Research Article

Income Convergence and Regional Growth in India: Before and After the Economic Liberalization

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Abstract

In this article I study regional growth and sub-national income convergence in India in the context of economic reforms that have been undertaken since 1991. I also examine convergence in development inputs such as population growth, literacy and investment at the sub-national level. My results show that there is a strong evidence of divergence in per capita income of the 15 states studied in the sample. The standard deviation of net state domestic product has increased over time indicating no evidence of convergence in the pre- or post-reform period. Population, state capital expenditure and commercial bank credit have also diverged over time across these 15 Indian states. However, literacy shows evidence of convergence across states.

JEL: O18, O2, O40, R11

Keywords

Economic growth, convergence, economic reforms, regional inequality, India, Asia

Introduction

In recent years India has shown a dramatic improvement on the economic scene. It has become one of the world's fastest growing economies with average growth rates of 9 per cent over the past four years (World Bank, 2009). This is in stark contrast to the post-independence decade growth rate of about 3.5 per cent per year and the 5–6 per cent average rate of growth which prevailed in the 1980s (Government of India, 2008). Looking at the fast pace of growth in the 2000s, the media and scholars have dubbed India as the 'Newest Asian tiger'. India is also

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the world's second most populated country with a population that is both growing and young. This is a vital dimension of India as a player in the world markets as an investor, consumer and producer. Being a democratic country, India's recent turnaround in growth is important from the point of view of the development and democracy nexus.

In this article, I study the sub-national economic growth patterns and income convergence in the context of economic reforms. The role of comprehensive economic reforms undertaken in 1991 in this unprecedented growth boost and transformation of India's image has sparked a lot of discussion in the development literature, especially about whether this fast economic growth can be attributed to the liberalization in 1991 (Ahluwalia, 2000; Joshi and Little, 1996; Kumar, 2000; Panagaria, 2004). Nevertheless, it is important to note that a high rate of economic growth at the national level need not necessarily mean that all the states enjoyed equal benefits of this growth spurt. Besides the effect on the national economic growth, economic reforms also have significant implications for the regional distribution of growth in India.[1]

To examine if states in India experienced income convergence, both before and after the reforms, I analyze economic growth across 15 Indian states for the pre-liberalization period (1970–1990) and post-liberalization period (1991–2005). I test for sigma convergence in output (income).[2] For any explanation of divergence or convergence of output, it is also necessary to test for convergence in some determinants of the steady state.[3] Hence I investigate sigma convergence of input variables such as human capital, investment and population. Understanding the regional differences after economic liberalization has important implications for continuation of these reforms and the development of second-generation reforms.

My results show that there is a strong evidence of divergence in the per capita income of the 15 states in the sample. The standard deviation of net state domestic product has increased over time. This indicates that there is no evidence of sub-national convergence in the pre- or post-reforms period in Indian states. Population, state capital expenditure and commercial bank credit also have diverged over time across these 15 states. However, literacy shows evidence of convergence across states.

My article is novel in the following ways. First, as mentioned above, in addition to studying convergence in output across states, I also study convergence in inputs like population growth, literacy and investment to see whether there has been a convergence in these development inputs across states over time. Second, I break the period under study into pre-liberalization and post-liberalization years. This will help in understanding the differences and/or similarities in growth processes in states across the two periods.

The article is organized as follows: In the next section, I discuss the economic reform policies in detail. In the third section, I explain why it is important to study growth at the state level. The fourth section presents the state-level growth experience in the context of per capita net state domestic product in the pre- and

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post-liberalization periods. Later in the fifth section, I review articles on income convergence in India at the sub-national level. In the sixth section, I discuss the convergence hypothesis. In the seventh section, I discuss the data, methodology and test for convergence.

The eighth section summarizes the results. I present descriptive evidence of the impact of economic reforms in some states in the ninth section. The last section concludes.

Liberalization in India

As a response to the balance of payments crisis that India faced in 1991, India undertook comprehensive reform policies for economic liberalization. In 1991, import licenses on almost all the intermediate and capital goods were dismantled. The government introduced Special Import Licenses (SIL), which could be used for importing restricted items as a way of promoting exports. Exporters were allowed to obtain SILs proportional to their export trading volume. That is, import concessions were tied to export excellence for some commodities. Profits earned from exports became 100 percent tax-free. The export promotion zones were given an additional incentive of a tax holiday for five to eight years. Import licensing was abolished in 2001 after the dispute between India and its trade partners in the World Trade Organization (WTO). Now only a few canalized[4] and environmentally sensitive goods need import licensing. All the quantitative restrictions on imports from member countries of the South Asian Association for Regional Cooperation (SAARC) were given up unilaterally in 1998 by India (Virmani, 2003). As far as tariff rates are concerned, the Indian economy faced very high tariffs in the 1980s, partly for protectionist arguments, and partly for revenue reasons. In 1990–1991 the highest tariff rate was 355 per cent. This was brought down to 50.8 per cent in 1998–1999 (Kumar, 2000). Tariff rates on capital goods, among others, were brought down from 35 per cent to 25 per cent in 1994–1995. While India may still have very high tariff rates when compared to other Asian countries, there has nonetheless been a spectacular decrease in tariffs relative to the pre-reform tariffs in India.

There was also a conscious effort to attract more foreign direct investment (FDI) to India. FDI can be a very significant factor in accelerating industrialization in developing countries. FDI, along with financial flows, brings modern technology, skill levels and even market access. The government declared a New Industrial Policy in 1991, which liberalized rules about FDI. This new policy allowed for an 'automatic approval' or an 'automatic route' for FDI in 34 priority industries.[5] Up to 51 per cent foreign equity was allowed in 35 priority industries. For some of the infrastructure industries, this could be up to 71 per cent. In the sector of ports and roads development, up to 100 per cent foreign ownership was permitted by the end of the 1990s. Non-resident Indians were allowed 100 per cent

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ownership even in priority industries (Kumar, 2000; Pangariya, 2004; Virmani, 2003).The government also established the Foreign Investment Promotion Board (FIPB), which aims to promote FDI in India through undertaking activities in India and abroad. The FIPB facilitates investment in India through non-resident Indians, international companies and various foreign investors.[6]

As is clear from the above discussion, India made a serious and much more comprehensive effort of opening up its external sector in 1991.[7]

Why is a Study at the Regional/State Level Important?

As can be gleamed from the above discussion, the economic liberalization undertaken in 1991 reduced the extent of control by the central government in many areas. Specifically, decentralization in areas related to investment led to a higher scope for initiative on the part of state and local governments. With less central government control and intervention, the states had the freedom to frame policies to attract foreign as well as domestic investment. Therefore, it is important to study the patterns in economic growth before, and after, liberalization was undertaken. Besides looking at the national economic growth, it is important to compare the economic performance at the sub-national level. A study aimed only at the national level can mask the dynamics at the state level. Finding out whether all states enjoyed the same rate of economic growth or only the richer states continued to grow faster will have important policy implications for a balanced regional growth objective. Analyzing the differences, and/or similarities, between economic performances of various states would shed light on the distribution of high economic growth experienced in the post-liberalization period.

Another reason a regional level study is interesting is the structure of Indian government and the relations between the central and state governments. As far as the tax raising powers of the state and centre are concerned, the Indian Constitution gives most powers to the central government, which leads to an imbalance as far as the sources of tax revenue for the states are concerned (Cashin & Sahay, 1996). However, to ensure balanced regional growth, the constitution also has made provisions for the transfer of grants from the centre to the states in three forms: statutory transfers (like tax sharing), grants in aid, and plan and discretionary grants (usually given to support central government projects). The study of the allocation of funds shows that poorer states have indeed received a relatively higher proportion of funds than the richer states (Ghosh, 2008). For states like Bihar, which has very low economic and social development, the transfers of funds from the central government form a major source of state income (Luce, 2004). Studying whether the regional inequalities have declined over time, and whether the poorer states have been able to catch up with the richer ones will be able to indirectly shed some light on the impact of such fund transfers to state governments. I will analyze the growth experience at the state level in the next section.

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State-level Growth Experience in the Pre- and Post-liberalization Period

A brief look at the state domestic product's growth rates of various states in India indicates significant regional disparities. The Indian states are characterized by very different socio-economic conditions. This is true for indicators of economic well-being such as the growth of state domestic product as well as various measures of social well-being like literacy rates and demographic indices. The growth experience at the aggregate level masks a lot of what is happening at the sub-national level. Aiyar (2001) notes that the sub-national dispersion of per capita income, urbanization and literacy rates in India is greater than that found in relatively homogeneous groups of countries like those in the European Union. While emphasizing the geography of development, Bhandari and Khare (2002) point out that, on an average, the western parts of India have grown faster than the eastern parts of India.

