1.18471	-0.26882	-3698.91	-27.6376	
	[-1.48057]	[2.83686]	[0.67559]	[-1.68521]	
D(RUCREDEPRATWB(-3)	2.701364	-0.06208	-5293.61	7.200105	
	-1.3683	-0.31048	-4272.1	-31.9203	
	[1.97425]	[-0.19996]	[-1.23911]	[0.22556]	
D(NFCFWB(-3))	-0.00038	-1.07E-05	-0.14505	-0.00213	
	-0.00012	-2.80E-05	-0.38031	-0.00284	
	[-3.07722]	[-0.38645]	[-0.38138]	[-0.75050]	
D(NFCFWB(-4))	-0.00015	-1.51E-05	-0.04495	-0.00115	
	-9.10E-05	-2.10E-05	-0.28486	-0.00213	
	[-1.60256]	[-0.73150]	[-0.15778]	[-0.54151]	
D(NIRRIGAWB(-3))	-0.00017	-0.00056	-8.57086	-0.20028	
	-0.0114	-0.00259	-35.5809	-0.26585	
	[-0.01473]	[-0.21639]	[-0.24088]	[-0.75334]	
D(NIRRIGAWB(-4))	-0.01719	-0.00049	-22.6841	-0.1115	
	-0.01049	-0.00238	-32.7635	-0.2448	
	[-1.63796]	[-0.20430]	[-0.69236]	[-0.45548]	
R-squared	0.494684	0.588808	0.562173	0.297721	
Adj. R-squared	0.205933	0.353841	0.311986	-0.10358	
Sum sq. resids	1510.365	77.76359	1.47E+10	821969.2	
S.E. equation	10.38668	2.356808	32429.29	242.3058	
F-statistic	1.713182	2.505917	2.247013	0.741888	
Log likelihood	-80.7586	-46.6447	-265.823	-153.201	
Akaike AIC	7.805098	4.838665	23.89768	14.10445	
Schwarz SC	8.249422	5.282989	24.34201	14.54877	
Mean dependent	4.830978	-0.35217	-2097.96	51.91304	
S.D. dependent	11.65597	2.931935	39096.59	230.6544	
Determinant resid covariance (dof		9.76E+15			
Determinant resid covariance		1.34E+15			
Log likelihood		-531.098			
Akaike information criterion		49.66065			
Schwarz criterion		51.63542			

