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Regional Disparities in Economic Growth: A Case Study of Indian States

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ABSTRACT

In India, regional imbalance has been one of the major concerns before policy makers and planners. There had been a huge gap between active and vibrant regions and hinterland during pre-independence period in terms of availability of facilities and this has resulted in the form of unequal levels of development both in terms of economic and human. After independence, reduction in inter-state disparities has been emphasized during successive Five Year Plans, but the menace continued unabated. For instance, the World Bank (2006) in its reported entitled, "India-Inclusive Growth and Service Delivery: Building of India's Success" has observed sharp differentiation across states since the early 1990s reflects acceleration of growth in some states but declaration in others. The report further adds that more worryingly, growth failed to pick up in states such as Bihar, Orissa and U.P. that were initially poor to start with, with the result that the gap in performance between India's rich and poor states widened dramatically during the 1990s. The World Bank (2008) again in its recent release "The Growth Report Strategies for sustained Growth and Inclusive Development" has mentioned that disparity in income distribution in India has risen during 1993-2005 which is revealed by fact that Gini-coefficient in this connection has risen from 0.3152 in 1993-94 to 0.3676 in 2004-05. The Draft Eleventh Five Year Plan (2007-2012, vol. I), has also admitted that regional disparities have continued to grow and the gap have been accentuated as the benefits of economic growth have been largely confined to the better developed areas.

The present study has been undertaken against this backdrop. In order to accomplished the task, inter-state disparity in total as well as per capita SDP for 20 major Indian states for the period 1980-2002 has been examined with the help of inequality indices that are based on properties of Lorenz Curve, Atkinson's social welfare function. Herfindahl's Concentration indices etc. Inter-state inequality trend has also been examined through 'convergence-hypothesis' as β -convergence and σ -convergence. Empirical results revealed disparity among states in terms of total/per capita SDP has risen sharply as inequality indices like Gini, Theil's index, RMD, Kakwani's as well as Atkinson's indices have shown surge, especially after the economic reforms of 1991. Widening gap in terms of income among rich and poor states, especially after 1991 has also been established through empirical results based on β -convergence and σ -convergence. This is indeed an alarming situation and a potential threat for stability of a federation like India. Redressel of horizontal economic disparity happens to be an important objective in any scheme of federal devolution of funds among federating states. In India, this task is done by the Planning Commission and Finance Commission. The Thirteenth Finance Commission, Government of India (2010-15) should assign due weight age to this factor in its scheme of devolution of taxes/grants for states such that inter-state economic disparities may be rectified effectively.

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I-INTRODUCTION

The nexus in between and inequality has been debated extensively by the scholars in terms of theory as well as empirical investigators. For example, starting with the classical economists, Ricardo's two sector model which mainly concentrated on growth and distribution within agriculture and industry addressed the shares of rent and profits and growth process eventually approaching the steady state of zero growth due to diminishing returns in agriculture (Boyer, 1996). Karl Marx also believed that capitalist development would inherently result in uneven distribution of wealth and capitalist have an incentive for pushing wages to the subsistence level (Martin and Sunley-1998, Dunford and Smith-2000). The neo-classical growth models for closed economies [Solow (1956, 1957, 1970), Cass (1965), and Koopmans (1965)] state that per capita growth rate tends to be inversely related to the starting level of output/income per head and if economies are similar in respect of preferences and technologies, then poor economies grow faster than rich ones. The neoclassicals, however, were more optimistic about market forces and postulated that regional inequality is a passing phase and that market forces would ensure that the returns to all factors of production would approach their marginal products (Smith, 1975). Neo-Keynesians such as Kalecki (1954, 71), Steindl (1952), Kaldor (1955-6, 60) and Pasinetti (1962, 77, 81) have explained the inter-relationship between income distribution and economic growth. By and large, Neo-Keynesian growth models have concluded that reduction in concentration raises the real wage and provides a redistribution of income which leads to higher capacity utilization and higher rate of economic growth.

The link between inequality and average well-being for two sector economy is known as Kuznets hypothesis (1955, 1963) which maintains that given a two-sector economy with not too distinct degrees of sectoral mean incomes, a perennial shift of population

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from one sector to another will initially raise aggregate inequality and it will decrease at later stage. This formulation has been labeled as the “Inverted U” (I-U)¹ hypothesis or Kuznets cycle (Branlke, 1983). Regional concentration/diversification has also been examined through ‘convergence hypothesis’ which has primarily emerged due to seminal theoretical contributions on endogenous growth models by Romer (1986, 1987, 1990, 1992, 1993) and Lucas (1988). The hypothesis asserts that differences in contemporaneous per capita income between any pair of regions will be transitory so long as the two regions contain identical technologies, preferences and population growth (Bernard and Durlauf, 1966). The bulk of the new theoretical literature on growth and inequality has focused on models which generate divergence across nations. The theoretical as well as empirical presentation by Barro, Robert J. (1990, 1991, 1999), Borro, Robert J. and Jong-Wha Lee (1994), Barro, Robert J., N. Gregory Mankiw, and Xavier Sala-i-Martin (1991, 1992a, 1992b, 1992c, 1997, 2007), Baumol (1986), Cashin (1995), Cashin and Sahay (1996), DeLong (1988), Dowrick and Nguyen (1989), Easterlin (1960a, 1960b), Quah (1993, 1995, 1996a, 1996b) etc. deal with process of convergence/divergence at national as well as international level.

In India, inter-state/region inequality has been one of the major concerns before policy makers and planners. There had been a huge gap between active and vibrant region and the hinterland during the pre-independence period in terms of availability of facilities and this manifested itself in the form of unequal levels of development both in terms of economic and human. After independence, reduction in inter-state/region disparities has been emphasized during the successive five year plans. Apart from that, the issue has been examined, in depth, by the scholars like Chattopadhyaya, R.N. and M.N. Pal (1972), Rao, S.K. (1973), Nair, K.R.G. (1973, 1982), Sampat, R.K. (1977), Mohapatra, A.C. (1978), Mathur, Ashok (1983, 1987, 1992), Datt and Ravallion (1993, 1998, 2002), Dreeze and Sen (1995), Dreeze and Srinivasan (1996), Marie-Ange Veganzones (1998), Rao, M. Govinda, Ric Shand and K.P. Kalirajan (1999), Ramiah (2002), Ahluwalia, M. (2002), Ravindra H. Dholakia (2003), Majumdar, R. (2004), Shatakshee Dhongde (2006), Dev, S.M. and Ravi, C. (2007), N.J. Kurian (2007), Gaurav Nayyar (2008), Yanrui Wu (2008), Chakraborty Achin (2009). For example, according to Dreze and Sen (1995), enormous variations in regional experiences and achievements coupled with the even sharper contrasts in some fields of social development have resulted in remarkable internal diversities in India. Furthermore, the long-term progress

in raising rural living standards has been diverse across Indian states (Datt and Ravallion, 1998). Such disparities are responsible for various states having different capacities for poverty reduction (Datt and Ravallion, 2002). Similarly, Rajarshi Majumdar (2004) in his paper entitled, “Human Development in India : Regional Pattern and Policy Issues” has observed that states like Kerala, Maharashtra and Himanchal Pradesh put up consistently good performance regarding social and human development indicators, however, Kerala has not been able to convert its social development into economic progress. On the other hand, Gujarat, in spite of its having low Human Development (HD) ranks, have consistently good ranking in per capita Net State Domestic Product (PCNSDP).

