India at 100 and the Significance of Top Six States

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Abstract

India has a goal of achieving a $7 trillion economy in 2030, and subsequently a developed nation status by 2047. While some studies/reports have explored the possibilities of reaching these targets based on assumptions regarding the growth rate, inflation etc., this study is an attempt to forecast the future growth of the Indian economy till 2047-48, using the Markov Switching model and real GDP growth data from 1993-94 to 2022-23, and verify when these goals will be achieved. Since the economic outcomes are highly heterogeneous across the Indian States, and there are indications of divergence in economic growth, it also estimates and predicts the future growth prospects of the top six states to see how much these top states contributes to achieve the targets. The findings suggest that India will achieve the US$ 7 trillion target by 2032-33 and the per capita income level of developed nation by 2046-47, assuming 4.5% inflation and 2% depreciation of exchange rate. Tamil Nadu, Karnataka and Gujarat are expected to reach per capita income mark of developed nation by 2037-38, Maharashtra is expected to reach in 2040-41. West Bengal will reach this target by 2047-48, while Uttar Pradesh has to go a long way to reach this ambitious target.

Keywords: Indian economy, Indian States, Markov Switching Regression, GDP/GSDP forecasts

JEL Codes: C34, E17, E66

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1. Introduction

India is amongst the fastest growing major economies in the world in recent years. It is the third-largest economy in terms of purchasing power parity, aspiring to achieving a US$ 7 trillion economy by 2030 and becoming a "developed" economy, with a per capita income of US$13,845 by 2047 (Ministry of Finance, 2024), the year at which India will complete 100 years after achieving freedom from British rule.

The successful growth story of India since 1990 is as a result of carefully designed policy reforms and sector-specific action goals embedded in the vision of equitable development and enhancing the standard of life of the people in the country. Accelerating India's growth will have profound implications for more than 1.4 billion Indians, particularly young people, who are looking for jobs-led growth. Further, India's higher performance has relevance far beyond India's borders - the entire world has a lot riding on India's success (NITI Aayog, 2018). If India is able to achieve its ambitious target of becoming a developed nation, while becoming a net-zero economy, this will become a successful model for many nations to follow to improve their economies without compromising on their climate change commitments.

However, India faces a number of challenges in achieving this target. It is the world's most populous country. India is now a lower middle-income country with per capita income (in 2022) of only US$2,390, as against USA's per capita income of US$76,770 and China's per capita income of US$12,850. According to the World Inequality Report 2022, India is among the most unequal countries in the world. The wealthiest top 1% own nearly 40.6% of the total wealth in India. India still has the world's largest absolute number of poor persons, at 228.9 million (Oxfam India, 2023).

The sectoral transformation from agriculture to industry has been relatively slow, especially in terms of employment. 45% of the working population is still in agriculture, which contributes only 15% of GDP, indicating low productivity in this sector. Poor quality of human capital is another concern. India ranked 134 out of 193 nations in UNDPs' HDI index in 2022.

While there are a few signs of convergence, economic and social outcomes across India are indeed highly heterogeneous. A few states account for a large share of national output, and overwhelmingly dominate activities like exports and innovation.[1] On the other hand, a large number of laggard states appear largely unconnected to the modern Indian and global economy.

India also suffers from high inflation, unstable rupee against the US dollar, and a larger fiscal deficit (with public debt of about 80%) and current account deficit. While its unemployment rate ranged between 2.37% - 5.76% between 1991 to 2019, it increased to 8% in 2020. It also suffers from climate risks. The Global Climate Risk Index 2021 ranked India the seventh most affected country in terms of extreme weather events. ity. It is the third largest CO_2 emitter globally.

Like all other nations, India was also severely affected by the COVID-19 pandemic. RBI's Report on Currency and Finance (2022) shows that based on pre-COVID trend growth and actual growth

rates for the last three years (2020-21 to 2022-23), India's real output loss amounted to a total of ₹52.6 lakh crore.

Government of India announced the target of achieving a US$ 5 trillion strong economy by 2024-25 just before the pandemic started. Several studies have worked out the growth rate required to reach this target: 9.5 % to 13.5 % (Soni and Subrahmanya 2020; Srivastava et al. 2021; Chakrabarty and Mukherjee 2022). Due to the pandemic, this target was missed.

Given this background, the central questions are: will the Indian economy become a seven trillion-dollar economy by 2030 or not? whether India will become a developed country by 2047 or not? Will the top six states – Maharashtra, Tamil Nadu, Uttar Pradesh, Karnataka, Gujarat, and West Bengal – reach the target per capita income (of a developed country) well in advance or not? This study is an attempt to answer these questions, taking into account the GDP/GSDP growth cycles, by characterizing the non-linear and asymmetric features it encompasses.[2]

The main contributions of this study are as follows:

(i) While some studies/reports including EY (2023) have explored the possibilities for India to reach the target of developed nation based on assumed growth rate, inflation etc., this study attempts to forecast the future growth of the Indian economy till 2047-48 using the Markov Switching (MS) model and real GDP growth data from 1994-95 to 2022-23, and verify whether and when these aspirational goals of seven trillion dollar economy and developed nation's per capita income will be achieved;

(ii) while no study has analyzed when the Indian states will achieve the target of developed nation's per capita income level, this study estimates the future growth of the top six states using the MS model and real GSDP growth rates from 1994-95 to 2022-23, to check empirically when they will achieve the ambitious target.

2. Review of the Indian Economy and Top 6 States' Economy

The Indian economy had been mostly driven by the monsoon in the pre-reform period. From 1950-51 to 1979-80, its average annual growth rate was only 3.5% (not shown). It was popularly known as the "Hindu Rate of Growth". The major policy during that period was import substitution, with an administered exchange rate.

From 1980-81 to 1989-90, the Indian economy grew at an average rate of 5.69%. India had faced a severe economic crisis by the end of 1990. A sharp rise in crude oil prices as a consequence of the Gulf Crisis in mild 1990 gave a severe jolt to India's balance of payments situation which was already under stress and the current account deficit deteriorated to 3% in 1990-91(Rangarajan, 2021). India's growth rate came down to 1.06% in 1991-92. The economic reform process, including deregulation, globalization and market orientation, started from 1991 onwards. The average growth picked up marginally to 5.87% in the 1990s (Figure 1).

