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A STUDY ON THE APPLICABILITY OF NEO-CLASSICAL GROWTH CONVERGENCE HYPOTHESIS ACROSS INDIAN STATES DURING 1982-2012

Economics

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ABSTRACT

To enhance the understanding of disparities in India`s economic growth from a regional perspective, this paper tests the neo-classical convergence theorem across major 15 Indian states in the period 1982-2012. We assume that in the beginning all states have similar steady states. The results show that there is a significant tendency for growth divergence among Indian states in the last 3 decades. The initially richer states continue to register faster growth rates than poorer states and there is no evidence for that the income levels will eventually converge among these states.

KEYWORDS

Growth Convergence, Solow-Swan model, Inter-state Disparity, NSDP, Per Capita Income, Indian States, convergence theorem

INTRODUCTION

The study of growth convergence has been widely used to study the growth dynamics between countries and between regions within a country. The convergence theorem is derived from the neo-classical Solow-Swan growth model. It states that if we assume that all regions possess similar technology and preferences, and that there are no institutional barriers to the flow of both capital and labour across state borders, then the neo-classical growth model would predict that states would have similar levels of real per capita in the long run. And if the only difference between regions lie in the initial conditions of income or capital stock, then the initially poorer regions will grow faster than the initially richer ones. This is achieved due to Inter-regional capital mobility, Adaptation of latest technology by poorer regions from richer regions, deliberate policy level efforts by the central government to redistribute the wealth in favour of poor regions, and Inter-regional labour migration. In this paper, we test the growth convergence hypothesis among 15 major Indian states. In the beginning of the analysis, we assume that all the states have similar structural mould and hence they have similar steady states. With the help of a panel data regression analysis of 30 years (from 1982 to 2012) of data on these states, we examine whether the convergence hypothesis hold true among Indian states.

Previous Research

The studies on convergence among Indian states have resulted in all types of results. While (Dholakia, 1994) and (Cashin & Sahay, 1996) among others have found evidence for both absolute as well as conditional convergence in per capita income across indian states, (Margit & Mitra, 1996), (Ghosh, Marjit, & Neogi, 1998) etc., finds that there is actually divergence of growth among states. (Purfield, 2006) states that once the policy variables are included in the model, the study becomes more potent. He finds that once these variables are controlled, the growth scenario among Indian states exhibits conditional convergence. Another group of researchers including (Kalra & Sodsriwiboon, 2010) observes that the regional growth scenario among Indian states actually exhibits growth polarisation and club-convergence. In short, the evidence from the studies on the neo-classical convergence hypothesis in Indian context is far from conclusive.

Data Source

The Data on Net State Domestic Product (NSDP) at Factor Cost(in Constant Prices) and Per Capita NSDP at Factor Cost (in Constant Prices) for the period 1980-2012 for 15 states is obtained from Handbook of Statistics on Indian Economy, 2012-13, published by the Reserve Bank of India. This data set published by RBI is a compilation of reports on state accounts published by Directorate of Economics & Statistics of respective state governments as well as the data collected on national economy by Central Statistical Organisation (CSO). The state population figures are calculated with the help of decadal growth rates and Population figures as published in Census Report 2011.

Methodology

The testing of theoy of growth convergence among Indian states include examining whether the initial level of income of a state has any role in determining the state`s growth performance. For this purpose, the Panel data of growth rates of 5 years, 10 years, 15 years and 20 years intervals is constructed from the data series. This is done as follows. The panel data of growth rates with 5 year interval starts from 1987. The 5 year growth rate for 1987 is calculated as follows

$$5\ year\ GR_{1987} = \left(\frac{PNSDP_{1987} - PNSDP_{1982}}{PNSDP_{1982}}\right) * 100$$

The log of initial Per Capita NSDP at Factor Cost (in 2004-05 Prices) is the explanatory variable we are using to test whether the growth rate is negatively conditioned upon the initial income level.

In the 5 year panel data, the initial per capita NSDP will take values from year 1982 to 2007 according to the current year. For the 10 year panel data, the initial Per capita NSDP will be that of years 1982 to 2002. Hence we will have 20 Initial PNSDP figures.

The regression model is the following

$$\left(\left(\frac{Yt}{Y_o}\right)^{\frac{1}{n}} - 1 = \alpha + \beta \log(Y_o) + u\right.$$

Where,
Yt = current year PNSDP
Yo = initial year PNSDP
n= time interval. For 5 year panel data, n will be 5, and
α,β and u =constant, coefficient and error term in the model.

For example, in the 5 year panel data, the regression equation for 1985 growth rate will be

$$\left(\left(\frac{PNSDP_{1985}}{PNSDP_{1980}}\right)^{\frac{1}{5}} - 1 = \alpha + \beta \log(PNSDP_{1980}) + u\right.$$

The base year will shift to 1981 for the next observation, ie., the 1986 compound annual growth rate. This way the regression will be run in all 405 observations in the 5 year panel. Likewise, the regression equation will be run for observations in 10 year, 15 year, and 20 year Panel data and the regression coefficients and significance levels will be analysed to examine whether conditional growth convergence exists among Indian states.

DATA ANALYSIS AND RESULTS

We are testing the convergence hypothesis using two techniques of analysing panel data, the Fixed Effects and Random Effects models.