The National Human Development Report-2001 for India reveals considerable differences in human development among Indian states during 1981-2001. The report notes that in the early eighties, states like Bihar, U.P., M.P., Rajasthan and Orissa had HDI close to just half that of Kerala's. The inter-state differences in human poverty are quite striking and report notes that while there have been improvements in the human development index and human poverty index during the 1980s, the inter-state disparities and the relative position of the states has practically remained the same. Facts show that inter-state disparity as measured in terms of standard deviation in human development index stood 0.083 for 1981 which further increased and stood at 0.100 in 1991 [Tenth Five Year Plan (2002-2007), Vol. III]. The World Bank (2006) in its report entitled, “India-Inclusive Growth and Service delivery : Building on India's Success” has observed sharp differentiation across states since the early 1990s reflects acceleration of growth in some states but deceleration in others. The report further adds that more worryingly, growth failed to pick up in states such as Bihar, Orissa and Uttar Pradesh that were initially poor to start with, with the result that the gap in performance between India's rich and poor states widened dramatically during the 1990s. An approach to the 11th Five Year Plan (Planning Commission, Government of India, 2006) has also acknowledged regional backwardness as an issue of concern. The differences across states have long been a cause of concern and therefore, we cannot let large parts of the country be trapped in a prison of discontent, injustice and frustration that will only breed extremism. The World Bank (2008) in its recent release “The Growth Report Strategies for Sustained Growth and Inclusive Development” has mentioned that disparity in income distribution in India has risen during 1993-2005.

The report (pp. 125-126) further adds that Gini-coefficient in this connection stood at 0.3152 during 1993-94 which increased later on and was recorded at 0.3676 in the year 2004-05.

It is against this backdrop, the present study has been undertaken. The data on State Domestic Product (Total as well as Per Capita) for twenty major Indian States has been taken for the period 1980-2002. Interstate disparity in SDP has been examined with the help of several inequality indices that are based on properties of Lorenz Curve, Atkinson's Social Welfare Function, Herfindahl's indices followed by traditional measures like, CV and Log Normal Distribution. In addition, 'convergence hypothesis' as σ -convergence and β -convergence has been tested to detect inter-state disparities during the period 1980-2002. Section II deals with data and methodology (technical note) while empirical results are contained in Section III. Concluding remarks and policy observations are contained in Section IV.

II-DATA AND METHODOLOGY

The present study attempts to examine inter-state disparities in terms of state domestic product (SDP) and per capita state domestic product (PC SDP) over the period 1980-81 to 2001-02. Significant to mention that state income and per capita income have their limitations in any study of inter-state comparisons (Bhattacharya and Sakthivel, 2004). Inter-state comparison of SDP is also hampered by the quality of statistics provided by different states and the CSO has revised the base year from 1980-81 to 1993-94. The modifications in the new GDP and SDP series have been done in terms of price, production boundaries for many sectors etc. and hence any comparison of inter-state income levels and growth rate based on 1980-81 base series upto 1993-94 base series may not yield the correct picture. In view of this, an important task before analyzing the trends in income disparities is to evolve a comparable income series with a single base year. This has been done through the technique of base shifting and SDP data onwards 1998-99 up to 2001-02 at the base 1993-94 has been converted at the base 1980-81 in order to prepare inter-state SDP from 1980-81 to 2001-02 at the base 1980-81. In the present paper, Net State Domestic Product (at current prices-base 1980-81) and per capita Net State Domestic Product (at current prices-base 1980-81) for twenty major Indian states have been taken for the period 1980-81 to 2001-02.

Measures of Income Inequality

There exists plethora of literature on measures of income and wealth inequality. The conventional inequality measures (Atkinson 1970, 83) that are most frequently used in empirical research are (a) the coefficient of variation i.e.

$$\sigma/\mu \quad (1)$$

and (b) the standard deviation of logarithms i.e.

$$\int_0^{\bar{Y}} \{\log(y/\mu)\}^2 f(y).dy \quad (2)$$

where \bar{Y} , σ and μ are in usual notations.

Dalton's Principle of transfer (1920) has established that measure of inequality should increase when income is transferred from a poor person to a richer person. Chaperowne (1974) argues that coefficient of variation is most sensitive to inequality of extreme income that procedures a flat response to the transfers. The variance of logarithms of income may be interpreted as a measure of concentration of incomes since it can be estimated through the framework of Lorenz's measures of concentration (Aitchinson, J and Brown, J.A.C., 1957).

An attractive way to measure income inequality without imposing a functional form of statistical distribution on income graduation is to use Lorenz-based inequality measures. In the Lorenz diagram (Fig.1), the proportion of income receivers having income less than x is measured along x axis and the proportion of total income accruing to the same income receivers along the y -axis. The points plotted for the various values of x trace out a curve below the line sloping 45° from the curve explains the relation between the distribution function $F(x)$ and the first-moment distribution function $F_1(x)$, given by

$$F_1(X) = \int_0^X t dF(t) / \int_0^\infty t dF(t) \quad (3)$$

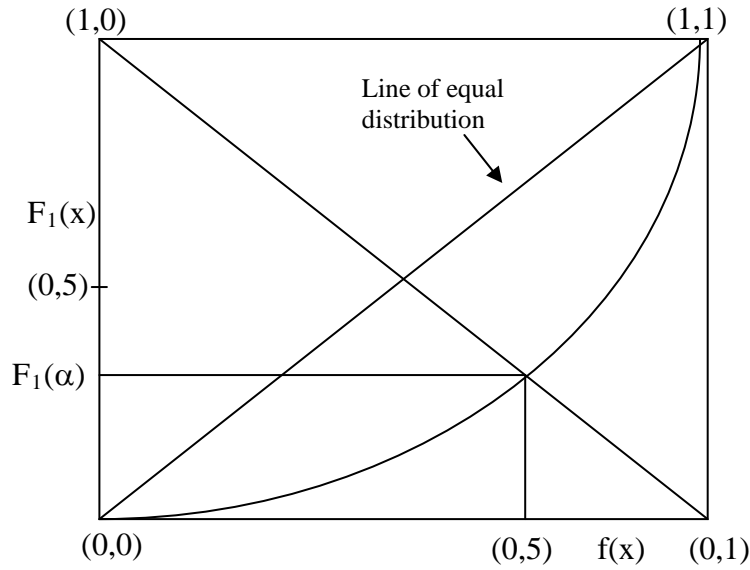


Fig. 1

It is obvious from the Lorenz diagram that the measure of income concentration is the ratio of the shaded area between the Lorenz curve and the 45° line. The income concentration (L) for the log normal hypothesis is defined as.

$$L = 1 - 2 \int_0^\infty F_1(x) dF(x) \quad (4)$$

substituting the value of $F_1(X)$ in Eq (4) we get

$$L = \left[2N \left\{ \frac{\sigma}{\sqrt{2}} \mid 0,1 \right\} - 1 \right] \quad (5)$$

Obviously, the measure of concentration (L) is monotonically related to value of σ^2 and thus the parameter σ^2 (variance of logarithms of the income) may well be interpreted as a measure of income inequality.

The Lorenz curve may again be generated by defining the income earner units, say, quintile shares where q_i , $i=1,2,\dots,n$ reveals the share of i th income earner. Let, incomes are arranged in ascending order i.e.

$$0 \leq q_1 \leq q_2 \dots \leq q_i \dots \leq q_n \leq 1 \quad (6)$$

From the order of the incomes as shown by Eq. (6), several well known income inequality measures may be derived (Slotte, D.J., Basmann, R.L. and Nieswiadomy, M., 1989).

For example, the Gini (1912) measure of income inequality is given by

$$G = 1 - \frac{1}{n} - \frac{2}{n} \cdot \sum_{i=1}^{n-1} (n-i)q_i \dots \quad (7)$$

and the relative mean deviation (Cowell, 1980)

$$R = \frac{1}{2} \cdot \frac{n}{n-1} \left[\sum_{i=1}^n \left| q_i - \frac{1}{n} \right| \right] \quad (8)$$

Theil's (1967) entropy measure (normalised) is given by

$$T = 1 + \frac{1}{\ln(n)} \left[\sum_{i=1}^n q_i \cdot \ln(q_i) \right] \quad (9)$$

Kakwani's (1980a, 80b) measure is defined by

$$K = \frac{\left\{ \sum_{i=1}^n \left[\sqrt{q_i^2 + 1/n^2} \right] - \sqrt{2} \right\}}{2 - \sqrt{2}} \quad (10)$$

The survey of literature on income inequality reveal that Gini coefficient suffer with serious drawbacks. For instance, the simple aging of a populations will raise income inequality (Morgan, 1962). The Gini Coefficient is also insensitivity to non-money components and differential price indices between states which exaggerate income inequality in rural areas. It is found that Gini ratio is more responsive to changes in income of the middle class rather than among the rich or poor (Allison, 1978 and Osberg, 1984), and despite of major changes in taxation and welfare during 1950-70 in United States, inequality as measured by Gini Coefficient remained unchanged. It is obvious that the Kakwani measure and the Gini ratio measure every different properties of the Lorenz Curve (Basmann, R.L. Slotte, D.J., 1987). The Gini ratio measures a property of distribution inequality that varies in direct proportion to the area of the closed geometric representation (Fig.1) and bounded below by the horizontal axis on

the right by the Lorenz Curve itself while the Kakwani measure correlates a property of distributional inequality that varies directly with the perimeter if the closed geometric area (Fig.1).

