Productivity in Manufacturing Sector: A Comparative View of India and China

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1. Introduction

In the recent years, Indian industry and manufacturing sector have started growing at rates higher than those witnessed in the past. This has enthused optimism in both industry captains as well as in policy makers. The concerns expressed earlier regarding the low growth rates of commodity sectors (viz., agriculture and industry) still remain due to problems witnessed by the agricultural sector in the recent past. However, the one of the welcome signs is the upsurge of industrial growth in the Indian economy. The questions being asked now are as follows. Is this growth experience sustainable? Is it due to increased application of inputs or due to productivity growth? How is India placed vis-à-vis China?

The objective of this paper is to highlight the differences in the structure of the Indian and Chinese economy and to present the empirical evidence on the growth of productivity in the two economies. The hope is that the content of the paper will throw some light on the questions raised above.

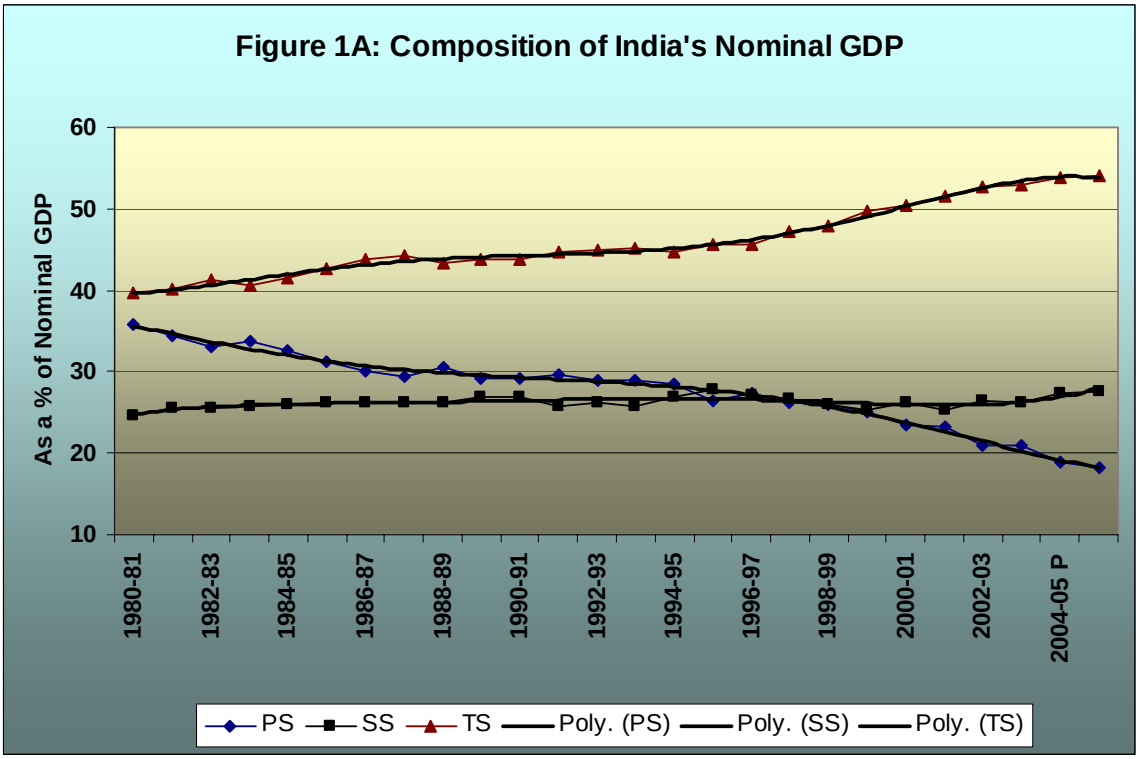
The paper is organized as follows. We present the growth evidence for India and China in Section 2. In Section 3, we present the empirical evidence on estimates of productivity in India and China. Section 4 presents the conclusions emanating from the study and Section 5 highlights the limitations of the study and the scope for future work.

