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DEVELOPMENT EXPERIENCE OF THE TWO GIANT OUTLIERS INDIA & CHINA

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ABSTRACT

World Bank (2004), in their study, has shown that from 1990 up to 2003, Indian Service Sector has grown by almost 9 percent and 60 percent of growth of the Indian economy has been contributed by the Services sector alone, the share of S sector in GDP has gradually crossed the 50 percent mark and export of Services has displayed one of the fastest rates of growth in the world. They have pointed out that India is amidst the 'Services Revolution'. It seems that India perhaps jumped over the phase of industrialization to enter directly into the phase of 'tertiarisation'. Naturally this 'ahistorical' development process followed by India has drawn the attention of the economists worldwide and many of them have identified India to be the 'outlier' in this regard. Hence a definite question arises-'Is India an outlier in the historical development experience of the world? We will try to address this question here with a specific reference to China; India's neighbor and one of the fastest growing countries of the world. We also enquire into the structural change of Indian economy from 1973-74 to 2007-08 based upon Input-Output analysis.

Keynotes: Robust Estimation, Bootstrapping, Structural Change in Input-Output Framework.

JEL Classification: C21, O14, O50

Introduction: In the historical development process, through the analysis of long term trend of sectoral shares by Simon Kuznets (1966, 1971) from 1801 to 1967, it is observed that Agricultural (A) sector's share in value added has declined unambiguously over time for both developed and developing countries. However, the fall in the A sector's share has been very drastic for the developed group at their developing stage and this fall in A's share has almost single handedly been compensated by the increase in industrial (I) sector's share in value added, led especially by the Manufacturing (M) sector, being the pivot of industrialization. Further, quite significantly the share of the service (S) sector in value added has not shown any conspicuous trend. For the developing group, however, the fall in A's share was somewhat moderate and this fall has been compensated by the growing joint dominance of I and S sector.[1]

[1] This doctrine is famous as the 'Stylised Facts of Development'.

However, since 1970s, a significant change in historical development process led by the present developed countries (DCs) has been observed. Unlike the period 1801-1967, now, almost all the DCs are showing a significant rising trend of S sector and quite astonishingly a declining trend of I sector, given the fact that the share of A sector has already reached below 5 percent (excluding certain exceptions). It clearly signifies the fact that the DCs have started to grow in terms of capital intensive services and labor intensive manufacturing is not the pivot of development any more. What is the matter of surprise is the fact that for most of the developing economies (LDCs), share of the S sector in GDP is rising steadily and is showing a significant rising trend.

On the other hand, LDCs are clearly showing that in some cases, there exists moderate increasing trend of the share of the I sector in value added coupled with significant rise in the share of the S sector in value added and in other cases, there is no increasing trend of the share of the I sector in value added coupled with significant rise in the share of the S sector in value added. Thus the obvious issue that is arising is that, following the DCs, the LDCs have also started to grow in terms of services, thereby, contradicting the stylized facts of development proposed by Kuznets (1966, 1971) and Clark (1940) that in the historical development process, at the initial stage of development, agricultural (A) sector is the predominant sector in terms of its contribution to GDP; with increase in per capita income, sector A's share decreases and industrial sector (I)'s share increases (due to manufacturing (M) increase) and later on, as saturation comes in terms of manufactured goods consumption, hence demand for services starts generating (and hence, after the saturation in industrial production, S's share increases in the value added.[2] Thus a structural break is evident in world development around 1970s.

The change around 1970s occurs due to massive advancement in scientific research and development through advent of modern computers and internet, modern satellite technologies, modern telecommunications as well as modern Transport facilities, introduction of remarkable change in the banking and insurance setors and other sectors as well. This led to the shift of emphasis from the labor intensive Manufacturing to the computerized Manufacturing and Services. This transformation has become possible owing to rapid technological progress. This technological progress did not remain confined within the central Developed Countries; it spread out to the peripheral Developing Countries almost simultaneously owing to gradual openness of the developing economies towards trade. The decade of 1970s is known for the advent of modern computers. Later on, revolution in international communications through the world wide web and telecommunications have taken place mainly due to satellite technology. In this regard, United States, U.S.S.R., and later on France, Japan, Germany, U.K. and even India and China have provided important contributions. Revolution in technology coupled with trade orientation especially on the part of the LDCs have created the stage for further technology transfer as well as transfer of knowledge worldwide for both the developed as well as developing economies. Dependence between developed world and developing world again started to increase (Krugman & Obstfeld, pp.6, pp.259,(2009)). This has further opened the gate of knowledge dissemination over the world. As a result, most of the Developing Countries have started to show remarkable growth in the Tertiary Sector, thereby leading to a steady rise in the Tertiary Sector's share in GDP, thereby making this sector dominant sector in terms of percentage contribution in GDP. Hence, if we follow Kuznet's wisdom, then the developing nations like India, Mexico, Brazil perhaps have charted a new path of development and they have got a different prescription of development since 1970s; in that sense these are outliers in terms of stylized facts of development proposed by Kuznets and Clark. Actually, Kuznets perhaps have failed to realize the fact that worldwide increase in trade and global spread of technology would automatically create an opportunity in front of the LDCs to pick up or prefer the latest technology intensive, computerized and capital intensive 'tertiarisation' mode of development over the 'stylised' 'industrialisation' mode of development. Now let's move further towards India.

[2] According to Engel's Law of income elasticity of demand, as income increases, the proportion of income spent on food grains decreases and proportion of income spent on manufacturing and services increases.

India (1950-51-2010): Literature Survey and a Comparative Analysis with China: India is a developing nation. In our study of the trend of shares of three major sectors, we have to clarify at the outset that the Agricultural, Industrial and Services sectors are defined in the same manner as by Kuznets.[3] If we see Indian economy from 1950-51 up to 2009-10, the share of Services (S sector) in GDP has remained higher always relative to the Industrial Sector's (I sector) share in GDP. The share of the Services sector in GDP is steadily rising. I sector does not show a steady rise but rise in two different phases. The share of the agricultural sector in GDP has declined steadily. It is evident from above that Service Sector's share has always been higher relative to the Industrial Sector's share in GDP in the Indian economy. Industrial Sector's share has never crossed 30 percentage marks in terms of sectoral contributions to GDP for the Indian economy (here it should be mentioned that we have included the Transport, Storage and Communications subdivision within the S sector so that this subdivision has excluded from the I sector). It is also quite clear that the over time reduction in Agriculture's share in GDP has been compensated mostly through the rising share of Services in GDP. India's development pattern indicates that it is not progressing on the basis of the labor intensive Manufacturing Sector but it is progressing on the strength of its' Service sector. Indeed, as World Bank study (2004) suggests, from 1990 up to 2003, Indian Service Sector has grown by almost 9 percent and 60 percent of growth of the Indian economy has been contributed by the Services sector alone. During the same time period, the share of this sector in GDP has gradually crossed the 50 percent mark. India has exhibited a strong revealed comparative advantage (RCA) in Services relative to goods. Between 1996 and 2000, although the RCA index of goods has reduced by 15 percent, the RCA index for Services has increased by massive 74 percent. The World Bank Study thus explains India's progress as 'Services Revolution'.

