

Demographic Transition and Demographic Dividend in the States of India

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Abstract: Demographic transition is inevitable and the utilization of the windows of opportunity it creates depends on policy framework of concerned nations. India has entered into the phase of demographic dividend since 1980 and will experience it till 2035 (UN; 2002). Unlike earlier studies, the present paper has made an attempt to understand demographic transition in state level and the dividend created through it in 21 major states following the process adopted by Mason and Lee (2006). Population has been projected using smoothed age-sex data of Census 2001 as base year population following Cohort Component method of projection. Bihar and Uttar Pradesh are the youngest and Kerala is the oldest among the major states followed by Tamil Nadu. First dividend is positive for all states in 2001. Delhi will observe negative dividend since 2016-21, followed by Kerala and Tamil Nadu. Most of the North Indian states will observe positive dividend till 2036-41.

Introduction: The association between demographic change and economic benefit is a matter of debate and is not easy to resolve with a single solution. There are three different phases of demographic transition which gives birth to three unique age structures. In the very first phase, very high fertility and declining mortality accumulates a large number of people in the younger age group, particularly below 15 years and creates a high dependency ratio. The second phase is characterized by decline in fertility in a fast pace with declining mortality. This leads to a reduction in the younger population and the earlier higher fertility resulted into a higher growth rate in the working age population. In this phase, the economy enjoys a considerable reduction in dependency ratio and is usually termed as first dividend phase. The third phase of demographic transition is known as the ageing phase where the dependency ratio started growing higher again due to old age population. The demographic change followed by fertility decline, given the appropriate policy formulation to absorb the growing labour force in productive activity creates potential to the economy to grow rapidly. In most industrialized countries, demographic change in the period after Second World War led to a demographic dividend that began in the 1970s when the baby boom generation entered into labour force. The first part of the dividend is commonly known as the accounting affect whereas the second phase is related to the behavioral changes.

According to the projection by United Nations (UN; 2002), India has entered into the phase of demographic dividend since 1980 and will experience it till 2035. The period for Windows of

Opportunity is almost the longest globally (Kumar, 2010). Demographic transition is an inevitable part of every nation and the

Review of Literature:

Objectives: The present paper has the following basic objectives:

- 1) To determine the first dividend phase for India and its major 21 states,
- 2) To estimate first dividend for the states of India

Hypotheses:

- 1) All the major states of India enjoy first dividend at the same time and for the same duration
- 2) The dividend gained from the demographic change at the second phase of demographic transition is same for all the states.

Data and Methodology:

Required data for the proposed analysis has been extracted from several census rounds of India's National Census. The support ratio and the first dividend have been calculated for India and its 21 major states using projected population figures till 2051. The age-sex distribution of population of India and states till 2051 were estimated using the smoothed age-sex population figure of Census 2001.

This paper follows the procedure to estimate demographic dividend as proposed by Mason and Lee (2006). If the effective number of consumer is denoted by N and the effective number of producers by L and

$$N(t) = \sum_a \alpha(a)P(a, t)$$

Where $P(a,t)$ is the population aged a at time t and $\alpha(a)$ and $\lambda(a)$ are age-specific coefficients reflecting relative levels of consumption and production. Output per effective consumer (Y/N) is given by:

$$\frac{Y(t)}{N(t)} = \frac{L(t)}{N(t)} * \frac{Y(t)}{L(t)}, \quad (2)$$

Equation (2) is readily converted from levels to rates of growth by taking the natural logarithm of both sides and taking the derivative with respect to time so that:

$$\dot{y}^n(t) = \dot{L}(t) - \dot{N}(t) + \dot{y}(t). \quad (3)$$

Thus, the rate of growth in output per effective consumer (\dot{y}^n) is the sum of the rate of growth of the support ratio ($\dot{L}(t) - \dot{N}(t)$) and the rate of growth of output per worker (\dot{y}). The first dividend is then defined as the rate of growth of the support ratio.

Results:

A number of states in India are with population size larger than some countries. Though, the proportion of elderly at this moment is not as of developed countries, but the absolute number of elderly is of great concern. The median age of population of India has increased from about 21 years in 1950 to 23 years in 2001 (i.e., only two years increase in last fifty years). This was a slow increase in the median age but it is further expected to increase to 39 years in 2051 (i.e., 16 years increase in next fifty years). This rapid increase in the median age can be attributed to the rapid pace of population ageing (Table 1). The median age will increase lowest by 15 years in Madhya Pradesh and highest by 23 years in Delhi. Delhi, Kerala and Punjab will be the states with highest median age population (46 years) and Uttar Pradesh and Bihar with youngest population (35 years).

