Did Gujarat's Growth Rate Accelerate under Modi?

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The Gujarat economic model under Narendra Modi continues to dominate the media and public discussions as the elections approach. For the past few years we have been hearing glowing references to Gujarat's double digit growth under Modi when India's growth rate has faltered, not just from the national but also the international media.[1] Several economists have written praising Gujarat's growth performance under Modi, such as Debroy (2012) and Panagariya (2014).

However, there is very little systematic evidence to evaluate Gujarat's performance under Modi to its own past growth record, *and* to that of the rest of the country or other states.[2] This is unsatisfactory, given that the standard research method in this context is the "differences-in-differences" approach: did Gujarat's growth under Modi compared to its growth in the previous period increase by a higher margin than the corresponding figure for the whole country or other states? Just the fact that Gujarat had a higher rate of growth than the whole country during the period Modi was Chief Minister is not considered good enough evidence in favour of a "Modi effect" on growth. The difference between Gujarat's growth rate and that of the whole country during Modi's rule has to be significantly higher than what it was in the earlier period for such a claim to be made.

Several essays have touched on this issue. For example, Panagariya (2014) mentions, citing a study by Archana Dholakia and Ravindra Dholakia, that Gujarat's growth rate has not always been above the national average – in order to rebut the critique that Gujarat has always been growing faster than the rest of India, and hence Modi does not deserve any credit. In particular, the essay argues that "… the growth rate trend in Gujarat was below the national average in the 1960s, above it in the 1970s and below it yet again in the 1980s. Far from always growing the fastest in the nation, Gujarat has not even grown faster, always, than the national average." Even though growth is what dominates the media discourse owing to Modi's business-friendly model of economic governance, and growth vs human development indicators was the main dividing line between the recent debate between Bhagwati-Panagariya and Sen-Dreze about India's development path, this essay does not present any evidence on growth, and focuses mainly on poverty and human development indicators instead. Debroy (2012) observes that Gujarat's growth performance was very good both during the 8th Plan (1992-97) and during the 10th plan (2002-07). However, he cautions against inferring from this that there is nothing exceptional in the growth performance during the latter period, as the larger and more developed a state, such as Gujarat, Maharashtra, Haryana, and Tamil Nadu, the harder it is to sustain growth, compared to poorer states like Bihar. He does not present

a difference-in-difference analysis but some of the evidence he presents does suggest that some of these larger and richer states, such as Maharashtra, Tamil Nadu and Haryana, did increase their growth performance by a bigger margin than that of Gujarat.

With the goal of getting a clearer and more comprehensive picture, we carry out a systematic difference-in-difference analysis of the growth performance of Gujarat relative to the whole country, as well as other major states, using alternative measures of income as well as alternative methods of estimating growth rates. In particular, we look at alternative measures of state level income (GSDP vs NSDP) as well as per capita vs level comparisons.[3] We also compute growth rates based on decadal[4] averages of annual growth rates, as well as estimating a linear trend.

Let us first consider Gujarat's growth performance in the 1980s. There are two sets of issues that may potentially explain the opposite nature of our findings compared to that obtained in some existing studies like Dholakia (2009) and Ahluwalia (2001) in this regard.[5] The first relates to the index that is used to measure economic growth. The second relates to the method used to calculate average growth rates.

Dholakia (2009) uses growth rate of gross state domestic product (GSDP) at constant prices to measure economic growth and find that Gujarat's annualized growth rate during the 1980s was 4.2 percent, below the national average of 5.3 percent.  In Ghatak and Roy (2014) we use per capita net state domestic product (NSDP) at constant prices and find that Gujarat's average annual growth rate during the 1980s was 4.4 percent, above the national average of 3.2 (see Table 1(a)). Two points deserve highlighting here. First, an important reason behind this discrepancy could be differential population growth rates of Gujarat compared to all of India, as is borne out by Table 1(c) and Figure 1. Population growth rate appears to be slowing more sharply in Gujarat compared to the national average, leading to a lower rate of income growth at the national level on a per capita basis relative to Gujarat.[6] Second, it is also worth noting that using growth rate of GSDP in order to facilitate comparison with Dholakia (2009) and Ahluwalia (2001), our estimate of Gujarat's growth rate in 1980s is 6.4 percent: 2.0 percentage points higher than Dholakia's (see Table 1(b)), although that for India's growth rate is similar to Dholakia's.