In this section I present some observations about the net state domestic product (NSDP) growth in 15 states in the pre- and post-reform periods. Table 1 and Figure 1 give the average annual growth rates for 15 states in the pre-reform and post-reform years. At the aggregate level, the average annual growth rate of these 15 states increased from 2.12 per cent before reforms to 3.30 per cent in the post-reform period.

Table 1. Average Annual Growth Rates of the Net State Domestic Product Per Capita for 15 Indian States

State	Pre-reform Period (1970–1990)	Post-reform Period (1991–2004)
Andhra Pradesh	2.22	4.08
Assam	2.38	1.31
Bihar	1.43	1.10
Gujarat	1.79	4.48
Haryana	2.72	3.07
Himachal Pradesh	2.08	4.92
Karnataka	1.83	3.69
Kerala	1.76	5.54
Madhya Pradesh	2.60	2.38
Maharashtra	3.24	3.40
Orissa	1.22	2.58
Punjab	2.24	1.78
Tamil Nadu	2.73	4.38
Uttar Pradesh	1.98	1.08
West Bengal	1.32	4.00
Full sample*	2.03	2.21

Source: Author's calculations using data from the Economic and Political Weekly Research Foundation.

Notes: Numbers are percentages.
*Total of 15 states.

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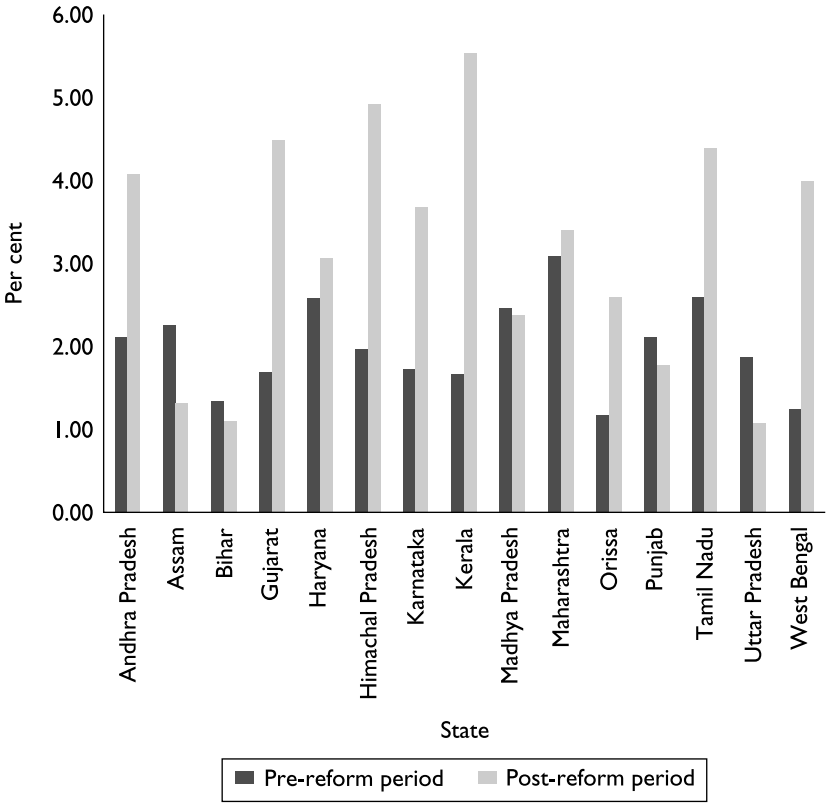

Figure 1. Average Annual Growth Rate of Per Capita Net State Domestic Product Before and After the Reforms, in Selected States

Source: Developed by the author.

Some states, like Tamil Nadu, Kerala and Maharashtra, grew faster in the post-reform period compared to states like Bihar, Uttar Pradesh and Assam. Of the 15 states in my sample, nine states show acceleration in growth after reforms. Kerala and West Bengal, which initially were middle-income states, grew very rapidly after 1991. These two states, in spite of having lower growth in the pre-reform period, show high growth rates in the post-reform years. Kerala's result is especially interesting because Kerala's 'development paradox' is often talked about in the socio-economic literature. Kerala has achieved high development in literacy, life expectancy and other indicators of human development. For example, the literacy rate in Kerala is almost 91 per cent. In spite of this, its economic performance in decades prior to the reforms was not good. However, in the post-reform decades Kerala actually grew faster than most of the other states, from an NSDP of ₹6992 in 1991 to almost ₹23,199 in 2005.[8] Likewise Andhra Pradesh almost tripled its per capita NSDP, going from ₹6886 in 1970 to ₹19,858 in 2005.

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For initially rich states like Maharashtra and Gujarat, economic growth continued in the post-reform period.

Now turning to some poor states, in 2005–2006, the NDSP for Bihar was only ₹5129. If we consider the evolution of state domestic product per capita in various states over the period of 1970–2006, we see that Bihar stagnated around the income of ₹4746 for almost a decade, picking up only in late 1980s, and again falling in the post-reform period to reach only ₹5129 in 2005. Uttar Pradesh also could not accelerate its pace of growth in the post-reform period. However, the two initially low-income states of Madhya Pradesh and Orissa show marked improvement in their performance. This diversity makes understanding the pattern and transition of economic growth across states of fundamental interest. In the next section, I present a review of some papers that discuss regional convergence in India.

Sub-national Convergence in India

The literature on testing for income convergence across Indian states is relatively recent.[9] There have been various studies on economic growth and productivity in India, both at the national and regional levels, but the empirical study of income convergence began only in the mid-1990s. Starting with a 1996 study done by Cashin and Sahay, there has been a range of analytical studies on sub-national income convergence. Many of these theoretically model and empirically test for absolute and conditional beta convergence as well as sigma convergence of income. The empirical papers test for and explain the differences across Indian states in per capita income and other human development indicators using variables like inter-state migration, investment, transfer of funds from the central government to the state governments, and infrastructure. However, there does not seem to be a consensus among researchers on whether or not there is income convergence across Indian states. Various papers reach diverse conclusions using a range of differing samples, methods and explanatory variables. I review several of the most prominent studies below and provide a more extensive list in Table 2.

As mentioned above, Cashin and Sahay (1996) were the first to empirically test for sub-national convergence in India. They use data for 20 states for the period 1961–1991 to test the Solow–Swan neoclassical growth model and find strong evidence of absolute convergence. Specifically, they show that the states that were initially poor in their sample grew faster than the states that were initially rich. They theorize that interstate migration and grant transfers from the central government to state governments could be the main sources of cross-state equalization of incomes. Resources transferred in the form of tax sharing, grants in aid, plan grants, loans or allocation of credit may have reduced interstate disparities in income. While migration from poor states to richer states and grant transfers from richer to poorer states are good potential reasons for income convergence, their data shows only weak evidence for such migration and grant transfers.

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Table 2. Literature on Economic Growth and Income Convergence in India

Author and Year	Period of Study	Econometric Method	Results
Sachs, Bajpai and Ramiah (2002)	1980–1998	Ordinary Least Squares(OLS)	Sources of Convergence are found to be very weak
Dasgupta, Maiti, Mukherjee, Sarkar and Chakrabarti(2002)	1960–1996	OLS	Per capita SDP diverges
Trivedi (2002)	1962–1992	OLS, Re-weighted least squares and Least trimmed squares	No evidence of unconditional convergence, evidence of conditional β convergence, σ divergence
Bandyopadhyay (2006)	1965–1997	Distribution Dynamics Approach	Twin peaks: two income convergence clubs
Ghate and Wright (2009)	1970–2004	Non-stationary panel data	Different convergence rates for different states

Source: Author's literature review.

Nagaraj, Varoudakis and Veganzones (2000) use a dynamic panel with fixed effects to study the period from 1970 to 1994 for 17 states. Unlike the previous paper, the authors explain growth differences across states at least in part by differences in infrastructure development. The authors construct an aggregate infrastructure variable using principal components analysis and show that the role of public expenditure on infrastructure is an important determinant of the conditional convergence in their sample. Aiyar (2001), however, in a study of 19 Indian states over the period 1971–1996 finds strong evidence of absolute divergence. However, when he controls for factors like the literacy rate and private capital formation, the data shows support for conditional convergence.