2. India and China: A Comparative View of the Economy

The facts pertaining to the composition of nominal GDP (Figure 1A) in India are as follows. The share of primary sector (PS) has fallen from about 35.7 % (1980-81) to about 18.3 % (2005-06). The share of secondary sector (SS) has increased from about 24.7 % (1980) to just about 27.6 % (2005-06)[1]. The share of tertiary sector (TS) has increased from about 39.6 % (1980-81) to about 54.1 % (2005-06). The share of primary sector has fallen at the rate of 2.2 % per annum. The share of secondary and tertiary

[1] See Appendix 1 for the classification of primary, secondary and tertiary sectors. The definitions used in official statistics in the two countries differ marginally. In order to maintain the comparability, we have used the Chinese classification and readjusted the Indian data wherever required.

sectors increased at the rate of 0.2 and 1.2 % per annum. In other words, though the decline in the contribution of the primary sector to nominal GDP has been substantial, this has been picked up almost entirely by the tertiary sector.



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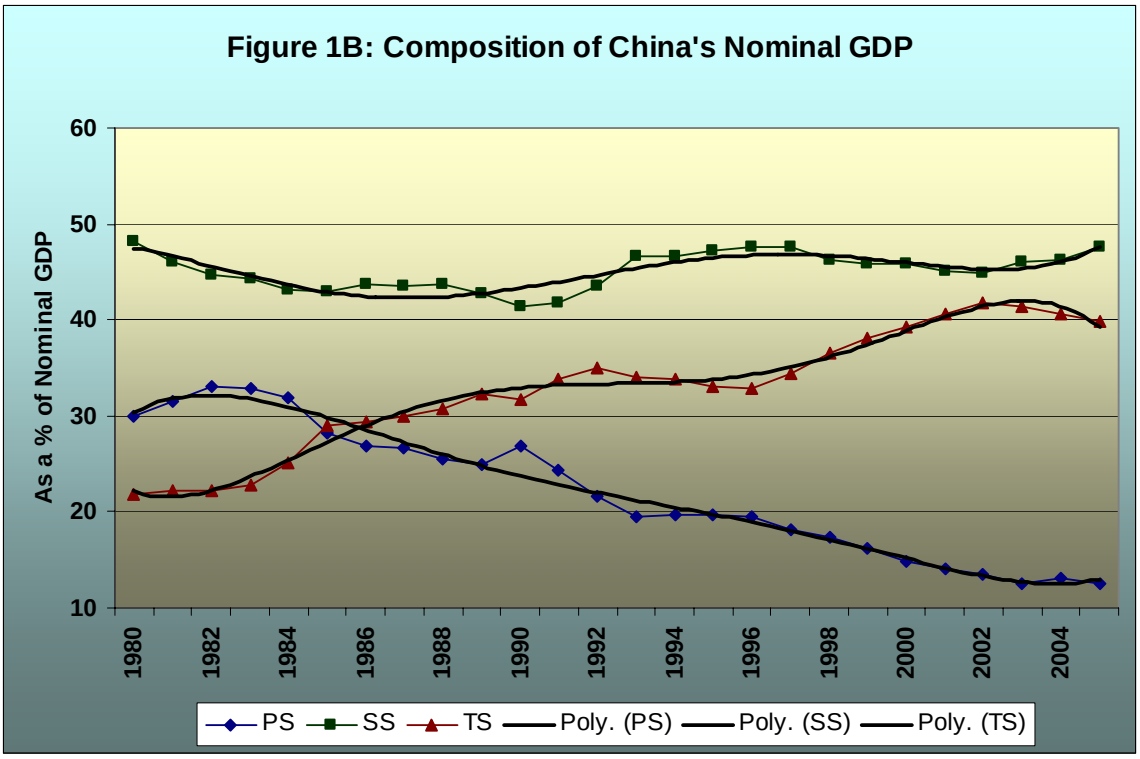
As regards China (Figure 1B), the share of primary sector share of primary sector in 1980 was about 30 percent and it has fallen to about 12.6 % in 2005. The corresponding figures for the secondary sector are 48.2 and 47.5. As against it, the share of tertiary sector has increased from about 22 percent to 40 % over the same period. In other words, a predominant industrial sector, declining contribution of primary sector which is compensated by the rising contribution of service sector have been the characteristics of the Chinese growth process.

