



## **Revisiting the Service-led Growth in India Understanding India's service sector productivity growth**

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## Understanding India's service sector productivity growth

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### Abstract

Understanding the drivers of economic growth is hugely beneficial for low income countries like India as it is directly related to improving the living standards of its population. The rapid rise of service sector in India like its developing counterparts in Asia follows the pattern of skipped industrialization and raises concern for sustaining economic growth in India. While the share of services in India's GDP has risen over much of the post-independence period, the economic liberalization in the 1990s paved the way for the emergence of service sector as a key player in India's growth story. The present paper examines the productivity dynamics in service sector at detailed industry level using a carefully developed INDIA KLEMS panel data. Our results suggest that labor productivity in Indian service sector has been growing substantially over decades, and much of this productivity gain is accruing through acceleration in market services labor productivity. This observed productivity gain in the market services, and in particular ICT intense services, might indicate the role of increasing ICT in contributing to labor productivity growth. The labor reallocation effect is positive for the period 1980-2009 and has increased in the 2000s, suggesting a structural transformation which is growth enhancing. The paper also examines the dynamics of total factor productivity in the service sector, measured using KLEMS growth accounting framework. The observed growth pattern in the service sector has not been uniform across all services in India. The performance of market based ICT intensive sectors is impressive especially telecommunications and financial services. However by and large, we find a dominance of capital deepening in accounting for growth.

**Key words:** labor Productivity, resource allocation, services, India

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## 1. Introduction.

Understanding the drivers of economic growth is hugely beneficial for low income countries like India as it is directly related to improving the living standards of its population. Often productivity improvements in manufacturing industries are considered as one of the major sources of growth. This idea is analogous to the traditional structural transformation hypothesis that as a country develops resources move from primary to manufacturing and subsequently to services (see Kuznets, 1966). The experience in India, however, seems to suggest that the country has been pioneering a stage of development that defies the conventionally hypothesized structural transformation. Indian economy has been witnessing a service-driven growth, particularly since 1990s, though it still remains in the category of low-middle income emerging countries. While the share of services in India's GDP has risen over much of the post-independence period, there was a marked acceleration in the trend since the early 1990s. Similarly, the relative importance of services sector in employment generation has also increased substantially. Moreover, the export share of services has been large and increasing in recent years (Eichengreen and Gupta, 2012). The economic reforms of the 1990s paving the way for trade liberalization along with major policy changes in domestic business environment may have helped the emergence of service sector as a key player in India's growth story. Traditionally, services have been a regulated activity. This was particularly true in areas of banking, insurance and telecommunication, which are among the sectors that witnessed massive improvement in the post-reform period. Further, this sector has evolved as a prominent sector in terms of contribution to national and state incomes, trade flows, FDI and employment.

The emergence of services as the most dynamic sector of the Indian economy has in many ways been a revolution. The most visible and well-known dimension of the take-off in services has been in software and information technology (IT)-enabled services (including call centers, software design, and business process outsourcing), which to some extent also help increase innovation capabilities in the sector (Lema et al, 2012). However, growth in services in India has been much more broad-based than IT (Gordon and Gupta, 2004). There have been many studies looking into India's service-driven economy (Eichengreen and Gupta 2009, 2010), and its sluggish manufacturing. While studies on structural transformation suggest that the observed structural transformation in India has been growth enhancing (McMillan and Rodrik, 2011; Bosworth and Collins, 2008; Vries et al, 2012), evidence on services sector suggest that the observed growth surge is mainly due to higher productivity growth in this sector (Verma, 2012). However, there has hardly been any attempt to explain the observed momentum in the service economy in detail, particularly by looking into how productive the sector is and what are the factors that drive the productivity in this sector. This paper attempts to revisits the "Services led Growth" hypothesis for the Indian economy by undertaking detailed analysis of the service industries in terms of labor productivity and multi factor productivity growth. An attempt is made to explore the factors that drive productivity performances in the service sector. Yet another aspect that has been overlooked in the literature is the complementarities between service sector growth and manufacturing performance, which calls for understanding why productivity improvement in the manufacturing sector continues to be slow and low. The examination of the above issues constitutes the core of our paper.

In order to understand the empirics of India's growth performance, we undertake a growth accounting exercise based on the KLEMS production function due to Jorgenson, Gollop and Fraumeni (1987). The gross output production function incorporating Capital (K), Labor (L), Energy (E), Material (M) and Services (S) as inputs allows us to evaluate the relative significance of multi factor productivity growth *vis a vis* input accumulation in accounting for output growth. Using the newly created comprehensive INDIA KLEMS data set for the Indian economy for the period 1980-2010, we compute productivity trends

for the service sector. We analyze sources of labor productivity in 9 sub-sectors of the service economy – trade, hotels and restaurant, transport and storage, post and telecommunication, financial services, public administration, education, health and other services. These 9 sectors are further re-classified into market services and non-market services, within which we also examine ICT intensive and non-ICT service segments separately. Our measure of productivity is based on the gross output approach at industry level as it accurately reflects the contribution of intermediate inputs.

The paper makes a number of contributions to the existing literature. First, in contrast to previous productivity studies in the Indian context, we use more rigorous measures of factor inputs, which will have important consequences for productivity analysis (see OECD, 2001, Productivity manual). Both labor and capital inputs are measured as Tornqvist indices of different types of workers and asset types. Labor input, which is inclusive of self-employment, is measured using five education categories of employment, with the growth of each category being weighted by its relevant cost share. In the case of capital input, previous studies have used a measure of capital stock, often making no adjustment for depreciation of various asset types. Such an approach ignores the importance of heterogeneity in capital asset due to the existence of multiple vintages and various asset types. In our measurement, we use a measure of capital services using 3 different asset types, asset-specific depreciation rates and an external rate of return (see Diewert, 2003; Schreyer, 2002). Our second contribution is in providing a detailed sectoral perspective on India's service sector. Since there is substantial heterogeneity within service sector, and the contribution of different segments of the sector to aggregate service sector growth is substantially different, we examine the productivity dynamics in service sector at detailed industry level using a carefully developed time series data from INDIA KLEMS project. Our detailed focus on several sectors also helps in understanding the respective position of market services as against non-market based services, and ICT using and producing services as against non-ICT services in the overall service sector performance in India. Thirdly, at industry level we use a gross output production function, which includes contribution of intermediate inputs in the production accounts.

The paper is structured as follows. Following the introduction, section 2 provides an overview of service sector in India with a focus on policy as well as regulatory environment and its impact on value added, employment. The methodology and dataset including the construction of variables are outlined in section 3. Trends in productivity in the services sector are analyzed in Section 4. In particular, using a value added framework we decompose the sources of observed labor productivity growth and the role of TFP versus factor inputs is addressed via the gross output based KLEMS framework. Section 5 explores drivers of service sector performance. The final section concludes the paper.

## 2. Service sector in India:

### *The coverage of Service sector: The heterogeneity*

The service sector in India is a heterogeneous group as the activities range from traditional services (barber shops and neighborhood retailing) to those based on new technology and standardization of delivery. Further given, India's quasi federal governance structure, services come under the union list (federal government), the states as well as joint administration of both.<sup>1</sup>

#### **Box 1: Services Sector under different Jurisdictions according to the Constitution of India**

<p style="text-align: center;"><b>UNION LIST</b></p> <p>Telecommunications, postal, broadcasting, financial services (including insurance and banking), national highways, mining services</p> <p style="text-align: center;"><b>STATE LIST</b></p> <p>Health and related services, real estate services, retail, services incidental to agriculture, hunting and forestry</p> <p style="text-align: center;"><b>CONCURRENT LIST</b></p> <p>Professional services (legal, accounting, auditing and book-keeping, taxation, architectural, engineering, integrated engineering, urban planning and landscape architectural, medical and dental services and service provided by midwives, nurses, etc.), education, printing and Publishing, electricity</p>
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Source: Mukherjee, A (2013) Box 1

Further, service sector in India is classified according to National Industrial classification (NIC) 2008. Disaggregated data for many services is not available for India, though different organizations of government of India have been involved in developing the database. The India KLEMS dataset makes an attempt to classify services into 9 sub sectors- namely trade inclusive of wholesale and retail, hotels and restaurants, transport and storage, post and telecommunication, financial services, public administration, defense and social security, education, health and social work and other services. The service sector in India therefore can be classified under two broad heads- market based services and non market services. Further, for each of the market based services, we can list them under ICT intensive and non intensive services.

### ***Policy and Regulatory Environment of Service sector in India***

The rapid rise of service sector in India like its developing counterparts in Asia follows the pattern of skipped industrialization and its rising share in GDP reflects the outcome of pro market reforms in India beginning mid 1980s. The policy reforms which led to privatization, removal of restrictions on FDI and streamlining of procedures of exports as well as imports had important consequences for the emergence of service led "growth" in India beginning 1990s.

<sup>1</sup> For the lists of services under different jurisdictions according to the Constitution of India, see Mukerjee, A (2013)

It is important to understand the business environment that surrounds the different categories of services in India. Alternative views exist for the boom in services in India- industries was tied up in the red tape of “License-Permit-Raj” and relatively unregulated services became a natural outlet for Indian entrepreneurs. Others held that splintering of industrial capacities resulted in growth of service sectors. Services have been critical part of the overall economic liberalization process in India since the mid 1980s. Several sectors like telecommunications, banking & financial services (including insurance) have been beneficiaries of the economic liberalization efforts to attract foreign capital and technology. Other services like health care, trade have been put under automatic route for FDI subject to regulatory requirements. A significant feature of service sector reforms has been the elimination of governmental monopoly and establishment of independent regulatory authority- telecommunications. Reforms in service sector have raised considerable debate; two case to mention being the case of FDI in retail as well as Higher Education Legislation.

The policy environment of services in India, given the nature of different activities can be understood best in terms of (1) general issues and (2) sector specific issues. Issues connected with foreign direct investment (FDI), tariff and taxes; credit and finance form the core of policy for services in India. In addition issues connected with domestic regulation, market access, bilateral and multilateral negotiations are significant policy issues when addressing reforms in service sector in India. The policy environment for services in India is a mix of various domestic policy issues- FDI and disinvestment, tariff connected with imports and taxes in the context of domestic production. As can be observed from the table below, the major issues relating to FDI are (a) whether to allow FDI or not and (b) what is the extent of cap on FDI. FDI in services accounts for almost 22 per cent of total FDI flows in India (2008-09).<sup>2</sup> Major issues connected with FDI are about capping the retail trade to 100 percent. In the Banking and Insurance sectors-entry of foreign firms through partnerships/joint ventures in insurance firms as well allowing FDI in health insurance. In the banking sector, though foreign investment cap of 74 percent is allowed, still issues remain regarding licensing requirements etc. India’s entertainment industry is showing considerable growth however there remain issues with up linking services for news and TV channels and allowing FDI in animation studios etc. Relaxing FDI norms and kind of FDI to be allowed remain significant in sectors like rail and air services.

