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Analyzing "jobless growth" in post-liberalisation India: a decomposition approach

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Abstract *There has been a growing concern about "jobless growth" in the Indian economy as a major problem to the significant rise in GDP. This paper comprehensively examines India's economic growth and employment during the different National Sample Survey (NSS) rounds, with a special reference to the service sector, the main growth engine for Indian economy over the past two decades. This paper tries to examine the factors accounting for the growth in the Indian economy through the labour market and workforce behaviour. It focuses on growth decomposition to account for the factors driving growth of the Indian economy, and it looks to decompose growth across the different sectors of the economy. The methodology used here is Shapley (in: Contributions to the Theory of Games, 1953) decomposition. The periods of analysis are the different rounds of NSS. The three spells of growth considered are 1993/1994 to 1999/2000, 1999/2000 to 2004/05 and 2004/05 to 2009/10. The paper reveals an interesting fact that the main cause of growth in per capita GDP in post-liberalisation India is a massive growth in output per worker across all sectors over the three growth spells. There has been negative growth associated with employment rate, implying jobless growth in India. The demographic component effect on growth has been mostly positive. At the sectoral level, the industrial and specialised service sectors show fairly positive growth in terms of employment rate, though small, the negative contribution of employment in agriculture is so large that it overshadows the positive effect of these sectors, leading to huge negative contribution to the changes in the employment rate, defining jobless growth in India.*

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1 INTRODUCTION

A striking feature of India's growth performance over the past two decades has been the strength of the service sector. Service sector in India has been the growth engine in her structural transformation. However, such growth performance is not a significant indicator of the development of people's well-being. Failure in generating employment opportunities and reducing regional disparities are cited as examples of the outcomes of "growth only" obsessions of the Indian economy.

According to the Economic Survey, 2010–11, the ratcheting up of the overall growth rate (compound annual growth rate [CAGR]) of the Indian economy from 5.7 per cent in the 1990s to 8.6 per cent during 2004–05 to 2009–10 was largely due to the acceleration of the growth rate (CAGR) in the services sector from 7.5 per cent in the 1990s to 10.3 per cent in 2004–05 to 2009–10. However, although the agricultural sector is the dominant employer followed by the service sector, the share of services has been increasing over the years, while that of primary sector has been decreasing. From 1993–94 to 2004–05, there was a sharp fall in the share of the primary sector in employment. The consequent rise in the share of employment of the other two sectors was almost equally divided between the secondary and tertiary sectors. There has been an emerging issue among economists about "jobless growth" as a major impediment to the benefit from the overall high-growth performance in India.

In this paper, a growth accounting framework is formed to empirically examine these dimensions of India's recent growth. The paper first tries to interpret whether this high rate of growth of service sector during the post-liberalisation period has augmented employment. Secondly, it assesses which of these factors, such as increased employment, output per worker and demographic components, is the major contributor to per capita GDP growth. Finally, it examines whether the changes in output per worker are due to changes within sectors, or due to shifts of workers from low-productivity to high-productivity sectors, that is, changing employment structure.

In this paper, though all the broad components of GDP are considered, the particular interest is in the sources of growth in the service-producing industries, which has been the prime force in India's economic growth in recent years. There is already an extensive empirical literature using growth accounting exercise that examines these and other aspects of India's economic growth, but most of the analyses have focused on characterising India's economic performance at the most aggregate level. This paper tries to analyse the economic performance at both the aggregate and the sectoral level. The paper is organised as follows: section 1 provides the stylised facts of India's economic growth and employment, section 2 discusses the selective survey of literature; section 3 provides the data source and an overall macroeconomic overview of growth and employment in post-globalisation India; section 4 elaborates the method of growth decomposition, section 5 presents the results and its interpretation; section 6 concludes the study.

2 STYLISED FACTS OF INDIA'S GROWTH AND EMPLOYMENT

There are several salient stylised facts about employment and growth in India. First, the Indian economy has grown at a robust average rate of about 6 per cent per year since the mid-1980s and at more than 8 per cent per year since 2004–05 to 2009–10. The sectoral pattern of growth has been unusual, in that the growth has been driven by the service sector for most of this period.

Second, employment growth has been more uneven, showing a deceleration in employment growth rates between 1993 and 2000, and acceleration since 2000. However, long-term job growth has been fairly constant at about 2 per cent per annum, or even slightly declining if only full-time principal workers are considered.

Finally, the sectoral composition of employment, largely unaltered for nearly two decades, has changed perceptibly since the economic liberalisation of 1991, and particularly since 2000. The share of the agricultural sector has declined, to the benefit of the services sector—especially the trade, transport, and construction sub-sectors.

3 SELECTIVE SURVEY OF LITERATURE

In developing countries, the rapid growth in employment in the service sector is accompanied by an appreciable decrease in the growth of labour force in the manufacturing sector. This change is attributed to a structural shift in production behaviour towards the service sector. Increasing specialisation leads to shift of service sector-type activities in the manufacturing sector to the proper service sector. Bhattacharya and Mitra (1989) stated that higher the discrepancy between the industry and agriculture growth, the higher is the growth of services. If expansion in value added and employment generation takes place simultaneously within the service sector, there will be a commensurate increase in demand for food and other essential goods produced in the manufacturing sector. However, if the expansion of the service sector results only from the rise in income of those who are already employed in this sector, the additional income would create demand for luxury goods and other imported goods since the demand for food and other essential items has already been met (Bhattacharya and Mitra 1989, 1990, 1991).

In developing countries, a large workforce is employed in the service sector due to lack of employment opportunities in the manufacturing sector, resulting from the adoption of labour-saving technological changes, factor market imperfections and rapid increases in the labour force. It is also occasionally argued that only a small proportion of service sector employment in the developing countries is a function of the income elasticity of demand for services, and majority of it is believed to be a manifestation of excess supplies of labour relative to demand. Another view is that an increase in manufacturing activity leads to rise in service sector employment due to the fact that income growth originating from the expansion of manufacturing activity raises the consumption of services and also the demand for service inputs into manufacturing. Therefore, growth of employment in service activities is viewed

purely as either a supply-push phenomenon or rationalising its growth in terms of 'demand-induced' hypothesis.

Bhattacharya and Mitra (1997), based on a cross-country analysis, suggest that the impact of per capita income on the percentage share of service sector in total work force is positive, though it tends to stabilise at higher stages of development. Sarkar and Mehta (2006) point out that the growth of the Information and Communication Technology (ICT) sector has led to the emergence of a 'New Economy' in India, which has been a generator of new jobs for technical persons, and has been helping to earn foreign exchange through exports and attracting foreign investment. Though it is predominantly an urban activity, in rural areas, the telecommunication segment of ICT does provide employment. Given this rise in employment in some specialised services, Rakshit (2007) observed that, despite high growth, labour absorption in services as a whole has been abysmally low.

On the contrary, with certain demographic changes, such as population ageing, the purchase of certain personal services shows an increasing tendency. Realising its importance, Elfring (1989) and Bhattacharya and Mitra (1997) also classified the services sector into four categories—bureaucratic services, distributive services, consumer services and producer services.

4 DATA AND MACROECONOMIC VIEW

The data on GDP and its components for India are taken from National Accounts Statistics (NAS) for various years at 2004–05 constant prices published by the Central Statistical Organisation (CSO),[1] India. The economy in this analysis is broadly divided into six sectors: agriculture (AGR); industry (IND); trade, hotels, restaurants (THR); transport, storage and communication (TSC); financing, insurance, real estate and business services (FIRB); and community, social and personal services (CSP).[2] As time series data on employment are not available, employment by sector of industry of origin is calculated by various rounds of Employment and Unemployment Situation in India of the National Sample Survey Organisation (NSSO). Because 1987–88 was a severe drought period, any analysis relating to output or employment would throw up a distorted picture and so the 43rd round figures are ignored. The data on sectoral employment for the earlier NSS rounds are not comparable, so the data on employment for the 50th, 55th, 61st and 66th rounds of the NSS are taken. It is to be noted that that the total labour force is estimated by the labour force participation rate (LFPR) for a relevant round of NSS of the total population. Similarly, total number of workers is obtained by first calculating work force participation rate (WFPR) or the worker population ratio (WPR) for rural and urban persons of the relevant rounds of NSS of the total population category. Here employment is measured on the basis of the data on the usual principal and subsidiary status (UPSS) approach. In this approach, the status

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[1] This paper uses data from *National Accounts Statistics: Back Series 1950–51 to 2004–05*, published by Central Statistical Organisation, Ministry of Statistics and Programme Implementation.