Figure 1: Actual and Trend Growth Rate (%) of Real GDP of India (1993-94 to 2022-23)
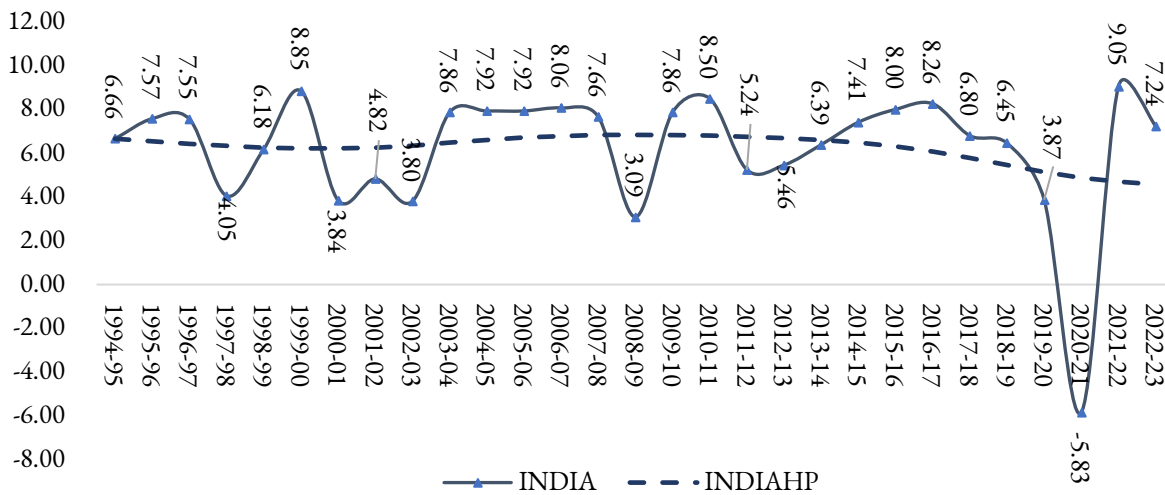
Source (basic data): MOSPI, GOI.

While the growth rate declined in the early 2000s, it picked up in 2003-04 and reached a high of 8.06% in 2006-07. Due to the global financial crisis, growth again declined to 3.09 % in 2008-09. It again increased to 8.5% in 2010-11. From 2000-01 to 2009-10, the average growth was 6.28%.

From 2011-12, the growth rate continuously increased to reach 8.26% in 2016-17. After that, it continuously declined to 3.87% in 2019-20, because of many issues, including demonetisation (November 2016) and the GST implementation in 2017 (Rangarajan and Srivastava 2020). The average rate of growth during 2010-11 to 2019-20 increased to 6.64%, then due to the COVID-19 pandemic went down to -5.83% in 2020-21. In 2021-22, it recovered to reach 9.05 % (due to negative base effect).

The trend growth rate (computed using HP filter) declined continuously from 6.66% in 1994-95 to 6.21% in 2000-01[3]. Then it continuously increased to 6.82% in 2009-10. After that, it continuously declined to 4.57% in 2022-23 (Figure 1). Thus, it is clear that the trend growth was already slowing down before the pandemic struck the Indian economy (Rao 2020). It is also noted that the Indian economy has experienced asymmetric recurring upswings and downswings due to the economic and non-economic shocks over the years.

Figure 2 depicts the GSDP details of Indian states and Union Territories (UTs) in 2021-22. Maharashtra is the largest economy with Rs. 31.08 trillion. Other top 5 economies are Tamil Nadu (Rs. 20.71 trillion), Karnataka (Rs. 19.78 trillion), Uttar Pradesh (Rs. 19.76 trillion), Gujarat (Rs. 19.29 trillion) and West Bengal (Rs. 13.29 trillion). These top six states accounted for about 52% of the total GDP of India, while the remaining 27 states and UTs accounted for about 48% of GDP.

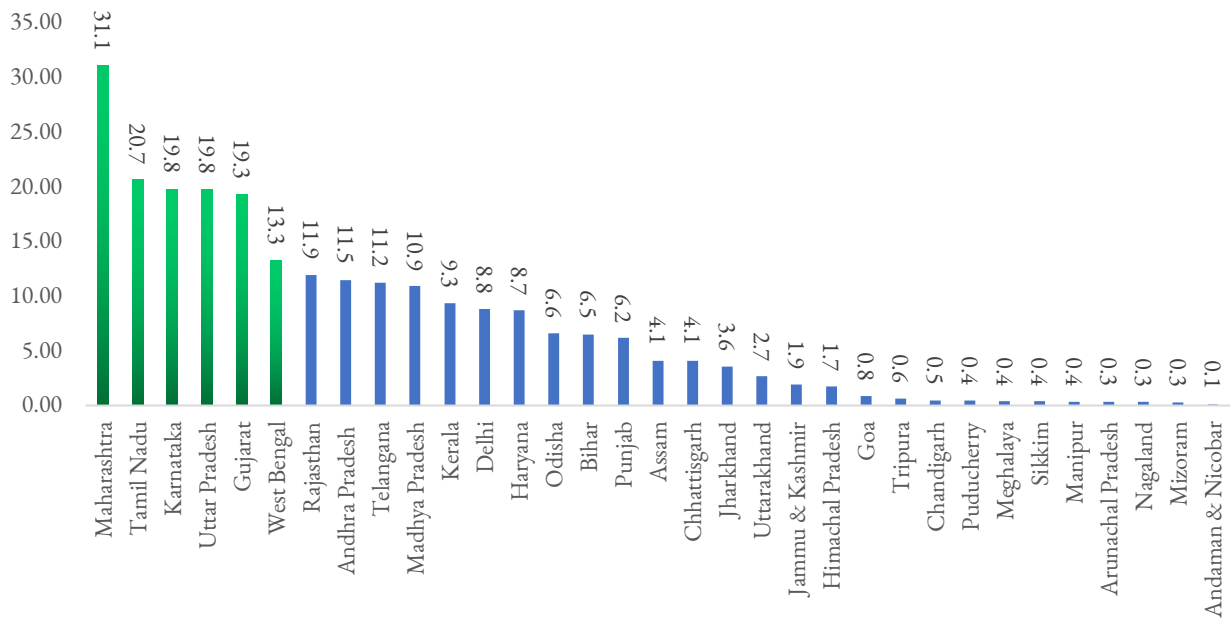## Figure 2: State-wise GSDP (Rs. Trillion) in 2021-22