The sectoral composition of China's national income has followed the conventional path and the industrial sector is the most predominant sector in China. Its contribution is slightly less than twice of the corresponding figure for India.



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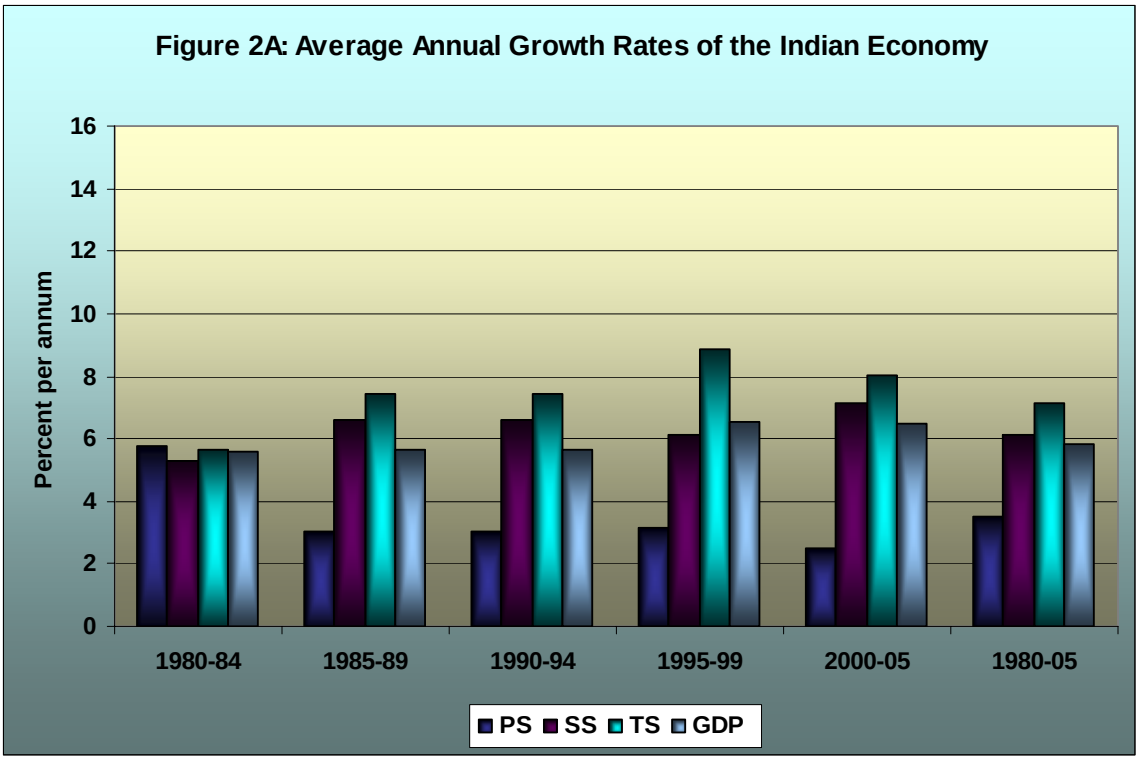
In Figures 2A and 2B, we highlight the sectoral growth performance of the Chinese economy. During the entire period of 1980-2005, the Indian economy has grown at an annual average rate of 5.8 percent per annum. The corresponding figure for the Chinese economy is 9.8 percent per annum. India's primary sector has grown at the rate of about 3.5 % per annum, whereas, the corresponding figure for the China is 4.6 % p.a. The secondary sector in Indian grew at the rate of about 6 % p.a., whereas, the corresponding figu re for China is 11.5 % p.a. The growth of tertiary sector in India was about 7 % p.a., whereas, this sector grew in China at the rate of about 11.% p.a. In other words, growth of each of the three sectors mentioned above has been at a higher rate in China as compared to the corresponding growth rates of these sectors witnessed by the India. However, the maximum difference can be seen in the growth of the secondary sector.