The relative mean deviation violates the principle of transfer since it is insensitive to transfer between income units on the same side of the mean. Theil (1967) proposed a decomposable measures based upon the Lovenz Curve that satisfy Dalton’s Principle of Transfer (Allison, 1978). Theil index is similar to the Gini index since it is too sensitive to movements in the middle part of the income distribution (Osberg 1984).

Atkinson (1970) developed a new measure of income inequality and argued that there should be social welfare function with each measured of income inequality. The index is defined as.

$$\text{Atkin (I)} = 1 - \left[\sum_i \left[\frac{y_i}{\mu} \right]^{1-\epsilon} \cdot f(Y_i) \right]^{\frac{1}{1-\epsilon}} \quad \epsilon \geq 0 \quad (11)$$

The value of ϵ , which is clearly a measure of the degree of inequality-aversion reveals the relative sensitivity to transfers at various income levels. As ϵ increases, inequality is emphasized much among the poors. Aktinson observed that if we take $\epsilon=1.0$ which implies a lower degree of inequality aversion then the ranking is closer to that of the Gini ratio. A wide range of values of inequality aversion emphasized the inequality at the top of the distribution ($\epsilon=0.5$) and at the bottom ($\epsilon=1.0$).

Apart from aforesaid measures of income/wealth inequality, Herfindah’s index (1950) is one that measures the concentration in income/wealth and more specifically in industrial sector. This index contains the feature of decomposability (Gaur, A.K., 2002). Let respective income (total per capita) of n federating units are given by $S_i = i=1,2,\dots,n$, then, the Herfindahl’s index of concentration is given by :

$$H_i = \sum_{i=1}^n \left\{ \frac{S_i}{\sum_{i=1}^n S_i} \right\}^2 = \frac{1}{\left\{ \sum_{i=1}^n S_i \right\}^2} \sum_{i=1}^n S_i^2 \quad (12)$$

The Herfindahl's index of concentration can again be generated by defining the expenditure gainer units on, say quintile shares, where $q_i, i=1, 2, \dots, n$ represents the i th quintile expenditure share, letting,

$$0 \leq q_1 \leq q_2 \leq q_3 \dots \leq q_n \leq 1 \quad (13)$$

from this simple ordering, the Herfindahl's index may be written as

$$H_i = \sum_{i=1}^n \left\{ \frac{q_i}{\sum_{i=1}^n q_i} \right\}^2 \quad (14)$$

since $\sum_{i=1}^n q_i = 1$, Eq. 14 may be written as

$$H_i = \sum_{i=1}^n (q_i)^2 \quad (15)$$

The properties as well as alternative forms of the Herfindahl's index have been reviewed by Theil (1967), Srivastava and Aggarwal (1979), Gaur, A.K. (2002). For instance, the other two forms of the Herfindahl's index are:

$$H_2 = \frac{n}{n-1} \sum_{i=1}^n (q_i)^2 \quad (16)$$

$$H_3 = \frac{1}{3} \left[n \sum_{i=1}^n q_i^2 - 1 \right] \quad (17)$$

The range of variation of the alternative forms of the Herfindahl's index are

$$\frac{1}{n} \leq H_1 \leq 1$$

$$\frac{1}{n-1} \leq H_2 \leq \frac{n}{n-1} \quad (18)$$

$$0 \leq H_3 \leq 1$$

It is obvious that when only comparison over time is desired, one would find H_3 better than H_2 (since the extreme values of H_3 are independent of number of observations) and H_2 better than H_1 . However, when decomposing is needed, H_1 and H_2 are better than H_3 .

In the present study, the following measures of inequality have been employed in order to measure the inter-state inequality in state domestic product (SDP) (total as well as per capita, both) among Indian states during the period 1980-81 to 2001-02 : (i) the Gini coefficient, (ii) Relative mean deviation (RMD), (iii) Theil's measure, (iv) Kakwani's measure, (v) Herfindahl's – H_1 , (Herfindahl's – H_2 , and (vii) Herfindahl's – H_3 , (vii) C.V., (ix) Variance of Logarithms, (x) Atkin ($\epsilon=0.5$), (xi)) Atkin ($\epsilon=1.1$), (xii)) Atkin ($\epsilon=1.5$), (xiii)) Atkin ($\epsilon=1.9$), (xiv)) Atkin ($\epsilon=2.1$) and (xv)) Atkin ($\epsilon=2.5$).

Convergence Hypothesis

Two concept of convergence exist in the discussions of economic growth across the nations/states/regions (Barro and Sala-i-Martin, 1991, 1992a, 1992b, 1992c, 1997, 2007). They are : (i) β -convergence and (ii) σ -convergence. β -convergence emerges if a poor economy tends to grow faster than a rich one, so that the poor economy tends to catch up to the rich one in terms of levels of income/product. Let, Y_i stands for SDP of i th state and $Y_{i,t+T} = [\log(Y_i, t + T/Y_{i,t})]$ be the annualized growth rate of SDP of i th state between t and $(t + T)$ period and $\log(Y_i, T)$ be the logarithm of SDP of i th state at time t then in order to detect β -convergence, following type of regression equation has been fitted in the present study.

$$(1/T) \log(Y_i, t + T/Y_i, t) = \alpha + \beta \log(Y_i, t) + U_{it} \quad (19)$$

Equation (19) is also known as Barro regressions (Quah, 1995) and $\beta < 0$ indicates absolute β -convergence. In other words, a value of β in the range of $-1 < \beta < 0$ would be an evidence of β -convergence i.e nearer the value of β to -1 , the higher the speed of convergence and the nearer to zero the lower the speed to convergence. By implication zero means no convergence and a positive value for β indicates a divergence.

The second concept relates to cross sectional disparison (Baumol, 1986; Dowrick and Nguyen, 1989; Barro and Sala-i-Martin, 1991, 1992a, 1992a, 1992b, 2007). In this context, convergence occurs if the dispersion measured, for example, by standard deviation of the logarithm of per capita income across a group of regions-declines over time. This process is known as σ -convergence. That is $\sigma_{y(t+T)} < \sigma_{yt}$ indicates the existence of σ -convergence and vice versa, where σ_{yt} is the time 't' standard deviation of $\log(y_i, T)$ across i th region.

III-RESULTS AND INTERPRETATION

In order to examine inter-state disparities in economic growth, total as well as per capita State Domestic Product (SDP) at current prices for the period 1980-2002 has been taken. State income are available from 1980-81 to 1998-99 at 1980-81 base and later on it is available at 1993-94 base year. Thus, in order to evolve a comparable SDP with a single base year, technique of base shifting has been applied for SDP data onwards upto 1998-99 upto 2001-02 and SDP data for this period at base 1993-94 has been converted at the base 1980-81 in order to prepare inter-state SDP from 1980-81 to 2001-02 at the base 1980-81. Total SDP (at current prices) for the period 1980-02 have shown in Table 1 while relevant statistics are presented in Table 2. Similarly, per capita SDP (at current prices) for 1980-02 are shown in Table 3 while relevant statistics are presented in Table 4.