Figure 3 shows the per capita income of Indian states and UTs in 2021-22. The top three states in per capita income were Goa, Sikkim, and Delhi. Among the top six largest economies, Karnataka had the highest per capita come of Rs. 2.66 lakh, followed by Tamil Nadu (Rs. 2.42 lakh), and Gujarat (Rs. 2.419 lakh). While Maharashtra ranked first in size of the economy, it ranked 13 in per capita income (Rs. 2.15 lakh). Thus, ranks of top six states in GSDP size are not consistent with their ranks in per capita income due to varying population growth.

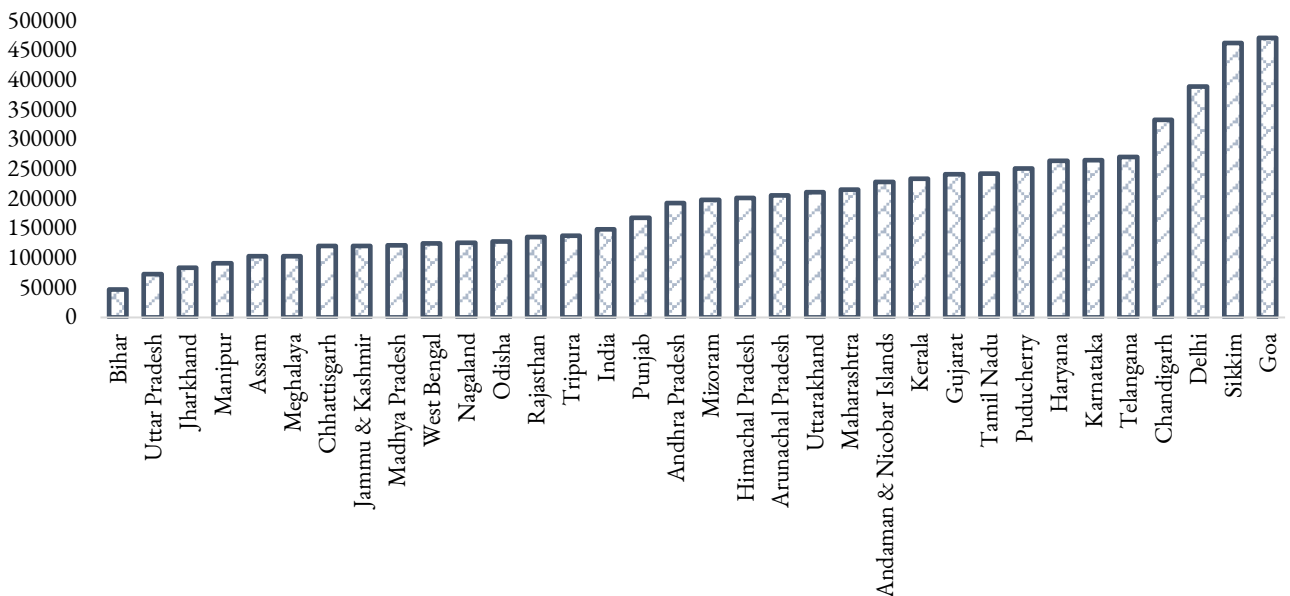## Figure 3: Per Capita Income (Rs.) of Indian States/UTs in 2021-22

Table 1 provides the average growth rates of the Indian economy and the top six Economies (Maharashtra, Tamil Nadu, Karnataka, Uttar Pradesh, Gujarat, and West Bengal) from 1994-95 to 2022-23. It also provides the average growth rates of the rest of India (India's GDP minus sum of GSDPs of the top six states). From 1994-95 to 2022-23, the real GDP of India grew at an average rate of 6.23%; Gujarat's GSDP grew at 8.42%; Karnataka at 7.1%; Tamil Nadu at 7.03%; Maharashtra at 6.34%; West Bengal at 5.73% and Uttar Pradesh at 5.47%.

It is noted that (i) average rate varied in different sub-periods of all cases, highlighting the presence of growth cycles with non-linear paths and asymmetric features, and (ii) from 2020-21 to 2022-23, the average rates of all declined due to Covid impact.

Table 1: Average Growth Rates of (real) GDP and GSDPS of Top Six States (%)

Periods	Maharashtra	Tamil Nadu	Karnataka	Uttar Pradesh	Gujarat	West Bengal	India
1994-95 to 1999-00	6.30	6.67	7.66	4.73	8.01	7.11	6.81
2000-01 to 2009-10	7.55	7.51	6.36	5.42	8.77	6.28	6.28
2010-11 to 2019-20	6.21	7.26	8.09	6.05	9.21	4.96	6.64
2020-21 to 2022-23	2.87	5.39	5.20	5.12	5.39	3.64	3.49
1994-95 to 2022-23	6.34	7.03	7.10	5.47	8.42	5.73	6.23

Source (Basic Data): MOSPI, GOI.

3. Methodology and Data

In general, GDP/GSDP growth rates for longer period are volatile in nature due to recession, external shocks, etc. they fluctuate around a higher level and more persistent during expansions (e.g., from 2022-23 to 2007-08, the GDP growth was at expansion phase with a high rate in Figure 1). However, they stay at a relatively lower level and less persistent during contractions (e.g., GDP growth in 1997-98, 2000-01, 2008-09 and 2012-13 in Figure 1). In order to make forecast of such series, the regular Auto-regressive, Integrated and Moving Average (ARIMA) model can be used. The ARIMA model assumes that the growth rate (dependent variable) depends on its own lagged term (i.e., AR terms) and current and lagged error terms (MA terms). It can provide only forecast of the dependent variable based on average relation (i.e., it can provide linear forecast). It cannot capture the fluctuations in the data. Non-linear models can capture these fluctuations. The popular Markov (regime) switching (MS) model of Hamilton (1989) is one of the best non-linear model. It characterizes the time series behaviours in different regimes. In particular, the MS-AR model allows for non-linearity by introducing the possibility of shifts in GDP/GSDP growth rates due to an unforeseen change in macroeconomic policies/crisis.