**Table2. 1: Selected Policies of services in India - A schematic view**

Issues	Policies
FDI	<ul style="list-style-type: none"> <li>- Allowing 100 percent retail trade</li> <li>- Raising FDI cap in Insurance sector ( from 26 per cent) and in Banking ( allowed 74 percent FDI+FII)</li> <li>- 100 percent FDI allowed in Construction</li> <li>- FDI open for entertainment sector- news and current affairs TV channel</li> <li>- FDI in air transport services</li> <li>- FDI for modernization of railways</li> </ul>
Disinvestment	<ul style="list-style-type: none"> <li>— Disinvestment of public sector units both within central and state governments</li> </ul>

<sup>2</sup> The estimates presented above are as per the classification of the Department of Industrial Promotion and Policy, Government of India, which uses a narrow definition of services. If we consider all services, then the percentage would be around 67 percent in 2008-09. ( Economic Survey, Government of India 2012-13)

Issues	Policies
Tariff and Tax	<b>specific sector issues</b> <ul style="list-style-type: none"> <li>– Shipping services( tonnage tax issues, zero rating input services, seafarer taxation issues, customs duty/excise duty exemptions, withholding tax)</li> <li>– Tourism services ) rationalizing tax structure, ATF taxation, state luxury tax, per seat passenger tax, fees for monuments and tax payment modes)</li> <li>– Entertainment Services (tax credit issues)</li> <li>– Health care services (zero tariff for medical equipments; exemptions at state level for capital goods used in hospitals)</li> <li>– Telecommunications (customs bonding, taxability of items between federal and state governments; service tax on IT software)</li> <li>– Air transport services( sales tax issues, import duty of spare parts, turnover tax by airports)</li> <li>– engineering services ( customs and excise duties, stamp duties)</li> </ul> <b>Other related issues</b> <ul style="list-style-type: none"> <li>Clarity on service tax refund policy on input services used <ul style="list-style-type: none"> <li>– Transfer pricing issues</li> <li>– Single return for service tax and excise tax</li> <li>– Reduction of tax deducted at source</li> </ul> </li> </ul>
Credit and Finance	<ul style="list-style-type: none"> <li>– Withholding tax on interest paid on ECB</li> <li>– Issues connected with venture capital funding</li> <li>– Extending dedicated lines of credit</li> </ul>
General issues	<ul style="list-style-type: none"> <li>– Showcasing India's services overseas</li> <li>– Measures for promoting service exports</li> <li>– Standardization of services</li> <li>– Consolidation of service providers in each category</li> <li>– Service portal</li> <li>– Preferential system for overseas investor and government</li> </ul>

*Source: Authors compilation from Prasad and Sathish (2010)*

A major aspect of services liberalization in India has been the elimination of governmental monopoly and establishment of independent regulators (the case of telecom with the setting up of Telecom regulator Authority of India (TRAI) is worth mentioning). Further the enormous disinvestment scope for both central and state governmental public sector firm's forms yet another core of policy environment in India. As is well known, resources freed from these activities can be used for schemes that will yield benefits for macroeconomic health as well as development. The administrative controls of some of the units listed belong to either departments of government of India or come under ministries of government of India<sup>3</sup>. The removal of controls would make these units more competitive and thereby giving more impetus to service growth.

<sup>3</sup> Table 2 of Prasad and Sathish (2010), "Policy for India's Service Sector' Working Paper, Department of Economic Affairs, Ministry of Finance, Government of India covers the list of public sector units likely for disinvestment

Domestic regulations also constitute an important aspect of service sector liberalization in India. Some of the important domestic regulations that are important for policy reforms pertain to sectors such as financial services, transport services, health and education. Health care has no FDI cap, but there remains barrier on foreigners providing medical services for profit. Education services in India come under the jurisdiction of both state and federal governments and there are regulations on setting up of new education services in some fields like medicines etc. In the banking & insurance sector, there is still need for regulatory approvals for routine business matters such as opening of new branches, minimum capitalization norms ( insurance sectors). For movement of goods, coordination issues between multi modal transportation still remains a problem and needs attention. While addressing specific regulation issues which act as barriers to the performances of sectors discussed above are of concern, some regulatory reforms of general nature also needs attention. Important among these are restrictions on the operation of domestic firms with emphasis on laws on road transport/financial services which create fragmented and uncompetitive industry structures and prohibit these firms from functioning efficiently. In India, there are regulators for some services (banking, insurance, telecom and ports), whereas most professional services lack independent regulators resulting in unevenness of standards across professional services.<sup>4</sup> Thus there is a need for a competition policy along with a regulatory body for services. Finally there is a need to repeal gender insensitive laws prohibiting aspects of work.

The final aspect in this section concerns issues connected with inability to access market for India's service exports. The contribution of services to India's trade flows have been on an upward trajectory since 1990s. The share of India in service exports in the world increased from 0.6 per cent in 1990 to around 3 percent in 2009-10. Evidence reflects India's growing competitiveness in service exports and resultantly there has been a shift from traditional services towards business services with ICT being predominant. Despite the impressive performance of services trade in India, it would be correct to point out that exports of services still remain constrained by domestic and external barriers (infrastructure, technical, standards financial) and regulatory aspects. Services trade is generally restricted with the aid of domestic or 'behind the border' regulations as opposed to border measure such as tariffs which are used to restrict goods trade (Chanda and Gupta, 2011)<sup>5</sup>. In case of India for certain services- Financial and business including IT services, legal, engineering, communication services, domestic regulations of specific nature imposed by the US denies market access for these services. Europe and UK also deny market access via regulations (entertainment services, travel and tourism). Finally apart from domestic regulations imposed by countries, huge subsidies levied on domestic goods also act as a regulatory barrier on market access.

In several services, the liberalization and reform process has been an ongoing process of learning through experience amongst different stakeholders- government, private sectors, regulators, foreign firms<sup>6</sup>. Liberalizing and regulating the policy environment could lead to developing a more efficient services sector in India. It is important to bear in mind that many services sector provides crucial inputs

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<sup>4</sup> Prasad and Sathish (2010) argue that lack of a proper all India accredited system legitimizes foreign restrictions. This is particularly true in case of services like Bar Councils of India, Medical, Dental and Nursing Councils of India and Institute of Chartered Accountants of India to name a few.

<sup>5</sup> Chanda and Gupta (2011) focuses on four important producer or intermediate services, namely, banking, telecom, air transport, and maritime transport services in the Indian economy over the 1995-2008 period. The study confirms that though there has been substantial liberalization at the "border", many "behind the border" restrictions still continue and constitute a sizeable share of restrictiveness in these services.

<sup>6</sup> See Chanda and Gupta ('2013) "Services Sector Reforms in India: Updates and Challenges", for an appraisal of economic liberalizations in service sector in India



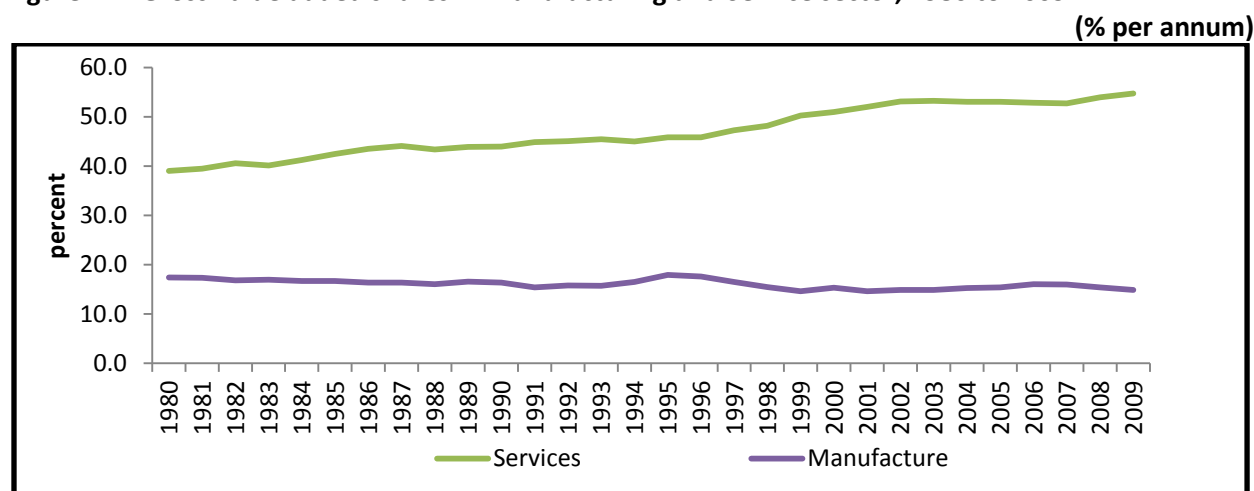
for manufacturing industries and hence more efficient services sector could arrest the manufacturing slide in India and lead to a competitive manufacturing environment. On the other hand, the emergence of quality services could also provide an increase in FDI flows.

### ***Services versus manufacturing in India***

For almost three decades following the adoption of import substitution led development strategy; the contribution of service sector to aggregate GDP remained below agriculture and allied activities. However since 1980s we observe that the service contribution to GDP is on the rise. Further, given the governance structure in India, we also observe that share of services in state gross domestic products of different Indian states have also increased.<sup>7</sup> Therefore India's service has emerged as a leading driver of "growth" in terms of its contribution to several macroeconomic indicators. Still, many observers argue that India's faster growth in services, and its 55 per cent share of GDP, is unnatural in a low income economy.

In India, in terms of structural change hypothesis, it is interesting to look at the contribution of services to GDP *vis-à-vis* the performance of manufacturing. Figure 2.1 clearly points towards the declining share of manufacturing and increasing share of services over time<sup>8</sup>. A closer examination of the 1990s explains the situation. This has often led commentators on India question if the service sector momentum is sustainable and further, if the continued expansion of service sector in India bypassing manufacturing is good for long term macroeconomic health of the economy.

**Figure 2.1: Gross value added shares in Manufacturing and Service sector, 1980 to 2009**



Source: Authors' computation from National Accounts Statistics, Government of India

### ***Services in India: Value added and Employment***

The role of service sector as the driver of India's growth performance leads us to dwell further and examine service sector's contribution to growth and employment in India. Examining table 2.1, we observe that services contribution to economy value added stands at around 55 percent per annum in

<sup>7</sup> Refer to various issues of Economic Survey, Government of India.

<sup>8</sup> It is important to note that unlike many developing countries, India showed considerable resilience to the global economic crisis by recording a growth of 6.7 percent in 2008-09 and service sector being the main driver of this growth by contributing around 88 percent of the observed growth ( Das, Banga and Kumar, 2011)

2009 from around 40 percent at the beginning of 1980s with market based services as the largest component within the aggregate services. Given the wide array of activities included within services, it may be important to note that wholesale and retail trade emerges as the single largest sector in terms of value added share in total services in 2009. Unlike agriculture, services contribution to employment remains low, yet we find from 16 percent share in total employment in 1980, there has been a consistent upward movement as far as “*jobs in service sector*” is concerned. As in the case of value added, we find the employment share in market services (16 per cent) exceeds that of non market services (11 percent).

