Convergence In Public Expenditure And Public Revenue Across Indian States: Implications For Sustainable Economic Growth

Bimal K. Mohanty
Gangadhar Meher (Autonomous) College
Sambalpur-768 004, Orissa: India
E-mail: mohanty_bimal@indiatimes.com
          mohanty_bimal@yahoo.in

Abstract

Convergence of public expenditure, public revenue and also per capita income has been examined for fourteen non-special category major states of India during the post-reforms period 1991-92 – 2009-10. The empirical verification of the convergence hypothesis has been accomplished with absolute β-convergence, σ-convergence and spatial convergence with Spatial Lag Models and Spatial Cross-Regressive Models. Though in certain cases, the sign of the convergence coefficient exhibits the presence of convergence, it could not be defended on ground of its statistical significance. The absence of convergence in public expenditure and public revenue is seen to have been a strong deterrent to the achievement of sustainable economic growth of the Indian economy.

Introduction

In one of the ingenious works, Sala-i-Martin (1996) has put a question probably to the world of economists and to himself that "Will relatively poor economies remain poor for many generations?" A close look at the dynamics of international development has often resulted in the surfacing of such spontaneous apprehension. In recent time, there has been reallocation of global economic powers from the developed economies to the developing world particularly to emerging economies of Brazil, Russia, India and China (BRIC). In near future, South Africa is expected to join the cluster. Since the conclusion of the World War II till 2010, the world economy has exhibited a growth rate of 5 per cent per annum. During the period under reference, while the group of developed economies has grown by 3 per cent per annum, the developing economies have displayed a phenomenal growth rate of 7.1 per cent per annum. The annual average growth rates for the BRIC countries, China, India, Brazil and Russia are 10.3, 9.7, 7.5 and 3.7 per cents respectively, each has exhibited growth rate higher than the over all growth rate of developed economies (3 per cent). The countries which had no economies worth the name few years back are now at least capable of arranging, if not fabulous but some minimum livelihood for their citizens. India in the Indian Sub-Continent and Ethiopia in the Sub-Saharan Africa each had a paltry growth rate of less than 3 per cent during 1970s. The shift of approach of each to a more open and market-based economy during 1990s has brought them splendid gains. While the growth rate of India has leaped into

more than 8 per cent in 2010-11 by breaking all hitherto existing barriers, Ethiopia which had the tenth biggest economy in Sub-Saharan Africa in 2004 has elevated to the fifth place in 2010. Thus the international evidence on the growth profiles of countries over time could be a possible part response to Sala-i-Martin's scepticism. Given the market to function ideally, convergence among countries is not a proposition beyond one's expectation. But how long may it take to converge depends exclusively on how perfect the international market for technology, goods, capital and labour is and the receptive capacity of the home economy of each country under reference. The neo-classical economists who are believed to have laid the foundation stone for research on convergence particularly Koopmans (1965), Solow (1956) and Swan (1956) have attributed the ultimate convergence among nations to the speed at which returns to capital diminishes with increase in national output. However, this conclusion has encountered challenges from the writings of endogenous growth theorists (DeLong 1988, Romer 1986, 1990). In their opinion, the inclusion of human capital into the model would be the source of continuation of increasing returns to scale in production which would widen the gap between per capita incomes of the countries over time. In spite of the conflicting theoretical ideologies of the two schools of thought in respect of growth convergence, lots of research interests have been focused particularly on regional income convergence. Beside the studies from other parts of the globe, quite a good number of researches have been done on convergence among the countries of European Union (Anagnostou et al 2008, Arbia and Paelinck 2003, Baumont et al 2001, Cuadrado 2001, Dogan and Saracoglu 2007, Paas et al 2007, Paas and Schlitte 2008, Quah 1996). Almost all the

studies have made profuse use of tools from applied econometrics particularly from spatial econometrics to reach inferences. Of course, no uniformity has been located in their conclusions.

The publication of two classic papers on the theory of convergence by Barro and Sala-i-Martin (1991, 1992) ignited interest among economists and researchers to enquire into the trends of regional income convergence. Of course, much before them, Baumol (1986) hinted at the theory of convergence. The basic idea behind the convergence studies is that given perfect foresight for all individuals and substitutability between capital and labour, regardless of the initial capital stocks economies with similar characteristics would follow a growth path leading to a common steady-state balance which is globally stable. This is 'absolute' convergence hypothesis. However, economies seldom exhibit comparable characteristics. In the presence of such non-comparable distinctiveness, with the passage of time, the countries would tend towards growth paths leading to different steady-state balance for each. This convergence hypothesis has been described as 'conditional' convergence. In spite of these two tests being complementary, in a longitudinal space, convergence can occur even though absolute convergence is not valid (Paas et al 2007). Both 'absolute' and 'conditional' convergence hypotheses have been highlighted by Barro and Sala-i-Martin (1992). Initially in the literature on 'convergence' no mention has been made of spatial variation in the cross-section. This sounds logically incongruous. Spatial spillovers and spatial interdependence at least among contiguous regions should not be ignored while investigating the dynamics of convergence across geographical space. With the advancement in the network of communication and transportation technology and wonderful expansion of cable media and internet, interdependence and spillovers among the geographically distanced regions cannot be ruled out. Thus the test for convergence across the geographical regions of a particular space must admit the assumption of interdependence and spillovers. In all good sense therefore, the studies on convergence must explicitly relax the assumption of independence and non-flow of externalities across the regions. In this context, Krugman's (1991) views merit mention. Spatial convergence is theoretically attributed to location externalities and spillovers. But empirical economics is yet to discover the reasons for convergence across space and regions. Thus empirical economics without making any attempt to locate the causes and sources of convergence, simply examines whether the regions are convergent in classical sense. This seems to be a great paradox in empirical economics for convergence studies. Sala-i-Martin (1996) himself has admitted the (his) technique of convergence as the 'classical' technique more appropriately for having 'survived the challenges of more modern and 'surrealist' movements'.

