The Indian Journal of Labour Economics (2021) 64:247–279
https://doi.org/10.1007/s41027-021-00314-0

ARTICLE

India's Deepening Employment Crisis in the Time of Rapid Economic Growth

Ajit K. Ghose[1] · **Abhishek Kumar**[2]

Accepted: 22 April 2021 / Published online: 9 June 2021

Abstract
The employment conditions in India were steadily deteriorating in the 2000s. Agriculture not just stopped accommodating new workers but was increasingly rendering many of the already employed workers—mostly less educated—redundant. Meanwhile, non-agriculture was generating employment at an increasingly slower pace and was also generating it basically for the educated. So, it was failing to absorb the labour moving out of agriculture. Under these conditions, progressive exclusion of the less educated from employment and decelerating employment growth of the educated emerged as the main trends, which showed up in declining employment rate, rising unemployment rate and, ironically enough, steady improvement in the average quality of employment. All this was happening in a period of rapid economic growth. The proximate explanation is that growth was less rapid than the skill-biased technological change that was associated with it. The deeper reason is that the benefits of growth accrued to a thin top layer of the population—the rich.

Keywords Employment · Skill-bias · Economic growth · Inequality

1 Introduction

The observed pattern of change in employment conditions in India in recent periods has justifiably aroused widespread concern. Employment conditions, it turns out, actually worsened quite substantially during 2011–2017, a period of high economic growth.[1] Apparently, growth has been exclusionary and hence unaccompanied by development.

[1] See Kannan and Raveendran (2019) and Mehrotra and Parida (2019).

Abhishek Kumar is an independent researcher based in New Delhi.

✉ Ajit K. Ghose
ghose.ajit@gmail.com

[1] Institute for Human Development, New Delhi, India

[2] New Delhi, India

In this paper, we take a close look into the evolution of employment conditions during a slightly longer period: 2011–2018.[2] We also do a review of employment trends over a much longer period (1999–2018) so as to place the developments during 2011–2018 in a context of longer-term developments. Furthermore, we examine the links between the observed employment trends and the pattern of growth of India's economy. We have three distinct but related objectives: one, to assess the extent of deterioration in employment conditions during 2011–2018; two, to determine whether the worsening of employment conditions during 2011–2018 represents a wholly new development or a continuation (and perhaps intensification) of longer-term trends; and, three, to develop an understanding of why the employment conditions have been worsening in a period of high economic growth.

Our empirical assessment of the employment trends is based on a database built from the unit-level information available from four surveys conducted by the National Sample Survey Organisation (NSSO): the 55th, 61st and 68th Rounds (conducted respectively during 1999–2000, 2004–2005 and 2011–2012) of The Employment and Unemployment Survey (EUS) and the recent Periodic Labour Force Survey (PLFS) conducted during 2018–2019.[3] Since these surveys generally underestimate population, we derive key ratios and proportions (such as labour force participation rate, employment rate, and so on) from the surveys and use these together with estimates of population based on data available from the Population Censuses to derive the absolute numbers relating to labour force and employment.

As the NSSO surveys cover July-to-June years (e.g. July 2011–June 2012) and use a reference period of the preceding year, we take the survey data (i.e. the ratios and proportions that we shall be using) to refer to 1 July of the first year (e.g. data from the 2011–2012 survey to refer to 1 July 2011).[4] So, we use census-based estimates of adult (aged 15 or more years) populations (of rural male, rural female, urban male and urban female) on 1 July of the years 1999, 2004, 2011 and 2018 together with the ratios and proportions derived from the surveys to estimate the absolute numbers.[5]

We should mention a few other points about the data used in the paper. The first is that we use estimates of employment according to: Usual Principal Status (UPS), Usual Subsidiary Status (USS) and Usual Principal and Subsidiary Status (UPSS). Persons are employed according to UPS if they have been engaged in economically gainful activities for the major part (180+ days) of the reference year. Persons are employed according to USS if they have been engaged in economically gainful

[2] Data from a more recent survey have now become available.

[3] PLFS was first conducted during 2017–2018 and then again during 2018–2019. We have examined the data from both surveys but have used only the data from the 2018–2019 survey in our analysis in this paper. The data from the 2017–2018 survey, however, are presented in the "Appendix 2" (Tables). And a brief analysis of the developments between the two years is presented in "Appendix 1".

[4] The NSSO Surveys actually use several reference periods (a year, a week and each day of a week) thereby generating four different definitions, and hence four different estimates, of employment and unemployment. For a detailed discussion, see Ghose (2016), Box 1.1 (p. 4). In this paper, however, we shall be using only the data collected by using the reference period of one year.

[5] The issues involved in the choice of a reference date for the survey data are discussed by Nath and Basole (2020), who argue that this should be 1 June of the first year.

activities for a minor part (30–180 days) of the reference year. Persons are employed according to UPSS if they are employed either according to UPS or according to USS, i.e. if they have been engaged in economically gainful activities for at least 30 days in the reference year. Persons engaging in economically gainful activities for less than 30 days in the reference year are not counted as employed; they could be either unemployed or out of the labour force.

We shall refer to the first two categories of employment respectively as *full- time* employment and *part-time* employment. Admittedly, these terms represent approximations rather than accurate descriptions (we only know that persons employed according to UPS have worked for more than 180 days in a year, for example), but their use helps avoid repeated use of UPS and USS as prefixes. Employment according to UPSS, which is our primary focus in this paper, will be referred to simply as employment. As for unemployment, we shall consider only that according to UPSS: persons in unemployment are those who did not work even for 30 days in the reference year but were looking or available for employment for at least 30 days. We can, therefore, simply use the terms 'unemployment' and 'unemployed' without adding any prefixes. The justification for using only this definition of unemployment is the following. Some of the persons who are unemployed according to UPS—persons who did not work for the major part of the reference year but were looking or available for employment for the major part—usually are found to be employed according to USS. Clearly, these persons would prefer *full-time* employment and can thus be considered as underemployed. But we cannot consider them as unemployed unless we choose to exclude *part-time* employment altogether from our analysis, which we do not do.

A second point we need to mention is that we have slightly modified the data available from the 61st Round of the EUS as we have very good reasons to believe that it erroneously overestimated a particular kind of employment—unpaid family work in rural areas.[6] Both the unmodified and modified estimates for 2004 are given in "Appendix" Table 5, the note to which explains the nature and method of the modification.

Finally, the analysis of the pace and pattern of economic growth relies on estimates of output (value added at constant prices) at national and sector levels available from the National Accounts Statistics produced by the National Statistical Office. These data refer to financial years (April–March) and we can reasonably consider them to hold for the mid-point of each of the financial years (e.g. consider the data for 2011–2012 to be actually for 1 September 2011). This means that there is a slight anomaly between the data on employment (which refer to 1 July) and the data on output (which refer to 1 September), but we do not believe this introduces serious distortions.

The other point we should mention is that for estimation of growth rates of the economy and its sectors, we have used the old series (with 2004–2005 as the base year) of national accounts data for the period 1999–2011 and the new series (which uses 2011–2012 as the base year and a slightly altered methodology of estimation) for the period 2011–2018. We believe that the growth rates for the two periods, though they lack strict comparability, do not give a misleading picture.

[6] See Ghose (2013) and Kapsos et al (2014) for discussions of these reasons.

The paper is structured as follows. In the section that follows, we seek to empirically establish the core employment trends and some remarkable associated developments. As our objective is to analyse rather than to merely describe, our discussion of the trends is selective rather than comprehensive.[7] In the next section, we examine the relationship between the core employment trends and output growth at the level of the aggregate economy as also in the broad sectors in an effort to understand why high economic growth was associated with worsening employment conditions. The final section states the main conclusions and offers some reflections on the growth process in India's economy, which produced the employment outcomes that we observe.

2 Evolution of Employment Conditions, 1999–2018

2.1 The Main Trends

There is little room for doubting that employment conditions in India worsened substantially between 2011 and 2018 (see Tables 1 and 2).[8] The average annual growth of *full-time* employment was a miserable 0.7 per cent. And *part-time* employment recorded a dramatic decline (by 10 per cent per annum). Thus, total employment showed near-zero growth. At the same time, the adult non-student population—the pool of potential workers—was growing at 1.8 per cent per annum. So, the employment rate (defined with reference to the non-student population) declined sharply, from 61.6 per cent in 2011 to 54.5 per cent in 2018. And the open unemployment rate recorded a sharp increase from just 2.2 per cent in 2011 to 5.7 per cent in 2018.

This substantial worsening of employment conditions during 2011–2018, however, was to a large extent the end result of the trends that had set in right from the beginning of the millennium. The growth of *full-time* employment was decelerating throughout the period 1999–2018; it declined from 1.9 per cent during 1999–2004 to 1.1 per cent during 2004–2011 and then to 0.7 per cent during 2011–2018. The growth of *part-time* employment was also decelerating throughout the period 1999–2018 though the deceleration between 2011 and 2018 was shockingly large. Till 2011, the growth of total employment was decelerating just as rapidly as the growth of *full-time* employment (it declined from 2 per cent during 1999–2004 to 1.1 per cent during 2004–2011) but then, after 2011, decelerated more sharply because of the drastic decline in *part-time* employment. Thus, the employment rate declined gradually from 65.2 per cent in 1999 to 61.6 per cent in 2011 and then sharply to 54.5 per cent in 2018.

It is clear that decelerating employment growth was the basic trend for the entire period 1999–2017 and that the employment conditions were, in fact, deteriorating

[7] Thus, we do not consider employment trends separately in organised and unorganised sectors, in rural and urban areas, of males and females, and of persons belonging to different caste/religious groups.

[8] Employment conditions showed a little deeper worsening during 2011–2017 than during 2011–2018. This is explained by the fact that the conditions improved a little between 2017 and 2018. See "Appendix 1" for a brief discussion of the trends between 2017 and 2018.