Average annual growth in total SDP for 1980-02 has been examined in the semi-log model with the help of slope-dummy and intercept-dummy technique with dummy variable for year 1991, in order to detect any Kink, if any, in per annum growth in SDP around year 1991 i.e. the period when economic reforms were introduced in India. Regression result for per annum growth in Total SDP are shown in Table 5 while average annual growth during pre-reform (1980-90) and reform-era (1990-02) are presented in Table 6. Facts show that per annum growth in total SDP has fallen for 20 states during reform period (1990-02). Disparity in total SDP during this period has widened as per annum growth for relatively developed states like Gujarat (11.6%), Haryana (10.5%), Maharashtra (10.9%) has been found higher than poor states like Bihar (7.4%), M.P. (9.4%), Orissa (8.7%) and U.P. (8.8%). Similarly, during reform period, per annum growth in total SDP were found lower for hill states as Assam (7.6%), H.P. (7.2%), J & K (7.4%), Manipur (9.9%) and Tripura (7.8%) as compared to developed states like Gujarat, Haryana and Maharashtra. Estimated regression results for per annum growth in per capita SDP (1980-02) are presented in Table 7 while per annum growth trends are shown in Table 8. It is evident from Table 8 that per annum growth in per capita SDP during reform period (1990-02) has fallen for all twenty states under consideration. Significant to mention that per annum growth in this regard for relatively well-off states as Gujarat (8.62%), Haryana (7.31%), Maharashtra (7.95%) and Punjab (7.03%) were found higher than poor states like Bihar (6.16%), Orissa (6.07%) and U.P. (5.86%) and hill states like Assam (5.27%), H.P. (4.99%), J & K

(4.52%), Manipur (5.39%) and Tripura (5.38%) during the reform era i.e. 1991-2002. This has certainly aggravated the inter-state disparity in per capita SDP among states during the reform period.

Widening economic disparities among states in terms of total as well as per capita SDP is corroborated through enhancement in inequality indices over the period. Facts reveal that Gini index, RMD index, Theil's index and Kakwani's index for total SDP during 1980-81 stood at 0.4409, 0.3372, 0.1147 and 0.1804 respectively and they remained almost stagnant upto 1990-91. But later on, these indices have risen and were recorded at 0.4558, 0.3459, 0.1237 and 0.1929 respectively during 2001-02. Similarly, for per capita SDP, Gini index, RMD-index, Theil's index, Kakwani's index stood at 0.1493, 0.1177, 0.0124 and 0.0215 respectively in 1980-81 and with mild enhancement these indices stood at 0.1596, 0.1164, 0.0144 and 0.0248 respectively in 1990-91. Later on, a surge was found among these inequality indices and finally these stood at 0.2171, 0.1660, 0.0249 and 0.0429 respectively in 2001-02. Inequality indices pertaining to total as well as per capita SDP for 1980-2002 reveal the harsh reality, that income inequalities at aggregate as well as per capita level have increased with is evident in increasing values of inequality indices as mentioned above. These inequalities have been much more prominent during the reform (1991-2002) period.

Different measures of convergence/divergence, for instance **σ -convergence** and **β -convergence**, have also been estimated for the period 1980-2002 in order to examine the trends and issues pertaining to inter-state income disparities among twenty major Indian states. **σ -convergence** results for total SDP as well as per capita SDP are shown in Table 11 and Table 12 respectively. The estimated beta-coefficient are found positive and significant for all three periods i.e. 1980-81 to 1990-91, 1991-92 to 2001-02 and 1980-81 to 2001-02. Beta coefficients for reform period (1991-2002) as compared to pre-reform (1980-91) period suggest that economic reforms have resulted in widening of inter-state disparities. In order to detect β -convergence, estimated Barro-regressions are presented in Table 13 and Table 14. Facts show that β -coefficient for total as well as per capita SDP were found negative (insignificant) during pre reform (1980-1991) period indicating weak convergence in state income during this period. However, Beta coefficient were found positive and significant for total as well as per capita SDP during reform (1991-2002) period revealing the fact that divergence in state

income (total/per capita) resulting in increasing inter-state disparities has occurred after the reforms of 1991 have been introduced.

IV-SUMUP

The empirical results pertaining to interstate disparity in terms of total as well as per capita for 20 major Indian states during the period 1980-2002 are quite pathetic and alarming. Inequality indices for total SDP in terms of Gini ratio, RMD, Theil's index and Kakwani index stood at 0.4409, 0.3372, 0.1147 and 0.1804 respectively during 1980-81 and these indices have risen, however moderately, and stood at 0.4558, 0.3459, 0.1237 and 0.1929 respectively in 2001-02. These indices for per capita SDP were noted at 0.1493, 0.1177, 0.0124 and 0.0215 respectively during 1980-81 and these indices have risen drastically later on and were observed at 0.2171, 0.1660, 0.0249 and 0.0429 in the year 2001-02. Widening gap in terms of income among rich and poor states, especially after 1991 has also been established through empirical results based on **β -convergence** and **σ -convergence**. This is indeed an alarming situation and a potential threat for stability of a federation like India. Redressal of horizontal economic disparity happens to be an important objective in any scheme of federal devolution of funds among federating states. In India, this task is done by the Planning Commission and Finance Commission. The Thirteenth Finance Commission (2010-15) should assign due weight age to this factor in its scheme of devolution of taxes/grants for states such that inter-state economic disparities may be rectified effectively.

NOTES

1. There exists difference of opinion as to what the I-U hypothesis actually stands for. Sometimes, it is argued that inverted shape is merely a technical property of some inequality measures [Knight, 1976] while Robinson (1976) showed the same to hold true if the variance is taken as a measure of inequality. The other group of scholar [Oshima (1962), Adelman and Morris (1973), Paukert (1973), Della Valle and Oguchi (1976)] have interpreted as a theory about the nexus between economic development and inequality. There have been several attempts [Ahulwalia (1976), Sen (1984), Harris (1986), Braun (1988), Deaton (1989), Anand and Kanbur (1990), Hadd and Kanbur (1992), Alperovich (1992), Braulke (1983), and Shreman Robinson (1976)] to test this hypothesis empirically in case of only two sector. However, it would be more realistic

to explore the possibility of existence of “I-U hypothesis” in case of multi-sector/region economy (Gaur, A.K., 2004).

2. Chatterji (1992) and Chatterji and Dewhurst (1996) distinguish between weak convergence where $\beta < 0$, and strong convergence where $-2 < \beta < 0$.

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Table 1: State Domestic Product (at current Prices) of states (1981-2002)

(Rupees Cro.)

Year	A.P.	Assam	Bihar	Gujarat	Hararyana	H.P.	J&K	Karnataka	Kerala	M.P.	Maharast	Manipur	Nagaland	Orissa	Punjab	Rajasthan	Tamil	Tripura	U.P.	W.B.
1981	7324	2298	6349	6547	3032	723	1050	5587	3823	7012	15163	200	105	3443	4449	4126	7218	264	14012	9594
1982	8974	2966	7391	8205	3498	846	1195	6423	4050	7596	16993	242	131	3844	5285	4850	8677	313	15036	10667
1983	9702	2359	8289	8675	4004	897	1362	7137	4742	8680	18304	256	160	4070	5838	5531	8821	354	17600	12002
1984	11516	4016	9479	11283	4351	1023	1549	8617	5523	10151	21152	304	185	5253	6456	7043	10222	390	19533	14121
1985	11962	4715	11371	11740	4747	1031	1747	9697	6141	10224	22890	344	215	5191	7381	6983	12028	433	21514	16319
1986	13412	5175	12366	12103	5788	1237	1929	10218	6503	12092	26467	372	240	6226	8317	7669	13682	474	24669	17415
1987	14242	5601	14182	14022	6081	1363	2134	11733	7354	12491	28431	426	268	6748	9174	8341	15305	522	27237	18946
1988	17375	6330	15358	13908	6743	1539	2086	13435	8258	16112	33770	542	349	6853	10816	9436	18166	601	30481	23012
1989	22089	6780	18533	19496	8878	1933	2548	15671	9182	18994	40472	606	424	8681	12495	12892	20423	771	36601	24686
1990	25423	8064	19408	21425	9919	2184	2688	17798	10668	21119	50139	634	477	9917	15055	13836	23935	840	41664	27790
1991	31165	9498	22787	24180	12238	2521	2908	20551	12173	26515	58137	723	579	9664	16788	18281	27674	917	49496	31500
1992	37344	10632	25099	26068	14639	2975	3250	26738	15102	27849	65808	868	691	12505	20245	20062	32584	1030	57206	36433
1993	39131	11543	26820	35018	15416	3411	3565	29162	17176	31070	82076	958	811	13416	23280	23671	37023	1079	62066	38768
1994	48048	13095	31250	39190	18347	3744	4416	33924	19688	38500	99729	1156	1045	15481	27547	24727	46152	1244	69846	44460
1995	55844	14580	34912	52013	21863	4340	4901	40427	23236	42901	113197	1306	1209	18156	31543	30420	54131	1307	79135	53819
1996	66780	16385	33705	57861	24652	4931	5329	45133	27909	49118	136119	1412	1442	21463	35504	33708	59718	1557	88511	62462
1997	75410	17480	41188	66883	30363	4676	5812	51360	32387	55872	155388	1571	1727	20636	40585	41872	69042	1703	102864	71555
1998	76705	18865	46219	75335	33275	4971	5599	59752	38002	61019	164577	1695	1541	24105	44789	46846	77302	1863	113105	80665
1999	76606	18588	43467	69499	30645	5266	5905	53935	33850	57830	158196	1828	1647	23112	42223	42497	71963	1785	106351	73719
2000	81311	19601	45792	73867	32538	5561	6210	57206	35940	61243	168130	1961	1752	24401	44763	45100	76368	1882	112455	78004
2001	88453	20877	48152	81173	36316	5698	6439	62691	40583	66963	184306	2094	1867	25943	48947	50575	83705	2055	123440	86419
2002	93038	21821	50516	85534	38438	5910	6666	66031	43068	70477	194322	2227	1957	27076	51532	53570	88168	2161	130021	91099