Therefore, this study employs the Hamilton's regime switching model (i.e., MS(m)-AR(p)) framework to forecast the future growth rates of the Indian economy, and top six economies, taking into account the non-linear behaviour of the underlying variables, real GDP/GSDP growth rates.

In the preliminary analysis, we have tried 2 regimes and 3 regimes (i..e, m=2 or 3) with different AR terms (1 to 5). That is, we have estimated MS(2)-AR(1). MS(3)-AR(1), MS(2)-AR(2), MS(3)-AR(2) etc and noted the information criteria value for each model. Basically we have used three info criteria: Akaike Info Criteria (AIC), Schwartz and Bayesian Info Criteria (SBIC) and Hannan and Quin Infor Criteria (HQIC). Based on info values (i.e., minimum values), we have selected two regimes model for all cases. These info criteria have supported (i) AR(4) for Tamil Nadu, Karnataka and Gujarat GSDP growth rates, (ii) AR(3) for Maharashtra and Uttar Pradesh GSDP growth rates, (iii) AR(1) for India and West Bengal.

The MS(2)-AR(4) model is specified as:

$$y_t - \mu_{st} = \phi_1(y_{t-1} - \mu_{st-1}) + \phi_2(y_{t-2} - \mu_{st-2}) + \phi_3(y_{t-3} - \mu_{st-3}) + \phi_4(y_{t-4} - \mu_{st-4}) + \epsilon_{st} \quad ; \text{ and}$$

$$\mu_{st} = \alpha_1 s_1 + \alpha_2 s_2 \tag{1}$$

where,

- ε_t is the i.i.d. normal error with mean 0 and state-dependent variance (σ_1^2, σ_2^2);

- μ_s is the state dependent mean;

- y_t, is the growth rate of real GDP of India or real GSDP of top six states;

- the regime shift at time t is determined by the state variable s_t, which follows the first order Markov process. [4] It takes value from 1 to 2, i.e., $s_t = 1 \; if$ high growth state/regime, 2 if low growth regime.

- α_1 and α_2 are the average growth rate for regime one and two respectively.

- ϕ_1, ϕ_2, ϕ_3 and ϕ_4 are the respective coefficients of AR terms (for Maharashtra and Uttar Pradesh, ϕ_4 is zero; for India and West Bengal, ϕ_2, ϕ_3 and ϕ_4 are all zeros).

As the state variable follows a two-state first order Markov process, its transition probability matrix is given by:

$$P = \begin{bmatrix} p_{11} & p_{12} \\ p_{21} & p_{22} \end{bmatrix} \tag{3}$$

where,

- $p_{ij} = p[s_t = j/s_{t-1} = i]$, for $(i, j) = 1,2$ and

- Σp_{ij} =1. p_{11} and p_{22} are the probabilities of being in (high growth) regime 1, given that the system was in regime 1 during the previous period, and the probability of being in regime 2, given that the system was in regime 2 during the previous period respectively.

Thus, the model is a nonlinear combination of discrete and continuous dynamics with twelve parameters: (α_1, α_2, p_{11}, p_{12}, p_{21}, p_{22}, σ_1, σ_1, ϕ_1, ϕ_2, ϕ_3, ϕ_4). The model is estimated using the maximum likelihood estimation (MLE) approach.

The data for real GDP growth and GSDP real growth rates of top six states (in 2011-12 prices) from 1993-94 to 2022-23 were compiled from the website of the Ministry of Statistics and Programme Implementation, Government of India, and Economic and Political Weekly.

- Based on the estimated MS-AR models, the real GDP/GSDP growth rates are predicted on annual basis from 2023-24 to 2047-48.

- The respective nominal GDP/GSDP is then estimated by adding (an assumed inflation) of 4.5% with the real GDP/GSDP forecasts.

- Projected exchange rate for future period, assuming 2% depreciation every year (following Rangarajan and Shanmugam 2023), are used to compute GDP/GSDP in US$.

- Projected population data from Report of the Technical Group on Population Projection, July 2020 are used to compute the per capita figure in US $.[5]

4. Empirical Results

In any time series forecasting method, only stationary variables can be used. To check whether the real growth rates data of GDP for India and GSDP for top 6 states are stationary or not, the Augmented Dickey Fuller (ADF) test is used to verify whether the real GDP/GSDP growth data are stationary or not. The ADF test results in Table 2 indicate that all variables are stationary at their levels.

Table 2: ADF Test Results

GDP/GSDP Real Growth	t-Statistic	Prob.*
Maharashtra	-4.5549	0.0012
Tamil Nadu	-3.5964	0.0127
Karnataka	-2.7986	0.0547
Uttar Pradesh	-4.7566	0.007
Gujarat	-2.9962	0.0485
West Bengal	-5.5687	0.0001
India	-5.0084	0.0004

Source: Computed by authors

Table 3 presents the maximum likelihood estimation results of Marko-switching models. For India, the real growth rate is related only to its first lag (i.e., AR(1) term). The coefficient of this auto-regression term, ϕ_1 is negative and statistically significant at 1% level, indicating that the current growth has a negative and significant relation to its first lagged value. For Gujarat, the term is also negative, but not significant. For all others, this term is positive and significant. Almost all the coefficients of remaining auto-regression terms are significant. [6]

In all cases, both regimes have a positive mean rate of growth (as indicated by the positive and significant coefficients, α_1, and α_2).

- For India, the conditional mean growth is 7.82% in the high growth regime 1 and 4.49% in low growth regime 2.

- Gujarat has the highest conditional mean growth in regime 1 (9.77%), followed by Karnataka (9.66%), and Uttar Pradesh (7.79%).