Table 1 Employment: the basic trends-1

	Number of persons (millions)				Growth rate (per cent per annum)		
	1999	2004	2011	2018	1999–2004	2004–2011	2011–2018
Full-time employment	355.1	389.9	421.4	441.7	1.9	1.1	0.7
Part-time employment	28.4	33.4	35.1	16.3	3.4	0.7	− 10.4
Employment	383.4	423.3	456.5	458.2	2.0	1.1	0.1
Non-student population	588.2	656.4	741.2	841.2	2.2	1.7	1.8
Population	639.1	717.5	842.8	968.0	2.3	2.3	2.0

The figures relate to persons aged 15 years or more

Source: Authors' estimates based on data in "Appendix" Table 23

Table 2 Employment: the basic trends-2

	1999	2004	2011	2018
Employment rate (%)	65.2	64.5	61.6	54.5
Unemployment rate (%)	2.3	2.4	2.2	5.7

The employment rates are defined with reference to the non-student population

Source: Authors' estimates based on data in "Appendix" Table 23

throughout this period (as evidenced by the declining employment rate). But the period 2011–2018 did witness a sharpening of the decelerating trend and, consequently, a deeper worsening of the employment conditions.[9] This period also witnessed a new development—a sharp rise in open unemployment. These are the trends and developments that we need to explore more fully and we do this below.

2.2 The Decelerating Employment Growth

Hidden behind the decelerating growth of employment was a growing education bias in job creation throughout the period 1999–2018 (Table 3). During 1999–2011, employment of persons with no education declined in absolute terms and the decline was faster during 2004–2011 than during 1999–2004. The growth of employment of persons with up-to-primary level education also decelerated very sharply: from a high 3.7 per cent during 1999–2004 to an insignificant 0.5 per cent during 2004–2011. In the more recent period (2011–2018), employment declined quite rapidly not only for persons with no education but also for persons with up-to-primary level education. Thus, progressive exclusion of the less educated from employment was an important part of the story of decelerating employment growth. The other part was decelerating growth of employment of persons with above-primary level education throughout 1999–2018.

[9] It is possible, indeed likely, that the shock delivered to the economy by the sudden demonetisation of 2016 had contributed to the worsening of the employment conditions during 2011–2017 though it is hard to establish this in empirical terms. However, see Lahiri (2020) for a discussion of the shock and some evidence of its adverse effect.

Table 3 The education bias: employment growth by education category

	Not literate	Up to primary	Up to secondary	Higher secondary and above
Total employment				
1999–2004	– 1.2	3.7	3.5	6.9
2004–2011	– 2.2	0.5	3.2	5.9
2011–2018	– 2.8	– 2.6	2.3	3.4

Source: Authors' estimates based on data in "Appendix" Table 23

A stark view of the nature and consequences of the education bias in job creation emerges if we divide the employed into just two groups: the less educated (those with either no schooling or up-to-primary level education) and the educated (those with above-primary level education).[10] We can then see very clearly that, throughout the period since 1999, a process of shrinking employment opportunities for the less educated has existed alongside a process of expanding employment opportunities for the educated (Table 4). Moreover, while the pace of decline of employment of the less educated has been accelerating over time, the pace of expansion of employment of the educated has been decelerating.

The decelerating growth of employment in the economy has been the combined outcome of these two parallel processes. During 1999–2004, employment increased for both the less educated and the educated, but it increased by just 8 million for the less educated and by 32 million for the educated; overall, employment increased by 40 million (i.e. by 8 million per year on average). During 2004–2011, employment of the less educated declined by 20 million while that of the educated increased by 53 million; overall, employment increased by 33 million (i.e. by less than 5 million per year on average). During 2011–2018, employment of the less educated declined by 42 million while that of the educated increased by 44 million so that, overall, employment increased by just two million (or by less than 0.3 million per year on average).

What is remarkable in all this is not the education-biased employment growth *per se*; we expect the share of the educated in employed population to be rising since the share of the educated in non-student population has also been rising. The remarkable facts are: (i) that, for the less educated, the decline in the number in employment was much faster than the decline in non-student population and (ii) that, for the educated, the increase in the number in employment was significantly slower than the increase in non-student population. Both facts get reflected in declining employment rates for all education categories (Table 5).[11] And the second fact explains the rise in the unemployment rate, as we shall see below.

[10] The division, of course, is unavoidably arbitrary. We could define "the educated" as those with secondary- and-above level of education or as those with higher-secondary-and above level of education. We have checked that use of these alternative definitions would not substantially alter the arguments and conclusions. In Indian conditions, however, we judge it appropriate to regard persons with middle-level education as educated. Detailed information is available in the "Appendix" Tables.

[11] Noticeably, the employment rate dispersion across education levels was rising. For example, the gap between the "not literate" and the "higher secondary and above" increased from 7 percentage points in 1999 to 13 percentage points in 2018.

Table 4 The education bias and employment growth

	Number of persons (in millions)				Change in number (in millions)		
	1999	2004	2011	2018	1999–2004	2004–2011	2011–2018
Employment of							
Less educated	256.1	264.0	244.4	202.1	7.9	– 19.6	– 42.3
Educated	127.4	159.3	212.1	256.1	31.9	52.9	44.0

Less educated—persons with 0–5 years of education; educated—persons with more than 5 years of education

Source: Authors' estimates based on data in "Appendix" Table 23

Table 5 Level of education and employment rate (percentages)

	1999	2004	2011	2018
Not literate	62.2	59.7	55.2	45.3
Up to primary	67.5	67.2	64.2	57.8
Up to secondary	67.3	67.4	64.8	58.8
Higher secondary and above	69.2	69.6	65.4	58.0

Employment rates are defined with respect to non-student populations

Source: Authors' estimates based on data in "Appendix" Table 23

2.3 The Rise in Open Unemployment

Why did the rate of open unemployment increase so sharply during 2011–2018 while it had remained stable at a low level over a long period up to 2011 (Table 6)? In 2018, just as in all the preceding years, open unemployment was confined very largely to the educated. Persons with above-primary education accounted for 89 per cent of all unemployed in 2018. The corresponding figures were 84 per cent in 1999, 82 per cent in 2004 and 85 per cent in 2011.[12] The increase in open unemployment between 2011 and 2018, therefore, could only have resulted from a sharp increase in unemployment of the educated. That this was the case is quite clear from Fig. 1 below. In all the years, the rate of unemployment is observed to be rising with the rising level of education. But in 2018, there was a spike in unemployment of persons with above-middle-level education.

To see the trends in starker terms, we can consider, once again, just the two categories—the less educated and the educated. The unemployment rate for the less educated was 0.7 per cent in 2011 and 1.6 per cent in 2018 while, for the educated, it was 3.9 per cent in 2011 and 8.8 per cent in 2018 (Table 6). Between 1999 and 2011, it is worth noting, the unemployment rate for the less educated had remained

[12] The unemployed have always been not just "educated" but "young and educated". The unemployment rate has always been high for the "educated persons aged between 15 and 29 years" but insignificant for the "educated persons aged 30 or more years". See Ghose (2016), Box 2.1 (p. 27). Much of the unemployment, therefore, is "educated youth" unemployment. This should not come as a surprise. We should expect the fresh entrants into the labour force to always face much higher unemployment than those who have been in the labour force for some time.

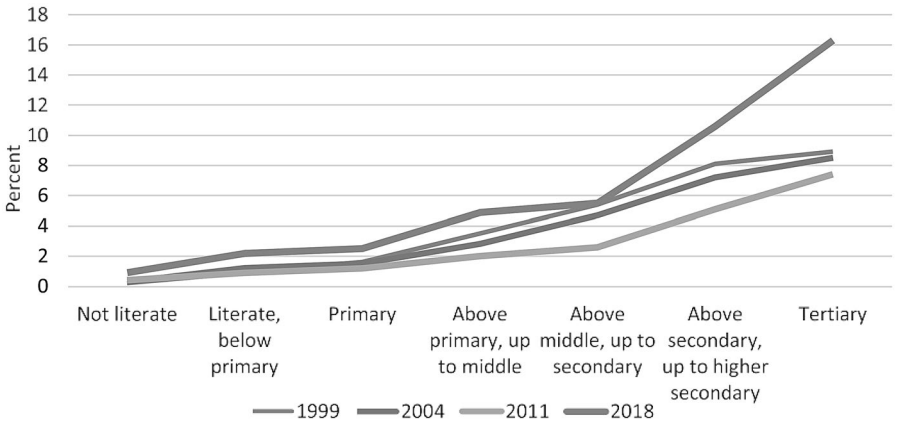

Fig. 1 Unemployment rate by education category. *Source* (*data*): Authors' estimates based on data in "Appendix" Table 23

Table 6 Unemployment

	1999	2004	2011	2018
All unemployed (number in million)	9.2	10.4	10.3	27.9
Less educated	1.5	1.9	1.6	3.2
Educated	7.7	8.5	8.7	24.7
Unemployment rate (%)	2.3	2.4	2.2	5.7
Less educated	0.6	0.7	0.7	1.6
Educated	5.6	5.0	3.9	8.8

Source: Authors' estimates based on data in "Appendix" Table 23

virtually constant; it was 0.6 per cent in 1999, 0.7 per cent in 2004 and 0.7 per cent in 2011. On the other hand, the unemployment rate for the educated had shown a declining trend during this period; it was 5.6 in 1999, 5.0 in 2004 and 3.9 per cent in 2011. The overall unemployment rate had remained stable at just over 2 per cent throughout 1999–2011.

It is a remarkable fact that, for the less educated, the number in unemployment had shown only a small increase (of less than 2 million) between 2011 and 2018 even though a large number of them (42 million) had actually suffered loss of employment. It suggests that less-educated persons, when confronted with loss of employment, went out of the labour force rather than join the ranks of the unemployed. Thus, for the less educated, labour force growth simply adjusted to employment growth so that the labour force participation rate followed the employment rate (Fig. 2 and Table 7). A similar adjustment is observed to have taken place during 2004–2011 when *the* employment of the less educated had also declined in absolute terms (by 20 million) and yet the number in unemployment had actually declined (by 0.1 million).