[2] The abbreviations for the sectors like agriculture; industry etc. will be used henceforth.

Table 1 Sectoral shares in India's GDP

India	Year	Sectors of GDP			Activity			
					Sub-sector of services			
		AGR	IND	SER	THR	TSC	FIRB	CSP
All India	1993–94	28.32	26.79	44.88	12.62	5.45	13.27	13.51
	1999–00	23.28	26.87	49.85	14.55	6.64	14.02	14.51
	2004–05	19.03	27.92	53.04	16.06	8.42	14.70	13.83
	2009–10	14.62	28.08	57.29	16.39	10.15	17.17	13.56

Source: National Accounts Statistics, Central Statistical Organisation, EPW Research Foundation (2010), various rounds of NAS data

of activity on which a person spent relatively longer time of the preceding 365 days from the date of survey is considered as the principal usual status activity of the person. Accordingly, a person is considered 'working or employed' if the person was engaged for a relatively longer time during the past year in any one or more work-related activities (economic activities).

4.1 Sectoral shares of GDP and employment in different sectors in India

In 1993–94, the share of agriculture accounted for 28 per cent, the share of industry accounted for 26 per cent and that of services accounted for 44 per cent of GDP. During the 1993–94 to 2009–10, the share of agriculture in GDP declined by 14 percentage points, while that of the industrial and services sectors increased by 2 and 13 percentage points respectively, as envisaged from Table 1.

For the share of sub-sector of services, the maximum share of service sector output comes from the FIRB sector, followed by THR. While the share of all the sub-sectors of services in GDP has been increasing, CSP services showed a declining share.

Table 2 reports the share of total employment in all the sectoral economic activities in India. In 1993–94, agriculture accounted for 64 per cent of total employment in India, industry accounted for 15 per cent and services for about 21 per cent. From 1993–94 to 2009–10, the share of the agriculture in total employment declined by 12.8 percentage points, while that of the industrial and services sectors increased by 7.1 and 5.7 percentage points, respectively.

For the share of services sub-sector, the maximum share of service sector employment comes from the THR, followed by TSC, followed by FIRB services for India. During the past two decades since liberalisation in 1991, the sharp increase in the share of the services sector production in India has not been accompanied by a corresponding increase in the share of services in employment.

The sectoral shares in total employment in India show a pattern that the share of agriculture in GDP and employment has been falling and the share of industry and services has been rising in post-liberalisation India. In spite of the continuous fall in the share of agriculture in employment, it still absorbs about 50–60 per cent of the

Table 2 Sectoral share in India's total employment

India	Year	Activity						
		Sectors of GDP			Sub-sector of services			
		AGR	IND	SER	THR	TSC	FIRB	CSP
All India	1993–94	64.0	15.0	21.0	7.6	2.8	1.0	9.6
	1999–00	60.3	16.3	23.5	10.3	3.7	1.2	8.4
	2004–05	56.5	18.9	24.6	10.8	4.0	1.7	8.1
	2009–10	51.2	22.1	26.7	11.4	4.5	2.3	8.6

Source: Employment and unemployment situation in India, various rounds of NSSO

workforce. More precisely, 51 per cent of people are employed in agriculture, which produces an output of 14 per cent, while 22 per cent of people engaged in industrial sector produced an output of 28 per cent in India in 2009–10. In the services sector, 57 per cent of the production absorbed only about 26 per cent of the labour force in 2009–10. Therefore, even if India were to be considered as a service-oriented country in terms of total production, it still remains primarily agrarian in terms of its occupational structure.

4.2 Growth of output, employment and employment elasticity of services in GDP

However, traditionally, the service sector has been believed to be highly labour intensive and, hence, economic growth that has been stepped up mainly because of the service sector is then expected to have generated employment opportunities. However, in the Indian context, the gross estimates of employment elasticity defined as the employment growth relative to the value-added growth do not seem to be impressive. Simply stated, it indicates the employment per unit of output.

$$Employment\ Elasticity = \frac{\%\ change\ in\ employment}{\%\ change\ in\ output}$$

Table 3 presents the aggregate and sectoral employment elasticity for India during the last four rounds of the NSS at the aggregate as well as the sectoral levels based on the UPSS criteria. Employment has grown at an average annual rate of 2 per cent in India during the past two decades from 1993 to 1994, and this could be regarded as an important record; as such an employment growth has not been recorded by most countries in recent years. In fact, most countries in general and developed countries in particular have had a low employment rate in recent years.[3] In case of developing countries, the average employment growth was at roughly

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[3] According to the ILO data, most of the developed countries saw an increase of less than 1% per annum in their employment during the 1990s. It was 0.45% in the United States, 0.18% in the United Kingdom, 0.32% in France, 0.41% in Germany and –0.15% in Japan.

Table 3 Growth of GDP, employment and employment elasticity (India)

Activity	Rate of growth of GDP			Rate of growth of employment			Employment elasticity		
	1993/ 94–1999/00	1999/ 00–2004/05	2004/ 05–2009/10	1993/94–1999/ 2000	1999/ 00–2004/05	2004/ 05–2009/10	1993/ 94–1999/00	1999/ 00–2004/05	2004/ 05–2009/10
Agriculture	21.6	8.2	16.2	2.0	12.1	−2.6	0.09	1.48	−0.16
Industry	48.4	37.5	52.1	1.1	13.8	25.5	0.02	0.37	0.49
Services	64.4	40.8	63.3	10.9	24.3	11.9	0.17	0.60	0.19
All sectors	47.6	32.3	51.2	4.3	16.1	8.5	0.09	0.50	0.17

Source: National Accounts Statistics, Central Statistical Organisation, EPW Research Foundation (2010), Various rounds of NSSO data, Employment and unemployment situation in India, various rounds of NAS data

about 1.5 per cent per annum and India's noteworthy record on employment growth, however, has not been adequate enough to be able to absorb the faster growth of labour force.

Long-term employment growth over the period of past two decades has been about 2 per cent per annum, but it is seen to show a declining trend over the decades. In between these decadal periods, some fluctuations were noted in shorter periods of 5 years. Of these, a sharp rise in employment growth during 1999–2000 to 2004–05 to about 3.2 per cent per annum and over 1 per cent per annum for the period 1993–94/2004–05 is striking. The most favourable interpretation of this upturn in employment growth in the post-2000 period is that of the inevitable teething troubles of the economic reforms which led to the slow growth of employment initially were over by 2000 and globalisation started having its beneficial effect on employment with the start of the millennium. A slowdown in employment growth is revealed during 2004–05/2009–10 by the 66th round of the NSSO survey.

The long-term trend in the decline in the rate of employment growth is largely noteworthy as it has accompanied acceleration in the rate of economic growth. Thus, during 1993–94/1999–2000, GDP grew at 7.8 per cent per annum, while employment grew by only 0.7 per cent; again during 1999–2000/2004–05, GDP grew at 6.2 per cent per annum, while employment grew at 3.2 per cent; finally during 2004–05/2009–10, GDP grew at about 10 per cent, while employment grew by 1.2 per cent per annum. The declining trend in the employment content of growth is clearly visible in terms of the values of employment elasticity in Table 3. The value of the elasticity has been 0.09 in 1993–94/1999–2000, increased to 0.50 in 1999–2000/2004–05, and finally decreased to 0.17 during 2004–05/2009–10.