The study by Rakshit (2007) also shows that GDP growth in India since mid-1990s has been driven primarily by Services. Several researchers, like Bhattacharya and Mitra (1990 and 1991), Bhalla (2004), Singh (2005) et. al., however, have questioned the sustainability of this 'Services led Growth'. They have pointed out that the 'Services Revolution' actually reflects an 'Excess Growth' of Services and have questioned its sustainability from the viewpoint of its implications for price stability, employment and income distribution. But Rakshit (2007), Gordon and Gupta (2006), Eichengreen and Gupta (2011), Datta (2011) et. al. have pointed out that this growth is a result of various factors like 'Splintering', 'Technological Progress', 'change in the final demand structure' and several other factors. According to Datta (2011), the growth of the service sector can be explained by three important factors, viz., 'Final Demand Effect', 'Input Structure Effect' and 'Reallocation Effect'. For the Tertiary Sector as a whole, during 1973-74 to 1993-94, input structure effect and reallocation effect together explain about 60 percent of the total increase in relative share. Final demand effect explains about 40 percent of the total increase in relative share. However, during 1993-94 to 2003-04, input structure effect and reallocation effect together explain mere 15 percent of the total increase in relative share of Tertiary Sector as a whole. Final demand effect explains 85 percent of the total increase in relative share. The role of export of Services has also been emphasized by these authors. Hence the natural opinion emerges that India is an outlier in the context of the worldwide development, or more specifically, a positive outlier in terms of the share of the Service in GDP.

This question has been addressed already by several economists like Kochhar, Rajan et. al. (2006). They have taken the cross section data for selected number of countries for two distinct periods, viz., 1981 and 2000, and regressed the sectoral shares of Services and Manufacturing on per capita GDP, square of per capita GDP and a dummy called 'India Indicator'. ***They have done the regression once Without Control of the country size and then With Control of the country size***.

Then, for the year 1981, they have taken a sample of 122 countries for the regression of the share of the Services on logarithm of per capita GDP, square of logarithm of per capita GDP and India Indicator. Similarly, they have taken a sample of 101 countries for the regression of the share of the Manufacturing on logarithm of per capita GDP, square of logarithm of per capita GDP and India Indicator.

Further, for the year 2000, they have taken a sample of 156 countries for the regression of the share of the Services on logarithm of per capita GDP, square of logarithm of per capita GDP and India Indicator. Similarly, they have taken a sample of 149 countries for the regression of the share of the Services on logarithm of per capita GDP, square of logarithm of per capita GDP and India Indicator. The following Table-1 and Table-2 explains their results.

[3] A sector excludes Mining and Quarrying. The Industrial Sector (I sector) incorporates Mining and Quarrying, Manufacturing, Construction and Electricity, Gas and Water Supply. The Service Sector (S sector) incorporates Trade and Hotels and Restaurants; Transport, Storage and Communications; Banking and Finance, Insurance, Real Estate and Business Services; Community, Social and Personal Services. Thus in our analysis Transport, Storage and Communications subsector is a part of S sector and not that of I sector.

Table -1: Outlier India in trms of Sectoral Shares of Services and Manufacturing

YEAR	1981		2000	
Sectors	Without Control	With Control	Without Control	With Control
Service	Negative Outlier	Negative Outlier	Non Outlier	Positive Outlier
Manufacturing	Positive Outlier	Non Outlier	Positive Outlier	Non Outlier

Table - 2: Results Obtained From the Study of Kochhar, Rajan et. al. (2006)

	1981				2000			
	Manufacturing		Services		Manufacturing		Services	
Log GDP per capita	15.37	21.58	36.27**	27.81	13.18**	15.41**	10.88	8.01
Robust Standard Errors	14.58	13.75	17.01	17.79	6.41	6.38	10.34	10.3
(Log GDP per capita)2	(-0.73)	(-1.09)	(-1.95)*	(-1.46)	(-0.610)	0.72*	(-0.19)	0.04
Robust Standard Errors	0.88	0.83	1.03	1.08	0.12	0.38	0.6	0.6
India indicator	4.58***	2.33	(-6.50)***	(-3.55)***	2.4***	0.26	(-0.05)	3.77**
Robust Standard Errors	1.25	1.76	1.3	1.61	0.73	1.11	1.17	1.46
Control for country size	NO	YES	NO	YES	NO	YES	NO	YES
Observations	101	101	122	122	149	149	156	156

Notes: Robust standard errors are reported in parenthesis; ***represents significance at 1%, **represents significance at 5%, *represents significance at 10%; Country size is measured by area in square kilometers; Source: Kochhar, Rajan et. al. (2006).

They have done the same analysis for China, in which case they have found China to be a positive outlier in terms of manufacturing sector's share in GDP.

We will recheck the hypothesis that India is an outlier in terms of Service Sector's share in GDP. We will also recheck whether India is an outlier in terms of Manufacturing Sector's share, Industrial Sector's share and Agricultural Sector's share in GDP. Additionally, we will observe whether China is an outlier in terms of the shares of Service Sector, Manufacturing Sector, Industrial Sector and Agricultural Sector in GDP.

Now firstly we have checked the hypothesis without having any control over the country size. Here, initially, ***when we are not controlling for the country size (Without Control)***, then we have chosen the cross section observation of 105 countries for five distinct points in time, at an interval of a decade, viz., 1970, 1980, 1990, 2000 and 2010. Then at the next phase, in order to control the country size, ***when we are controlling for the country size (With Control)***, we have eliminated 30 small countries from our sample. In both cases, we have regressed sectoral shares of (i) Services, (ii) Manufacturing, (iii) Industry and (iv) Agriculture in GDP upon log of per capita GDP, square of log of per capita GDP and (a) india indicator variable for India and (b) china indicator variable for China. Here, in the regression, owing to the existence of possible spatial autocorrelation and heteroscedasticity, we have utilized (i) the method of Bootstrapping and (ii) the method of Robust Regression. These methodologies are described in brief in the Appendix of this paper.

We find that our results, although broadly support the findings of Kochhar, Rajan et. al. (2006), are not exactly similar. The following Table-3 and Table-4 entails our results for India and China. The detailed results are given in the Table-A(1), Table-A(2) (for Robust Estimation) and Table-A(3), Table-A(4) (for Bootstrapping Estimation) of Appendix of this paper.

Table 3: Outlier India in terms of Sectoral Shares of Services, Manufacturing, Industry and Agriculture

YEAR	1970		1980		1990		2000		2010	
Sectors	WC	C	WC	C	WC	C	WC	C	WC	C
SHSERV	neg. outlier	neg. outlier	neg. outlier	non outlier	non outlier	non outlier	pos. outlier	pos. outlier	pos. outlier	pos. outlier
SHMANU	non outlier	non outlier	non outlier	non outlier	pos. outlier	pos. outlier	pos. outlier	pos. outlier	pos. outlier	pos. outlier
SHINDU	non outlier	non outlier	pos. outlier	non outlier	pos. outlier	non outlier	non outlier	neg. outlier	neg. outlier	neg. outlier
SHAG	pos. outlier	pos. outlier	pos. outlier	pos. outlier	non outlier	non outlier	neg. outlier	neg. outlier	neg. outlier	neg. outlier

'SHSERV' , 'SHMANU', 'SHINDU' and 'SHAG' imply shares of Service, Manufacturing, Industry and Agriculture in GDP respectively; 'neg outlier' and 'pos outlier' imply negative outlier and positive outlier respectively; 'WC' and 'C' imply 'without control of country size' and 'with control of the country size' analysis.

