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No Virginia, States in India are NOT Converging

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by

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Abstract

A vast literature has developed around convergence of per capita income across different regions both within a country and across different countries. There seems to be a consensus that regions converge at least in the conditional beta sense of convergence. The evidence to date has been based mostly on developed countries only. For India, a developing country, we show that neither beta convergence nor conditional beta convergence holds. The results for India are in sharp contrast with results from other countries.

JEL Classifications: C21, O53

Introduction

Developments across different states in India vary tremendously. Much have been written about high literacy rate in Kerala and its consequences, the success of industrialisation in Maharashtra, foreign investment in Karnataka, and about the backwardness of Bihar. With the new era of free market philosophy, states are competing with each other for resources. How are the states doing relative to one another? Have they been diverging away from one another? These are critical questions for three reasons: (1) Central planning in India has explicitly sought to reduce regional disparities, (2) Rising regional disparities cause regional tensions and (3) We have seen a steady reduction of power of a single party. The Congress party which remained in power for so long, seems unlikely to come back to power on its own strength. The same holds for the Bharatiya Janata Party. In fact, the new wave of regional realignment is the basis for the existing coalition government in New Delhi. We have witnessed what ethnic and religious differences could do to economic development in Kashmir, Punjab and Assam.

This problem is not unique to India. Even in China, with all its economic success, there are widening gaps between the coastal states and the states in the interior parts of the country. Parts of Shenzen look like Hong Kong, but poor peasants in Qinghai have not seen their lives changed since the rule of Ming Dynasty. Although information from interior parts of China is difficult to obtain, there have been numerous reports about riots caused by regional tension in China.

Measurement of Disparity

There are several ways of measuring the regional disparity: (1) Measuring the proportion of people below poverty line in each state. (2) Measuring income inequality through some standard measure such as the Gini coefficient.

(3) Measuring the growth rate of income in each state starting at some date in the past.

We will exploit the third measure because it allows us to clearly see the changes and assess how each state in performing relative to one another. The other two measures have the following shortcomings. Data on people below poverty are notoriously unreliable. An inequality measure (such as the Gini coefficient) does not vary enough across states. These measures are static as well as relative measures of poverty. The third one has the advantage of being dynamic over time and it combines both absolute and relative concepts together. Therefore, we do not consider the other two measures.

We have plotted per capita income in each state for the financial year 1960-61. On the vertical axis, we have plotted the rate of growth in per capita income over the next thirty years (see Figure 1).

[Figure 1, about here]

Four states are clearly ahead of the rest: Gujarat, Haryana, Maharashtra and Punjab. They have had an advantage over the other states from the start of the race thirty years ago. However, their growth rates are not that much higher than others. They started out with an advantage. Therefore, they are likely to stay ahead of the rest. On the other hand, West Bengal did start out with a similar advantage but is gradually pulling back into the pack of the other states. There is one clear laggard state: Bihar. It is in a class of its own. The pattern from rest of the states shows that there is some tendency for the states that started at a lower level are growing at a rate higher than the states that started at a higher level. In the long haul, this process may lead to a convergence of states in terms of per capita income. This result has been observed in other parts of the developed countries such as the United States and Australia. In the United States, for example, Alaska (for its oil income), Connecticut (for its dominance in insurance business) is ahead of the rest of the states. Mississippi has been in a class of its own.

Among the leading states in India, the results for West Bengal and Maharashtra are skewed because of the presence of two very large cities: Calcutta and Bombay. To a lesser extent, Ahmedabad has also aided Gujarat in achieving high income. This makes the results of Punjab and Haryana even more remarkable. Rural development in Punjab and Haryana has been more widespread than in any other state. This fact shows up in other indicators such as the proportion of population below poverty. Punjab has been plagued by the aftermath of Operation Bluestar over the past ten years. It has seen violence of unprecedented scale. Even then, the pace of development in Punjab has not diminished. Kerala illustrates that health condition (as measured by child death rate or life expectancy at birth) or literacy rate has very little to do with high rate of economic growth. Political stability and political will of the ruling government seems to be a more relevant factor than other kinds of infrastructure and general social/human conditions.

Convergence Analysis

In the past decade, a vast amount of research has gone into investigating the so-called convergence hypothesis. Do poor regions remain poor for many generations? Or do they "catch up"? These are important questions. For India, it is of particular importance because the whole basis of central planning depends on it.

The literature on convergence has distinguished between two types of convergence. Beta convergence says that the countries (or regions) that are initially poorer tend to grow faster than countries (or regions) that are initially richer. Sigma convergence entails that disparity in per capita income across countries (or regions) tends to decline. Thus, beta convergence is a necessary but not a sufficient condition for sigma convergence. Most studies have focussed on beta convergence.

Convergence can be conditional or unconditional. Conditional convergence implies that a country or a region is converging to its own steady state while the unconditional convergence implies that all countries or regions are converging to a common steady state.