Table 4 represents the growth of output, the growth of employment and the employment elasticities of different components of services for the India. In the service sector, both THR and TSC registered a growth of over 5 per cent per annum in the first growth spell. However, the employment growth declined over the other two spells. These trends are in line with the respective GDP growth rates, while the jump in employment growth is lower than in GDP growth, the fall in employment growth is deeper than GDP growth. The THR sector showed the highest growth in employment; even in the third spell, it registered a growth more than 6 per cent per annum. It appears that all sub-sectors of services except for the CSP sector have shown a reasonably high potential for employment generation.

However, it must be remembered that in most sub-sectors of services, while respective sectors has seen a high and increasing growth, employment growth has been declining. Though during 1993–94 to 2004–05, the growth of employment was somewhat notable but, on an average, in the post-liberalisation period, this employment growth is not at all remarkable. So, throughout the post-liberalisation period in India, until 2009–10, a rise in economic activity was not followed by a strong rebound in the labour market.

Table 4 Rate of growth of GDP, employment and employment elasticity

India	Activity	Rate of growth of GDP			Rate of growth of employment			Employment elasticity		
		1993/94–1999/00	1999/00–2004/05	2004/05–2009/10	1993/94–1999/2000	1999/00–2004/05	2004/05–2009/10	1993/94–1999/00	1999/00–2004/05	2004/05–2009/10
All India	THR	70.46	46.01	54.33	34.82	18.95	16.58	0.49	0.41	0.31
	TSC	79.94	67.84	82.36	36.79	19.47	15.20	0.46	0.29	0.18
	FIRB	56.27	38.79	76.53	18.76	72.27	–8.75	0.33	1.86	–0.11
	CSP	60.30	25.12	48.22	–17.77	26.67	9.24	–0.29	1.06	0.19

Source: National accounts statistics, Central Statistical Organisation, EPW Research Foundation (2010), Various rounds of NSSO data, Employment and unemployment situation in India, various rounds of NAS data

5 GROWTH DECOMPOSITION ANALYSIS: METHODOLOGY

There are several methods for decomposing changes in GDP, but this paper uses Shapley (1953) decompositions. It has the advantage of being a relatively simple additive method, meaning that the total change in per capita GDP can be described in terms of the sum of the growth attributed to each of its components, of presenting a unified way of looking at all the components (employment and sectoral relocation of labour) and also of being less difficult in terms of data requirements. The aim of this methodology is to understand how per capita income growth is linked to changes in employment, output per worker and population structure at the aggregate level and by sectors. Traditional growth theory emphasises that growth is driven by industrialisation and by the re-allocation of labour from lower productivity activities to higher productivity sectors. Therefore, labour market dynamics are also driven by growth patterns at the sectoral level, such as productivity developments within different sectors and the movement of workers between sectors. The methodology is executed using the Job Generation and Growth (JoGGs) Decomposition tool; an Microsoft Excel-based macro-spreadsheet developed by the World Bank (2012). This tool enables the decomposition of GDP growth using consecutive steps along this box diagram (Figure 1).

Each step in the box diagram (Figure 1) is discussed in detail as follows:

Step 1: Understanding the aggregate growth and productivity profile of growth

To understand how growth has translated into increases in productivity and employment at the aggregate level and by sectors (or regions), note that per capita GDP, $Y/N = y$ can be expressed as

$$\frac{Y}{N} = \frac{Y}{E}\frac{E}{A}\frac{A}{N} \tag{1}$$

$$y = w * e * a \tag{2}$$

where Y is the total value added, E is the total employment, A is the total population of working age and N is total population. Here, $Y/E = w$ is the total output per worker, E/A is the share of working age population (i.e. the labour force) employed and A/N is the labour force as a fraction of the total population.

The term w will capture changes in output per worker, but increase in output per worker can come from relocation of jobs from bad job sectors (low productivity) to good job sectors (high productivity). The term e (defined as the employment rate) is measured by the ratio of total employment and the working age population.[4] Increases in employment rates would reflect both increases in participation and movements of people out of unemployment and into employment. The component a reflect changes in the demographic structure of the population.

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[4] Although employment rates as defined by the ILO measure the population that "participates" in the labour market that is employed, throughout this paper the term "employment rate" will refer to employment rate as a fraction of the working age population.
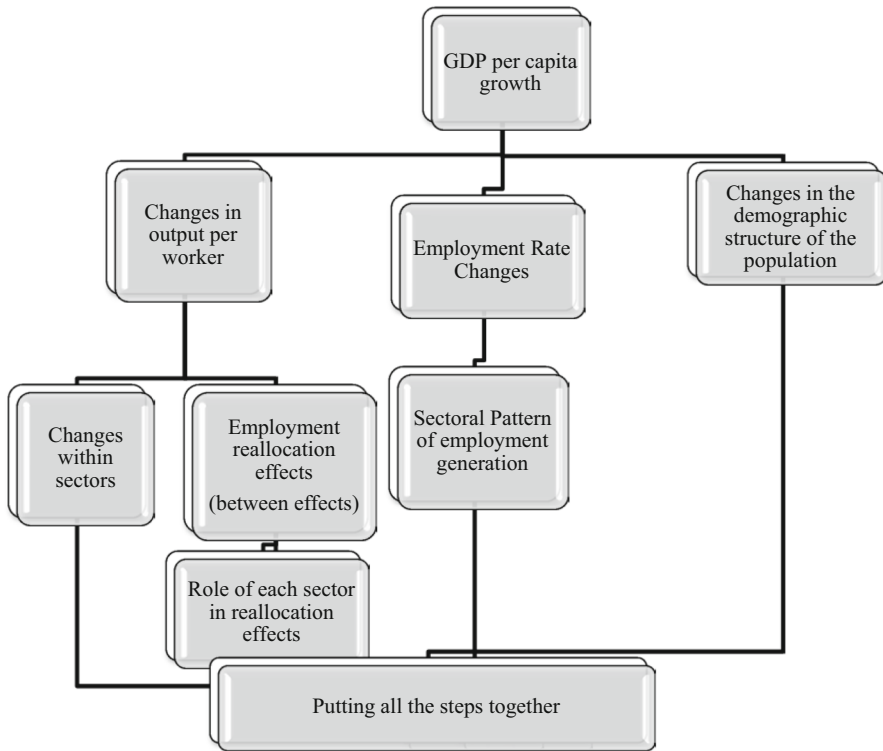
Fig. 1 Box diagram to show the scheme of changes in growth of GDP per capita using the shapley decomposition. *Source*: World Bank

Per capita GDP growth can be decomposed into growth associated with changes in output per worker, employment rates and the relative weight of the working age population. Since the decomposition is additive, the total change in per capita GDP will be the sum of the growth attributed to each of its components, w, e, and a. Therefore if w, e and a denote the fraction of growth linked to each component, then the growth can be expressed as

$$\Delta y = \bar{w} * \Delta y + \bar{e} * \Delta y + \bar{a} * \Delta y \qquad (3)$$

$\bar{w} * \Delta y$ will reflect the amount of growth that would be consistent with a scenario in which the employment rate e and the share of population of working age a stayed constant. In the same way, $\bar{e} * \Delta y$ will be the amount of growth consistent with a scenario in which output per worker w and the share of population of working age a had remained 'unchanged'. The amount of per capita growth linked to demographic changes will be $\bar{a} * \Delta y$.