Rationale Of The Study

In this article, an attempt has been made to examine whether public expenditure and own revenue receipts, each taken separately across the non-special category major Indian states are convergent during the post-reforms period 1991-92 – 2009-10. Though these are the two major items of focus, nonetheless a passing reference has also been made to locate the convergence in per capita Net State Domestic Product (NSDP) at factor cost for the same cluster of Indian states. The Indian economy has submitted itself to a transformation that is unique from a historical point of view. India opted for a policy shift from the more-than-three-decade old mixed economic governance to a privatised and liberalised regime which had the twin objectives of dislodging the stagnant growth rate of 3.56 per cent per annum in GDP production during 1950-51 – 1979-80 and resolving the decades-old deep-seated balance of payments crisis. Though the policy shift was confronted with risks as no body was explicit about its likely consequences, in spite of all apprehensions, it has proved beneficial to Indian economy much exceeding one's expectations. The agenda of reforms was developed on the urgency of bringing macroeconomic stability on the one hand and increasing allocative efficiency of the Indian economy on the other. Fiscal restructuring was one among the leading components of the whole agenda of structural reforms programme in India whose foundation stone was laid in early 1980s. Though the full-fledged reforms programme was initiated with the introduction of the New Economic Policy in mid-July 1991, it finally got completed in 1993-94 with the conclusion of almost all the major sectoral reforms. It was strongly felt that for the Indian federation, fiscal consolidation at the centre would be an impossible and futile exercise without supplementing fiscal reforms at the state level. Accordingly, all the states of India went for reorganisation of their respective fiscal system with the principal aim of stabilising their own within the shortest possible time limit. This needed enhancement of revenue productivity of the tax system, reorientation and prioritisation of public expenditure and ultimately restraining the obese fiscal deficits by liquidating the debt burden. Fiscal deficits which were the perturbing causes of smooth operation of sub-national finances in India were planned to be contained not exceeding a quantitative target of 6.5 per cent of Gross State Domestic Product (GSDP).

The overall reforms of the Indian economy comprise the reforms in fiscal, monetary, financial, banking and in other complementary sectors. It was comprehended that among all these sectoral reforms, fiscal and budgetary reforms at the national level would be incomplete without reforming the sub-national fiscal system and its management. Accordingly, all the state governments in India worked under one transcript from the Fiscal Responsibility and Budget Management Act of the Government of India which came into force in 2003. The main purpose of the FRBM Act is to discipline the finances of the Government of India and also those of the sub-national governments. This would unavoidably lead to bring about harmonisation of state level tax systems, public expenditure programmes and debt policies excepting for minor variations. Disciplining the finances of the governments necessitates meeting the objectives of (1) ensuring intergenerational equity in fiscal management, (2) ensuring long-term macroeconomic stability, and (3) removing fiscal hurdles for effective implementation of monetary policy. The corresponding strategies were to (1) limit the government borrowing in a time bound agenda, eliminate revenue deficit in total, and bring down fiscal deficit to economically rational limits; (2) bring a medium-term perspective in budget planning; and (3) improve transparency in the fiscal functioning of the government. In order to fulfill the objectives of the FRBM Act, the Government of India structured certain quantitative and non-quantitative obligations. All these obligations, as it was felt, could not be met in the absence of complementarity and harmonisation initiatives from the constituent states of the Indian federation. Accordingly, all the state governments in India were brought under a single directive for fiscal consolidation of their respective finances. Since they were under a single command to discipline their fiscal systems for realising the maximum economic and social gains from the new regime of liberalisation, privatisation and globalisation (LPG), it is postulated that there might have been flow of spatial (inter-state) externalities and spillovers in regard to public expenditure and own revenue receipts along with per capita NSDP (per capita income) in the post-reforms period. Hence is the rationale of the study.

Consequent upon the reforms in national and sub-national finances in India, the possibility of the flow of spatial externalities across the Indian states should not be ruled out. Some reasonable grounds are there to justify the hypothesis. Indian states particularly the low-income states of (undivided) Bihar, (undivided) Madhya Pradesh, Orissa, Rajasthan, and (undivided) Uttar Pradesh are seen to have lagged behind the other states in terms of both economic and social sector development. The reforms in fiscal systems in India have a priority objective of using budgets of the states as instruments of economic and social sector development. This avowed objective equally applies to other states. If one state goes to have larger provision for the development of physical infrastructure with a view to attracting more foreign direct investment (FDI), the remaining states may not park themselves as the onlookers on obvious grounds. If one state goes to have larger budgetary allocations for social sector development like health, sanitation, education, nutrition etc, it is expected that other states may use their budgets to augment development in their own social sectors also. If one state in a federation is amply rich in terms of own revenue receipts, this may leave some type of demonstration effect on the other states in terms of tax efforts. The expenditure provision by any state or an agglomeration of some states to a particular objective of contemporary significance is likely to be followed by the remaining states, more particularly the contiguous states. On these grounds and on similar such other grounds inter-state spillovers in public actions may not be ruled out. In view of this, the present work unambiguously relaxes the assumption of spatial independence across the observations. Without this assumption, the study results may be distorting in their implications.