- Maharashtra has the highest mean growth rate (6.47%) in regime 2 among the top six economies, while Gujarat has the lowest conditional mean growth (5.79%) in regime 2.

- Interestingly, in both regimes, the conditional mean growth is positive in all cases. The reason for the positive average growth rate even in a contraction period is that the positive growth rates in some years offset the negative growth rates in other years (Ahmed and Kamaiah 2010).

Table 3: Markov Switching Model Estimation Results

Parameters	Maharashtra	Tamil Nadu	Karnataka	Uttar Pradesh	Gujarat	West Bengal	India
α_1	7.0734 (364.792)	7.6412 (47.098)	9.6588 (44.531)	7.7961 (2.774)	9.7733 (51.409)	6.2975 (173.891)	7.8266 (70.334)
α_2	6.4748 (1835.41)	5.9195 (163.659)	6.2293 (19.424)	5.9837 (4.899)	5.7916 (1.686)	6.1215 (8.935)	4.4865 (5.114)
$\text{Ln } \sigma_1$	1.6067 (8.242)	1.3824 (6.151)	-0.6339 (-1.683)	1.6751 (5.764)	-1.5294 (-5.491)	-3.3841 (-10.133)	-1.3841 (-3.765)
$\text{Ln } \sigma_2$	-6.3067 (-11.610)	-2.7145 (-8.147)	0.5679 (2.449	0.1361 (0.586)	1.6859 (6.679)	1.3069 (7.264)	1.2044 (5.701)
ϕ_1	0.2136 (478.603)	0.4714 (41.272)	0.2092 (3.200)	0.3559 (1.924)	-0.0072 (-0.317)	0.0545 (9.597)	-0.1212 (-3.876)
ϕ_2	-0.0257 (-98.277)	-0.3938 (-30.858)	-0.1684 (-1.438)	0.0139 (0.097)	0.2139 (8.351)	-	-
ϕ_3	0.1067 (371.527)	0.1255 (7.705)	0.3524 (4.555)	0.2790 (1.981)	-0.1161 (-3.269)	-	-
ϕ_4	-	-0.2581 (-21.169)	-0.9308 (-8.632)	-	0.0489 (2.365)	-	-
p_{11}	0.8260	0.6239	1.16E-09	0.9020	0.3309	0.1517	0.6572
p_{22}	0.5506	0.1276	0.6324	0.9211	0.4198	0.7375	0.7209

Source: Estimated by Authors.

Table 3 also shows that the estimated probability that the high growth regime is followed by another year of high growth is: p_{11}= 0.657 for India. The expected duration in state 1 is: $1/(1-p_{11}) \approx$

2.9 years; that is, this regime will persist on an average of two years and 9 months. The probability that the low growth phase is followed by another year of low growth is: p_{22} = 0.7209 for India and the expected duration in state two is: $1/(1-p_{22}) \approx 3.6$ years. This is consistent with a gradual slowdown of the Indian economy after 2016-17 as shown in Figure 1. This finding is in line with World Bank (2020) and Rangarajan and Srivastava (2020). Interestingly, the value of p_{11} for both Uttar Pradesh and Maharashtra is higher than in India and the remaining states. that is, the probability of being in (high growth) regime 1, given that the system was in regime 1 during the previous period is higher in Uttar Pradesh and Maharashtra than in India. But the p_{22} (the probability of being in (low growth) regime 2, given that the system was in regime 2 during the previous period) is higher in Uttar Pradesh and West Bengal.

The estimated MS-AR models also provide the dynamic forecast of growth rates of GSDPs and GDP till 2047-48. It is noticed that these future growth rates are based on past growth rates, growth cycles (i.e., the non-linear growth paths). From 2023-24 to 2047-48, India's GDP (real) is expected to grow at an annual average rate of 6.02% (Table 4). Gujarat's GSDP is projected to grow at an average rate of 7.65%, 7.41% for Karnataka, 7.2% for Tamil Nadu, 6.97% for Uttar Pradesh, 6.82% for Maharashtra, and 6.16% for West Bengal.

Table 4: Dynamic Forecast of Average Real GDP/GSDP Growth Rates till 2047-48(%)

Periods	Maharashtra	Tamil Nadu	Karnataka	Uttar Pradesh	Gujarat	West Bengal	India
2023-24 to 2032-33	6.70	7.34	7.21	6.92	7.65	6.16	6.08
2033-34 to 2042-43	6.91	7.11	7.68	7.01	7.64	6.16	5.99
2043-44 to 2047-48	6.91	7.12	7.26	6.99	7.64	6.16	5.99
2023-24 to 2047-48	6.82	7.20	7.41	6.97	7.65	6.16	6.02

Source: Computed by authors

However, it is noted that from 2023-24 to 2032-33, Indian economy will grow at 6.08% as against its growth of 5.99% from 2043-44 to 2047-48. Tamil Nadu economy will grow at a faster average rate of 7.34% from 2023-24 to 2032-33 as against its expected growth of 7.12% from 2043-44 to 2047-48. At the same time, Gujarat's economy will grow at 7.65% as against 7.64%. In the other four states, the average growth rates from 2023-44 to 2047-48 will be higher than that from 2023-24 to 2032-33 (Table 4).

5. Nominal GDP/GSDP and Per capita GDP/GSDP of India and Top Six States till 2047-48

As indicated, the nominal GDP/GSDP growth rates are computed by adding 4.5% inflation to the forecast of future annual real growth rates provided by the estimated MS-AR models. Using the

projected future exchange rates and population figures, the nominal GDP/GSDP and nominal per capita GDP/GSDP figures are computed. Table 5 presents the projected nominal GDP of India and GSDP of top six states in US$ trillion till 2047-48.

5.2 India's 7 US$ Trillion Economy and High-Income Country Status

The GDP forecast in Table 5 indicates that the US$ 5 trillion mark of Indian economy will be achieved in 2027-28. The target of US$ 7 trillion economy will be achieved in 2032-33 (instead of 2030-31).[7] Achieving a US$ 7 trillion economy by 2032-33 will also pave the way for India's transition into the minimum per capita income level of an upper middle-income country, of US$ 4,466, in 2031-32 itself (Table 6). In 2046-47 (i.e., India @99), the Indian economy will cross US$ 22.91 trillion and the per capita income will be US$ 14,143, which crosses the threshold level of developed country's per capita income of US$13,845 in that year.