Unlike the papers discussed above, Das (2002) studies agricultural wages for 14 Indian states from 1956 to 1993 and finds evidence of absolute convergence in wages. Later he goes on to classify the states in his sample into high-, middle- and low-income categories and tests for convergence within these groups. Here again, he finds evidence of absolute income convergence, with the rate of convergence being the fastest in the group of the poorest states.

Adabar (2004) extends the period under study by including the late 1990s and early 2000s. With data on 14 states for 1976–2001, the author uses dynamic fixed effects estimation and also finds support for absolute and conditional convergence in per capita income. The rate at which the poorer states caught up with the incomes of richer states is about 12 per cent per five-year time period. The author shows that population growth, credit extended by commercial banks and capital expenditures by state governments are significant factors in explaining this convergence.

Most recently, Nayyar (2008) studies 16 Indian states for the period 1978–2003 using the Generalized Method of Moments estimation. Like Aiyar (2001), the author finds no evidence of absolute convergence. States do not seem to converge to the same steady state. Nevertheless, once variables like literacy rate, investment and infant mortality are taken into account, the author does find evidence of conditional convergence. In sum, it is clear from the above discussion that there is no clear-cut conclusion about income convergence in India. The findings about convergence vary depending on the explanatory variables considered, the period under study, and the states in the sample.

Income Growth in State Economies—Convergence or Divergence?

As can be seen from the above discussion, the most common starting point for a regional growth analysis of India has been the neoclassical growth model (NGM) (Solow, 1956). One important implications of the NGM is income convergence between regions. If countries have similar population growth, savings and technology, the NGM implies that the output or income across countries will tend to

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converge to the same steady state. Convergence as implied by NGM means that countries that are poor grow faster than the rich ones; that is they 'catch up' with them in the long run. This catch up is based on diminishing returns to scale. A rich country will grow slower as diminishing marginal returns to capital set in after accumulating more and more capital. On the other hand, a poor country, where capital is scarce, will have a higher return to capital and grow faster.

There is a wide range of literature that studies the implications and empirical validity of the NGM in various ways. Most of the studies discussed in the earlier sections tested for beta convergence using a regression framework. Another way to test whether countries have converged in income is to study the standard deviation of income of the sample over time (Grier & Grier, 2007). In the current article, I use this method to test for convergence. This concept of convergence is called σ convergence and refers to a decrease in dispersion of income in a group of economies. Sala-i-Martin (1996) defines this type of convergence as follows: 'a group of economies are converging in the sense of sigma (convergence) if the dispersion of their real per capita GDP levels tends to decrease over time'. Evaluating the evidence for σ convergence in my case involves studying the trend of the standard deviation of NSDP per capita across states. One drawback of sigma convergence is that it does not tell us information about the distribution dynamics of per capita income across regions.[10] However, the advantage of using sigma convergence is that this type of convergence is non-parametric in the sense that it relies completely on how the data behaves and does not impose any restrictions on the data. Studying sigma convergence in income or output may not help us make inferences about conditional convergence directly as implied by NGM. Nevertheless, if we conduct similar convergence tests for some of the determinants of steady state determinants, we may be able to comment on conditional convergence (Grier & Grier, 2007).

In the recent literature, in addition to testing absolute and conditional convergence based on classical regression methods, various different techniques of testing for convergence have been used. These help us understand the underlying dynamics of income distribution that may get ignored while using sigma convergence. Kar, Jha and Kateja (2010) study the convergence among Indian states using the distribution dynamics approach. The authors study per capita income in 21 Indian states over the period 1993–2005. The study of distribution dynamics of per capita income across the states finds evidence for polarization: two convergence clubs among the states. Some middle-income states moved to the relatively higher income states while others fell back to the lower-income states forming two convergence clubs over time. Another paper that uses a different approach for studying convergence analysis is the one by Kalra and Sodsriwiboon (2010). The authors use non-stationary panel data methods to analyze income convergence during the period 1970–2004 across 15 Indian states. This approach also helps to investigate for spillover effects across the states. The authors find evidence for divergence

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over the whole sample period and convergence clubs among the high and lower income states and small spillover effects.

For the current article I use sigma convergence. As pointed out earlier, sigma convergence does not impose any restrictions on data and can help understand the dispersion of income across states. In the following section, I explain my data and methodology for testing convergence among Indian states.

Data and Methodology

My sample covers the period 1970 to 2005 and includes data from 15 different states including Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Orissa, Punjab, Tamil Nadu, Uttar Pradesh and West Bengal. These states taken together account for more than 85 per cent of India's population, and include both poor as well as rich states, thereby making this sample fairly representative of the Indian economy.

To test for sigma convergence in output, we need to estimate the dispersion of output over time. In this article, I use the standard deviation of per capita state domestic product as a measure of dispersion of output. The method is as follows. I calculate a time series of the standard deviation of income across the 15 Indian states in my sample. Then, I fit a time trend to this series. Convergence of output across states would imply that this trend is negative and significant. If the time trend is positive and significant, then I can conclude that the output is diverging.[11] To test if the divergence or convergence can be explained by the steady state variables, I test for convergence in input variables in the same way. I use the following variables as input variables: population growth, literacy rate, capital expenditure by state government and commercial credit given by banks. I discuss each of the variables below. Details about the data and their sources are given in Table 3.

Literacy Rate

The literacy rate is an indicator of human capital and a possible determinant of economic development. One would expect to see a positive relationship between literacy and economic growth although it is not always so.[12] Specifically, higher levels of literacy (and in turn human capital) may be associated with a higher quality of the labour force and therefore higher economic growth. Literacy can also increase the efficiency of economic and political institutions and help in scientific advances.[13]

In India, at the national level, 64 per cent of the population was literate in 2001.[14] This was an improvement from about 34 per cent in 1971. Table 4 gives the evolution of literacy rates in selected states from 1971–2001. In 2001, only

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Table 3. Explanation of the Variables and Their Sources

Variable	Description
Growth rate of per capita net state domestic product	The growth rate of Per Capita Net State Domestic Product over five-year intervals. The data is in 2000–2001 prices. Sources: 'Domestic product of states of India, 1960–61 to 2000–01', Economic and Political Weekly Research Foundation and Central Statistical Organization.
Population Growth	The growth rate of population over five-year intervals. Sources: Economic Survey (2007–2008), www.indiabudget.nic.in and Census of India, Office of Registrar General.
Literacy	Literacy rates for 1971 are for the population aged 5 and above and for 1981, 1991, 2001, they are for the population aged 7 and above. The Census was not conducted in Assam during 1981; in this case the average of the preceding and succeeding figures is taken. Sources: Economic Survey (2007–2008), www.indiabudget.nic.in
Credit extended by commercial banks	The total credit extended by commercial banks over each five-year period. Source: 'Database of commercial banks in India', Economic and Political Weekly Research Foundation.
State government capital expenditure	Source: Budget documents of the state governments, Reserve Bank of India (rbi.com).

Table 4. Literacy Rates in Selected States

State	1971	1981	1991	2001
Andhra Pradesh	24.57	35.66	44.08	60.47
Assam	33.94	43.00	52.89	63.25
Bihar	23.17	32.32	37.49	47.00
Gujarat	36.95	44.92	61.29	69.14
Haryana	25.71	37.13	55.85	67.91
Himachal Pradesh	35.00	50.00	63.86	76.48
Karnataka	36.83	46.21	56.04	66.64
Kerala	69.75	78.85	89.81	90.86
Madhya Pradesh	27.27	38.63	44.67	63.74
Maharashtra	45.77	57.24	64.87	76.88
Orissa	26.18	33.62	49.09	63.08
Punjab	34.12	43.37	58.51	69.65
Tamil Nadu	45.50	54.39	62.66	73.45
Uttar Pradesh	23.99	32.65	40.71	56.27
West Bengal	38.86	48.65	57.70	68.64
India	34.45	43.57	52.21	64.84

Source: Economic Survey, 2007–2008.

41 per cent of the citizens of Bihar were literate, while 90 per cent of the people in Kerala were literate. Kerala, which had about 70 per cent literacy in 1970, is now at par with highly developed countries in literacy standards. Most of the states have shown a steady increase in literacy rates over the period of 1970–2001.