However, our study uses a different method of calculating growth rates than these cited studies. In particular, as in Ghatak and Roy (2014), we calculate growth rates on a year-on-year basis using the formula $\frac{y_t - y_{t-1}}{y_{t-1}}$ and these yearly figures are averaged to get the decadal figures. Dholakia (2009) and Ahluwalia (2001) fit a linear trend regression (*lnY=a+bt*) to GSDP data to calculate growth rates.

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[3] See Ghatak and Roy (2014) for a related discussion on the growth performance of various states using NSDP per capita, as well as other economic indicators, such as HDI, inequality, and poverty.

[4] The decadal average for 2000s is estimated using data for 2000-2011, instead of 2000-2009 like in the 80s and 90s. This was done primarily to cover as much of the Modi rule as possible.

[5] We could not locate the Dholakia and Dholakia study that Panagariya's essay mentions. However, Dholakia (2009) provides similar evidence.

[6] Our finding is also consistent with that of Ahluwalia (2001), which reports that while Gujarat's GSDP growth rate was 5.1 percent in the 1980s (below the national average of 5.4 percent), its per capita GSDP growth rate was 3.1 and marginally above the national average of 3.0 percent during the same period.

When we fit a linear trend to the per capita NSDP data, our results do not change qualitatively. Gujarat's rate of growth of per capita NSDP was very similar to the national average in the 1980s, but increased during the 1990s, with the difference with the national average being 2.1 percentage points (see Table 2(a)). However, this difference did not increase *significantly* during the 2000s. In other words, the difference-in-difference estimate of Gujarat's relative growth performance in the 2000s compared to 1990s is close to zero. This suggests that Gujarat was already growing faster than the rest of India during the 1990s, and did not experience any *further* acceleration of growth in the 2000s relative to the 1990s.

This finding is also robust to using growth rate of GSDP instead of per capita NSDP while fitting the linear trend (see Table 2(b)), as well as restricting the analysis for the 2000s decade to begin from the year Modi came to power i.e. 2001-2011 (see Tables 4(a) and 4(b)), as opposed to 2000-2011. This is particularly relevant given that in the year 2000-01, Gujarat experienced a negative growth rate due to the Bhuj earthquake and one might worry that this would bias the comparison against the tenure of Modi. Since this relates to a more general problem concerning the effect of the base and terminal years while looking at decadal growth rates, we also plot per capita NSDP of Gujarat against that of rest of India for the entire period of 1981-2011 (see Figure 2). We find that the actual acceleration in Gujarat's relative growth rate occurred in early 1990s, just after liberalization of the Indian economy. This is also borne out in Figure 3 where we plot the difference between growth performances of Gujarat and rest of India over time. The solid curve represents the estimated difference between Gujarat's rate of growth from rest of India's rate of growth of per capita NSDP, and the dashed lines represent 95% confidence intervals.[7] This difference fluctuates around zero until 1992, but starts increasing after 1992. This difference becomes statistically significant from 1994 and continues to remain so (except for the dip in 2000-01). Taken together, these two figures therefore provide further support to our earlier decadal growth analysis that Gujarat's relative growth performance had outstripped the rest of India by mid-1990s, and did not *differentially* improve in the 2000s compared to the 1990s.