Barro and Sala-i-Martin (1992) have investigated the question of convergence using different states of the United States. Others have studied different regions of now developed countries: Keller (1994) for Austria and Germany, Cashin (1995) for Australia and Coulombe and Lee (1993) for regions in Canada, Kangasharju (1999) for Finland and Sala-i-Martin (1996) for Japanese Prefectures. The evidence seems to be unequivocal: different regions in different countries are converging. Most rates of convergence hover around 2% per annum. However, the same cannot be said about the whole world. With data of the past 30 years for 110 countries, the evidence shows that the world is not converging. They are diverging. Poor countries are getting relatively poorer and the rich countries getting richer. The argument put forth to reconcile these two facts is that there is no diffusion of technology across different countries. However, within a country, regions are more closely related. Hence the result.

There have been very few studies that look at convergence in the developing countries. Why should such studies for developing countries be of importance? Studying the rich countries only produces the well-known ex-post sample selection bias well documented by DeLong (1988). Thus, studying the regions of rich countries only has the same problem of ex-post sample selection bias. By studying a developing country, we will be able to avoid such a bias. Just because for developed countries like the US, Canada, Japan, Australia and so on are converging at a higher level; this process is by no means assured at a lower level. This means that even though the states of the United States have been converging in the last hundred years, it does not mean they had done so in the previous hundred *when the level of development was much lower*.

There have been three recent studies for developing countries. These are Borges and Alfonso (1999) for Brazil, Koo, Kim and Kim (1998) for Korea and Elias and Fuentes (1998) for Argentine and Chile. Using conventional convergence tests, Borges and Alfonso find that for Brazil, there is an inverse and statistically significant relationship between per capita income and per capita income growth rates for the period, 1939-1995. However, they do not find any evidence of absolute convergence. Koo, Kim and Koo use data for the period 1967-1992 to find that the convergence rate for Korea for the period was significantly higher than that estimated by Barro and Sala-i-Martin (1992). The convergence rate did vary among the sub-periods. Nevertheless, the rate was between four to six percent per year. Elias and Fuentes use the data for the period 1960-85 for both Argentina and Chile. The rate of convergence was higher for Chile than for Argentina most likely due to more rapid liberalisation and opening up of Chile during the second part of the period under consideration.

Models of Convergence

Convergence has been defined as follows by Barro and Sala-i-Martin (1995): Let $\gamma_{i,t,\ t+T}$ be the annualised (real) growth rate of GDP for region (state) i between time t and t+T and let $y_{i,t}$ be the per capita real income of region i at time t. Suppose we run the following regression equation with $\varepsilon_{i,t}$ as the white noise process:

$$\gamma_{i,t,\ t+T} = \alpha + \beta \log(y_{i,t}) + \varepsilon_{i,t} \qquad (1)$$

and the regression coefficient β turns out to be negative, then, we say that the regions (states) are beta convergent.

If, on the other hand we fit a model with $\varepsilon_{i,t}$ as the white noise process:

$$\gamma_{i,t,\ t+T} = \alpha + \beta \log(y_{i,t}) + \psi \mathbf{X}_{i,t} + \varepsilon_{i,t} \quad (2)$$

where $\mathbf{X}_{i,t}$ is another (set of) variable(s) that hold constant in the steady state of region (state) i. In this case, if β is negative, we say that the regions are conditionally beta convergent. In our analysis, we take two variables in $\mathbf{X}_{i,t}$. They are geographical location and life expectancy in each state. These are some of the commonly used variables in this type of regression (Sala-i-Martin, 1997). The annualised growth rates are for the period, 1960-93. These are taken from various issues of the Reserve Bank of India bulletins. The literacy data for the states are from 1991 Census of India.

The results of fitting equation (1) and diagnostics are in tables 1-2. As we can see from table 1, β is positive in our case implying that beta convergence does not hold for Indian states. The results of fitting equation (2) and the diagnostics are in tables 3-4. Table 3 shows that β is again positive meaning that states in India are not even conditionally beta convergent.

[Tables 1-4, about here]

Conclusion

Neither beta convergence nor conditional beta convergence holds for regions of India. This result is in contrast with results from developed countries and other selected developing countries. In India, the central government has much more powers than the state governments with respect to taxes and therefore, public expenditures. The successive Finance Commissions have developed formulas for the devolution of funds between the central governments and the state governments. The state governments have always asked for a greater share of the revenues but the central government has been reluctant to agree to this. At present, the states are limited in their abilities to raise revenue through taxes. Some state governments such as West Bengal have complained that their states have been neglected by the central government. The charge is that the central government has been unfair in its allocation of funds to states. The solution may lie in giving the state governments more powers in raising revenue. However, the counter argument that is that many of the lower per capita income state governments have been inefficient. It is hoped that the new liberalised policies whereby state governments are competing with each other will help achieve the convergence in per capita income.

