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A STUDY ABOUT THE CONVERGENCE ANALYSIS ACROSS INDIAN STATES

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ABSTRACT

The convergence analysis across Indian states is a vital endeavor in the realm of economics and development. This study aims to examine the trends, patterns, and dynamics of economic convergence among the various states of India. Economic disparities and inequalities have long been a concern in the country, with some states advancing rapidly while others lag behind. The concept of convergence posits that over time, regions with lower initial income levels tend to grow at faster rates, leading to a narrowing of income gaps between regions.

Keywords: - Economic, Convergence, Model, Growth, Ranging.

I. INTRODUCTION

For a long time, growth economists have struggled with how to properly analyze economic growth and convergence. As a result, the wide variety of growth and convergence models, ranging from the simple to the intricate, should come as no surprise. Solow's (1956) growth model is well-known and straightforward. Two, or three in the expanded form, variables are all that are needed to describe the level of life. Since the publication of the seminar paper by [Mankiw Romer and Weil (1992)], growth models have been an area of emphasis in the field of econometrics. The authors provide data in support with Solow's (1956) neoclassical growth model. Mankiw, Romer, and Weil also analyzed and looked at the issue of convergence in the human capital expanded version of the model. Although evidence for the Solow-Cass-Koopmans model would be inferred from a convergence result, the opposite is true for endogenous growth theories: a lack of convergence. As a result of the debate, the term "conditional convergence" has emerged to describe the process of convergence once differences in steady states across nations have been accounted for.

Existing empirical research on this topic share the premise that all nations have the same aggregate production function Since most of these research have been done within the context of single period cross-country regressions, attempts to enable such differences have been restricted, despite the widespread recognition that the production function may genuinely change between nations. In this setting, it is challenging to account for such variations in output estimates. We have employed a cross-sectional method, a panel data method, and a distributional method to examine convergence in this work. The -convergence is checked using the first two methods, and the -convergence is checked using the third. Data on Gross State Product (GSP) per capita at two different constant prices (i.e., 1993–1994 and 2004–

2005 prices) has been obtained from the Central Statistical Organisation (CSO) and converted using the adjustment factor method to ensure comparability across Indian states and union territories. For the purpose of testing the convergence between states and union territories, only 30 states and union territories' per-capita GSDP statistics were used. The other states and union territories were excluded because they lacked access to the necessary time series data. This chapter has been split in half so that both parts can adequately cover the wide range of topics associated with convergence. The first part of this paper examines the many conceptions, issues, and methods to convergence; the second, an empirical examination of convergence across Indian states and union territories; the third, a test of convergence in three randomly chosen states in the North.

II. THE ISSUE OF "CONVERGENCE" AND ITS EMPIRICAL SEARCH

According to Ramsey (1928), Solow (1956), Cass (1965), and Koopmans (1965)'s neoclassical growth models for closed economies, the initial level of production or income per person has a negative correlation with the growth rate. In instance, if tastes and technology levels are equal across countries, then low economies will expand at a quicker rate than affluent ones. As a result, there is a factor that pushes nations toward similar levels of GDP and income per person. One of the most well-known models of economic development, which uses just two variables to explain changes in living standards, was suggested by Solow (1956). This fundamental model is almost 60 years old, yet it is still used as a foundational reference today. Per capita output, capital stock, and consumption all grow at the same constant rate equaling the exogenously given rate of technological progress, which is a central assumption in the Solow model of economic growth. The result was the concept of convergence, which has two distinct meanings. The first relates to one's financial situation. If nations are comparable in terms of taste and technology, then their steady state income levels will coincide, and over time, their average GDP per capita will converge on a common target. Second, if technology is a public benefit, convergence in terms of growth rate dictated by the exogenous rate of technical advancement is possible. Eventually, every nation will experience the same pace of development as the others. These same conclusions hold for the Cass Koopmans variant of the model, in which the rate of savings is dynamically optimized.

Scientists have been utilizing actual data to put these theories to the test for some time now. In the beginning, most of these studies relied on information from advanced industrialized nations. The decision to choose an empirical estimating approach and a sample was heavily influenced by the availability of data. Baumol, for instance, observed convergence among a set of nations that were part of Maddison's sample in one of the publications on this issue. The average income and the average pace of growth across these nations have converged. Several others (e.g. Mankiw et al., 1992; Barro, 1991; Barro & Sala-i-Martin, 2004) provide economic expansions of the model

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
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while concurrently testing its empirical validity through econometric estimate.