TABLE-12 : GROWTH RATE OF THE 22 DEVELOPED & DEVELOPING COUNTRIES							
Country	IndicatorName	1970	1980	1990	2000	2010	2017
Argentina	Gross Domestic Product (GDP)	3.761159	1.45317	10.49604	-0.78899	10.1254	2.66859
Argentina	Total Value Added	3.764172	2.649859	9.814571	-0.68222	10.02841	2.412488
Australia	Gross Domestic Product (GDP)	3.912524	3.337768	0.412185	1.930858	2.462756	2.949286
Australia	Total Value Added	4.134488	3.691015	0.955541	2.463498	2.49859	3.087729
Brazil	Gross Domestic Product (GDP)	11.34	9.23	1.03	4.306197	7.528226	1.322869
Brazil	Total Value Added	11.32823	9.109058	1.496431	3.934601	9.111513	1.18383
Canada	Gross Domestic Product (GDP)	3.970251	2.155537	0.164673	5.177636	3.089919	3.03988
Canada	Total Value Added	4.174861	2.014628	0.604263	5.035148	3.509341	3.325282
Chile	Gross Domestic Product (GDP)	8.955234	7.944971	7.969901	4.489076	5.844863	1.188573
Chile	Total Value Added	7.955831	10.59017	7.510978	4.064989	5.005023	0.898794
China	**Gross Domestic Product (GDP)**	**7**	**7.83279**	**9.262487**	**8.490017**	**10.39186**	**6.947196**
China	**Total Value Added**	**5.200709**	**5.905962**	**8.537341**	**8.313159**	**10.18482**	**6.859115**
Egypt	Gross Domestic Product (GDP)	3.440912	9.950973	5.815788	5.383305	5.147109	4.181366
Egypt	Total Value Added	3.749247	9.366085	5.081073	5.67581	3.708721	3.701865
France	Gross Domestic Product (GDP)	5.316716	1.578745	2.923935	3.923669	1.949438	2.29142
France	Total Value Added	5.399091	2.103028	2.777224	3.776178	1.659404	2.172066
Germany	Gross Domestic Product (GDP)	3.1327	1.408829	5.255006	2.912503	4.179882	2.601976
Germany	Total Value Added	3.37548	1.622035	5.015139	2.726622	4.262092	2.712318
Greece	Gross Domestic Product (GDP)	7.841177	0.67713	3.1	3.919771	-5.47863	1.280819
Greece	Total Value Added	7.687302	1.4565	3.1	3.583204	-6.24068	1.816215
India	**Gross Domestic Product (GDP)**	**1.64293**	**6.735822**	**5.533455**	**3.840991**	**8.497587**	**7.04382**
India	**Total Value Added**	**0.813391**	**8.119226**	**5.55459**	**3.285108**	**8.029867**	**6.586444**
Iraq	Gross Domestic Product (GDP)	6.940267	0.409492	0.016944	1.406475	6.402565	-3.76809
Iraq	Total Value Added	7.528293	-14.9037	-3.38945	3.278606	6.36052	-4.04529
Italy	Gross Domestic Product (GDP)	1.818108	3.430016	2.052581	3.786955	1.713296	1.667859
Italy	Total Value Added	2.356052	2.904733	2.114218	3.566892	1.701981	1.597586
Japan	Gross Domestic Product (GDP)	4.698992	2.817591	4.892713	2.779633	4.191739	2.168291
Japan	Total Value Added	5.698504	8.230386	5.485659	2.247618	3.596388	2.210163
Mexico	Gross Domestic Product (GDP)	4.171414	8.324114	5.068306	4.942454	5.118118	2.118085
Mexico	Total Value Added	3.330205	9.326954	4.879104	5.059558	5.157012	2.04305
Netherlands	Gross Domestic Product (GDP)	4.330778	3.251004	4.183127	4.195642	1.342739	2.910903
Netherlands	Total Value Added	3.936999	1.538916	3.572103	3.939768	1.515084	2.810874
Portugal	Gross Domestic Product (GDP)	6.631652	4.58934	3.950523	3.816178	1.737626	3.506345
Portugal	Total Value Added	8.700207	5.013059	6.409012	3.705973	1.569645	3.27549
Republic of Korea (S)	**Gross Domestic Product (GDP)**	**10.54551**	**7.246176**	**9.877553**	**9.060833**	**6.804825**	**3.159636**
Republic of Korea (S)	**Total Value Added**	**8.601153**	**6.583768**	**10.11711**	**7.837502**	**6.543722**	**3.192461**
Spain	Gross Domestic Product (GDP)	4.649473	2.208728	3.781393	5.245995	0.16301	2.973641
Spain	Total Value Added	4.593857	1.061781	3.887032	5.171775	0.208463	3.052027
Sweden	Gross Domestic Product (GDP)	0.944646	1.699971	0.754675	4.766349	5.952107	2.567925
Sweden	Total Value Added	2.64487	7.281231	1.174279	4.612222	5.971219	2.592067
Switzerland	Gross Domestic Product (GDP)	4.075443	4.601977	3.674626	3.976409	3.268102	1.58482
Switzerland	Total Value Added	4.074427	4.33061	3.453321	3.286224	3.05233	1.592478
United States	Gross Domestic Product (GDP)	3.293362	2.537719	1.88596	4.127484	2.563767	2.33268
United States	Total Value Added	1.753982	1.606077	1.711312	3.925932	2.197723	2.386486
Source: Own Calculations based on United Nations Statistical Database (UNSD)							