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Figure 1: Growth of annual per capita income versus 1960/61 per capita income in states of India

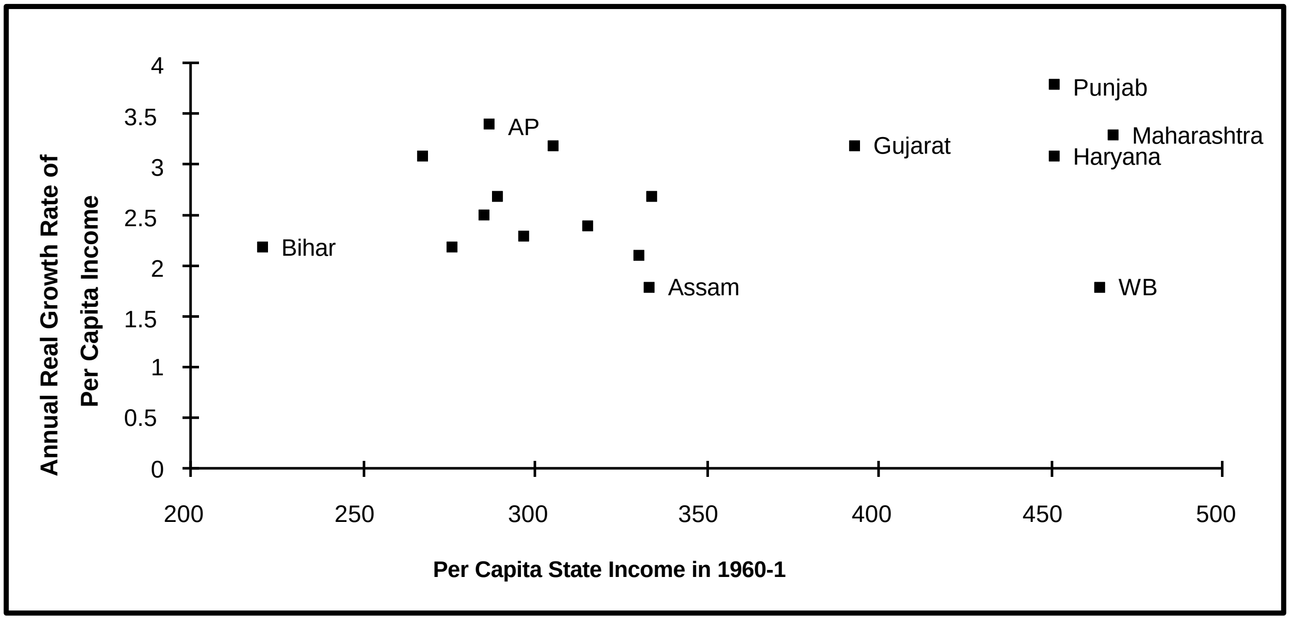

Table 1: Regression Results for Equation (1)

Dependent variable is γ (in equation (1)) (n=17)

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
α	.081897	.0069850	11.7247[.000]
β	.2460E-4	.2011E-4	1.2231[.240]

R^2 = .090692 F-statistic F(1, 15) = 1.4961[.240]

$\bar{R}^2$ = 030071 S.E. of Regression = .0062020

Residual Sum of Squares = .5770E-3 Mean of Dependent Variable = .090240

S.D. of Dependent Variable = .0062974 Maximum of Log-likelihood = 63.3510

Durbin-Watson statistic = 1.6052

Table 2: Diagnostic Tests for Regression in Equation (1)

Test Statistics	LM Version	F Version
A:Serial Correlation	CHI-SQ(1)= .0027475[.958]	F(1, 14)= .0022630[.963]
B:Functional Form	CHI-SQ(1)= .0052713[.942]	F(1, 14)= .0043424[.948]
C:Normality	CHI-SQ(2)= .51373[.773]	Not applicable
D:Heteroscedasticity	CHI-SQ(1)= 2.5292[.112]	F(1, 15)= 2.6217[.126]

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

Table 3: Regression Results for Equation (2)

Dependent variable is γ (in equation (2)) (n=17)

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
α	.082544	.0076302	10.8182[.000]
β	.2716E-4	.2299E-4	1.1815[.257]
Ψ	-.4127E-4	.1587E-3	-.26008[.799]

R^2 = .095064 F-statistic F(2, 14)= .73535[.497]

$\bar{R}^2$ = = -.034213 S.E. of Regression = .0064042

Residual Sum of Squares = .5742E-3 Mean of Dependent Variable= .090240

S.D. of Dependent Variable=.0062974 Maximum of Log-likelihood = 63.3920

Durbin-Watson statistic = 1.5804

Note: Probability of rejecting the null hypothesis of the value of the coefficient being zero is noted in the parantheses.

Table 4: Diagnostic Tests for Regression in Equation (2)

Test Statistics	LM Version	F Version
A:Serial Correlation	CHI-SQ(1)= .2375E-5[.999]	F(1, 13)= .1816E-5[.999]
B:Functional Form	CHI-SQ(1)= .054564[.815]	F(1, 13)= .041860[.841]
C:Normality	CHI-SQ(2)= .59634[.742]	Not applicable
D:Heteroscedasticity	CHI-SQ(1)= 3.0711[.080]	F(1, 15)= 3.3073[.089]

A:Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values