All this stands in sharp contrast with what used to happen in the past when, for the less educated, it was employment growth that adjusted to labour force growth in a context where the scope for work sharing (*part-time* employment) was large. That was why, for this category of workers, employment growth was always positive (since labour force growth was always positive), open unemployment was always insignificant and underemployment was always significant. In the period since 1999, it is labour force growth that seems to have been adjusting to employment growth in a context where the scope for work sharing has been dwindling (so that underemployment has been declining). The effect on unemployment remains the same as before: open unemployment of the less educated remains insignificant. But an increasingly larger proportion of the less educated non-student population now stays out of the labour force. So, a new question now arises: how do the less educated survive when they lose employment and move out of the labour force? Loss

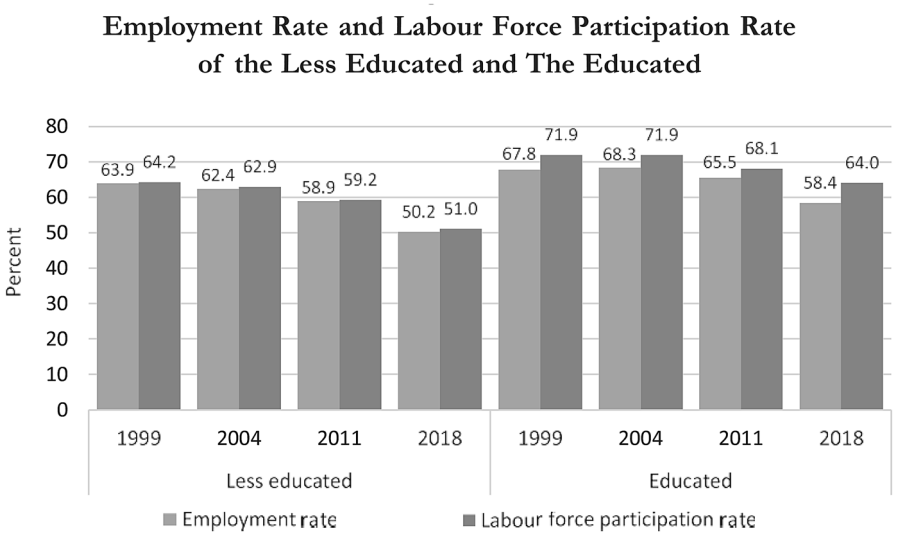

Fig. 2 Employment rate and labour force participation rate of the less educated and the educated. *Source* (*data*): Authors' estimates based on data in "Appendix" Table 23

Table 7 Growth (% P.A.) of employment, labour force and population

	Less educated			Educated		
	1999–2004	2004–2011	2011–2018	1999–2004	2004–2011	2011–2018
Total employment	0.6	– 1.1	– 2.7	4.6	4.2	2.7
Total labour force	0.6	– 1.1	– 2.5	4.5	4.0	3.5
Non-student population	1.1	– 0.3	– 0.4	4.5	4.9	4.3

Less educated—persons with 0–5 years of education; educated—persons with more than 5 years of education

Source: Authors' estimates based on data in "Appendix" Table 23

of employment means not just loss of income but also a simultaneous increase in the dependency ratio (the average number of persons that an employed less educated person must support) for those remaining in employment. The likely consequence is stalled decline (or even increase) in the incidence of poverty.

For the educated, too, both the employment rate and the labour force participation rate were declining, but the declines were not synchronised. During 2004–2011, the employment rate declined by 3 percentage points while the participation rate declined by 4 percentage points so that the unemployment rate actually declined. During 2011–2018, the employment rate declined by 7 percentage points while the participation rate declined by 4 percentage points so that the unemployment rate increased quite sharply. Thus, in the case of the educated, the labour force participation rate either did not adjust or adjusted only partially to the employment rate; when confronted with non-availability of jobs, the educated mostly remained in the labour force and joined the ranks of the unemployed. As a rule, therefore, the declining employment rate was associated with both declining labour force participation rate and a rising unemployment rate. Between 2011 and 2018, employment of the educated increased by 44 million but this fell seriously short of the increase in the educated labour force (60 million) so that the number in unemployment increased by 16 million at the same time. And the increase in educated labour force itself fell seriously short of the increase in educated non-student population (112 million).

We can sum up the findings as follows. For the less educated, declines in employment rate tend to induce matching declines in labour force participation rate. For the educated, declines in employment rate tend to induce declines in labour force participation rate together with increases in the unemployment rate. The sharp increase in the overall unemployment rate during 2011–2018 essentially reflected the effect of the sharp decline in the employment rate of the educated.

2.4 Improvement in Average Quality of Employment

While the overall employment conditions were worsening, the average quality of employment was improving throughout 1999–2018. This can be discerned from the changing weights of the different types of employment (that are found to exist in India) in total employment. Regular-formal employment is salaried employment that also offers entitlement to some form of social security benefit. Regular-informal employment is salaried employment that offers no entitlement to any kind of social security benefit. Casual employment is employment on a daily basis for a daily wage. Self-employment is engagement in work in own enterprise that generates output and income for those engaged.

In terms of quality, these four types of employment fall into a neat hierarchical order: regular-formal employment is best-quality, regular-informal employment is second-best-quality, self-employment is third-best-quality, and casual employment is worst-quality.[13] The change in the average quality of employment during a period can thus be read from the changes in the shares of these different types of employment in total employment (Table 8).

[13] See Ghose (2016), pp. 26–29 for discussion and evidence.

The data in Table 8 clearly suggest that the average quality of employment was improving throughout the period 1999–2018. The improvement derived basically from a growing regularisation of wage employment in the economy; the share of regular employment, formal and informal, in total employment was increasing while the share of casual wage employment was declining. The share of self-employment in total employment did not show a clear trend.[14]

The steady improvement in the average quality of employment can be read more readily from the changing values of a summary statistic—the Employment Quality Index (EQI); the higher the value of this Index, the higher is the average quality of employment.[15] These data, presented in Table 9, show not just that the average quality of employment was improving throughout 1999–2018, but, rather strikingly, also that the improvement was substantially larger during 2011–2018 than during 2004–2011.

All this appears rather puzzling at first sight. How could the average quality of employment have been improving when the overall employment conditions were worsening? And how could the average quality of employment have improved the most when the overall employment conditions also worsened the most? The answer lies in the fact that the very factors that worsened the overall employment conditions also improved the average quality of employment. The simultaneous processes of accelerating decline of employment of the less educated and decelerating growth of employment of the educated worsened the overall employment conditions but also improved the average quality of employment. As we have already seen, these trends had become much sharper during 2011–2018 than they had been during 1999–2011. Hence the period 2011–2018 also witnessed the largest improvement in the average quality of employment.

There has always been a systematic relationship between the type of employment and the educational status of the employed. Regular wage employment, formal and informal, has been and is held overwhelmingly by the educated while casual wage employment has been and is held overwhelmingly by the less educated (Table 10). Viewed in another way, a large section of the less-educated workers has been and still is in casual wage employment while a large section of the educated workers has been and still is in regular wage employment (Table 11). As a rule, therefore, growth of jobs for the educated means growth of regular wage employment, formal and informal, while a decline of jobs for the less educated means a decline of casual wage employment. Thus, simultaneous processes of declining employment of the less educated and increasing employment of the educated worsen aggregate employment conditions but also improve the average quality of employment at the same time.[16]

[14] Several observers have noted that the average quality of regular-formal employment itself has been on the decline in the 2000s. Despite this, however, regular-formal employment still remains the best-quality employment so that the trend in the average quality of employment can still be read from the changes in the shares of the different types of employment in total employment.

[15] See Ghose (2016), Box 2.3, p. 31 and Ghose (2019), Box 3.4, p. 67 for discussions.

[16] Note the implication that any observed improvement in the average quality of employment does not automatically mean improvement in overall employment conditions.

Table 8 Structure of total employment by type

	Percentage distribution			
	1999	2005	2012	2018
Type of employment				
Regular-formal		7.0	7.7	9.7
Regular-informal		9.2	11.3	14.1
Regular	15.0	16.2	19.0	23.8
Self	52.3	54.1	51.8	52.0
Casual	32.7	29.7	29.2	24.2
All types	100	100	100	100

Source: Authors' estimates based on data in "Appendix" Table 25

Table 9 Employment quality index (EQI)

	1999	2004	2011	2018
EQI		1.935	1.975	2.093
EQI*	1.897	1.946	1.993	2.115

EQI is simply the weighted average of the quality-ranks assigned to different types of employment and is estimated as (percentage share of regular-formal employment × 4 + percentage share of regular-informal employment × 3 + percentage share of self-employment × 2 + percentage share of casual employment × 1) / 100. The larger the value of EQI, the higher is the average quality of employment. For 1999, comparable data on formal employment is not available. So, we define EQI* as (percentage share of regular employment × 3.5 + percentage share of self-employment × 2 + percentage share of casual employment × 1) / 100 so that comparable estimates can be derived for all four years

Source: Authors' estimates based on data in Table 8

Table 10 Share (%) of the less educated in employment of different types

	1999	2004	2011	2018
Regular-formal employment		13.1	8.3	6.8
Regular-informal employment		41.9	34.2	28.5
Regular	28.9	29.5	23.7	19.7
Self-employment	66.7	62.3	53.6	46.1
Casual wage employment	84.4	81.1	73.2	64.1
Total employment	66.8	62.5	53.6	44.2

Source: Authors' estimates based on data in "Appendix" Table 24

2.5 The Evolution of Employment Conditions, 1999–2018: A Summary View

Progressive exclusion of the less educated from employment and decelerating employment growth of the educated were the two defining trends for the period since the beginning of the millennium. Employment of the less educated was

Table 11 Distribution of employed persons by type of employment (percentages)