Table 5: Nominal GDP and GSDP (in US$ Trillion)

Year	Maharashtra	Tamil Nadu	Karnataka	Uttar Pradesh	Gujarat	West Bengal	India
2023-24	0.47	0.32	0.30	0.30	0.31	0.21	3.64
2024-25	0.51	0.36	0.35	0.33	0.33	0.22	3.94
2025-26	0.56	0.40	0.39	0.36	0.37	0.24	4.28
2026-27	0.61	0.43	0.42	0.40	0.40	0.26	4.63
2027-28	0.67	0.47	0.47	0.43	0.44	0.29	5.02
2028-29	0.73	0.51	0.50	0.47	0.49	0.31	5.44
2029-30	0.80	0.56	0.52	0.52	0.54	0.34	5.89
2030-31	0.87	0.61	0.59	0.57	0.59	0.36	6.38
2031-32	0.95	0.67	0.63	0.62	0.65	0.40	6.91
2032-33	1.04	0.74	0.69	0.68	0.71	0.43	7.48
2033-34	1.13	0.80	0.81	0.74	0.78	0.47	8.11
2034-35	1.24	0.88	0.85	0.81	0.86	0.50	8.78
2035-36	1.35	0.96	0.95	0.88	0.95	0.55	9.51
2036-37	1.47	1.05	1.06	0.97	1.04	0.59	10.30
2037-38	1.61	1.15	1.08	1.06	1.15	0.64	11.16
2038-39	1.76	1.26	1.21	1.16	1.26	0.70	12.09
2039-40	1.92	1.38	1.34	1.26	1.39	0.76	13.10
2040-41	2.10	1.51	1.40	1.38	1.52	0.82	14.18
2041-42	2.29	1.65	1.62	1.51	1.67	0.89	15.36
2042-43	2.50	1.81	1.78	1.65	1.84	0.97	16.64
2043-44	2.73	1.98	1.89	1.80	2.02	1.05	18.03
2044-45	2.99	2.17	2.18	1.97	2.23	1.14	19.53
2045-46	3.26	2.37	2.30	2.15	2.45	1.24	21.15
2046-47	3.56	2.59	2.44	2.36	2.69	1.34	22.91
2047-48	3.89	2.84	2.80	2.57	2.96	1.46	24.82

5.2 Towards One Trillion Dollar Economy and High-Income Status of Top Six States:

A few states set an ambitious target of achieving one trillion-dollar economy.

- Tamil Nadu has set its target to become a US$ 1 trillion economy by 2030[8].

- Karnataka has a road map to achieve the status of US$1 trillion economy by 2032[9].

- Gujarat has also set its goal to become US$ 1 trillion economy by 2030[10].

- Maharashtra has announced its target to be achieved by 2027[11].

- Uttar Pradesh has aimed to reach a trillion-dollar economy by 2027[12].

Our analyses indicate that Maharashtra will be the first amongst the top six states to reach the one trillion-dollar economy mark, in 2032-33 (Table 5). That is, there will a delay of 5 years to reach its target. Tamil Nadu and Gujarat will reach this ambitious target in 2036-37, instead of 2030. Karnataka will attain the target in 2036-37 instead of 2032. Uttar Pradesh will become one trillion-dollar economy by 2037-38 as against its target year of 2027.

West Bengal will become a one trillion-dollar economy only in 2043-44. (It is noted that West Bengal has not announced this target officially.) It is also noticed that when five top states achieve 1 US$ trillion mark, India would have crossed 11 US$ trillion mark.

Interestingly, in 2037-38 the per capita income of Tamil Nadu, Karnataka, and Gujarat will reach US$13,845, which is the minimum threshold required to be classified as high income by World Bank (Table 6). That is, these three states will reach this mark at least 9 years before India will reach this target. Maharashtra will reach the high-income status in 2040-41, and West Bengal only in 2047-48. Uttar Pradesh will not reach the target in 2047-48, but it has to go a long way to reach this ambitious target.

5.3 Alternative Scenarios

It is noted that the above model-based forecasts are based on past data. One may argue that long-term forecasts based on a time series model may not be reliable. Future technological advancements and growth-inducing policies could lead to higher growth rates. Therefore, we consider the GDP/GSDP forecasts in two alternative scenarios:

    i.   in scenario 1, the projected growth rates of India and top six states in every forecast year are assumed to increase by 1%, and

    ii.   in scenario 2, they are assumed to increase every year by 2%.

Table 6: Nominal Per Capita GDP and Per Capita GSDP (in US$ Trillion)

Year	Maharashtra	Tamil Nadu	Karnataka	Uttar Pradesh	Gujarat	West Bengal	India
2023-24	3690	4210	4432	1262	4220	2068	2595
2024-25	3994	4659	5133	1368	4559	2233	2791
2025-26	4330	5108	5702	1492	4972	2411	2999
2026-27	4693	5541	6030	1615	5393	2607	3225
2027-28	5091	6018	6799	1753	5881	2819	3468
2028-29	5525	6556	7103	1906	6391	3049	3730
2029-30	5996	7156	7402	2069	6963	3297	4011
2030-31	6508	7834	8369	2245	7574	3565	4314
2031-32	7073	8595	8844	2442	8260	3862	4645
2032-33	7687	9417	9748	2656	9000	4184	5003
2033-34	8355	10307	11290	2888	9814	4533	5387
2034-35	9081	11273	11890	3140	10697	4910	5802
2035-36	9870	12327	13173	3415	11664	5320	6249
2036-37	10731	13469	14667	3714	12719	5753	6725
2037-38	11669	14736	14919	4041	13875	6232	7243
2038-39	12690	16126	16602	4396	15136	6751	7801
2039-40	13801	17647	18271	4782	16513	7313	8402
2040-41	15009	19310	19034	5203	18016	7922	9050
2041-42	16323	21126	21991	5660	19657	8582	9749
2042-43	17753	23111	24096	6158	21448	9297	10501
2043-44	19308	25283	25418	6699	23405	10071	11312
2044-45	20999	27659	29259	7289	25541	10910	12186
2045-46	22840	30261	30763	7930	27873	11818	13128
2046-47	24842	33108	32470	8627	30421	12803	14143
2047-48	27019	36224	37180	9387	33202	13869	15237

Source: Estimated by authors.