Table 4: Outlier China in terms of Sectoral Shares of Services, Manufacturing, Industry and Agriculture

YEAR	1970		1980		1990		2000		2010	
Sectors	WC	C	WC	C	WC	C	WC	C	WC	C
SHSERV	neg. outlier	neg. outlier	neg. outlier	neg. outlier	neg. outlier	neg. outlier	neg. outlier	neg. outlier	neg. outlier	neg. outlier
SHMANU	pos. outlier	pos. outlier	pos. outlier	pos. outlier	pos. outlier	pos. outlier	pos. outlier	pos. outlier	pos. outlier	pos. outlier
SHINDU	pos. outlier	pos. outlier	pos. outlier	pos. outlier	pos. outlier	pos. outlier	pos. outlier	pos. outlier	pos. outlier	pos. outlier
SHAG	pos. outlier	pos. outlier	non outlier	non outlier	non outlier	non outlier	neg. outlier	neg. outlier	neg. outlier	neg. outlier

'SHSERV' , 'SHMANU', 'SHINDU' and 'SHAG' imply shares of Service, Manufacturing, Industry and Agriculture in GDP respectively; 'neg outlier' and 'pos outlier' imply negative outlier and positive outlier respectively; 'WC' and 'C' imply 'without control of country size' and 'with control of the country size' analysis.

In the historical development process, a significant structural break exists worldwide around 1970s around which the capitalist development has changed it's course from labor intensive manufacturing led industrialization towards capital intensive 'tertiarisation'. Here, from our analysis, it is clearly observed that the impact of change in worldwide development pattern has become evident upon the Indian economy almost 20 years later since 1990 mainly due to the economic reforms towards Liberalization, Privatization and Globalization started taking shape in the early 1980s. Thus the end of the long era of 'Hindu Rate of Growth' and the start of the era of 'Services Led Growth' signifies simultaneously (i) the efficacy of the liberalization policies upon policies of control and (ii) the failure of command economy and 'Dirigisme' for India. Generation of intermediate and final demand for services output; 'Splintering' (Bhagwati, 1984) i.e., outsourcing of industrial activities like advertisement, audit, consultancy, marketing, Transport, security etc. from industries to firms specialized in these services; technological progress are the possible explanations behind the 'Services Revolution' of India (Sinha, 2015). It is to be noted that in our study, India was a negative outlier in terms of services' share in GDP up to 1980, if we do not control for the country size. Only from 1990, India has become a positive outlier in terms of services. So, switching from 'dirigisme' to 'laissez-faire' has created the opportunity in front of India to become one of the 'fastest growing' countries of the world through the engine of services.

We must not forget that liberalization has not only created the opportunity of growth for services, but also for the manufacturing especially through the liberalization of industrial licensing, freeing of domestic entrepreneur from the restrictions of MRTP Act, removing restrictions on foreign direct investment, referring the chronically sick PSUs to Board of Industrial and Financial Reconstruction (BIFR) for disinvestment. Kochhar, Rajan et. al. (2006) have not found India to be an outlier, more specially, a positive outlier in terms of manufacturing sector's share in GDP in 1981, when they have controlled for the country size. However, they have obtained India a positive outlier in this respect in 2000. Our result broadly matches with theirs in this respect. We get India a non-outlier in terms of manufacturing share in GDP up to 1980, but we get India a positive outlier in this respect 1990 onwards up to 2010.

In terms of industrial sector's share in GDP, however, India seems to be a positive outlier in 1980 and in 1990, when we have not controlled for the country size. However, in 2010, India becomes a negative outlier in terms of the aforesaid. The reason for this is the relatively much lesser growth of mining and quarrying, construction, electricity, gas and warehouses etc..

On the other hand, the development experience of China has shown that they have reaped the benefit of closed door command economic policies and have become specialized in import substitution, especially in manufacturing. China is still reaping the benefits of its policies of import substitution, even when they have opened their gate for world trade in mid 1990s, because China has timely opened their gate for world trade when they knew that they have become the 'Manufacturing Powerhouse' of the world and none is able to compete them out in the manufacturing. Rather they have claimed largest market share in the world market of manufacturing owing mainly to the cheaper labor cost (through absorption of surplus labour from agriculture to manufacturing) for manufacturing as well as cheaper cost of raw materials. Obviously the impact has spread over the entire industrial sector of Chinese economy and industrial sector has also grown much above the world average in order to come at an outlying position (Sinha, 2015). As our study shows, almost 80 percent of industrial sector is grabbed by the manufacturing sector in 2000 in China. So, a natural consequence follows.

However, China is a negative outlier in terms of it's' services share in GDP (this result also matches with the result obtained by Kochhar, Rajan et. al. (2006)). One possible explanation is the lack of stress in tertiary skill based computer oriented education such as Information Technology (IT), Information Technology Enabled Services (ITES) in China. As Kochhar, Rajan et. al. (2006) points out, China has spent only 10.7 percent and 12.1 percent respectively of per capita GDP per student in tertiary and primary education in 2000 whereas India spent 86 percent and 14 percent respectively of per capita GDP per student in tertiary and primary education in 2000. This has serious implication upon other services activities like transport and communications, distributive trade, medical and health services, education and research, Banking and Finance as well as many other services including Governance itself for both the countries, viz., China and

India. Another explanation is that China has previously followed the national accounts process of Net Material Product System (NMP) in which various extractive, distributive and industry associated services were included in the industrial sector. Hence, the industrial sector is over-emphasized and service sector is under-reported in the System of National Accounts (NAS). Though China is adjusting to NAS, but it is very difficult as well as time consuming to convert the NMP databank to convert into NAS databank.

Both India and China were positive outliers in terms of agriculture up to 1980s, but later on from 2000 onwards it has become a negative outlier in this field. One possible reason is the growing urbanization in India and China that has created shortage of agricultural land. Both China and India are densely populated countries. For the growing living and employment requirement of people, houses, roads, industries are being built up and these are virtually eating up agricultural land in both the countries. Further, in order to feed the growing population, each plot of land gets ploughed several times along with the massive use of chemical fertilizers, pesticides and other harmful ingredients. These are not only harmful for human life, but also these have reduced the productivity of agricultural lands. Both India and China are suffering from the same problem.

India's Structural Change in Favor of Services: Input-Output Analysis: We now take up an examination of the structural interrelationships among four major sectors of the Indian economy through the input-output (I-O) transaction Tables published by the Central Statistical Organization. We have considered four I-0 Tables for the years 1973-74, 1993-94 and 2006-07 in the following Table-A(5).[4] We condensed them into 4x4 matrices.[5] We know from the Input-Output methodology that for an 'n' sector economy, if '**A**' is the 'nxn' input coefficient matrix, '**F**' is the 'n' sector final demand vector, '**X**' is the 'n' sector vector of output, '**I**' is the 'nxn' Identity Matrix, then we have –

$$\mathbf{(I - A)X = F} \quad \text{.....(6)}$$

$$\mathbf{X = (I - A)^{-1}F} \quad \text{.....(7)}$$

Here we are going to observe the change in the value added structure from 1973-74 to 2007-08. Then we firstly want to observe the effect of change in the final demand structure on the value added structure for the relevant period (1973-74 to 2007-08), given the input structure of 2007-08. This effect is called 'Final Demand Effect' (see Datta (2011)).

Further, we want to observe the effect of change in the input structure on the value added structure for the relevant period (1973-74 to 2007-08), given the final demand structure of 1973-74. This effect is called 'Input Structure Effect' (see Datta (2011)). Now it is important to note that a change in the input structure automatically creates a reallocation of value added among the industries. This could be observed from the fact that as input structure changes from 1973-74 to 2007-08, then correspondingly a change occurs in reallocation of value added among industries since,

Corresponding to **(I – A)X = F**,

we have, value added in sector j is given by the relation,

$$v_j = (1 - \sum_{i=1}^{n} a_{ij} - a_{mj}) \text{.....(8)}$$

where a_{ij} is the amount of i^{th} input required to produce 1 unit of j^{th} sector's output, and a_{mj} is the amount of imported input required per unit of j. This effect is called 'Reallocation Effect' (see Datta (2011)). Here, we are taking 'Input Structure Effect' and 'Reallocation Effect' together we are naming it 'Combined Input Structure and Reallocation Effect' (ISR Effect).