TABLE 13: (M+S)/GVA SHARE: PROXY TO PER CAPITA CAPITAL STOCK							
Country	**IndicatorName**	**1970**	**1980**	**1990**	**2000**	**2010**	**2017**
Argentina	(M+S)/GVA Share	81.8	83.0	83.4	85.4	80.3	82.8
Australia	(M+S)/GVA Share	77.6	75.6	80.1	82.3	77.1	77.7
Brazil	(M+S)/GVA Share	80.0	80.2	78.5	83.8	82.8	86.0
Canada	(M+S)/GVA Share	81.1	77.1	82.8	84.5	81.2	82.2
Chile	(M+S)/GVA Share	72.5	74.8	70.5	76.6	69.0	74.8
China	(M+S)/GVA Share	61.2	65.8	68.6	79.6	83.8	85.3
Egypt	(M+S)/GVA Share	64.1	56.4	68.9	70.8	65.4	70.8
France	(M+S)/GVA Share	82.3	85.6	87.3	90.1	89.9	90.3
Germany	(M+S)/GVA Share	83.0	86.1	88.9	91.0	91.2	91.2
Greece	(M+S)/GVA Share	78.0	78.8	80.2	83.6	88.6	89.1
India	**(M+S)/GVA Share**	**48.9**	**53.5**	**57.5**	**63.7**	**66.9**	**69.2**
Iraq	(M+S)/GVA Share	48.4	26.5	59.5	11.7	41.7	49.7
Italy	(M+S)/GVA Share	79.4	84.7	87.6	89.6	89.5	90.7
Japan	(M+S)/GVA Share	84.4	85.0	85.6	88.3	91.3	90.4
Mexico	(M+S)/GVA Share	76.8	70.5	76.2	80.5	79.2	82.2
Netherlands	(M+S)/GVA Share	82.1	81.9	85.2	88.1	87.8	90.5
Portugal	(M+S)/GVA Share	63.7	74.3	82.0	85.7	88.3	89.8
Republic of Korea (S)	(M+S)/GVA Share	62.8	72.7	79.1	86.5	90.3	89.4
Spain	(M+S)/GVA Share	73.3	78.4	80.2	83.0	84.6	87.3
Sweden	(M+S)/GVA Share	82.1	85.1	85.7	90.9	88.0	88.2
Switzerland	(M+S)/GVA Share	86.4	86.3	86.8	90.7	92.3	92.5
United States	(M+S)/GVA Share	89.1	87.8	90.2	91.5	91.3	91.8
Source: United Nations Statistical Division (UNSD)Database							

TABLE 14: PANEL FIXED REGRESSION WITH BIHAR IRRIGATION DUMMY

Dependent Variable: LNANSVA
Method: Panel Least Squares
Date: 11/09/21 Time: 16:56
Sample: 1991 2018
Periods included: 28
Cross-sections included: 28
Total panel (unbalanced) observations: 644

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.34115	0.682975	16.60552	0.0000
LNNFCF	0.170982	0.015064	11.35020	0.0000
LNNETIRR	0.399307	0.083577	4.777694	0.0000
LNTOTMFG	0.568917	0.066333	8.576642	0.0000
LNTOTSERV	-0.979882	0.062789	-15.60589	0.0000
DUMIRRIGBIHARLN	-3.502762	1.458819	-2.401095	0.0166

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.923738	Mean dependent var	13.70987
Adjusted R-squared	0.919744	S.D. dependent var	1.790418
S.E. of regression	0.507217	Akaike info criterion	1.530125
Sum squared resid	157.1911	Schwarz criterion	1.759060
Log likelihood	-459.7003	Hannan-Quinn criter.	1.618961
F-statistic	231.2766	Durbin-Watson stat	0.494561
Prob(F-statistic)	0.000000		

TABLE-15: PANEL FIXED EFFECT REGRESSION WITH WEST BENGAL IRRIGATION DUMMY

Dependent Variable: LNANSVA
Method: Panel Least Squares
Date: 11/09/21 Time: 17:00
Sample: 1991 2018
Periods included: 28
Cross-sections included: 28
Total panel (unbalanced) observations: 644

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	10.33237	0.593598	17.40635	0.0000
LNNFCF	0.172816	0.015087	11.45450	0.0000
LNNETIRR	0.351769	0.084667	4.154748	0.0000
LNTOTMFG	0.544477	0.066804	8.150412	0.0000
LNTOTSERV	-0.962956	0.063661	-15.12624	0.0000
DUMIRRIGWBLN	1.314014	0.515980	2.546640	0.0111

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.923827	Mean dependent var	13.70987
Adjusted R-squared	0.919837	S.D. dependent var	1.790418
S.E. of regression	0.506921	Akaike info criterion	1.528958
Sum squared resid	157.0078	Schwarz criterion	1.757893
Log likelihood	-459.3246	Hannan-Quinn criter.	1.617794
F-statistic	231.5689	Durbin-Watson stat	0.498779
Prob(F-statistic)	0.000000		