Variables, Data And Data Sources

In order to accomplish the objectives of the study, three variables namely state wise public expenditure, public revenue and per capita income of India during a nineteen-year time period spreading over 1991-92 – 2009-10 have been used. The cross-section of states includes those ones which are non-special category major states of India in respect of whom comparable and continuous data are available from published sources. Indian states are classified into special category states and non-special category states. Though in India no constitutional provision is there to assign the special category status to a state, but from the view point of granting them certain concessions and awards in the shape of Central Plan Assistance to catch-up with other states, the Government of India declared 11 states out of 28 states as special category states of India[1]. The Thirteenth Finance Commission (2010-2015) has defined a special category state as the one which comprises "hilly terrain, sparsely populated habitation and high transport costs leading to high delivery cost of public services." For such states, in the past, 90 per cent of the assistance from the Government of India was treated as a grant, the remaining 10 per cent as a loan. The most part of the expenditure responsibilities of these states is directly funded by the central government. Their heavy dependence on central grants might render

them lethargic in terms of tax efforts. Non-special category states, on the contrary are those ones which are exempted from extra financial awards from the Government of India excepting those ones which are statutorily provided. They receive routine awards from the Government of India on the basis of the recommendations of the Finance Commissions and plan grants from the Planning Commission. Though in India, there are 17 non-special category major states, all have not been included in the cross-section. From among these 17 states, the states of Chhattisgarh, Goa and Jharkhand are newly formed after the reorganistion of Indian states and hence comparable data in respect of these three states are not available for the period under reference. On ground of data continuity, the cross-section comprises 14 major states only[2].

Public expenditure variable of each state comprises the revenue expenditure and capital expenditure, the latter being the aggregate of expenditure on social services, economic services and general services. Though a portion of the capital expenditure consists of the 'discharge and repayment of loans', it is omitted from the study. This portion being a committed expenditure of the government is counted as a control variable and hence treated constant to the analysis. Public revenue variable comprises revenue receipts of each state from its own tax sources and own non-tax sources, the aggregate of which is referred to as states' own revenue receipts. In order to analyse state level income convergence for India along with the convergence in public expenditure and public revenue, the empirical testing of the convergence hypothesis for income has been made by using per capita NSDP at factor cost at current prices which is referred to as per capita income. In order to retain compatibility, per capita income in its current price terms has been admitted. Since other two series in public expenditure and public revenue each has been used at current prices for convergence analysis, per capita income is also used in its current price terms. The type of data that has been used in the study is a set of pooled data. Since the sample information is to include cross-section and time-series data of the form Y_{it}, it has to be a series of pooled data. Pooled data in its recent terminology has been described as panel data or longitudinal data. It has the advantages of measuring within and between variations over time. Data on these variables have been accessed from the regular publications of the Reserve Bank of India, Central Statistical Organisation, Government of India and Registrar General of India[3].

Models For Convergence Analysis

Convergence hypothesis is an empirical derivative of the theoretical growth models particularly due to neo-classical economists during 1950s and 1960s in which technical progress parameter appears to be exogenously given. It focuses on the main item of whether the difference over space (inter space) or regions within a given space (intra space) in terms of per capita income decreases over time. Though the model was initially formulated for estimating income convergence, it can also be extended to study the presence/absence of convergence in other longitudinal observations. The models that have been used in this paper for estimating state level public expenditure, public revenue and per capita income convergence separately in India are due to Barro and Sala-i-Martin (1991) and Sala-i-Martin (1996). Stated elsewhere in this work, the methodology draws an unambiguous difference between the concepts of absolute convergence and conditional convergence. The classical regression model with white noise disturbance is used to estimate β-convergence (the other name for absolute convergence) under the assumption that all state economies are identical and there is the absence of spillovers across the states over time. The models are as follows.

$$\ln\left(\frac{pe_{i,t+T}}{pe_{it}}\right) = \alpha_1 + \beta_1 \ln(pe_{it}) + \varepsilon_{1t} \text{ ------ (1)}$$

$$\ln\left(\frac{pr_{i,t+T}}{pr_{it}}\right) = \alpha_2 + \beta_2 \ln(pr_{it}) + \varepsilon_{2t} \text{ ------ (2)}$$

$$\ln\left(\frac{y_{i,t+T}}{y_{it}}\right) = \alpha_3 + \beta_3 \ln(y_{it}) + \varepsilon_{3t} \text{ ---------- (3)}$$

where pe = per capita public expenditure,
pr = per capita revenue receipts,
y = per capita income, and
α and β are the parameters of the models of which the latter is defined as the 'convergence' coefficient.

Absolute β-convergence holds across the states if β−coefficient in each regression is negative and is not statistically different from zero (statistically significant). The existence of β-convergence means that initially the less developed states progress more rapidly than the more developed states and finally the former tends to catch-up with the latter. To quote Sala-i-Martin (1996), "--- there is absolute β-convergence if poor economies tend to grow faster than the rich ones." In the reverse, the more developed states initially progress faster and hence there would be no convergence across the states at all.