Source : Figures have been taken from (i) Handbook of Statistics of the Indian Economy, RBI 2006-07, Mumbai, and (ii) C.S.O., Govt. of India.

Table 2 : State Domestic Product of States (1981-02) at Current Prices : Some Relevant Statistics.

States	Mean	Median	Maximum Value	Minimum Value	Standard Dev.	Skewness	Kurtosis	Jerque-Bera	Probability	No. of Obs.
A.P.	41447.9	34254.5	93038	7324	29954.3	0.40513	1.61805	2.35245	0.30844	22
Assam	10966.8	10065	21821	2298	6595.27	0.23658	1.61092	1.97397	0.3727	22
Bihar	26028.8	23943	50516	6349	14924.1	0.26405	1.64633	1.93538	0.37996	22
Gujrat	37001.1	25124	85534	6547	27711.3	0.50385	1.66592	2.56227	0.27772	22
Harayana	3035.46	2748	5910	723	1856.05	0.19938	1.47857	2.26762	0.3218	22
H.P.	16626	13438.5	38438	3032	12224.4	0.48253	1.72086	2.35358	0.30827	22
J&K	3604	3079	6666	1050	1933.81	0.25097	1.53267	2.20459	0.33211	22
Karnatak	29692.1	23644.5	66031	5587	21124.1	0.43014	1.64993	2.34921	0.30894	22
Kerala	18425.4	13637.5	43068	3823	13497.2	0.55078	1.78311	2.46973	0.29088	22
M.P.	32446.7	27182	70477	7012	22003.6	0.39491	1.64599	2.25238	0.32427	22
Maharastra	84262.1	61972.5	194322	15163	63401	0.44491	1.62613	2.45603	0.29287	22
Manipur	987.5	795.5	2227	200	669.27	0.47854	1.83011	2.09426	0.35094	22
Nagaland	855.546	635	1957	105	663.61	0.39917	1.56324	2.47651	0.28989	22
Orissa	13462.9	11211	27076	3443	8215.96	0.33811	1.5862	2.25143	0.32442	22
Punjab	23318.7	18516.5	51532	4449	16340.6	0.40576	1.63674	2.3073	0.31548	22
Rajasthan	23274.4	19171.5	53570	4126	16920.9	0.47613	1.73969	2.28723	0.31867	22
Tamil	39195.8	30129	88168	7218	28246.3	0.43543	1.64784	2.37116	0.30557	22
Tripura	1070.23	973.5	2161	264	629.83	0.31534	1.69181	1.93337	0.38034	22
U.P.	61038.3	53351	130021	14012	39635	0.38091	1.67549	2.14015	0.34298	22
W.B.	41975.2	33966.5	91099	9594	27720.9	0.47103	1.7274	2.29807	0.31694	22

Note : Relevant Statistics are based on figures as shown in Table 1.

Table 3: Per- Capita State-Domestic Product (at current prices) of States (1981-2002)

(Rs.)

Year	A.P.	Assam	Bihar	Gujarat	Hara-yana	H.P.	J.& K.	Karnataka	Kerala	M.P.	Maharastra	Meghalatya	Nagaland	Orissa	Punjab	Rajasthan	Tamilnadu	Tripura	U.P.	W.B.
1981	1358	1144	901	1906	2325	1677	1747	1493	1493	1334	2397	1258	1329	1298	2630	1192	1483	1275	1254	1745
1982	1629	1428	1024	2334	2622	1922	1949	1672	1560	1419	2639	1401	1578	1432	3051	1355	1761	1455	1309	1902
1983	1731	1594	1127	2422	2903	2002	2161	1824	1776	1580	2771	1503	1882	1480	3311	1513	1754	1623	1509	2098
1984	2017	1865	1262	3088	3068	2243	2401	2156	2043	1808	3134	1696	2078	1876	3590	1877	1998	1741	1642	2420
1985	2057	2142	1483	3152	3258	2217	2646	2377	2230	1799	3324	1899	2336	1820	4031	1812	2312	1890	1772	2743
1986	2264	2300	1579	3190	3874	2615	2857	2456	2321	2063	3773	2111	2500	2144	4482	1939	2588	2025	1991	2873
1987	2362	2334	1772	3630	3977	2833	3092	2765	2583	2088	3985	2325	2680	2283	4851	2054	2852	2184	2153	3067
1988	2831	2689	1878	3539	4316	3147	2963	3107	2854	2640	4661	2747	3388	2279	5642	2265	3337	2453	2360	3657
1989	3357	2814	2218	4880	5573	3889	3543	3558	3126	3051	5506	2908	3962	2838	6437	3016	3701	3084	2775	3853
1990	4002	3272	2274	5279	6107	4324	3662	3970	3578	3328	6724	3728	4297	3188	7661	3155	4280	3294	3095	4263
1991	4660	4210	2625	5815	7372	4820	3723	4540	4165	3975	7319	4123	4745	3035	8200	4120	4933	3286	3529	4599
1992	5481	4606	2820	6158	8626	5613	4088	5818	5091	4093	8121	4677	5484	3852	9780	4427	5753	3626	4014	5230
1993	5643	4893	2948	8126	8890	6316	4384	6248	5711	4476	9932	5046	6238	4058	11080	5114	6473	3707	4277	5470
1994	6812	5433	3362	8937	10359	6794	5307	7161	6457	5439	11834	5722	7798	4599	12926	5233	7993	4174	4732	6168
1995	7787	5924	3678	11659	12099	7736	5759	8413	7517	5946	13177	6197	8697	5297	14603	6311	9286	4285	5271	7345
1996	9203	6588	3601	12644	13204	8163	5927	9103	8976	6580	15642	7162	9809	6208	15793	6734	10008	4675	5613	8329
1997	10279	6914	4324	14408	15963	7178	6276	10212	10294	7350	17603	7665	11287	5904	17792	8203	11451	4936	6400	9399
1998	10611	7354	4766	15994	17205	7387	5676	11367	11957	7883	18407	6456	8886	6828	19389	8910	12697	5203	6894	10442
1999	10286	7024	4269	15184	16546	9142	6619	10688	10489	7655	17853	8218	10424	6475	19105	8003	11762	5613	6531	9645
2000	10793	7281	4414	15947	17372	9554	6854	30794	11004	8007	18151	8544	10748	6753	20037	8322	12355	5826	6780	10080
2001	10885	7618	5709	14533	15559	9424	6335	11001	11264	10338	18043	7679	8883	6791	18749	7893	12459	6085	6937	9845
2002	11017	7894	4882	15640	16881	9488	6732	11426	11394	8436	19213	7837	10425	6970	19980	8347	12851	5732	7026	10148

Note : State-wise Net Domestic at factor cost (At Current Prices) for the period 1980-81 to 2001-02 have been taken from Handbook of Statistics on the Indian Economy, RBI 2006-07, Mumbai, and C.S.O., Govt. of India.

