
Understanding Regional Economic Growth in India*

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Abstract

This paper aims to explain the growth experiences of 14 major states of India between 1980 and 1998. Using two measures of convergence, σ -convergence and \hat{u} -convergence, we examine whether per capita incomes in the states have been converging or diverging. By both standards of convergence, India demonstrated overall divergence during 1980–98, as well as during both the pre-reform and post-reform subperiods. Interestingly, the richer states experienced a degree of convergence during the post-reform period, whereas the poorer states did not. Divergence was most notable within the poorer group of states. A remarkable 82 percent of the cross-state variation in growth is explained by just the urbanization variable in India, with no hint of any conditional convergence after controlling for the degree of urbanization. The regression estimate shows that a 10 percentage point higher rate of urbanization is associated with 1.3 percentage points per year higher rate of annual growth.

1. Introduction

India accounts for a meager 2.4 percent of the world's surface area, yet it sustains a whopping 16.7 percent of the world's population, amounting to a little over 1 billion people residing in 28 states and 7 union territories. The variation in physical geography, culture, and economic conditions across these states and territories is enormous. Some states have achieved rapid economic growth in recent years, whereas others have languished. This paper attempts to explain the differential economic performance

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of India's states, especially under the forces of globalization in the 1990s. The paper may be read most profitably as a companion to Démurger et al.'s recent work (2002) on regional differences in China's economic performance.

We focus on the 14 most populous states in India, which excludes the Himalayan states, the northeastern states, and the 7 union territories (UTs). The included states have a combined population of 897 million (approximately 90 percent of India's population) and cover 2.7 million km² (83 percent of India's total land area). Some important data for the 14 states are listed in table 1, and the states' locations are shown in figure 1. Economic performance varies greatly among the 14 states. The gross state domestic product (GSDP) per capita ranges from 1,261 rupees per month in 1997-98 in the poorest state, Bihar (population 82 million), to 5,690 rupees per month in the richest state, Maharashtra (population 96 million). Some states have achieved rapid economic growth in recent years, such as Gujarat, with growth in state per capita income at 7.8 percent per year from 1992-93 to 1998-99, whereas others have languished, such as Bihar, at -0.2 percent per year over the same period.

The differential economic performance across states raises important policy questions. To what extent are the differences a manifestation of global economic forces acting upon India, especially during a period of economic liberalization, and to what extent do they reflect differences in economic policies at the local and national levels? Will market reforms tend to make the rich states richer in relative terms or will they lead to economic convergence across states? Specifically, are the poorest states (especially the so-called BIMARU states of Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh) condemned to fall farther behind the front-runners, at least in relative terms?

Démurger et al. (2002) found that the underlying drivers of economic growth in China, and hence the tendencies toward convergence or divergence, differed markedly across subperiods as a result of major shifts in the economic policy regime. In 1978-84, during the first phase of China's market reforms, the dismantling of the communes and the partial liberalization of food production gave a great boost to major food-producing regions. By the late 1980s, international trade became the major driver of economic growth, and the coastal regions outpaced the interior provinces.

Policy regimes have also affected economic growth in India. In the state planning period up to 1991, international trade played only a minor role, and industrialization was heavily affected by state investment plans, which attempted (at least mildly) to promote the laggard regions. The Green Revolution, which introduced

Table 1. Indian states: Main characteristics

	GSDP per capita, 1997-98 (rupees per month)	Growth in GSDP per capita, 1980-98 (%)	Coastal access (% of population within 100 km of coast)	Main climate zone (percentage of land area)		Major port city (population greater than 5 million)
				Tropical	Arid	
Andhra Pradesh	2,521	2.9	42	54	45	1
Bihar	1,261	1.0	0	5	0	95
Gujarat	4,505	4.3	71	17	82	0
Haryana	4,516	3.1	0	0	87	13
Karnataka	3,109	3.6	19	40	60	0
Kerala	2,823	3.1	1	1	0	0
Madhya Pradesh	2,286	2.5	0	35	9	56
Maharashtra	5,690	4.5	34	61	39	0
Orissa	1,871	1.7	56	67	0	33
Punjab	5,079	3.0	0	0	76	24
Rajasthan	2,621	3.8	0	7	80	13
Tamil Nadu	3,454	4.3	65	96	4	0
Uttar Pradesh	2,023	2.0	0	5	8	82
West Bengal	3,308	3.3	43	67	0	33
						Mumbai
						Chennai
						Kolkata

Figure 1. Indian States



Source: Registrar General and Census Commissioner (2001).

Note: P = Pondicherry.

certain high-yield grain crops to India, led to sharp increases in grain productivity in regions such as Punjab and Haryana, which were suited for the improved crops (mainly wheat). In the market reform period after 1991, market forces and international trade played a larger role in India's economic growth, although India's entrance into the global economy has been much less dramatic than China's. We would expect the coastal regions to have advantages over the interior regions after 1991 because they face much lower transactions costs in participating in global trade and investment.

Several studies of high-income market economies, undertaken during the 1990s for the United States, Japan, and regions within western Europe, found evidence for strong convergence among regions (see Barro and Sala-i-Martin 1995, chap. 11). Similar to the findings for China, we found little evidence of comparable convergence among Indian states. In China and India, geographical variation across regions appears to block or slow the convergence of incomes.

This paper is organized as follows. Section 2 reviews the results of previous studies of convergence among Indian states during the period 1980–98, discusses measures of convergence, and summarizes our conclusions on interstate convergence. In section 3 we account for the lack of convergence, discussing the social and demographic factors that affect the economic performance of the 14 states under study. In section 4, we attempt to unravel some mysteries at the state level. Policy implications and directions for future research are discussed in section 5.

2. Convergence among Indian states (1980–98)

2.1 Previous studies of convergence across Indian states

Several studies covering different time periods examine whether per capita income levels have been converging or diverging in India, and most find a tendency toward divergence rather than convergence. Nair (1971) finds no noticeable reduction in interstate income differentials between 1950 and 1960,¹ and Chaudhury (1974) concludes that the degree of state income inequality did not change between 1950 and 1970. Majumdar and Kapoor (1980) suggest that interstate inequalities of income in India steadily increased during 1962–76.

Rao, Shand, and Kalirajan (1999) suggest that per capita state domestic product (SDP) in the Indian states has tended to diverge rather than converge. Per capita

¹ Nair concludes that neither changes in the degree of industrialization nor changes in labor productivity helped reduce income disparities.

SDP growth is positively related to the initial levels of income. States with better infrastructure and human resources have been able to attract more investment in the post-reform era. Dasgupta et al. (2000) also report a distinct tendency for per capita SDP in Indian states to have diverged during 1960–95.² Kurian (2000) finds widening regional disparities among the Indian states and a clear dichotomy between what he calls the forward and backward states. The forward states have higher levels of per capita income, better infrastructure, higher per capita resource flows and private investment, and better social and demographic indicators.

In contrast, Dholakia's (1994) analysis of 20 Indian states over the period 1960–90 finds marked tendencies of convergence of long-term GSDP growth rates.³ This appears to be a result of including the 5 special-category Indian states⁴ and Delhi with the 14 major Indian states. Cashin and Sahay (1996) also reach similar conclusions, finding absolute convergence in a study of 20 states over the period 1961–91.

Ahluwalia (2001) analyzes the economic performance of the Indian states during the post-reform period and suggests that not all the richest states got richer relative to poorer states; for example, Punjab and Haryana were the two richest states in 1990–91, but their per capita SDP growth rates in the 1990s not only were lower than in the 1980s, but actually fell below the national average. Ahluwalia also points out that two poor states, Rajasthan and Madhya Pradesh, had performed well in terms of growth over the 1980s, but he does not offer an explanation for this result.

In general, the studies that focus on the most populous states uncover little evidence of convergence, although there may be some convergence of the small northeastern states with the rest of the country. Our study, which is based on data from the 14 most populous states and leaves aside the question of the northeastern areas, similarly finds evidence of overall divergence rather than convergence.