From the estimate of β, two indicators of absolute convergence, that is speed of convergence and half-life can be computed. While the 'speed of convergence' measures how fast the economies converge towards a globally stable steady state balance (by reducing the distance between more developed and less developed space), 'half-life' is defined as the time necessary for the economies to traverse half of the initial lag from their steady states or half of the variations which separate them from their steady states (Pass et al 2007). The speed of convergence is estimated from:

$$s = -\ln(1+\beta)/T \quad \text{---------------------- (4)}$$
and the half-life is computed from:
$$\tau = -\ln(2)/\ln(1+\beta/T) \quad \text{------------- (5)}$$

where T is the number of periods for which we have data. In the present context, the period having ranged over 1991-92 – 2009-10, makes T = 19.

The empirical testing of the convergence hypothesis is usually conducted at two levels, β-convergence and σ-convergence. Both concepts are complementary in the sense that while β-convergence is a measure of showing whether the poorer regions are catching-up with the richer regions over time, σ-convergence indicates the trend of inequality in the distribution over time. The σ-convergence is defined in terms of cross-sectional dispersion. If the standard deviation or the coefficient of variation of observations across space for a given time decreases, then there is convergence. In the reverse, there is divergence. Since both these measures of convergence stand to explain different phenomena, they are far from being identical but complementary. While β-convergence explains the behaviour of the per capita variable within the distribution, σ-convergence on the other hand, explains the sequential movement in the distribution. The complementarity between β-convergence and σ-convergence has been explained by Sala-i-Martin (1996) with Panel Diagrammes. He writes, "… a necessary condition for the existence of σ-convergence is the existence of β-convergence" and "… the existence of β-convergence will tend to generate σ-convergence". These two in combination produce the generalisation that if a variable is convergent in β sense, this may be convergent in σ sense. If it is convergent in σ sense, may not necessarily be convergent in β sense for the reason that with distribution of income across space tending to be more equitable over time, poor countries may not grow faster than the rich from the growth initial (Quah 1993). Thus β-convergence may be a vital requirement for σ-convergence.

Again β-convergence has two editions namely absolute β-convergence and conditional β-convergence. While the former emphasises space independence and discounts the spatial dimension of the problem, the latter makes space dependence explicit. In reality, with the passage of time, interactions among space cannot be ruled out and hence, spatial interaction effects must be admitted into convergence equation which is again a linear regression. Once spatial interaction effects are admitted into the model estimation, β-convergence estimated from the unconditional models given under (1), (2) and (3) above would be biased. This would lead to spatial autocorrelation with measurement errors problem. The presence of spatial autocorrelation in a longitudinal series is the other version of the existence of a functional relationship between what happens at one point in space and what happens elsewhere (Magalhaes et al 2005). In order to avoid the econometric problems in estimation of spatial regressions, two versions of spatial models for conditional β-convergence due to Rey and Montouri (1999) have been used as follows.

1. Spatial Lag Models (SLM)

In order to admit actual interactions among the states, spatial lag of dependent variables have been added to each (1), (2) and (3) above. This variable is interpreted as the growth rate in the concerned variable for a particular state as being affected by the growth rate in the same variable of its neighbour. The spatial weight matrix (W) in each case is a square matrix whose elements are 'supposed' (mine) to be the direct geographical distances from the observational units (Paas et al 2007). This matrix is constructed under the assumption that distances between a single space are zero and others are non-zero. Then only it would be a matrix whose principal diagonal contains zero-elements and off-principal diagonal elements are all non-zero but positive. The magnitudes of all non-zero elements are the actual geographical distances between the spaces. But in the present context, we assume that no state is a centre nor a periphery and all are as much centres as peripheries to the rest. Given this assumption, the distances between all states are equal and hence, the off-diagonal elements of W will all be unity. This unit distance rule is tenable on the grounds that (1) all the states of India are bound by a common code of conduct due to FRBM Act to discipline their respective finances under a federal structure, and (2) the flow of externalities from one state to the other is functionally related to the speed at which information transmits. In an age of cable media and internet, transmission of information between any two states takes a unit time duration irrespective of the actual

geographical distance between them. If travel time (one of the measures of the spatial or geographical distance) measures the distance between any two states while formulating the weight matrix, then it has to be unity through out. Finally, the weight matrix W is a row standardised symmetric matrix where $W_1 = W_2 = W_3 = W$. In these models, each disturbance term is normal with zero mean and variance one.

$$\ln\left(\frac{pe_{i,t+T}}{pe_{it}}\right) = \alpha_4 + \beta_4 \ln(pe_{it}) + \rho_1 W \ln\left(\frac{pe_{i,t+T}}{pe_{it}}\right) + \varepsilon_{4t}$$

-------------- (6)

$$\ln\left(\frac{pr_{i,t+T}}{pr_{it}}\right) = \alpha_5 + \beta_5 \ln(pr_{it}) + \rho_2 W \ln\left(\frac{pr_{i,t+T}}{pr_{it}}\right) + \varepsilon_{5t}$$

-------------- (7)

$$\ln\left(\frac{y_{i,t+T}}{y_{it}}\right) = \alpha_6 + \beta_6 \ln(y_{it}) + \rho_3 W \ln\left(\frac{y_{i,t+T}}{y_{it}}\right) + \varepsilon_{6t}$$

-------------- (8)

2. Spatial Cross-Regressive Models (SCRM)

In spatial cross-regressive models, spatial lag of independent variables have been added which are different from those in (6), (7) and (8) where $\varepsilon \sim N(0,1)$. Their inclusion is based on the logic that growth rate in a variable for an individual state is affected by the initial per capita value of the same variable of its neighbour. The weight matrices are defined in the same way as they were defined for Spatial Lag Models.