Table 4 : Per capita State Domestic Product of States (1981-2002) (Current Prices): Some Relevant Statistics.

States	Mean	Median	Maximum Value	Minimum Value	Standard Dev.	Skewness	Kurtosis	Jerque-Bera	Probability	No. of Obs.
A.P.	5575.68	5070.5	11017	1358	7675.19	0.286	1.4604	2.4728	0.2904	22
Assam	4423.68	4408	7894	1144	2345.29	0.10382	1.466	2.1966	0.3334	22
Bihar	2859.82	2722.5	5709	901	1432.99	1.911	1.4384	1.4384	0.4871	22
Gujrat	8112.05	5986.5	15994	1906	5308.47	0.3771	1.4904	2.6105	0.2711	22
Harayana	9004.5	7999	17372	2325	5623.17	0.3183	1.522	2.3739	0.3051	22
H.P.	5385.63	5216.5	9554	1677	2828.32	0.1381	1.5332	2.0421	0.3602	22
J&K	4304.59	3905.5	6854	1747	1734.8	0.1025	1.5395	1.9938	0.369	22
Karnatak	6915.86	5179	30794	1493	6414.84	2.4068	9.7483	62.9832	0	22
Kerala	5812.86	4628	11957	1493	3828.26	0.4138	1.5611	2.5257	0.2828	22
M.P.	4604	4034	10338	1334	2761.74	0.4496	1.9192	1.812	0.4041	22
Maharastra	9736.77	7720	19213	2397	6365.82	0.3121	1.4547	2.5461	0.2799	22
Manipur	4586.46	4400	8544	1258	2557.85	0.1509	1.5134	2.1095	0.3483	22
Nagaland	5884.27	5114.5	11287	1329	3499.61	0.1883	1.4745	2.2632	0.3225	22
Orissa	3973.09	3520	6970	1298	2077.87	0.2271	1.4823	2.3005	0.3166	22
Punjab	10596.4	8990	20037	2630	6498.27	0.2656	1.4794	2.3781	0.3045	22
Rajasthan	4627.05	4223.5	8910	1192	2766.64	0.2485	1.4952	2.302	0.3163	22
Tamil	6549.41	5343	12851	1483	4283.56	0.3119	1.4794	2.4764	0.2899	22
Tripura	3553.27	3460	6085	1275	1581.98	0.1208	1.6768	1.6558	0.4364	22
U.P.	3993.82	3771.5	7026	1254	2127.72	0.1817	1.4954	2.1962	0.3335	22
W.B.	5696.41	4914.5	10442	1745	3134.47	0.32	1.5546	2.291	0.318	22

Note : Relevant Statistics have been computed on the basis of data as given in Table 3.

Table 5 : Inter-state Growth in Total SDP of Indian States (1980-81 to 2001-02): Regression Results

States	Inter-cept	t	D ₁	D ₂ t	Adj R ²	RSS	SER
A.P.	8.784	0.128 (13.006)	0.593 (4.225)	-0.029 (-2.365)	0.989	0.145	0.089
Assam	7.631	0.14 (13.043)	0.779 (5.102)	-0.064 (-4.808)	0.982	0.171	0.098
Bihar	8.655	0.127 (20.495)	0.629 (7.167)	-0.052 (-6.819)	0.993	0.057	0.0561
Gujrat	8.732	0.119 (9.079)	0.211 (1.125)	-0.003 (-0.169)	0.98	0.259	0.119
Hararyana	7.88	0.127 (13.679)	0.477 (3.606)	-0.022 (-1.905)	0.99	0.128	0.085
H.P.	6.443	0.118 (14.088)	0.742 (6.227)	-0.046 (-4.339)	0.989	0.104	0.076
J&K	6.903	0.103 (12.116)	0.379 (3.145)	-0.029 (-2.719)	0.985	0.107	0.077
Karnatak	8.513	0.126 (13.258)	0.489 (3.619)	-0.025 (-2.116)	0.989	0.134	0.086
Kerala	8.124	0.113 (11.677)	0.187 (1.355)	-0.0001 (-0.011)	0.988	0.139	0.088
M.P.	8.692	0.123 (14.089)	0.524 (4.233)	-0.029 (-2.699)	0.989	0.112	0.079
Maharashtra	9.449	0.127 (11.416)	0.473 (2.989)	-0.018 (-1.293)	0.987	0.183	0.101
Manipur	5.18	0.131 (20.842)	0.421 (4.697)	-0.032 (-3.994)	0.995	0.059	0.057
Nagaland	4.535	0.163 (13.154)	0.823 (4.656)	-0.055 (-3.546)	0.986	0.229	0.113
Orissa	8.023	0.114 (11.774)	0.381 (2.769)	-0.027 (-2.197)	0.984	0.139	0.088
Punjab	8.273	0.129 (14.513)	0.525 (4.158)	-0.03 (-2.715)	0.99	0.117	0.081
Rajasthan	8.227	0.127 (13.372)	0.536 (3.959)	-0.026 (-2.202)	0.989	0.135	0.087
Tamilnadu	8.739	0.132 (13.541)	0.488 (3.527)	-0.028 (-2.269)	0.989	0.141	0.088
Tripura	5.465	0.123 (19.672)	0.546 (6.118)	-0.045 (-5.668)	0.993	0.058	0.057
U.P.	9.396	0.121 (18.493)	0.536 (5.77)	-0.033 (-4.048)	0.993	0.063	0.059
W.B.	9.055	0.119 (14.144)	0.3 (2.505)	-0.02 (-1.927)	0.989	0.105	0.077

Note : Regression results have been calculated on the basis of data as given in Table 1. Figures in the parenthesis are t values.

Table 6 : State Domestic Product (Total) of Indian States (1981-2002): Per Annum Growth Rates

States	Growth rate (in percentage) during	
	Pre-economic reform era (1980-81 –1990-91)	Economic reform era (1991-92 –2001-2002)
A.P.	12.8	9.9
Assam	14	7.6
Bihar	12.7	7.4
Gujrat	11.9	11.6
Harayana	12.7	10.5
H.P.	11.8	7.2
J&K	10.3	7.4
Karnatak	12.6	10.1
Kerala	11.3	11.29
M.P.	12.3	9.4
Maharastra	12.7	10.9
Manipur	13.1	9.9
Nagaland	16.3	10.8
Orissa	11.4	8.7
Punjab	12.9	9.9
Rajasthan	12.7	10.1
Tamilnadu	13.2	10.4
Tripura	12.3	7.8
U.P.	12.1	8.8
W.B.	11.9	9.9

Note : Per annum growth has been calculated on the basis of regression coefficients at t and $D_{2,t}$ as given in Table 5.

Table 7 : Per capita growth rate of SDPs at current prices (1981-2002) : Regression Results.