2.2 Measures of convergence

There are two standard ways of examining the presence or absence of *unconditional convergence* (see Barro and Sala-i-Martin 1995, 383–87). The first measure is σ -convergence. We measure the standard deviation across regions of the logarithm of the real GSDP per capita. There is σ -convergence if the standard deviation across states tends

² In terms of the *shares* of the different sectors within each state's SDP, Dasgupta et al. (2000) find a tendency for increasing similarity across states in sectoral composition.

³ Dholakia identifies 1980 as the turning point when several of the lagging states started growing and the leading states began to stagnate.

⁴ Assam, Himachal Pradesh, Jammu and Kashmir, Manipur, and Tripura are classified as special-category states by the Planning Commission because of their mountainous terrain.

to decline over time. The second measure is β -convergence. Here we regress the proportionate growth in per capita GDP on the logarithm of initial income. There is β -convergence if the coefficient of initial income, denoted β , is negative and statistically significant.

In addition to looking at σ -convergence and β -convergence across the 14 states, we also divide the states into two groups based on GSDP per capita and examine convergence within these two subgroups.⁵ Group I includes the high-income states of Maharashtra, Punjab, Haryana, Gujarat, Tamil Nadu, West Bengal, Karnataka, and Kerala. Group II includes the poor states of Rajasthan, Andhra Pradesh, Madhya Pradesh, Uttar Pradesh, Orissa, and Bihar. Table 2 shows that the states in group I ranked within the top eight positions in GSDP per capita in all the years in question.⁶

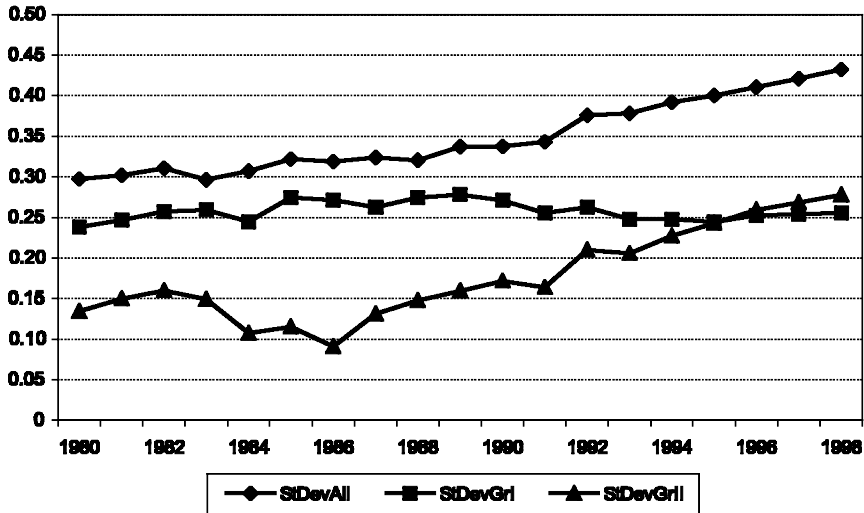
σ -convergence measure Figure 2 shows the standard deviation across the states of the log of real GSDP per capita. We can see that the 14 states as a group show an increasing standard deviation between 1980 and 1990 and an increased rise in that standard deviation in the post-reform period. There was an overall rise in inequality of 2.40 percent per annum between 1980 and 1998. Of the two periods within that time frame, the 1992–98 period experienced the most divergence: 2.14 percent per annum compared to 1.24 percent per annum in 1980–90. Thus there was no σ -convergence during either of the periods in question.

Group II states exhibited much greater volatility in dispersion than group I states, in addition to exhibiting the greater absolute dispersion (even though group II states started off with considerably lower standard deviations). This is the case for both periods. From 1980 to 1990, group I states experienced an increase in dispersion of a mere 1.24 percent per annum compared to 2.51 percent per annum within the group II states. During 1992–98, group I states exhibited a *decrease* in dispersion of 0.35 percent per annum, whereas group II states witnessed an increase of 4.61 percent per annum. Thus, the richer states experienced a degree of convergence during the post-reform period, whereas the poorer states did not.

⁵ We have used only states with populations above 10 million. Delhi is not included (despite having a huge population) because it suffers/benefits from factors related to being the capital city. Assam is not included because of incomplete data.

⁶ All data in this paper (unless otherwise indicated) are calculated from the Economic and Political Weekly Research Foundation's *National Accounts Statistics of India 1950–51 to 1996–97* (EPWRF 1998). GSDP per capita levels for 1997–98 and 1998–99 are calculated from Ahluwalia (2001).

Figure 2. Standard deviation (StDev) of log real per capita GSDP for group I, group II, and all states



β -convergence measure The lack of σ -convergence is mirrored by a lack of β -convergence. Thus, there is a positive coefficient on initial income in table 3, which shows the results of regressions of the growth during each subperiod on the log of initial income. Regressions are given for 1980–98, 1980–90, and 1991–98.

During 1980–90, growth patterns were divergent. The state with the highest GSDP per capita in 1980 was Punjab (Rs3,020 per month), and the state with the lowest GSDP per capita was Bihar (Rs1,062 per month). From 1980–81 to 1990–91, Punjab’s growth rate was 3.78 percent per annum and Bihar’s was 2.94 percent per annum. Punjab was the 6th-fastest-growing state and Bihar the 10th. In general, the richest states had the highest growth rates (see table 4). The only notable exception is Rajasthan, which had the second-lowest initial GSDP per capita level but was the fastest-growing state during the 1980s. Apart from Rajasthan, all states grew in a manner that perpetuated divergent trends during the pre-reform period.

Do states exhibit convergent trends during the post-reform period? The fastest-growing state is Maharashtra, but it also has one of the highest GSDP levels of the 14 states. Overall there is a significant positive relationship between initial income in 1990 and growth during the 1990s, indicating divergence. The regression evidence suggests that β -divergence was especially marked for group I states in the post-reform period.

Table 2. Fourteen Indian states ranked according to GSDP per capita levels (highest income = 1, lowest income = 14)

1980-81	1991-92	1996-97	1998-99
1 Punjab	Punjab	Maharashtra	Maharashtra
2 Maharashtra	Haryana	Punjab	Punjab
3 Haryana	Maharashtra	Haryana	Gujarat
4 Gujarat	Gujarat	Gujarat	Haryana
5 West Bengal	Tamil Nadu	Tamil Nadu	Tamil Nadu
6 Kerala	Karnataka	West Bengal	West Bengal
7 Karnataka	West Bengal	Karnataka	Karnataka
8 Tamil Nadu	Kerala	Kerala	Kerala
9 Andhra Pradesh	Andhra Pradesh	Rajasthan	Rajasthan
10 Madhya Pradesh	Rajasthan	Andhra Pradesh	Andhra Pradesh
11 Uttar Pradesh	Uttar Pradesh	Madhya Pradesh	Madhya Pradesh
12 Orissa	Madhya Pradesh	Uttar Pradesh	Uttar Pradesh
13 Rajasthan	Orissa	Orissa	Orissa
14 Bihar	Bihar	Bihar	Bihar

Table 3. β -convergence regressions (Dependent variable: growth rate)

	1980-98	1980-90	1991-98
Log of initial per capita real GSDP (All)	2.0 (2.54)	1.23 (1.09)	2.91 (1.91)
Log of initial per capita real GSDP (group I)	-0.2 (0.18)	1.32 (0.86)	9.34 (3.47)
Log of initial per capita real GSDP (group II)	4.4 (1.51)	-0.66 (0.11)	-1.74 (0.62)