	Less educated				Educated			
	1999	2004	2011	2018	1999	2004	2011	2018
Regular-formal		1.5	1.2	1.5		16.3	15.2	16.1
Regular-informal		6.2	7.2	9.1		14.3	16.0	18.1
Regular	6.5	7.7	8.4	10.6	32.2	30.6	31.2	34.2
Self-	52.1	53.9	51.7	54.2	52.4	54.4	51.9	50.2
Casual	41.4	38.4	39.9	35.2	15.4	15.0	16.9	15.6
	Not literate				Graduates and above			
	1999	2004	2011	2018	1999	2004	2011	2018
Regular-formal		0.8	0.7	0.9		40.7	40.9	40.8
Regular-informal		4.1	5.0	6.8		16.4	18.8	20.9
Regular	4.2	4.9	5.7	7.7	59.8	57.1	59.7	61.7
Self-	50.7	53.4	52.1	55.0	38.8	41.5	38.1	36.2
Casual	45.1	41.7	42.2	37.3	1.4	1.4	2.2	2.1

Source: Authors' estimates based on data in "Appendix" Table 24

declining at an increasing rate while employment of the educated was increasing at a declining rate. The employment rate (with respect to non-student population) was declining for both but it was declining faster for the less educated than for the educated. For the less educated, however, declining employment rate engendered declining labour force participation rate rather than rising unemployment rate; when confronted with employment loss, the less educated became "discouraged workers" and moved out of the labour force. For the educated, on the other hand, the declining employment rate was associated with both declining labour force participation rate and rising unemployment rate. When confronted with non-availability of jobs, only some of the educated moved out of the labour force while others joined the ranks of the unemployed. The large rise in unemployment between 2011 and 2018 was, in essence, a large rise in unemployment of the educated.

Ironically, while the overall employment conditions were worsening, the average quality of employment was actually improving. The reason that these two trends came to co-exist is that they were generated by exactly the same factors: progressive exclusion of the less educated and decelerating employment growth of the educated. It is striking but not surprising that the average quality of employment improved the most when the overall employment conditions worsened the most.

2.6 Economic Growth and Employment

Why were the employment conditions steadily worsening over a fairly long period of high economic growth? To answer this question, we need to analyse the pattern of employment growth across economic sectors and the associated movement of

workers across sectors to see how these relate to the employment trends discussed above. For, it is through an examination of the relationship between the pattern of employment growth across sectors and the pattern of output growth across sectors that we can develop an understanding of why growth performed so poorly in terms of employment generation.

2.7 Employment in Sectors and Inter-Sector Movement of Workers

Underlying the decelerating growth of employment in the economy were two striking trends in sector-level employment (Table 12). First, employment in agriculture has been declining at an increasing rate since 2004 (employment growth was close to zero during 1999–2004). Second, employment in non-agriculture has been increasing at a decreasing rate since 1999. These two trends seem to bear a remarkable resemblance to two other trends we noted earlier: that employment of the less educated has been declining at an increasing rate since 2004 and that employment of the educated has been increasing at a declining rate since 1999. The resemblance is not accidental; the two sets of trends were in fact closely related, as we shall see below.

The decline of employment in agriculture in the period since 2004 derived basically from the decline in casual employment, which has been falling at an accelerating rate since 1999. Self-employment recorded decelerating growth but not persistent decline. And regular employment has never been significant in agriculture so that the observed trends do not mean much.

In non-agriculture, the deceleration in employment growth during 2004–2011 was due solely to deceleration in the growth of self-employment. Casual employment recorded rapid growth in non-agriculture during this period; indeed, the

Table 12 Employment by sector

	Change (in millions)			Growth (per cent per annum)		
	1999–2004	2004–2011	2011–2018	1999–2004	2004–2011	2011–2018
Total (UPSS) employment	39.9	33.2	1.7	2.0	1.1	0.05
Regular	11.1	17.6	22.7	3.6	3.3	3.4
Self-	28.8	7.7	1.6	2.7	0.5	0.1
Casual	0.0	7.9	– 22.6	0.0	0.9	– 2.6
Agriculture	3.1	– 18.0	– 20.9	0.3	– 1.3	– 1.4
Regular	0.0	– 0.7	– 0.7	0.0	– 2.9	– 3.6
Self-	10.2	– 3.0	4.3	1.5	– 0.3	0.4
Casual	– 7.1	– 14.3	– 24.5	– 1.6	– 2.5	– 5.7
Non-agriculture	36.8	51.1	22.6	4.4	3.5	1.3
Regular	11.1	18.3	23.4	3.8	3.6	3.6
Self-	18.6	10.7	– 2.7	5.0	1.7	– 0.4
Casual	7.1	22.1	1.9	4.1	6.6	0.4

Source: Authors' estimates based on data in "Appendix" Table 25

Table 13 Trends in self-employment and casual employment in non-agriculture

	Change (in millions)		
	1999–2004	2004–2011	2011–2018
Self-employment	18.6 (5.0)	10.7 (1.7)	– 2.7 (– 0.4)
Manufacturing	5.5 (4.8)	3.1 (1.6)	– 5.1 (– 2.7)
Services	11.5 (4.8)	6.4 (1.6)	1.8 (0.4)
Casual employment	7.3 (4.2)	22.2 (6.6)	1.9 (0.4)
Construction	6.9 (8.8)	20.7 (10.7)	6.0 (2.0)

Figures in parentheses are average annual growth rates (percentages)

Source: Authors' estimates based on data in "Appendix" Table 25

Table 14 Growth of self-employment

	Change (in millions)			Growth (per cent per annum)		
	1999–2004	2004–2011	2011–2018	1999–2004	2004–2011	2011–2018
Economy						
Self-employed	28.8	7.7	1.6	2.7	0.5	0.1
Own account workers	23.4	9.6	16.2	3.7	0.9	1.5
Employers	2.4	0.5	3.6	10.1	1.1	6.3
Unpaid family workers	3.0	– 2.4	– 18.2	0.8	– 0.4	– 3.7
Agriculture						
Self-employed	10.2	– 3.0	4.3	1.5	– 0.3	0.4
Own account workers	8.0	0.1	15.0	2.3	0.0	2.6
Employers	0.7	0.0	0.8	5.1	0.0	3.2
Unpaid family workers	1.5	– 3.1	– 11.5	0.5	– 0.7	– 2.9
Non-agriculture						
Self-employed	18.6	10.7	– 2.7	5.0	1.7	– 0.4
Own account workers	15.4	9.5	1.2	5.4	1.9	0.2
Employers	1.7	0.5	2.8	17.2	2.2	8.6
Unpaid family workers	1.5	0.7	– 6.7	1.9	0.6	– 6.6

Figures in parentheses are average annual growth rates (percentages)

Source: Authors' estimates based on data in "Appendix" Tables 27 and 28

increase in non-agriculture outweighed the decline in agriculture so that casual employment in the economy recorded a positive growth. The sharp deceleration in employment growth in non-agriculture in the next period (2011–2018) resulted from the sharp deceleration in both self-employment growth and casual employment growth.

Within non-agriculture, the two sectors in which self-employment has traditionally been of much importance are manufacturing and services. In 2004, for example, self-employment accounted for 50 per cent of total employment in each of these two sectors and self-employment in the two sectors together accounted for 95 per

cent of total self-employment in non-agriculture.[17] Thus, the decelerating growth of self-employment in non-agriculture during 1999–2018 essentially reflected the decelerating growth of self-employment in these two sectors (Table 13). Noticeably, the deceleration was similar in the two sectors during 1999–2011 but was sharper in manufacturing than in services during 2011–2018.[18] Indeed, self-employment in manufacturing declined in absolute terms in the later period.

The only sector of non-agriculture in which casual employment has traditionally been of importance is construction.[19] In 2004, casual employment accounted for 78 per cent of total employment in construction, and the sector accounted for 51 per cent of total casual employment in non-agriculture. Naturally enough, the time-trend in casual employment in non-agriculture basically reflected the time-trend in casual employment in construction. Thus, between 2004 and 2011, casual employment increased by 22 million in non-agriculture when it increased by 21 million in construction alone (Table 13). Between 2011 and 2018, casual employment in construction increased by 6 million while this increased by just about 2 million in non-agriculture (implying a decline of 4 million in the rest of non-agriculture). As a matter of fact, casual employment in construction was growing at a rapid and accelerating rate during 1999–2011 but then the growth decelerated very sharply during 2011–2018. Here we need to note that expanding government programmes—rural employment guarantee schemes, rural housing schemes and rural roads schemes—had contributed much to the growth of casual employment in construction during 1999–2011.[20] These programmes did not expand much between 2011 and 2018.

One remarkable aspect of the decelerating growth of self-employment in the economy (in agriculture as well as in non-agriculture) is that this was due entirely to decelerating growth of unpaid family work (Table 14). In the aggregate economy, the number of unpaid family workers recorded little growth during 1999–2004 and was declining at an increasing rate after 2004. Thus, self-employment was increasingly becoming own account employment; the share of own account workers in all self-employed was 59 per cent in 1999, 62 per cent 2004, 64 per cent in 2011 and 70 per cent in 2018. Between 2011 and 2018, when the number of unpaid family workers declined by as much as 18 million, the number of own account workers increased

[17] Bulk (97 per cent) of the self-employment in non-agriculture was of course in unorganised or informal part, i.e. in informal manufacturing and informal services. See "Appendix" Table 25.

[18] Arguably, the adverse effect of demonetisation was stronger on informal manufacturing than on informal services.

[19] Again, bulk of the casual employment was in unorganised or informal construction. See "Appendix" Table 25.