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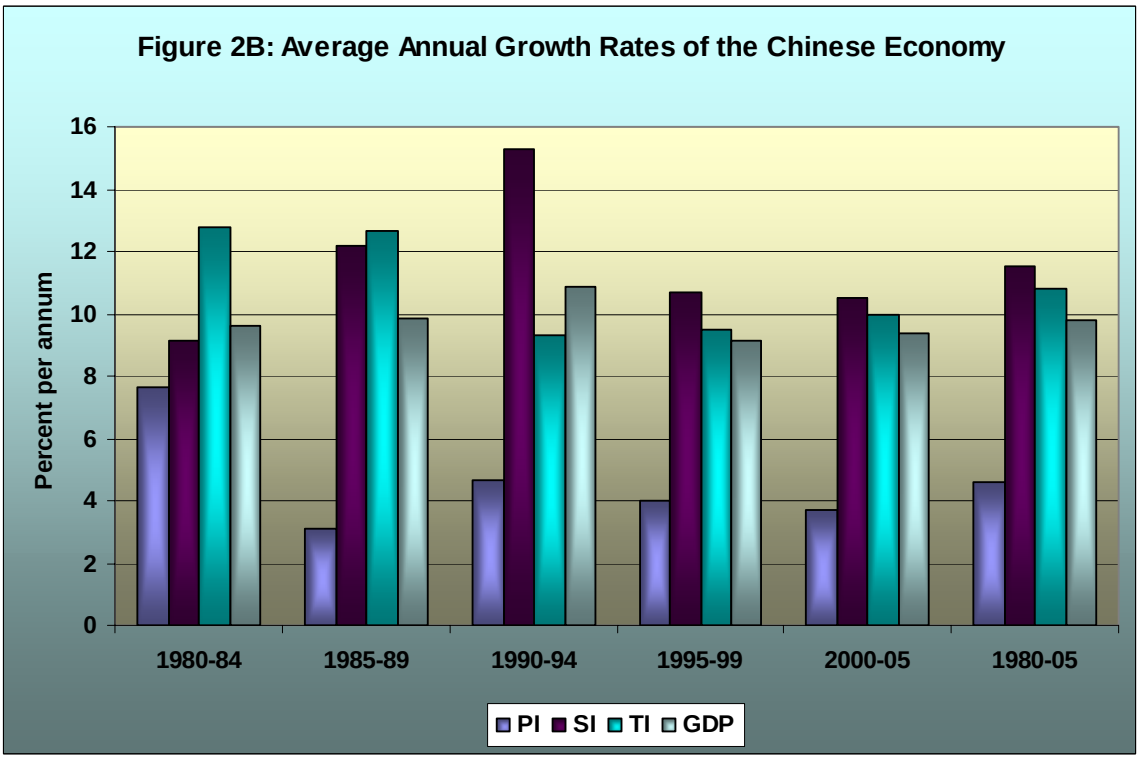

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3. India and China: A Comparison of Productivity in Manufacturing Sector

The most recent empirical evidence available on productivity growth in India and China are in the two studies by Bosworth and Collins (2007) and Bosworth, Collins and Virmani (2007). It can be seen from Table 1 that the rate of growth of output of Industry in China has been consistently much higher than that witnessed by the Indian industry. As regards, employment growth, both the economies were more or less comparable if we take the entire period of 1978-04. However, China has done much better in terms of employment growth during the first sub-period, i.e., during 1978-93, whereas, India seems to have fared much better during the second sub-period, i.e., during 1993-04. The employment growth rate for India is almost thrice that of China. Productivity of labour in Chinese industry has been consistently higher than for the Indian Industry and in the second sub-period, the former is almost thrice of that of India. In other words, labour productivity in China in the last decade has been achieved by rationalization of labour force. The contribution of total factor productivity is consistently higher for China as compared to that for India.