Population Growth

There is no consensus in the literature on the effect on population growth on economic development. There are three schools of thought, namely the pessimists, the optimists and the revisionists (Birdsall, 1991). The pessimists, like Coale and Hoover (1958), Malthus (1806) and Solow (1956), argued that faster population growth and the corresponding increase in labour supply compared with capital formation would lower per capita consumption. According to the NGM, we would expect to see a negative impact of population growth on economic development. On the other hand, optimists look at population as a 'net contributor' to economic growth (Birdsall, 1991). Increased population can bring about scale economies and encourage technological innovations (Boserup, 1965, 1981; Kuznets, 1966). Revisionists do not admit to any generalization about consequences of population growth and focus on micro-level case studies, which may vary by time, place, and circumstances (Birdsall, 1991).

In the case of India, population has been growing at a rapid rate. Since independence with a population of 1,124.8 million people in 2007, India was the second most populous country in the world (World Bank, 2009). There has been

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a lot of discussion about the economic consequences of this rapid population growth in the development literature. Particularly, Nayyar (2008) and Adabar (2004), among others, find a negative impact of population growth on economic development in India. Table 5 summarizes the population and average annual population growth rate in selected states in India for the period 1971–2001. Over the entire period, the average annual growth rate of population was 2.03 per cent. Bihar, Madhya Pradesh and Uttar Pradesh grew at annual growth rates higher than that of the national average. Kerala, on the other hand, has achieved spectacular demographic developments. With the population growth at 1.29 per cent, Kerala was the state with the lowest population growth.

Table 5. Population and Average Annual Population Growth Rate in Selected States

(in '000)

State	1971	2001	Percentage Change from 1971–2001
Andhra Pradesh	43,503	76,210	1.81
Assam	14,625	26,656	1.94
Bihar	42,126	82,999	2.19
Gujarat	26,697	50,671	2.07
Haryana	10,036	21,145	2.40
Himachal Pradesh	3,460	6,078	1.82
Karnataka	29,299	52,851	1.90
Kerala	21,347	31,841	1.29
Madhya Pradesh	30,017	60,348	2.25
Maharashtra	50,412	96,879	2.11
Orissa	21,945	36,805	1.67
Punjab	13,551	24,359	1.89
Tamil Nadu	41,199	62,406	1.34
Uttar Pradesh	83,849	166,198	2.21
West Bengal	44,312	80,176	1.91
India	548,160	1,028,737	2.03

Source: Author's calculations using data from Economic Survey, 2007–2008.

Investment

According to the NGM, we would expect that higher investment would promote economic growth. For the purpose of this article, I divide investment into two types: private investment and public investment. Getting a long and reliable time series data on investment across states is not possible. Therefore, one has to look for proxies for measures of investment. For a measure of private investment, the closest proxy is the amount of credit given by commercial banks. I use the total credit given by 'scheduled commercial banks' (SCBs) for this purpose.[15] Although this is not the perfect measure of private capital formation or investment, SCBs credit is a good indicator of the same. Below, I present a few reasons for choosing

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this proxy. SCBs in India have almost three-fourths of the total financial assets of financial institutions in India, thereby conferring prime importance to them in financial intermediation. SCBs consist of the following five groups according to their ownership and nature of operation: (a) State Bank of India and its subsidiaries; (b) nationalized banks; (c) regional rural banks; (d) foreign banks; and (e) other Indian SCBs (private sector).[16] Aiyar (2001) found that at the national level the correlation coefficient between credit extended by SCB and gross private capital formation was 0.93 for the period 1970–1995. Also, Nayyar (2008) finds a strong correlation between loans extended by financial institutions and levels of private investment at the national level. Therefore, given the limitations posed by data availability, SCB credit seems like a good proxy for private investment.

Like private investment, there is no reliable information for all the states. Comprehensive public investment data at the sub-national level is not available. The data is available at the national level but this cannot be subdivided into state level data (Ahluwalia, 2000). Hence one also has to look for proxies for public investment levels. Some papers in the economic literature use various proxies like developmental expenditure by the state (Ahluwalia, 2000) and capital expenditure by the state (Adabar, 2004; Nayyar, 2008).[17] Nayyar (2008) finds that at the national level there is a strong correlation between state-wise capital expenditure and gross capital formation in the public sector for the period 1975–2003. Following Nayyar (2008) and Adabar (2004), in this article I use capital expenditure by the states in India as an indication of public investment expenditure at the state level.

Results

As mentioned earlier, testing for σ convergence involves analyzing the standard deviation of NSDP per capita across states. Table 6 presents the results of time trend estimations for different variables. Figure 2 plots the standard deviation of income for the full sample period. It finds that the standard deviation of NSDP has been increasing over time. Thus, there is an evidence of σ divergence in income for the full sample period across states. Figure 3 and 4 divide the sample in pre- and post-liberalization years. Figure 3 presents behaviour of the standard deviation of income from 1970 to1990 (pre-liberalization period). It is clear from the figure that states have diverged in income over time. This suggests that income divergence is not just post-reform phenomena: Indian states have been diverging in income long before the reforms were undertaken. To check whether this divergence continued in later years, Figure 4 plots the standard deviation for years 1991 to 2005, that is, the post-liberalization period. We find that even in post-reform years, the incomes have been diverging. The plot shows a positive and significant trend in standard deviation, thus showing evidence of σ divergence. This indicates that incomes have diverged before as well as after the reforms. Therefore, we can

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conclude that there is no evidence of σ convergence in output in the pre- or post-reforms period in Indian states.[18] The coefficient on time is positive and significant at the 1 per cent level in the case of the full, pre- as well as post-reform period. This finding is supported by Trivedi (2002) who uses data for the period 1962–92, for 19 Indian states and finds income divergence. Also, if we look at the pre- and post-reform estimations, the divergence becomes more prominent in the

Table 6. Estimating Time Trends for Output and Input Variables

	Full Period	Pre-reform Period	Post-reform Period
Per capita NSDP	140.80***	72.27***	201.02***
	(18.32)	(7.65)	(13.36)
Population growth	676.73***	–	–
	(25.05)		
Literacy rate	–0.04*	–	–
	(–2.08)		
Credit by commercial banks	126701.2***	51666.27***	283342.40***
	(11.04)	(16.30)	(10.77)
State capital expenditure	39.77***	9.63*	98.73**
	(3.61)	(1.70)	(2.15)

Source: Author's calculations.

Notes: The numbers in parentheses are *t*-statistics.
***, ** and * represent statistical significance at the 1%, 5% and 10% levels.

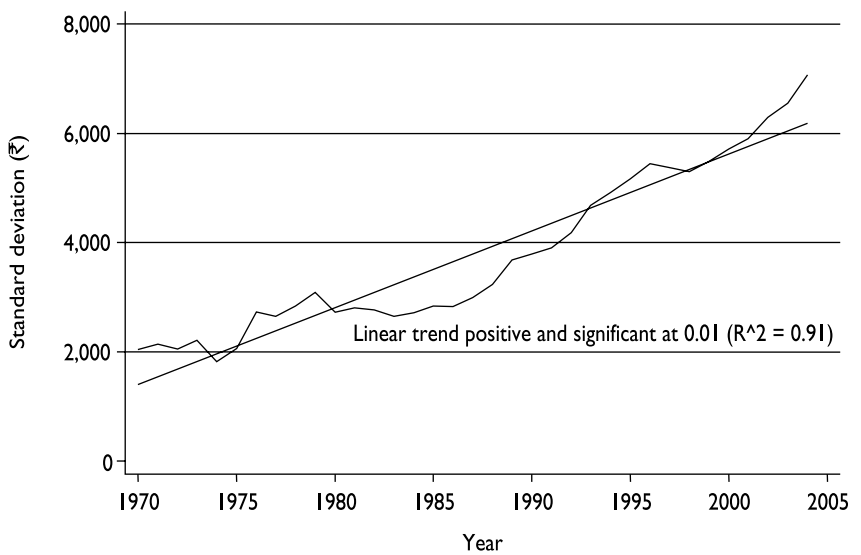

Figure 2. The Dispersion of Per Capita State Domestic Product across 15 States from 1970 to 2005