[20] This can be seen from the fact that employment growth in construction was much faster in rural areas (10.3 per cent per annum during 1999–2004 and 12.3 per cent per annum during 2004–2011) than in urban areas (4.2 per cent per annum during 1999–2004 and 4.8 per cent per annum during 2004–2011). Employment in construction in rural areas as percentage of employment in construction in the economy was 56.8 in 1999, 63.5 in 2004 and 73.8 in 2011. During 2011–2018, employment growth in construction slowed down in both rural and urban areas (it was 2.4 per cent per annum in rural areas and 0.7 per cent per annum in urban areas) though it continued to be higher in rural areas. The rural share increased to 76 per cent in 2018.

by 16 million and the number of employers increased by 4 million.[21] These facts are of significance for two reasons. First, of the self-employed, the unpaid family workers had the lowest level of education. The decline of unpaid family work was thus consistent with the decline in the employment of the less educated. Second, the unpaid family workers, when they could no longer find work in family enterprises, were quite unlikely to look for wage employment outside the home. And this surely is one reason why, for the less educated, declining employment meant declining labour force.

The broad picture is now clear. In agriculture, the employment of less-educated workers—unpaid family workers and casual workers—was declining quite rapidly. While the unpaid family workers are likely to have moved out of the labour force following a loss of employment, the casual workers, having lost employment in agriculture, would have looked for jobs in non-agriculture. Between 1999 and 2011, construction was generating jobs at a very rapid pace and most of these jobs were casual. So, many of the casual workers who lost jobs in agriculture could and did move into casual wage employment in construction. After 2011, job growth in construction collapsed so that most of the casual workers who lost employment in agriculture had nowhere to go and were forced out of the labour force. Growth of self-employment—particularly of unpaid family work in non-agriculture was also decelerating rapidly between 1999 and 2018; it was negative and large during 2011–2018. Thus, throughout the period 1999–2018, employment opportunities for less-educated workers were rapidly dwindling in both agriculture and non-agriculture.

But, even for the educated, employment growth was decelerating in both agriculture and non-agriculture (Table 15). While regular jobs in non-agriculture were growing steadily and most of these jobs went to the educated, this did not ensure steady growth of employment of the educated in non-agriculture. For, a majority of the educated workers had in fact been in self-employment throughout the period (see Table 9 above) and the growth of self-employment was decelerating rapidly in both agriculture and non-agriculture. So, even for the educated, employment growth in the economy was decelerating throughout 1999–2018.

2.8 Economic Growth and Employment

That 1999–2018 was a period of high economic growth (at 6 per cent or more per annum) is evident from the data in Table 16. It is also clear that while growth was undoubtedly services-led throughout this period, it still was quite broad-based. The individual sectors, with very few exceptions (agriculture during 1999–2004 and construction during 2011–2018), recorded high growth. We must remember, of course, that there are problems of comparability of the growth rates for the period 1999–2011 with those for the period 2011–2018 since, for the later period, we have to use a new series of national accounts data (with a new base year and changed methodology of estimation). Some have argued that the data for the period after

[21] The trends, of course, would have looked different had we left the data for 2004 unmodified (see "Appendix" Table 27). Then, the number of unpaid family workers would have shown an inexplicable increase of 23.8 million between 1999 and 2004 and an equally inexplicable decline of 23.2 million between 2004 and 2011 (notice, too, how remarkably similar the two numbers are) with corresponding consequences for trends in self-employment and in total employment in the economy.

Table 15 Growth of employment of the educated in the economy

	Change (in millions)			Rate of growth (% per annum)		
	1999–2004	2004–2011	2011–2018	1999–2004	2004–2011	2011–2018
Regular employment	6.9	19.4	21.7	3.2	5.0	4.2
Self-employment	22.4	20.2	18.6	4.9	3.0	2.3
Casual employment	2.7	13.2	4.0	2.6	6.8	1.5
Total employment	32.0	52.8	44.3	4.6	4.2	2.8

Source: Authors; estimates based on data in "Appendix" Table 24

2011 are flawed so that there is a serious overestimation of growth rates.[22] The economy, moreover, suffered two shocks, delivered by the sudden demonetisation of 2016 and the introduction of the Goods and Services Tax in 2017, which are widely thought to have had serious adverse effects on national output.[23] And yet, the observed growth rates of output for the period 2011–2018 do not seem to suggest that the shocks mattered at all. This is no place for undertaking a thorough evaluation of national accounts statistics in light of these arguments, however, and we can do precious little beyond noting them as caveats.

This period of high growth, as it happens, was also a period of sharply declining employment intensity of growth. The data in Table 16 show that labour productivity growth was accelerating throughout the period and the ratio of labour productivity growth to output growth was rapidly rising so that the employment elasticity was rapidly declining.[24] Remarkably, this tendency is observed not just in the aggregate economy but also in both agriculture and non-agriculture. Indeed, it is observed in the major sectors of non-agriculture as well.[25]

The accelerating growth of labour productivity in agriculture is most likely to have been the result of increasing mechanisation of agricultural operations.[26] Accelerating growth of labour productivity in the broadly defined non-agricultural sectors (particularly in manufacturing and services), on the other hand, could conceivably have resulted from any or all of three possible developments: technological advances and associated increases in capital intensity in the constituent (narrowly defined) subsectors, changes in the structure of output involving increases in the shares of

[22] See Subramanian (2019a, b), and Morris and Kumari (2019).

[23] See Lahiri (2020) for discussion of the effects of de-monetisation.

[24] Employment elasticity, defined as the ratio of employment growth to output growth, equals [1—ratio of labour productivity growth to output growth]. Hence, rising ratio of labour productivity growth to output growth means declining employment elasticity.

[25] The exceptions are to be found in construction during 1999–2011, in "mining and utilities" during 1999–2018, and in services during 2011–2018.

[26] By 2015/16, percentages of agricultural operations mechanized were: soil working & seed bed preparation: 40; seeding and planting: 29; plant protection: 34; irrigation: 37; harvesting and threshing: 60–70 (for wheat and rice). See National Bank for Agriculture and Rural Development (NABARD), *Sectoral Paper on Farm Mechanization*, Mumbai, 2018.

Table 16 Growth of output (real value added) and employment

	Output growth (per cent per annum)			Employment growth (per cent per annum)			Ratio: productivity growth to output growth		
	1999–2004	2004–2011	2011–2018	1999–2004	2004–2011	2011–2018	1999–2004	2004–2011	2011–2018
Economy	6.0	8.1	6.8	2.0	1.1	0.1	0.667	0.864	0.985
Agriculture	1.4	3.6	3.2	0.3	− 1.3	− 1.5	0.786	1.306	1.469
Non-agriculture	7.1	9.0	7.5	4.4	3.6	1.3	0.380	0.611	0.827
Manufacturing	5.7	8.7	7.6	4.7	2.1	− 1.0	0.193	0.770	1.132
Construction	8.2	8.2	4.0	7.8	9.9	1.9	0.049	− 0.146	0.525
Mining and utilities	4.2	5.0	6.0	2.5	3.0	6.6	0.405	0.400	− 0.100
Services	7.6	9.6	8.1	3.6	2.5	2.0	0.526	0.760	0.753

In estimating output growth, the old National Accounts data series (base: 2004–2005) have been used for the period 2000–2012 and the new data series (base: 2011–2012) have been used for the period 2012–2018. Employment elasticity is defined as the ratio of rate of growth of employment to rate of growth of output

Source: Output growth—authors' estimates based on data in "Appendix" Tables 29 and 30; employment growth—authors' estimates based on data in "Appendix" Table 25

more technology-and-capital-intensive products, and increase in the share of large enterprises (which generally employ more technology-and-capital-intensive methods of production than small enterprises) in the sector's output. Empirical investigation into the extent and relative significance of these developments within the broad sectors of India's economy is beyond the scope of this paper. What we can say with some confidence is that the rapid and accelerating growth of output per worker that we observe to have occurred in the broad non-agricultural sectors of the economy during the period under study constitutes evidence of rapid technological advances and rising capital intensity—"skill-biased" technological change for short—resulting from some combination of the three possible developments listed above.

But this is only one part of the story. By itself, "skill-biased" technological change can engender education-biased employment growth but not a progressive exclusion of the less educated from employment nor decelerating growth of employment of the educated. This is where the phenomenon of the rising ratio of labour productivity growth to output growth comes into play. For, this shows that the demand growth in the economy (as reflected in output growth) persistently lagged behind the expansion of production potential generated by the "skill-biased" technological change (as reflected in labour productivity growth). And it is this persistent failure of effective demand to keep pace with productivity growth that explains the decelerating employment growth, which incorporated both the negative growth of employment of the less educated and the positive but decelerating growth of employment of the educated.

It is a remarkable fact that these employment trends are observed not just at the level of the economy but also in each of the broad sectors (Table 17). Employment of the less educated declined in agriculture during 1999–2004, in agriculture and services during 2004–2011 and in all sectors except "mining and utilities" (which employed very few less-educated workers) during 2011–2018.[27] And the growth of employment of the educated was steadily decelerating throughout 1999–2018 in all sectors except "mining and utilities", which employed few educated workers.[28] The rising trend in the ratio of labour productivity growth to output growth, we may recall, is observed not just in the aggregate economy but also in the broad sectors. The demand growth persistently lagged behind the potential supply growth even in the individual sectors.

3 Concluding Observations

In the early 2000s, India's economy reached a turning point very different from the Lewis turning point. Agriculture not just stopped accommodating new workers but was increasingly rendering many of the already employed workers—mostly

[27] In 2011, for example, "mining and utilities" employed less than 1 million less-educated workers when non-agriculture employed 99 million.

[28] In 2011, for example, "mining and utilities" employed just 3 million educated workers when non-agriculture employed 143 million.

