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Economic Growth and Population Transition in India, 2001-2011

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Abstract: This paper analyses how population transition has influenced the economic growth in India during 2001-2011. The analysis reveals that population transition had a substantial impact on the economic growth but most of this impact was due to the increase in population size. The demographic dividend resulting from the transition in age composition had contributed only marginally towards accelerating the economic growth. Moreover, there is significant inter-state/Union Territory variation in the contribution of the population transition to economic growth. The paper argues that the productivity of the economic system of the country will have to be increased substantially to maintain the tempo of economic growth in the coming years as population growth will slow down with population transition.

Keywords: India, States, Union Territories, Economic growth, Population transition, Demographic dividend.

Introduction

India has recorded an impressive economic growth during the decade 2001-2011. The real gross domestic product of the country at factor cost increased from around Rs 23484 billion in 2000-01 to more than Rs 491853 billion in 2010-11 at 2004-05 prices which means that the economy of the country grew at an average annual rate of almost 7.4 per cent per year during this period. This rate of economic growth was the second highest in the world, next only to China. The growth of the economy had been particularly rapid during the period 2003-04 through 2007-08 when the real gross domestic product increased at an average annual rate of about 9 per cent per year (Nagaraj, 2013). At the same time, population of the country increased from about 1026 million in 2001 to around 1206 million in 2011. A notable feature of India's population growth during this period was that, for the first time since 1931, the decadal net addition to the population of the country decreased, albeit marginally, indicating that population transition is gaining momentum in the country.

In this paper, we analyse the impact of population transition on economic growth in India and in its constituent states/Union Territories during the period 2001 through 2011. By population transition, we mean the change in population stock - the size and the age composition of the population. It is well-known that population transition leads to the increase in the size and the ageing of the population. The implications of the increase in population size for economic growth have been debated for decades (Birdsall, Kelly, Sinding, 2001; Bloom, Canning, Sevilla, 2001, Heady and Hodge, 2009). This debate can be synthesised in terms of three alternative positions - population growth restricts, promotes, or is independent of economic growth. Proponents of each position have empirical evidence to support their case. The issue is, however, complicated as the

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relationship between population growth and economic growth is found to be different in the developing as compared to the developed countries (Kelly, 2001).

The ageing of the population associated with population transition also impacts economic growth because the economic behaviour of the people varies by age. Population with high proportion of child population requires high investment on children which tends to depress economic growth. On the other hand, if a large proportion of the population is concentrated in working ages, then the added productivity of the working age population can produce a demographic dividend that can accelerate economic growth (Bloom, Canning, Sevilla, 2001). Bloom and Williamson (1998) were the first to demonstrate the key role played by age composition transition in the economic miracle in selected East Asian countries. Subsequently, many studies have been carried out globally to highlight the contribution of the transition in population age composition to economic growth (Bloom and Finlay, 2008; Bloom, 2011; Golley and Tyres, 2011; Joe, Dash, Agrawal, 2011; Mason, Lee, Lee, 2008; Prskawetz et.al., 2007; Ranganathan, Swain, Stumper, 2015; Wang, chen, Huang, 2013).

The demographic dividend resulting from the transition in population age composition has been further classified as the first and the second demographic dividend. (Lee, Mason, Miller, 2000; Mason, 2005; Lee and Mason, 2006). The first demographic dividend occurs when the working age population raises relatively fewer number of children leading to the increased availability of resources for investment in the economy. This dividend is transitory in nature. It turns negative at later stages of population transition because of the decrease in the working age population and rapid increase in the old age population. The second demographic dividend, on the other hand, is due to the tendency of the people to create assets and accumulate wealth as they get older which leads to increased investment in the economy. The second dividend depends upon the first and begins somewhat later than the first. It is not transitory in nature and can continue indefinitely.

Concerns about the impact of population growth on economic growth in India is not new. Way back in 1958, Coale and Hoover (1958) argued that curtailing population growth by reducing fertility could contribute to accelerated increase in per capita output of the Indian economy, although Kuznets (1956) did not find any correlation between per capita income growth and population growth across nations. There are many studies that have analysed the impact of population growth on economic growth in India (Dawson and Tiffin, 1998; Haldar, 2009; Bloom, Canning, Fink, 2011; Eberstad, 2010; DaVanzo et al, 2010). These studies have found that population growth has both positive and negative impact on economic growth. Recently, Sethy and Sahoo (2015) have observed strong positive relationship between per capita output and population growth during 1970-2010. Similar observations have also been made by Peterson (2017) on the basis of historical data. Many studies have also pointed out demographic dividend as the basis of optimism for India's economic future (Bloom, 2011; Kelkar, 2004; Kumar, 2010; Aiyar and Mody, 2011). This optimism has been shared at the official level also (Government of India, 2013). However, Kumar and Subramanian (2012) have observed that the demographic dividend in India was strong and positive during the 1990s but, during the 2000s, there was either no dividend or the effect of the change in population age composition on India's economic growth was negative. Thakur (2012) has also observed negative impact of the growth in working age ratios

on the economic growth whereas Chandrashekhar et al. (2006) have concluded that India could not exploit the benefit of the change in population age composition because of unsatisfactory employment, education and health situation. Recently, Singh (2016) has observed that under the conditions prevailing in the country, the high optimism about India's ability to reap the demographic dividend seems to be misplaced.

However, to the best of our knowledge, there is no study that has studied the effect of the change in population stock - change in population size and the change in population age composition - on economic growth in India. In this paper, we develop an analytical framework that decomposes the growth in the output of the economy into the growth attributed to the change in population stock - the change in population size and the change in the population age composition or the demographic dividend - and the growth attributed to the change in the productivity of the economic system. Piketty (2014) has argued that the output of the economy can be decomposed into two components: a purely demographic component and a purely economic component and only the latter allows for an improvement in the standard of living (Piketty, 2014, pp 72). The demographic component of the economy is determined by the population stock - the size and the age composition. The economic component, on the other hand, is determined by the productivity of the economy system which, in turn, is determined by the productivity of those who are engaged in productive activities and the opportunity of participation in productive processes. The growth in the output of the economy, therefore, can be decomposed into the growth attributed to the change in the population stock or the change in population size and the change in the population age composition and the growth attributed to the change in the productivity of the economic system or the change in the per capita output of those who are engaged in productive activities and the change in the opportunity of participation in the productive activities.This paper follows the arguments put forward by Piketty (2014) to analyse the contribution of the change in the demographic component and the change in the economic component to the growth of the output of the economy in India and in its constituent states/Union Territories for the period 2000-01 through 2010-11. The decomposition analysis suggests that the change in the demographic component during the period under reference has contributed substantially to the growth of the output of the economy of the country but there is great diversity across states/Union Territories.