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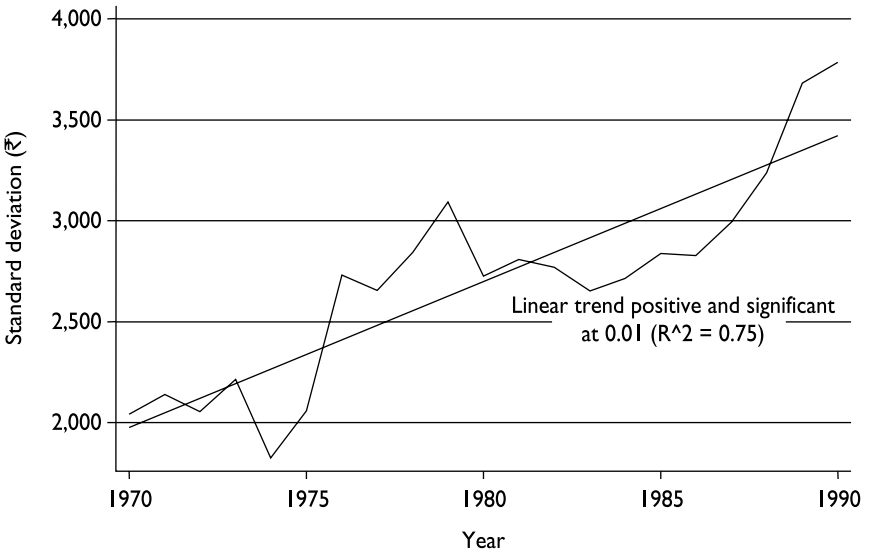

Figure 3. The Dispersion of Per Capita State Domestic Product across 15 States in the Pre-reform Period

Source: Developed by the author.

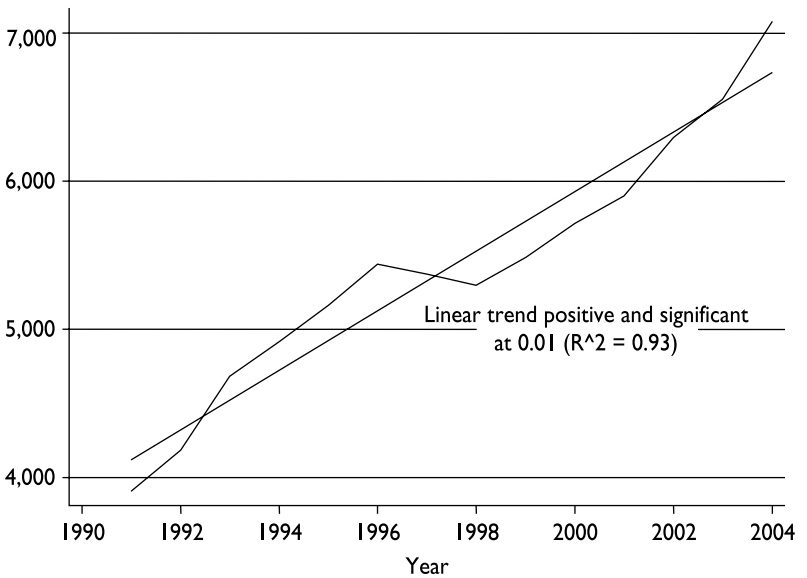

Figure 4. The Dispersion of Per Capita State Domestic Product across 15 States in the Post-reform Period

Source: Developed by the author.

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post-reform period. The slope coefficient in case of post-reform income dispersion is higher than the pre-reform period. The trend line in the post-reform diagram is a lot steeper than the one in the pre-reform diagram. This means that for a given change in time, the change in standard deviation of output was much more during the post-liberalization years than the change in standard deviation of output before reforms were undertaken. The states moved away from the mean output much faster after the liberalization was undertaken, disparities in income among states have increased after the economic liberalization.

Given the output divergence discussed above, it will be interesting to see whether there is any evidence of divergence in the inputs also. The NGM says that if the outputs across states or countries diverge over time, then the inputs must be diverging too. I test for sigma convergence in the determinants of economic growth discussed above. There is a strong evidence of divergence in population, state capital expenditure and commercial bank credit. Figure 5 shows a significant positive trend in the standard deviation of population growth. Figures 7, 8 and 9 show a significant positive trend in standard deviation of commercial bank credit for the full period as well as pre- and post-reform periods. Again, as was the case with income, this divergence is more pronounced in the post-reform period of 1991–2004. The slope coefficient increases significantly after the reforms. In addition to bank credit, state capital expenditure also has diverged in the pre-reform as well as the post-reform period as can be gleamed from Figures 10, 11 and 12, the dispersion being much higher in the post-reform period as compared to the pre-reform years. This can to some extent explain the output divergence that is evident from the earlier analysis. However, literacy shows evidence of convergence across states. Figure 6 shows a negative trend in standard deviation of literacy rates across 15 states in the sample. The coefficient on time for the whole period is negative and significant at the 1 per cent level. The states have become more and more similar as far as the literacy rates are concerned. This is puzzling since for output divergence, NGM would imply that literacy rate diverges too. However, Pritchett (2004) finds that similar result that the schooling per worker in India over the period of 1960–1995 has converged. Grier and Grier (2007) reach similar conclusions while studying country-level data. The fall in the disparity in literacy rates over time across states may be explained by various factors. In India, overall, there has been a slow but steady growth in literacy as mentioned earlier in the article. Improvements in education and literacy rates among the states are significant especially in the case of Himachal Pradesh and Tamil Nadu. The states seem to be getting more comparable in literacy rates. Various government and non-government initiatives may have created this 'push-factor' towards reaching better literacy levels. An increase in private schooling also could have promoted literacy in Indian states. Tooley (2009) describes the successes of private schooling among some states in India. The National Literacy Mission was undertaken in 1988 to conduct widespread campaigns for adult literacy across states. Subsequently, many states also took initiatives to promote literacy through different

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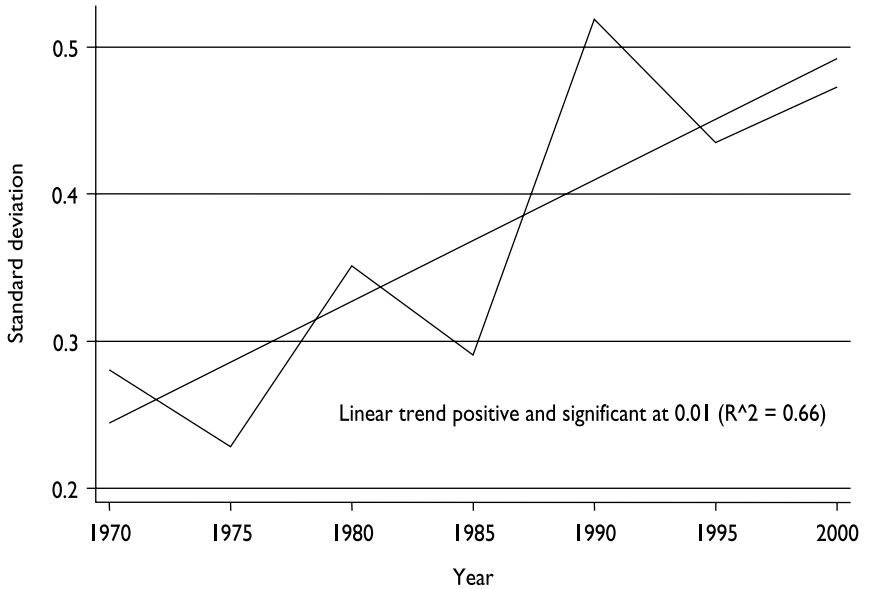

Figure 5. The Dispersion of Population Growth across 15 States from 1970 to 2005

Source: Developed by the author.