Thus, changes in per capita GDP can be decomposed into changes in output per worker, changes in employment rates and changes in the share of the labour force. The relationship can be used to explore how changes in the components of per capita growth vary with changes in per capita growth itself. The Shapley

decomposition approach is based on the marginal effect on the value of a variable or indicator, of eliminating each of the contributory factors in a sequence. The method then assigns to each factor the average of its marginal contribution in all possible elimination sequences (Shorrocks 1999). Using the Shapley decomposition, total changes in per capita GDP will be equal to

$$\Delta y = \Delta w \left[\frac{e_{t=1}a_{t=1} + e_{t=0}a_{t=0}}{3} + \frac{e_{t=1}a_{t=0} + e_{t=0}a_{t=1}}{6} \right]$$
$$+ \Delta e \left[\frac{w_{t=1}a_{t=1} + w_{t=0}a_{t=0}}{3} + \frac{w_{t=1}a_{t=0} + w_{t=0}a_{t=1}}{6} \right] \quad (4)$$
$$+ \Delta a \left[\frac{w_{t=1}e_{t=1} + w_{t=0}e_{t=0}}{3} + \frac{w_{t=1}e_{t=0} + w_{t=0}e_{t=1}}{6} \right]$$

The first term in the summation will be the contribution of changes in output per worker, the second term the contribution of changes in the employment rate and the third term the contribution to changes in the demographic component.

This information can be used to present aggregate growth in terms of each of these components, where $\bar{w} = \Delta w \left[\frac{e_{t=1}a_{t=1}+e_{t=0}a_{t=0}}{3} + \frac{e_{t=1}a_{t=0}+e_{t=0}a_{t=1}}{6} \right]/\Delta y$ will be the fraction of growth that can be linked to changes in output per worker, $\bar{e} = \Delta e \left[\frac{w_{t=1}a_{t=1}+w_{t=0}a_{t=0}}{3} + \frac{w_{t=1}a_{t=0}+w_{t=0}a_{t=1}}{6} \right]/\Delta y$ will be the fraction of growth that can be linked to changes in the employment rate, and $\bar{a} = \Delta a \left[\frac{w_{t=1}e_{t=1}+w_{t=0}e_{t=0}}{3} + \frac{w_{t=1}e_{t=0}+w_{t=0}e_{t=1}}{6} \right]/\Delta y$ will be the fraction of growth that can be linked to changes in the share of total population that is of working age, and where the bar denotes the fraction of growth explained by the component.

Step 2: Understanding the role of each sector in employment generation

To understand the way in which sectors contributed to employment generation, the employment (rate) growth (Δe) by sectors is further decomposed. The total growth in employment is the sum of employment growth in each sector.

$$\Delta e = \sum_{i=1}^{s} \Delta ei \quad (5)$$

where $\Delta e_i = \Delta \frac{E_i}{A}$ is just the change in employment in sector i as a share of total working age population. Let $\bar{e}_i^e = \frac{\Delta e_i}{\Delta_e}$ denote the fraction of the aggregate employment rate change that can be linked to changes in employment in sector i.

Step 3: Decomposing the changes in output per worker by sectors and between and within components

The decomposition provides a first step towards understanding, first, the role played by different sectors in changes in employment, and second, the role of and inter-sectoral shifts in explaining changes in output per worker, both at the aggregate level and by sectors. This amounts to doing a stepwise decomposition, first decomposing aggregate growth into employment and productivity changes, and then decomposing employment and productivity changes by sectors.

The decomposition can be easily extended to multiple sectors:

$$\frac{Y}{N} = \left(\sum_{i=1}^{s} \frac{Y_i}{E_i} \frac{E_i}{A} \right) \frac{A}{N} \tag{6}$$

Or its equivalent:

$$y = \left(\sum_{s} w_s * e_s \right) * a \tag{7}$$

where the sub-index s stands for the sector of economic activity.

The output per worker is further decomposed into sectoral employment shifts and changes in output per worker by sectors by noting that

$$\frac{Y}{E} = \left(\sum_{i=1}^{s} \frac{Yi}{E_i} \frac{E_i}{E} \right) \tag{8}$$

Or equivalently

$$w = \left(\sum_{i=1}^{s} w_i s_i \right) \tag{9}$$

where Y_i is the value added of sector $i = 1...S$, E_i is the employment in sector i, and E is the total employment. This means that $w_i = \frac{Y_i}{E_i}$ will correspond output per worker in sector i, $s_i = \frac{E_i}{E}$ is the share of sector i in total employment. This equation states that changes in output per worker are the weighted sum of changes in output per worker in all sectors, where the weights are simply the employment share of each sector.

Using the Shapley approach, changes in aggregate output per worker can be decomposed as

$$\Delta w = \sum_{i=1}^{s} \Delta w_i * \left(\frac{s_{i,t=0} + s_{i,t=1}}{2} \right) + \sum_{i=1}^{s} \Delta s_i * \left(\frac{w_{i,t=0} + w_{i,t=1}}{2} \right) = \Delta w_w + \Delta w_B \tag{10}$$

Each term $\Delta w_i * \left(\frac{s_{i,t=0} + s_{i,t=1}}{2} \right)$ corresponds to the change in output per worker due to changes in output per worker in sector s. The last term in the equation Δw_B can be interpreted as the change in output per worker due to inter-sectoral employment changes (i.e. net movements of workers between sectors). That is, employment movements from low-productivity sectors to high-productivity sectors should increase total output per worker, and the flows from high-productivity sectors to low-productivity sectors should reduce aggregate output per worker. If the last term is negative, it would mean that the relocation of employment by sectors was detrimental to overall productivity growth. Finally, the term Δw_w corresponds to total changes in output per worker net of relocation effects, which is also referred to as the 'within component'. That is, changes in total productivity due to changes in productivity within sectors.

The fraction of aggregate output per worker growth that can be linked to growth in output per worker in sector i is denoted as $\overline{w_i^w} = \Delta w_i * \left(\frac{s_{i,t=0} + s_{i,t=1}}{2} \right) / \Delta w$, where the supra-index implies that it is a contribution to growth in aggregate output per worker w, rather than a contribution to growth in output per capita y.

Similarly, the contribution of within-sector productivity growth is defined as $\overline{w_w^w} = \Delta w_w / \Delta w$ and the contribution of inter-sectoral shifts as $\overline{w_B^w} = \Delta w B / \Delta w$

Step 4: Understanding the role of each sector in inter-sectoral shifts

It is possible to understand further how changes in the share of employment in the different sectors help explain the overall contribution of inter-sectoral shifts to per capita growth or output per worker. Numerous studies have found that structural change, which is movements of labour force shares from low-productivity sectors to high-productivity sectors, is an important factor behind growth. Increases in the share of employment in sectors with above-average productivity will increase overall productivity and contribute positively to the inter-sectoral shift term. On the contrary, movements out of sectors with above-average productivity will have the opposite effect. Again, increases in the share of employment in sectors with below-average productivity shall reduce growth, while reduction in their share shall contribute positively to growth.

Using the aforementioned intuition, we can rewrite the intersectional shift term as

$$\Delta w_B = \sum_{i=1}^{s} \Delta s_i * \left(\frac{w_{i,t=0} + w_{i,t=1}}{2} - \frac{w_{t=0} + w_{t=1}}{2} \right) \tag{11}$$

The term in parenthesis is the difference between a sector i's productivity (averaged between the two periods) $\frac{w_{i,t=0} + w_{i,t=1}}{2}$ and the average productivity of the economy overall (note there is no sectoral sub-index i, to refer to the aggregate) $\frac{w_{t=0} + w_{t=1}}{2}$. Therefore, the contribution of sector i to the inter-sectoral shifts term will be $\Delta s_i * \left(\frac{w_{i,t=0} + w_{i,t=1}}{2} - \frac{w_{t=0} + w_{t=1}}{2} \right)$

Thus, if sector i has productivity below the average productivity, and increases its share S_i, its contribution will be positive, that is, outflows from this low-productivity sector have contributed to the increase in output per worker. If, by contrast, the sector sees an increase in its share, these inflows into this low-productivity sector will decrease output per worker and thus have a negative effect on the inter-sectoral shift term. The magnitude of the effect will be proportional to: a) the difference in the sector's productivity with respect to the average and b) the magnitude of the employment shift.