[4] A look at Table-A(5) in Appendix will make it clear that Category-I Services-intensity (in terms of indirect effects) is by far the highest in the Secondary Sector. Furthermore, this intensity has increased substantially from 1973-74 to 1993-94 and to 2007-08 relative to 1973-74. This deepening of Service intensity is present in other sectors also. This fact indicates to a change in the structure of final demand from material goods to Services will change the sectoral shares in GDP in favour of Services; and consequently it will also change the relative weights of the two categories of Services. But this is not the only source of change, the change in relative weights will also be affected by the increase in intermediate Service-intensity of production which should raise the relative share of Category 1 Service further.

[5] Normal practice is to classify the I-O framework into 3x3 matrix based upon three major sectors, viz., Agriculture and Allied activities, Industry and Services. However, here, it may be noted that we have divided the Service Sector in two broad parts, viz., Category-1 Service and Category-2 Service. Category-1 Service is basically of intermediate nature and Category-2 Service is basically of final use in nature. Hence, instead of using the terms intermediate and final, we use neutral terms –Category-1 and Category-2 Service – as Category-1 has some final use while Category-2 has some has some intermediate use. Hence, we have classified our four major sectors as 'Agriculture and Allied' (A&A), 'Industry' (I), 'Category-1 Service' (S1) and 'Category-2 Service' (S2) (Datta and Sinha, 2008).

Now, as Datta (2011) has shown comprehensively that we can decompose the 'Value Added Effect' into 'Final Demand Effect', 'Input Structure Effect' and 'Reallocation Effect' by the following decomposition methodology.[6] We are here explaining the present decomposition in the light of this methodology proposed by Datta (2011). A preliminary version of this methodology has been discussed also in Datta and Sinha (2008).

Here I have decomposed the value added effect in (a) final demand effect and (b) combined input structure and reallocation effect, i.e.,

$$\Delta X = V_1(I-A_1)^{-1}\Delta F + \Delta\{V(I-A)^{-1}\}F_0 = ISR_1.\Delta F + \Delta ISR.F_0 \quad \text{.....(11)}$$

Here, ΔX implies Value Added Effect; $ISR_1.\Delta F$ implies Final Demand Effect; and, $\Delta ISR.F_0$ implies combined input structure and reallocation effect.

where, $ISR_0 = V_0(I-A_0)^{-1}$ and $ISR_1 = V_1(I-A_1)^{-1}$; F_1 , F_0 , X_1 and X_0 have their usual meanings (Sinha, 2015). **Now, Datta (2011) has already shown comprehensively that we can decompose the 'ValueAdded Effect' into 'Final Demand Effect', 'Input Structure Effect' and 'Reallocation Effect' bythe following decomposition methodology.7 However, the fault in Datta's approach is that aninfinitesimal change in input structure leads to a corresponding change in value added. So,value added effect cannot be independent of input structure effect. There lies the fault inDatta's approach. It has separated the input structure effect from the value added effect.Sinha has corrected it and this is Sinha's invention (see Sinha (2015)).**

The following Table-5 shows our decomposition results.

Table 5: Decomposition of Change in Value Added of India from 1973-74 to 2007-08 into Final Demand Effect and ISR Effect

SECTORS	CHANGE IN VALUE ADDED (1973-74 TO 2007-08)	FINAL DEMAND EFFECT	ISR EFFECT
A	-0.31	-0.21	-0.1
I	0.08	0.06	0.02
S1	0.13	0.07	0.06
S2	0.1	0.08	0.02

Here from we get that out of a reduction of 30 percentage share in agriculture from 1973-74 to 2007-08, 21 percentage points reduction is due to final demand effect and 10 percentage points reduction is due to input structure and reallocation effect (ISR effect). This signifies a massive shift of final demand away from agriculture.

Industrial sector's share has increased by a poultry 8 percentage points during the aforesaid period, out of which 6 percentage point increase is due to final demand effect and 2 percentage point increase is due to ISR effect.

The share of Services-1 (basically of intermediate in nature) in value added has increased by 13 percentage points during the aforesaid period, out of which 7 percentage point increase is due to final demand effect and 6 percentage point increase is due to ISR effect.

Further, share of Services-2 (basically of final in nature) in value added has increased by 10 percentage points during the aforesaid period, out of which 8 percentage point increase is due to final demand effect and 2 percentage point increase is due to ISR effect.

Thus, as a whole, share of Services in value added has increased by 23 percentage points during the aforesaid period, out of which 15 percentage point increase is due to final demand effect and 8 percentage point increase is due to ISR effect.

Hence, (i) The shift of final demand away from agriculture has almost solely grabbed by the service sector for India during the aforesaid period.

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[6] As Datta (2011) has shown,

$$\chi = VX = V(I-A)^{-1}F$$

Then, $$\underline{\Delta\chi} = \underline{V_0(I-A_0)^{-1}\Delta F} + \underline{V_0\Delta(I-A)^{-1}F_1} + \underline{\Delta V(I-A_1)^{-1}F_1}$$

Where, $\Delta\chi$ implies Value Added Effect; $V_0(I-A_0)^{-1}\Delta F$ implies Final Demand Effect ; $V_0\Delta(I-A)^{-1}F_1$ implies Input Structure Effect ; and $\Delta V(I-A_1)^{-1}F_1$ implies Reallocation Effect.

(ii) Final demand plays the dominant role in the structural transformation of Indian economy as 68 percent of change in agriculture's share in value added, (ii) 75 percent change in industry's share in value added and (iii) 65 percent change in service's share in value added is explained by the change in the final demand alone.

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APPENDIX:

TABLE A(1): ROBUST ESTIMATION FOR INDIA FOR THE SHARES OF SERVICES, MANUFACTURING, INDUSTRY AND SERVICES FOR THE PERIODS 1970, 1980, 1990, 2000 AND 2010 (I) WHEN COUNTRY SIZE HAS NOT CONTROLLED (WC) AND (II) WHEN COUNTRY SIZE IS CONTROLLED (C)

INDIA	SERVICE SECTOR'S SHARE IN GDP FOR INDIA									
	1970		1980		1990		2000		2010	
SHSERV	WC	C	WC	C	WC	C	WC	C	WC	C
INTERCEPT	6.437	11.568*	11.018**	14.386**	8.27*	10.926**	3.388	6.928	5.037	6.419
ROBUST STD. ERROR	5.52	6.8	5.24	6.51	4.53	5.44	5.17	5.56	4.7	5.25
LNPCGDP	5.647***	4.593***	5.221***	4.483***	5.726***	5.117***	6.281***	5.616***	6.229***	5.86***
ROBUST STD. ERROR	0.74	0.95	0.68	0.91	0.55	0.72	0.6	0.71	0.55	0.65
SQLNPCGDP										
ROBUST STD. ERROR										
INDIA INDICATOR	**(-4.792)*** **	**(-4.035)** **	**(-3.044)***	(-2.238)	(-1.624)	(-0.63)	**6.159*** **	**6.836*** **	**8.844*** **	**10.02*** **
ROBUST STD. ERROR	**1.781**	**1.95**	**1.71**	1.87	1.59	1.65	**1.7**	**1.65**	**1.34**	**1.38**
R^2	0.31	0.234	0.317	0.26	0.4	0.35	0.44	0.39	0.47	0.43

NOTE: The symbol '***' implies significance at 1% level; the symbol '**' implies significance at 5% level; the symbol '*' implies significance at 10% level.