Table 4. Rates of growth of per capita GSDP in Indian states

State (ranked from highest income in 1980-81)	Growth rate of per capita GSDP from 1980-81 to 1990-91	State (ranked from highest income in 1990-91)	Growth rate of per capita GSDP from 1992-93 to 1998-99
Punjab	3.8	Punjab	2.8
Maharashtra	4.3	Haryana	2.6
Haryana	4.6	Maharashtra	6.8
Gujarat	3.8	Gujarat	7.8
West Bengal	2.3	Tamil Nadu	5.0
Kerala	2.5	Karnataka	3.5
Karnataka	3.6	West Bengal	4.8
Tamil Nadu	5.0	Kerala	4.6
Andhra Pradesh	2.9	Andhra Pradesh	3.7
Madhya Pradesh	2.9	Rajasthan	4.4
Uttar Pradesh	3.0	Uttar Pradesh	1.6
Orissa	1.0	Madhya Pradesh	3.9
Rajasthan	5.8	Orissa	1.6
Bihar	2.9	Bihar	-0.2
Unweighted average	3.5	Unweighted average	3.8

In table 5 we decompose the interstate variance of income as equal to the variance within groups I and II and the variance between the two groups.⁷ The method used for calculating variance decomposition is described in the technical appendix. From 1980 to 1990, variance increased within groups I and II, as well as between the two groups. From 1992 to 1998, there was a smaller increase in dispersion in overall variance of 20.2 percent, compared with 35.5 percent in the earlier period.⁸ Over the whole period there was an increase in dispersion within group I of a mere 0.8 percent per annum, whereas the dispersion within group II increased by 17.17 percent per annum. There was also an increase in the dispersion of average incomes between the two groups of 3.83 percent per annum. Thus, we conclude that the increase in overall dispersion during the second period was driven by increased dispersion within the group II states.

Conclusions on interstate convergence By both standards of convergence, India demonstrated overall divergence during 1980–98 and during the pre-reform and post-reform subperiods. Divergence was most notable within the poorer group of states. This finding is consistent with the experience of China in the post-reform period but differs from the findings for the United States, Japan, and European regions.

3. Economic performance of the states

We hypothesize that regional differences in growth reflect regional differences in the marginal productivity of investments by subsector. To some extent the relative returns to investment in each subsector depend on the general business environment, but to an important extent they also depend on specific geographical factors. Some of these geographical considerations are listed in table 6.

Agriculture can occasionally be a leading sector in economic growth, as a result of either a spurt in agricultural productivity or increased cash crop exports. In India, agricultural productivity-led growth occurred in one major historical period, the Green Revolution, dating from the mid-1960s to the early 1980s. The Green Revolution originated from the introduction of short-stemmed, high-yield wheat, and to a lesser extent, paddy rice. These crops depended on irrigation and intensive applica-

⁷ The variance decomposition is calculated as follows: overall variance = a (within group I variance) + b (within group II variance) + c (average between group I and group II variances). The constants a , b , and c are weights that depend on the number of states in each group (see technical appendix for a more detailed explanation).

⁸ We omitted 1991 because it represents a structural break in the data resulting from the economic crisis in India.

Table 5. Variance decomposition within and between group I and group II states

	Within group I	Within group II	Between group I and group II	Overall variance
1980	0.00576	0.00131	0.00187	0.00894
1981	0.00618	0.00162	0.00206	0.00986
1982	0.00672	0.00185	0.00226	0.01083
1983	0.00683	0.00162	0.00223	0.01067
1984	0.00608	0.00084	0.00183	0.00874
1985	0.00765	0.00096	0.00228	0.01089
1986	0.00748	0.00060	0.00213	0.01021
1987	0.00699	0.00125	0.00218	0.01041
1988	0.00765	0.00158	0.00244	0.01167
1989	0.00784	0.00184	0.00256	0.01224
1990	0.00744	0.00214	0.00253	0.01211
1991	0.00661	0.00194	0.00226	0.01081
1992	0.00698	0.00320	0.00269	0.01286
1993	0.00624	0.00307	0.00246	0.01177
1994	0.00624	0.00374	0.00264	0.01262
1995	0.00606	0.00427	0.00273	0.01307
1996	0.00648	0.00488	0.00300	0.01435
1997	0.00654	0.00523	0.00311	0.01487
1998	0.00664	0.00559	0.00323	0.01546

tions of fertilizer.⁹ The epicenter of the Green Revolution was in Punjab and Haryana, and to a lesser extent other states of the North Indian Plains (as far east as Bihar) and southward to Rajasthan, Gujarat, and Maharashtra. High-yielding rice varieties made the most impact in West Bengal and Tamil Nadu. Note that China, like India, experienced one short-lived burst of agriculture-led growth during the dismantling of the communes; food output jumped during 1978–84.

Almost all the regions among the group II states (except perhaps much of western Rajasthan and parts of western Madhya Pradesh and southern Uttar Pradesh) have the agro-climatic potential to yield high returns in agriculture because of reasonable to high rainfall and availability of perennial river waters. The poverty in these states is a consequence of human failure rather than of natural factors. Although it may be useful to identify states with high or low incidences of poverty, there are states with high variations within them owing to historical and economic antecedents and agro-climatic factors. This is typically true of the larger states, though such variations exist in smaller states as well.

A more disaggregated National Sample Survey (NSS) region-wise picture of poverty (head count ratio) shows that there are significant heterogeneities in poverty in each state except perhaps Bihar, which is uniformly poor. Sharp contrasts are witnessed in Andhra Pradesh, Karnataka, and Maharashtra, though variations can be seen in smaller states like Haryana and Punjab as well. The regions can be segregated ac-

⁹ Most rice farmers were too poor to introduce the high-yield varieties of rice, which required substantial applications of fertilizer, as well as irrigation. Also, the taste of the rice was unfamiliar, and public acceptance was limited. Therefore, rice became the “orphan” of the Green Revolution (Tirtha 2000, 268).

Table 6. Some regional factors in sectoral growth

	Key determinants for future growth	Favored states	Time period	Current contribution to growth
Agriculture	Climate, agricultural technologies	Punjab, Haryana	Green Revolution, 1970s to 1980s	Low
Manufacturing	Urban, coastal, major port facilities, attraction of foreign direct investment	Maharashtra, West Bengal, Tamil Nadu, Gujarat	1980s onward, with rising importance in the 1990s	High
Tourism	Historical, cultural, and natural attractions; proximity to major ports of entry, such as Delhi and Mumbai	Rajasthan, Maharashtra	1980s onward	Moderate
High-tech services (finance and ICT)	Urban, skilled labor force, universities	Maharashtra, Tamil Nadu, Karnataka, West Bengal	1990s	High

Note: ICT = information-communication technology.

ording to their poverty levels: low (up to 20 percent), medium (21–40 percent), high (41–60 percent), and very high (more than 60 percent). Southern Bihar, southern Orissa, southwestern Madhya Pradesh, and southern Uttar Pradesh fall in the very-high-poverty bracket. These regions are composed of the districts in Chotanagpur and Santhal Parganas in Bihar; Koraput and Phulbani districts in Orissa; the Jhansi region in Uttar Pradesh; and its adjacent regions in Madhya Pradesh, including Betul, Khandwa, and Hoshangabad. These regions are either mainly tribal (except Jhansi) or rocky and dry, yet densely populated because of their agro-climatic features. The main inference drawn is that tribal areas are predominantly and distinctly poor.

The areas of high poverty are in Bihar, portions of Madhya Pradesh, inland Maharashtra, northern Tamil Nadu, eastern and central Uttar Pradesh, and parts of West Bengal. These are generally tribal, thickly populated, semi-arid areas, and those areas that have been neglected historically are poor. West Bengal has made strides in poverty alleviation in some areas. Medium-level poverty persists in regions of the western states, and a few regions have made more progress than others compared to the eastern ones, where there is uniform poverty. Typical examples are Madhya Pradesh, Maharashtra, Tamil Nadu, and Uttar Pradesh. Pockets of low poverty include the western coastal regions, all of Andhra Pradesh, Punjab, and parts of Madhya Pradesh and Rajasthan, which form a north-south belt that was affected by the Green Revolution.