The paper is organised as follows. The next section of the paper outlines the decomposition methodology. The paper follows the factor decomposition approach for the purpose. Section three describes the data that constitute the basis for the analysis. Section four describes, briefly, the growth of the output of the economy in India and in its states/Union territories whereas section five explores the change in the population stock that have taken place during the period 2001 through 2011. Section six presents and discusses results of the decomposition exercise. The last section of the paper discusses the demographic imperatives for India and states/Union Territories in the context of economic growth.

Data Source

Data from two sources have been used in the present analysis. The output of the economy has been measured in terms of the gross domestic product at factor cost (GDP) at 2004-05 prices.

Estimates of real GDP at factor cost have been prepared by the Government of India, Ministry of Statistics and Programme Implementation. These estimates are available for all states and Union Territories except for the three Union Territories - Dadra and Nagar Haveli, Daman and Diu and Lakshadweep - for the year 2000-01 and 2010-11. The present analysis, therefore, excludes these three Union Territories. On the other hand, estimates of the total population, child population (population aged 0-14 years), working age population (population aged 15-59 years), old population (population aged 60 years and above) and total workers aged 15-59 years have been taken from 2001 and 2011 population census. In India's population census, a person is classified as a worker if the person concerned has worked even for a day during the year prior to the census irrespective of the age of the person. A comprehensive definition of work was adopted at the population census to classify a person as a worker. Workers are further classified into main and marginal workers (Government of India, 2011).

Methodology

Let *Y* denotes the gross domestic product (GDP) at constant prices and *P* denotes the population. Then, *Y* is the product of the population (*P*) and the per capita real GDP or the output.

$$Y = P * \frac{Y}{P} \tag{1}$$

The per capita output may further be written as

$$\frac{Y}{P} = \frac{Y}{L} * \frac{L}{W} * \frac{W}{P} \tag{2}$$

Here, *L* is the number of workers or the number of people engaged in productive activities and *W* is the working age population. Combining equations (1) and (2), we get

$$Y = P * \frac{Y}{L} * \frac{L}{W} * \frac{W}{P}$$

$$Y = \left(P * \frac{W}{P} \right) * \left(\frac{Y}{L} * \frac{L}{W} \right) \tag{3}$$

The first term on the right of equation (3) reflects the demographic component of the output of the economic system while the second reflects the economic component. The economic component comprises of two factors productivity per worker (*Y/L*) and level of participation of the working age population in productive activities (*L/W*). Similarly, the demographic component also comprises of two factors - population size (*P*) and ratio of the working age population to the total population (*W*/*P*) which reflects the age composition of the population.

Equation (3) suggests that the growth of the output of the economy is the result of the change in four factors - population size (*P*), age composition of the population measured in terms of the ratio (*W*/*P*), average productivity of the worker productivity (*Y*/*L*), and participation opportunity, measured in terms of the ratio of the workers to the working age population (*L*/*W*). The growth of the output of the economy can, therefore, be decomposed into the growth attributed to the change in population size, change in population age composition, change in worker

productivity and change in the participation opportunity. Following Ang (2016), the growth in the output of the economy, in absolute terms, can be decomposed as

$$\nabla Y = Y_2 - Y_1 = \frac{(Y_2 - Y_1)}{(\ln(Y_2) - \ln(Y_1))} * (\ln(Y_2) - \ln(Y_1)) \quad (4)$$

Let $D=(W/P)$, $I=(Y/L)$ and $E=(L/W)$, then

$$\ln(Y_2) - \ln(Y_1) = \ln(P_2 * D_2 * I_2 * E_2) - \ln(P_1 * D_1 * I_1 * E_1),$$
$$= \ln(P_2 - P_1) + \ln(D_2 - D_1) + \ln(I_2 - I_1) + \ln(E_2 - E_1) \quad (5)$$

substituting from (5) in (4), we get

$$\nabla Y = Y_2 - Y_1 = \frac{(Y_2 - Y_1)}{(\ln(Y_2) - \ln(Y_1))} * (\ln(P_2) - \ln(P_1)) +$$
$$+ \frac{(Y_2 - Y_1)}{(\ln(Y_2) - \ln(Y_1))} * (\ln(D_2) - \ln(D_1)) +$$
$$+ \frac{(Y_2 - Y_1)}{(\ln(Y_2) - \ln(Y_1))} * (\ln(I_2) - \ln(I_1)) +$$
$$+ \frac{(Y_2 - Y_1)}{(\ln(Y_2) - \ln(Y_1))} * (\ln(E_2) - \ln(E_1)) \quad (6)$$

or

$$\nabla Y = \partial P + \partial D + \partial I + \partial E \quad (7)$$

The growth attributed to D in equation (7) is popularly known as the demographic dividend. The demographic component (DC) of the growth in the total output of the economy is now given by

$$DC = \partial P + \partial D \quad (8)$$

whereas the economic component (EC) is given by

$$EC = \partial I + \partial E \quad (9)$$

Findings

Economic Growth, 2000-2011

The data used in the present analysis are given in the Appendix Table 1. The real GDP (at 2004-05 prices) at factor cost or the real output of the Indian economy more than doubled from around 23484 billion Rupees in 2000-01 to around 491853 billion Rupees in 2010-11 (Table 1). This means that the economy of the country grew at an average annual rate of around 7.4 per cent per year during the ten years between 2000-01 and 2010-11 (Figure 1). At the same time, the population of the country increased by almost 1.18 times - from about 1025 million in 2001 to 1206 million in 2011 - or at an average annual growth rate of almost 1.62 per cent per year. As the result, the per capita output of the economy increased by more than 1.78 times - from Rs 22902 in 2000-01 to Rs 40794 in 2010-11 - at an average annual growth rate of around 5.77 per cent per year.