**Table 2.1 Relative contribution of service sectors to gross value added and employment.**  
(% per annum)

**Panel A: Gross Value Added Shares**

Sector	1980	1990	2000	2009
<b>Total Services</b>	39.05	43.98	50.98	54.72
<b>Market Services</b>	18.63	22.61	27.56	29.83
<b>ICT intensive services</b>	14.04	16.42	20.14	22.03
Trade	10.55	11.66	13.21	15.11
Financial Services	2.94	3.85	5.41	5.44
Post and Telecommunication	0.56	0.91	1.52	1.47
<b>ICT non-intensive services</b>	4.59	6.19	7.42	7.80
Hotels and Restaurants	0.79	0.95	1.32	1.44
Transport and Storage	3.79	5.23	6.10	6.35
<b>Non-market services</b>	20.42	21.37	23.42	24.88
Public Administration and Defense	4.95	5.88	6.52	6.66
Education	2.55	3.13	4.13	3.87
Health and Social Work	0.97	1.24	1.60	1.58
Other services	11.96	11.12	11.16	12.78

**Panel B: Labour employment shares**

Sector	1980	1990	2000	2009
<b>Total Services</b>	16.93	20.04	23.67	27.97
<b>Market Services</b>	8.95	11.55	14.69	16.87
<b>ICT intensive services</b>	6.25	8.05	10.14	11.37
Trade	5.80	7.36	9.23	10.07
Financial Services	0.31	0.51	0.58	0.88
Post and Telecommunication	0.14	0.18	0.33	0.43
<b>ICT non-intensive services</b>	2.70	3.50	4.55	5.51
Hotels and Restaurants	0.80	0.92	1.18	1.37
Transport and Storage	1.90	2.58	3.37	4.14
<b>Non-market services</b>	7.99	8.49	8.99	11.10
Public Administration and Defense	2.75	2.85	2.45	2.20
Education	1.58	1.63	2.18	2.67
Health and Social Work	0.58	0.56	0.73	0.86
Other services	3.07	3.45	3.63	5.37

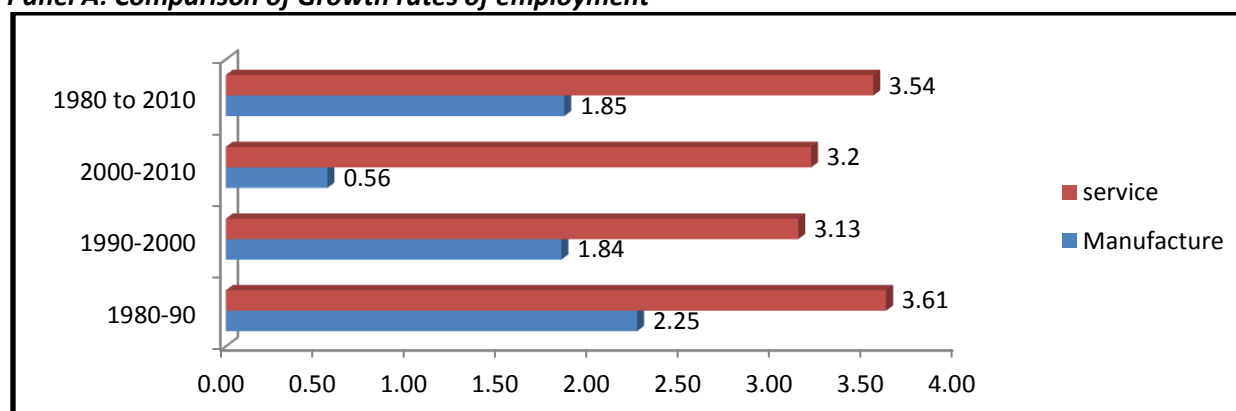
**Source:** Authors' computation from National Accounts Statistics, Government of India

One of the noteworthy features of India's economic growth over the past few decades has been the faster growth of the services sector in comparison with manufacturing. Table 2.2 highlights the growth in value added and employment by decades beginning 1980s. The performance of services leads over manufacturing in all decades. The same holds with respect to manufacturing. The gap between the growth rates of the two sectors offers some interesting observation- in case of growth in value added services have performed better than manufacturing consistently, whereas from the 1990s, the employment generation across services has been more than double in comparison to manufacturing. Two possible explanations can be given for the observed trend. First, it takes several decades for manufacturing performance to respond to changes in the policy environment. Many studies have pointed towards lagged impact of trade liberalization on manufacturing productivity in general and in India (Das, 2005). On the other hand, the 1980s saw the emergence of sizeable middle class and the growing demand for services (Jain and Ninan, 2010).

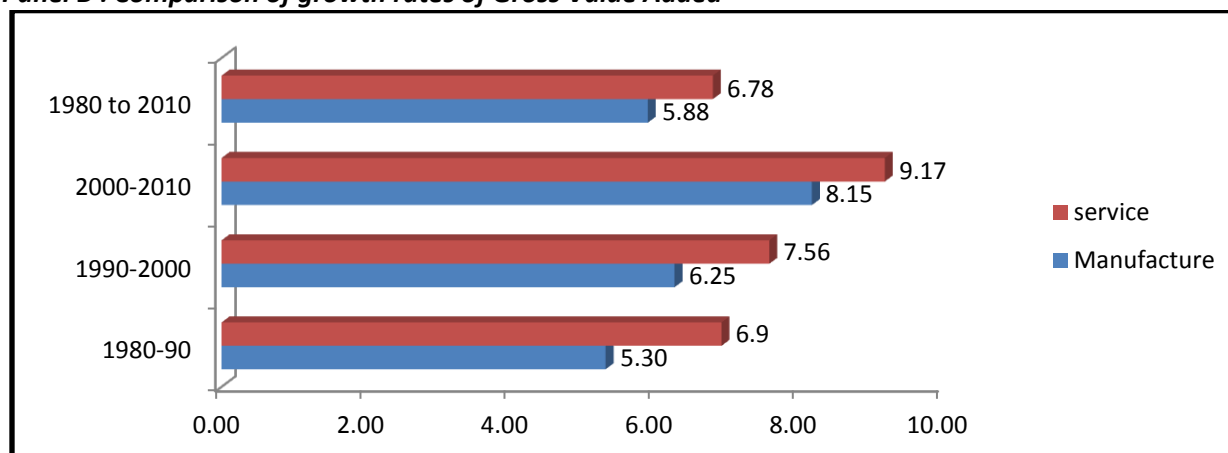
The share of services in overall employment is often seen as a barrier to sustaining service led overall growth for India. This is an area of concern in the context of equity and employment creation.<sup>9</sup> Therefore, we compare the growth rates of services and manufacturing for 3 decades- 1980s, 1990s and 2000s. Figure 2.2 clearly depicts that service sector absorbs more workforce in relation to manufacturing in India. For the period 1980-2010, the respective shares being 3.54 and 1.85 per cents. It is evident from the above that services led manufacturing as far as employment creation goes, however we need to delve beyond these numbers to ascertain the kind and quality of employment that services are generating in India. The nature of employment creation has to keep in mind the level of educational requirements and quality of employment – wages, job security and social protection. Nayyar (2009) argues that generally sub sectors of services in India are providers of both “good” and “bad” employment and prevalence of low quality employment with low educational requirements and vice versa explains the nature of employment in services. In addition, the service-sector is relatively more skill demanding than manufacturing and therefore service-sector is unlikely to be a destination for the millions of low skilled job seekers in India (Ramaswamy et al, 2012).

**Figure 2.2: Comparison of Growth rates between manufacturing and services; 1980 to 2010 (% per annum)**

**Panel A: Comparison of Growth rates of employment**



<sup>9</sup> As per the NSSO report on Employment and Unemployment Situation in India in 2009-10 on the basis of persons in principal and subsidiary statuses, for every 1000 people employed in rural India, 241 are employed in services as against 80 in industrial sector. In case of urban India, the numbers are respectively 683 and 242 respectively. (Economic Survey, Government of India, 2012-13)

**Panel B : Comparison of growth rates of Gross Value Added**

**Source:** Authors' computation from National Accounts Statistics, Government of India

Despite questions being raised about the nature of employment generated in services, it has to be kept in mind that internal and external competition ushered in by trade and industrial policy reforms in manufacturing sub sectors, compels industry to adopt more and more capital intensive technologies<sup>10</sup> and also necessitates more flexibility in labor usage and thus the resultant decline in employment generation over the period 1980-2010.

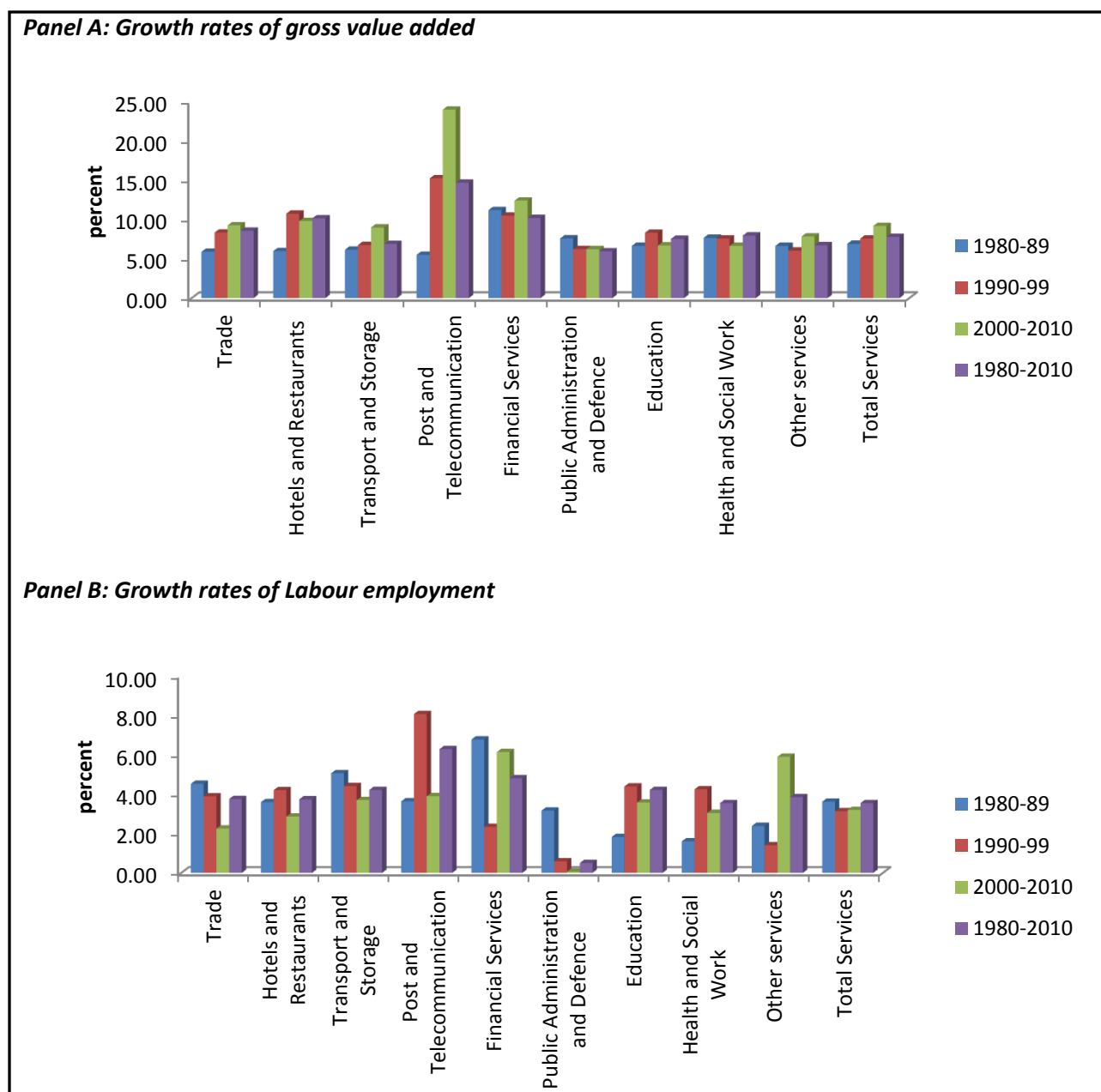
The bottom panel of Figure 2.2 provides a comparison between growth in value added of services and manufacturing sectors. As discussed by several studies, India's service sector growth performance begins from the 1990s, but skeptics have raised doubts about both the quality and sustainability of the increase in service sector activity and its implications for economic development. Looking at the 30 year period from 1980-2010, we find on an average a growth of almost 7 percent per annum. The growth momentum of the 1990s accelerated to an average of 9 per cent per annum in the decade of 2000-2010 and substantiates the role played by services growth in India even during the period of global financial crisis.