The manufacturing sector is a much more consistent engine of growth that has likely played a growing role since 1991 with the opening of the economy. As China's experience demonstrates, trade liberalization in a low-wage, surplus-labor environ-

ment permits a rapid expansion of export-oriented industry that can absorb a large number of workers to provide goods for the world market. India's insertion into the world economy has been much less dramatic and successful than China's. The share of exports of goods and services in GNP was stable at 7 percent in 1980 and 1990; it rose to 11 percent in 1999, after the reforms (World Bank 1997; 2001, table 13). In China the comparable share rose from 6 percent in 1980 to 18 percent in 1990 and to 22 percent in 1999. Several factors may account for these differences: China's reforms were bolder in promoting both foreign direct investment (FDI) and manufactured exports (Bajpai and Sachs 2000), and China benefited from the vast inflows of FDI from overseas Chinese investors, especially from Hong Kong, Taiwan, and Southeast Asia.

The most likely site for sustained manufacturing growth in India, as in China, is along the coast, especially at the four large port cities of Mumbai (Maharashtra), Kolkata (West Bengal), Chennai (Tamil Nadu), and Kandla (Gujarat). Coastal, urban-based industry can serve both the internal market and the international market, and can more readily make logistical links with foreign suppliers and customers than can interior-based enterprises. New export-oriented units (EOUs) are therefore heavily concentrated on the coast (table 7). Manufacturers in interior regions can of course service the domestic market, particularly in consumer goods such as processed foods, but the potential for rapid growth based on the internal market tends to be more limited than the potential growth based on exports to the world market. For this reason we have seen much faster growth in coastal China than in the interior.

The tourist sector can also be a source of export-led growth, but in a country the size of India, it is likely to play a secondary role except in some local niches. Tourist potential is very much geographically determined, as it depends on the physical environment, the presence of historical sites, and easy access to transport nodes, especially international airports. Rajasthan has been the state with the most significant growth and scale of the tourist industry because of the popularity of Jaipur and Udaipur and its proximity to Delhi.

High-tech services, such as information- and communications-based industry (e.g., software production) or financial services, usually rely on a network of universities and an urban labor market. These sectors are much less dependent on coastal access because much of their business can be transacted by telephone or via the Internet. A high quality of life of the location, as an attraction for highly mobile skilled workers, is probably more important for these service sectors than for other sectors of the economy. The most important state for service-sector activities is Maharashtra; it

Table 7. Distribution of export-oriented units (August 1991 to May 2001)

State/union territory	Number of units	Percentage of total EOUs	EOUs per million population (2001)
Andhra Pradesh	404	11.0	5.3
Bihar	7	0.2	0.1
Gujarat	458	12.4	9.1
Haryana	206	5.6	9.8
Karnataka	376	10.2	7.1
Kerala	72	2.0	2.3
Madhya Pradesh	136	3.7	2.3
Maharashtra	563	15.3	5.8
Orissa	41	1.1	1.1
Punjab	127	3.5	5.2
Rajasthan	205	5.6	3.6
Tamil Nadu	547	14.8	8.8
Uttar Pradesh	206	5.6	1.2
West Bengal	98	2.7	1.2

Source: Secretariat for Industrial Approvals (SIA) Newsletter, June 2001, Ministry of Industry, Government of India.

Note: Group 1 states are in boldface type.

combines the country's financial center with an important information technology (IT)-based industry. Other key states include Tamil Nadu, Karnataka, Delhi, and to a lesser extent Andhra Pradesh (see table 8).

Foreign investors have various motivations: to service the domestic market; to exploit site-specific natural resources (e.g., mining); and, in low-wage countries, to establish export platforms in labor-intensive goods, in labor-intensive stages of the production process, or in standardized technologies that are easily transferable to lower-wage settings. Coastal access is a huge benefit for all export platform manufacturing, as we have seen clearly in the case of China. FDI is also attracted to urban areas and to regions with natural-resource deposits. Interior cities (such as Bangalore and Hyderabad) may be suitable for IT-based activities that do not depend on coastal access. Although the data on state-by-state FDI are spotty, table 9 shows the cumulative FDI approvals by state, on an aggregate and per capita basis, for 1991–2001. The following simple regression confirms that FDI as a percentage of GSDP flowed mainly to the urbanized states and to the states with large mining sectors (especially Orissa and, to a lesser extent, Madhya Pradesh).¹⁰

$$\text{FDI per capita} = -4,682 + 220 (\% \text{ urban}) + 459 (\% \text{ mining in GSDP})$$

(4.04) (2.03)

$$N = 14; R^2 = 0.62$$

These considerations suggest that *urbanization* is likely to have been a key determinant of economic growth in the 1980s and 1990s, because existing urban areas were

¹⁰ The dependent variable is cumulative approvals of FDI in rupees per capita.

Table 8. Software exports by state, 1995-96

State	Value of software exports (Rs, millions)	Software exports per capita (Rs, millions)
Andhra Pradesh	931.3	12.9
Bihar	—	—
Gujarat	55.1	1.2
Haryana	629.9	34.7
Karnataka	7,278.4	150.9
Kerala	38.7	1.2
Madhya Pradesh	2.5	0.0
Maharashtra	7,085.4	82.1
Orissa	—	—
Punjab	9.0	0.4
Rajasthan	—	—
Tamil Nadu	3,116.7	53.3
Uttar Pradesh	—	—
West Bengal	—	—

Source: <http://www.maharashtra.gov.in/english/invest/softw.htm> (accessed as of 4 April 1999).

Note: Group 1 states are in boldface type.

Table 9. Flows of foreign direct investment to Indian states

States	Foreign direct investment approved (August 1991 to July 2001)	
	Investment (Rs, in millions)	FDI per capita (1991-2001 per 2001 population)
Andhra Pradesh	124,701	1,646
Bihar	7,395	89
Gujarat	168,556	3,331
Haryana	31,948	1,515
Karnataka	208,156	3,947
Kerala	14,361	451
Madhya Pradesh	91,542	1,515
Maharashtra	456,286	4,716
Orissa	82,289	2,241
Punjab	19,519	803
Rajasthan	25,917	459
Tamil Nadu	222,804	3,587
Uttar Pradesh	42,048	253
West Bengal	84,235	1,050

Source: Secretariat for Industrial Approvals (SIA) Newsletter, August 2001, Ministry of Industry, Government of India.

the preferred location for new investments in manufacturing and services. As we see in table 10, the extent of urbanization varies widely among the states, from a low of 13 percent in Bihar and Orissa to 39 percent in Maharashtra (as of 1991), with the relative proportions of urbanization by state relatively constant over the past 30 years. The degree of urbanization itself depends on underlying geographical factors, especially the location of the main national ports and the productivity of agriculture in the region. Regions of high agricultural productivity tend to support a larger proportion of the local population in an urban setting, whereas regions of low agricultural productivity tend to have a high proportion of the population in peasant, subsistence agriculture. Empirically, we find that two factors account for *two-thirds* of the variation in urbanization rates across the 14 states: having a major port (e.g., in

Table 10. Rates of urbanization

	1971	1981	1991
Andhra Pradesh	19.3 (7)	23.3 (7)	26.8 (7)
Bihar	10.0 (13)	12.5 (13)	13.2 (14)
Gujarat	28.1 (3)	31.1 (3)	34.4 (2)
Haryana	17.7 (8)	21.9 (8)	24.8 (9)
Karnataka	24.3 (5)	28.9 (4)	30.9 (4)
Kerala	16.2 (11)	18.7 (11)	26.4 (8)
Madhya Pradesh	16.3 (10)	20.3 (10)	23.2 (10)
Maharashtra	31.2 (1)	35.0 (1)	38.7 (1)
Orissa	8.4 (14)	11.8 (14)	13.4 (13)
Punjab	23.7 (6)	27.7 (5)	29.7 (5)
Rajasthan	17.6 (9)	21.1 (9)	22.9 (11)
Tamil Nadu	30.3 (2)	33.0 (2)	34.2 (3)
Uttar Pradesh	14.0 (12)	18.0 (12)	19.9 (12)
West Bengal	24.8 (4)	26.5 (6)	27.4 (6)

Source: Registrar General and Census Commissioner (1981, 1991).