$$\ln\left(\frac{pe_{i,t+T}}{pe_{it}}\right) = \alpha_7 + \beta_7 \ln(pe_{it}) + \varphi_1 W \ln(pe_{it}) + \varepsilon_{7t}$$

------ (9)

$$\ln\left(\frac{pr_{i,t+T}}{pr_{it}}\right) = \alpha_8 + \beta_8 \ln(pr_{it}) + \varphi_2 W \ln(pr_{it}) + \varepsilon_{8t}$$

------ (10)

$$\ln\left(\frac{y_{i,t+T}}{y_{it}}\right) = \alpha_9 + \beta_9 \ln(y_{it}) + \varphi_3 W \ln(y_{it}) + \varepsilon_{9t}$$

------ (11)

Econometric Results

The convergence in public expenditure, public revenue and per capita income across Indian states during 1991-92 – 2009-10 has been analysed for absolute β-convergence, σ-convergence and conditional β-convergence with two models

Spatial Lag Models and Spatial Cross-Regressive Models. The estimation of absolute β-convergence models (Table 1) produces the evidence of non-convergence in any of the variables. However, the sign of β-estimate each for public expenditure and public revenue is negative but not statistically different from zero. For per capita income, the sign is positive but statistically not significant. This does not support the hypothesis of poorer states of India having grown faster than the richer states from the initial in the post-reforms period. Moreover, the Government of India is making all possible efforts to increase the growth rates of the economy to more than 9 per cent per annum. This may be a futile exercise if states fail to respond to the policy decision through their own plans. With approximately two decades after reforms, the absence of convergence in public expenditure and public revenue particularly in the former has been a great source of unevenness in the development of social and infrastructure sectors across Indian states. This may act as a hindrance to the realisation of the objective growth rate of 9 per cent per annum. In spite of the fact that there is a central legislation (FRBM Act) which has acted as a guide to similar sub-national level legislations in the post-reforms period, the states are having different patterns of public revenue and public expenditure. In the absence of convergence, each state is inferred to have its own choice for public expenditure and public revenue without having any cohesion with the choices of the rest. Since states enjoy autonomy in some of the fiscal matters, they may have different choices for revenue raising activities from their own sources both tax and non-tax which may not be that inimical to the achievement of the balanced growth strategy of more than 9 per cent, but acutely diverse way of carrying out public expenditure programmes by sub-national governments may have damaging consequences for the national level strategy of annual average growth rate of 9 per cent even though Indian states differ widely among themselves.

Table 1: Absolute β-Convergence Results

Parameters and Related Statistics	Public Expenditure	Public Revenue	Per Capita Income
α	2.088 (3.210)*	2.633 (1.424)	-0.595(-0.378)
β	-0.198 (-0.223)	0.142 (0.489)	0.313 (1.706)
R^2	0.004	0.020	0.195
DW	1.729	1.695	2.505
95 % Confidence Interval for β	-0.214<β< 0.174	-0.764<β< 0.480	-0.087<β< 0.713
Results	No Convergence	No Convergence	No Convergence

Sources: Handbook of Statistics on State Government Finances 2004 and 2010, Reserve Bank of India, Mumbai.

Handbook of Statistics on Indian Economy 2010, Reserve Bank of India, Mumbai.

Economic Survey, Government of India.

Central Statistical Organisation of India.

* Significant at 5 per cent level. Others are not significant.

In the pre-reforms period, Indian economy was challenged by severe inequality in the distribution of income which was further widened in the post-reforms period (Bhattacharya and Sakthivel 2004). The coefficient of variation in per capita income has increased from 33.64 per cent in 1991-92 to 40.60 per cent in 2009-10 (Table 2). The distribution of public expenditure across Indian states and also own revenue (own tax revenue + own non-tax revenue) each has exhibited increasing inequality, of course, the inequality has been less intense in case of public expenditure (Table 2) than what it is for own revenue receipts. In both the cases, there is the evidence of non-convergence. The dispersion in revenue receipts of the Indian states increases faster than public expenditure from their respective initial magnitudes. Dispersion of public expenditure and also public revenue each is seen to have been some how odd with the figures relating to the rest of the time periods. This has happened particularly for the impact of outliers. Thus σ-convergence results exclude the possibility of convergence in public expenditure, public revenue and per capita income in the post-reforms period for the Indian states.

Table 2: σ-Convergence Results

Year	Coefficient of Variation across Indian States		
	Public Expenditure	Public Revenue	Per Capita Income
1991-92	40.78	49.53	33.64
1992-93	46.17	50.30	35.85
1993-94	41.50	49.58	34.41
1994-95	40.75	47.48	34.15
1995-96	31.83	48.22	34.88
1996-97	41.64	49.81	34.88
1997-98	58.44	59.99	35.07
1998-99	47.55	51.87	33.38
1999-2000	39.58	59.12	33.12
2000-01	44.72	56.35	35.06
2001-02	97.23	4.39	37.29
2002-03	42.30	54.52	36.55
2003-04	52.23	50.69	35.78
2004-05	48.27	51.74	44.54
2005-06	44.81	53.64	37.71
2006-07	46.13	55.04	38.07
2007-08	45.43	61.52	38.71
2008-09	46.19	53.92	38.66
2009-10	45.32	61.05	40.60

Sources: As Table 1.