Table 1: Worker productivity and participation opportunity, 2001 and 2011

Country/State/Union Territory	Worker productivity (Rupees)		Participation opportunity		working age population as proportion to total population	
	2001	2011	2001	2011	2001	2011
India	61909	109748	0.611	0.585	0.571	0.605
AN Islands	109749	241042	0.551	0.548	0.657	0.689
Andhra Pradesh	56997	109593	0.679	0.649	0.603	0.641
Arunachal Pradesh	56201	98204	0.718	0.644	0.551	0.597
Assam	51849	68153	0.565	0.571	0.567	0.605
Bihar	28281	43989	0.572	0.545	0.513	0.523
Chandigarh	175199	345522	0.550	0.535	0.660	0.684
Chhattisgarh	40086	72042	0.740	0.714	0.558	0.601
Delhi	175223	342266	0.504	0.478	0.623	0.659
Goa	196501	423931	0.544	0.544	0.669	0.669
Gujarat	70815	163284	0.643	0.593	0.602	0.631
Haryana	92415	202014	0.637	0.520	0.565	0.616
Himachal Pradesh	71920	126929	0.717	0.703	0.599	0.638
Jammu & Kashmir	70293	98788	0.564	0.526	0.575	0.588
Jharkhand	48508	77218	0.618	0.622	0.543	0.567
Karnataka	64668	108760	0.662	0.639	0.604	0.643
Kerala	95317	180107	0.470	0.494	0.634	0.640
Madhya Pradesh	42052	63393	0.696	0.661	0.543	0.586
Maharashtra	86188	169167	0.646	0.618	0.591	0.634
Manipur	47680	57786	0.636	0.647	0.606	0.627
Meghalaya	60784	98260	0.692	0.645	0.531	0.555
Mizoram	51579	112316	0.784	0.660	0.591	0.613
Nagaland	59164	110525	0.631	0.700	0.588	0.605
Odisha	44550	79976	0.590	0.607	0.585	0.616
Puducherry	162925	259404	0.510	0.503	0.647	0.664
Punjab	101746	168506	0.564	0.494	0.596	0.641
Rajasthan	48455	79913	0.700	0.676	0.531	0.578
Sikkim	56270	173550	0.715	0.685	0.596	0.661
Tamil Nadu	74269	137694	0.627	0.616	0.642	0.660
Tripura	61391	106928	0.553	0.569	0.591	0.644
Uttar Pradesh	47780	71033	0.541	0.501	0.519	0.562
Uttarakhand	63348	164094	0.586	0.562	0.558	0.600
West Bengal	61658	97291	0.561	0.541	0.596	0.644

Figure 1: Average annual growth of real GDP (Per cent) in India and states/Union Territories, 2001-2012

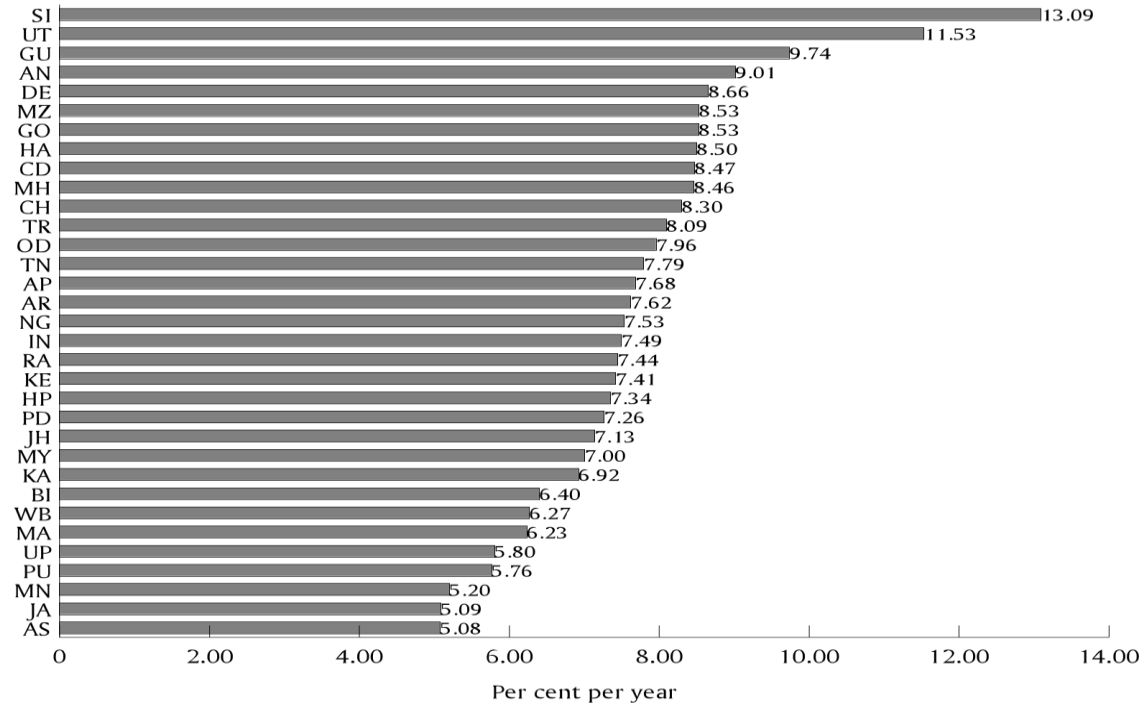


Figure 2: Population growth rate in India and states/Union Territories, 2001-2012

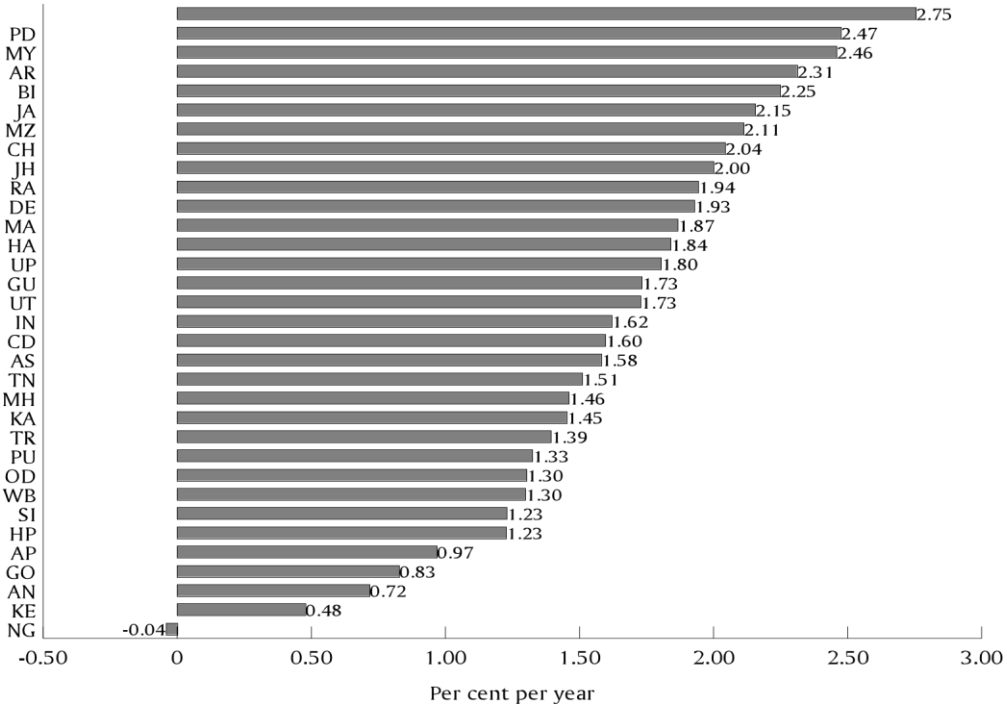


Table 2: Growth of real GDP (r_Y), population growth (r_P), change in worker productivity (r_I), change in the ratio of workers to working age population (r_E) and demographic dividend (r_D) in India, States and Union Territories, 2001-2011