Note: Group 1 states are in boldface type. Figures in parentheses indicate relative rankings.

Maharashtra, Tamil Nadu, West Bengal, and Gujarat) and having a dry steppe climate (Bs) suitable for wheat production.¹¹

$$\text{Urbanization (\% in 1991)} = 19.4 + 11.1 (\text{major port}) + 12.6 (\% \text{ population in Bs climate})$$

$$(9.9) \quad (4.1) \quad (2.8)$$

$$N = 14; R^2 = 0.68$$

The rate of growth of GSDP per capita is highly correlated with the extent of urbanization at the beginning of the period in question. The results of six regressions are shown in table 11. In a regression of growth for 1980–98 on initial income in 1980 and urbanization as of 1981, the urbanization coefficient is highly significant, with a coefficient of 0.13 and a t-statistic of 5.3 (regression 1). A remarkable 82 percent of the cross-state variation in growth is explained by this variable alone, with no hint of any conditional convergence, after controlling for the degree of urbanization. The regression shows that a 10 percentage point higher rate of urbanization is associated with 1.3 percentage points of higher annual growth. A simple bivariate regression without initial income shows the same results (regression 2). The relationship between 1981 urbanization [$e(\text{urban81} | X)$] and growth [$e(\text{gr8098} | X)$] during 1980–98 is shown in figure 3.

During 1980–90 the Green Revolution continued to play a role in growth differentials across states. To capture the effect of the Green Revolution, we construct a dummy variable equal to 1.0 in Punjab and Haryana (the epicenter of the areas

¹¹ The major port variable takes the value of 1 for the states Maharashtra, West Bengal, Tamil Nadu, and Gujarat, and 0 otherwise. The Bs variable is the proportion of the population (0 to 100 percent) living in the Bs climate zone of the Koeppen-Geiger climate classification.

Table 11. Growth equations, 1980–98

Regression	1	2	3	4	5	6
Period	1980–98	1980–98	1980–90	1991–98	1991–98	1991–98
Ln (initial income)	-0.04 (0.08)		-4.68 (3.29)	0.08 (0.02)	-1.83 (1.35)	
Urbanization	0.13 (5.30)	0.13 (7.31)	0.19 (5.30)	0.25 (2.09)	0.30 (4.75)	0.23 (5.38)
Green Revolution			3.54 (4.01)	-1.27 (0.48)		
Rajasthan dummy			1.56 (2.43)	1.61 (1.24)		
Constant	0.39 (0.09)	0.05 (0.12)	33.17 (3.37)	-3.29 (0.12)	10.25 (1.09)	-2.33 (1.98)
R ²	0.82	0.82	0.88	0.79	0.75	0.71

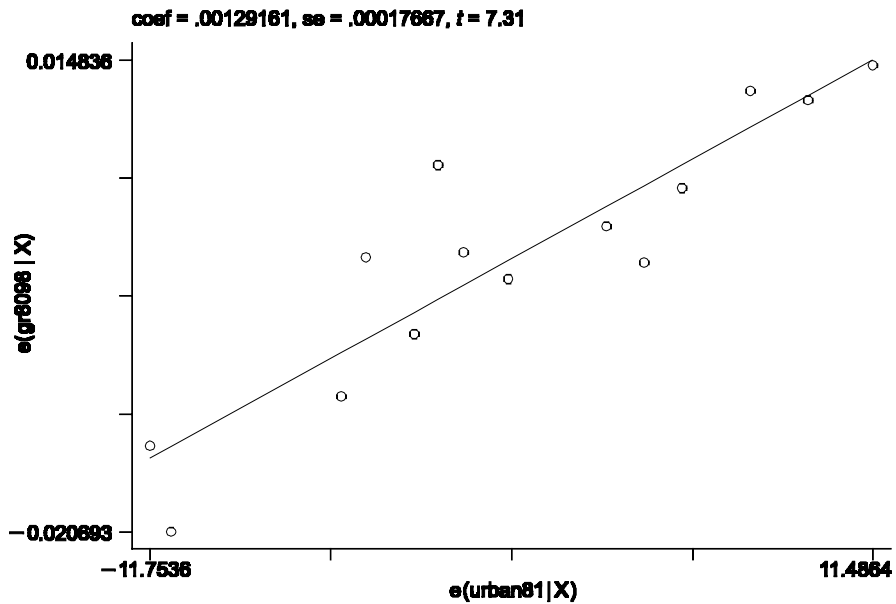
Note: Figures in parentheses are *t*-statistics. For the equations beginning in 1980, urbanization in 1981 is used; for the regressions beginning in 1991, urbanization in 1991 is used.

where the high-yield wheat is grown), 0.25 in Gujarat, Maharashtra, and Rajasthan, and 0 elsewhere. This variable has a coefficient of 3.54 ($t = 4.01$) in the growth regression for the period 1980–90, holding constant the initial income and the degree of urbanization in 1981. Rajasthan is an outlier in this regression, with growth more than one percentage point per year faster than is otherwise explained (table 11, regression 3). This may be attributable to the boom in tourism, or to the rapid electrification of the state in the 1980s, or to a more significant effect of the Green Revolution than is captured by the value 0.25, or to some other unmeasured effect. Interestingly, if one holds constant the urbanization variable, the Green Revolution variable, and the Rajasthan dummy variable, there is evidence of conditional convergence, with the slower states achieving faster growth than the richer states. This is the only regression result in which we find this conditional convergence.

By the 1990s the Green Revolution effect has disappeared entirely, as has the conditional convergence and the fast growth of Rajasthan (regression 4).¹² The only variable that accounts for cross-state growth in the 1990s is urbanization as of 1991 (regression 5), with a point estimate of the urbanization coefficient that is somewhat higher than the coefficient for the 1980s (0.30 compared with 0.13). A simple bivariate regression of growth in the 1991–98 period on urbanization in 1991 is also shown (regression 6), with this single variable accounting for 71 percent of the variation. Economic liberalization may have added to the growth-promoting benefits of urbanization, especially for the coastal cities and the main cities engaged in IT exports (e.g., Bangalore, Chennai, Hyderabad, and Delhi).

¹² The coefficient of the dummy variable for Rajasthan is still positive but is no longer statistically significant.

Figure 3. Relationship of urbanization (1981) and economic growth (1980-98)



Consistent with our view of urban-led (and export-led) growth during the past decade, we find that the gap between urban and rural expenditure per capita has widened in the past decade. Table 12 shows the urban/rural expenditure ratios by state for 1987-88 and 1999-2000 and the percentage change of these ratios in the two periods. Simple regression analysis (not shown) confirms that the urban/rural ratio in 1999-2000 is higher in the more urbanized states and lower in the states that benefited most from the Green Revolution (Punjab and Haryana). The increase in these ratios is highest in the urbanized states, although Bihar is an outlier because it has a large increase in the urban/rural ratio but a relatively low level of urbanization. This result has also recently been reported by Radhakrishna (2002, 248): “The benefits of better income growth during the 1990s seem to have benefited the urban areas more than the rural, thus aggravating the urban-rural divide.” Radhakrishna also cites Bhalla’s (2000) result that employment growth during the 1990s was concentrated in urban areas.