TABLE 16: TRADE OF THE 22 MAJOR DEVELOPED & DEVELOPING COUNTRIES AS PERCENTAGE OF USA TRADE VOLUME							
Country	**IndicatorName**	**1970**	**1980**	**1990**	**2000**	**2010**	**2017**
Argentina	TRADE	3.8759866	6.209930631	4.460580165	9.406761686	11.74385649	11.15063402
Australia	TRADE	43.5580112	46.73283601	30.64380148	40.46237643	45.32554427	42.04678124
Brazil	TRADE	128.074007	136.3772897	118.2282079	137.8531638	147.4719074	146.5284249
Canada	TRADE	36.7790465	45.06341999	53.59942143	89.45194775	76.30381881	77.80028104
Chile	TRADE	2.27997074	3.813513015	4.29318564	8.507532498	11.88426485	11.33029518
China	**TRADE**	**2.47588066**	**8.912806495**	**20.37129698**	83.66180464	234.8475803	323.262072
Egypt	TRADE	2.90528362	5.1940852	4.757844829	4.543473442	8.100779175	11.37022438
France	TRADE	45.0404853	71.15045394	77.53060083	116.4221599	114.168621	124.3591469
Germany	TRADE	81.8713618	108.0591179	122.7946753	177.7266479	213.3748956	239.7940734
Greece	TRADE	3.48293702	7.461345616	7.538397596	14.11596314	12.45275752	10.99412448
India	**TRADE**	**4.19266982**	**6.759219624**	**8.4483625**	21.86621179	64.75391162	74.19714509
Iraq	TRADE	4.81291515	13.61095527	14.47401432	13.59182524	8.016244094	8.1156142
Italy	TRADE	48.1459521	64.85774015	76.18785194	98.04556469	87.58853998	86.51720646
Japan	TRADE	51.1097727	79.83884354	103.8234375	120.1102615	128.4227963	135.590487
Mexico	TRADE	8.83215212	17.99442695	19.80093516	47.65744152	50.6081112	60.98706525
Netherlands	TRADE	37.2784251	47.46114646	51.28430451	82.0518065	87.6698076	99.98400697
Portugal	TRADE	4.72488427	5.812537613	8.637450022	12.64452186	12.62911604	11.78200731
Republic of Korea (S)	TRADE	2.24394759	9.143302603	18.3891357	46.56503851	82.43569666	95.09333373
Spain	TRADE	14.0777427	21.40859594	30.52631222	59.56016272	59.00467381	62.04778476
Sweden	TRADE	18.2158091	19.44477922	21.06906606	31.52382753	33.41843436	36.35656519
Switzerland	TRADE	30.7263477	37.72391087	43.99964982	50.45995351	53.8974999	56.51183493
United States	TRADE	100.06018	100.0006383	100.043764	100.0173389	99.86466352	100.1526184
Source: Own Calculations from UNSD Database. The Figures in bold for India and China shows their Trade Regimes at Autarky.							
For others, growth is Gradual. It is not so in case of India and China.							
Their lies big jumps in Trade Volume (as percentage of USA GDP) for India and China since 2000.							