Theoretically, the admission of spatial dependence and interactions are expected to impact convergence across regions and space. But in the current context, no such empirical evidence is found to have existed. Table 3 and Table 4 present the results relating to the estimation of Spatial Lag Models and Spatial Cross-Regressive Models respectively. In both the cases, there is the absence of convergence in public expenditure, public revenue and per capita income across Indian states after 1991-92. Hence neither the growth rate of the neighbours nor its own initial per capita value affects the growth profile of the state. Non-imitation of the pattern of public expenditure of more advanced states by less advanced ones is more detrimental to balanced growth of the Indian economy than non-imitation of tax efforts of richer states by the poorer ones. Among all the non-special category major states of India, Punjab has the highest score in terms of both physical and support infrastructure. This is one of the reasons for which the state has been able to create accessibility of its population to market and assets. Any attempt to develop in line with the advanced states of India like Punjab by the less developed states like Orissa must consist of reducing infrastructure bottlenecks and thus, to their advantage should follow the pattern of public outlays on economic and physical infrastructure of the developed states.

Table 3: Estimation Of Spatial Lag Models

Parameters and Related Statistics	Public Expenditure	Public Revenue	Per Capita Income
α	-2.234 (-98.233)*	-2.124 (-7.793)*	-2.469 (-74.116)*
β	-0.001 (-0.641)	0.026 (0.762)	0.004 (1.007)
ρ	1.117 (214.311)*	1.107 (29.149)*	1.125 (172.792)*
R^2	0.999	0.987	0.999
DW	2.855	1.397	2.198
95 % Confidence Interval for β	-0.004<β<0.002	-.049<β<0.101	-.005<β<0.013
Results	No Convergence	No Convergence	No Convergence

Sources: As Table 1.
* Significant at 5 per cent level. Others are not significant.

Table 4: Estimation Of Spatial Cross-Regressive Models

Parameters and Related Statistics	Public Expenditure	Public Revenue	Per Capita Income
α	3.675 (1.123)	3.672 (0.917)	-0.597 (-0.362)
β	0.174 (0.434)	-55.56(-1.338)	0.311 (1.261)
φ	-0.213 (-0.497)	-0.157 (-0.489)	0.001 (0.014)
R^2	0.026	0.020	0.195
DW	1.865	1.695	2.508
95 % Confidence Interval for β	-0.708<β< 1.056	-0.008<β< 0.125	-0.232<β< 0.854
Results	No Convergence	No Convergence	No Convergence

Sources: As Table 1.
None of the parameter estimates is significant

Convergence In Public Expenditure And Public Revenue And Sustainable Economic Growth

If public expenditure across space is convergent, it becomes more similar. Like wise, it is for public revenue. But the study results have indicated the absence of convergence each in public expenditure and public revenue across Indian states in the post-reforms period. The Constitution of India has granted some autonomy and powers to the sub-national governments in respect of carrying out public expenditure programmes and levying and collecting taxes[4]. Though it has been safeguarded by the Constitution, it has both positive and negative implications for the Indian economy. Under a democratic set up, it is a welcome agenda. Given them autonomy, states would select their own ways of public expenditure management and tax administration in a manner conducive to their own economic and social interests. But an unbridled exercise on the part of the state governments may dampen the national interest. The uncontrolled fiscal deficits at the states' level in the pre-reforms period were one among a few to have shattered the fiscal strength of India and macroeconomic balance. Thus negative aspect seems stronger to switch the growth path away from the balanced trajectory. India is experiencing sharp regional inequality both in terms of growth and development. In the post-reforms period, the regional disparity measured in terms of per capita income has escalated in comparison to what it was in the pre-reforms period (Bhattacharya and Sakthivel 2004) and in the process; the poorer states of India have lost to the richer states faster. It has also been admitted in the Eleventh Five-Year Plan (2007-12) Document that regional disparities have continued to grow and the gaps have accentuated as the benefits of economic growth have been largely confined to the relatively more advanced developed areas. In the removal of regional disparity, market failure persists. Of course, market failure is not an uncommon event even if India has opted for a more globalised economy. A vast section of the Indian population is socially and economically under privileged that need state support. Accordingly, government sector has to work towards fulfilling the much cherished goal of balanced regional development. One of the surest ways to deal with the regional disparity in India is to follow a pattern of public expenditure, if not identical across the states but more akin to each other particularly in the provision of social and economic infrastructure. In the presence of glaring regional disparity, the states lagging behind would not hesitate to live beyond their means (natural resource stock) thereby reducing the ability of the future generations to meet their own needs. Public expenditure in its classical connotation was essential in those lines and heads where private persons would feel diffident to invest. But public expenditure programme in recent time, particularly in the Third World developing countries is held to

be an instrument of sustainability and accordingly, it has to be public-centric.

In the matter of levying taxes, absence of convergence could be a possible source of differential cost structure of goods and services across the states. Keeping aside the direct tax regime in India which is mostly centrally administered, most part of the indirect tax regime is administered by the federating states. Differential tax regimes across the states could be one of the causes of uneven flow of Foreign Direct Investment (FDI) to India. Globalisation of the Indian economy has the principal objectives of making it more competitive and attracting larger flow of investible funds from abroad particularly in the form of Foreign Direct Investment (FDI). Naturally, the momentum of FDI flow would be strong to those states where the tax regime is FDI friendly. So long as own tax regimes of the states are not convergent, uneven flow of FDI would be a hindrance on the sustainable economic growth of the Indian economy. With a view to streamlining the indirect tax regime, the most important tax policy development after independence has been the introduction of the Value-Added Tax (VAT). Recently, there is a determined effort at the Government of India level to introduce a national level Goods and Services Tax (GST). These reforms in tax regime are expected to force tax convergence across the states.