INDIA	MANUFACTURING SECTOR'S SHARE IN GDP FOR INDIA									
	1970		1980		1990		2000		2010	
SHMANU	WC	C	WC	C	WC	C	WC	C	WC	C
INTERCEPT	0.021	1.418	1.157	3.48	(-26.723)**	(-26.307)*	(-31.42)**	(-28.148)	(-44.517)**	(-53.35)**
ROBUST STD. ERROR	2.7	3.36	3.04	3.43	11.89	14.26	15.36	19.11	17.31	23.03
LNPCGDP	1.862***	1.639***	1.751***	1.388***	9.175***	9.35**	10.219***	9.794*	13.137***	15.822**
ROBUST STD. ERROR	0.35	0.45	0.39	0.45	3.14	3.8	4.01	5.02	4.46	5.88
SQLNPCGDP					(-0.477)***	(-0.511)**	(-0.531)**	(-0.533)	(-0.695)**	(-0.889)**
ROBUST STD. ERROR					0.19	0.24	0.25	0.31	0.27	0.36
INDIA INDICATOR	1.016	0.861	1.51	1.239	**3.975*** **	**3.762*** **	**3.357*** **	**3.038*** **	**2.823*** **	**2.362** **
ROBUST STD. ERROR	0.96	1.1	1.02	1.126	**0.78**	**0.87**	**0.86**	**1.01**	**0.94**	**1.13**
R^2	0.15	0.112	0.134	0.09	0.18	0.14	0.17	0.12	0.14	0.14

NOTE: The symbol '***' implies significance at 1% level; the symbol '**' implies significance at 5% level; the symbol '*' implies significance at 10% level.

INDIA	INDUSTRIAL SECTOR'S SHARE IN GDP FOR INDIA									
	1970		1980		1990		2000		2010	
SHINDU	WC	C	WC	C	WC	C	WC	C	WC	C
INTERCEPT	(-79.516)***	(-112.879)***	(104.686)***	(-135.114)***	(-118.738)***	(-153.629)***	(-111.453)***	(-149.935)***	(-124.951)***	(-167.526)***
ROBUST STD. ERROR	24.56	31.78	24.74	30.83	25.08	32.09	27.47	35.58	29.09	38.41
LNPCGDP	26.414***	35.432***	33.046***	41.439***	37.228***	46.795***	35.746***	46.098***	38.656***	49.78***
ROBUST STD. ERROR	6.63	8.7	6.73	8.56	6.65	8.53	7.2	9.41	7.37	9.77
SQLNPCGDP	(-1.487)***	(-2.024)***	(-1.913)***	(-2.422)***	(-2.215)***	(-2.802)***	(-2.136)***	(-2.767)***	(-2.304)***	(-2.978)***
ROBUST STD. ERROR	0.43	0.57	0.43	0.56	0.41	0.54	0.44	0.59	0.44	0.59
INDIA INDICATOR	0.741	0.464	**3.452** **	2.73	**2.998** **	1.663	(-1.68)	**(-3.454)***	**(-4.124)*** **	**(-6.298)*** **
ROBUST STD. ERROR	1.96	2.36	**1.62**	1.85	**1.4**	1.7	1.58	**1.82**	**1.53**	**1.76**
R^2	0.18	0.25	0.22	0.29	0.23	0.32	0.19	0.26	0.2	0.27

NOTE: The symbol '***' implies significance at 1% level; the symbol '**' implies significance at 5% level; the symbol '*' implies significance at 10% level.

INDIA	AGRICULTURAL SECTOR'S SHARE IN GDP FOR INDIA									
	1970		1980		1990		2000		2010	
SHAG	WC	C	WC	C	WC	C	WC	C	WC	C
INTERCEPT	88.908***	89.306***	81.209***	81.996***	76.228***	77.055***	74.834***	73.471***	69.018***	68.003***
ROBUST STD. ERROR	5.276	5.63	5.01	5.32	5.13	5.64	5.71	5.53	5.68	5.9
LNPCGDP	(-9.219)***	(-9.272)***	(-8.288)***	(-8.423)***	(-7.664)***	(-7.826)***	(-7.467)***	(-7.381)***	(-6.788)***	(-6.722)***
ROBUST STD. ERROR	0.617	0.66	0.58	0.62	0.58	0.66	0.64	0.65	0.62	0.66
SQLNPCGDP										
ROBUST STD. ERROR										
INDIA INDICATOR	**7.029*** **	**6.925*** **	**3.743** **	**3.718** **	0.915	1.059	**(-4.518)*** **	**(-3.7)** **	**(-7.16)*** **	**(-6.604)*** **
ROBUST STD. ERROR	**1.94**	**2.09**	**1.84**	**1.94**	1.75	1.86	**1.78**	**1.61**	**1.47**	**1.44**
R^2	0.68	0.66	0.69	0.69	0.65	0.66	0.65	0.68	0.65	0.65

NOTE: The symbol '***' implies significance at 1% level; the symbol '**' implies significance at 5% level; the symbol '*' implies significance at 10% level.

TABLE A(2): ROBUST ESTIMATION FOR CHINA FOR THE SHARES OF SERVICES, MANUFACTURING, INDUSTRY AND SERVICES FOR THE PERIODS 1970, 1980, 1990, 2000 AND 2010 (I) WHEN COUNTRY SIZE HAS NOT CONTROLLED (WC) AND (II) WHEN COUNTRY SIZE IS CONTROLLED (C)

CHINA	SERVICE SECTOR'S SHARE IN GDP FOR CHINA									
	1970		1980		1990		2000		2010	
SHSERV	WC	C	WC	C	WC	C	WC	C	WC	C
INTERCEPT	7.416	12.892*	11.559**	15.08**	8.45*	11.151**	3.952	7.615	5.594	7.072
ROBUST STD. ERROR	5.42	6.68	5.21	6.48	4.51	5.41	5.14	5.51	4.68	5.19
LNPCGDP	5.53***	4.433***	5.16***	4.403***	5.707***	5.094***	6.227***	5.551***	6.187***	5.814***
ROBUST STD. ERROR	0.73	0.95	0.69	0.91	0.54	0.72	0.6	0.7	0.55	0.65
SQLNPCGDP										
ROBUST STD. ERROR										
CHINA INDICATOR	**(-15.221)*** **	**(-15.2)*** **	**(-10.166)*** **	**(-9.579)*** **	**(-5.267)*** **	**(-4.188)** **	**(-8.808)*** **	**(-7.705)*** **	**(13.224)*** **	**(-11.727)*** **
ROBUST STD. ERROR	**2.05**	**2.28**	**1.81**	**1.99**	**1.52**	**1.58**	**1.43**	**1.43**	**1.11**	**1.27**
R^2	0.31	0.25	0.32	0.26	0.4	0.35	0.44	0.39	0.47	0.43

NOTE: The symbol '***' implies significance at 1% level; the symbol '**' implies significance at 5% level; the symbol '*' implies significance at 10% level.