Table 1. Growth and Productivity of Industry: India versus China

Period	Country	Output	Employment	Output per Worker	Contribution of:		
					Physical Capital	Education	Factor Productivity
1978-04	India	5.9	3.4	2.5	1.5	0.3	0.6
	China	10	3.1	7.0	2.2	0.2	4.4
1978-93	India	5.4	3.3	2.1	1.4	0.4	0.3
	China	9.3	4.4	4.9	1.5	0.2	3.1
1993-04	India	6.7	3.6	3.1	1.7	0.3	1.1
	China	11.0	1.2	9.8	3.2	0.2	6.2

Source: Bosworth and Collins (2007)

Table 2. Growth and Productivity of Indian Industry and Manufacturing Sector

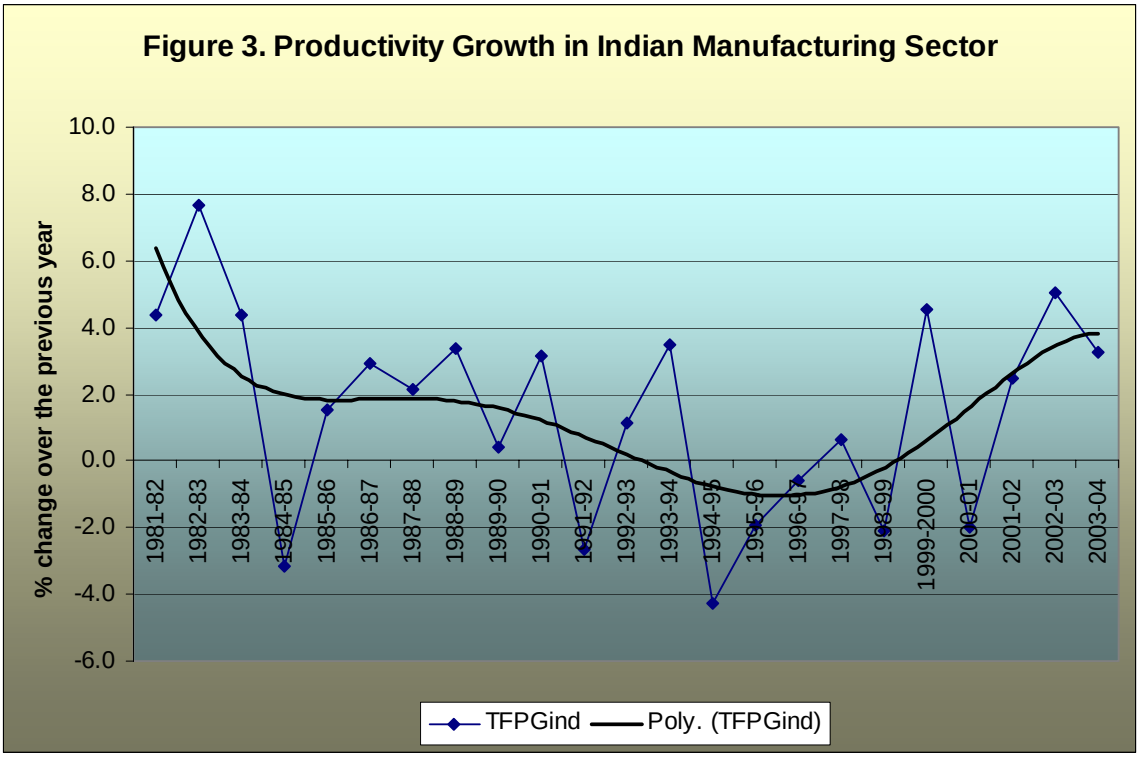
Industry (Inclusive of Manufacturing)						
Period	Output	Employment	Output per Worker	Contribution of:		
				Physical Capital	Education	Factor Productivity
1960-04	5.6	3.3	2.3	1.6	0.3	0.3
1960-80	4.7	3.1	1.6	1.8	0.3	-0.4
1980-04	6.4	3.5	2.9	1.6	0.3	1.0
1960-73	4.7	2.3	2.4	2.3	0.2	-0.1
1973-83	5.2	4.5	0.7	1.1	0.3	-0.8
1983-93	6.0	2.9	3.1	1.3	0.3	1.4
1993-99	6.9	2.4	4.5	3.0	0.5	1.0
1999-04	6.4	5.5	0.9	-0.1	0.2	0.9
Manufacturing						
1960-04	5.7	2.6	3.1	1.8	0.3	0.9
1960-80	4.6	2.7	2.0	1.5	0.3	0.2
1980-04	6.6	2.6	4.0	2.1	0.4	1.5
1960-73	4.9	1.5	3.4	2.1	0.2	1.1
1973-83	5.3	4.3	1.0	1.0	0.4	-0.3
1983-93	6.0	2.1	3.9	1.3	0.4	2.1
1993-99	7.2	1.7	5.5	4.6	0.6	0.3
1999-04	6.4	4.4	2.0	0.4	0.3	1.4