States	Inter-cept	t	D ₁	D ₂ t	R ²	AdjR ²	Rss	SER
A.P.	7.0932	0.1156 (12.8626)	0.7121 (4.2647)	-0.0411 (-3.2331)	0.986	0.9835	0.16	0.0943
Assam	7.0235	0.1127 (18.3419)	0.8463 (7.4157)	-0.06 (-6.9078)	0.991	0.9891	0.0747	0.0644
Bihar	6.7243	0.1049 (17.6172)	0.5173 (4.676)	-0.0433 (-5.1379)	0.989	0.9874	0.0702	0.0625
Gujarat	7.5042	0.1032 (8.6433)	0.4331 (1.9519)	-0.017 (-1.0067)	0.975	0.9708	0.2825	0.1253
Haryana	7.6081	0.109 (11.7014)	0.6574 (3.7993)	-0.0359 (-2.7276)	0.984	0.9811	0.1718	0.0977
H.P	7.2851	0.104 (15.9701)	0.8266 (6.8358)	-0.0541 (-5.8788)	0.989	0.9871	0.0839	0.0683
J & K	7.4503	0.0761 (11.3639)	0.4374 (3.5186)	-0.0309 (-3.2627)	0.978	0.9744	0.0887	0.0702
Karnataka	7.2001	0.1082 (4.9627)	0.3504 (0.8649)	-0.0108 (-0.3513)	0.93	0.918	0.9419	0.2288
Kerala	7.1841	0.0997 (11.1328)	0.4561 (2.7430)	-0.0151 (-1.1955)	0.986	0.9836	0.1587	0.0939
M.P.	7.0309	0.1068 (13.6283)	0.4163 (2.8595)	-0.0267 (-2.4099)	0.987	0.9846	0.1216	0.0822
Maharashtra	7.6027	0.1123 (11.5308)	0.644 (3.5592)	-0.0328 (-2.3818)	0.984	0.9815	0.1879	0.1022
Manipur	6.9757	0.1182 (16.0414)	0.9211 (6.7325)	-0.0643 (-0.1730)	0.988	0.986	0.1074	0.0772
Nagaland	7.111	0.1247 (11.4296)	1.0639 (5.2497)	-0.0715 (-4.6342)	0.977	0.9737	0.2357	0.1144
Orissa	7.0854	0.0911 (12.4925)	0.5272 (3.8935)	-0.0304 (-2.9477)	0.985	0.9826	0.1052	0.0765
Punjab	7.7525	0.1132 (15.7346)	0.7239 (5.4173)	-0.0429 (-4.2163)	0.99	0.9886	0.1025	0.0755
Rajasthan	6.9709	0.1105 (11.0325)	0.7742 (4.1623)	-0.0463 (-3.2727)	0.98	0.9767	0.1985	0.105
Tamilnadu	7.1616	0.1185 (14.1066)	0.7052 (4.5186)	-0.0398 (-3.3533)	0.988	0.9865	0.1398	0.0881
Tripura	7.0651	0.0978 (22.1409)	0.5015 (6.1126)	-0.0440 (-7.0421)	0.993	0.9913	0.0386	0.0463
U.P.	6.988	0.1033 (19.1601)	0.6733 (6.7232)	-0.0447 (-5.8616)	0.992	0.9912	0.0576	0.0565
W.B.	7.3741	0.0985 (12.5162)	0.4072 (2.7857)	-0.0266 (-2.3896)	0.984	0.9814	0.1226	0.0825

Notes : (1) Regression results have been calculated on the basis of data as given in Table 3

(2) Figures in the parenthesis are t values.

Table 8 : Average Annual Growth in per capita State Domestic Products of States (1981-2002).

States	Growth rate (in percentage during	
	Pre-economic reform era (1980-81 –1990-91)	Economic reform era (1991-92 –2001-02)
A.P.	11.56	7.45
Assam	11.27	5.27
Bihar	10.49	6.16
Gujarat	10.32	8.62
Harayana	10.9	7.31
H.P.	10.4	4.99
J & K	7.61	4.52
Karnataka	10.82	9.47
Kerala	9.97	8.46
M.P.	10.68	8.01
Maharashtra	11.23	7.95
Manipur	11.82	5.39
Nagaland	12.47	5.32
Orissa	9.11	6.07
Punjab	11.32	7.03
Rajasthan	11.05	6.42
Tamilnadu	11.85	7.87
Tripura	9.78	5.38
Uttar Pradesh	10.33	5.86
W.B.	9.85	7.19

Note : Growth rates for Pre-economic and Reform era have been calculated on the basis of coefficients of t and D_2t as given in Table 7.

Table 9 : Family of SDP (Total) Inequality Indices of Indian States (1981-2002) .

Year	Inequality Indices Based on														
	Traditional Measures		Properties of Lorenz Curve				Herfindahl's Index			Atkinson's Social Welfare Function					
	C.V.	Variance of Log	Gini Coefficient	RMD	Theil Index	Kakwani index	H ₁	H ₂	H ₃	Atkin (ε=0.5)	Atkin (ε=1.1)	Atkin (ε=1.5)	Atkin (ε=1.9)	Atkin (ε=2.1)	Atkin (ε=2.5)
1980-81	0.8106	1.3900	0.4409	0.3372	0.1147	0.1804	0.0829	0.0872	0.0346	0.1958	0.4994	0.6933	0.8178	0.8548	0.8990
1981-82	0.7872	1.3700	0.4340	0.3347	0.1109	0.1707	0.0810	0.0852	0.0326	0.1910	0.4931	0.6849	0.8105	0.8483	0.8936
1982-83	0.7886	1.3600	0.4319	0.3313	0.1107	0.1753	0.0811	0.0854	0.0327	0.1901	0.4873	0.6786	0.8040	0.8421	0.8881
1983-84	0.7727	1.3800	0.4282	0.3295	0.1088	0.1733	0.0799	0.0841	0.0314	0.1889	0.4893	0.6827	0.8077	0.8403	0.8905
1984-85	0.7754	1.3700	0.4292	0.3334	0.1094	0.1745	0.0801	0.0843	0.0316	0.1895	0.4879	0.5785	0.8026	0.8403	0.8860
1985-86	0.7845	1.3600	0.4304	0.3308	0.1100	0.1744	0.0808	0.0850	0.0324	0.1894	0.4864	0.6770	0.8018	0.8397	0.8858
1986-87	0.7803	1.3500	0.4297	0.3321	0.1095	0.1741	0.0804	0.0847	0.0320	0.1888	0.4846	0.6745	0.7993	0.8375	0.8838
1987-88	0.7960	1.3400	0.4395	0.3395	0.1131	0.1798	0.0817	0.0860	0.0333	0.1933	0.4871	0.6709	0.7919	0.8296	0.8767
1988-89	0.7868	1.3500	0.4334	0.3360	0.1113	0.1774	0.0810	0.0852	0.0326	0.1911	0.4850	0.6703	0.7926	0.8306	0.8775
1989-90	0.8109	1.3400	0.4411	0.3368	0.1147	0.1808	0.0829	0.0872	0.0346	0.1946	0.4874	0.6699	0.7667	0.8283	0.8751
1990-91	0.8144	1.3500	0.4441	0.3389	0.1162	0.1835	0.0832	0.0875	0.0349	0.1975	0.4930	0.6746	0.7932	0.8300	0.8757
1991-92	0.8041	1.3500	0.4391	0.3333	0.1142	0.1804	0.0823	0.0867	0.0340	0.1949	0.4901	0.6728	0.7921	0.8291	0.8748
1992-93	0.8299	1.3600	0.4454	0.3360	0.1181	0.1848	0.0844	0.0889	0.0363	0.1996	0.4965	0.6779	0.7953	0.8316	0.8765
1993-94	0.8430	1.3600	0.4512	0.3428	0.1203	0.1876	0.0855	0.0900	0.0374	0.2019	0.4976	0.6765	0.7926	0.8288	0.8737
1994-95	0.8298	1.3800	0.4486	0.3421	0.1192	0.1871	0.0844	0.0889	0.0362	0.2022	0.5533	0.6850	0.8008	0.8362	0.8796
1995-96	0.8542	1.3600	0.4557	0.3484	0.1224	0.1904	0.0865	0.0910	0.0384	0.2047	0.5011	0.6784	0.7930	0.8286	0.8730
1996-97	0.8563	1.3800	0.4580	0.3472	0.1244	0.1937	0.0867	0.0912	0.0386	0.2097	0.5120	0.6889	0.8000	0.8342	0.8764
1997-98	0.8405	1.4500	0.4536	0.3438	0.1234	0.1927	0.0853	0.0898	0.0372	0.2117	0.5302	0.7150	0.8250	0.8541	0.8954
1998-99	0.8459	1.3900	0.4538	0.3443	0.1223	0.1909	0.0858	0.0903	0.0377	0.2067	0.5103	0.6899	0.8029	0.8373	0.8796
1999-00	0.8787	1.4300	0.4757	0.3703	0.1318	0.2055	0.0886	0.0933	0.0406	0.2209	0.5348	0.7122	0.8195	0.8515	0.8904
2000-01	0.8494	1.3900	0.4555	0.3459	0.1235	0.1925	0.0867	0.0913	0.0386	0.2087	0.5144	0.6934	0.8148	0.8587	0.8904
2001-02	0.8501	1.4000	0.4558	0.3459	0.1237	0.1929	0.0868	0.0913	0.0387	0.2092	0.5154	0.6942	0.8253	0.8691	0.9606

Note : Inequality indices have been calculated on the basis of data given in Table 1.