The support ratio of India as well as states starts rising first, and then falls. In India, as a whole, there were three supporters to support two dependents in 2001 (support ratio 1.5). The support ratio will increase to 2.3 during 2031-2046 and then will start falling again. Support ratio will be highest for Delhi (2.8) during 2016-2021. A highest support ratio implies huge potential of a country to improve. Relatively lower values of support ratio in the initial and the end point of the estimation period arises due to abundance of younger and older population respectively. The support ratio will give a lower value with the introduction of age pattern of production (or, age specific work participation rate).

India has entered into the phase of demographic dividend since 1980 and will experience it till 2035 (UN; 2002). The present analysis suggests that, India will observe positive first dividend till 2036-41. First dividend will become negative for Delhi since 2016-21. Kerala and Tamil Nadu will join the group during 2021-26 and West Bengal will join by 2026-31. All the major states of India will observe negative first dividend during 2046-51, except Bihar, Madhya Pradesh and Uttar Pradesh. The first dividend of Madhya Pradesh will be zero during this period.

Figure 1: Support ratio and first demographic dividend in Kerala and Uttar Pradesh

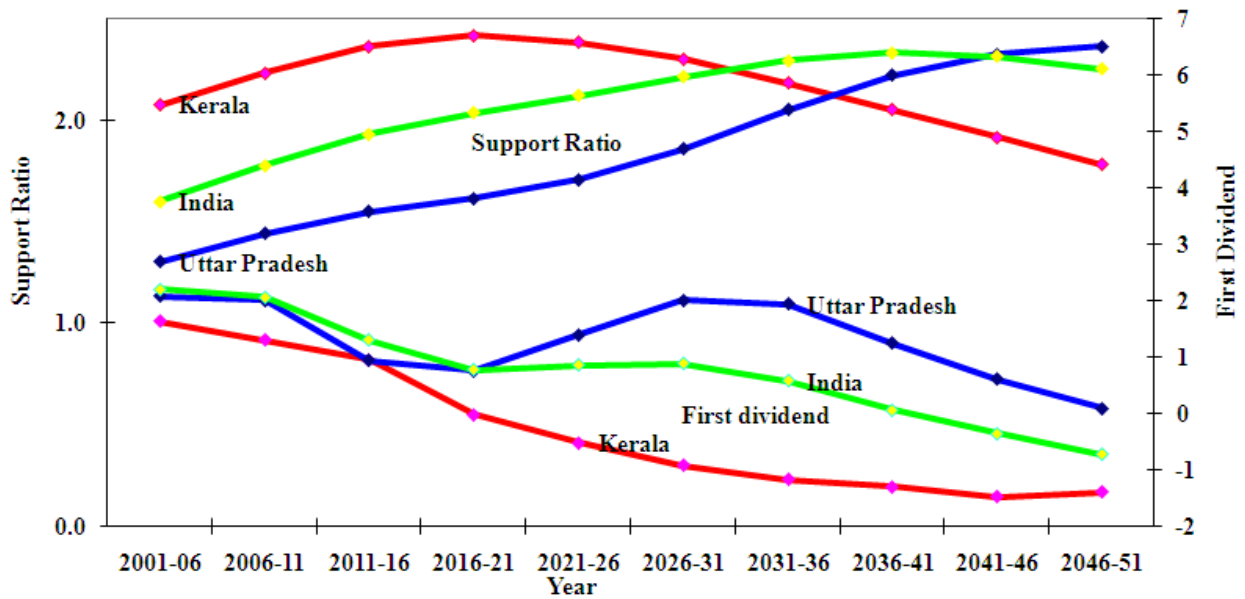


Table 1: Median age of Population for the major 21 states in India, 2001-2051

India/States	2001	2006	2011	2016	2021	2026	2031	2036	2041	2046	2051
Andhra Pradesh	24	26	28	30	32	35	37	39	41	43	44
Assam	21	23	24	26	28	30	32	34	35	36	38
Bihar	19	20	21	23	24	26	28	29	31	33	35
Chattishgarh	22	23	24	26	28	29	31	33	35	36	38
Delhi	23	26	28	31	33	36	38	41	43	45	46
Gujarat	24	25	27	28	30	32	34	36	37	39	41
Haryana	22	23	25	27	29	32	34	36	38	40	41
Himachal Pradesh	24	26	28	30	32	35	37	39	41	43	44
Jammu & Kashmir	22	24	26	28	30	32	34	36	37	38	40