Country/State/Union Territory	r_Y	r_P	r_D	r_I	r_E
India	0.739	0.162	0.058	0.563	-0.044
AN Islands	0.901	0.072	0.048	0.787	-0.006
Andhra Pradesh	0.768	0.097	0.061	0.654	-0.044
Arunachal Pradesh	0.761	0.231	0.081	0.558	-0.109
Assam	0.508	0.158	0.065	0.273	0.012
Bihar	0.640	0.225	0.021	0.442	-0.047
Chandigarh	0.847	0.160	0.036	0.679	-0.028
Chhattisgarh	0.830	0.204	0.074	0.586	-0.035
Delhi	0.866	0.193	0.057	0.670	-0.053
Goa	0.853	0.083	0.000	0.769	0.001
Gujarat	0.974	0.173	0.046	0.835	-0.081
Haryana	0.850	0.184	0.086	0.782	-0.203
Himachal Pradesh	0.735	0.123	0.064	0.568	-0.020
Jammu & Kashmir	0.508	0.215	0.022	0.340	-0.069
Jharkhand	0.713	0.200	0.042	0.465	0.007
Karnataka	0.692	0.145	0.062	0.520	-0.035
Kerala	0.741	0.048	0.008	0.636	0.049
Madhya Pradesh	0.623	0.187	0.077	0.410	-0.051
Maharashtra	0.846	0.146	0.069	0.674	-0.044
Manipur	0.520	0.275	0.035	0.192	0.018
Meghalaya	0.700	0.246	0.045	0.480	-0.071
Mizoram	0.853	0.211	0.036	0.778	-0.172
Nagaland	0.753	-0.004	0.028	0.625	0.104
Odisha	0.796	0.130	0.052	0.585	0.028
Puducherry	0.726	0.247	0.026	0.465	-0.013
Punjab	0.576	0.132	0.073	0.504	-0.133
Rajasthan	0.744	0.194	0.084	0.500	-0.034
Sikkim	1.309	0.123	0.104	1.126	-0.044
Tamil Nadu	0.779	0.151	0.028	0.617	-0.017
Tripura	0.809	0.139	0.087	0.555	0.028
Uttar Pradesh	0.580	0.180	0.080	0.397	-0.077
Uttarakhand	1.153	0.173	0.072	0.952	-0.043
West Bengal	0.627	0.130	0.077	0.456	-0.036

The growth of the output of the economy varied widely across states/Union Territories during the period under reference. The growth of the economy was the most rapid in Sikkim where the real GDP at factor cost increased by more than 3.7 times at an average annual growth rate of more than 13 per cent per year. Besides Sikkim, Uttarakhand is the only other state/Union Territory in the country where the economy more than tripled during the 10 years between 2000-01 and 2010-11. By comparison, the real GDP at factor cost increased by less than 1.7 times in Assam, at an average annual growth rate of around 5 per cent per year. In addition, there are eight states/Union Territories where the output of the economy less than doubled during the period under reference whereas in six states/Union Territories, the economy grew at an average annual growth rate of less than 6 per cent per year.

The per capita output of the economy was the highest in Goa but the lowest in Bihar in 2000-01 as well as in 2010-11. However, the increase in the per capita output of the economy was relatively the most rapid in Sikkim - almost 11.9 per cent per year - but the slowest in Manipur - 2.4 per cent per year. Sikkim is the only state/Union Territory in the country which recorded double-digit growth in the per capita output of the economy during the period under reference. On the other hand, Jammu and Kashmir is the only other state/Union Territory where the average annual growth rate of the per capita output of the economy was less than 2.5 per cent per year. At the same time, there are eight states/Union Territories where the per capita output of the economy increased at an average annual rate of less than 5 per cent per year. This leaves only six states/Union Territories where the average annual increase in the per capita output of the economy was more than 7 per cent per year. The wide variation in the performance of the economy across states/Union Territories is very much evident from Table 1.

Population Growth

Between 2001 and 2011, more than 180 million people were added to the population of the country. Population growth was the most rapid in Manipur whereas Nagaland is the only state/Union Territory in the country where population decreased, instead increased, during the period under reference according to India's 2001 and 2011 population census. In addition, there are only three states/Union Territories - Andaman and Nicobar Islands, Andhra Pradesh and Kerala - where the population increased at an average annual rate of less than 1 per cent per year with Kerala recording the slowest average annual population growth rate among states/Union Territories of the country. On the other hand, the population increased at an average annual growth rate of more than 2 per cent per year during 2001-2011 in eight states/Union Territories, in addition to Manipur. If population growth rate is any indication, then, it is obvious from figure 2 that population transition varied widely across states/union territories of the country.