Since the initiation of economic reforms in 1991, Indian states have competed with each other to attract private investment, both domestic and foreign. Within states, the investment has tended to flow to the urban areas. State-level data on FDI approvals (aggregate FDI approvals between 1991 and 2001) suggest that the relatively fast-moving reformers have attracted higher levels of FDI (see table 9). Gujarat (pop-

Table 12. Ratio of urban to rural expenditures, 1987–88 and 1999–2000 (total expenditures)

State	TE U/R 1987–88	TE U/R 1999–2000	Percentage change
Andhra Pradesh	1.438	1.705	18.567
Bihar	1.365	1.563	14.505
Gujarat	1.493	1.617	8.305
Haryana	1.173	1.277	8.866
Karnataka	1.494	1.823	22.021
Kerala	1.259	1.218	-3.256
Madhya Pradesh	1.662	1.727	3.910
Maharashtra	1.739	1.959	12.651
Orissa	1.766	1.657	-6.172
Punjab	1.106	1.210	9.403
Rajasthan	1.338	1.450	8.371
Tamil Nadu	1.613	1.890	17.173
Uttar Pradesh	1.458	1.479	1.440
West Bengal	1.664	1.905	14.483
All India	1.581	1.759	11.259

Source: For 1987–88 the data are from National Sample Survey Organization (1991). For 1999–2000, the data are from National Sample Survey Organization (2001).

Note: TE U/R = total expenditure urban/rural ratio.

ulation 50 million) received over a fifth of the private investment proposals, whereas Bihar (population 83 million) barely managed a 5 percent share of such proposals. Maharashtra and Gujarat accounted for 37 percent of the total investment proposals, but Bihar, Madhya Pradesh, Orissa, Rajasthan, and Uttar Pradesh together were able to attract only 26 percent of such proposals.

We have not been able to analyze the role of public sector investment in cross-state growth, especially the central-government funds allocated to the state governments in India's five-year investment plans. The data we have collected to date are too spotty for a serious analysis. There are hints that such investments have made a difference, at least in some places and times. The rapid electrification of Rajasthan's villages in the 1980s and 1990s (table 13) probably helps account for the otherwise unexplained growth of that state.

3.1 Accounting for the lack of convergence

It is surprising, but robustly the case, that after controlling for urbanization alone there is no evidence whatsoever of conditional convergence. We did not find any candidate explanatory variables that, once they were controlled for, allowed signs of conditional convergence to emerge. This poses a major issue of interpretation. Why is it that the U.S. states displayed *unconditional* convergence in most decades of U.S. history, as did Japanese prefectures and European regions, but India and China do not show signs of conditional convergence, much less unconditional convergence? There are several possible hypotheses for the lack of unconditional convergence:

1. The geographical differences are larger in India and China than in the United States, Europe, and Japan.

Table 13. Percentage of villages with electricity

	1985	1998	Change
Andhra Pradesh	83.95	97.03	13.08
Bihar	49.63	70.82	21.19
Gujarat	88.26	99.02	10.76
Haryana	100.00	100.00	0
Karnataka	83.14	98.65	15.51
Kerala	100.00	100.00	0
Madhya Pradesh	57.10	95.24	38.14
Maharashtra	92.84	100.00	7.16
Orissa	50.48	72.23	21.75
Punjab	99.49	100.00	0.51
Rajasthan	59.48	97.95	38.47
Tamil Nadu	99.73	99.94	0.21
Uttar Pradesh	56.03	78.11	22.08
West Bengal	50.43	77.11	26.68
All India	64.02	86.67	22.65

Source: 1985 data are from the *Seventh Five Year Plan (1985-90)*, Planning Commission, Government of India, p. 164. 1998 data are from *Economic and Political Weekly*, January 13, 2001.

Note: Group 1 states are in boldface type.

2. Population movements in the United States, Europe, and Japan more readily arbitrage differences across regions.
3. Policies of the national or regional governments have prevented convergence.
4. Economic convergence is easier at levels of economic development higher than those present in China and India.

We find some merit in each of these possibilities. Certainly the intrinsic economic advantages or disadvantages of Japanese prefectures and western European regions are much smaller than those found in the different regions of either India or China. Consider coastal access, for example (table 14). In Japan, 97 percent of the population lives within 100 km of the coast. In the European Union, 51 percent of the population lives within 100 km of the coast, and 89 percent lives within 100 km of the coast or a sea-navigable waterway (e.g., the Rhine or the Danube).¹³ A surprisingly high proportion of the U.S. population, 65 percent, lives within 100 km of the coast or sea-navigable waterway.

One reason that the United States has such a high proportion of the population at the coasts and along navigable waterways is that it has highly efficient agriculture, which can feed the entire population (and much more) with just 2 percent of the labor force. For this reason, few people in the United States are “bound to the land,” in the economic sense of needing to be in the place where food is grown. With much lower food productivity in China and India (a reflection of the long history of much higher man/land ratios in Asia), a much larger part of the population is needed to produce food. This means that populations are “stuck” in the interior of the country

¹³ By sea-navigable waterway we mean that seagoing vessels may proceed up and down the waterway to and from the sea.

Table 14. Proximity of population to coast

Region	Percentage of population within 100 km of coast	Percentage of population within 100 km of coast or sea-navigable waterway
India	22	38
China	19	45
Japan	97	97
United States	35	65
European Union (EU 15)	51	90

Source: CID Geography Database (2001).

and much less able to participate in international trade and globalized production systems (e.g., outsourcing for multinational firms). Large numbers of poor, near-subsistence farmers live in the hinterland of China and India, in regions that are not part of convergent growth except to the extent that households migrate in large numbers.

Climatic variability is much lower in Europe, the United States, and Japan than it is in India and China (see table 15). Substantial proportions of India's population live in tropical, arid, subtropical, and highland ecozones, whereas the overwhelming proportion of U.S., European, and Japanese populations reside in temperate ecozones. China also has large variations in climate, but only a small proportion of China's population lives in tropical ecozones, which have proved most difficult for development in other parts of the world (including India). Similar to the variation in access to the sea, the climatic variation most likely puts a brake on cross-regional convergence.

This brings us to the question of migration. In China, migration is limited by the household registration system, which has blocked the legal migration of families from the hinterland to urban areas. In India migration is not restricted, yet poor families without social safety nets apparently face such high costs and risks associated with migration that internal labor flows are not powerful enough to create forces of convergence.¹⁴ In the case of China, the policy regime in the 1980s and 1990s favored the already-favored coastal provinces, and this accounted for part of the continuing divergence between coastal and interior regions. In India, no such preferential policies are readily discernible.

3.2 Social and demographic factors in convergence and divergence

We examined whether social and demographic factors could account for cross-state growth patterns. The results were surprisingly negative. The states vary consider-

¹⁴ Exactly why this is the case is beyond the scope of this paper, but is certainly worthy of much closer investigation.

Table 15. Percentage of population in ecozones, 2001

	Tropical (Aw + Am)	Subtropical (Cw)	Arid (Bs + Bw)	Temperate (Cf + Cs + Dw + Df + E)	Highland (H)
India	33	32	28	0	7
China	0	10	36	30	24
Japan	0	0	0	100	0
United States	0	0	19	70	10
European Union (15)	0	0	1	98	1

Source: CID Geography Database (2001), using Koeppen-Geiger climate classification.

Note: Aw = tropical wet and dry. Am = tropical monsoon. Bs = dry semiarid (steppe). Bw = dry arid (desert). Cf = humid subtropical, coast. Cs = humid subtropical, mediterranean. Cw = humid subtropical, dry winters. Dw = continental mid-latitude, dry winters. Df = continental mid-latitude, wet all seasons. E = polar. H = highland.

ably in social indicators, such as infant mortality rates (tables 16 and 17). Generally, the southern states have outperformed the northern states by a wide margin, and Kerala has outperformed all states. However, this superior performance has not translated into discernibly higher rates of economic growth at the state level.¹⁵

Kerala has reaped the returns of improving the literacy and health of its population: migration has increased, and large amounts of remittance income have flowed back to the state. This remittance income is counted as part of the state's income but not as part of its GSDP, which is the measure of economic development used in this study. Thus, Keralites have a higher income standard than is measured by the production *within the state*. We speculate on why this is so in the next section.