CHINA	MANUFACTURING SECTOR'S SHARE IN GDP FOR CHINA									
	1970		1980		1990		2000		2010	
SHMANU	WC	C	WC	C	WC	C	WC	C	WC	C
INTERCEPT	(-0.916)	0.225	(-26.823)*	2.035	(-27.587)**	(-27.032)**	(-27.56)*	3.747	(-36.951)**	(-41.983)***
ROBUST STD. ERROR	2.59	3.16	14.22	3.04	11.9	14.36	14.98	2.7	15.69	20.39
LNPCGDP	1.973***	1.784***	9.028**	1.554***	9.303***	9.416***	9.109**	1.316***	11.166***	12.885**
ROBUST STD. ERROR	0.34	0.43	3.8	0.42	3.17	3.87	3.89	0.34	4.02	5.18
SQLNPCGDP			(-0.456)*		(-0.481)**	(-0.51)**	(-0.459)*		(-0.576)**	(-0.712)**
ROBUST STD. ERROR			0.24		0.2	0.25	0.24		0.25	0.31
CHINA INDICATOR	**11.738*** **	**11.545*** **	**18.557*** **	**16.831*** **	**16.521*** **	**16.403*** **	**25.769*** **	**26.59*** **	**27.608*** **	**27.593*** **
ROBUST STD. ERROR	**1.05**	**1.19**	**1.1**	**1.03**	**0.71**	**0.8**	**0.92**	**0.76**	**1.09**	**1.3**
R^2	0.18	0.14	0.2	0.16	0.23	0.22	0.28	0.27	0.27	0.31

NOTE: The symbol '***' implies significance at 1% level; the symbol '**' implies significance at 5% level; the symbol '*' implies significance at 10% level.

CHINA	INDUSTRIAL SECTOR'S SHARE IN GDP FOR CHINA									
	1970		1980		1990		2000		2010	
SHINDU	WC	C	WC	C	WC	C	WC	C	WC	C
INTERCEPT	(-85.348)***	(-121.831)***	(-109.585)***	(-141.096)***	(-118.893)***	(-153.78)***	(-109.969)**	(-148.429)***	(-121.046)**	(-162.802)***
ROBUST STD. ERROR	25.3	34.08	24.5	31.04	25.07	32.11	27.59	35.86	29.24	38.88
LNPCGDP	27.876***	37.697***	34.219***	42.877***	37.239***	46.8***	35.291***	45.621***	37.605***	48.503***
ROBUST STD. ERROR	6.81	9.25	6.7	8.63	6.66	8.54	7.24	9.5	7.4	9.89
SQLNPCGDP	(-1.577)***	(-2.163)***	(-1.981)***	(-2.507)***	(-2.215)***	(-2.801)***	(-2.105)***	(-2.735)***	(-2.24)***	(-2.898)***
ROBUST STD. ERROR	0.44	0.6	0.43	0.57	0.42	0.54	0.45	0.59	0.44	0.6
CHINA INDICATOR	**9.932*** **	**11.94*** **	**15.127*** **	**15.133*** **	**6.849*** **	**5.094*** **	**10.889*** **	**7.8*** **	**12.88*** **	**9.632*** **
ROBUST STD. ERROR	**2.84**	**3.64**	**1.75**	**2.01**	**1.39**	**1.67**	**1.93**	**2.32**	**1.97**	**2.43**
R^2	0.18	0.26	0.23	0.3	0.23	0.31	0.19	0.26	0.21	0.27

NOTE: The symbol '***' implies significance at 1% level; the symbol '**' implies significance at 5% level; the symbol '*' implies significance at 10% level.

CHINA	AGRICULTURAL SECTOR'S SHARE IN GDP FOR CHINA									
	1970		1980		1990		2000		2010	
SHAG	WC	C	WC	C	WC	C	WC	C	WC	C
INTERCEPT	88.275***	88.48***	81.353***	82.179***	76.315***	77.163***	74.810***	73.44***	68.792***	67.698***
ROBUST STD. ERROR	5.04	5.56	5.04	5.35	5.11	5.62	5.67	5.48	5.65	5.85
LNPCGDP	(-9.143)***	(-9.17)***	(-8.304)***	(-8.443)***	(-7.673)***	(-7.838)***	(-7.462)***	(-7.374)***	(-6.762)***	(-6.685)***
ROBUST STD. ERROR	0.59	0.65	0.58	0.63	0.58	0.66	0.63	0.64	0.62	0.66
SQLNPCGDP										
ROBUST STD. ERROR										
CHINA INDICATOR	**12.974*** **	**12.904*** **	1.453	1.383	(-0.686)	(-0.523)	**(-6.326)*** **	**(-5.577)*** **	**(-5.888)*** **	**(-5.405)*** **
ROBUST STD. ERROR	**2.18**	**2.42**	1.97	2.08	1.66	1.76	**1.38**	**1.24**	**0.91**	**0.9**
R^2	0.68	0.66	0.69	0.69	0.65	0.66	0.65	0.68	0.64	0.65

NOTE: The symbol '***' implies significance at 1% level; the symbol '**' implies significance at 5% level; the symbol '*' implies significance at 10% level.

TABLE A(3): BOOTSTRAPPING ESTIMATION FOR INDIA FOR THE SHARES OF SERVICES, MANUFACTURING, INDUSTRY AND SERVICES FOR THE PERIODS 1970, 1980, 1990, 2000 AND 2010 (I) WHEN COUNTRY SIZE HAS NOT CONTROLLED (WC) AND (II) WHEN COUNTRY SIZE IS CONTROLLED (C)

INDIA	SERVICE SECTOR'S SHARE IN GDP FOR INDIA									
	1970		1980		1990		2000		2010	
SHSERV	WC	C	WC	C	WC	C	WC	C	WC	C
INTERCEPT	6.437	11.568	11.018**	14.386**	8.27*	10.926**	3.388	6.928	5.037	6.419
BOOT. STD. ERROR	5.678	7.167	5.241	5.923	4.372	5.242	4.846	5.304	4.75	5.536
LNPCGDP	5.647***	4.593***	5.221***	4.483***	5.726***	5.117***	6.281***	5.616***	6.229***	5.86***
BOOT. STD. ERROR	0.741	0.993	0.677	0.809	0.534	0.692	0.56	0.695	0.562	0.674
SQLNPCGDP										
BOOT. STD. ERROR										
INDIA INDICATOR	**(-4.792)*** **	**(-4.035)** **	**(-3.044)***	(-2.238)	(-1.624)	(-0.63)	**6.159*** **	**6.836*** **	**8.844*** **	**10.02*** **
BOOT. STD. ERROR	**1.925**	**2.051**	**1.739**	1.853	1.543	1.7	**1.629**	**1.505**	**1.332**	**1.403**
R^2	0.31	0.234	0.317	0.26	0.4	0.35	0.44	0.39	0.47	0.43

NOTE: The symbol '***' implies significance at 1% level; the symbol '**' implies significance at 5% level; the symbol '*' implies significance at 10% level.

INDIA	MANUFACTURING SECTOR'S SHARE IN GDP FOR INDIA									
	1970		1980		1990		2000		2010	
SHMANU	WC	C	WC	C	WC	C	WC	C	WC	C
INTERCEPT	0.021	1.418	1.157	3.48	(-26.723)**	(-26.307)*	(-31.42)**	(-28.148)	(-44.517)**	(-53.35)**
BOOT. STD. ERROR	2.7	3.596	3.461	3.385	10.818	14.419	15.2	20.122	19.0001	24.55
LNPCGDP	1.862***	1.639***	1.751***	1.388***	9.175***	9.35**	10.219***	9.794*	13.137***	15.822**
BOOT. STD. ERROR	0.35	0.477	0.437	0.436	2.878	3.899	3.967	5.274	4.913	6.24
SQLNPCGDP					(-0.477)***	(-0.511)**	(-0.531)**	(-0.533)	(-0.695)**	(-0.889)**
BOOT. STD. ERROR					0.179	0.249	0.245	0.326	0.301	0.375
INDIA INDICATOR	1.016	0.861	1.51	1.239	**3.975*** **	**3.762*** **	**3.357*** **	**3.038*** **	**2.823*** **	**2.362** **
BOOT. STD. ERROR	0.953	1.143	1.178	1.15	**0.745**	**0.952**	**0.827**	**1.003**	**1.091**	**1.154**
R^2	0.15	0.112	0.134	0.09	0.18	0.14	0.17	0.12	0.14	0.14

NOTE: The symbol '***' implies significance at 1% level; the symbol '**' implies significance at 5% level; the symbol '*' implies significance at 10% level.