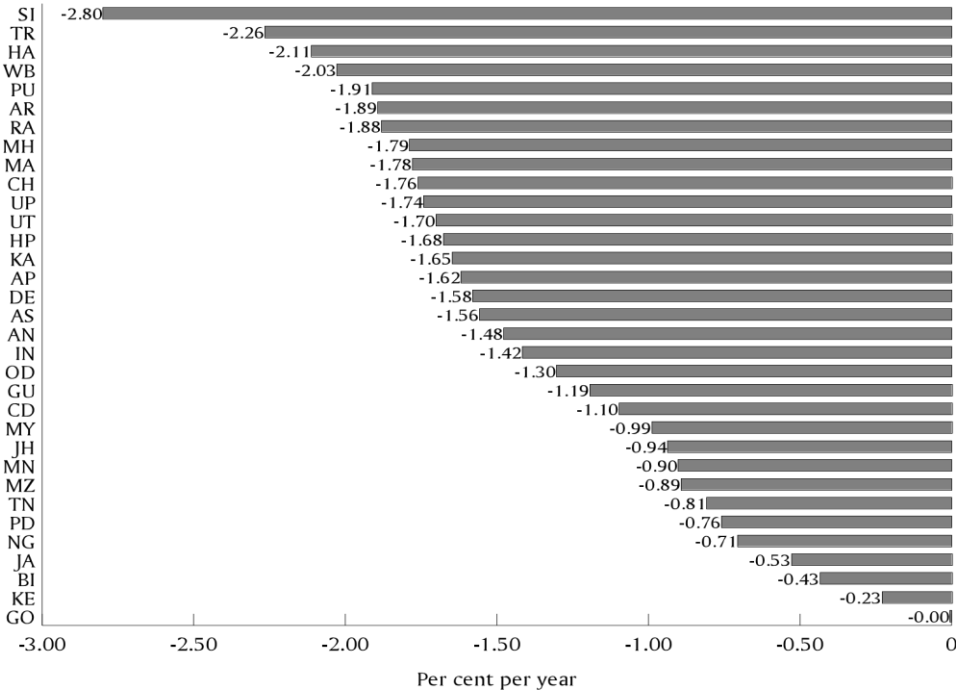
Transition in the Age Composition

During the period under reference, population of all the three subgroups - child population (0-14 years), working age population (15-59 years) and old population (60 years and above) - recorded an increase in the country, although the increase was the most rapid in the old population but the least rapid in the child population. The old population in the country increased by almost 36 per cent during the period under reference whereas the child population increased by about 2 per cent only. The working age population, on the other hand, increased by almost 25 per cent between 2001 and 2011. As the result, the dependency ratio - the ratio of the child and the old population to the working age population - decreased from around 752 children and old people for every 1000 working age people in 2001 to 652 in 2011. The decrease in the dependency ratio is attributed to the decrease in the child dependency ratio as the old dependency ratio increased during this period (Figure 3).

The dependency ratio also decreased in all states/Union Territories of the country during the period under reference, although the pace of the decrease varied widely across states/Union Territories. The variation in the decrease in the dependency ratio reflects the variation in the transition in the age composition of the population (Figure 3). The most rapid decrease in the

dependency ratio during 2001-2011 was recorded in Sikkim followed by Tripura, Haryana and West Bengal. The decrease in the dependency ratio has also been quite rapid in Punjab, Arunachal Pradesh and Rajasthan. By contrast, there has been hardly any decrease in the dependency ratio in Goa, Kerala and Bihar (Figure 3). In 14 states/Union Territories of the country, the average annual decrease in the dependency ratio was slower than the national average. The decrease in the dependency ratio has been the result of the decrease in the young dependency ratio. The old dependency ratio increased in all but three states of the country - Arunachal Pradesh, Meghalaya and Tripura.

Figure 3: Average annual decrease in the dependency ratio (per cent) in India and states/Union Territories, 2001-2011



Growth of Workers

Workers aged 15-59 years in the country increased at an average annual rate of 1.76 per cent during the ten years between 2001 to 2011 according to the definition of work adopted at 2001 and 2011 population census. In 16 states/Union Territories, growth of workers aged 15-59 years was faster than the national average with the most rapid growth in workers aged 15-59 years recorded in Manipur which is the only state/Union Territory where workers aged 15-59 years increased at an average annual rate of more than 3 per cent during 2001-11 (Figure 4). On the other hand, there are four states - Haryana, Punjab, Mizoram and Goa - where workers aged 15-59 years increased at an average annual rate of less than 1 per cent per year during this period with Haryana recording the lowest growth of workers aged 15-59 years in the country. In Kerala, Andhra Pradesh, Andaman and Nicobar Islands, Nagaland and Gujarat also, the growth of workers aged 15-59 years has been quite slow during the period under reference - less than 1.5 per cent per year.

Figure 4: Average annual growth rate of workers (per cent) in India and states/Union Territories, 2001-2011

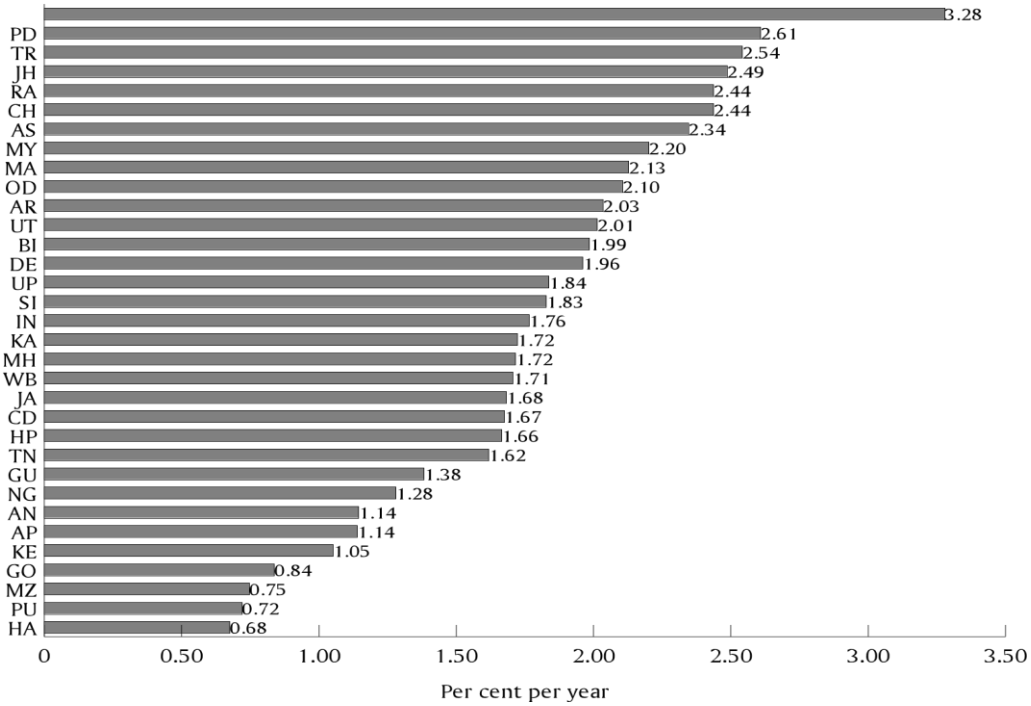


Figure 5: Difference between average annual growth rate of workers and working age population in India and states/Union Territories, 2001-2011