As before, the share of inter-sectoral shift that is explained by sector i is denoted by

$$\overline{s_i^{wB}} = \Delta s_i \left(\frac{w_{i,t=0} + w_{i,t=1}}{2} - \frac{w_{t=0} + w_{t=1}}{2} \right) / \Delta w_B \tag{12}$$

Step 5: Putting all the steps together

To sum up, the term $\bar{w}_s$ will denote the amount of growth that can be linked to productivity changes in sector s. The term $\bar{e}_s$ will denote the amount of growth that can be linked to changes in the share of employment of sector s.

$$\frac{\Delta y}{y} = \sum_s \bar{w}_s + \sum_s \bar{e}_s + \bar{a} \tag{13}$$

Aggregate growth can also be profiled in terms of sectoral growth, without discriminating between productivity and employment. In this simple case, the Shapley decomposition boils down to aggregate growth just being the sum of growth in each sector multiplied by the (average) share of the sector in total value added. This decomposition can thus be expressed as

$$\frac{\Delta y}{y} = \sum_s \overline{y_s} \tag{14}$$

and $\overline{y_s}$ would be the amount of growth that can be attributed to value-added growth in sector s.

Using the methodology described earlier, a growth episode can be profiled in three different ways by the vectors $((\bar{w}, \bar{e}, \bar{a}), (\bar{w}1, \bar{w}_2, \ldots w_s; \bar{e}_1, \bar{e}_2 \ldots \bar{e}_s; \bar{a})$ and $(\overline{y_1}, \overline{y_2}, \ldots, \overline{y_s})$. The first vector would profile growth according to aggregate productivity, employment and demographic changes. The second vector would profile growth according to changes in sectoral productivity, in sectoral employment shares and in aggregate demographic changes. And the final vector would profile growth according to its sectoral pattern.

6 RESULTS AND INTERPRETATION

The main summary statistics used for the aggregate decomposition, that is, output, employment and populations, as well as employment shares, output per worker, and share of population of working age, are presented in Table 5. India registered a growth rate of 30.20 per cent in per capita value added between 1993/94 and 1999/2000 (Spell I), which declined minimally to 22.48 per cent for the period 1999/00 to 2004/05 (Spell II) and again an increase to 38.57 per cent from 2004/05 to 2009/10 (Spell III). Growth was accompanied by an increase in the growth of output per worker (37.82 per cent), decrease in employment rate (5.32 per cent) and share of working age population (0.13 per cent) in the first growth spell. However, growth for the second spell was accompanied by an increase in the growth of output per worker (15.93 per cent), an increase in employment rates (1.74 per cent) and also an increase in the share of working age population (2.20 per cent). Growth in the third spell was accompanied by an increase in the growth of output per worker (48.32 per cent), with a huge decrease in employment rates (9.72 per cent) and a positive growth in the share of working age population (2.07 per cent).

Table 5 Employment, output, productivity and population in India

	1993–94	1999–00	2004–05	2009–10	% change 1993/94–1999/2000	% change 1999/2000–2004/05	% change 2004/05–2009/10
GDP (Rs.million)	1,518,179	2,246,276	2,971,465	4,493,743	48.0	32.28	51.23
Total population	883,277,022	1,003,756,525	1,084,140,072	1,183,187,262	13.6	8.01	9.14
Total population of working age	506,628,646	574,423,541	644,279,857	727,660,166	13.4	12.16	12.94
Total number of employed	369,642,744	396,823,217	452,812,467	461,696,354	7.4	14.11	1.96
GDP per capita	17,188	22,379	27,408	37,980	30.20	22.48	38.57
Output per worker	41,072	56,606	65,622	97,331	37.82	15.93	48.32
Employment rate	72.96	69.08	70.28	63.45	-5.32	1.74	-9.72
Share of population of working age	57.36	57.23	59.43	61.50	-0.13	2.20	2.07

Source: Table summarised using JoGGs Decomposition tool with CSO and NSSO data
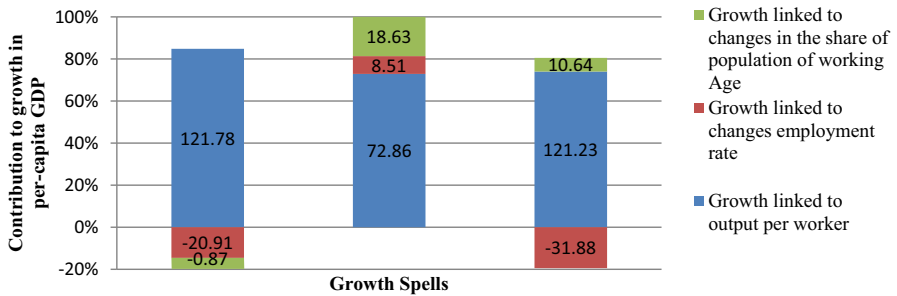
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Fig. 2 Decomposition of total growth in per capita GDP (%). *Source*: Figure summarised from tables using JoGGs decomposition tool with CSO and NSSO data

Table 5 presents the data; Figure 2 describes the decomposition of growth in per capita GDP in the three growth spells. In India, the rate of growth of output per capita has been mainly due to the influence of the growth of output per worker, which is positive for all the three growth spells. However, growth linked with changes in the employment rate has been negative except for the second growth spell for the three spells under consideration. Again, growth linked with the share of the population of working age has been negative in the first growth spell, positive in the second and third growth spells.

In other words, had everything else stayed the same, change in productivity alone would have generated a growth equivalent to 121 per cent of the actual observed growth for 1993/94 to 1999/2000. Because we are constructing a counterfactual in which we assume that the output per worker faced the same employment rate and share of population of working age in both periods, productivity increased per capita output by 36.5 per cent. Changes in employment were important, accounting for some negative 31 per cent of the observed growth during 2004/05 to 2009/10, thus growth in India was 'jobless' growth. This means that if productivity had stayed the same and the number of dependents per working age member had also remained constant, the higher rate of employment would have generated a negative growth of 12 per cent in the last growth spell. This completes the first step of the stepwise decomposition analysis.

The second step starts with Table 6 presenting the data summary on employment per sector. It is already seen that total employment grew by 7.35 per cent, 14.11 per cent and 1.96 per cent, but the employment rate grew by only —5.32 per cent, 1.74 per cent and –9.72 per cent respectively in the three growth spells under consideration. The first and the third growth spells have shown negative changes in growth of the employment rate, while the second growth spell saw a positive change in growth rate of employment. The table confirms that the growth of employment in THR, TSC and FIRB sectors have been positive for the three growth spells. The growth of employment rate in the three spells for India is negative for AGR and CSP sector. The industrial and service sectors, except that of CSP, have faily shown some positive growth in terms of employment rate, though small, the negative contribution of employment in AGR is so huge that it overshadows the positive effect of these sectors, leading to huge negative contribution to the changes in the

Table 6 Employment by sectors of economic activity in India

	Total employment			Employment/pop. of working age		
	Growth Spell I % change	Growth Spell II % change	Growth Spell III % change	Growth Spell I % change	Growth Spell II % change	Growth Spell III % change
AGR	1.02	6.97	−7.67	−10.90	−4.62	−18.25
IND	16.93	32.08	19.47	3.13	17.76	5.78
THR	44.97	20.16	7.35	27.86	7.13	−4.95
TSC	39.51	26.24	13.58	23.04	12.55	0.56
FIRB	31.92	63.56	36.02	16.35	45.82	20.43
CSP	−6.90	10.74	8.21	−17.89	−1.27	−4.19
Total	7.35	14.11	1.96	−5.32	1.74	−9.72

Source: Table summarised using JoGGs Decomposition tool with CSO and NSSO data

employment rate. Thus, deceleration in agriculture was mainly responsible for the overall declining contribution of employment rate, despite the modest acceleration in industry and services sector during the period.