Conclusions

Though convergence analysis is a topic in empirical economics, it is not above controversy. These controversies emanate out of the facts that the underlying methodology consists of searching for convergence across space in the presence or absence of spatial spillovers without locating the sources and origins of convergence. The technique also confronts several econometric problems particularly in respect of omitted variables, outliers and measurement errors. In view of this, there were diverse opinions (Cetorelli 2002, Lauterbach 2007, Romer 1994) as to its efficacy as a tool in applied econometrics. With a view to doing away with these problems, longitudinal data in place of cross-section data has been used in the studies on convergence. This even does not make the method error filtered. Moreover, the technique is based on a common sense proposition. Unless the poorer space moves faster than the rich from the initial, there can be no convergence. Rich will not wait till the poor converges. In spite of all these controversies, convergence technique has been hugely used in the study of catch-up effects in macroeconomic theory. The application of the technique to the study of convergence in public expenditure, public revenue and per capita income each for the non-special category major states of

India during the post-reforms period (1991-92 – 2009-10) has produced the evidence of non-convergence in each variable. While examining the possibility of convergence by applying techniques from applied econometrics, both absolute and conditional convergence hypotheses in two of the latter's variants Spatial Lag Models and Spatial Cross-Regressive Models have been examined for their validity. No where there has been any evidence of convergence (evaluated from the view point of statistical significance of the convergence coefficient β). If the sign of β coefficient alone is considered to judge the possibility of convergence without considering its statistical significance, there is the indication of absolute β-convergence for public expenditure and public revenue (Table 1), spatial convergence with Spatial Lag Model for public expenditure (Table 3) and spatial convergence with Spatial Cross-Regressive Model for public revenue (Table 4). Thus these two spatial econometric models show that spatial spillovers are encountered for public expenditure and spatial autocorrelation may not be ruled out for public revenue. Disregard for statistical significance of the convergence coefficient is an inexcusable error and omission in empirical verification of the hypothesis. Viewed from this angle, the study results point to the absence of convergence in the variables. Sustainable development with emphasis on sustainable economic growth which is the most cherished goal of democratic countries could be at threat in the absence of long-run convergence. Since all the states have been taken together, global convergence has not been established. This might have been due to strong geographical and physical heterogeneity among the Indian states. However, with some kind of clubbing of states having similar characteristics, there might have been some indications for convergence. But this is beyond the scope of the current work. Moreover, the results finally reached may not be taken as a long-run development for India. The work having covered only nineteen years is undoubtedly a short-period analysis for convergence study. However, the objectives of the paper have been accomplished with empirical support.

NOTES

[1]NON-SPECIAL CATEGORY STATES

NON-SPECIAL CATEGORY STATES	SPECIAL CATEGORY STATES
1. Andhra Pradesh	1. Arunachal Pradesh
2. Bihar	2. Assam
3. Chhattisgarh	3. Himachal Pradesh
4. Goa	4. Jammu and Kashmir
5. Gujarat	5. Manipur
6. Haryana	6. Meghalaya
7. Jharkhand	7. Mizoram
8. Karnataka	8. Nagaland
9. Kerala	9. Sikkim
10. Madhya Pradesh	10. Tripura
11. Maharashtra	11. Uttarakhand
12. Orissa	
13. Punjab	
14. Rajasthan	
15. Tamil Nadu	
16. Uttar Pradesh	
17. West Bengal	

[2] NON-SPECIAL CATEGORY MAJOR STATES OF INDIA INCLUDED IN THE STUDY
1. Andhra Pradesh
2. Bihar
3. Gujarat
4. Haryana
5. Karnataka
6. Kerala
7. Madhya Pradesh
8. Maharashtra
9. Orissa
10. Punjab
11. Rajasthan
12. Tamil Nadu
13. Uttar Pradesh
14. West Bengal

[3] Data Sources:
1. Handbook of Statistics on State Government Finances 2004 and 2010, Reserve Bank of India, Mumbai.
2. Handbook of Statistics on Indian Economy 2010, Reserve Bank of India, Mumbai.
3. Economic Survey, Government of India.
4. Registrar General and Census Commissioner of India.
5. Central Statistical Organisation of India.

[4] The items on which the state governments are empowered to have their own choice for spending in India are included in the List II of the Indian Legislative. There are 69 subjects of which more important ones are (1) Public Order and Police, (2) State Taxes and Duties, (3) Agriculture, (4) Sanitation, (5) Local Governments, (6) Forests, (7) Fisheries, (8) Public Health. Article 365, Schedule 7 of the Indian Constitution provides the constituent states with the power to levy and collect taxes like (1) Agricultural Income Tax, (2) Excise Duties on Goods manufactured or produced in the state, (3) Entry Tax, (4) Duties on Electricity, (5) Tax on Goods and Passengers, (6) Tax on Vehicles, (7) Tolls.

References

Anagnostou, A, P.Artelaris, G.Petracos and Y.Psycharis (2008). Growth and Convergence-Divergence Trends in the European Union. *Italian Journal of Regional Science*, 7(2), pp.9-28.

Arbia, G and J.Paelinck (2003). EconomicConvergence or Divergence? Modelling the Interregional Dynamics of Eu Region., 1985-

1999. *Journal of Geographical Systems*, 5(3), pp.291-314.

Armstrong, H. (1995). Convergence among Regions of the European Union 1950-1990. *Papers in Regional Science*, 74(2), pp.143-152.