### ***Performances of Services- A disaggregated picture***

The overall services growth needs a detailed examination to understand the contribution of different subsectors to the overall performances of services in India. Further, given the heterogeneous nature of services in general, it is important to understand where is the concentration of service sector growth?

<sup>10</sup> A recent study by Sen and Das (2013) has found a decline in labor intensity across labor intensive sectors in Indian manufacturing thereby highlighting the employment implications of post reform growth.

**Figure 2.3: Growth rates of value added and employment, 1980 to 2010 (% per annum)**



**Source:** Authors' computation from National Accounts Statistics, Government of India

We observed from table 2.1 that market services account for more than 50 percent value added and employment share within services in 2009. Trade including wholesale and retail account for more than 15 percent value added share followed by financial services and post and telecommunication. Trade has remained by far the single largest group in terms of value added share throughout the different periods of the study. As regards, employment share, trade followed by financial service emerge as the two leading sectors. Across all sub sectors, we find an increase in employment shares over the successive decades.

We observe from figure 2.3 that service-sector growth is widespread across activities. In accounting for growth in value added in different sectors, we find that post and telecommunication shows the maximum growth (around 15 per cent per annum) for the period 1980-2010. Hotels and restaurants and financial services are the other two sectors to register more than 10 per cent growth for the above period. If we consider the period of 2000-2010, we find that post and telecommunications and financial services exhibiting high growth rates of around 23 per cent and 12 per cent respectively. Amongst the non market services- notably education, health and social work, public administration and defense the growth rates have been around 6 per cent, which is in line with the aggregate services growth of around 6.8 percent per annum for the period 1980-2010.

An appraisal of the different sub sectors shows that the performance of post and telecommunication has been remarkable. The telecommunication liberalization began in 1994 with the private sector being allowed to offer telecom services. Financial services include banking and insurance, with banking being the largest and fastest growing. The reforms in the financial sector saw emergence of private sector banks with a substantial increase in their shares in overall banking over the time period. The performance of hotels and restaurant underlies the fact that tourism contribution of around 6.8 per cent to India's GDP in 2009-10.

The employment generating potential of service sector in India has been the subject of intense debate on *sustainability* of service sector growth in India. Issues related to skilled versus unskilled nature of labor force requirements have been at the core based on access to education and training. In addition, issues of quality employment have also been addressed in terms of the nature of social security and other benefits. A glance at the panel B of figure 2.3 shows that post and telecommunication and financial services have been the major providers of employment. Further majority of the sectors show an employment growth of around 3 percent for the period 1980-2010.

The rapid growth in overall services and its different subsectors calls for an examination as to what underlies this performance in India especially since the advent of market based reforms in the mid 1980s. While there is broad agreement about the dynamism of the service-sector, questions have been raised about the sustainability of services growth (Acharya 2002; Bosworth, Collins & Virmani 2007; Panagariya 2008). We need to infer if the driver of the service sector growth in India can be explained through improvements in resource use efficiency<sup>11</sup> (both labor and total factor productivity growth)? The rest of the paper will make an attempt in this direction.

### 3. Methodology and Dataset

In this section, we discuss the respective frameworks for computing productivity in the individual sectors of services in Indian economy. The concept of labour productivity used in the present paper is defined as real output per unit of labour input. Typically, the labour input is measured in terms of hours worked. However in the case of India, the data on hours worked are either not available or are of low quality and hence labour input is measured in terms of the number of persons.<sup>12</sup> Further, a more specific measure of productivity, that is, TFP, which is defined as real output per unit of all (combined)

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<sup>11</sup> A recent study by Rubina Verma (2012) attempts to account for the rapid growth of the service sector observed in India during 1980- 2005. A growth accounting exercise shows that total factor productivity (TFP) growth was the fastest for services

<sup>12</sup> The number of persons employed in India refers to persons usually employed either in *principal* or in *subsidiary activities* for major period of the year.

inputs (also called multi-factor productivity or the Solow residual) is also computed. It is often assumed that TFP is a measure that corresponds to the theoretical concept of technological progress. However, in practice TFP captures the impact of several factors (such as improvements in organisation and in the quality of labour and capital), such that its evolution cannot automatically be associated with purely technological advances. The relationship between labour productivity and TFP, as well as other determinants of real output per capita growth, can be illustrated using the standard growth accounting framework.<sup>13</sup>

### **Measuring Productivity Growth for Individual Industries**

Sectoral TFP growth is measured using the standard growth accounting approach (see Jorgenson et al, 2005) using both gross output – using factor inputs capital (K), labor (L), energy (E), material (M) and services (S) – and value added functions – using K and L only. In the latter case, it is assumed that gross output production is separable in capital, labour and technology. Let the production function for industry j be denoted by

$$Y_j = f_j(K_j, L_j, E_j, M_j, S_j, A_j) \quad (3.1)$$

Where Y is industry gross output, K is capital input, L is labour input, E is energy input, M is material input S is services input, and A is an indicator of technology, in any industry j. All variables vary over time t, but the t subscript is not shown explicitly, for the sake of simplicity.

Assuming constant returns to scale, and perfect competition, industry output can be decomposed into the contribution of factor inputs and TFP using a Tornqvist aggregation:

$$\Delta \ln Y_j = \bar{v}_{K,j}^Y \Delta \ln K_j + \bar{v}_{L,j}^Y \Delta \ln L_j + \bar{v}_{E,j}^Y \Delta \ln E_j + \bar{v}_{M,j}^Y \Delta \ln M_j + \bar{v}_{S,j}^Y \Delta \ln S_j + \Delta \ln A_j^Y \quad (3.2)$$

and the gross output based TFPG is obtained as a residual:

$$\Delta \ln A_j^Y = \Delta \ln Y_j - \bar{v}_{K,j}^Y \Delta \ln K_j - \bar{v}_{L,j}^Y \Delta \ln L_j - \bar{v}_{E,j}^Y \Delta \ln E_j - \bar{v}_{M,j}^Y \Delta \ln M_j - \bar{v}_{S,j}^Y \Delta \ln S_j \quad (3.3)$$

Or equivalently as:

$$\Delta \ln A_j^Y = \Delta \ln Y_j - \sum_{i=K}^S \bar{v}_{i,j}^Y \Delta \ln X_{i,j} \quad (3.4)$$

Where  $X_{i,j}$  =capital, labor, energy, material and services inputs in industry j;  $\bar{v}_{i,j}^Y$ =compensation share of input i in total nominal output, averaged through year t and t-1, i.e.

$\bar{v}_{i,j}^Y = 0.5(\bar{v}_{i,j,t}^Y + \bar{v}_{i,j,t-1}^Y)$ , with  $\bar{v}_{i,j,t}^Y = \frac{P_{xi,j,t} \cdot X_{i,j,t}}{P_{Y,j,t} \cdot Y_{j,t}}$ , the compensation share of input i in total industry nominal output. Where  $P_{xi}$  is the price of input i, and  $P_Y$  is the output price. The assumption of constant

<sup>13</sup> In this context, real output per capita (YPC) can be decomposed into two main factors: labour productivity and labour utilization (defined here as hours worked per head of total population). Both main factors can be decomposed further into a number of components. Labour productivity is a function of TFP, capital intensity (i.e. capital per unit of labour input K/H) and labour quality (LQ). Labour utilization can be decomposed into four components: average hours worked; the unemployment rate (UR); the participation rate (PR); and the share of the working age

returns to scale implies  $\sum_i \bar{v}_{i,j}^Y = 1$  and allows the use of observed value shares for the calculation of TFP growth in equation (3.4).

In the similar way, assuming that gross output production is separable in capital, labour and technology, we can compute TFP and factor contribution using a value added function as;

$$\Delta \ln A_j^Z = \Delta \ln Z_j - \bar{v}_{K,j}^Z \Delta \ln K_j - \bar{v}_{L,j}^Z \Delta \ln L_j \quad (3.5)$$

where  $\Delta \ln A_j^Z$  is the growth rate of real value added and  $\bar{v}_{K,j}^Z$  and  $\bar{v}_{L,j}^Z$  are respectively the compensation shares of capital and labor in nominal value added, so that the sum of the two is unity, under constant returns to scale assumption.

The above equation can also be re-written to decompose the growth rate of industrial labor productivity. Subtracting growth rate of employment (H)<sup>14</sup> from both sides, TFPG can be computed as the difference between labor productivity growth and contribution from capital deepening:

$$\Delta \ln A_j^Z = \Delta \ln \left( \frac{Z}{H} \right)_j - \bar{v}_{K,j}^Z \Delta \ln \left( \frac{K}{H} \right)_j \quad (3.6)$$

### ***Aggregate Services sector productivity growth and sectoral contributions***

Aggregate service sector growth is computed as the sum of sectoral growth rates weighted using their nominal share in total service sector value added. Using a Tornqvist index and defining aggregate service sector value added growth as

$$\Delta \ln Z = \sum_j \bar{v}_j^Z \Delta \ln Z_j \quad (3.7)$$

where  $\Delta \ln Z$  is the aggregate service sector value added growth rate,  $\bar{v}_j^Z$  is the nominal share of industry j in aggregate service sector value added (averaged over current and previous years), and  $\Delta \ln Z_j$  is the growth rate of value added in sector j. Assuming that aggregate service sector employment (H) is the sum of industry employment ( $H_j$ ), so that

$$\Delta \ln H = \Delta \sum_j \ln H_j \quad (3.8)$$

Aggregate service sector labor productivity is obtained as:

$$\Delta \ln \left( \frac{Z}{L} \right) = \sum_j \bar{v}_j^Z \Delta \ln \left( \frac{Z}{H} \right)_j \quad (3.9)$$

Aggregate service sector TFPG is also obtained as in (3.9) using value added weights:

$$\Delta \ln A^Z = \sum_j \bar{v}_j^Z \Delta \ln A_j^Z \quad (3.10)$$

### ***Data and variables***

This section provides a description of the data sources, methodology of construction of variables and the industrial classifications used in the study. The data used in the empirical analysis of this study is the India KLEMS data compiled from National Accounts Statistics (NAS), published annually by the Central Statistical Organization. This data is supplemented by Input-Output tables, and various rounds of National Sample Survey Organizations (NSSO) surveys on employment & unemployment. In what

<sup>14</sup> Note that we measure labor input by taking account of heterogeneity among different type of employees, in terms of education, and therefore, the concept of labor input (L) is different from the concept of employment (H), where the latter is measured as the number of workers.



follows we discuss these sources more specifically with regard to each of the variables used in our analysis.