Table 7 shows the results of the second step of the stepwise sectoral decomposition discussed earlier. The table shows how the −5.32, 1.74 and −9.72 percentage points of growth in the employment rates calculated was distributed among the different sectors. The sectors, IND, THR, TSC and FIRB, are responsible for most of the increase in the growth of total employment rate during the three growth spells. However, the per cent contribution of the sector to total employment rate growth for AGR and CSP sector has been of the same sign as that of the growth of employment rate.

Figure 3 illustrates the decomposition in percentage contribution. The same logic of Shapley decomposition can be interpreted as the per capita growth consistent with a counterfactual scenario, in which everything else such as productivity, demographics and employment in the remaining sectors had remained unchanged, the only change is in the employment in that sector.

As growth of total employment rate is negative in growth spells I and III, a negative growth rate contribution of employment for sectors such as financing, insurance, real estate and banking contributes positively and affect the total employment growth of the economy. Therefore, for the first growth spell, AGR and CSP contributed negatively to employment rate growth, but IND and all sub-components of service sector have contributed positively to employment growth, the maximum given by the THR sector. For the second growth spell, AGR and CSP contributed negatively to employment rate growth, but IND and all sub-components of service sector have contributed positively to employment growth, the maximum given by the IND sector.

For growth spell II, growth of employment rate is positive; hence, the decomposition implies that if all the sectoral employment would have remained unchanged along with the output per worker and demographic factor, agriculture alone would have contributed to a negative 160 per cent of the total employment

Table 7 Contribution of sectors to total change in employment rate in India

	Contribution to change in total employment rate (per cent points) Spell I	Per cent contribution of the sector to total employment rate growth Spell I	Contribution to change in total employment rate (per cent points) Spell II	Per cent contribution of the sector to total employment rate growth Spell II	Contribution to change in total employment rate (per cent points) Spell III	Per cent contribution of the sector to total employment rate growth Spell III
AGR	−5.10	131.4	−1.93	−160.5	−7.25	106.1
IND	0.34	−8.8	2.00	166.6	0.77	−11.2
THR	1.54	−39.7	0.50	42.0	−0.38	5.5
TSC	0.47	−12.2	0.32	26.4	0.02	−0.2
FIRB	0.12	−3.0	0.38	31.6	0.25	−3.6
CSP	−1.26	32.4	−0.07	−6.1	−0.24	3.5
Total employment rate	−3.88	100.0	1.20	100.0	−6.83	100.0

Source: Table summarised using JoGGs decomposition tool with CSO, census and NSSO data
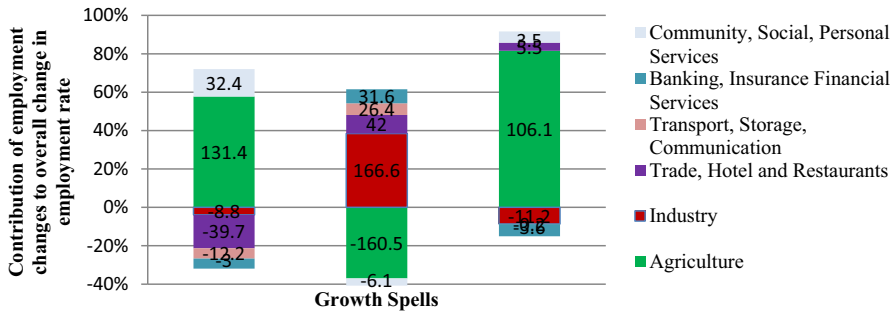
Fig. 3 Contribution of employment changes to overall change in employment rate in India. *Source:* Figure summarised from tables using JoGGs decomposition tool with CSO and NSSO data

growth rate. The displacement of unskilled workforce from agriculture was much larger than the absorption of relatively skilled labour force engaged in manufacturing, industry and services such as banking insurance and TSC, which recorded higher growth during the period.

Again, for growth spell III, AGR, THR and CSP contributed negatively to employment rate growth, but IND and all sub-components of service sector have contributed positively to employment growth, the maximum given by the IND sector. The FIRB sector has always contributed positively to the total employment rate growth in the three growth spells.

Table 8 shows the contribution of sectoral employment changes to growth in total per capita output. Out of the total contribution of the per cent of total change in per capita GDP, which is negative to all the first and third growth spells, the sectors that have contributed positively to (value added) are IND, THR, TSC and FIRB. In

Table 8 Contribution of employment changes to overall change in per capita GDP in India

	Contribution to change in per capita GDP	Per cent of total change in per capita GDP	Contribution to change in per capita GDP	Per cent of total change in per capita GDP	Contribution to change in per capita GDP	Per cent of total change in per capita GDP
	Spell I	Spell I	Spell II	Spell II	Spell III	Spell III
AGR	−1425.9	−27.5	−686.8	−13.7	−3574.5	−33.8
IND	95.5	1.8	712.8	14.2	377.9	3.6
THR	431.3	8.3	179.9	3.6	−185.0	−1.7
TSC	132.3	2.5	113.0	2.2	7.9	0.1
FIRB	32.5	0.6	135.1	2.7	121.5	1.1
CSP	−351.1	−6.8	−26.0	−0.5	−117.5	−1.1
Total Contribution	−1085.4	−20.9	427.9	8.5	−3369.7	−31.9

Source: Table summarised using JoGGs decomposition tool with CSO and NSSO data

Table 9 Changes in output per worker by sectors in India

	1993/94	1999/2000	2004/05	2009/10	% change Spell I	% change Spell II	% change Spell III
AGR	18,160	21,857	22,099	27,810	20.36	1.10	25.84
IND	73,569	93,351	97,160	123,686	26.89	4.08	27.30
THR	68,423	80,454	97,766	140,552	17.58	21.52	43.76
TSC	79,755	102,866	136,767	219,591	28.98	32.96	60.56
FIRB	560,063	663,419	562,960	730,641	18.45	−15.14	29.79
CSP	57,699	99,344	112,245	153,743	72.18	12.99	36.97
Total output per worker	41,072	56,606	65,622	97,331	37.82	15.93	48.32

Source: Table summarised using JoGGs Decomposition tool with CSO and NSSO data

all the other sectors, employment contracted thus having a negative effect on growth.

The third step of the stepwise decomposition begins with Table 9, which presents output per worker for the four years and three growth spells under consideration. Mostly, all the sectors except FIRB services in the second spell saw increases in output per worker. Therefore, at the aggregate as well as at the sectoral level, the growth in per capita output would have increased much more due to growth linked with output per worker at the aggregate if employment rate and share of the working age population remained unchanged.

Table 10 shows the contribution of each sector as well as that of inter-sectoral employment shifts to the observed growth in total output per worker. All the sectors except FIRB in the second growth spell have contributed positively to the increase in change in total output per worker for all the growth spells with a positive effect of inter-sectoral labour relocation in the three growth spells. The fact that inter-sectoral shifts had a positive contribution means that, on average, labour moved from lower-than-average productivity sectors to above-average productivity sectors.

To summarise, all the sectors saw increases in output per worker, and given their large share in total employment, it had important positive effects on aggregate output per worker. Inter-sectoral shifts, which capture movement of labour between sectors, exerted a positive effect on output per worker in all the three growth spells, which means that on average labour moved from low-productivity to high-productivity sectors. Thus, it appears that between-sector labour shifts have been largely positive in all the growth spells, while the within-sector shifts, though positive, are comparatively less significant. The within-sector shifts of labour for different growth spells, however, exhibited variations across sub-sectors, and this may be due to changes in production structures that have taken place during the process of growth.