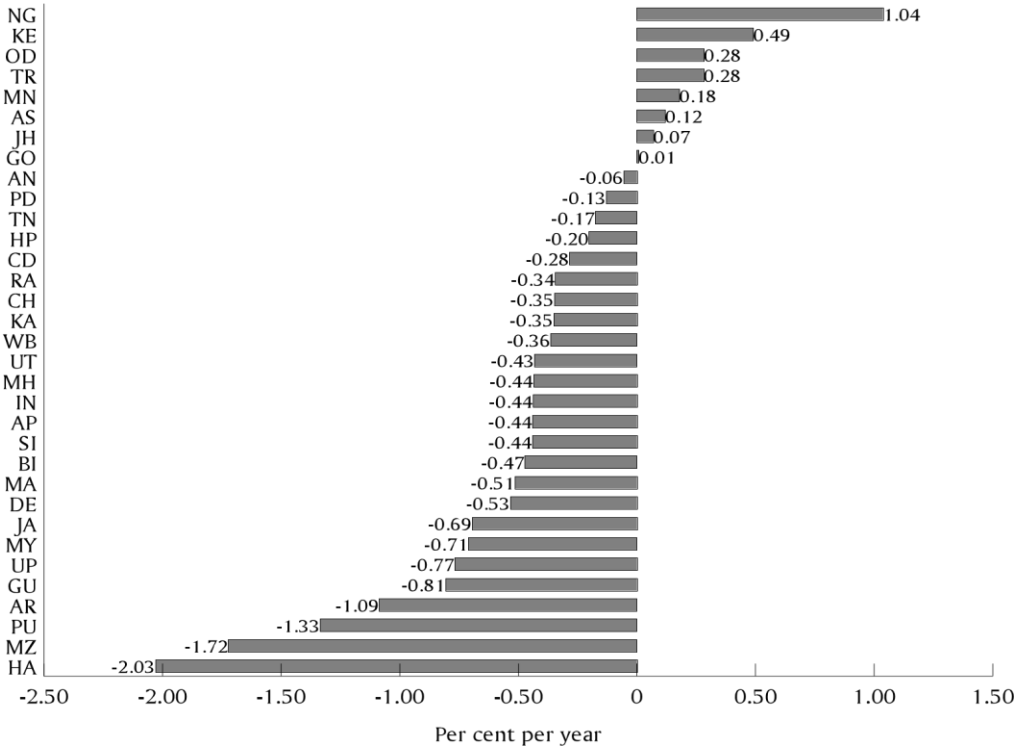


Table 3: Decomposition of the growth of real GDP (Billion Rupees) during 2001-2011, India and states/Union Territories

Country/State/Union Territory	Change in *Y*	Increase in *Y* attributed to change in			
		P	*D*	*I*	*E*
India	25701	5631	2029	19565	-1524
AN Islands	21	2	1	18	0
Andhra Pradesh	2050	258	163	1745	-117
Arunachal Pradesh	28	8	3	20	-4
Assam	292	91	37	157	7
Bihar	616	216	20	425	-45
Chandigarh	76	14	3	61	-3
Chhattisgarh	445	110	40	314	-19
Delhi	1047	233	68	810	-65
Goa	129	13	0	116	0
Gujarat	2288	407	107	1963	-190
Haryana	937	203	95	863	-224
Himachal Pradesh	203	34	18	157	-6
Jammu & Kashmir	153	65	7	102	-21
Jharkhand	456	128	27	297	4
Karnataka	1362	286	122	1023	-69
Kerala	994	64	11	853	66
Madhya Pradesh	826	248	103	544	-68
Maharashtra	4236	731	347	3377	-218
Manipur	27	14	2	10	1
Meghalaya	52	18	3	36	-5
Mizoram	29	7	1	26	-6
Nagaland	49	0	2	41	7
Odisha	687	112	45	505	24
Puducherry	56	19	2	36	-1
Punjab	647	149	82	566	-150
Rajasthan	1118	292	126	752	-52
Sikkim	35	3	3	30	-1
Tamil Nadu	2183	423	79	1730	-49
Tripura	80	14	9	55	3
Uttar Pradesh	1745	543	240	1192	-231
Uttarakhand	381	57	24	314	-14
West Bengal	1438	298	177	1047	-83

The growth of workers aged 15-59 years had, however, been slower than the growth of the working age population during the period under reference. The working age population in the country increased at an average annual rate of more than 2.2 per cent whereas the workers aged 15-59 years increased at an average annual rate of 1.76 per cent. In most of the states/Union Territories of the country also, the increase in the workers aged 15-59 years had been slower than the increase in the working age population during this period. There are only eight states where the growth of workers was faster than the growth of the working age population during the period under reference (Figure 5). The growth of workers aged 15-59 years relative to the working age population had been the fastest in Nagaland but the slowest in Haryana. In Mizoram, Punjab and Arunachal Pradesh also, the growth of workers aged 15-59 years had been substantially slower than that of working age population during the period under reference.

Figure 6: Demographic component of the growth of the economy in India and states/Union Territories, 2001-2012