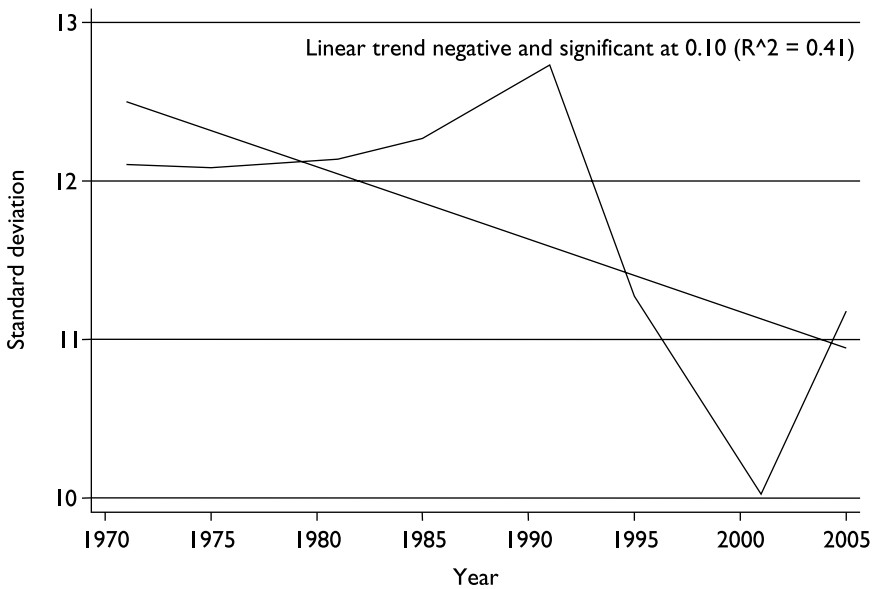

Figure 6. The Dispersion of Literacy across 15 States from 1970 to 2005

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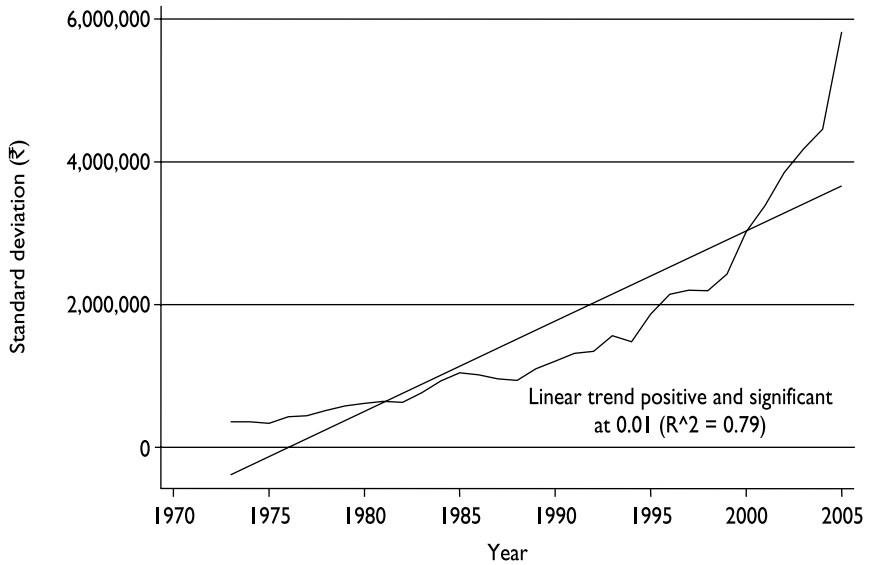

Figure 7. The Dispersion of Commercial Bank Credit across 15 States from 1970 to 2005

Source: Developed by the author.

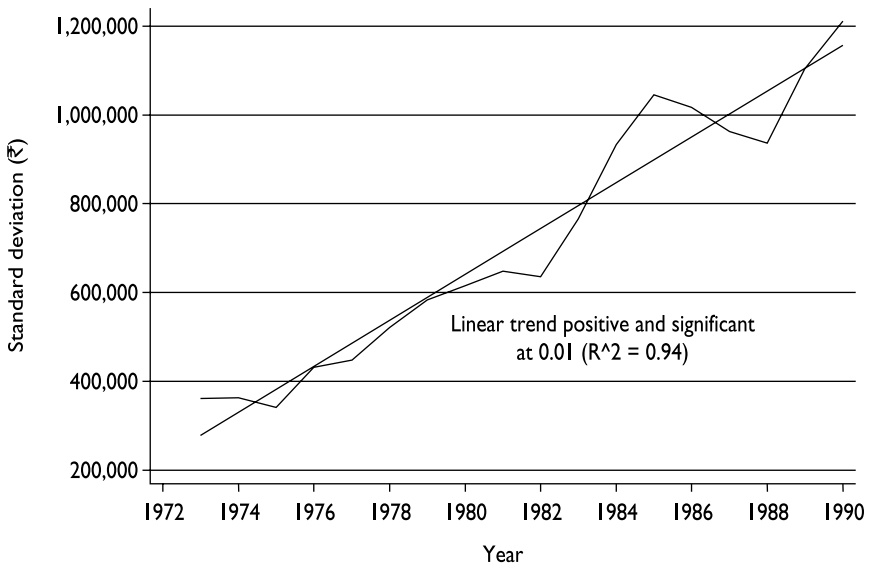

Figure 8. The Dispersion of Commercial Bank Credit across 15 States for the Pre-reform Period

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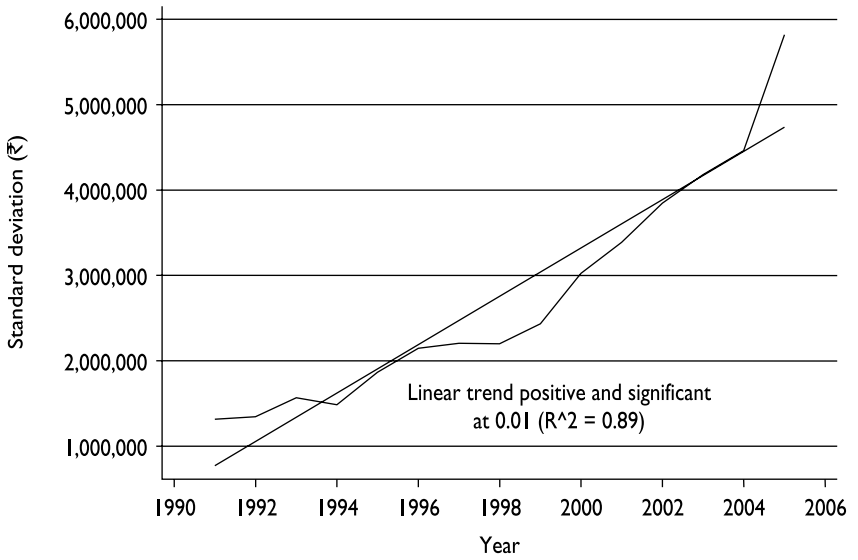

Figure 9. The Dispersion of Commercial Bank Credit across 15 States for the Post-reform Period

Source: Developed by the author.

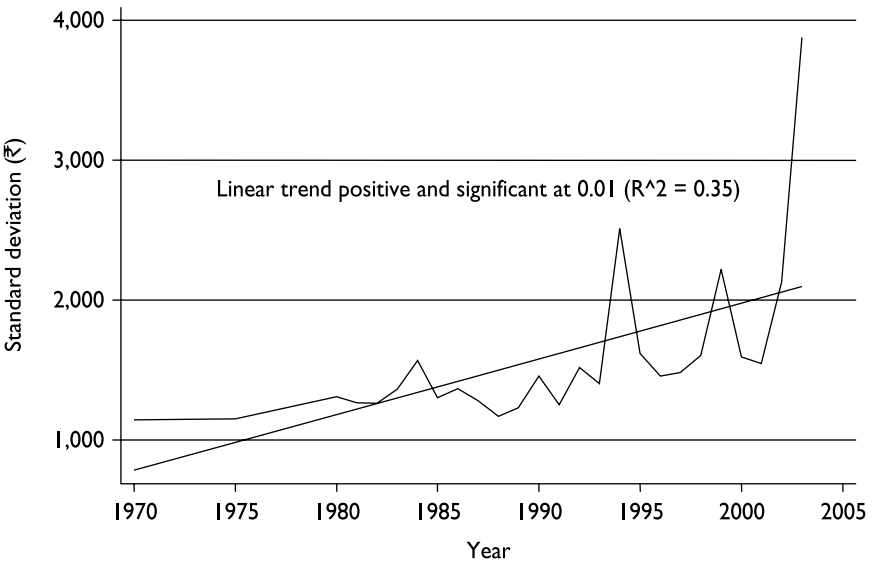

Figure 10. The Dispersion of State Capital Expenditure across 15 States from 1970 to 2005

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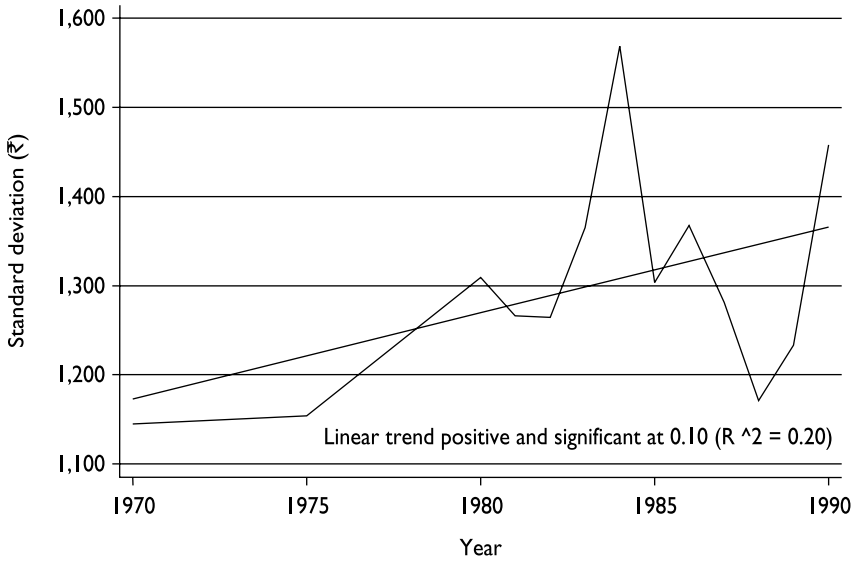

Figure 11. The Dispersion of State Capital Expenditure across 15 States for the Pre-reform Period

Source: Developed by the author.