The present paper requires industry wise data on nominal and real value added, investment by asset type, number of employees and labor compensation by type of workers and intermediate inputs. In the following paragraphs, we describe the source and construction of these variables in detail.

**Gross Value added:** NAS provides estimates of Gross Domestic Product (GDP or gross value added) by industries at both current and constant prices since 1950. We use the data for the period 1980 to 2010 from the most recent National Accounts series which provides constant price data in 2004-05 prices. GDP estimates are adjusted for Financial Intermediation Services Indirectly Measured (FISIM). The value of such services forms a part of the income originating in the banking and insurance sector and, as such, is deducted from the GVA

**Gross output:** Gross Output series for Services sectors and has been constructed using information from Input –Output Transaction Tables of the Indian economy published by CSO. GVO to GVA ratios for Services sectors are obtained from IOTT benchmark years of 1978-79, 1983-84, 1989-90, 1993-94, 1998-99, 2003-04. These ratios are linearly interpolated for intervening years and applied to GVA series of NAS to derive the output estimates consistent with NAS at current prices.<sup>15</sup> The nominal estimates are then deflated with implicit GVA deflators from NAS to arrive at constant price series.

**Employment and labor composition:** Employment data is basically obtained from the quinquennial rounds of Employment and Unemployment Surveys (EUS) published by National Sample Survey Office (NSSO). Using the EUS, we estimate the total workforce by industry groups, as per the National Industrial Classification (NIC). The work participation estimates obtained from EUS are adjusted for population, using various population censuses. In the EUS, the persons employed are classified on the basis of their activity status into usual principal status (UPS), usual principal and subsidiary status (UPSS), current weekly status (CWS) and current daily status (CDS). UPSS is the most liberal and widely used of these concepts. Despite that the UPSS has some limitations<sup>16</sup> this seems to be the best measure to use given the data and hence we estimate the number of employed persons using UPSS definition.

We use number of workers estimated using UPSS assumption as our measure of employment, and our measure of labor input in any industry  $j$  ( $L_j$ ) is computed as a Tornqvist volume index of persons worked by individual labour types ' $l$ ' as follows:

$$\Delta \ln L_j = \sum_l \bar{v}_{l,j}^L \Delta \ln L_{l,j} \quad (3.11)$$

We use five education categories ( $n=5$  in the above equation) namely- up to primary, primary, middle, secondary & higher secondary, and above higher secondary. The weights  $\bar{v}_{l,j}^L$  in the above equation are

<sup>15</sup> It is to be noted that for government owned sector Public Administration and Defense no intermediate inputs are given in IOTT tables. Consequently value added to output ratio from System of National Accounts tables have been applied to nominal GVA figures of NAS to estimate the output for this sector.

<sup>16</sup> Problems in using UPSS includes: 1) the UPSS seeks to place as many persons as possible under the category of employed by assigning priority to work; 2) no single long-term activity status for many as they move between statuses over a long period of one year; and 3) usual status requires a recall over a whole year of what the person did, which is not easy for those who take whatever work opportunities they can find over the year or have prolonged spells out of the labor force.

obtained as the compensation share of employee category  $l$  in total wage bill of industry  $j$ , averaged through current and previous year i.e.

$$\bar{v}_{l,j}^L = \frac{P_{l,j}^L L_{l,j}}{\sum_l P_{l,j}^L L_{l,j}}$$

Subtracting (3.8), the growth rate of aggregate employment from (3.11), we obtain the labor composition growth rates. The wages for regular and casual persons employed is directly estimated from EUS of NSSO; however wages of self employed have been estimated using suitable econometric techniques.<sup>17</sup>

**Capital services:** As in the case of labour input (3.11) we measure capital input  $K_j$  as a Tornqvist volume index of individual capital assets as follows:

$$\Delta \ln K_j = \sum_k \bar{v}_{k,j}^K \Delta \ln K_{k,j} \quad (3.12)$$

where  $\Delta \ln K_j$  is the growth rate of aggregate capital services in any given industry  $j$ ,  $\Delta \ln K_{k,j}$  is the growth rate of capital stock in asset  $k$  (we distinguish between 4 types of capital assets; construction, machinery and transport equipment,) and the weights  $\bar{v}_{k,j}^K$  are given by the period average shares of each type of asset in the total value of capital compensation, such that the sum of shares over all capital types add to unity.

$$\bar{v}_{k,j}^K = \frac{P_{k,j}^K K_{k,j}}{\sum_k P_{k,j}^K K_{k,j}}$$

Where individual capital stocks  $K_k$  are estimated using standard Perpetual Inventory Method (PIM) with geometric depreciation rates  $\delta_k$ :

$$K_{k,t} = K_{k,t-1}(1 - \delta_k) + I_{k,t}$$

And the rental prices of capital  $p_{k,j}^K$  are computed as

$$P_{k,t}^K = P_{k,t-1}^L i_t^* + \delta_k P_{k,t}^L$$

where  $p_k^L$  is the investment price of asset  $k$ ,  $i^*$  is real external rate of return<sup>18</sup>  $\delta_k$  is the assumed geometric depreciation rate of asset  $k$ . We measure the real external rate of return,  $i^*$  by a long-run average of real bond rate and market interest rate, obtained from Reserve Bank of India.

**Labour Income Share:** There are no published data on factor income shares in Indian economy at a detailed disaggregate level. *National Accounts Statistics* (NAS) of the CSO publishes the NDP series comprising of compensation of employees (CE), operating surplus (OS) and mixed income (MI) for the NAS industries. The income of the self employed persons, i.e. mixed income (MI) is not separated into the labour component and capital component of the income. Therefore, to compute the labour income share out of value added, one has to take the sum of the compensation of employees and that part of the mixed income which are wages for labour. The computation of labour income share involves two steps. First, estimates of CE, OS and MI have to be obtained for each of the study industries from the

<sup>17</sup> For details of methodology, refer to Aggarwal and Azeez(2013), forthcoming

<sup>18</sup> In the present version of the India-KLEMS database, we use an external rate of return. However, one can also use an internal rate of return, which will ensure complete consistency with NAS (see Jorgenson and Vu (2005)). This will be attempted in the future. See Erumban (2008) for a discussion on alternative approaches to the measurement of rental prices.

NAS data which are available only for the NAS sectors. Second, for splitting the labour and non-labour components out of the mixed income of self-employed, the unit level data of NSS employment-unemployment survey are used along with the estimates of CE, OS and Mi basically obtained from the NAS.

**Intermediate inputs:** The methodology for measuring, intermediate inputs was developed by Jorgenson, Gallop and Fraumeni (1987) and extended by Jorgenson (1990). Following a similar approach as explained in Jorgenson et al. (2005, Chapter 4) and Timmer et al. (2010, Chapter 3), the time series on intermediate inputs for the Indian economy has been constructed. The cornerstone of this approach is the use of input output (IO) tables which gives the flows of all commodities in the economy, as well as payments to primary factors. As the starting point, a concordance table between the industrial classifications used our study and the Input Output Transaction Tables has been prepared. For the Benchmark IOTT years of 1978, 1983, 1989, 1993, 1998 and 2003, proportions of Material Inputs, Energy Inputs, and Service Inputs in Total Intermediate Inputs are calculated. Proportions for intervening years are obtained by linear interpolation of the benchmark proportions. This involves an implicit assumption for each IO sector that technological change or efficiency improvement in input use between two benchmark IOTT years indicated by the corresponding two IO tables occurred progressively between the benchmark years, by an equal amount in each intervening year to be more specific. A similar assumption about technical change is involved in extrapolations beyond 2003-04, done on the basis of the change in IO coefficients observed between 1999-00 and 2003-04. Next, to ensure consistency with National Accounts series, the projected input vector has been proportionately adjusted to match the gap between gross output and value added of NAS such that when we aggregate all the inputs at current price, it should exactly match the intermediate input of NAS. To transform the nominal intermediate input series to volumes weighted WPI deflators are used. The weights are based on the column of the relevant industry in the Input Output tables. Different weights have been used for different time periods. Two IOTT has been used for deriving weights - 1989 and 1998. The price series based on 1989 table has been used from 1980 to 1993 and the 1998 table has been used for the price series from 1993 to 2008. Once the two series have been formed, these have been spliced. The deflators for Material, Energy and Service Inputs for each sector have been used to deflate the Current price Intermediate Input series to Constant price.

#### 4. Productivity trends in India's Service sector

In this section, we provide estimates of labour productivity growth using a value added framework for the sub sectors of services in India. Using this approach, we also detail the sources of labor productivity growth. Measurement and analysis of productivity at the disaggregate level as well as for the aggregate services when based on value added version of the production function, ignores the explicit role of intermediate inputs in the production process. In the present paper, we have considered three intermediate inputs- energy, material and services and this is important as we may find that intermediate inputs are the primary component of some industries outputs.<sup>19</sup> Failure to quantify intermediate inputs leads us to miss both the role of key industries that produce intermediate inputs and the importance of intermediate inputs for the sub sectors that use them( Jorgenson, Ho and Stiroh

<sup>19</sup> Consider, the semi conductor (SC) industry, which is a key input to the computer hardware industry. Much of the output is invisible at the aggregate level because semi conductor products are intermediate inputs to other industries rather than deliverables to final demand- consumption and investment goods. Moreover, SC plays a role in the improvements in quality and performance of other products like-computers, communication equipments and scientific instruments.

(2005), Productivity, volume 3). Our measure of labor input incorporates the qualitative aspects of the labor force in terms of education in defining a new and refined measure of labor input as the product of labor person and quality index. The capital input defined in terms of capital service takes the asset heterogeneity in account as against a measure of capital stock which is devoid of it. In the following sub sections, we discuss the sources of labor productivity and output growth using the value added and gross output version of the production function.

#### **4.1: Sources of labor productivity growth**

The service sector performance in terms of labor productivity is summarized in table 4.1. Our main observation from panel A is that labor productivity in India' service sector has been growing substantially over decades, and much of this productivity gain is accruing through acceleration in market services labor productivity. For the first two decades, non market services showed higher labor productivity relative to the market services, with the reverse happening in the decade of 2000s, a period of rapid slow down in the global economy. A closer look at this further suggests that ICT intensive sectors, in particular post and telecom and financial intermediation has brought much of the service sector productivity growth. For the period as a whole, labor productivity in services have grown at the rate of 4 per cent per annum. Turning attention to the individual sectors within services, we find overall, majority of the sectors show labor productivity growth higher than the sectoral average, the exceptions being transport and storage, public administration and other services which register low growth in labor productivity in the region of 2-3 per cent.