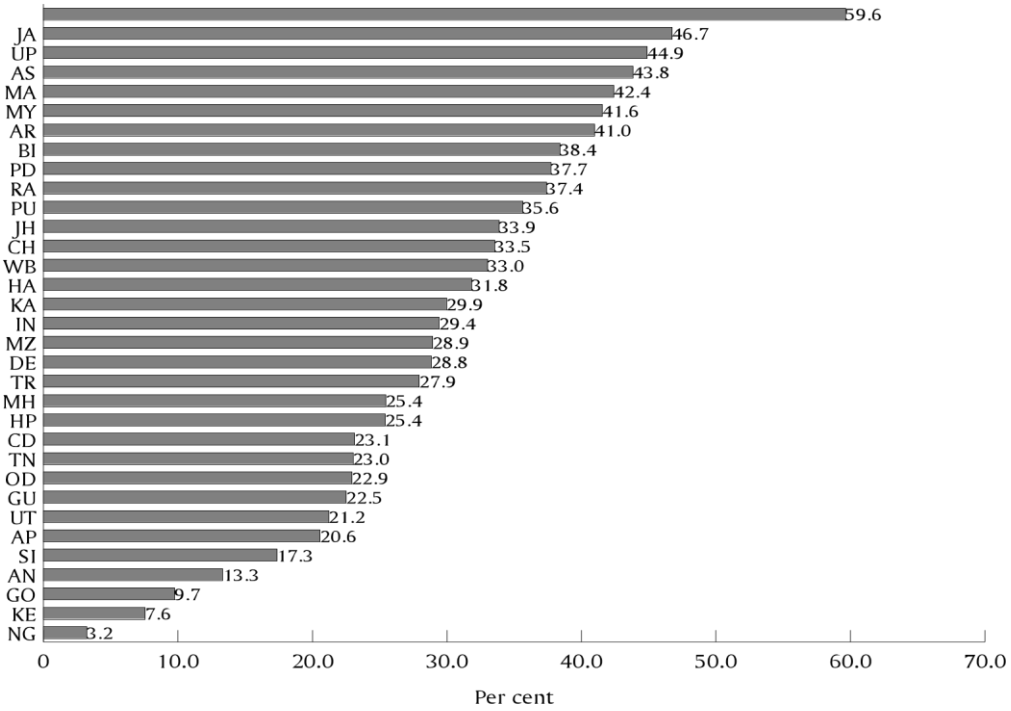
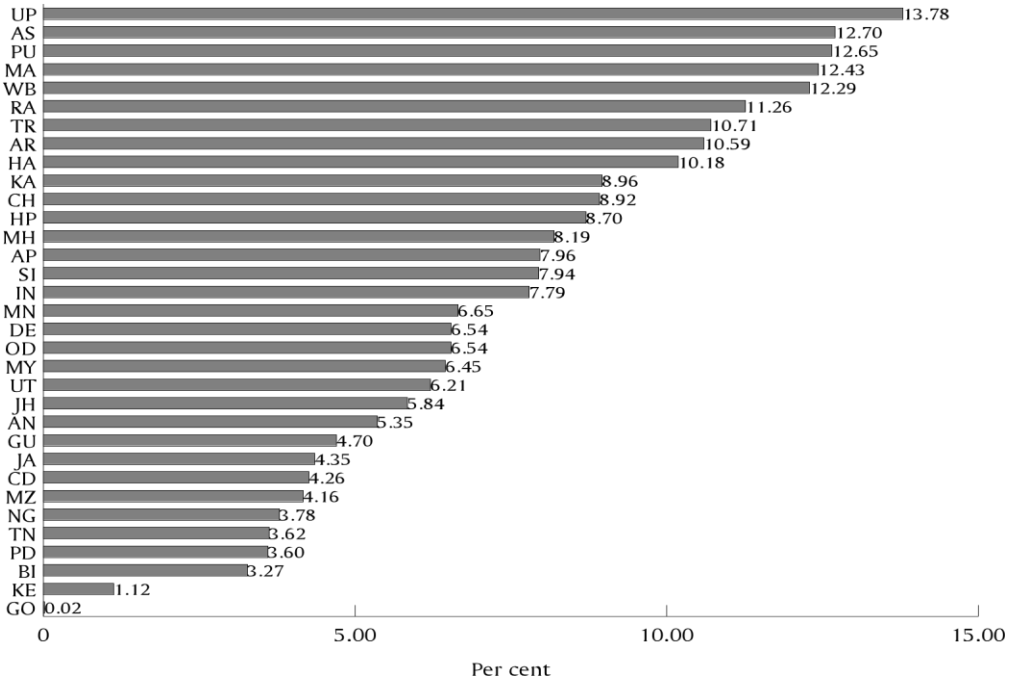


Figure 7: Demographic dividend in India and states/Union Territories, 2001-2012



Decomposition Results

Results of the decomposition of the increase in the total output of the economy of the country and that of the states/Union Territories are presented in Table 3. The demographic component resulted in almost 1.25 times increase in the output of the economy between 2000-01

and 2010-11 whereas the economic component resulted in around 1.68 times increase so that the output of the economy more than doubled during this period. The increase in the population size resulted in around 1.18 times increase in the output of the economy whereas the change in the population age composition resulted in around 1.06 times increase in the output. On the other hand, the increase in worker productivity resulted in about 1.76 times increase in the output but the decrease in the proportion of workers to the working age population resulted in a decrease in the output. Alternatively, the increase in the population size accounted for almost 22 per cent of the increase in the output of the Indian economy during 2000-11 whereas the change in population age composition accounted for less than 8 per cent of the increase. On the other hand, increase in the worker productivity accounted for 76 per cent of the increase in the output of the economy but the decrease in the proportion of workers to the working age population accounted for around 6 per cent of the decrease in the output of the economy.

The contribution of the demographic component to the output of the economy varied widely across states/Union Territories. In Manipur, the demographic component accounted for almost 60 per cent of the growth of the output of the economy which is the highest in the country (Figure 6). In Jammu and Kashmir, Uttar Pradesh, Assam, Madhya Pradesh, Meghalaya and Arunachal Pradesh also, the demographic component accounted for more than 40 per cent of the growth of the output of the economy. In other words, a large proportion of the growth in the output of the economy, in these states, had contributed little to improving the standard of living of the people. By contrast, in Nagaland, Kerala and Goa, demographic component accounted for less than 10 per cent of the growth in the output of the economy. In these states, nearly all the growth of the output of the economy during the period under reference was attributed to the economic component which has direct relevance to improving the standard of living of the people.

In all states/Union Territories, most of the demographic component of the growth of the output of the economy was the result of the increase in population size. In Manipur, the increase in population size resulted in almost 1.32 times increase in the output of the economy which is the highest in the country. In addition, increase in population size resulted in more than 1.2 times increase in the output of the economy in 12 states/Union Territories of the country. On the other hand, there are only three states/Union Territories where increase in population size resulted in less than 1.1 times increase in the output of the economy whereas in Nagaland, population decreased, instead increased, during the period under reference so that the decrease in population size resulted in a marginal decrease in the output of the economy.

The demographic dividend, on the other hand, contributed only marginally to the growth of the output of the economy in all states/Union Territories. Sikkim is the only state/Union Territory where the demographic dividend resulting from the transition in the population age composition induced more than 1.1 times increase in the output of the economy. By contrast, in Goa and Kerala, there was little change in the age composition of the population so that the demographic dividend contributed little to accelerate the growth of the output of the economy in these states. There are, in fact, only six states/Union Territories where the demographic dividend resulting from the transition in the population age composition resulted in more than 1.08 times increase in the growth in the output of the economy.

Alternatively, there are only nine states/Union Territories where the demographic dividend accounted for at least 10 per cent of the increase in the output of the economy of the state/Union Territory during the period under reference. The contribution of the demographic dividend to the increase in the output of the economy was the largest in Uttar Pradesh where the transition in the population age composition is estimated to have resulted in almost 14 per cent increase in the output of the economy of the state. On the other hand, in ten states/Union Territories, the demographic dividend contributed less than 5 per cent of the increase in the output of the economy during this period. The contribution of the demographic dividend to the growth in the output of the economy was the lowest in Goa where the demographic dividend accounted for just around 0.02 per cent increase in the output of the economy of the state. In Kerala also, the demographic dividend accounted for just around one per cent of the increase in the output of the economy during the period under reference.