Jharkhand	20	22	23	25	27	29	31	33	34	36	37
Karnataka	24	26	28	30	32	34	36	38	40	42	43
Kerala	28	30	32	34	36	38	40	42	44	45	46
Madhya Pradesh	21	22	23	24	26	27	29	30	32	34	36
Maharashtra	24	26	28	30	32	34	36	39	41	42	44
Orissa	24	25	27	28	30	32	34	36	38	39	40
Punjab	24	26	28	30	33	35	38	40	42	44	46
Rajasthan	20	21	22	24	25	27	29	31	33	35	37
Tamil Nadu	27	29	31	33	35	37	39	41	43	44	45
Uttar Pradesh	19	20	22	23	24	25	27	29	30	32	35
Uttaranchal	21	22	24	25	27	28	30	31	33	35	37
West Bengal	24	26	28	30	32	34	37	39	41	42	44
India Weighted	23	24	25	27	29	30	32	34	36	37	39

Table 2: Support ratio for the major 21 states in India, 2001-2051

India/States	2001	2006	2011	2016	2021	2026	2031	2036	2041	2046	2051
Andhra Pradesh	1.7	2.0	2.3	2.4	2.5	2.6	2.6	2.5	2.4	2.3	2.1
Assam	1.5	1.7	1.9	2.1	2.1	2.2	2.3	2.3	2.3	2.3	2.2
Bihar	1.2	1.3	1.5	1.7	1.7	1.8	2.0	2.2	2.3	2.4	2.4
Chhattisgarh	1.4	1.6	1.8	1.9	2.0	2.1	2.2	2.3	2.3	2.3	2.2
Delhi	1.8	2.1	2.5	2.8	2.8	2.7	2.6	2.5	2.3	2.1	1.9
Gujarat	1.7	1.8	2.0	2.1	2.2	2.3	2.3	2.3	2.3	2.2	2.1
Haryana	1.5	1.4	1.5	1.7	1.7	1.7	1.9	1.9	1.9	2.1	2.1
Himachal Pradesh	1.7	1.9	2.2	2.3	2.4	2.6	2.6	2.5	2.4	2.3	2.1
Jammu & Kashmir	1.5	1.8	2.1	2.2	2.2	2.3	2.4	2.4	2.4	2.3	2.1
Jharkhand	1.3	1.5	1.8	1.9	2.0	2.1	2.2	2.3	2.4	2.4	2.3
Karnataka	1.7	2.0	2.2	2.3	2.4	2.5	2.5	2.5	2.4	2.3	2.1
Kerala	2.0	2.2	2.3	2.4	2.4	2.4	2.3	2.1	2.0	1.8	1.7
Madhya Pradesh	1.4	1.5	1.6	1.7	1.8	1.9	2.1	2.2	2.3	2.4	2.4
Maharashtra	1.7	1.9	2.1	2.4	2.5	2.5	2.5	2.5	2.4	2.3	2.1
Orissa	1.6	1.8	2.1	2.2	2.3	2.4	2.4	2.4	2.3	2.2	2.1
Punjab	1.7	2.0	2.2	2.4	2.5	2.6	2.6	2.6	2.5	2.3	2.1
Rajasthan	1.3	1.4	1.6	1.7	1.8	2.0	2.2	2.3	2.4	2.4	2.4
Tamil Nadu	2.0	2.2	2.4	2.5	2.6	2.6	2.5	2.4	2.2	2.1	1.9
Uttar Pradesh	1.2	1.4	1.5	1.6	1.6	1.8	2.0	2.2	2.3	2.4	2.4
Uttaranchal	1.4	1.6	1.7	1.7	1.9	2.0	2.2	2.3	2.3	2.3	2.3
West Bengal	1.7	1.9	2.2	2.5	2.5	2.6	2.5	2.5	2.4	2.3	2.1
India Weighted	1.5	1.7	1.9	2.0	2.1	2.2	2.3	2.3	2.3	2.3	2.2

*The estimation is based on the population projected by the author.