**Table 4.1: Labour productivity trends in service industries by sub period: 1980 to 2010 (% per annum)**

Description	1980 to 1989	1990 to 1999	2000 to 2010	1980 to 2010
<b>Total services</b>	<b>3.1</b>	<b>4.2</b>	<b>5.6</b>	<b>4.0</b>
<b>Market services</b>	<b>1.7</b>	<b>3.8</b>	<b>7.0</b>	<b>4.2</b>
<b>ICT intensive services</b>	<b>2.0</b>	<b>4.2</b>	<b>7.8</b>	<b>4.7</b>
Trade	0.6	4.5	8.0	4.5
Financial Services	3.3	6.0	4.8	5.0
Post and Telecommunication	1.3	5.3	16.9	7.6
<b>ICT non-intensive services</b>	<b>0.9</b>	<b>2.5</b>	<b>4.9</b>	<b>2.8</b>
Hotels and Restaurants	2.2	6.9	7.6	6.0
Transport and Storage	1.4	2.1	4.2	2.5
<b>Non-market services</b>	<b>4.1</b>	<b>4.3</b>	<b>3.2</b>	<b>3.9</b>
Public Administration and Defense	3.4	5.4	6.6	5.3
Education	4.0	2.9	2.9	3.1
Health and Social Work	5.9	3.5	3.8	4.2
Other services	2.7	3.1	2.1	2.7

**Source:** Authors calculations based on India KLEMS dataset.

A few interesting developments from the disaggregated picture of table 4.1 is worth a mention. Three sectors- Hotels and Restaurant, Post and Telecommunications, Trade and Transport and Storage showed large improvements in productivity from a very low base in the decade of 1980s. All the three sectors mentioned above had significant changes in their business environment beginning 1980s covering regulation as well as policy measures. For road transport; we find reforms from early 1990s covering entry of private players, amendments in motor vehicle laws, setting up of National Highways Act. In case of telecom services, most of the manufacturing services were totally under governmental domain and entry of private firms in providing telecommunication services started in 1992 with the introduction of

value added services. In the financial services especially banking services, substantial reforms were undertaken pertaining to new banks, licensing policies. Reforms in the insurance sector commenced in the latter part of 1990s and securities markets were also streamlined. Except for public administration, all other sub sectors of non market services registered lower levels of labor productivity growth for the period 1980-2010.

Our next table in this segment addresses the contribution of individual sector's LP to the aggregate service sector labor productivity growth for the period 1980-2010. The aggregate productivity growth is the weighted sum of industry productivity growth plus a reallocation term  $R$ . The reallocation term is positive if value added shifts from low productivity industries towards high productivity industries. Table 4.2 summarizes the contributions of major service groups (market services including ICT and non ICT intensive and non market services) and reallocation effect to labour productivity growth in the service sector.

**Table 4.2: Sectoral Contribution to Aggregate Labor Productivity Growth; 1980 to 2010**

	1980-1989	1990-1999	2000-2010	1980 -2010
<b>Aggregate service sector Labour Productivity Growth</b>	3.06	4.16	5.58	4.01
of which				
<b>Market Services</b>	0.87	2.54	3.74	2.34
<b>ICT intensive</b>	0.70	1.97	2.95	1.90
Trade	0.35	1.12	1.82	1.23
Financial Intermediation	0.32	0.69	0.62	0.49
Post and Telecommunication	0.03	0.15	0.51	0.18
<b>ICT non intensive</b>	0.16	0.58	0.79	0.44
Hotels and Restaurants	0.05	0.12	0.18	0.14
Transport and Storage	0.12	0.45	0.61	0.30
<b>Non Market Services</b>	2.14	2.25	1.34	1.65
Public Administration and Defense; Compulsory Social Security	0.56	0.75	0.61	0.65
Education	0.31	0.29	0.22	0.22
Health and Social Work	0.15	0.08	0.11	0.12
Other Services	1.13	1.13	0.40	0.66
<b>Reallocation</b>	0.05	-0.63	0.50	0.01

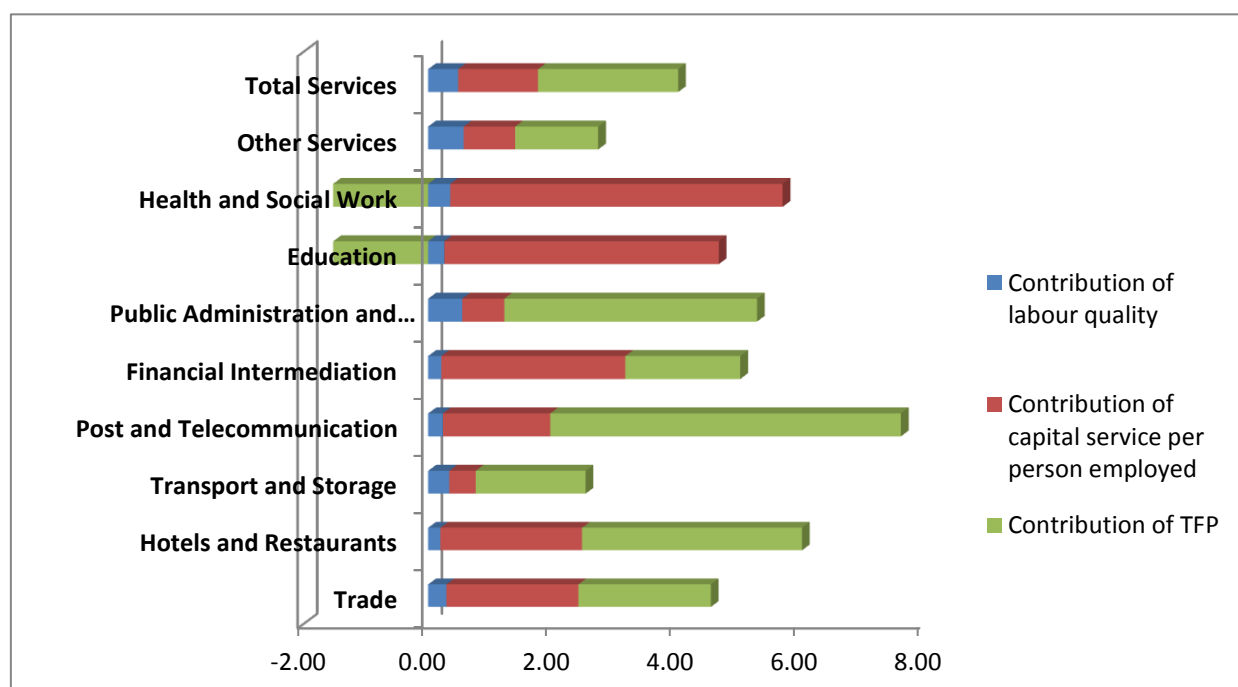
**Source:** Authors' calculation based on India KLEMS dataset

Labor productivity in Indian service sector has been growing substantially over decades, and much of this productivity gain is accruing through acceleration in the contribution of market services labor productivity to aggregate service labor productivity growth. While the non market services productivity contribution declined from about 2% in 1980s and 1990s to 1.3%, market services has witnessed an increase in its contribution from less than 1% to above 3%. A closer look at this further suggests that ICT intensive sectors, in particular post and telecom, trade and financial intermediation has brought much of the service sector productivity growth. Within ICT non-intense services transport and storage sector has contributed a major part of aggregate productivity improvement. Almost all non-market services has

shown a deceleration in their contribution to aggregate service sector productivity in the 1990s, while Health sector improved slightly its contribution in the 2000s. Aggregate service LPG has not improved in the 1990s compared to that of 1980s. However, market services did witness an improvement in its contribution to aggregate service sector LP growth both in 1990s and 2000s with larger improvement, again visible in ICT intense sectors. This observed productivity increase in the contribution of the market services, and in particular ICT intense services, to aggregate service sector productivity might indicate the role of increasing ICT in contributing to labor productivity growth. The labor reallocation effect is positive in most periods, and has increased in the 2000s, suggesting a structural transformation which is growth enhancing. Resources seems to be moving from less productive services to more productive services

Finally, we investigate the sources of observed labor productivity growth across different components of services. The standard growth accounting exercise attributes the main source of increases in labour productivity per person employed to TFP growth and capital deepening. Figure 4.1 below provides a decomposition of labour productivity growth in terms of TFP, capital deepening and labour quality.

**Figure 4.1: Sources of Labour Productivity growth, 1980 to 2010, (% per annum)**



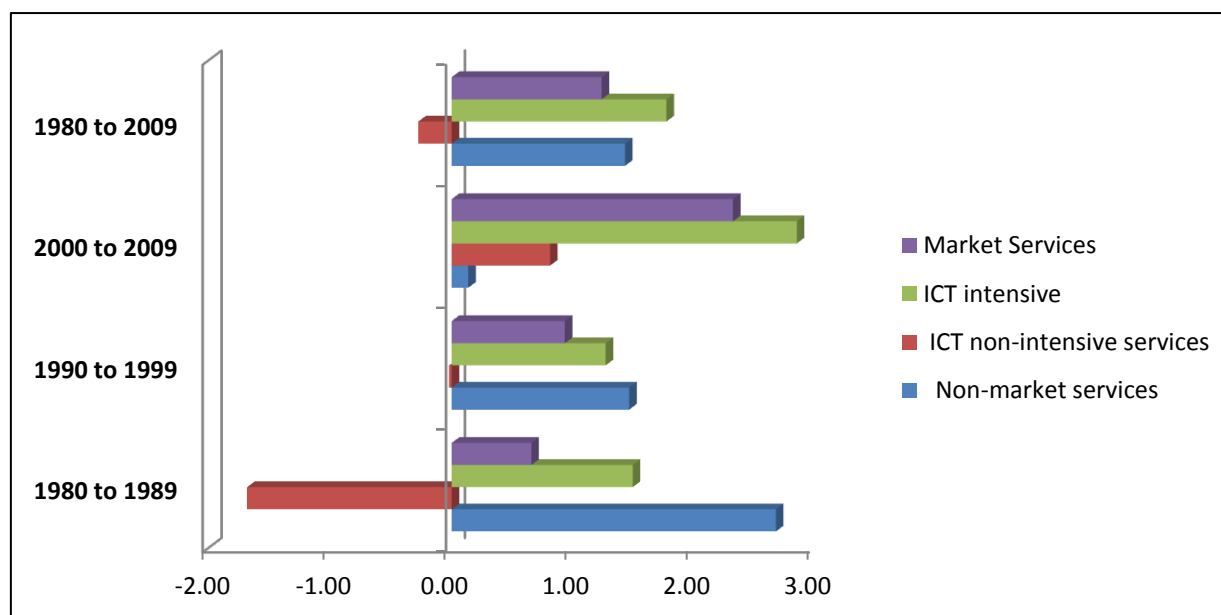
**Source:** Authors' calculation based on India KLEMS dataset

We observe that TFP growth is significant in accounting for the observed improvement in labour productivity in total services and its various components. This holds true for most sectors, except health and education. In these two sectors, we however find enormous role of capital deepening. Our study also points to the almost negligible role of labour quality in explaining services productivity.