Hence, the key point is that whether growth rate is calculated in terms of GSDP or per capita NSDP, our analysis finds that Gujarat, one of the richest states in India, was always at par or ahead of the rest of India during 1980s, and unambiguously ahead in the 1990s. Moreover, there is no evidence to suggest that Gujarat succeeded in widening its lead over the national average in the 2000s, relative to the 1990s. To return to the decadal growth analysis, the difference between Gujarat's growth rate of per capita NSDP (or, per capita income) and the national average was 1.1 in the 1990s and 1.4 in the 2000s (see Table 1(a), Panel B). In other words, Gujarat's lead over the national average in terms of economic growth has remained fairly constant over the last two decades.[8] In this regard, Gujarat's performance was also very similar to that of Maharashtra, another rich state

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[7] Each dot on the solid line is the estimated regression coefficient of the interaction of the Gujarat dummy with the respective year dummy. Each coefficient estimates the differential growth rate of Gujarat relative to the rest of India for that particular year. If the coefficient is positive and statistically significant (i.e. the confidence interval of the coefficient does not overlap with the horizontal zero line), then Gujarat grew faster than rest of India for that year.

[8] This is broadly consistent with the conclusions of Nagaraj and Pandey (2013a).

of India, whose difference with the national average was 0.7 in 1980s, 0.8 in the 1990s and 1.2 in the 2000s (see Table 3(a)). Thus, Gujarat did not show any signs of accelerating any faster in the 2000s than before, and nor was it the only one at the top of the league. For both GSDP growth and per capita NSDP growth, Gujarat has to share this honour with Maharashtra, Haryana and Tamil Nadu. The state that achieved the most impressive turnaround for all measures of state income in the 2000s was Bihar. It may be argued that it is easier to achieve high growth in Bihar, since it starts at a much lower level. However, it is equally true that if it were so easy, why didn't it happen before?  It may also be argued that Maharashtra includes Mumbai, and that gives it an unfair advantage. Given data limitations such an analysis is difficult to carry out, but the fact is, all states have some natural advantages and disadvantages (for example, Bihar being landlocked and Gujarat being coastal) and as a first cut, our approach of comparing unconditional average  growth rates is a reasonable one. Also, when one talks about Gujarat's growth model for the rest of the country, it is somewhat awkward to object at Gujarat being compared with both a backward state (Bihar) and an advanced state (Maharashtra, due to the presence of Mumbai) at the same time.  In any case, Haryana and Tamil Nadu have achieved growth accelerations comparable to that of Gujarat in the 2000s.

Our conclusion is that Gujarat's growth rate was similar to or above the national average in the 1980s, depending on the method of calculating the growth rates. Also, there is definitely evidence of growth acceleration in Gujarat in the 1990s, but there is no evidence of any *differential* acceleration in the 2000s, when Modi was in power, relative to the 1990s, both with respect to the country as a whole, as well as other major states. This is robust to using alternative measures of income, alternative methods of computing growth rates, and keeping or dropping the year 2000-01, for which Gujarat had a negative growth rate due to the earthquake.

So the Gujarat growth story in the last two decades is definitely real and worthy of attention. However, using the difference-in-differences approach, we do not find any evidence in favour of the hypothesis that Modi's economic leadership has had any significant additional effect on its growth rate in the 2000s.

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**TABLES AND FIGURES**

**GROWTH RATES CALCULATED AS AVERAGE OF ANNUAL GROWTH RATES**

**Table1 (a): Growth rates of NSDP level and per capita: Gujarat vs India**

|  | Growth rates | | | | | |
|---|---|---|---|---|---|---|
|  | **Panel A: Total NSDP** | | | **Panel B: Per capita NSDP** | | |
|  | **1980-89** | **1990-99** | **2000-11** | **1980-89** | **1990-99** | **2000-11** |
| Gujarat | 6.5 | 6.8 | 8.6 | 4.4 | 4.8 | 6.9 |
| All India | 5.4 | 5.8 | 7.1 | 3.2 | 3.7 | 5.5 |
| Difference | 1.1 | 1.0 | 1.5 | 1.2 | 1.1 | 1.4 |

**Table 1(b): Growth rates of GSDP level and per capita: Gujarat vs India**

|  | Growth rates | | | | | |
|---|---|---|---|---|---|---|
|  | **Panel A: Total GSDP** | | | **Panel B: Per capita GSDP** | | |
|  | **1980-89** | **1990-99** | **2000-11** | **1980-89** | **1990-99** | **2000-11** |
| Gujarat | 6.4 | 7.0 | 8.9 | 3.9 | 4.9 | 6.9 |
| All India | 5.4 | 5.8 | 7.3 | 3.1 | 3.7 | 5.6 |
| Difference | 1.0 | 1.2 | 1.6 | 0.8 | 1.2 | 1.3 |