Source: Bosworth, Collins and Virmani (2007)

It can be seen from Table 2 that the contribution of productivity to growth in India has been rather low in India. IT was highest during the period 1983-93 and it is only in the recent period that the reversal from extremely low growth of factor productivity is taking place.

Following the methodology discussed in Trivedi (2004), factor productivity growth (TFPG) has been estimated for the Indian manufacturing sector (using the ASI data). These estimates use the Input-output Table for 1998-99 for compiling input prices during the post 1998-99 period, which are later used for converting nominal output into real output. The trend in TFPG is presented in Figure 3. We find that TFPG was 1.3 % p.a. during 1983-93, which not only registered a decline, but became negative during

1993-99. However, the recent decade has been a decade of much better performance as compared with the past record of TFPG for the Indian manufacturing sector.



Source: Author's estimates

4. Summary and Conclusions

It can be seen from the above sections that the growth of Indian industry and manufacturing sector has been much higher in the recent years. We have also seen that there has been an upturn in productivity growth rate of manufacturing sector in India (albeit with fluctuations, as seen in Figure 3). However, both production and productivity growth rates in India have been rather moderate as compared to that in China. A higher growth is sustainable if it is mainly due to productivity upsurge. What we see in the Indian context is that productivity growth has risen sharply, but from a low and negative growth rate witnessed during 1983-93 and 1993-99, respectively. This calls for some optimism, though not jubilation. The Chinese growth has been higher and her productivity performance of manufacturing sector has been impressive as well. However, the questions are being raised regarding the sustainability of growth process from

environmental perspective, besides those emanating from the arguments of diminishing returns and continued availability of factor inputs.

5. Limitations of the Study and the scope for Future Work

The questions have been raised about the reliability of data on Chinese Statistics. We have not made any such adjustments in data in presenting the background material in Section 2 and productivity estimates for China have been taken from other studies. Hence, empirical evidence presented in this study on China is conditional to the assumptions made in these studies, such as, constant returns to scale, the constant shares of labour and capital in national income across the two countries, the constant rate of return on education, etc.

We hope to subject the data to more flexible assumptions, such as variable returns to scale, using actual factor shares rather than the benchmarks obtained from cross-country evidence. We also plan to conduct the comparisons at the disaggregated industry levels, which could then enable us to assess competitiveness of specific industries in the two countries.

Appendix 1: Sectoral Classification of National Income in China

Sr. No.	Sector
1	**Primary Industry**
1a	Farming, Forestry, Animal Husbandry and Fishing
2	**Secondary Industry**
2a	Industry
2ai	Mining
2aii	Manufacturing
2aiii	Production and Supply of Electricity, Gas and Water
2b	Construction
3	**Tertiary Industry**
3a	Wholesale and Retail Trades
3b	Transport, Storage and Post
3c	Real Estate
3d	Public Management and Social Organizations
3e	Financial Intermediation
3f	Education
3g	Information Transmission, Computer Services and Software
3h	Hotels and Catering Services
3i	Leasing and Business Services
3j	Health, Social Security and Social Welfare
3k	Services to Households and Other Services
3l	Scientific Research, Technical Services,etc.
3m	Culture, Sports and Entertainment
3n	Management of Water Conservancy, Environment, etc.

Note: In India, Construction is included in Service sector, whereas, in China, it is included in the industry sector. As we could not reclassify Chinese data, we have classified Indian data to conform to the Chinese classification for the sake of comparability.

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