INDIA	INDUSTRIAL SECTOR'S SHARE IN GDP FOR INDIA									
	1970		1980		1990		2000		2010	
SHINDU	WC	C	WC	C	WC	C	WC	C	WC	C
INTERCEPT	(-79.516)***	(-112.879)***	(104.686)***	(-135.114)***	(-118.738)***	(-153.629)***	(-111.453)***	(-149.935)***	(-124.951)***	(-167.526)***
BOOT. STD. ERROR	24.656	35.587	24.304	29.375	25.6	33.283	28.645	33.9	29.205	30.956
LNPCGDP	26.414***	35.432***	33.046***	41.439***	37.228***	46.795***	35.746***	46.098***	38.656***	49.78***
BOOT. STD. ERROR	6.737	9.667	6.568	8.164	7.225	8.979	7.55	8.948	7.39	7.878
SQLNPCGDP	(-1.487)***	(-2.024)***	(-1.913)***	(-2.422)***	(-2.215)***	(-2.802)***	(-2.136)***	(-2.767)***	(-2.304)***	(-2.978)***
BOOT. STD. ERROR	0.437	0.635	0.425	0.545	0.453	0.569	0.466	0.558	0.443	0.455
INDIA INDICATOR	0.741	0.464	**3.452** **	2.73	**2.998** **	1.663	(-1.68)	**(-3.454)***	**(-4.124)*** **	**(-6.298)*** **
BOOT. STD. ERROR	1.771	2.431	**1.558**	1.856	**1.477**	1.773	1.487	**1.867**	**1.607**	**1.867**
R^2	0.18	0.25	0.22	0.29	0.23	0.32	0.19	0.26	0.2	0.27

NOTE: The symbol '***' implies significance at 1% level; the symbol '**' implies significance at 5% level; the symbol '*' implies significance at 10% level.

INDIA	AGRICULTURAL SECTOR'S SHARE IN GDP FOR INDIA									
	1970		1980		1990		2000		2010	
SHAG	WC	C	WC	C	WC	C	WC	C	WC	C
INTERCEPT	88.908***	89.306***	81.209***	81.996***	76.228***	77.055***	74.834***	73.471***	69.018***	68.003***
BOOT. STD. ERROR	5.276	6.031	4.955	4.802	4.81	6.078	5.373	5.958	5.781	5.569
LNPCGDP	(-9.219)***	(-9.272)***	(-8.288)***	(-8.423)***	(-7.664)***	(-7.826)***	(-7.467)***	(-7.381)***	(-6.788)***	(-6.722)***
BOOT. STD. ERROR	0.617	0.702	0.583	0.562	0.554	0.718	0.597	0.695	0.637	0.629
SQLNPCGDP										
BOOT. STD. ERROR										
INDIA INDICATOR	**7.029*** **	**6.925*** **	**3.743** **	**3.718** **	0.915	1.059	**(-4.518)*** **	**(-3.7)** **	**(-7.16)*** **	**(-6.604)*** **
BOOT. STD. ERROR	**1.94**	**2.268**	**1.822**	**1.78**	1.605	1.922	**1.68**	**1.747**	**1.465**	**1.368**
R^2	0.68	0.66	0.69	0.69	0.65	0.66	0.65	0.68	0.65	0.65

NOTE: The symbol '***' implies significance at 1% level; the symbol '**' implies significance at 5% level; the symbol '*' implies significance at 10% level.

TABLE A(4): BOOTSTRAPPING ESTIMATION FOR CHINA FOR THE SHARES OF SERVICES, MANUFACTURING, INDUSTRY AND SERVICES FOR THE PERIODS 1970, 1980, 1990, 2000 AND 2010 (I) WHEN COUNTRY SIZE HAS NOT CONTROLLED (WC) AND (II) WHEN COUNTRY SIZE IS CONTROLLED (C)

CHINA	SERVICE SECTOR'S SHARE IN GDP FOR CHINA									
	1970		1980		1990		2000		2010	
SHSERV	WC	C	WC	C	WC	C	WC	C	WC	C
INTERCEPT	7.416	12.892*	11.559**	15.08**	8.45*	11.151**	3.952	7.615	5.594	7.072
BOOT. STD. ERROR	5.179	7.798	4.96	6.465	4.655	5.064	5.323	5.319	4.741	5.148
LNPCGDP	5.53***	4.433***	5.16***	4.403***	5.707***	5.094***	6.227***	5.551***	6.187***	5.814***
BOOT. STD. ERROR	0.708	1.096	0.635	0.869	0.559	0.659	0.616	0.692	0.557	0.625
SQLNPCGDP										
BOOT. STD. ERROR										
CHINA INDICATOR	**(-15.221)*** **	**(-15.2)*** **	**(-10.166)*** **	**(-9.579)*** **	**(-5.267)*** **	**(-4.188)** **	**(-8.808)*** **	**(-7.705)*** **	**(13.224)*** **	**(-11.727)*** **
BOOT. STD. ERROR	**2.007**	**2.622**	**1.788**	**2.167**	**1.594**	**1.647**	**1.406**	**1.395**	**1.103**	**1.194**
R^2	0.31	0.25	0.32	0.26	0.4	0.35	0.44	0.39	0.47	0.43

NOTE: The symbol '***' implies significance at 1% level; the symbol '**' implies significance at 5% level; the symbol '*' implies significance at 10% level.

CHINA	MANUFACTURING SECTOR'S SHARE IN GDP FOR CHINA									
	1970		1980		1990		2000		2010	
SHMANU	WC	C	WC	C	WC	C	WC	C	WC	C
INTERCEPT	(-0.916)	0.225	(-26.823)*	2.035	(-27.587)**	(-27.032)**	(-27.56)*	3.747	(-36.951)**	(-41.983)***
BOOT. STD. ERROR	2.703	3.191	14.355	3.192	13.186	12.779	15.455	2.478	16.761	21.031
LNPCGDP	1.973***	1.784***	9.028**	1.554***	9.303***	9.416***	9.109**	1.316***	11.166***	12.885**
BOOT. STD. ERROR	0.352	0.439	3.822	0.438	3.462	3.476	3.991	0.299	4.295	5.355
SQLNPCGDP			(-0.456)*		(-0.481)**	(-0.51)**	(-0.459)*		(-0.576)**	(-0.712)**
BOOT. STD. ERROR			0.241		0.215	0.222	0.2453		0.263	0.323
CHINA INDICATOR	**11.738*** **	**11.545*** **	**18.557*** **	**16.831*** **	**16.521*** **	**16.403*** **	**25.769*** **	**26.59*** **	**27.608*** **	**27.593*** **
BOOT. STD. ERROR	**1.059**	**1.246**	**1.137**	**1.051**	**0.715**	**0.901**	**0.879**	**0.725**	**1.169**	**1.463**
R^2	0.18	0.14	0.2	0.16	0.23	0.22	0.28	0.27	0.27	0.31

NOTE: The symbol '***' implies significance at 1% level; the symbol '**' implies significance at 5% level; the symbol '*' implies significance at 10% level.