**Table 1(c): Population Growth Rates: Gujarat vs India**

| **States** | **1981-91** | **1991-01** | **2001-11** |
|---|---|---|---|
| Gujarat | 2.1 | 2.3 | 1.9 |
| All India | 2.4 | 2.2 | 1.8 |

**Figure 1: Population Growth Rates: Gujarat vs India (1961-2011)**
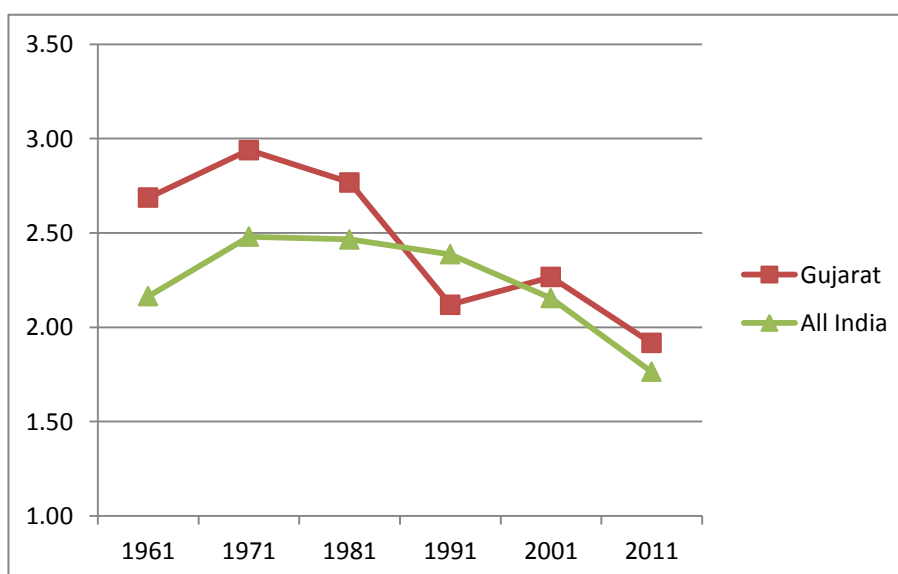
**GROWTH RATES CALCULATED BY FITTING A LINEAR TREND**

**Table 2(a): Growth rates of NSDP per capita: Gujarat vs India**

| | Growth rates | | |
|---|---|---|---|
| | NSDP Per capita | | |
| | **1980-89** | **1990-99** | **2000-2011** |
| Gujarat | 2.6 | 5.6 | 8.0 |
| India | 2.7 | 3.5 | 5.7 |
| Difference | -0.1 | 2.1 | 2.3 |

**Table 2(b): Growth rates of GSDP level: Gujarat vs India**

| | Growth rates | | |
|---|---|---|---|
| | Total GSDP | | |
| | **1980-89** | **1990-99** | **2000-2011** |
| Gujarat | 4.9 | 8.0 | 9.8 |
| India | 5.0 | 5.9 | 7.7 |
| Difference | -0.1 | 2.1 | 2.1 |