Discussions and Conclusions

The present analysis suggests that the demographic component contributed, quite substantially, in fueling the growth of India's economy during the 10 years between 2000-01 and 2010-11 as well as in its many states/Union Territories. The analysis also reveals that the contribution of the demographic dividend in accelerating the growth of the economy has not been significant so that most of the contribution of the demographic component to the growth of the output of the economy has been the result of the increase in the size of the population which contributes little towards improving the standard of living. If the growth of the output of the economy attributed to the demographic component is excluded, then it is obvious from the present analysis that the growth of the economy of the country and many of its states/Union Territories had been less spectacular in the context of improving the standard of living of the Indian people during the period under reference.

The analysis also suggests that the prospects of the demographic divided accelerating the economic growth in future are at best remote in India. The pace of fertility decline in future would be slower as the level of fertility in the country has already reached low in most of the states/Union Territories. According to the Sample Registration System, the total fertility rate in India was 2.4 live birth per woman of reproductive age in 2011. In ten of the twenty states for which estimates of total fertility rate are available through the Sample Registration System, the replacement fertility was achieved by the year 2011. As such, there is little scope of a significant contribution of demographic transition in accelerating economic growth in India in the coming years. This means that the country will have to rely upon improving the productivity of its economic system in order to maintain the tempo of economic growth that was witnessed during 2000-01 through 2011-12. This will require both increasing the opportunity of participation in productive activities for the working age population that will continue to increase in the coming years and improving the average productivity of the worker. If the productivity of the economic system is not increased, then the slowing down of the population growth in the coming years will have a decelerating effect on the economic growth in the country and in its many states/Union Territories where the demographic component contributes substantially to the growth of the output of the economy and where the productivity of the economic system is low. Creating employment opportunities for the

increasing working age population and investment in human resources to raise their average productivity, therefore, is necessary for maintaining the tempo of economic growth that the country had witnessed during the 10 years between 2001 and 2011.

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Appendix Table 1: Real GDP and population 2001 and 2011: India and states/Union Territories

Country/State/ Union Territory	Real GDP Billion Rupees		Population Million								Workers Million	
			Total		<15 years		15-59 years		≥60 years			
	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011
India*	23484.81	49185.33	1025.43	1205.72	363.47	372.26	585.36	729.63	0.02	0.03	0.13	0.14
AN Islands	14.05	34.60	0.35	0.38	0.10	0.09	0.23	0.26	5.79	8.28	31.14	34.90
Andhra Pradesh	1774.89	3824.59	76.08	83.81	24.40	21.79	45.89	53.74	0.05	0.06	0.43	0.53
Arunachal Pradesh	24.38	52.20	1.10	1.38	0.44	0.49	0.60	0.83	1.56	2.08	8.52	10.78
Assam	441.97	734.44	26.63	31.19	9.97	10.25	15.10	18.86	5.50	7.71	24.26	29.59
Bihar	686.20	1301.71	82.82	103.70	34.87	41.72	42.45	54.27	0.04	0.07	0.33	0.39
Chandigarh	57.20	133.38	0.90	1.06	0.26	0.27	0.59	0.72	1.50	2.00	8.58	10.95
Chhattisgarh	344.12	789.03	20.81	25.52	7.69	8.18	11.61	15.33	0.72	1.15	4.34	5.28
Delhi	760.60	1807.65	13.83	16.77	4.49	4.57	8.62	11.06	0.11	0.16	0.49	0.53
Goa	95.91	224.99	1.34	1.46	0.33	0.32	0.90	0.98	3.50	4.79	19.60	22.51
Gujarat	1388.25	3675.81	50.62	60.20	16.62	17.45	30.50	37.97	1.58	2.19	7.58	8.11
Haryana	700.27	1637.70	21.06	25.32	7.58	7.53	11.90	15.60	0.55	0.70	2.61	3.08
Himachal Pradesh	187.36	390.54	6.06	6.85	1.88	1.78	3.63	4.38	0.68	0.92	3.27	3.87
Jammu & Kashmir	230.16	382.70	10.10	12.53	3.62	4.24	5.81	7.36	1.58	2.36	9.04	11.59
Jharkhand	438.46	894.91	26.91	32.87	10.71	11.89	14.63	18.62	4.06	5.79	21.11	25.08
Karnataka	1365.16	2727.21	52.80	61.05	16.85	16.02	31.89	39.23	3.34	4.19	9.49	10.54
Kerala	904.50	1898.51	31.81	33.37	8.30	7.83	20.18	21.35	4.28	5.71	22.72	28.10
Madhya Pradesh	955.25	1781.44	60.19	72.54	23.25	24.30	32.66	42.53	8.45	11.11	36.95	43.86
Maharashtra	3184.39	7420.42	96.76	111.97	31.10	29.92	57.21	70.94	0.15	0.20	0.83	1.16
Manipur	39.71	66.81	2.16	2.85	0.71	0.86	1.31	1.79	0.11	0.14	0.85	1.06
Meghalaya	51.69	104.13	2.32	2.96	0.98	1.18	1.23	1.64	0.05	0.07	0.41	0.44
Mizoram	21.22	49.79	0.89	1.10	0.31	0.36	0.53	0.67	0.09	0.10	0.74	0.84
Nagaland	43.58	92.54	1.99	1.98	0.73	0.68	1.17	1.20	3.04	3.98	12.68	15.65
Odisha	564.75	1251.31	36.74	41.86	12.21	12.08	21.50	25.79	0.08	0.12	0.32	0.42
Puducherry	52.30	108.06	0.97	1.25	0.26	0.30	0.63	0.83	2.19	2.87	8.16	8.76
Punjab	829.81	1476.70	24.27	27.70	7.62	7.09	14.46	17.75	3.81	5.11	20.90	26.66
Rajasthan	1012.63	2130.79	56.22	68.28	22.54	23.73	29.87	39.44	0.03	0.04	0.23	0.28
Sikkim	12.92	47.84	0.54	0.61	0.19	0.17	0.32	0.40	5.51	7.51	24.92	29.30
Tamil Nadu	1851.01	4034.16	61.98	72.08	16.71	17.01	39.76	47.56	0.23	0.29	1.04	1.35
Tripura	64.06	143.87	3.19	3.67	1.08	1.02	1.89	2.37	11.65	15.44	46.43	55.79
Uttar Pradesh	2218.43	3963.09	165.46	198.19	67.92	71.31	85.89	111.44	0.65	0.90	2.77	3.39
Uttarakhand	175.71	556.67	8.47	10.07	3.09	3.13	4.73	6.04	5.70	7.74	26.77	31.74
West Bengal	1650.31	3088.37	80.06	91.16	26.65	24.74	47.72	58.68	76.60	103.82	357.64	426.67

Note: *Figures for India exclude the Union Territories Dadra and Nagar Haveli, Daman and Diu and Lakshadweep for which estimates of GDP are not available. The population of India also excludes the population of the three Union Territories.