In this context, the issue of how to effectively verify convergence is crucial. A test for convergence would need to assume that the nations in the sample are in stable states of their economies, given that the concept of convergence is related to the steady states of the economies. Examining the link between starting income and future growth rates is one strategy for getting around this issue. Due to the law of declining marginal returns, nations with lower levels of capital stock will have a greater marginal product of capital and develop faster at constant saving rates. One common way to test for the existence of convergence is to see whether there is a negative relationship between starting income and future growth rates. To be clear, this inverse relationship has the potential to be read as showing convergence in both income and growth rate. Convergence in growth rates occurs when developing nations' GDP growth rates eventually converge with those of developed nations, a process known as "catching up" or "convergence" in terms of income level.

Empirical regularities of the growth process across a broader cross-section of nations have begun to attract the attention of scholars as more comprehensive data sets have become accessible. Romer has been instrumental in getting macroeconomists to notice that, across a wide range of nations, there is no negative association between starting income and future growth rates. The data has also been interpreted as showing the "persistence" of large gaps in national income and expansion rates from one country to the next. It is well known that the popularity of endogenous growth theories has been a direct reaction to these observations.

III. DIFFERENT CONCEPTS OF CONVERGENCE

- **Convergence Within vs. Convergence Across**

Beginning with six stylized facts about growth proposed by Kaldor, Robert Solow explains the growth hypothesis. After mentioning the first four, Solow says, "The remaining 'stylized facts' are of a different kind, and will concern me less because they relate more to comparisons between different economies than to the course of events within any one economy." This refers to the fifth and sixth points on the list.

- **Convergence in Terms of Growth Rate vs. Convergence in Terms of Income Level**

Convergence among economies may be interpreted in two distinct ways, either in terms of growth rate or income level. Both of these objectives call for a global application of the NCGT view of technology. Neoclassical growth theory (NCGT) assumes the following about technological advancement: (a) no resources are required to develop technical innovation, (b) everyone gains equally, and (c) nobody pays any price for profiting from it.

- **Difference between - and - convergence**

Income and growth rates must converge before convergence may be achieved. Since a nation with less resources would have a greater marginal productivity of capital, this follows from the concept of diminishing returns. If economies of different incomes save at the same rate, the

poorer one will expand more quickly. If this hypothesis is correct, then the rate of increase over time should be inversely proportional to the amount of income at the outset. As a result, the growth-initial-level regression approach has become a standard tool for examining convergence.

- **Difference Between Conditional and Club Convergence**

Conditional convergence is closely connected to the idea of 'club convergence.' The latter phrase was coined by Baumol, although Durlauf, Johnson, and Galor deserve credit for their thorough definition. The conventional idea of convergence relies on the uniqueness of the equilibrium, which is a feature of the neoclassical growth theory (NCGT). In the scenario of unconditional convergence, all economies converge to a single equilibrium point.

IV. An Analysis of Convergence in India

A convergence test across Indian states and union territories is attempted here. The goal here is to assess the likelihood of convergence or divergence among the states throughout the time frame under consideration. As was just discussed, there are several methods and varieties of convergence. The current research only employs three methods for testing convergence: the cross-sectional method, the panel method, and the distribution method. The distribution technique zeroes in on -convergence and overall changes in the cross-section income distribution, whereas the cross-section, panel, and time-series methods all look at it in their own ways. The CSO (Central Statistical Office) provided the data on GSDP per capita that was used in the convergence

test. In this analysis, we apply the convergence test to the fifty states as a whole, with a focus on three northern states.

Some efforts have been made to empirically examine whether or not state-by-state incomes in India are converging or diverging. Some examples of such works include Cashin and Sahay (1996), Bajpai and Sachs (1996), Rao, Shand, and Kalirajan (1999), and Singh and Srinivasan (2002), all of which use a cross section regression framework to examine the connection between per capita income, delayed per capita income, and the convergence coefficient.