Table 10 : Family of Per Capita SDP Inequality Indices of Indian States (1981-2002) .

Year	Inequality Indices Based on														
	Traditional Measures		Properties of Lorenz Curve				Herfindahl's Index			Atkinson's Social Welfare Function					
	C.V.	Variance of Log	Gini Coefficient	RMD	Theil Index	Kakwani index	H ₁	H ₂	H ₃	Atkin (ε=0.5)	Atkin (ε=1.1)	Atkin (ε=1.5)	Atkin (ε=1.9)	Atkin (ε=2.1)	Atkin (ε=2.5)
1980-81	0.2816	0.0688	0.1493	0.1177	0.0124	0.0215	0.0569	0.0599	0.0073	0.0181	0.0385	0.0513	0.0635	0.0693	0.0806
1981-82	0.2864	0.0708	0.1520	0.1192	0.0128	0.0222	0.0571	0.0601	0.0075	0.0187	0.0397	0.0528	0.0652	0.0712	0.0827
1982-83	0.2770	0.0658	0.1463	0.1138	0.0119	0.0207	0.0568	0.0598	0.0072	0.0174	0.0370	0.0492	0.0608	0.0664	0.0772
1983-84	0.2677	0.0623	0.1403	0.1087	0.0110	0.0191	0.0564	0.0594	0.0067	0.0161	0.0345	0.0463	0.0576	0.0631	0.0738
1984-85	0.2677	0.0625	0.1441	0.1107	0.1130	0.0195	0.0565	0.0595	0.0068	0.0164	0.0350	0.0467	0.0578	0.0631	0.0733
1985-86	0.2757	0.0642	0.1455	0.1111	0.0118	0.0204	0.0567	0.0597	0.0071	0.0171	0.0363	0.0482	0.0595	0.0649	0.0752
1986-87	0.2726	0.0634	0.1457	0.1109	0.0116	0.0200	0.0566	0.0596	0.0069	0.0169	0.0357	0.0475	0.0587	0.0640	0.0742
1987-88	0.2804	0.0667	0.1481	0.1105	0.0121	0.0209	0.0569	0.0599	0.0073	0.0177	0.0375	0.0499	0.0617	0.0673	0.0783
1988-89	0.2865	0.0695	0.1509	0.1149	0.0128	0.0219	0.0571	0.0601	0.0075	0.0185	0.0392	0.0520	0.0641	0.0699	0.0810
1989-90	0.3108	0.0799	0.1602	0.1203	0.0148	0.0252	0.0579	0.0610	0.0084	0.0214	0.0451	0.0597	0.0735	0.0801	0.0928
1990-91	0.3042	0.0802	0.1596	0.1164	0.0144	0.0248	0.0577	0.0608	0.0082	0.0210	0.0447	0.0595	0.0736	0.0804	0.0935
1991-92	0.3163	0.0871	0.1669	0.1228	0.0156	0.0267	0.0582	0.0612	0.0086	0.0227	0.0482	0.0643	0.0871	0.0800	0.1010
1992-93	0.3447	0.1055	0.1847	0.1388	0.0186	0.0319	0.0592	0.0623	0.0096	0.0271	0.0578	0.0771	0.0954	0.1043	0.1214
1993-94	0.3577	0.1131	0.1925	0.1455	0.0199	0.0342	0.0597	0.0628	0.0102	0.0291	0.0619	0.0824	0.1019	0.1112	0.1291
1994-95	0.3715	0.1286	0.2030	0.1541	0.0219	0.0379	0.0603	0.0634	0.0108	0.0322	0.0691	0.0924	0.1146	0.1253	0.1458
1995-96	0.3804	0.1418	0.2086	0.1579	0.0232	0.0402	0.0607	0.0639	0.0112	0.0344	0.0745	0.1004	0.1255	0.1377	0.1615
1996-97	0.4066	0.1572	0.2239	0.1741	0.0263	0.0456	0.0618	0.0651	0.0125	0.0388	0.0833	0.1113	0.1377	0.1503	0.1742
1997-98	0.4275	0.1697	0.2352	0.1861	0.0289	0.0499	0.0628	0.0661	0.0135	0.0425	0.0905	0.1201	0.1476	0.1605	0.1846
1998-99	0.4023	0.1508	0.2188	0.1653	0.0255	0.0439	0.0616	0.0648	0.0122	0.0375	0.0804	0.1073	0.1329	0.1452	0.1686
1999-00	0.5330	0.2150	0.2695	0.2098	0.0407	0.0664	0.0683	0.0718	0.0192	0.0578	0.1184	0.1537	0.1854	0.2000	0.2271
2000-01	0.3660	0.1204	0.2006	0.1539	0.0211	0.0365	0.0601	0.0632	0.0106	0.0309	0.0657	0.0821	0.1076	0.1173	0.1354
2001-02	0.3980	0.1450	0.2171	0.1660	0.0249	0.0429	0.0614	0.0647	0.0120	0.0365	0.0779	0.1037	0.1281	0.1396	0.1616

Note : Inequality indices have been calculated on the basis of data given in Table 3.

Table 11 : Barro Regression Results for Total State Domestic Product (at current prices) : σ convergence.

Time Period	α (intercept)	β (slope)	R ²	DW	Log likelihood	AIC
1980-81 to 1990-91	8.18 (285.59)	0.1289 (30.53)	0.99	0.50	19.78	-3.16
1991-92 to 2001-02	6.23 (2.70)	0.2217 (1.66)	0.23	2.40	-18.19	3.67
1980-81 to 2001-02	8.16 (18.87)	0.1149 (3.49)	0.38	2.19	-29.70	2.88

Table 12 : Barro Regression Results for Per Capita State Domestic Product (at current prices) : σ convergence.

Time Period	α (intercept)	β (slope)	R ²	DW	Log likelihood	AIC
1980-81 to 1990-91	5.95 (140.15)	0.12 (18.50)	0.97	0.58	15.45	-2.45
1991-92 to 2001-02	6.48 (20.04)	0.10 (5.18)	0.75	1.43	3.40	-0.25
1980-81 to 2001-02	6.34 (13.51)	0.07 (1.88)	0.16	1.09	-29.76	3.02

Table 13 : Barro Regression Results for Total State Domestic Product (at current prices) : β convergence.

Time Period	α (intercept)	β (slope)	R ²	DW	Log likelihood	AIC
1980-81 to 1990-91	14.98 (10.08)	-0.31 (-1.66)	0.13	2.17	-29.90	3.19
1991-92 to 2001-02	6.99 (3.13)	0.27 (1.44)	0.07	1.76	-34.79	3.68
1980-81 to 2001-02	11.4675 (6.18)	0.0688 (0.30)	0.005	2.13	-34.33	3.63

Table 14 : Barro Regression Results for Per Capita State Domestic Product (at current prices) : β convergence.

Time Period	α (intercept)	β (slope)	R ²	DW	Log likelihood	AIC
1980-81 to 1990-91	11.82 (1.71)	-0.16 (-0.17)	0.002	1.99	-29.38	3.14
1991-92 to 2001-02	-9.44 (-1.08)	1.92 (1.86)	0.16	1.54	-32.76	3.48
1980-81 to 2001-02	-2.53 (-0.30)	1.70 (1.48)	0.11	2.03	-33.32	3.53

Note : Figures in the Parenthesis are t-ratios.