Barro, R and X. Sala-i-Martin (1991). Convergence across States and Regions. *Brooking Papers on Economic Activity*, 1991(1), pp.107-182.

_____ (1992). Convergence. *Journal of Political Economy*, 100(2), pp.223-251.

Baumol, William .J. (1986). Productivity Growth, Convergence, and Welfare: What the Long-run Data Show. *American Economic Review*, 76(5), pp.1072-1085.

Baumont, Catherine, Cem Ertur and Julie Le Gallo (2001). *The European Regional Convergence Process: Do Spatial Regimes and Spatial Dependence Matter?* Paper Presented at the 56th Econometric Society European Meeting, Lausanne, August 25-29.

Bevan, Philippa (2000). *Poverty in Ethiopia.* Discussion Paper for DFID, University of Bath, November.

Bhattacharya, B.B. and S. Sakthivel (2004). Regional Growth and Disparity in India: Comparison of Pre- and Post-Reform Decades. *Economic and Political Weekly*, 39(10), pp.1064-1070.

Cetorelli, Nicolo (2002). Could Prometheus be Bound Again? A Contribution to the Convergence Controversy. *Journal of Economic Decisions and Control*, 27(1), pp.29-50.

Cuadrado, Roura J.R. (2001). Regional Convergence in the European Union: From Hypothesis to Actual Trends. *Annals of Regional Science*, 35(3), pp.333-356.

DeLong, J.Bradford (1988). Productivity Growth, Convergence, and Welfare: Comment. *American Economic Review*, 78(5), pp.1138-1154.

Dogan, Nukhet and Bedrite Saracoglu (2007). Income Convergence of European Union and Candidate Countries: Are they all the Same? *International Research Journal of Finance and Economics*, Issue 12, pp. 160-164.

Islam, Rizwanul (2005). *Some Data on Economic Growth, Poverty and Employment in Ethiopia and Uganda.* Paper Presented in 'International Conference on Strengthening the Employment Nexus between Growth and Poverty Reduction', UNDP, International Poverty Centre, Brazil, January.

Koopmans, T.C. (1965). On the Concept of Optimal Economic Growth. In '*The Econometric Approach to Development Planning*', North-Holland, Amsterdam.

Krugman, Paul. (1991). Increasing Returns and Economic Geography. *Journal of Political Economy,* 99(3), pp.483-499.

Lauterbach, Albert (2007). The 'Convergence' Controversy Revisited. *Kyklos*, 29(4), pp.733-754.

Magalhaes, Andre, J.D. Geoffrey Hewings, Carlos R. Azzoni (2005). Spatial Dependence and Regional Convergence in Brazil. *Investigaciones Regionales*, 6, pp.5-20.

Mohanty, B.K. and T.Tripathy (2007). Orissa Finance: A Behavioural Analysis. *Finance India,* 21(3), pp.965-986.

Mohanty, B.K. (2008). Public Investment in Orissa in Post-Reform Period. *Review of Development and Change,* 13(1), pp.29-48.

_____ (2010). An Econometric Analysis of Investment Spending of a Sub-national Government in India. *Margin-The Journal of Applied Economic Research*, 4(1), pp.79-100.

_____ (2011a). Public Expenditure and Growth: A Time-series Study on their Relationship for Orissa State (India), *Journal of Social and Economic Development*, 13(1), pp.45-66.

_____ (2011b). Structural Changes in the Indian Economy. In self (ed) '*Issues in Economic Development of India*', New Century Publications, New Delhi (In Press).

_____ (2011c). The FRBM Act and Orissa Finance. In self (ed) '*Issues in Economic Development of India*', New Century Publications, New Delhi (In Press).

Paas, Tiiu, Andres Kuusk, Friso Schlitte and Andres Vork (2007). *Econometric Analysis of Income Convergence in Selected EU Countries and their NUTS 3 Level Regions.* University of Tartu, Faculty of Economics and

Business Administration, Tartu University Press, Estonia.

Paas, Tiiu. and F.Schlitte (2008). Regional Income Inequality and Convergence Process in the EU-25. *Italian Journal of Regional Science*, 7(2), pp.29-49.

Quah, D. (1993). Galton's Fallacy and the Convergence Hypothesis. *Scandinavian Journal of Economics,* 95(4), pp.427-443.

_____ (1996). Empirics for Economic Growth and Convergence. *European Economic Review,* 40(6), pp.1353-1375.

Rey, Sergio J. and Brett D. Montouri (1999). US Regional Income Convergence: A spatial Econometric Perspective. *Regional Studies*, 3(2), pp.146-156.

Robertson, James (1997). *The New Economics of Sustainable Development: A Briefing for the European Commission.* Kogan Page.

Romer, Paul M. (1986). Increasing Returns and Long-run Growth. *Journal of Political Economy*, 94(5), pp.1002-1037.

_____ (1990). Endogenous Technological Change. *Journal of Political Economy*, 98(5), Part-2, pp.S71-S102.

_____ (1994). The Origins of Endogenous Growth. *Journal of Economic Perspectives*, 8(1), pp.3-22.

Sala-i-Martin, X. (1992). The Classical Approach to Convergence Analysis. *Economic Journal,* 106(437), pp.1019-1036.

Solow, R.M. (1956). A Contribution to the Theory of Economic Growth. *Quarterly Journal of Economics,* 70(1), pp.65-94.

Swan, T.W. (1956). Economic Growth and Capital Accumulation. *Economic Record*, 32(63), pp. 334-361.