**Table 3 (a):  Average annual growth rates of NSDP level and per capita: 16 major states**

| | Growth rates | | | | | |
|---|---|---|---|---|---|---|
| | **Panel A: Total NSDP** | | | **Panel B: Per capita NSDP** | | |
| **States** | **1980-89** | **1990-99** | **2000-11** | **1980-89** | **1990-99** | **2000-11** |
| Andhra Pradesh | 6.8 | 5.2 | 7.9 | 4.5 | 3.6 | 6.8 |
| Assam | 4.1 | 2.5 | 5.0 | 1.9 | 0.6 | 3.6 |
| Bihar | 4.6 | 2.8 | 9.0 | 2.4 | 1.0 | 7.1 |
| Gujarat | 6.5 | 6.8 | 8.6 | 4.4 | 4.8 | 6.9 |
| Haryana | 6.4 | 5.1 | 8.8 | 3.9 | 2.7 | 6.8 |
| Himachal Pradesh | 5.2 | 5.8 | 6.8 | 3.3 | 3.8 | 5.3 |
| Karnataka | 5.6 | 6.7 | 5.9 | 3.5 | 5.1 | 4.6 |
| Kerala | 2.9 | 6.0 | 7.7 | 1.5 | 4.9 | 6.8 |
| Madhya Pradesh | 3.9 | 5.6 | 5.8 | 1.4 | 2.9 | 3.9 |
| Maharashtra | 6.3 | 6.6 | 8.3 | 3.9 | 4.5 | 6.7 |
| Odisha | 5.2 | 2.7 | 6.7 | 3.3 | 1.0 | 5.4 |
| Punjab | 5.8 | 4.3 | 5.5 | 3.8 | 2.3 | 3.6 |
| Rajasthan | 7.5 | 6.5 | 6.6 | 4.8 | 4.0 | 4.6 |
| Tamil Nadu | 5.4 | 6.3 | 7.7 | 3.9 | 5.2 | 6.8 |
| Uttar Pradesh | 4.9 | 3.2 | 5.5 | 2.5 | 1.0 | 3.5 |
| West Bengal | 4.1 | 6.7 | 6.3 | 1.9 | 4.8 | 5.2 |
| India | **5.4** | **5.8** | **7.1** | **3.2** | **3.7** | **5.5** |

Note: Bihar in 1980s and 1990s is undivided Bihar, i.e.  includes Jharkhand. In 2000s, Bihar is modern-day Bihar. Similarly, for MP and UP. Highlighted cells indicate higher than national average growth in that decade.

**Table 3 (b):  Average Annual growth rates of GSDP level and per capita: 16 major states**

| | Growth rates | | | | | |
|---|---|---|---|---|---|---|
| | **Panel A: Total GSDP** | | | **Panel B: GSDP Per capita** | | |
| **States** | **1980-89** | **1990-99** | **2000-11** | **1980-89** | **1990-99** | **2000-11** |
| Andhra Pradesh | 5.3 | 4.8 | 7.9 | 1.9 | 3.3 | 6.7 |
| Assam | 4.2 | 2.7 | 5.3 | 1.3 | 0.8 | 3.7 |
| Bihar | 4.4 | 3.3 | 8.0 | 2.1 | 0.8 | 5.6 |
| Gujarat | 6.4 | 7.0 | 8.9 | 3.9 | 4.9 | 6.9 |
| Haryana | 6.3 | 5.3 | 8.8 | 4.0 | 2.7 | 6.8 |
| Himachal Pradesh | 5.2 | 5.7 | 7.5 | 3.2 | 4.0 | 6.2 |
| Karnataka | 5.6 | 6.9 | 6.5 | 3.5 | 5.2 | 5.0 |
| Kerala | 3.3 | 5.9 | 7.6 | 2.4 | 4.9 | 7.0 |
| Madhya Pradesh | 4.3 | 6.3 | 5.9 | 1.9 | 4.0 | 4.0 |
| Maharashtra | 6.3 | 6.8 | 7.7 | 4.3 | 4.6 | 6.1 |
| Odisha | 5.4 | 2.9 | 7.2 | 4.0 | 1.3 | 5.8 |
| Punjab | 5.7 | 4.5 | 5.8 | 3.3 | 2.5 | 4.4 |
| Rajasthan | 7.2 | 6.7 | 7.2 | 4.4 | 4.1 | 5.1 |
| Tamil Nadu | 5.5 | 6.4 | 8.0 | 3.4 | 5.2 | 6.5 |
| Uttar Pradesh | 5.0 | 4.0 | 5.7 | 2.8 | 1.7 | 3.7 |
| West Bengal | 4.3 | 6.6 | 6.3 | 2.7 | 4.8 | 4.8 |
| **India** | **5.4** | **5.8** | **7.3** | **3.1** | **3.7** | **5.6** |

Note: Bihar in 1980s and 1990s is undivided Bihar, i.e.  includes Jharkhand. In 2000s, Bihar is modern-day Bihar.
Similarly for MP and UP. Highlighted cells indicate higher than national average growth in that decade.