4. Unraveling some mysteries at the state level

This section explores four unusual aspects of state-level performance in India: (1) the mediocre growth of Kerala, despite its excellent social indicators; (2) the relatively fast growth of landlocked, arid Rajasthan; (3) the improved growth performance of landlocked Madhya Pradesh; and (4) the poor growth performance of coastal Orissa.

4.1 Kerala

During the period in question, Kerala has moved from sixth to eighth place in per capita GSDP rankings; it grew at 2.5 percent between 1980 and 1990 and 4.6 percent between 1992 and 1998. Although its growth performance has improved, making it one of the biggest beneficiaries of the reform period (moving from the 12th- to the 6th-fastest-growing state), it is unclear why Kerala is not among the top states in growth performance, given its outstanding results in health and education.

¹⁵ The simple correlation of growth with literacy is positive but it disappears once we control for urbanization, which is correlated with growth and the degree of literacy.

Table 16. Infant mortality rate (deaths under age 1 per 1,000 live births)

State	1990	1998
Andhra Pradesh	71	66
Bihar	71	67
Gujarat	69	64
Haryana	71	70
Karnataka	73	58
Kerala	17	16
Madhya Pradesh	111	98
Maharashtra	59	49
Orissa	120	98
Punjab	57	54
Rajasthan	84	83
Tamil Nadu	58	53
Uttar Pradesh	98	85
West Bengal	66	53

Source: EPWRF (2000).

Note: Group I states are in boldface type.

Table 17. Life expectancy at birth (years)

State	1981	1993
Andhra Pradesh	59.8	62.8
Bihar	51.5	58.0
Gujarat	59.3	62.0
Haryana	59.0	64.0
Karnataka	62.0	63.9
Kerala	71.5	75.6
Madhya Pradesh	51.9	54.6
Maharashtra	62.1	65.8
Orissa	53.0	56.2
Punjab	63.6	68.4
Rajasthan	53.8	59.4
Tamil Nadu	57.4	64.4
Uttar Pradesh	48.5	56.0
West Bengal	58.0	62.8
All India	59.8	62.8

Source: Central Bureau of Health Intelligence, Ministry of Health and Family Welfare, Government of India. 1994.

Note: Group I states are in boldface type.

Kerala has had a very small manufacturing base. In 1981, manufacturing as a percentage of GSDP was 13.9 percent; by 1991 that figure had risen to a meager 15.5 percent. Subrahmanian (1990) argues that Kerala's poor economic performance can be attributed to a limited focus on the commodity production sector. The secondary sector areas that have seen growth are construction and power, rather than areas involving actual manufacturing activity. Resource-based industries do not generally provide the growth potential of manufacturing (capital goods or demand-based) industries, in part because the latter are likely to lead to intersectoral linkages and technical progress, whereas the former have a tendency to stagnate. The lopsided industrial structure of Kerala is a symptom, however, and not a cause, of its low level of growth: the cause is insufficient public and private investment and a lack of effec-

tive government policies to encourage private investment.¹⁶ Kerala's private investment is a mere 1.77 percent of GSDP, the lowest in India. Kerala also receives very little FDI (see table 9).

The lack of FDI and private investment in Kerala is also the consequence of the relatively hostile attitude of state government to private investment and of the highly militant labor force. The Communist Party, which governed the state for many years until 2001, had part of its base in the unions and hence did not resist the labor militancy. This reputation for aggressive labor tactics has discouraged private investors, both domestic and foreign, over the years. The change in government to Congress party rule may lead to an improved investment climate in the state.

It should be noted that in recent years Keralites working abroad (mainly in the Gulf countries) have remitted about Rs6,000 crore¹⁷ annually, which is about one-fifth of Kerala's domestic product and is three times greater than the budget support the state receives from the central government. Between 1980 and 1995 more than Rs31,350 crore flowed into the state from the Gulf.¹⁸ Since remittance income is counted as part of the state's income but is not included in its GSDP, Kerala may not be as poor a state as its GSDP figures suggest.

4.2 Rajasthan

Rajasthan recorded the highest overall growth in the pre-reform period (table 4). Its agriculture, tourism, construction, and service sectors grew the most among all 14 states, and it was among the top three group II states in manufacturing growth. What spurred Rajasthan's incredible growth spurt in the 1980s? One part of the answer is that Rajasthan received the highest per capita transfers and grants from the union party government among the four BIMARU states. However, other states (e.g., Orissa) also received large transfers but did not experience such successful economic growth. Four additional factors probably contributed to Rajasthan's high growth: (1) the benefits of the Green Revolution in the wheat-growing areas of the state, (2) the positive impact on agriculture from the construction of Rajasthan's Command Canal in the early 1980s, (3) the tremendous increase in tourism during the 1980s and 1990s, and (4) the rapid electrification of the state that took place in the 1980s.

¹⁶ There are also historical reasons for Kerala's pattern of industrial development, but they are beyond the scope of this work.

¹⁷ One crore equals 10 million rupees.

¹⁸ M. G. Radhakrishnan, *India Today*, 1 May 2000.

4.3 Madhya Pradesh

Madhya Pradesh increased democratic participation in the 1990s, making it the state with the highest degree of direct democracy. Madhya Pradesh was the first state to hold elections to panchayats in 1994 (Behar 2001). The goal was to give power to the people directly rather than to their representatives. Kumar (2001) explains how empowering the people has enabled the government to overcome difficult situations such as water shortages. The state supplies the panchayats with funding and technical support in order to “widen, de-silt and deepen village ponds, dig new wells and build dam checks” (Kumar 2001, 18). The state government has moved toward a supervisory rather than a directly administrative role.

The extent to which enhanced democratization has aided growth is unclear. One would expect the reforms resulting from direct democracy to operate in the long term rather than the short term. Possibly, increased growth occurred because the reforms were well targeted and effectively implemented.

4.4 Orissa

Orissa has traditionally been one of India’s poorest states. It had the third-lowest GSDP per capita in 1980 and was also the slowest-growing state in the 1980s (1 percent per annum), which is partly attributable to its even lower agricultural growth (0.72 percent). It is unclear why agricultural production has fared so poorly, given that its soil quality and irrigation are on par with those of the more successful states. Orissa’s mines and quarries are the most productive in India, and their output grew by 15.6 percent during 1980–90, adding to the mystery of poor performance.

In the post-reform period, Orissa grew somewhat more rapidly than in its pre-reform phase (1.6 and 1.0 percent, respectively), but it was near the bottom of the states in growth performance (12th during 1991–98 and 14th during 1980–90). To some extent Orissa became an innovator in economic reforms: it was the first state to reform its power sector, it has strongly set out industrial policy promoting private sector investment and offering fiscal and other concessions, and it was the first state to announce new agricultural and tourism policies.

In the post-liberalization period, Orissa ranks sixth in foreign investment. This is the result of a change in the state’s economic policy, which has directed investors toward Orissa’s abundant natural resources. As Singh (1997) observed, “Orissa has 90 percent of India’s chrome ore and nickel reserves; 70 percent of bauxite; and 24 percent of coal reserves. With no other state having such abundance of natural resources, the big business houses have no option but to set up steel, alumina and coal based

power projects in Orissa only.” Orissa’s post-reform ability to attract both private and foreign investment suggests that its pre-reform failure was primarily a result of ineffective or nonexistent industrial policies to exploit its mineral wealth.

It is unclear why Orissa’s agriculture sector has grown so poorly. In the post-reform period, the sector declined further, experiencing a contraction of 0.5 percent. One explanation may be Orissa’s vulnerability to floods and devastation from tropical cyclones. As Orissa is predominantly an agricultural state, its poor agricultural performance augurs very badly for its future income growth and income distribution.