Table 11 shows the contribution of changes in output per worker and inter-sectoral shifts to total growth in per capita value added. Except for FIRB in the second spell, all the other sectors contributed positively to per cent of total change in

Table 10 Decomposition of output per worker into within-sector changes in output per worker and inter-sectoral shifts in India 1993/94–2009/10

	Contribution to change in total output per worker Spell I	Contribution to change in total output per worker (%) Spell I	Contribution to change in total output per worker Spell II	Contribution to change in total output per worker (%) Spell II	Contribution to change in total output per worker Spell III	Contribution to change in total output per worker (%) Spell III
AGR	2,298.5	14.8	140.9	1.6	3,074.7	9.7
IND	3,091.4	19.9	669.6	7.4	5,432.6	17.1
THR	1,072.0	6.9	1,819.6	20.2	4,734.9	14.9
TSC	747.4	4.8	1,304.9	14.5	3,539.8	11.2
FIRB	1,121.5	7.2	-1,462.4	-16.2	3,356.0	10.6
CSP	3,738.9	24.1	1,060.0	11.8	3,461.7	10.9
Inter-sectoral shift	3,465.2	22.3	5,483.3	60.8	8,109.0	25.6
Total change in output per worker	15,534.9	100.0	9,016.0	100.0	31,708.7	100.0

Source: Table summarised using JoGGs Decomposition tool with CSO and NSSO data

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Table 11 Contribution of within-sector changes in output per worker and inter-sectoral shifts to change in GDP per capita in India 1993/94–2009/10

	Contribution to change in GDP per capita	Per cent of total change in GDP per capita	Contribution to change in GDP per capita	Per cent of total change in GDP per capita	Contribution to change in GDP per capita	Per cent of total change in GDP per capita
	Spell I	Spell I	Spell II	Spell II	Spell III	Spell III
AGR	935.3	18.0	57.3	1.1	1242.7	11.8
IND	1257.9	24.2	272.2	5.4	2195.7	20.8
THR	436.2	8.4	739.6	14.7	1913.8	18.1
TSC	304.1	5.9	530.4	10.5	1430.7	13.5
FIRB	456.3	8.8	−594.4	−11.8	1356.4	12.8
CSP	1521.4	29.3	430.9	8.6	1399.1	13.2
Inter–sectoral shift	1410.0	27.2	2228.7	44.3	3277.5	31.0
Total contribution to change in per capita GDP	6,321.3	121.8	3,664.6	72.9	12,816.0	121.2

Source: Table summarised using JoGGs decomposition tool with CSO and NSSO data

GDP (value added) per capita, with a positive inter-sectoral shift. Therefore, there has been a shift in labour from low-productivity sectors such as agriculture to high-productivity sectors such as industry and service sectors such as THR, TSC and FIRB.

In the fourth step, it is necessary to understand how changes in the share of employment in the different sectors help explain the overall contribution of inter-sectoral shifts to per capita growth or output per worker. Once the contribution of each sector to changes in output per worker linked to employment relocation effects is calculated, the amount of total per capita growth that can be linked to relocation effects in each sector is further calculated. Table 12 illustrates the results of this exercise. Movements into agriculture, which is a lower-than-average productivity sector, have a negative shift in employment share and a positive effect in productivity, while movements of labour into manufacturing and all sub-sectors of services, which have above-average productivity, also had a positive effect on productivity (contributed positively to the between component of productivity changes). However, for the CSP services, average output per worker is more than aggregate productivity of the economy, but the change in employment share has been negative, thereby contributing negatively to overall productivity growth.

Table 13 shows the contribution of each term to the inter-sectoral shift or between components of productivity changes (Figure 4).

Figure 5 is the pictorial representation of the role of inter-sectoral shifts to overall growth in per capita income. The maximum positive contribution of inter-

Table 12 Understanding the role of inter-sectoral employment shifts in India

	Average output per worker Spell I	Change in employment share (per cent points) Spell I	Sectoral contribution to inter-sectoral shift component Spell I	Average output per worker Spell II	Change in employment share (per cent points) Spell II	Sectoral contribution to inter-sectoral shift component Spell II	Average output per worker Spell III	Change in employment share (per cent points) Spell III	Sectoral contribution to inter-sectoral shift component Spell III
AGR	20,009	-0.038	1089.77	21,978	-0.038	1475.06	24,954	-0.053	3017.30
IND	83,460	0.013	461.97	95,255	0.026	875.93	110,423	0.032	937.49
THR	74,438	0.027	680.17	89,110	0.005	151.95	119,159	0.006	214.74
TSC	91,310	0.008	357.81	119,817	0.004	228.02	178,179	0.005	445.43
FIRB	611,741	0.002	1254.43	613,189	0.005	2862.39	646,800	0.006	3238.47
CSP	78,521	-0.013	-378.95	105,794	-0.002	-110.03	132,994	0.005	255.63
Aggregate	48,839		3465.20	61,114		5483.32	81,477		8109.05

Source: Table summarised using JoGGs decomposition tool with CSO and NSSO data

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Table 13 Decomposition of Inter-sectoral shifts

Sectoral contributions	Direction of employment share shift Spell I	Contribution to inter-sectoral shifts (per cent) Spell I	Direction of employment Share shift Spell II	Contribution to inter-sectoral shifts (per cent) Spell II	Direction of employment share shift Spell III	Contribution to inter-sectoral shifts (per cent) Spell III
AGR	−	31.45	−	26.90	−	37.21
IND	+	13.33	+	15.97	+	11.56
THR	+	19.63	+	2.77	+	2.65
TSC	+	10.33	+	4.16	+	5.49
FIRB	+	36.20	+	52.20	+	39.94
CSP	−	−10.94	−	−2.01	+	3.15
Total Contribution of inter-sectoral shifts		100		100		100

India 1993/94–2009/10

Source: Table summarised using JoGGs decomposition tool with CSO and NSSO data
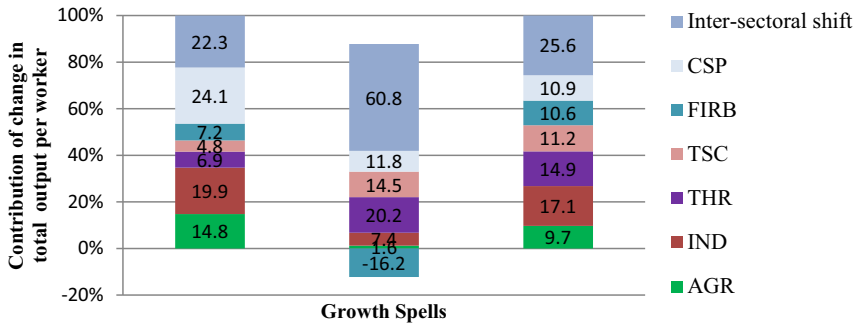
Fig. 4 Decomposition of output per worker into within-sector changes in output per worker and inter-sectoral shifts in India. *Source*: Figure summarised from tables using JoGGs decomposition tool with CSO and NSSO data
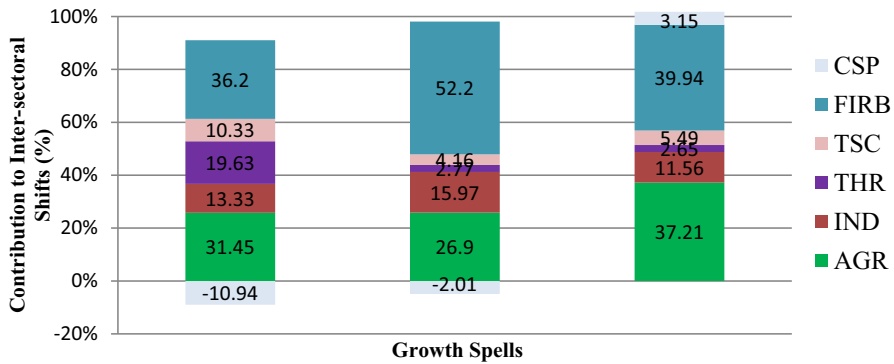

Fig. 5 Understanding the role of inter-sectoral shifts. *Source*: Figure summarised from tables using JoGGs decomposition tool with CSO and NSSO data

sectoral shift to per capita growth in GDP has been made by the FIRB sector, followed by AGR and then by the IND sector.