In the alternative scenario 1, Maharashtra will reach the one trillion-dollar economy status in 2031-32 (not shown). Karnataka, Tamil Nadu, and Gujarat will reach the target in 2035-36. Uttar Pradesh will attain the target in 2036-37 and West Bengal in 2041-42. The target of US$ 7 trillion Indian economy will be achieved in 2031-32. India will become a developed country in 2044-45. Karnataka will reach the minimum threshold level of developed country's per capita income in 2035-36 and both Tamil Nadu and Gujarat in 2036-37. Maharashtra will attain the high-income status in 2038-39, West Bengal in 2045-46 and Uttar Pradesh in 2049-50.

In scenario 2, India will reach the 7 trillion-dollar economy in 2030-31 and developed country status in 2042-43 (i.e., 5 years before 2047). Maharashtra will reach the one trillion-dollar economy status in 2030-31. Tamil Nadu, Gujarat, Karnataka and Uttar Pradesh will achieve this land mark in 2034-35. West Bengal will attain this target in 2039-40. Interestingly, both Karnataka and Tamil Nadu will reach the high-income status in 2034-35, and Gujarat in 2035-36. Maharashtra will attain the

status in 2037-38. West Bengal and Uttar Pradesh will reach the high-income status in 2043-44 and 2047-48 respectively. That is, these two top states will reach this status after a few years later the year when India does.

6. Strategies to Achieve the Targets

Our model-based analyses indicate that India will become US$ 7 trillion economy in 2032-33 (and not in 2030-31), and achieve developed country status (based on per capita income) in 2046-47, with an average growth rate of about 6% from 2023-34 to 2047-48. To attain the seven trillion-dollar economy in 2030-31, India GDP needs to grow at an average rate of about 8% (i.e., two percentage points higher). This will also help India to get the developed country status in 2042-43.

EY (2023a) indicates that given the immense capability of Gen AI with respect to its productivity and efficiency enhancing effects, its adoption will have the potential to accelerate India's growth trajectory over seven years (2023-24 to 2029-30). It is, therefore, necessary to increase investment in Gen AI, education, and upskilling to fully capitalize on the demographic dividend.

IFC (2022) argues that various reforms the government has launched over the last few years are a solid foundation to build on. But India will have to address three challenges.

i.   shared prosperity challenge: India's growth is strong and accelerating, but weak social progress, rising inequality, and lack of convergence across regions are hurdles to translate this growth into the expected improvements in quality of life of many citizens;

ii. jobs challenge: As India has a large and growing working-age population, it needs to create jobs for a large part of its labour force, particularly women and less skilled; and

iii. policy implementation challenge: India faces a shifting external environment with rising geopolitical tensions and changing patterns of globalization, climate change and policies to achieve the transition to net zero, digital transformation and other technological changes all embedded in a complex macroeconomic context.

According to EY (2023), the enthusiasm for India's growth prospects is palpable given the slowing global growth, unprecedentedly high levels of global debt-to-GDP, inflation, decelerating global population growth, and plateauing global trade-to-GDP. These trends have been further exacerbated by rising protectionism amidst rising geopolitical tensions. It further argues that India's current strengths of high services exports, a growing digital ecosystem, availability of a large working-age population, track record in creating renewable energy capacity, low private-debt-to-GDP ratio, growing entrepreneurship and start-up ecosystem (making Indian manufacturing globally competitive), funding and facilitation of infrastructure development, and improving the competitiveness of the economy will help India in sustaining its growth over the next few decades.

The MS-AR model forecasts indicate that from 2023-24 to 2047-48, Gujarat will grow at an average rate of 7.65%, Karnataka at 7.41%, Tamil Nadu at 7.2%, Uttar Pradesh at 6.97% and

Maharashtra at 6.82%. With 2% higher average growth during the same period, Maharashtra will reach the 1 trillion US$ target in 2030-31; Tamil Nadu, Gujarat, Karnataka, and Uttar Pradesh in 2034-35; and West Bengal in 2039-40. The extra 2% average growth will enable Karnataka and Tamil Nadu to reach the high-income status in 2034-35, Gujarat in 2035-36 Maharashtra in 2037-38, West Bengal in 2043-44, and Uttar Pradesh in 2047-48.

As per our analyses, Maharashtra would need to grow at 8.82% in future years to reach the one trillion-dollar economy in 2030-31. For this the following policy measures in eight sectors/areas suggested by the Economic Advisory committee might be useful: manufacturing, services, energy/renewables and sustainability, infra real estate and logistics, ease of doing business, MSME enablement, skill development, and agriculture and allied services.

Tamil Nadu would have to grow at 9.2% to reach a trillion-dollar economy by 2034-35. TNIDB (2024) suggests 7 key tenets as guiding principles for achieving the target: driving investments, enhancing human capital, pioneering innovation, developing best-in-class infrastructure, driving market efficiency, and ensuring efficient governance, while ensuring climate sensitive, regionally holistic and socially inclusive growth.

9.41% growth rate is required for Karnataka to attain a 1 trillion-dollar economy by 2034-35. A committee constituted by the Planning Department of Karnataka Government recommends that the agriculture should increase its growth from 13.3% to 16.3%, industry from 8.8% to 16.8% and services from 13.6% to 16.9%, so that the GSDP would grow at 16.8% to reach the target by 2032.

For Gujarat to become a trillion economy by 2034-35, it should register an average growth of 9.6%%. The state industries minister, addressing a plenary session on Gujarat's G20 Connect, suggested that Gujarat should focus on farsighted policies and green production processes for the new generation in alignment with the global agenda. The chief minister of Gujarat said while addressing a road show of the Vibrant Gujarat Global Summit 2024 that the higher growth in manufacturing sector (including semiconductor manufacturing, green hydrogen, electric vehicles, pharmaceuticals, textiles, and technical textiles) would help to achieve the goal.