Table 3: Estimated first demographic dividend for the major 21 states in India, 2001-2051

India/States	2001-06	2006-11	2011-16	2016-21	2021-26	2026-31	2031-36	2036-41	2041-46	2046-51
Andhra Pradesh	2.7	2.6	1.4	0.9	0.5	0.0	-0.6	-0.9	-1.1	-1.4
Assam	2.8	2.7	1.7	0.5	0.6	0.7	0.5	0.0	-0.3	-0.6
Bihar	2.1	2.5	1.7	0.5	1.0	1.9	2.1	1.4	0.7	0.1
Chhattisgarh	2.0	2.0	1.7	0.8	0.9	0.9	0.6	0.2	-0.1	-0.4
Delhi	3.5	2.9	2.1	-0.1	-0.2	-0.7	-1.1	-1.6	-1.8	-1.6
Gujarat	1.8	1.6	1.1	1.0	0.7	0.2	-0.2	-0.4	-0.7	-0.9
Haryana	2.9	2.7	1.9	1.6	1.3	0.7	0.0	-0.5	-0.8	-1.2
Himachal Pradesh	2.9	2.0	1.5	1.0	0.9	0.5	-0.6	-1.1	-1.3	-1.7
Jammu & Kashmir	3.9	2.7	0.8	0.1	0.4	0.9	0.3	-0.2	-1.0	-1.7
Jharkhand	2.7	2.7	1.8	0.3	0.9	1.4	1.1	0.4	-0.1	-0.5
Karnataka	2.6	2.0	1.3	0.9	0.7	0.2	-0.4	-0.8	-1.0	-1.4
Kerala	1.6	1.3	0.9	0.0	-0.5	-0.9	-1.2	-1.3	-1.5	-1.4
Madhya Pradesh	1.8	1.9	1.3	1.1	1.3	1.5	1.2	0.7	0.4	0.0
Maharashtra	2.6	2.4	2.0	0.8	0.6	0.1	-0.4	-0.8	-1.1	-1.3
Orissa	2.5	2.3	1.5	0.7	0.5	0.3	-0.1	-0.5	-0.7	-1.0
Punjab	3.2	2.6	1.4	1.1	0.7	0.2	-0.5	-1.0	-1.5	-1.8
Rajasthan	2.1	2.2	1.7	1.2	1.6	1.8	1.4	0.6	0.1	-0.2
Tamil Nadu	1.9	1.4	0.7	0.6	-0.1	-0.6	-1.0	-1.2	-1.5	-1.5
Uttar Pradesh	2.1	2.0	0.9	0.8	1.4	2.0	1.9	1.2	0.6	0.1
Uttaranchal	1.7	1.3	0.4	1.8	1.9	1.5	0.6	0.4	0.1	-0.5
West Bengal	3.1	2.9	2.0	0.5	0.2	-0.1	-0.5	-0.8	-1.0	-1.3
India Weighted	2.2	2.1	1.3	0.8	0.9	0.9	0.6	0.1	-0.4	-0.7

*The estimation is based on the population projected by the author.

Limitations: This paper has used projected population in the age group 15-64 years as potential producers and population in the age group less than 15 years and more than 65 years as potential consumers. The National Transfer Accounts (NTA) data regarding the age structure of production and consumption is expected to release shortly. Once the data is released, the figure of the potential producer and consumer will be revised accordingly, else age specific work participation rate will be applied to get the potential producer.