## 4.2 Sources of Output Growth<sup>20</sup>

The major observation to be drawn from the previous section is that the main contributor to labour productivity growth across different service sectors is to be found in total factor productivity, not in differences in the intensity of the production factors especially labour and capital. The estimates of TFP growth in this section for sub sectors of services are calculated using gross output as the measure of output, and primary inputs of capital (K) and labor (L) along with the trio of the inputs of energy (E), materials (M) and services (S) together constitute intermediate inputs in what has come to be known as the KLEMS framework for measuring productivity.<sup>21</sup>

**Figure 4.2: Growth of Total factor productivity across services sector 1980 to 2009 (% per annum)**



**Source:** Authors' calculation based on India KLEMS dataset

The TFP growth for broad categories of services is depicted in the figure above. Beginning from 1980s, we observe a rapid improvement in the TFP of market services. As in the case of labor productivity, **improvements in TFP also** are accruing through acceleration in efficiency of resource usage in ICT based market services. A closer look at this further suggests that ICT intensive sectors have registered significant growth in TFP beginning 1990s and especially in the decades of 2000s. Post and telecommunication is by far the single largest contributor to this observed performance registering a increase in productivity of 18 percent over the decade of 1990s as compared to 80s. It is worth noting that non market services after observing the maximum productivity enhancement in the decade of 1980s has been consistently registering a productivity decline. This is evident from the decline in

<sup>20</sup> The period under consideration is 1980-2009

<sup>21</sup> See for example OECD (2001), Jorgenson et al (2005), Diewert and Nakamura (2007) and Timmer et al. (2010) for detailed accounts of the new approach.. Jorgensen et al. (2005) and Timmer et al. (2010) have exploited the new methodological framework to address substantive issues for the American economy and EU economy, respectively.

productivity growth registered by education and health sub groups of services in the 1990s as compared to 1980s.

Table 4.3 below presents the decomposition of output growth for the period 1980-2009 for the different sub sectors of services in the Indian economy. The contribution of an input is defined as the product of value share of the input and the growth rate of the input. Thus each input contributes to output in proportion to its value share, while TFP contributes to output growth point for point. The first column gives the output growth and the other columns give the contributions of the factor inputs- labor, capital, material, energy and services and the final column provides TFP growth.<sup>22</sup> In panel A, we observe wide variations in output growth across different sub groups. TFP is the single most dominant sources of output growth in two sub groups- post and telecommunication and public administration including defense. We find that for the period 1980-2009, all sub groups have TFP growth below 2 percent. Post and telecommunication and public administration and defense with TFP growth rates of 4.9 and 2.8 percent per year respectively are two outliers. This performance is reflected in the rapid growth of output and TFP. Both of these industries exhibit the service driven economic growth boom in India since the 1990s., When comparing the contribution of factor inputs- labor, capital, material, energy and services, we find that material input is the dominant source of growth for ICT intensive market services- hotels and restaurants and transport and storage. We also find that in case of non market service sub groups like health and education substantial contributions are made via primary inputs- labour and capital. Capital services emerge as the single largest contributor for trade, post and telecommunications and financial services. It is evident from the table, that factor inputs especially capital services make a significant contribution to the output growth across different sub groups.



**Table 4.3 : Sources of output growth, 1980 to 2009 ( % per annum)**

***Panel A : Contribution of factor inputs and TFP to Gross output growth***

Industry description	GVO Growth	Contribution of Labour Input	Contribution of Capital Service	Contribution of Material Input	Contribution of Energy Input	Contribution of Service Input	TFPG
Trade	6.22	1.32	2.59	0.14	0.1	0.43	1.64
Hotels and Restaurants	7.89	0.5	1.37	3.65	0.18	1.4	0.79
Transport and Storage	7.25	1.09	1.34	1.48	1.61	1.85	-0.13
Post and Telecommunication	14.16	2.07	4.91	1.25	0.28	0.68	4.97
Financial Services	9.87	1.87	5.18	0.26	0.14	1.64	0.78
Public Administration and Defense	5.57	0.74	0.5	0.25	0.01	1.27	2.81
Education	7.02	2.46	3.74	0.04	0.02	0.56	0.20
Health and Social Work	4.94	1.28	2.39	0.91	0.03	0.39	-0.06
Other Services	6.65	1.95	2.17	1.04	0.05	0.47	0.97

***Panel B : Contribution of factor inputs and TFP to Gross value added growth***

Industry Description	GVA growth	Contribution of Capital stock	Contribution of Capital Quality	Contribution of Labour Person	Contribution of Labour Quality	TFPG
Trade	7.04	3.03	0.26	1.43	0.29	2.02
Hotels and Restaurants	8.44	4.02	0.27	1.38	0.18	2.59
Transport and Storage	6.46	3.06	0.11	2.18	0.38	0.73
Post and Telecommunication	13.9	5.59	0.34	2.27	0.23	5.49
Financial Services	9.61	5.99	0.34	2.12	0.21	0.95
Public Administration and Defense	5.63	0.67	0.02	0.49	0.53	3.94
Education	7.27	4.20	0.04	2.4	0.39	0.25
Health and Social Work	7.69	4.56	0.03	2.04	0.53	0.53
Other services	6.35	2.57	0.16	1.88	0.52	1.23

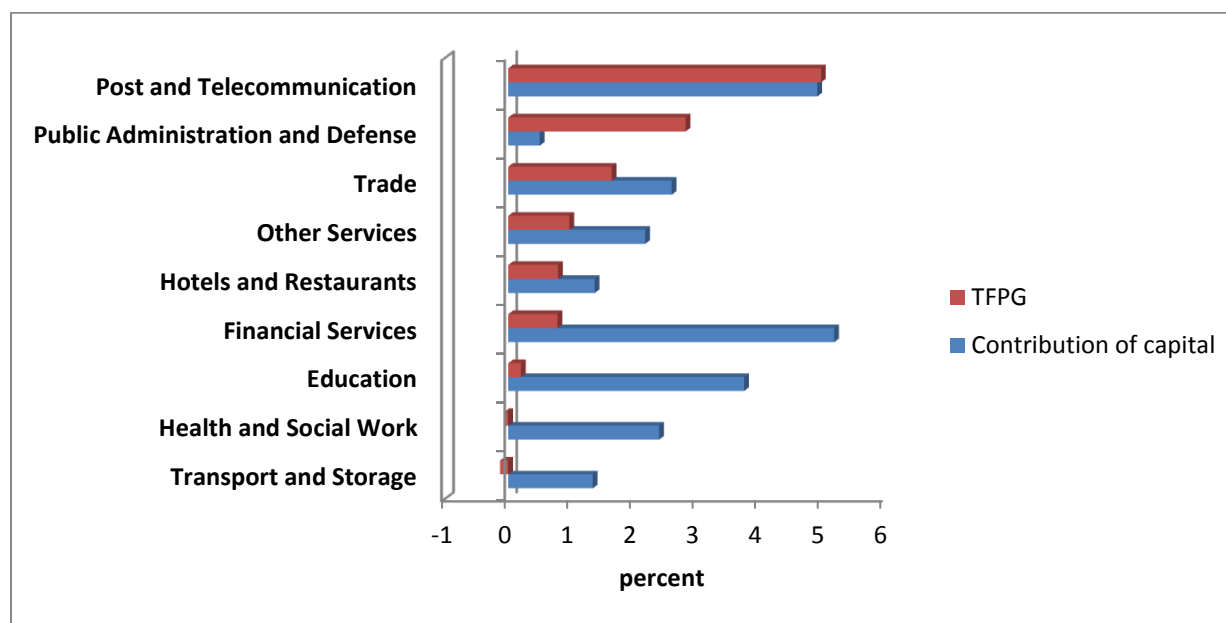
**Source:** Authors' calculation based on India KLEMS dataset

Panel B provides break down of value added growth in terms of quality and quantity components for labor and capital inputs. The quantity component reflects increases in the number of units, while the quality component capture substitution towards heterogeneous inputs with relatively high marginal products- a computer or a university educated worker. We observe that capital input measured in terms of capital stock makes a bigger contribution to value added growth across majority of the sectors than labor input. In terms of labor we find that labor person dominates labour quality in all sub groups of services. As with gross output specification, we observe the strong dominance of capital input in explaining output growth.

### 4.3. Factor accumulation versus TFP: The role of capital services

It is evident from the decomposition of services output growth (as well as growth in value added) that capital input makes a significant contribution to the observed growth. In addition, for certain sectors- namely, health, education, financial services, trade including wholesale and retails, hotels and restaurants capital services accounts for substantial contribution to improvements in labour productivity during the period 1980-2010. This might indicate the role of increasing ICT in contributing to labor productivity growth.

**Figure 4.3: Contribution of capital services and TFP growth; 1980 to 2009 (% per annum)**



**Source:** Authors' calculation based on India KLEMS dataset

Further, we note from Table 4.3 that for market based ICT intensive sectors- financial services, post and telecommunication and trade, capital service contribution is overwhelmingly large when compared to other inputs, thereby reflecting sharp inter industry variations in the contribution of capital deepening within services. It would suggest that Indian services are becoming highly intensive in capital on the one hand and on the other hand the share of capital intensive sectors within the service sector is increasing.

The share of ICT intensive sectors (trade, post and telecommunication, financial services) within market services stands at almost 40 % of total services (2009-10). This may be due to a number of reasons, including import of capital goods following liberalization of trade policy especially lowering of tariffs and easing of non tariff barriers in the capital goods sector.<sup>23</sup> It may also reflect the onset of many new technologies (ICT) that enhances capital deepening through liberalization of trade in services.

The observed growth pattern in the service sector has not been uniform across all services in India. The performance of market based ICT intensive sectors is impressive especially telecommunications and financial services. However by and large, we find a dominance of capital deepening in accounting for growth. We need to ascertain if information and communication technology (ICT) remained an important source of both capital deepening and total factor productivity growth within services in India. We conclude that import liberalization has been a principal component of the economic reforms undertaken in India and along with complementary policies like technology import policy have to a large extent contributed to the import and adaptation of ICT equipments and technology in the observed capital deepening within services.

#### **4.4. Services and aggregate TFP.**

The evolution of total factor productivity (TFP) is a key determinant of long-run economic growth of a country. Further, the service led growth momentum in India has been questioned on grounds of ‘sustainability.’ To this end, we examine the contribution of different sectors to productivity growth at the aggregate economy level. The decomposition of output growth into its sources is shown for different broad sectors and the economy. The whole period 1980 to 2009 is considered for the analysis. The contributions of different inputs to output growth are shown in the Table 4.4. TFP has played an important role in the growth of the Services sector. TFP growth accounted for about a fourth of the real GVA growth achieved by the Services sector. Besides productivity growth, growth in labour and capital input contributed to services sector growth.