Table 17 Employment growth for the less educated and the educated (per cent per annum)

	Less educated			Educated		
	1999–2004	2004–2011	2011–2018	1999–2004	2004–2011	2011–2018
Economy	0.6	−1.1	−2.7	4.6	4.2	2.7
Agriculture	−0.7	−2.9	−3.1	3.7	2.8	1.6
Non-agriculture	3.6	2.0	−1.9	5.1	4.9	3.2
Manufacturing	3.8	0.2	−5.3	5.9	4.0	2.0
Construction	7.1	9.0	−0.6	9.5	11.6	5.8
Mining & utilities	2.3	1.2	4.2	2.8	4.8	7.6
Services	2.2	−0.8	−1.1	4.4	4.2	3.4

Source: Authors' estimates based on data in "Appendix" Table 26

less educated—redundant. All this was not because non-agriculture was generating employment at a rapid rate and pulling labour out of agriculture. As a matter of fact, non-agriculture was generating employment at an increasingly slower pace and was also generating it basically for the educated. Under these conditions, overall employment conditions were steadily deteriorating with the extent of deterioration increasing over time. Progressive exclusion of the less educated from employment and decelerating employment growth of the educated were the underlying trends that showed up in declining employment rate, rising unemployment rate and, ironically enough, steady improvement in the average quality of employment.

As it happens, the employment conditions were worsening in a period of high economic growth. The proximate reason is that "skill-biased" technological change in production (reflected in accelerating labour productivity growth) was out of sync with demand growth (reflected in output growth) in the economy. This is what is indicated by the fact that the ratio of labour productivity growth to output growth was steadily rising throughout 1999–2018.

But why was technical progress in production so "skill-biased" in an economy with an abundance of low-skilled workers and scarcity of skilled workers? And why was it unaccompanied by the commensurate expansion of effective demand? These are the questions that we need to answer if we are to gain a full understanding of why rapid economic growth was accompanied by worsening employment conditions. Unfortunately, the kind of empirical analysis required to answer the questions cannot be undertaken here and has to be left for future research. Here we can offer some reflections on the characteristics of the growth process that produced the observed employment outcomes.

Existing research has highlighted the fact that the incremental incomes generated by India's services-led growth have been going principally to the richest 10 per cent of the adult population (Table 18).[29] How is this to be explained?

[29] The empirical evidence is analysed in Chancel and Piketty (2019).

Table 18 Trends in income distribution

	Share (%) of national income			
	1999	2004	2011	2015
Share (%) of adult population				
Richest 10 per cent	39.5	44.3	54.1	56.1
Middle 40 per cent	39.8	36.8	30.5	29.2
Poorest 50 per cent	20.7	18.8	15.4	14.7

Source: World Inequality Database (available online: www.wid.world)

Growth of the lead-sector—services—involved growth of skill-intensive services such as information technology and enabled services, financial services and business services. Such growth naturally generated jobs and incomes for the already rich and educated—a thin top layer of the population. The consequent growth of demand stimulated the growth of other sectors and subsectors of the economy, which also were skill-intensive and whose growth also had similar employment and distributional consequences. For, demand grew not so much for manufactures and services already being produced but for newer, high-end manufactures (e.g. consumer electronics, white goods, automobiles, etc.) and services (e.g. IT services, e-commerce, shopping malls for retail trade, professional services, private education and health services, and a variety of social and personal services associated with luxury consumption) whose production is more technology-and-skill-intensive. In successive rounds, therefore, the rich beneficiaries of growth generated demand for goods and services intensive in factors of production held by the rich. The overall outcome has been a rapidly growing concentration of jobs and incomes in a narrow segment of the population on the one hand and growth of capital-and-skill-intensive manufacturing and services on the other.

The problem with this kind of growth is that the growth of demand for high-end manufactures and services decelerates rather quickly as the consumption of the rather small (and non-expanding) class of beneficiaries of growth inevitably approaches saturation levels.[30] The capacity to produce persistently grows faster than the demand. This shows up in rising ratio of labour productivity growth to output growth.

When its benefits accrue to a thin layer of already rich population, even rapid economic growth is accompanied by worsening employment conditions and hence fails to bring commensurate development in its wake. Moreover, the rapid growth itself cannot be sustained for long. For growth to improve employment conditions and to be sustainable, the class of beneficiaries has to be continuously expanding and this happens when, in successive rounds, the beneficiaries of growth generate demand for goods and services intensive in factors of production held by the non-beneficiaries. India's growth has not been of this kind.

[30] This would mean either rising saving or rising consumption of goods and services produced outside India or perhaps both. Demand growth could in principle have been maintained by net export growth but India's imports persistently exceeded its exports throughout the period.

Appendix 1

Changes in Employment Conditions Between 2017 and 2018

Overall employment conditions appear to have improved between 2017 and 2018 (Table 19). Total employment in the economy increased by 11.6 million, which appears impressive, given that it had actually declined by 9.9 million between 2011 and 2017.[31] The employment rate (defined with reference to non-student population), which had declined from 61.6 per cent in 2011 to 54.0 per cent in 2017, increased to 54.5 per cent in 2018. The rate of unemployment in 2018—at 5.7 per cent—was marginally lower than that in 2017 (6.1 per cent) (Table 19).

However, scrutiny shows the improvement to have been rather insignificant. Of the incremental employment of 11.6 million, 10.2 million (88 per cent) was in agriculture, a sector in which employment had declined by 31 million during 2011–2017 (i.e. by 5 million per year on average). In non-agriculture, employment growth continued to decelerate; it increased by just 1.4 million while it had increased by an average of 3.5 million per year during 2011–2017. The growth of employment in construction between 2017 and 2018—by about 4 million (compared to 0.6 million per year on average during 2011–2017)—was impressive, but employment in manufacturing showed a large decline—by about 3 million (compared to a decline of about 2 million during the 6-year period 2011–2017). Employment in services showed a near-zero growth (compared to a growth of 3 million per year on average between 2011 and 2017). Thus, between 2017 and 2018, employment increased basically in agriculture and construction; employment in manufacturing recorded a large decline while employment in services showed near-zero growth.

Employment of the less educated, which had declined by 47 million (by 7.8 million per year on average) during 2011–2017, showed an increase of 4.5 million between 2017 and 2018. But the increase was confined to agriculture (5.5 million) and construction (2.1 million), the two sectors in which employment of the less educated had declined very substantially during 2011–2017. And, in manufacturing and services, employment of this category of workers declined much more rapidly than it had done during 2011–2017.

Employment of the educated increased by 7 million (compared to 6 million per year on average during 2011–2017), but nearly 5 million (66 per cent) of the incremental employment was in agriculture (just 9 per cent of the incremental employment of the educated was in agriculture during 2011–2017). Of the incremental employment of 2.4 million in non-agriculture, 1.6 million (67 per cent) was in construction (compared to 20 per cent during 2011–2017). And employment of the educated declined in manufacturing (where it had increased during 2011–2017) and recorded very slow growth in services (where it had recorded rapid growth during 2011–2017).

[31] *Full-time* employment, which had increased by 12.7 million (or by 2.1 million per year on average) increased by 7.6 million between 2017 and 2018. And *part-time* employment, which had declined by 22.6 million (or by 3.8 million per year on average) increased by 4 million between 2017 and 2018.

Table 19 Changes in employment (numbers in millions)

	Total		Less educated		Educated	
	2011–2017	2017–2018	2011–2017	2017–2018	2011–2017	2017–2018
Economy	−9.9	11.6	−46.8	4.5	36.9	7.1
Agriculture	−31.1	10.2	−34.4	5.5	3.3	4.7
Non-agriculture	21.2	1.4	−12.4	−1.0	33.6	2.4
Manufacturing	−1.7	−2.7	−7.3	−1.8	5.6	−0.9
Construction	3.3	3.7	−3.4	2.1	6.7	1.6
Mining and utilities	1.7	0.0	0.5	−0.2	1.2	0.2
Services	17.9	0.4	−2.2	−1.1	20.1	1.5

Source: Authors' estimates based on data in "Appendix" Table 26

Thus, between 2017 and 2018, employment growth occurred basically in agriculture and construction for both the less educated and the educated. The incremental employment in the two sectors was of two different types. The kind of employment that grew in agriculture was self-employment (Table 20), which increased by 10 million (after having declined by about 9 million during 2011–2017). The type of employment that grew in construction, on the other hand, was casual employment (Table 21). Thus, for both the less educated and the educated, it was primarily self-employment in agriculture and secondarily casual employment in construction that recorded growth.

The growth of casual employment in construction is easily explained: the sector recorded much higher output growth between 2017 and 2018 than during 2011–2017 (Table 22). However, employment growth was actually faster than output growth so that labour productivity declined. The likely explanation is that the government's special employment schemes also expanded between 2017 and 2018, which contributed significantly to the growth of casual employment in construction.[32] In agriculture, however, output growth was actually slower between 2017 and 2018 than it had been during 2011–2017. Yet, the growth of employment (essentially of self-employment) between 2017 and 2018 was very rapid (5.5 per cent) so that labour productivity also declined rapidly (by 3.1 per cent). It is not easy to see how and why this kind of employment growth might have occurred. A possible explanation is reverse migration of workers (whose families had remained engaged in agriculture) from manufacturing and services to agriculture. The fact that it was only self-employment that grew is supportive of this view. But the fact that such reverse migration had not happened during 2011–2017 when many less-educated workers had lost jobs in non-agriculture then becomes inexplicable.

[32] Person days of employment generated under the MGNREGS, for example, increased from 23.4 billion during 2017–2018 to 26.8 billion during 2018–2019.