Fixed Effects model examines the relationship between the explanatory and dependant variables within an entity. With Fixed Effects model, we are assuming that something within the entity will affect or bias the explanatory variable and we have to control for this. Fixed Effects model removes those time-invariant characteristics from the explanatory variable, so as to measure the net impact of the variable on the outcome.

$$Y_{it} = \beta_1 * X_{it} + \alpha_i + u_{it}$$

The Fixed Effect model in our analysis takes the form
where,
α_i(i=1...n) is the unknown intercept for each entity, in our case, States.
Yit is the dependent variable, where i = state and t= time
Xit is the explanatory variable with β_1 coefficient, and
uit is the error term

Random Effects model assumes that the variation of the unobserved factors across individual entities is random and uncorrelated with the explanatory variable or the outcome variable. One advantage with the Random Effects model is that, while in the fixed effect model the time

invariant variables are absorbed in the entity specific intercept term, here we can include them separately in the model.

The Random Effects model takes the following form

$$Y_{it} = \beta * X_{it} + \alpha + u_{it} + \varepsilon_{it}$$

where, *uit* represents between entity error term and *εit* represents within entity error term.

Random Effects model assumes that the within entity error term is uncorrelated with the predictor variable. Hence, time-invariant factors can play an explanatory role in the outcome of the analysis.

The results of regression on 5 panel data sets are summarized in the below table.

Table 1. Panel Regression Results

panel	Reg. Model	Constant	Coefficient	t value/Z value	P > t /P> Z
5 YEAR	F.E	-25.0744	6.875012	7.77	0.000
	R.E	-24.2921	6.69007	8.31	0.000
10 YEAR	F.E	-23.4628	6.511988	8.04	0.000
	R.E	-23.2384	6.458452	8.42	0.000
15 YEAR	F.E	-20.7882	5.891811	8.2	0.000
	R.E	-20.558	5.836458	8.41	0.000
20 YEAR	F.E	-23.7889	6.681865	6.87	0.000
	R.E	-22.9612	6.481254	7	0.000

Let us first analyse the results for fixed effect method. As we can see, the coefficient of predictor variable in all except one panel returns positive significant values. This implies that the predictor variable, i.e., initial per capita income of states, has a positive significant impact on the economic growth of the states.

Let us now analyse the results from Random Effects Method. As it is evident from the results, the positive coefficients of initial per capita income have a significant influence on the values of the outcome variable, i.e. the annual compound growth rates of states.

However, it is essential to test which one of the above models is appropriate for the panel data that we are using. Hausman specification test is used for this purpose. The test basically examines whether the unique error terms (Uit) are correlated with the regressors. The test hypotheses that they are not correlated. The results of Hausman specification test is given in the below table

Table 2. Hausman Specification Test Results

Panel	Variable	Coefficients		Difference	Chi Sqr	Prob > Chi Sqr
		fixed	random			
5 Year	LOGPCI	6.875012	6.69007	0.184942	0.25	0.6145
10 Year	LOGPCI	6.511988	6.458452	0.053536	0.04	0.8384
15 Year	LOGPCI	5.891811	5.836458	0.055353	0.09	0.7684
20 Year	LOGPCI	6.681865	6.481254	0.200611	0.46	0.4968

If the prob> χ^2 value is significant (i.e., <0.05) the hausman test recommends a Fixed Effect model. If the value is insignificant, then the test suggests a random effects model.

As we can understand from the results above, the hausman specification test gives us insignificant values in all panel data sets. This implies that it is better to use a Random Effect model for our panel data analysis. Hence we take the results of Random Effects Model as the final result of the panel data analysis.

To conclude, revisiting the results of the regression analysis, we can say that there is no growth convergence among Indian states in the study period. There is actually evidence for Growth Divergence among Indian states.

CONCLUSION

The present study dealt with the inter-state inequalities in the income levels in India in the period 1980-2012 and the question whether the movements in income levels across states were in concurrence with the neo-classical growth theorem. The convergence hypothesis was tested using two variants of panel data analysis models, namely fixed effects model and random effects model. We found that Random effects model is better suited for our data. The analysis of results found strong evidence for growth divergence across Indian states in the 30 year study period.

This observation could mean two different things. First, if it is assumed that individual states are progressing towards their steady states, then these steady states are not the same. Second, the simple neo-classical assumption that diminishing returns single handily will ensure the growth convergence cannot be sustained. We need a larger framework, incorporating factors like speed of diffusion of technology, capital mobility etc. into the model while studying at regional level.

REFERENCES

1. Cashin, P., & Sahay, R. (1996). Regional Economic Growth and Convergence in India. Finance and Development, 49-52.
2. Census India. (2011). Ministry of Home Affairs.
3. Dholakia, R. (1994). Spatial Dimensions of Accelerations of Economic Growth in India. Economic and Political Weekly, pp. 2303-09.
4. Ghosh, B., Marjit, S., & Neogi, S. (1998). Economic Growth and Regional Divergence in India, 1960 to 1995. Economic and Political Weekly, 33(260); 1623-30.
5. Handbook of Statistics on Indian Economy. (2012-13). Reserve Bank of India.
6. Kalra, S., & Sodsriwiboon, P. (2010). Growth convergence and spillovers among Indian states: What matters ? What does not ? . IMF Working Paper, WP/10/96, Asia Pacific Department.
7. Margit, S., & Mitra, S. (1996). Convergence in Regional Growth Rates: Indian Research Agenda. Economic and Political Weekly, pp. 31(33): 2239-42.
8. Nayyar, G. (2008). Economic Growth and Regional Ineqaulity in India. Economic and Political Weekly, 58-67.
9. Purfield, C. (2006). Mind the Gap-Is Economic Growth in India Leaving Some States Behind ? . IMF, Asia and Pacific Department.
10. Rao, M., Shand, R., & Kalirajan, K. (1999). Convergence of Income across Indian States: A Divergent View. Economic and Political Weekly, 34(13); 769-78.
11. Solow, R. (1956). A contribution to the theory of economic growth. Quarterly Journal of Economics, 65-94.