5. Policy implications and directions for future research

The main finding of this study is that the forces of convergence (absolute and conditional) are very weak in the 14 Indian states examined. We expect that growth will continue to occur in those states in which urbanization is already high, perhaps because of coastal access or the relatively high productivity of agriculture. There is little evidence to suggest that growth will equalize across regions. This assessment is hardly a pessimistic one, however, for several reasons. First, there is much more potential for growth in India than has been achieved to date. Whereas the per capita growth rates in India’s states have varied between 2 and 8 percent per annum, the per capita growth rates in China’s provinces have ranged between 8 and 13 percent per annum during 1992–98 (Démurger et al. 2002, table 4). Many Indian coastal cities have not begun to attract foreign direct investment for export-led growth. The most stunning example is Thiruvananthapuram (Trivandrum), Kerala, which boasts a skilled labor force and a natural harbor but has almost no FDI. With a new state government declaring its intention to begin attracting FDI, it is quite likely that FDI-led exports from Kerala will begin to grow. Other coastal cities that could be much more dynamic include Cochin, also in Kerala; Bhubaneswar, the capital city of Orissa; and Vishakhapatnam, the major port of Andhra Pradesh.

The reasons why these other coastal port cities have not rapidly developed are numerous. The continuing power of the central government over regional infrastructure (airports, major highways, power, and telecommunications) has certainly reduced the capacity of state governments to implement rapid economic reforms. In China, provincial governments have had ample leeway to make key infrastructure investments; in India, the powerful monopoly state enterprises in key infrastructure sectors have resisted competition, especially from potential foreign investors. This is changing, but gradually and not without continued resistance.

India, like China but unlike the United States, boasts several cities with populations greater than 1 million that are far from the coast or navigable waterways.¹⁹ Lucknow (Uttar Pradesh), Kanpur (Uttar Pradesh), Hyderabad (Andhra Pradesh), and Bangalore (Karnataka) are 100–500 km from the sea; and Delhi, Jaipur (Rajasthan), Bhopal (Madhya Pradesh), and Nagpur (Maharashtra) are 500–1,000 km from the sea. These Indian cities can readily support industry for the internal market, as well as IT-based services. Moreover, with a new high-quality internal highway system between these major cities, even these inland urban areas could become export oriented. Establishing improved transport and communications networks (including fiber-optic cables) among the major cities is a high priority.

India will likely continue to face the same problems as China in the inland areas, particularly the inland rural areas. Even with faster overall growth, the inland areas are likely to grow more slowly than the coastal areas, which is likely to provoke political pressures and to increase internal migration from rural areas to cities and from the interior to the coast. India, however, may have an advantage over China in that the westernmost regions of China are much farther from the coast than India's heavily populated interior regions of the Gangetic valley. China has four cities of more than 1 million that are more than 1,000 km from the coast (Chengdu, Lanzhou, Urumqi, and Xian), whereas India has none.

As in China, a careful balance will have to be struck between two kinds of investments in the rural hinterland (e.g., in Uttar Pradesh and Bihar): physical infrastructure, such as roads, rail, airports, and telecommunications, to bring these regions closer to the international markets; and investments in human capital, mainly education and health, to raise the productivity of the rural population. The latter investments may serve to attract new firms eager to benefit from an increasingly skilled labor force, or they may provoke large-scale migration to more economically vibrant coastal regions. Either way, the currently impoverished populations would benefit from rising living standards, wherever in India they are enjoyed.

Appendix

Data sources and description

Our data cover the period 1980–98 in 14 major states of India. The states not included are Arunachal Pradesh, Assam, Chattisgarh, Delhi, Goa, Himachal Pradesh,

¹⁹ Eleven U.S. cities with populations of 1 million or more are remote from the coast, but in all cases except Dallas they are close to a navigable waterway. These large interior cities are Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Milwaukee, Minneapolis, Pittsburgh, Portland, and St. Louis.

Jharkhand, Meghalaya, Mizoram, Nagaland, Pondicherry, Uttaranchal, and Sikkim. Data are not available for these states over a large number of years. The data used for analyzing income convergence or divergence among Indian states are from Indian official statistical publications. Various volumes of the Central Statistical Organization (CSO) publications provided the estimates of SDP. The concept of SDP used in the paper is based on income originating in the state rather than income accruing to the state.

The primary sector consists of agriculture and allied activities, and the fishery, forestry, and mining and quarrying subsectors. The secondary sector includes manufacturing, construction, electricity, gas, and water supply. The tertiary sector comprises transport, communication, storage, hotels and restaurants, finance and real estate, banking and insurance, public administration, community and personal services, and other services. We have used the share of the primary sector in SDP to measure the changes in the economic structure and their effect on growth. By total population we mean the total number of people in the state as of the end of a particular year. CSO data on state-wise real capita SDP are arrived at by using total population along with SDP deflated by the base year prices.

Some of the data are from the Sample Registration System (SRS) of the Registrar General, India. The SRS is a large-scale demographic sample survey that provides reliable annual estimates of the birth rate, death rate, and other fertility and mortality indicators at the state and national levels and for rural and urban areas. By providing age-specific mortality rates, SRS data also facilitate the construction of life tables at birth and at selected ages for the above disaggregated categories, including those for males and females separately. The age composition of the population from two successive censuses provides data for the construction of decadal life tables, but the SRS alone provides trends in life expectancy at more frequent intervals (annually in recent years).

The SRS uses a dual-record system for collection of data. First, continuous enumeration of births and deaths is undertaken by a part-time resident enumerator. Second, an independent retrospective survey every six months is conducted by a computer supervisor. The data obtained through these two processes are matched. The unmatched and partially matched events are re-verified in the field, and thereafter an unduplicated count of births and deaths is obtained. This procedure is said to eliminate errors of duplication and allow a quantitative assessment of sources of distortion in the two sets of records; that is, it ensures a cross-check on the correctness and completeness of the data collected. The SRS was introduced in 1969–70, after the ab-

sence of dependable data from the Civil Registration System began to be felt in the middle of the 1960s.

Data on the level of investment in individual states comparable with the investment data at the national level obtained from the national accounts are simply not available.

Technical appendix

There are 14 states ($N = 14$): 8 are in group I ($n_1 = 8$) and 6 are in group II ($n_2 = 6$). Variance²⁰ is calculated as follows:

$$\text{Var}(x_i) = \frac{1}{N-1} \sum_1^N (x_i - \bar{x})^2 = \frac{1}{N-1} \left(\sum_1^{n_1} (x_i - \bar{x})^2 + \sum_{n_2}^N (x_i - \bar{x})^2 \right),$$

where x_i is the log of real GSDP per capita. We proceed to add and subtract the means within group I and group II, denoted \bar{x}_1 and \bar{x}_2 respectively. Some of the terms disappear because the sum of the deviations from the mean is zero, leaving us with

$$= \frac{1}{N-1} \left(\sum_1^{n_1} (x_i - \bar{x}_1)^2 + \sum_1^{n_1} (\bar{x}_1 - \bar{x})^2 + \sum_{n_2}^N (x_i - \bar{x}_2)^2 + \sum_{n_2}^N (\bar{x}_2 - \bar{x})^2 \right).$$

This simplifies to

$$\frac{(n_1 - 1)}{N-1} \text{Var}(x_{1i}) + \frac{(n_2 - 1)}{N-1} \text{Var}(x_{2i}) + \frac{n_1(N - n_1)^2 + n_2(N - n_2)^2}{(N-1)N^2} \text{Var}(x_i - \bar{x})^2.$$

In our sample, the constants yield an equation of the form

$$0.538\text{Var}(\text{group I}) + 0.385\text{Var}(\text{group II}) + 0.264\text{Var}(\text{average between groups}).$$

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²⁰ The source of these equations is Jian, Sachs, and Warner (1995).

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