Table 20 Changes in employment (numbers in millions)

	Economy		Agriculture		Non-agriculture	
	2011–2017	2017–2018	2011–2017	2017–2018	2011–2017	2017–2018
Total	−9.9	11.6	−31.1	10.2	21.2	1.4
Regular	23.8	−1.1	0.2	−0.9	23.6	−0.2
Self	−8.4	10.0	−5.7	10.0	−2.7	0.0
Casual	−25.3	2.7	−25.6	1.1	0.3	1.6

Source: Authors' estimates based on data in "Appendix" Table 25

Table 21 Changes in Casual Employment (numbers in millions)

	2011–2017	2017–2018
Non-agriculture	0.3	1.6
Construction	2.4	3.6

Source: Authors' estimates based on data in "Appendix" Table 25

Table 22 Output (gross value added) growth (per cent per annum)

	Gross value added		Employment	
	2011–2017	2017–2018	2011–2017	2017–2018
Total	6.8	6.0	−0.4	2.6
Agriculture	2.8	2.4	−2.6	5.5
Non-agriculture	7.6	6.7	1.4	0.5
Manufacturing	7.7	5.7	−0.5	−4.6
Construction	3.8	6.1	1.1	7.1
Mining and utilities	6.2	0.2	7.8	0.0
Services	8.4	7.7	2.2	0.3

Source: Authors' estimates based on data in "Appendix" Tables 26, 29, and 30

While this puzzle must remain unresolved here, it is abundantly clear that the employment growth between 2017 and 2018 was associated with a serious decline in labour productivity. As such, it does not indicate significant improvement in employment conditions.

Appendix 2

See Tables 23, 24, 25, 26, 27, 28, 29, and 30.

Table 23 Population, non-student population, labour force and employment (age: 15 years or more, in millions)

	Population					Non-student population				
	1999	2004	2011	2017	2018	1999	2004	2011	2017	2018
Not literate	271.1	266.7	245.6	245.9	246.3	270.8	266.2	245.5	245.6	245.9
Below primary	64.3	70.7	78.2	49.6	47.3	63.2	69.4	77.2	49.3	47.0
Primary	71.2	91.2	97.7	107.7	114.5	66.5	86.9	92.5	103.3	110.2
Middle	95.7	116.2	139.6	192.8	194.8	78.6	97.4	114.4	162.9	165.6
Secondary	67.3	75.0	120.2	132.5	134.9	52.6	58.2	87.3	94.3	94.8
Higher secondary	35.1	53.0	88.1	116.6	122.2	25.1	38.6	58.7	75.7	80.6
Tertiary	34.4	43.7	73.4	106.4	108.0	31.4	39.7	65.6	95.4	97.1
Total	639.1	716.5	842.8	951.5	968.0	588.2	656.4	741.2	826.5	841.2
	Labour force (UPSS)					Employment (UPSS)				
	1999	2004	2011	2017	2018	1999	2004	2011	2017	2018
Not literate	169.0	159.4	136.0	112.7	112.5	168.6	158.9	135.5	111.4	111.5
Below primary	43.2	46.9	49.1	28.3	27.8	42.8	46.4	48.7	27.9	27.2
Primary	45.4	59.6	60.9	60.2	65.2	44.7	58.7	60.2	58.3	63.6
Middle	55.1	68.5	77.2	99.8	102.5	53.2	66.7	75.6	94.2	97.5
Secondary	37.2	40.1	56.7	58.8	58.6	35.1	38.1	55.2	55.4	55.4
Higher secondary	18.5	29.3	40.1	50.1	52.7	17.0	27.1	38.0	44.1	47.1
Tertiary	24.2	29.9	46.8	66.0	66.8	22.0	27.4	43.3	55.3	55.9
Total	392.6	433.7	466.8	475.9	486.1	383.4	423.3	456.5	446.6	458.2
	Labour force (UPS)					Employment (UPS)				
	1999	2004	2011	2017	2018	1999	2004	2011	2017	2018
Not literate	152.1	142.5	119.8	107.8	105.9	151.6	141.7	119.2	106.4	104.6
Below primary	40.9	44.6	46.1	27.6	27.1	40.4	44.0	45.5	27.1	26.5
Primary	42.8	55.9	56.8	58.8	63.1	42.0	54.8	55.9	56.8	61.4
Middle	52.4	64.5	72.6	98.1	100.4	50.2	62.1	70.8	92.4	95.3
Secondary	35.5	37.8	53.7	57.9	57.1	33.3	35.5	52.0	54.3	53.7
Higher secondary	17.7	27.7	38.1	48.7	51.1	16.1	25.2	35.7	42.6	45.3
Tertiary	23.9	29.8	46.1	65.5	66.1	21.4	26.6	42.3	54.5	54.9
Total	365.3	402.8	433.2	464.4	470.8	355.0	389.9	421.4	434.1	441.7

We have available: actual census data on population (rural male, rural female, urban male, urban female) on 1 March of the census years—1991, 2001 and 2011—by 5-year age group; official projections of population (rural male, rural female, urban male, urban female) on 1 July of the years 2011 and 2017; and official projections of population (male, female) on 1 March of 2016 and 2021 by 5-year age group. We have used linear interpolation to derive estimates of population (rural male, rural female, urban male, urban female) aged 15 years or more on 1 July of the years 1999, 2004, 2011, 2017 and 2018. These population estimates have then been used together with the relevant ratios (non-student population-to-population, labour force-to-population, and workforce-to-population) for rural male, rural female, urban male and urban female, derived from the NSSO surveys, to arrive at estimates of non-student population, labour force and employment

Table 24 Level of education and type of employment (UPSS) (numbers in millions)

	A	B	C	D
1999				
Illiterate	2.1	4.9	85.4	76.2
Below Primary	1.4	2.7	22.9	15.8
Primary	1.9	3.7	25.1	14.0
Middle	3.4	6.1	30.6	13.2
Secondary	6.2	5.2	18.8	4.9
Higher Secondary	4.5	2.5	8.8	1.2
Graduates and above	9.9	3.2	8.5	0.3
All	29.4	28.3	200.1	125.6
2004				
Illiterate	1.2	6.6	85.2	66.7
Below Primary	1.0	3.6	24.7	17.1
Primary	1.7	6.2	32.7	18.0
Middle	3.4	8.2	38.2	16.6
Secondary	4.6	5.6	22.6	5.0
Higher Secondary	6.6	4.4	14.1	1.8
Graduates and above	11.2	4.5	11.4	0.4
All	29.7	39.1	228.9	125.6
2011				
Illiterate	1.0	6.8	70.8	57.2
Below Primary	0.7	4.1	24.8	19.3
Primary	1.2	6.7	31.1	21.2
Middle	2.6	10.4	41.6	20.9
Secondary	4.5	8.4	32.2	10.0
Higher Secondary	7.4	6.9	19.7	4.0
Graduates and above	17.6	8.1	16.4	0.9
All	35.0	51.4	236.6	133.5
2017				
Illiterate	1.0	8.0	60.9	41.5
Below Primary	0.4	3.2	14.8	9.6
Primary	1.3	7.5	31.1	18.3
Middle	4.4	15.2	51.0	23.4
Secondary	5.1	10.7	29.7	9.8
Higher Secondary	8.9	9.3	21.6	4.5
Graduates and above	23.5	11.7	19.1	1.1
All	44.6	65.6	228.2	108.2
2018				
Illiterate	1.0	7.6	61.3	41.6
Below primary	0.5	2.6	14.6	9.5
Primary	1.5	8.3	33.8	20.0
Middle	4.7	15.3	53.5	24.0
Secondary	4.9	9.7	31.0	9.8
Higher Secondary	8.9	9.6	23.8	4.8
Graduates and above	22.8	11.7	20.2	1.2
All	44.3	64.8	238.2	110.9

Table 24 (continued)

A—regular-formal employment, B—regular-informal employment, C—self-employment, D—casual employment

Source: The distributions of the employed by level of education are derived from the NSSO surveys; estimates of employed population are from "Appendix" Table 23

Table 25 Employment (UPSS) by Type (numbers in millions)

	Economy					Agriculture				
	1999	2004	2011	2017	2018	1999	2004	2011	2017	2018
Regular Formal	29.4	29.7	35.0	44.6	44.3	1.9	1.2	1.3	1.2	0.2
Regular Informal	28.3	39.1	51.4	65.6	64.8	1.9	2.6	1.8	2.1	2.2
Regular	57.7	68.8	86.4	110.2	109.1	3.8	3.8	3.1	3.3	2.4
Self-employed	200.1	228.9	236.6	228.2	238.2	132.5	142.7	139.7	134.0	144.0
Casual Workers	125.6	125.6	133.5	108.2	110.9	93.7	86.6	72.3	46.7	47.8
Total	383.4	423.3	456.5	446.6	458.2	230.0	233.1	215.1	184.0	194.2
	Manufacturing					Construction				
	1999	2004	2011	2017	2018	1999	2004	2011	2017	2018
Regular Formal	5.5	5.7	6.4	9.0	9.2	0.3	0.3	0.6	0.9	0.8
Regular Informal	7.9	11.1	15.4	15.6	15.1	0.7	0.9	2.1	2.2	2.2
Regular	13.4	16.8	21.8	24.6	24.3	1.0	1.2	2.7	3.1	3.0
Self-employed	20.6	26.1	29.2	24.8	24.1	3.1	4.6	5.2	5.7	5.9
Casual Workers	7.5	9.1	9.2	9.1	7.4	13.1	20.0	40.7	43.1	46.7
Total	41.5	52.0	60.2	58.5	55.8	17.2	25.8	48.6	51.9	55.6
	Services					Non-agriculture				
	1999	2004	2011	2017	2018	1999	2004	2011	2017	2018
Regular Formal	20.6	21.7	25.8	32.3	32.3	27.5	28.5	33.7	43.4	44.1
Regular Informal	17.5	24.3	32.1	44.2	44.1	26.4	36.5	49.6	63.5	62.6
Regular	38.1	46.0	57.9	76.5	76.4	53.9	65.0	83.3	106.9	106.7
Self-employed	43.9	55.4	61.8	63.1	63.6	67.6	86.2	96.9	94.2	94.2
Casual Workers	9.8	8.2	9.9	7.9	7.9	31.9	39.0	61.2	61.5	63.1
Total	91.8	109.6	129.6	147.5	147.9	153.4	190.2	241.4	262.6	264.0
	Non-agriculture, organised					Non-agriculture, unorganised				
	1999	2004	2011	2017	2018	1999	2004	2011	2017	2018
Regular Formal	26.5	27.8	33.1	41.8	41.7	1.0	0.7	0.6	1.6	2.8
Regular Informal	8.1	12.7	23.1	26.6	27.4	18.3	23.8	26.5	36.9	34.8
Regular	34.6	40.5	56.2	68.4	69.1	19.2	24.5	27.1	38.5	37.6
Self-employed	1.8	2.6	2.7	3.1	2.7	65.8	83.6	94.2	91.1	91.8
Casual Workers	5.9	10.3	19.2	14.6	13.1	26.0	28.7	42.0	46.9	49.7
Total	42.3	53.4	78.1	86.1	84.9	111.1	136.8	163.3	176.5	179.1