**Table 4(a): Growth rates of NSDP per capita calculated by fitting a linear trend model: Gujarat vs India – Dropping 2000**

| | Growth rates | | |
|---|---|---|---|
| | **NSDP Per capita** | | |
| | **1980-89** | **1990-99** | **2001-2011** |
| Gujarat | 2.6 | 5.6 | 8.1 |
| India | 2.7 | 3.5 | 5.9 |
| Difference | -0.1 | 2.1 | 2.2 |

**Table 4(b): Growth rates of GSDP calculated by fitting a linear trend model: Gujarat vs India – Dropping 2000**

| | Growth rates | | |
|---|---|---|---|
| | **Total GSDP** | | |
| | **1980-89** | **1990-99** | **2001-2011** |
| Gujarat | 4.9 | 8.0 | 9.9 |
| India | 5.0 | 5.9 | 7.9 |
| Difference | -0.1 | 2.1 | 2.0 |

**Figure 2: Simple Plot of log(NSDP per capita) in Gujarat vs India: 1981-2011**
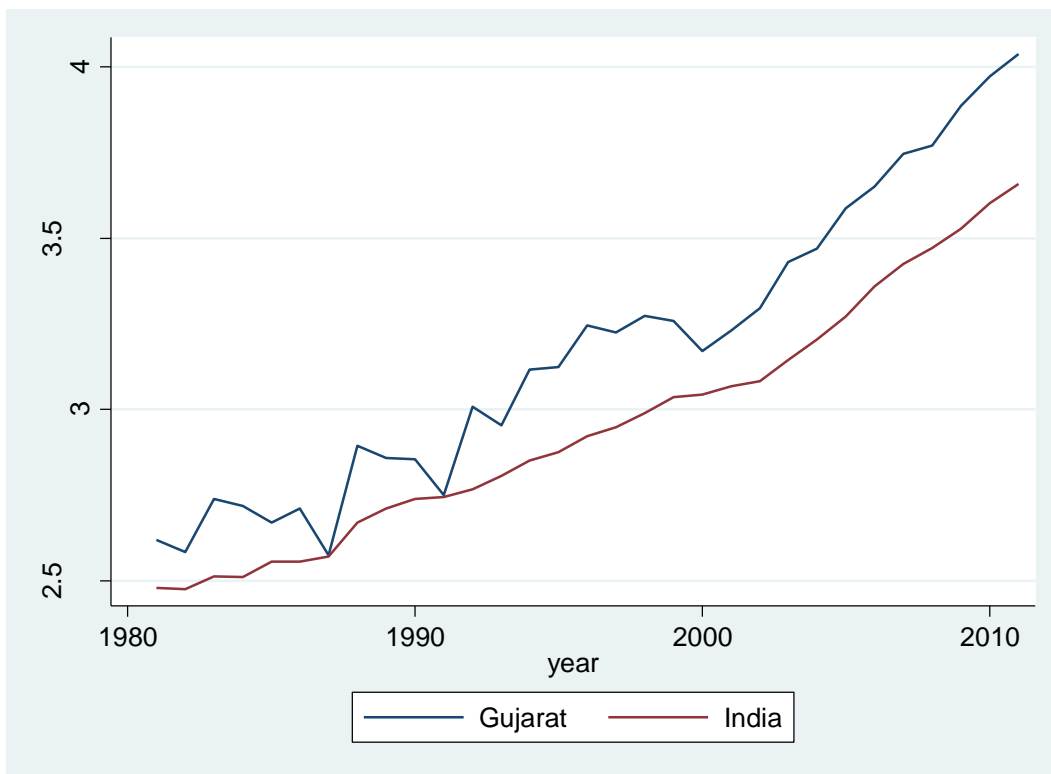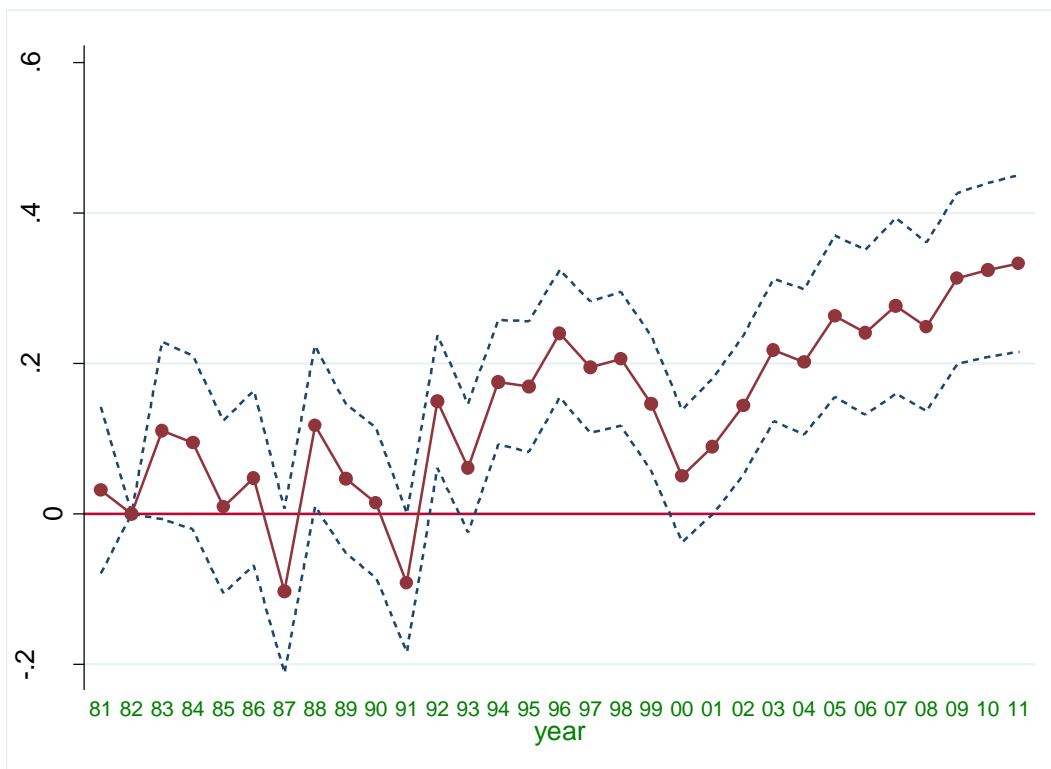