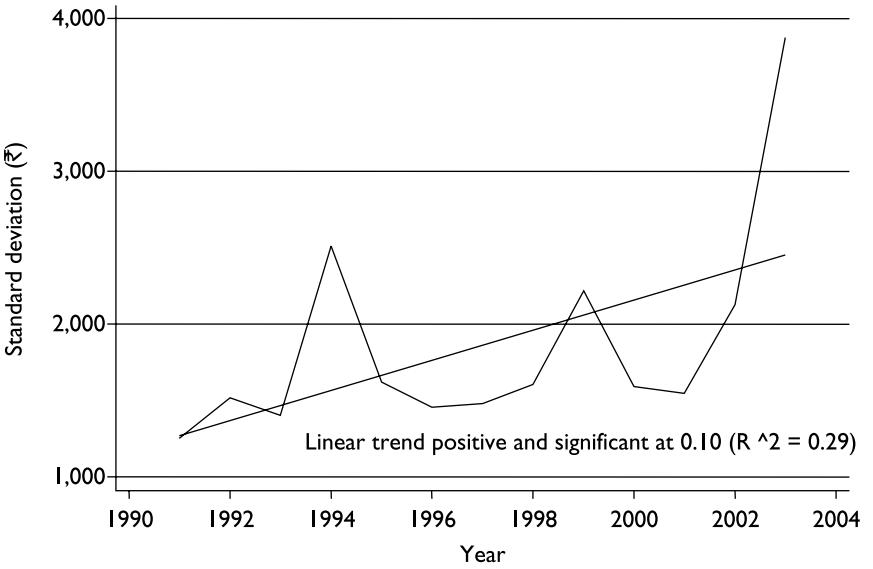

Figure 12. The Dispersion of State Capital Expenditure across 15 States for the Post-reform Period

Source: Developed by the author.

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initiatives like, for example, *Kala Jathas* (cultural troupes) and *Saksharta Pad Yatras* (Literacy Foot Marches) in Kerala, organized to generate awareness about literacy. The state government of Tamil Nadu had started a scheme to provide mid-day meals to schoolchildren in 1982, thereby encouraging school attendance and providing a boost to literacy. Many states have adopted this policy of providing school lunches to encourage school attendance. *Sarv Shiksha Abhiyan* (Literacy for all) was undertaken in 2000 to promote primary education among children. Various initiatives were taken by the governments and non-governmental organizations in providing infrastructure for schools and providing training to teachers. These different programmes may have helped in decreasing the disparity in literacy rates among states and creating awareness about education.

The Effect of Economic Policy Reforms on the State Economies—Some Case Studies

It would have been interesting to conduct an empirical study of impact of economic liberalization on growth at the state level in India. But such a study at the state level poses data problems. Comparable yearly data for different variables like foreign direct investment and portfolio investment at the sub-national level for the period 1970–2005 is not available. Thus, there exists a data availability constraint in studying the realized impact of policy reforms on state-wise economic growth in India. Therefore, in this section I will discuss some descriptive evidence of the effect of liberalization in some states.

Economic liberalization reduced the extent of control by the central government in many areas. Specifically, decentralization in areas related to investment led to a higher scope for initiative on the part of state and local governments. With lesser central government controls and interventions, the states had the freedom to frame policies to attract foreign as well as domestic investment. Below, I review some of the state case studies in literature.

Gujarat was one of the states that benefitted the most in India from liberalization. Scholars have pointed out various factors responsible for this, including the fact that Gujarat has the longest coastline in India and also has oil and natural gas resources. In addition to these geographic advantages, Gujaratis are believed to have a more open mind for entrepreneurship, being traditionally and culturally business-oriented. The state government in Gujarat has shown a very welcoming attitude towards private investment in the post-reform period. After liberalization, Gujarat took the initiative in developing infrastructure for new industries. As a part of the reforms, the electricity sector in the state was opened to the private sector. As a result of this step, Gujarat has not faced a power shortage in the post-reform period. Whereas Gujarat was a state ridden with frequent power shortages in the pre-reform period, Gujarat has become a state with a marginal surplus of power in the post-reform period (Dholakia, 2000). In building ports and roads too,

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the state promoted private enterprise. The state government adopted a policy of involving private businesses in policy-making, which improved the state's ability to match industry needs. Recently, the government has been hosting 'Investment *Melas*' (get-togethers of investors) for promoting investment in Gujarat. Dholakia (2007) discusses the growth experience in Gujarat in various sectors in the pre- and post-reform period.

For some southern states, namely Karnataka, Andhra Pradesh and Tamil Nadu, the gains from liberalization came mostly in the form of development of the information and technology sectors. A lot of software industries developed in India after the reforms as a result of the opening up of the economy. Today, software-related exports constitute almost 20 per cent of India's total exports to the outside world. The United States and United Kingdom have emerged as India's major trading partners, accounting for almost 75 per cent of software-related trade (Electronics and Computer Software Export Promotion Council of India, 2009). Karnataka, a leader in attracting software-based FDI in the post-reform period, has a highly developed software industry which is often referred to as the Silicon Valley of India. As shown in Table 7, the amount of FDI inflows that Karnataka attracted during 2000–2006 was almost ₹85,000 million. As mentioned in Joseph (2003), Karnataka accounts for almost one-fourth of India's total software exports. Table 8 gives the magnitude of software-related exports for selected states.

Andhra Pradesh also made spectacular progress on the Information and Technology (IT) front in India, developing Hyderabad, also called 'Cyberabad', as a major IT hub in the country. This great development potential in Andhra can be attributed to the large amount of good human capital and strong government commitment towards IT industry promotion. Major developments in the areas of

Table 7. FDI Inflows Received in Selected States in India

State	2000–2006 (Millions of ₹)	2000–2006 (Millions of USD)
Andhra Pradesh	48,250.0	1,061.4
Assam	417.4	9.0
Bihar	33.4	0.8
Gujarat	41,127.3	898.8
Haryana, Punjab and Himachal Pradesh	15,238.3	329.5
Karnataka	84,853.8	1,876.1
Kerala	3,397.7	75.1
Madhya Pradesh	2,359.1	51.8
Maharashtra	256,854.5	5,650.1
Orissa	3,650.0	81.2
Tamil Nadu	76,912.0	1,691.7
Uttar Pradesh	152.7	3.3
West Bengal	15,230.6	334.8

Source: Fact sheet on FDI, October 2006 (Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India, 2006).

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Table 8. India's Electronic and Computer Software-related Exports in Selected States (Millions of Rupees)

State	2005–2006	2006–2007
Karnataka	41,429	52,175
Tamil Nadu	14,573	21,325
Andhra Pradesh	12,620	19,140
Maharashtra	19,644	32,100
Total	114,625	158,500

Source: Electronics and Computer Software Export Promotion Council (2009).

infrastructure were undertaken to attract industry in areas like electricity generation. The state government took focused efforts on software development and the expansion of related exports. The business process outsourcing (BPO) industry flourished in Andhra.[19] Andhra Pradesh was the first state in India to come up with a specific information development-enabled services related policy. IT-enabled services were encouraged for employment generation. As far as e-governance is concerned, Andhra has emerged as a leader.[20] There were many IT-based modifications in the governance of various government departments. For example, Andhra's government introduced '*E-Seva*' under which all public utility bill payments, tax payments and reservations can be completed on a single website. The Fully Automated System for Transport (FAST) was also introduced to computerize services like the issue of driver's licences and vehicle registration.