Casual workers in the organised sector include those employed in public works and special employment schemes

Source: Distributions of the employed by employment status / sector are derived from the NSSO surveys; estimates of employed population are from "Appendix" Table 23

Table 26 Employment by level of education (in millions)

	Economy					Agriculture				
	1999	2004	2011	2017	2018	1999	2004	2011	2017	2018
Illiterate	168.6	158.9	135.5	111.4	111.3	130.9	117.4	89.8	70.9	72.9
Below Primary	42.8	46.4	48.7	27.9	27.2	26.3	27.5	26.4	14.1	14.0
Primary	44.7	58.7	60.2	58.3	63.6	25.3	31.2	29.0	25.8	29.4
Middle	53.2	66.7	75.6	94.2	97.5	26.2	31.7	33.0	37.5	38.4
Secondary	35.1	38.1	55.2	55.4	55.6	13.1	14.5	21.0	18.1	19.4
Higher Secondary	17.0	27.1	38.0	44.1	47.1	5.3	7.2	10.8	11.5	12.9
Graduates and above	22.0	27.4	43.3	55.3	55.9	2.9	3.6	5.1	6.1	7.2
Total	383.4	423.3	456.5	446.6	458.2	230.0	233.1	215.1	184.0	194.2
	Non-agriculture					Manufacturing				
	1999	2004	2011	2017	2018	1999	2004	2011	2017	2018
Illiterate	37.6	39.4	45.1	40.5	38.4	12.0	13.1	12.6	9.3	7.8
Below Primary	16.5	18.9	22.2	13.7	13.2	5.3	5.9	6.7	3.5	3.2
Primary	19.4	27.5	31.2	32.6	34.2	6.2	9.3	9.5	8.7	8.7
Middle	27.0	35.0	42.6	56.7	59.1	7.5	10.7	12.0	14.4	14.3
Secondary	22.1	23.6	34.1	37.2	36.2	5.2	5.9	8.2	9.0	8.3
Higher Secondary	11.7	20.0	27.2	32.6	34.2	2.5	4.0	6.2	7.3	7.8
Graduates and above	19.1	23.8	38.4	49.3	48.7	2.8	3.2	5.0	6.3	5.7
Total	153.4	190.2	241.4	262.6	264.0	41.5	52.1	60.2	58.5	55.8
	Construction					Services				
	1999	2004	2011	2017	2018	1999	2004	2011	2017	2018
Illiterate	7.1	9.2	16.9	14.5	15.4	17.5	18.0	16.2	15.9	14.6
Below Primary	2.4	3.4	6.3	4.0	4.0	8.4	9.2	8.9	6.1	5.6
Primary	2.6	4.5	8.1	9.4	10.1	10.2	13.2	13.1	14.0	14.7
Middle	2.8	4.8	9.0	12.9	14.4	16.1	19.0	21.0	28.6	29.5
Secondary	1.3	1.7	4.8	5.9	6.2	15.0	15.5	20.7	21.5	21.0
Higher Secondary	0.5	1.0	2.3	3.4	3.5	8.5	14.5	18.3	21.1	22.1
Graduates and above	0.5	0.6	1.2	1.8	1.7	15.5	19.6	31.4	40.3	40.4
Total	17.2	25.2	48.6	51.9	55.3	91.2	109.0	129.6	147.5	147.9

Source: Distributions of the employed in different sectors by level of education are derived from the NSSO surveys; estimates of employment in sectors are from "Appendix" Table 25

Table 27 Modification of data on self-employment in 2004 (numbers in millions)

	1999	2004 (u)	2004 (m)	2011	2017	2018
Self-employed	200.1	249.7	228.9	236.6	228.2	238.2
Employers	3.9	6.3	6.3	6.8	9.1	10.4
Own account workers	118.1	141.5	141.5	151.1	161.7	167.3
Unpaid family workers	78.1	101.9	81.1	78.7	57.4	60.5
Rural male	28.4	33.5	28.4	28.4	21.6	21.8
Rural female	40.6	55.4	39.7	38.7	27.3	31.7
Urban male	5.6	7.5	7.5	7.2	5.1	4.3
Urban female	3.5	5.5	5.5	4.4	3.4	2.7

2004 (u)—unmodified data for 2004; 2004 (m)—modified data for 2004. Only the figures for rural male unpaid family workers and rural female unpaid family workers are modified. The modified figures are simple averages of the figures for 1999 and 2011. If we leave the data for 2004 unmodified, we observe the number of unpaid family workers to increase by 23.8 million between 1999 and 2004 and to decline by 23.2 million between 2004 and 2011

Source: Distributions of the employed by employment status are derived from NSSO surveys; estimates of employment are from "Appendix" Table 23

Table 28 Self-employment in agriculture and non-agriculture (numbers in millions)

	1999	2004 (u)	2004 (m)	2011	2017	2018
Agriculture						
Self-employed	132.5	155.7	142.7	139.7	134.0	144.0
Employers	2.5	3.2	3.2	3.2	3.2	3.9
Own account workers	67.3	75.3	75.3	75.4	84.7	90.5
Unpaid family workers	62.7	77.2	64.2	61.1	46.1	49.6
Non-agriculture						
Self-employed	67.6	94.0	86.2	96.9	94.2	94.2
Employers	1.4	3.1	3.1	3.6	5.9	6.5
Own account workers	50.8	66.2	66.2	75.7	77.0	76.9
Unpaid family workers	15.4	24.7	16.9	17.6	11.3	10.8

Source: Same as in "Appendix" Table 27

Table 29 Gross value added (rupees crores in constant 2004–2005 prices)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Agriculture	529,850	528,016	559,809	518,956	568,642	565,426	594,487	619,190	655,080	655,689	660,987	713,477	739,495
Manufacturing	335,944	361,613	369,997	394,980	419,715	453,225	499,020	570,458	626,073	656,302	730,435	801,476	823,023
Construction	149,540	158,701	164,685	177,674	198,266	228,855	258,129	284,806	314,595	332,329	354,436	390,692	412,412
Mining and utilities	119,816	122,386	124,251	132,974	137,546	147,703	153,264	165,940	175,427	181,105	192,077	201,711	207,063
Services	1,060,054	1,189,802	1,268,909	1,355,102	1,463,967	1,576,255	1,748,173	1,923,970	2,121,561	2,333,251	2,578,165	2,829,650	3,061,589

Source: Central Statistical Office, National Accounts Statistics (available online)

Table 30 Gross value added (rupees crores in constant 2011–2012 prices)

	2011	2012	2013	2014	2015	2016	2017	2018
Agriculture	1,501,947	1,524,288	1,609,198	1,605,715	1,616,146	1,726,004	1,828,329	1,872,339
Manufacturing	1,409,986	1,486,873	1,560,709	1,683,938	1,903,850	2,054,764	2,190,791	2,316,643
Construction	777,335	780,050	800,771	835,229	865,335	916,445	962,009	1,020,314
Mining and utilities	447,703	454,244	462,708	502,732	542,132	595,744	640,600	641,629
Services	3,969,975	4,300,820	4,630,263	5,084,519	5,564,407	6,035,327	6,452,684	6,952,203
GVA	8,106,946	8,546,275	9,063,649	9,712,133	10,491,870	11,328,284	12,074,413	12,803,128

Source: Central Statistical Office, National Accounts Statistics (available online)

References

Chancel, L., and T. Piketty. 2019. Indian income inequality, 1922–2015: from British raj to billionaire raj? *Review of Income and Wealth* 65(51): 533–562.

Ghose, A.K. 2013. The enigma of women in the labour force. *Indian Journal of Labour Economics* 56(4): 635–642.

Ghose, A.K. 2016. *India employment report 2016: challenges and the imperatives of manufacturing-led growth*. New Delhi: Oxford University Press and Institute for Human Development.

Ghose, A.K. 2019. *Employment in India*. New Delhi: Oxford University Press.

Kannan, K.P., and G. Raveendran. 2019. From Jobless to job-loss growth: gainers and losers during 2012–2018. *Economic and Political Weekly* 54(44): 38–44.

Kapsos, S., A. Silberman and E. Bourmpoula. 2014. "Why is female labour force participation declining so sharply in India?", Research Paper No. 10, International Labour Office, Geneva

Lahiri, A. 2020. The great Indian demonetization. *The Journal of Economic Perspectives* 34(1): 55–74.

Mehrotra, S. and J. K. Parida. 2019. "India's employment crisis: rising education levels and falling non-agricultural job growth", Working Paper 4, Centre for Sustainable Employment (Azim Premji University), Bengaluru

Morris, S. and T. Kumari. 2019. "Overestimation in the growth rates of national income in recent years?—An analysis based on extending GDP04–05 through other indicators of output", Working Paper 2019-01-01, Indian Institute of Management, Ahmedabad

Nath, P. and A. Basole. 2020. "Did employment rise or fall in India between 2011 and 2017? Estimating absolute change in the workforce", Working Paper 29, Centre for Sustainable Employment (Azim Premji University), Bengaluru

Subramanian, A. 2019a. "India's GDP Mis-estimation: Likelihood, Magnitudes, Mechanisms, and Implications." Faculty Working Paper 354, Center for International Development (Harvard University), USA.

Subramanian, A. 2019b. "Validating India's GDP Growth Estimates." Faculty Working Paper 357, Center for International Development (Harvard University), USA.