**Table 4.4 : Contribution of Factor Inputs and TFP to GVA growth by Broad Sectors: 1980 to 2009.**

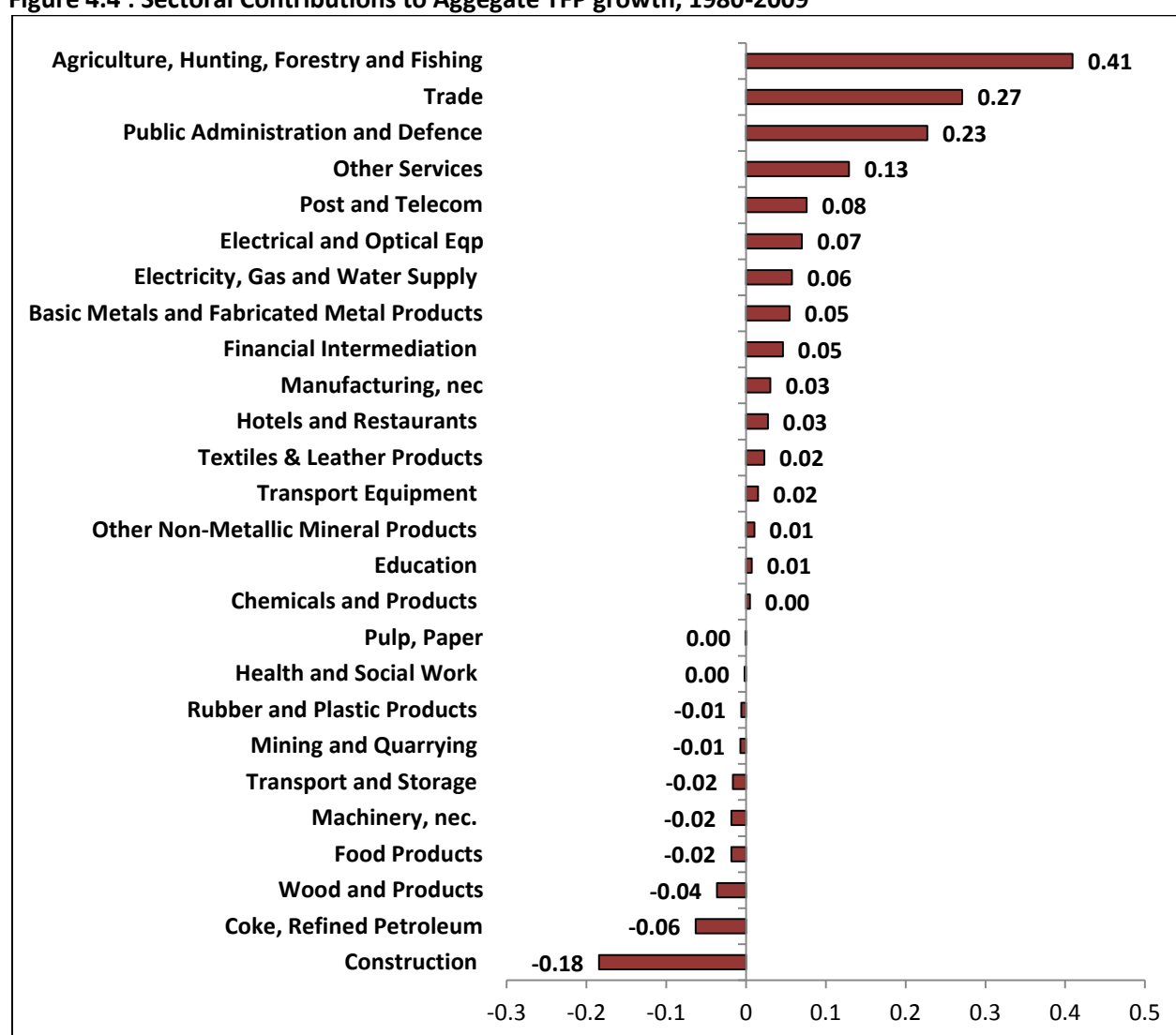
BROAD SECTOR	Real value added growth	Contribution of Labour persons	Contribution of Labour quality	(% per annum)	
				Contribution of Capital services	TFP growth
Agriculture	3.03	0.37	0.15	0.99*	1.52
Mining and Quarrying	4.75	0.68	0.38	3.93	-0.24
Manufacturing	7.22	0.68	0.44	5.37	0.73
Electricity, Gas and Water Supply	7.44	0.66	0.34	3.49	2.96
Construction	3.48	5.21	0.21	1.37	-3.31
Services	7.11	1.73	0.53	3.00	1.84
Total Economy	5.82	0.84	0.69	2.89*	1.40

**Source:** Authors’ calculation based on India KLEMS dataset

<sup>23</sup> Das (2007) shows that effective rate of protection for capital goods sector declined from an average 62 per cent in 1980s to around 30 percent by the end of 1999. In case of non tariff barriers, the decline was even steeper from a near 100 percent to around 8 percent by the end of the decade 1990-2000.

The vast heterogeneity that exists in the aggregate TFP growth in the form of a few sub groups dominating the growth of output and productivity over extended periods of time can often give a distorted scenario, as the role of the leading industries, however, can shift dramatically the TFP scenario observed over a period of time. A graphic presentation of the industry-wise contribution to aggregate TFP growth for the period 1980 to 2009 is given in Figure 4.4 below. The most important contributors to aggregate TFP growth include Agriculture, hunting, forestry and fishing, Trade, Public administration and defense, 'Other services', Post and telecommunication, Electrical and optical equipment, Electricity, gas and water supply, Basic metals and fabricated metal products and Financial Services. Thus we observe that several of the service sector industries are among the leading contributors to TFP growth in the economy. This substantiates our assertion about the growing importance of services in the overall economy and to a considerable extent it also shows that high productivity growth in the service sector is the main factor behind service expansion.

**Figure 4.4 : Sectoral Contributions to Aggregate TFP growth, 1980-2009**



*Source: Authors' calculation based on India KLEMS dataset*

### ***5. Drivers of Service sector growth: Exploring future research issues***

Service sector in India has also grown rapidly in the last decade (2000-10) and its growth has in fact been higher than the growth in agriculture and manufacturing. It remains to be seen however whether growth in services will lead to inclusive overall growth in India. The growth and productivity performance of services in India highlighted in this paper offers several issues that need attention in the form of future research endeavors.

The service sector revolution seems to be a spin-off of the manufacturing reforms. There is definitely a momentum in the sectoral productivity, which is driven by service sector. There is a clear sign of increase in the importance of market services, financial services and trade and distributive services both in terms of value added share and their contributions to value added and productivity growth after the late 1990s. However, one may question the meaning of productivity decline or improvement in the non-market services, which does not follow the market principles. The improvement in market services, however, might indicate the effect of information and communication technology, which needs further analysis. Since the production of ICT is heavily concentrated in the advanced countries, where evidences also suggest the effect of ICT on manufacturing sector through ICT producing sectors, India seems to have benefitted more in ICT using sectors, which is predominantly the service sector. However, to make such a strong conclusion we need further detailed analysis.

Our study makes an attempt to document the observed trends in service sector productivity. Eichengreen and Gupta (2010) examine proximate determinants of service sector growth in value added. The results confirm that the growth of value added in services increases with per capita income.<sup>24</sup> Given the impressive TFP growth in India's services, we need to look at the possible determinants of the productivity trends. We argue that capital deepening reflects the outcome of trade liberalization attempts at capital goods sector especially imports of machinery and equipments. There could be other equally strong determinants; in particular, skill intensity of workforce, labor market regulations, availability of infrastructure, technology etc to name a few. The issue of skill intensity of workforce raises issues connected with levels of education, gender and age.<sup>25</sup> Issues of labor market rigidities have been at the forefront of policy debates in India especially in organized manufacturing in India. In India, labour law is a federal subject as well as central subject and thus there are variations within the states. Given the linkages between organized manufacturing and services it would be interesting to see if labor laws impact of services growth. Substantial investment in infrastructure continues to be required in order to sustain growth in India's services. The country's capacity to absorb and benefit from new innovations depends on the availability and quality of infrastructure support including power and transportation. Finally, technology transfer is viewed as taking place either by reverse engineering via purchases of imported products/inputs, by training of local workers who move out of the TNC to domestic firms or start their own enterprise. There is hardly any study which addresses these and other possible determinants of observed service sector LP/TFP performance in a rigorous quantitative framework.

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<sup>24</sup> Determinants of services exports have been an important research issue for service sector in India, given India's impressive performance in services trade as opposed to goods trade. Refer to Eichengreen and Gupta (2013). In addition, see Das, Banga and Kumar (2011) for the impact of slowdown on global GDP growth on export demand for India's services.

<sup>25</sup> Ramaswamy and Aggarwal (2012) have argued that the growth in service-sector is relatively more skill demanding than manufacturing at higher skill levels.

Finally, the growth that we observe in India today is essentially service driven. Empirical evidence points that India has virtually leapfrogged manufacturing by transforming from agriculture to services in terms of contribution to value added. The National Manufacturing Policy (2011) is expected to enhance the share of manufacturing in India's GDP (gross domestic product) to 25% and add at least 100 million jobs by 2020. The distinction between manufacturing and services has often remained blurred. Manufacturing also includes a range of activities beyond production of goods (customer support, marketing and sales etc). Further just as manufacturing creates demand for services inputs (logistics to manufacturing), services also creates demand for manufactured outputs. However, we still need to understand the complementarities between services and manufacturing sectors especially in the context of services in India linking manufacturing to global production networks.

## **6: Conclusions**

Service sector in India has also grown rapidly in the last decade (2000-10) and its growth has in fact been higher than the growth in agriculture and manufacturing. It remains to be seen however whether growth in services will lead to inclusive overall growth in India. This paper is an attempt to understand India's service sector productivity growth dynamics observed since 1980s.

We examine the productivity trends in service sector at detailed industry level using a carefully developed INDIA KLEMS panel data for the period 1980-2010. We use both the VA as well as GVO framework in computing labour as well as total factor productivity growth based on growth accounting technique. In addition, a decomposition exercise is done to account for (1) sources of labor productivity growth and (2) sources of output growth. Our findings suggests the following- Labor productivity in Indian service sector has been growing substantially over decades, and much of this productivity gain is accruing through an acceleration in market services based sectors. This observed productivity gain in the market services, and in particular ICT intense services, might indicate the role of increasing ICT in contributing to labor productivity growth. The labor reallocation effect is positive in all the periods, and has increased in the 2000s, suggesting a structural transformation which is growth enhancing. Our observed TFP estimates based out of KLEMS production function for services sector indicate impressive growth in TFP for market based services. The non market based services on the other hand indicate a progressive decline in resource use efficiency in the recent decades. It is evident from the decomposition of output growth that capital input makes a significant contribution to the observed growth. This indicates a dominance of capital deepening in accounting for growth. We need to ascertain if information and communication technology (ICT) remained an important source of both capital deepening and total factor productivity growth within services in India. We infer that import liberalization has been a principal component of the economic reforms undertaken in India and along with complementary policies like technology import policy have to a large extent contributed to the import and adaptation of ICT equipments and technology in the observed capital deepening within services.

Finally, the growth and productivity performance of services in India highlighted in this paper offers several issues that need attention in the form of future research endeavors. One final aspect which needs mention is to undertake international comparison of services in emerging economies like India. However, for this we need to create internationally comparative datasets for engaging in meaningful comparisons. To a large extent, this has been solved by the India KLEMS dataset, which follows the EU KLEMS classification. However, the problem still has not been addressed to its full as the service sector

classification is still evolving in India and differences remain.<sup>26</sup> Further, questions are often raised about the quality of service sector data in India and methods used to construct the time series profile of disaggregated services in India and hence reliance of estimates computed. We end with the quote,

*“If the data is so dodgy, should all analysis on the services sector be called off? As is evident, this would mean the entire economy, since services account for more than a half of GDP. Conversely, should economists be like the drunk who looks for a lost key under the lamp-post because that is the only place where there is light? Given the need for analysis, there can be only one answer.”* (Jain and Ninan, 2010).

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<sup>26</sup> The service sector can be classified either by using the country's own definition or by using the United Nations Central Product Classification (UNCPC). The UNCPC is used as a basis for international negotiations like those of the World Trade Organization (WTO). According to Mukherjee, (2013), *In India, the National Industrial Classification provides classifications for services. Since the sector is evolving, both have undergone changes. At present, the National Industrial Classification 2008 is used (Box 1) though there are differences between it and the UNCPC, e.g., construction is not a part of the sector in India while it is in the UNCPC*

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