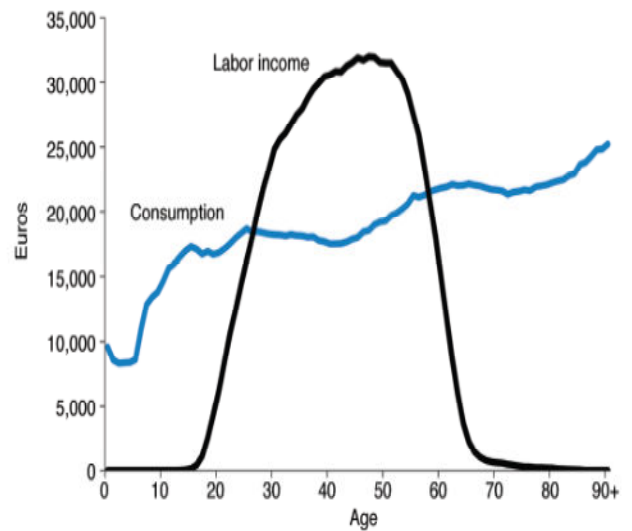
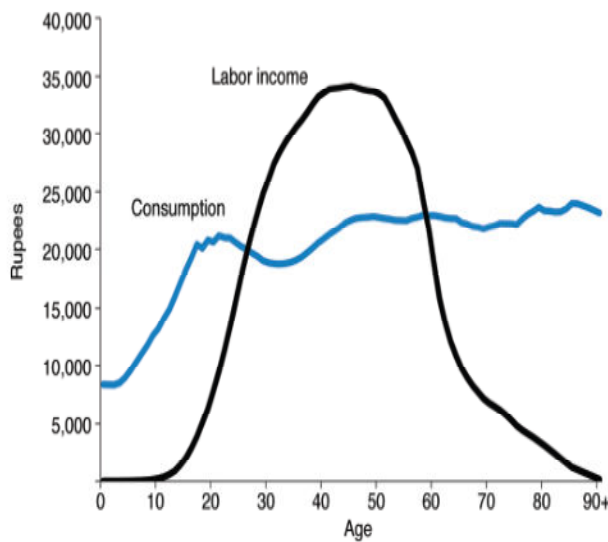
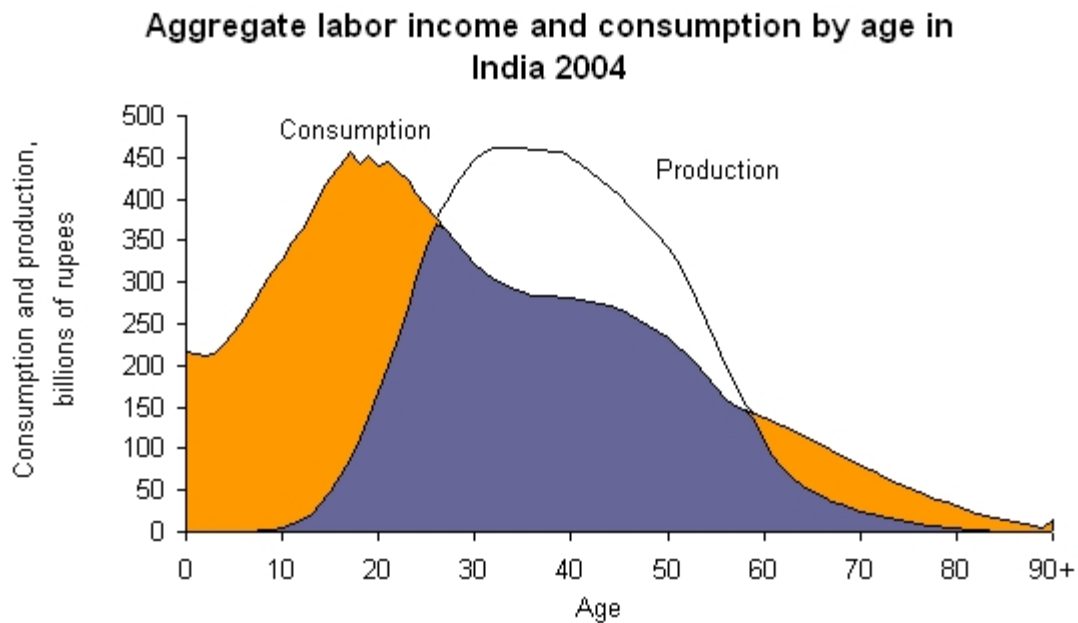


Figure 1. Per-capita labor income and consumption by age in India (left) in 2004 and in Germany (right) in 2003. *Source: Lee and Mason forthcoming, Figure 1.3.*

Reference:

Kumar Utsav, 2010, India's demographic Transition: Boon or Bane? A State Level Perspective, Unpublished MPRA Paper, [http://mpra.ub.uni-muenchen.de/24922/MPRA Paper No. 24922](http://mpra.ub.uni-muenchen.de/24922/MPRA_Paper_No._24922), posted 11. September 2010 / 12:13