**Figure 3: Difference in Growth Rates between Gujarat and India: 1981-2011 (% points on the vertical axis)**

**Data Sources:**

**Per capita NSDP:**

State level per capita income implies real net state domestic product (NSDP) at factor costs (constant prices) per capita. These data were downloaded from the Reserve Bank of India (RBI) website, available at http://www.rbi.org.in/scripts/AnnualPublications.aspx?head=Handbook%20of%20Statistics%20on%20Indian%20Economy and the Planning Commission of India website http://planningcommission.nic.in/data/datatable/ .  For All India, net domestic product at factor cost (constant prices) is reported, obtained from Reserve Bank of India's website. Original source cited as: Central Statistical Organization (CSO).

NSDP data with base year 2004-05 is used for carrying out linear trend analysis and plotting Figures 2 and 3 and were obtained from the Centre for Monitoring Indian Economy (CMIE) website at www.cmie.org.

**GSDP:**
Data on gross state domestic product (GSDP) at factor costs (constant prices, base year: 2004-05) are obtained from Centre for Monitoring Indian Economy (CMIE) website at www.cmie.com. Original source: Central Statistical Organization (CSO). For All India, gross domestic product (GDP) at factor cost (constant prices) is reported, obtained from Reserve Bank of India's website.

**Population:**

Data on state level population is obtained from various Censuses of India.

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