CHINA	INDUSTRIAL SECTOR'S SHARE IN GDP FOR CHINA									
	1970		1980		1990		2000		2010	
SHINDU	WC	C	WC	C	WC	C	WC	C	WC	C
INTERCEPT	(-85.348)***	(-121.831)***	(-109.585)***	(-141.096)***	(-118.893)***	(-153.78)***	(-109.969)***	(-148.429)***	(-121.046)***	(-162.802)***
BOOT. STD. ERROR	31.218	35.386	25.001	30.465	25.554	32.76	27.066	37.559	30.174	36.596
LNPCGDP	27.876***	37.697***	34.219***	42.877***	37.239***	46.8***	35.291***	45.621***	37.605***	48.503***
BOOT. STD. ERROR	8.245	9.573	6.78	8.486	6.757	8.762	7.093	10.016	7.559	9.284
SQLNPCGDP	(-1.577)***	(-2.163)***	(-1.981)***	(-2.507)***	(-2.215)***	(-2.801)***	(-2.105)***	(-2.735)***	(-2.24)***	(-2.898)***
BOOT. STD. ERROR	0.523	0.622	0.438	0.564	0.421	0.551	0.435	0.627	0.451	0.56
CHINA INDICATOR	**9.932*** **	**11.94*** **	**15.127*** **	**15.133*** **	**6.849*** **	**5.094*** **	**10.889*** **	**7.8*** **	**12.88*** **	**9.632*** **
BOOT. STD. ERROR	**3.502**	**3.794**	**1.777**	**1.986**	**1.416**	**1.821**	**1.847**	**2.554**	**1.938**	**2.484**
R^2	0.18	0.26	0.23	0.3	0.23	0.31	0.19	0.26	0.21	0.27

NOTE: The symbol '***' implies significance at 1% level; the symbol '**' implies significance at 5% level; the symbol '*' implies significance at 10% level.

CHINA	AGRICULTURAL SECTOR'S SHARE IN GDP FOR CHINA									
	1970		1980		1990		2000		2010	
SHAG	WC	C	WC	C	WC	C	WC	C	WC	C
INTERCEPT	88.275***	88.48***	81.353***	82.179***	76.315***	77.163***	74.810***	73.44***	68.792***	67.698***
BOOT. STD. ERROR	5.507	5.77	4.975	6.126	5.083	5.73	5.646	5.188	5.49	5.734
LNPCGDP	(-9.143)***	(-9.17)***	(-8.304)***	(-8.443)***	(-7.673)***	(-7.838)***	(-7.462)***	(-7.374)***	(-6.762)***	(-6.685)***
BOOT. STD. ERROR	0.642	0.681	0.586	0.705	0.571	0.671	0.624	0.608	0.605	0.655
SQLNPCGDP										
BOOT. STD. ERROR										
CHINA INDICATOR	**12.974*** **	**12.904*** **	1.453	1.383	(-0.686)	(-0.523)	**(-6.326)*** **	**(-5.577)*** **	**(-5.888)*** **	**(-5.405)*** **
BOOT. STD. ERROR	**2.388**	**2.473**	1.927	2.411	1.663	1.742	**1.394**	**1.137**	**0.851**	**0.858**
R^2	0.68	0.66	0.69	0.69	0.65	0.66	0.65	0.68	0.64	0.65

NOTE: The symbol '***' implies significance at 1% level; the symbol '**' implies significance at 5% level; the symbol '*' implies significance at 10% level.

Method I: Bootstrapping Method: It provides a way to obtain such measures when no formula is otherwise available or when available formulas make inappropriate assumptions. To illustrate bootstrapping, suppose that you have a dataset containing N observations and an estimator that, when applied to the data, produces certain statistics. You draw, with replacement, N observations from the N-observation dataset. In this random drawing, some of the original observations will appear once, some more than once, and some not at all. Using the resampled dataset, you apply the estimator and collect the statistics. This process is repeated many times; each time, a new random sample is drawn and the statistics are recalculated. This process builds a dataset of replicated statistics. From these data, you can calculate the standard error by using the standard formula for the sample standard deviation or bootstrap standard error

$$bse(\hat{\theta}) = \left[\frac{1}{(m-1)} \sum_{b=1}^{m} (\hat{\theta}(b) - \bar{\hat{\theta}})^2 \right]^{\frac{1}{2}}$$

Where $\hat{\theta}$ (b) is is the statistic calculated using the ith bootstrap sample and 'm' is the number of replications. This formula gives an estimate of the standard error of the statistic, according to Hall and Wilson (1991). Although the average, $\bar{\hat{\theta}}$, of the bootstrapped estimates is used in calculating the standard deviation, it is not used as the estimated value of the statistic itself. Instead, the original observed value of the statistic, is used, meaning the value of the statistic computed using the original N observations. Generally, replications on the order of 1,000 produce very good estimates, but only 50–200 replications are needed for estimates of standard errors. See Poi (2004) for a method to choose the number of bootstrap replications.

Method II: Robust Estimation:

(i) The OLS variance estimator is-

$$V_{OLS} = s^2 * (X'X)^{-1} \quad \text{where } s^2 = \left[\frac{1}{(N-k)} \sum_{i=1}^{N} u_i \right]$$

(ii) The Robust variance estimator is-

$$V_{ROB} = (X'X)^{-1} * \left[\sum_{i=1}^{N} (u_i * x_i)' * (u_i * x_i) \right] * (X'X)^{-1}$$

Interpreting a difference between (i) the OLS estimator and (ii) the Robust estimator is tricky. In (1) the squared residuals are summed, but in (2) the residuals are multiplied by the x's and then "squared" and summed. Hence, any difference between them has to do with correlations between the residuals and the x's. If big (in absolute value) e_i are paired with big x_i, then the robust variance estimate will be bigger than the OLS estimate. If, on the other hand, the robust variance estimate is smaller than the OLS estimate, what's happening is not clear at all but has to do with some odd correlations between the residuals and the x's. If the OLS model is true, the residuals should, of course, be uncorrelated with the x's. Indeed, if all the assumptions of the OLS model are true, then the expected values of (i) the OLS estimator and (ii) the robust estimator are approximately the same when the default multiplier is used. So, if the robust estimates are just a little smaller than the OLS estimates, it may be that the OLS assumptions are true and you are seeing a bit of random variation. If the robust estimates are much smaller than the OLS estimates, then either you are seeing a lot of random variation (which is possible, but unlikely) or else there is something odd going on between the residuals and the x's.

TABLE A(5): LEONTIEF INVERSE MATRIX FOR THE INDIAN ECONOMY:

LEONTIEF INVERSE MATRIX 1973-74				
	1	2	3	4
A	1.22121507	0.31209	0.132193	0.054546
I	0.090577	1.53149	0.183663	0.239861
S1	0.03552873	0.20015	1.158516	0.076208
S2	0.00164881	0.02269	0.012208	1.008796
LEONTIEF INVERSE MATRIX 1993-94				
	1	2	3	4
A	1.18834255	0.15567	0.062866	0.038583
I	0.18261504	1.79794	0.334247	0.254788
S1	0.11474492	0.35125	1.209319	0.111991
S2	0.00890349	0.0434	0.052069	1.023746
LEONTIEF INVERSE MATRIX 2007-08				
	1	2	3	4
A	1.25874705	0.1547	0.078477	0.016459
I	0.23272848	2.07642	0.420882	0.165218
S1	0.15902196	0.38458	1.245178	0.093434
S2	0.00820524	0.04311	0.026826	1.051615