Cashin and Sahay start by looking at 20 different states throughout India in four different time periods between 1961 and 1991. Unconditional and conditional convergence is seen throughout all four time segments, but the findings are not statistically significant. Overall, they find evidence of a mild convergence throughout the time analyzed. When Bajpai and Sachs looked at data from a sample of 19 Indian states over the period 1961-1993 (split into three sub-periods), they didn't find any evidence of convergence that was statistically significant. They only detect convergence in the sub-period 1961-1971. Third, Rao et al. analyze data from a cross-section of 14 large states between 1965 and 1994. Across all of the time intervals they look at, they consistently uncover evidence of divergence, both absolute and conditional. The findings of the other two investigations are at odds with this one. Fourth, Singh and Srinivasan, in the most current review of the literature on the topic, find poor evidence for both absolute

and conditional convergence for a sample of 14 major Indian states over the period 1990–1999. Sachs et al. analyzed the pre- and post-reform eras of 1980–1990 and 1992–1998 to determine the general disparity in economic performance across India's 14 main states during the study period.

V. Sigma (σ) Convergence

The notion of -convergence is also crucial to the study of convergence. The key premise is that convergence is assumed if the variation in cross-economy per capita income as measured by the standard deviation (or any other measure of dispersion) decreases with time. Researchers interested in "how the distribution of per capita income across economies has behaved in the past or is likely to behave in the future" should look at sigma convergence, as recommended by Barrow, Sala-I-Martin, Blanchard, and Hall (1991). Whether or whether the average income increases or decreases over time is irrelevant to the idea of -convergence, which focuses on the convergence of incomes to a stable state. The sole thing that matters when examining convergence is whether or whether the incomes of different states gradually approach one another, and whether or not the cross-economy variance of log $(y_{i,t})$ diminishes with time. If the variation in state or regional income, as measured by the standard deviation of the logarithm of per capita income, decreases with time, we have achieved sigma convergence, which is concerned with the cross-sectional dispersion of per capita income or product. An alternate metric for sigma convergence is the coefficient of variation. Similar to how a shrinking standard deviation indicates convergence, so too would a decreasing coefficient of variation.

Barro and Sala-i-Martin tested for sigma convergence using state per capita income data from 1880 to 1988, and Friedman[65] and Quah[66] argued that sigma convergence is the only valid measure of convergence because beta convergence tests are subject to Galton's fallcy of regression to mean. Their findings provide credence to the hypothesis of sigma convergence for the American economy outside of the 1920s and 1980s.

For each year of our analysis, we averaged the per-state GSDP at 2003-04 prices and estimated the coefficient of variation (CV). Then, we've used the coefficient of variation to fit a linear trend over time.

VI. CONCLUSION

We have just employed two ways of convergence testing, namely the cross sectional regression model and the panel data regress model, to estimate two forms of convergence, viz. sigma convergence and beta convergence, after describing the different ideas and methods of estimating convergence. We observed that there is divergence amongst Indian states using both sigma convergence estimate and cross-sectional convergence estimation. The coefficient of the log of the per capita Gross State Domestic Products (logGSDPpc) is negative and statistically significant, suggesting that the results support unconditional convergence (income convergence) in growth performance across all states while using the Appling panel data regression model for the period 1993 to 2012. Convergence (in terms of income) across time and between states is consistent with Solow's

concept of growth convergence. Convergence has been shown for both the earlier (1993-2002) and later (2003-2012) halves of the research period. Estimating the convergence test across the three sample states reveals convergence over the whole time, as well as convergence at the outset and divergence later in the growth performance of these states. When using sigma convergence, the same conclusion is true.

The above discussion lends credence to the Solow's interpretation of the development of economies and supports the viewpoints of other researchers [for example Gosh (1998), Bhattacharya and Sakthivel (2004), and Bakshi (2015] on the convergence of Indian states to their steady states in terms of per capita GSDP during the reference period 1993-1994 to 2012-13. However, when the reference period of the current analysis is split into two sub-periods, i.e. 1993–1994–2002–2003 and 2003–2004–2012–2013, convergence in terms of increase of per capita GSDP is seen during the former period and divergence in the latter. This inequity in development can be traced back to the reforms that ushered in such phenomena as cumulative and circular causation, differences in industrial base and knowledge spillovers, geographical dualism and infrastructure gaps, as well as persistent differences in a wide range of development indices as wage rates, per capita income, employment growth rates, unemployment rates, and so on. As has been said, more sophisticated countries have a tendency to leapfrog over less developed ones. The gap between the world's poorest and richest countries has widened. The low-performing states' plight is compounded by their inability to control population increase.

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