TABLE 17: GINI COEFFICIENTS OF THE 22 MAJOR DEVELOPED AND DEVELOPING COUNTRIES									
Country Name	Country Code	Indicator Name	Indicator Cod	AROUND 1970	AROUND 1980	AROUND 1990	AROUND 2000	AROUND 2010	AROUND 2017
Argentina	ARG	Gini index (World Bank e	SI.POV.GINI		40.8	46.8	51.1	43.6	41.1
Australia	AUS	Gini index (World Bank e	SI.POV.GINI		31.3	33.2	33.5	34.7	34.4
Brazil	BRA	Gini index (World Bank e	SI.POV.GINI		57.9	60.5	58.4	52.9	53.3
Canada	CAN	Gini index (World Bank e	SI.POV.GINI	37.3	32.4	31	33.3	33.6	33.3
Chile	CHL	Gini index (World Bank e	SI.POV.GINI			57.2	52.8	46	44.4
China	CHN	Gini index (World Bank e	SI.POV.GINI			32.2	38.7	43.7	38.5
Egypt, Arab Rep	EGY	Gini index (World Bank e	SI.POV.GINI			32	32.8	30.2	31.5
France	FRA	Gini index (World Bank e	SI.POV.GINI		35.2	32.2	31.1	33.7	31.6
Germany	DEU	Gini index (World Bank e	SI.POV.GINI			29.2	28.8	30.2	31.9
Greece	GRC	Gini index (World Bank e	SI.POV.GINI			37	34.2	34.1	34.4
India	IND	Gini index (World Bank e	SI.POV.GINI		32.1	31.7	34.4	35.7	35.7
Iraq	IRQ	Gini index (World Bank e	SI.POV.GINI				28.6	29.5	29.5
Italy	ITA	Gini index (World Bank e	SI.POV.GINI			31.5	35.3	34.7	35.9
Japan	JPN	Gini index (World Bank e	SI.POV.GINI					32.1	32.9
Mexico	MEX	Gini index (World Bank e	SI.POV.GINI		48.5	50.6	52.6	47.2	45.4
Netherlands	NLD	Gini index (World Bank e	SI.POV.GINI		28.4	31.1	28.1	27.8	28.5
Portugal	PRT	Gini index (World Bank e	SI.POV.GINI				38.8	35.8	33.8
Republic of Kor	KOR	Gini index (World Bank e	SI.POV.GINI				31.7	32	31.4
Spain	ESP	Gini index (World Bank e	SI.POV.GINI		34.5	32	34.3	35.2	34.7
Sweden	SWE	Gini index (World Bank e	SI.POV.GINI	34	22.9	24.9	27.2	27.7	28.8
Switzerland	CHE	Gini index (World Bank e	SI.POV.GINI			33.9	33.4	32.6	32.7
United States	USA	Gini index (World Bank e	SI.POV.GINI	35.3	34.5	38	40.1	40	41.2
Source: WORLD BANK DATABASE									

TABLE 18: PER CAPITA GDP AT CONSTANT PRICES						
Country	**1970**	**1980**	**1990**	**2000**	**2010**	**2017**
Switzerland	54357.61	60226.07	70860.4	74432.54	82197.26	86078.77
United States	**24725.05**	**30816.91**	**38864.74**	**48767.07**	**52813.9**	**58394.49**
Australia	24579.23	28805.34	33306.19	42177.63	49056.22	53447.25
Sweden	24351.62	28634.96	34535.81	41073.03	48307.88	53387.91
Netherlands	21096.86	26357.66	31064.61	40438.96	44193.06	47281.91
Canada	21432.49	27720.22	31872.18	38034.89	40974.18	44089.23
Germany	17793.98	23758.21	29615.17	34819.54	38189.34	42589.2
France	17519.43	23562.28	28512.12	33604.9	35666.61	37620.24
Japan	13629.91	18783.99	27690.16	30743.77	32502.62	35356.57
Italy	15833.61	21839.49	27364.46	32480.46	32019.46	31161.15
Republic of Korea (S)	1979.843	4064.124	9354.673	16859.37	25455.36	30464.87
Spain	11408.24	14640.72	18800.31	23778.1	25498.51	27181.84
Portugal	7681.408	10829.62	14695.75	18774.31	19619.85	20456.65
Greece	10890.68	15363.17	15487.07	18184.54	22030.98	18624.49
Argentina	10321.56	11370.5	8697.316	11635.5	14655.54	14756.06
Chile	4310.865	4748.592	5448.628	8764.294	11809.17	13591.53
Mexico	5274.418	7595.109	7333.233	8856.389	8873.071	9858.78
China	**280.0254**	**423.7222**	**874.8967**	**2151.201**	**5518.743**	**8895.187**
Brazil	3667.934	6613.871	6263.052	6826.992	8702.255	8498.294
Iraq	2658.171	5281.448	3741.179	4007.762	4052.063	4862.949
Egypt	817.6689	1217.784	1890.953	2499.224	3362.302	3581.601
India	**370.4405**	**395.5962**	**543.688**	**773.218**	**1269.903**	**1858.328**
Source: UNITED NATIONS STATISTICAL DIVISION DATABASE (UNSD)						