Finally, the last step of summing up is done in Table 14, which illustrates the results for India, in percentage contribution and in constant prices of 2004–05, respectively. The demographic component accounts negative 0.87 per cent, a positive 19 per cent and again a positive 11 per cent of the change for the three growth spells. The other 100.87 per cent is explained by an increase in output per worker within sectors (94 per cent), a decrease in the share of working age population employed (–20.91 per cent), and a positive effect of labour relocation (27.16 per cent) for the period 1993/94 to 1999/2000. Again, the other 82 per cent is explained by an increase in output per worker within sectors (29 per cent), an increase in the share of working age population employed (8.5 per cent), and a positive effect of labour relocation (44 per cent) for the next period 1999/2000 to 2004/05. In the last growth spell, the other 89 per cent is explained by an increase in output per worker within sectors (90 per cent), an decrease in the share of working age population employed (–32 per cent), and a positive effect of labour relocation

Table 14 Growth decomposition of total growth in GDP per capita: India

Sectoral contributions	Spell I				Spell II			
	Contribution of within-sector changes in output per worker (%)	Contribution of changes in Employment (%)	Contributions of inter-sectoral shifts (%)	Total (%)	Contribution of within-sector changes in output per worker (%)	Contribution of changes in Employment (%)	Contributions of inter-sectoral shifts (%)	Total (%)
AGR	18.02	−27.47	8.54	−0.91	1.14	−13.65	11.92	−0.60
IND	24.23	1.84	3.62	29.70	5.41	14.17	7.08	26.66
THR	8.40	8.31	5.33	22.04	14.70	3.58	1.23	19.51
TSC	5.86	2.55	2.80	11.21	10.55	2.25	1.84	14.63
FIRB	8.79	0.63	9.83	19.25	−11.82	2.69	23.13	14.00
CSP	29.31	−6.76	−2.97	19.57	8.57	−0.52	−0.89	7.16
Sub-totals	94.62	−20.91	27.16	100.87	28.55	8.51	44.31	81.37
Demographic component				−0.87				18.63
Total				100.00				100.00
Total % change in value added per capita				30.20				22.48

Sectoral contributions	Spell III			
	Contribution of within-sector changes in output per worker (%)	Contribution of changes in Employment (%)	Contributions of inter-sectoral shifts (%)	Total (%)
AGR	11.76	−33.81	11.54	−10.52
IND	20.77	3.57	3.58	27.93
THR	18.10	−1.75	0.82	17.17
TSC	13.53	0.07	1.70	15.31
FIRB	12.83	1.15	12.38	26.36

Table 14 continued

Sectoral contributions	Spell III			
	Contribution of within-sector changes in output per worker (%)	Contribution of changes in Employment (%)	Contributions of inter-sectoral shifts (%)	Total (%)
CSP	13.23	−1.11	0.98	13.10
Sub–totals	*90.23*	*−31.88*	*31.00*	*89.36*
Demographic component				10.64
Total				100.00
Total *% change in value added per capita*				38.57

Source: Table summarised using JoGGs decomposition tool with CSO and NSSO data

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(31 per cent). While looking across sectors, the biggest positive role was played by the IND, THR, TSC, FIRB but AGR played a negative contribution in all the three growth spells.

From Table 14, it is apparent that the negative contributions by the changes in employment in most of the sectors such as agriculture and community social and personal services, and a negative inter-sectoral shift for CSP services, the massive positive growth linked with output per worker in all the sectors have been able to contribute a positive total growth in per capita income.

7 CONCLUSION

This paper analyses the nature of transformation of employment in the service sector and its unmatched growth in relation to economic growth of services. The sectoral shares in total employment in India reveal that the share of agriculture in total employment has fallen and the share of industry and services has risen in post-liberalisation India. In spite of the continuous fall in the share of agriculture in employment, it still absorbs about 50–60 per cent of the workforce. More precisely, 51 per cent of people are employed in agriculture, which produces an output of 14 per cent, while 22 per cent of people engaged in industrial sector produce an output of 28 per cent in India in 2009–10. In the services sector, 57 per cent of the production absorbs only about 26 per cent of the labour force in 2009–10. Therefore, even if India were to be considered as a service-oriented country in terms of total production, it still remains primarily agrarian in terms of its occupational structure.

However, traditionally, the service sector has been believed to be highly labour-intensive and, hence, economic growth that has been stepped up mainly because the service sector is then expected to have generated employment opportunities. Employment growth has been increasingly uneven, showing a deceleration in employment growth rates between 1993 and 2000, and acceleration since 2000. Employment growth in the secondary sector has been relatively high, in fact, the highest among the three broad sectors of economic activities during 1993–94/2009–10. Growth in the primary sector, as expected, has been the lowest with the sharpest decline; it, in fact, turned negative during the last growth spell. Employment growth in the service sector has been relatively high but has initially increased and then declined in the three growth spells. Therefore, the sectoral composition of employment, largely unaltered for nearly two decades, has changed perceptibly since the economic liberalisation of 1991, and particularly since 2000. The share of the agricultural sector has declined, to the benefit of the services sector—especially the trade, transport and construction sub-sectors. The growth of employment in the service sector has been relatively high. THR and TSC both registered a growth of over 5 per cent per annum in the first growth spell, declined over the other two spells. FIRB showed the highest growth in employment, even in the third spells, it registered a growth of more than 6 per cent per annum. All sub-sectors of services except CSP have shown a reasonably high potential for employment generation. India's noteworthy record on employment growth, however, has not been adequate enough to be able to absorb the faster growth of labour force.

Comparing growth of GDP and employment, GDP grew at 7.8 per cent per annum, while employment grew by 0.7 per cent per annum in the first spell; GDP grew at 6.2 per cent per annum, while employment grew at 3.2% per annum in the second spell, while GDP grew at around 10 per cent per annum, while employment grew by 1.2 per cent per annum in the third spell. However, in the Indian contextm the gross estimates of employment elasticity defined as the employment growth relative to the value-added growth do not seem to be impressive. Therefore, in the post-liberalisation period until 2009–10, the pickup in economic activity was not followed by a strong rebound in the labour market.

The growth decomposition exercise illustrates that the main cause of growth in per capita GDP in post-liberalisation India has been mainly the massive growth in output per worker across all sectors over the three growth spells. The contribution of growth associated with employment rate has been mostly negative, but it was positive in the second growth spell. The most favourable interpretation of this upturn in employment growth in the post-2000 period is that of the inevitable teething troubles of the economic reforms which led to slow growth of employment initially were over by 2000 and globalisation started having its beneficial effect on employment with the start of the millennium. The demographic component effect on growth has been mostly positive for India.

When looking across sectors, the biggest positive role was played by the IND, THR, TSC and FIRB, but AGR played a negative contribution in all the three growth spells. It is also apparent that the negative contributions by the changes in employment in most of the sectors such as AGR, and CSP, and a negative inter-sectoral shift for CSP, the massive positive growth linked with output per worker in all the sectors have compensated to have a positive total growth in per capita income. The manufacturing and service sectors except that of CSP have fairly shown some positive growth in terms of employment rate, though small, the negative contribution of employment in AGR is so huge that it overshadows the positive effect of these sectors, leading to huge negative contribution to the changes in the employment rate. Therefore, the growth in India's per capita GDP has been mainly in the sub-sectors of services except community social and personal services.

While these analyses correspond to simple orders of magnitude, the nature of the crisis lies in the fact that relatively high rates of economic growth in India had limited employment intensity. Though there has been a shift from the low-productivity sectors to high-productivity sectors, the employment generation is not been adequate to absorb the huge labour force. On the other hand, if technological change, macroeconomic conditions and labour supply issues are also considered, there is little doubt that the "employment challenge" faced by India is, at least to some extent, a consequence of the prevailing pattern of structural change.

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