Lastly, Tamil Nadu is another state that has taken advantage of economic reforms through software development. Tamil Nadu ranks third in software exports in India after Karnataka and Delhi. In 2002 the state government announced a new policy related to the Information and Technology sectors. Its objective was to develop the state to become the 'destination of choice' for IT investors. In addition to promoting software-based exports, this policy also aimed at expansion of the IT services to rural areas, and thus to minimize the 'digital divide' between urban and rural areas. In Madurai district a project named 'Sustainable Access in Rural India' (SARI) was implemented under which telephone and Internet access was given to all villages. The IT and IT-enabled services policy also gave capital subsidies among others to promote investment. Chennai, the capital of Tamil Nadu, has today emerged as one of the biggest hosts for BPO, housing BPOs of the World Bank, Citibank and others. Tamil Nadu has also succeeded to some extent, in computerizing its government departments.

The above studies make it clear that liberalization for some states may have worked through FDI, information technology and export promotion. The role of the state in taking advantage of the policy reforms, and taking necessary steps to implement these in their own states, seems to have played a significant role in their economic development. Some of the price-based interventions, like giving tax incentives, subsidies, and other direct interventions like providing better infrastructure to the businesses, could have enabled some states to reap higher benefits of economic liberalization.

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Conclusion and Discussion

I have shown that there has been sigma divergence in the per capita NSDP of 15 states in India in both the pre-and post-reform periods. The dispersion of the per capita NSDP has grown in the period prior to liberalization as well as after the economic liberalization. Further, the analysis of input variables like population and investment suggests divergence as well. Only literacy shows signs of convergence across states. The answer to curb this divergence does not lie in reversing the reform process or holding back the richer states. If India is to attain its maximum growth potential, then the economic reforms should be continued and if anything, at a faster pace. Acceleration of reforms should take place in the backward areas. As I have pointed out, the determinants of growth like investment are diverging too. Therefore, particular attention needs to be given to improvements in states which are economically backward. Also, as noted earlier, after liberalization, the role of state government and state policy have become an important launch-pad of economic growth. This is especially the case with investment (Ahluwalia, 2000). Therefore, rapid growth of the lagging economies calls for a proactive role for state governments as facilitators of benefits of the reform process. The recent growth spurt in Bihar may be an example that better governance and infrastructure can help the socio-economic development of the state. The efficiency and quality of governance must be improved in the laggard states (Bhattacharya & Sakthivel, 2004). Public investment is a poor substitute for private investment; nevertheless public investment can be used to build social and economic infrastructural facilities (Ahluwalia, 2000). This will help the poorer states to benefit from the more open and less controlled economy and thereby achieve higher economic growth. Therefore, there must be efforts for increased public investment for developing infrastructure. As far as central government is concerned, the central assistance to the states should be linked to economic performance instead of the current practice of unconditional transfers (Ahluwalia, 2000). Thus, the observed economic divergence calls for the acceleration of reforms and better infrastructural facilities in the poorer states and not for limiting the pro-market reform process that started in 1991. Efforts should be made to make this recent economic growth more inclusive. A well-balanced growth across all regions can provide political stability and boost unity in the country. This is important for the onset of the second-generation economic reforms in India.

Continued economic reforms and inclusive growth in India are important not only for the country itself but also for the rest of the world. As mentioned in the introduction, India's fast economic growth, combined with its large population, democracy, diversity and strategic importance, make India a case worth paying attention to. Fast and sustained growth of India, which houses 20 per cent of the world's population, has long-term implications in terms of increased consumption, investment and savings that get pushed in the domestic as well as the world economy. With the demographic transition underway, as the younger, working-age

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population gets added to this force, the effect is only going to multiply.[21] In addition to this, India is the world's largest democracy. This fact, coupled with the fast growing economy, can put an end to the belief that democracy and economic development do not co-exist. India stands apart from the other 'Asian models' like Singapore that combine fast growth and authoritarian governments. Lee Kuan Yew, minister mentor of Singapore, believes that democracy does not often lead to development because governments do not establish the stability and discipline necessary for government (Schuman, 2009). In contrast to this, Manmohan Singh, India's Prime Minister, believes that the democratic process builds a stronger consensus behind the policies and creates more sustainable growth (Schuman, 2009).

Last but not least, India's growth is also of strategic importance to the rest of the world. India's strained relations in the past with the USA have changed in recent times to a warming-up of relationships between the two countries (Panagaria, 2008). A fast-growing and regionally balanced India has political and strategic implications for the USA and the rest of the world.

That said, an open, strong, fast-growing and regionally balanced India has a lot to contribute to the changing world dynamics.

Acknowledgements

The author would like to thank Dr Robin Grier, Dr Carlos Lamarche and an anonymous referee for valuable comments and suggestions. The usual disclaimers apply.

Notes

1. As mentioned by Kar and Saktivel (2007, p. 69), the study of trends in regional disparity in the context of reforms has 'serious ramifications for the continuation of the reform processes'.
2. Sigma convergence refers to a decrease in dispersion of income in a group of economies. One important implication of the neoclassical growth model is output (income) convergence between regions. If states have a similar population growth, savings and technology, the output or income across countries will tend to converge to a common steady state.
3. See Grier and Grier (2007) for convergence in determinants of the steady state.
4. The government has a monopoly in importing these items.
5. Automatic route means that in these sectors, investment can be made without approval of the central government. Only the regional office of the Reserve Bank of India needs to be notified. After the approval for FDI by the automatic route, FDI can take place after getting the necessary regulatory approvals at the state and local level.
6. FIPB approves all other investment cases which do not fall under the purview of automatic approval. There is a limit of 4–6 weeks on the processing time of these applications by FIPB. According to the FIPB, if the foreign investor wants to hold less than the entire equity of the company, there is no need for a local partner. The rest of the equity can be offered to the general public (FIPB, 2007).

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7. On the domestic front there was also an effort towards disinvestment of government ownership in public sector corporations. A commission on disinvestment was set up for recommending the phases of this disinvestment.
8. Kerala's better performance in NSDP per capita can in part be attributed to the low growth rate of population in the state and high growth of its service industry.
9. India has 28 states and 7 union territories. Union territories are areas which do not have a separate state government and are administered directly by the central government.
10. For example, even if one finds that incomes are diverging over time, there may be other dynamics of the evolution of income that are ignored while focusing only on the standard deviation of income. It may be the case that economies are forming convergence clubs or there may be leapfrogging of the economies during the period in question. Sigma convergence cannot capture these phenomena.
11. See Grier and Grier (2007) for more on this.
12. For example, see Pritchett (2004) about the effect of schooling.
13. For a detailed discussion of relationship between human capital, literacy and economic growth, see Cameron and Cameron (2006) and Schultz (1991).
14. The Census of India publishes data at the beginning of every decade. The latest data on literacy rates that is available for now is for 2001. The next census data will be available in 2011.
15. Scheduled commercial banks (SCBs) are all the banks that are included in second chapter of Reserve Bank of India's act of 1934 (Reserve Bank of India, 2009).
16. There are 19 nationalized banks in India. Some of these were nationalized in 1969 and some were nationalized in 1980 (Government of India, 2009).
17. Capital expenditures by the states are classified as developmental and non-developmental expenditures. The expenditure on social and economic services constitutes developmental expenditures, while expenditure on general services is treated as non-developmental (RBI, 2004).
18. Some studies like Cashin & Sahay (1996) reach the opposite conclusion in that they find convergence among Indian states during 1961–1991. However, the authors test for conditional beta convergence. Therefore, the method of testing for convergence is different from that of this article. Adabar (2004), as mentioned earlier, also finds income convergence during the period 1976–2001. Nevertheless similar to Cashin & Sahay, Adabar (2004) focuses on beta convergence and not sigma convergence.
19. The business process outsourcing (BPO) is the subcontracting of some business functions or processes to a third party. Back-office outsourcing may involve subcontracting services like finance or accounting of the company. Front-office outsourcing involves delegating customer care units.
20. United Nations Educational Scientific and Cultural Organization (portal.unesco.org) states that 'E-governance is the public sector's use of information and communication technologies with the aim of improving information and service delivery, encouraging citizen participation in the decision-making process and making government more accountable, transparent and effective'.
21. Demographic transition refers to the process of the transformation of countries from high birth rates and high death rates to low birth rates and low death rates as part of the economic development of a country.

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