Uttar Pradesh would need 9.87% growth to reach the target in 2024-35. The state planning department suggests that the focus is on accurate assessment of the economic activity across sectors. All efforts should be taken to improve the agriculture productivity. To improve the growth figures in both secondary and tertiary sector, the state should encourage formalization of the economy.

While West Bengal has not yet announced its one trillion-dollar economy target, it would need to grow 8.16% to attain the task in 2039-40. Basically the state needs to progressively increase the share of services and industry in its GSVA compared to agriculture. The basic point is that faster growth of these top six economies will speed up the target of reaching US$ 7 trillion Indian economy and make India to become the developed nation well before 2047.

We hope that this study will be useful for policy makers and stakeholders to take appropriate strategies such that India will achieve a US$ 7 trillion-economy by 2030 and become a "developed" economy by 2042 and top six states will reach a trillion-dollar economy soon.

References

Ahmad, W., and B. Kamaiah. 2010. "Modeling Business Cycles in India: A Markov Switching Approach". *The Asian Economic Review*, 52 (2): 1-14.

Chakrabarty, M., and S. Mukherjee. 2022. "A Pandemic and Economic Slowdown: The Case of India". *Applied Economics*, 54(19), 2214-2230.

EY. 2023. *INDIA@100: Realizing the Potential of a US$26 Trillion Economy*, Ernst & Young LLP Report.   https://assets.ey.com/content/dam/ey-sites/ey-com/en_in/topics/india-at-100/2023/01/ey-india-at-100-full-version.pdf

EY. 2023a. *The AIdea of India: Generative AI's Potential to Accelerate India's Digital Transformation.*   ey-the-aidea-of-india-generative-ai-s-potential-to-accelerate-india-s-digital-transformation.pdf

IFC. 2022. *Competitiveness Roadmap for India@100,* Institute for Competitiveness. https://www.hbs.edu/ris/Publication%20Files/Report_Competitiveness_Roadmap-25_August_2022_Web_Version_690d1fab-dce8-48a0-8cd5-6d6a63a6d5eb.pdf

NITI Aayog. 2018. *Strategy for New India @ 75.* https://www.niti.gov.in/sites/default/files/2019-01/Strategy_for_New_India_0.pdf

Ministry of Finance. 2024. *Indian Economy – A Review*. Department of Economic Affairs (2024, January), Government of India. https://dea.gov.in/sites/default/files/The%20Indian%20Economy%20-%20A%20Review_Jan%202024.pdf

Oxfam India. 2023. *Survival of the Riches: the India Story*, January 2023. https://d1ns4ht6ytuzzo.cloudfront.net/oxfamdata/oxfamdatapublic/2023-01/India%20Supplement%202023_digital.pdf?kz3wav0jbhJdvkJ.fK1rj1k1_5ap9FhQ

Rangarajan, C. 2021. *Three Decades of Economic Reforms in India*. G Ramachandran Endowment Lecture delivered on December 20, 2021 at Madras School of Economics

Rangarajan, C., and D. K. Srivastava. 2020."India's Growth Prospects and Policy Options". *Indian Public Policy Review* 1 (1): 1-18.

Rangarajan,C. and K.R. Shanmugam. 2023. "Achieving One Trillion Dollar Economy for Tamil Nadu: Some Implications and Concerns". *Indian Public Policy Review* 4 (1): 1-26.

Soni, S., and M. B. Subrahmanya. 2020. "India's Sectoral Growth Patterns and US $5 Trillion Trajectory: An Empirical Investigation on Macroeconomic Impact of COVID-19". *The Indian Economic Journal* 68 (3): 309-322.

Srivastava, D. K., M. Bharadwaj, T. Kapur and R. Trehan. 2021. "Estimating COVID-19's Economic Impact on the Indian Economy using Two Restricted Var Models". https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3975130.

TNIDB (2024). *Tamil Nadu Vision: $ 1 Trillion,* Tamil Nadu Infrastructure Board, Chennai, January 2024.

World Bank. 2020. *India Development Update.* https://hdl.handle.net/10986/34367

Notes

[1] Maharashtra and Gujarat alone accounted for 50% of total exports. Gujarat alone accounted for about 25% of India's total gross fixed capital formation, followed by Maharashtra and Tamil Nadu.

[2] An economy can experience asymmetric recurring upswings and downswings due to the economic and non-economic shocks. The global financial crisis of 2008 is an example of the former, while the negative growth rate due to the recession caused by the global pandemic is an example of the latter.

[3] The HP (Hodrick-Prescott) Filter is a data smoothing technique, It removes short-term fluctuations associated with the business cycles in the data. Removal of these short-term fluctuation provides the long term trend.

[4] It assumes that probability distribution of the state at any time t depends on state at time t-1 and not on t-2 etc. i.e., Markov process is not path dependent.

[5] This reports provides projected population for India and all states till 2036. Using the exponential growth model, this study projects the population figures till 2047-48.

[6] The coefficients of AR terms (i.e., lagged terms) are basically partial auto correlation coefficients (which lie between -1 to +1). Therefore, the current growth rate may be negatively or positively correlated with past values.

[7] It is noticed that in 2023-24, the top 6 states together contribute 52.5% of India's US $ 3.64 trillion. But in 2032-33 when India reaches the US$ 7 trillion, the top six states will contribute about 57.4%.

[8] The Chief Minister of Tamil Nadu had announced this ambitious target at the Investors Conclave in July 2021.

[9] An official statement in May 2023 the chief Minister of Karnataka has asked his administration to execute the recommendations of a report prepared by the Planning Department committee to scale up the state economy to scale up the state economy to create massive opportunities for the people of Karnataka.

[10] The chief minister of Gujarat announced at the FICCI's National Executive Committee Meeting in October 2023.

[11] The chief minister of Maharashtra announced in the first meeting of Maharashtra State Economy Advisory Council in February 2023.

[12] The chief minister of Uttar Pradesh said that the state will become a benchmark for the policy of 'sabka saath, sabka Vikas' with a trillion-dollar economy in August 2022.