Trends In Inter-District Inequalities of Income in Central Region Of Uttar Pradesh

Abstract

The Paper aims to study the growth performance and the convergence/divergence in growth among districts from 2011–12 to 2017–18 in Central Uttar Pradesh. We used two Convergence measures: Beta convergence, which relies on neoclassical growth theory, and Sigma convergence, which uses the coefficient of variation to measure the spread of per capita net income.We found a negative relationship between the two variables in estimating a regression equation linking growth to the PCNI's initial per capita income log. Growth and starting per capita net income had a statistically insignificant negative association the whole time. The levels of PCNI (Per capita Net Income) depict inter-district disparity decline as shown by the decreasing coefficient of variation.

INTRODUCTION

The discussion of inequalities or inequality in the course of economic development and growth is not a recent one. Since Adam Smith's time until more recent times of globalization and convergence, economists have attempted to explain the dynamics of economic growth and inequality using a variety of economic models while taking into account experience from theestablished, developing, and rising nations.Although inequality has significantly decreased in industrialized countries over the past forty years, it is actually increasing sharply in emerging economies since their growth rates are insufficient to balance it out.The idea of development is fluid, and different people have given it different definitions. The phrase "economic development" is far more inclusive. Having said that, when discussing regional development, the term "development" refers to a positive value notion intended to improve the standard of living and overall welfare of people in a certain area.While, Economic growth is characterized as an improvement in a nation's wealth and standard of living.Growth in the economy is the gradual rise over time in a nation's production of commodities and services. Ensuring equitable benefit distribution, minimizing negative environmental repercussions, and resolving social inequities

are critical issues for realizing economic growth's full potential.Regional imbalances, or the coexistence of economically developed and underdeveloped regions, are shown by regional disparities. The main topic of discussion among economists and decision-makers around the world has been differences in economic growth among areas. Regional differences in economic development exist.The productivity of workers, the dominance of regional economic activity, and public and private investment within and between regions all have an impact on economic development disparities.The discussion surrounding the evolution of regional disparities and the notion of spatial convergence in the fields of regional science and socioeconomic geography has always focused upon two poles: in the neoclassical paradigm, the unrestricted operation of market forces ensures that spatial inequalities resulting from flexible capital and labor (Richardson 1973) or the trade of specialized goods (Ohlin 1933) will be compensated for. There are some places in the globe that have a more developed economy than others.Such an imbalance has quite severe effects. It might cause societal upheaval, unrestricted migration, interstate and intrastate agitations, etc.India exhibits a significant amount of intricate regional variety in terms of the extent of social and economic development.Throughout order to lessen inter-state imbalances, it was aimed to create balanced growth throughout the country through the implementation of planning and a programme of state-led industrialization.Regional development disparity was cited as a critical development issue in the Three Year Action Agenda (2017–2018–2019–2020). The realization of potential increases the competitiveness of the country as a whole, hence there is a need for balanced regional development. In Uttar Pradesh, the socioeconomic development of the various regions varies significantly. The Bundelkhand and Eastern parts of this State are two examples of some of this State's more underdeveloped regions. While the Central and Western regions are more developed than the rest. TheCentral area of Uttar Pradesh has historically been important to many industries, including manufacturing, services, and agriculture.It’s economy heavily depends on agriculture. Wheat, rice, sugarcane, potatoes, and pulses may all be grown in the area.Numerous industrial cities, including Kanpur, a former industrial and commercial Centre, are located in central Uttar Pradesh.City like Lucknow have always served as significant administrative and educational hub.Despite these encouraging achievements, Central Uttar Pradesh continues to struggle with socioeconomic inequalities, poverty, and unemployment.The structure of this essay is as follows. The theoretical underpinning of our suggested Model is outlined in Section 2. Section 3 has described the data

collection and research technique. The outcome and discussion are reported in Section 4. Section 5 comes to a close.

LITERATURE REVIEW

There is a huge and diverse body of literature on regional imbalance at the district level. There aren't a lot of research on the Central region of the Uttar Pradesh state (UP), but the ones that exist do provide greater detail and show the development level at the district level. Few studies have examined the degree of discrepancy and trend over time in various regions using various dimensions and indicators.

Nair (1971) looked at the inter-state variations among 1950 and 1960 and found that there had was no obvious reduction in the economic divides in India. Additionally, he discovered that changes in industrialization or labor efficiency had no bearing on how interstate income disparities changed over time.**Gupta (1973)** analyzed the public sector's role in lowering regional income inequality in the FiveYear Plans. He found that public sector investment activities between 1950 and 1966 had reduced the country's geographical income inequality.**Nirupam Bajpai and Jeffrey D. Sachs (1996)** examined trends in Inter-State Inequalities of Income in India. During 1961–1971, did the study found convergence in per capita income levels.The convergence was principally caused by the green revolution's outstanding expansion of the agriculture sector. The divergence observed during the 1970s appears to be caused by the slowing down of industrial growth andthe creation of a city-based industrial development pattern ,whichwas concentrated only in a few places.**D M Diwakar (2009)** examined intra-regional disparities, inequality and poverty in Uttar Pradesh and identified that almost all the districts in Western and Central region were in a higher state of development than those in Bundelkhand and Eastern region. **Chirashree Das Gupta (2009)**in his article titled "Impact of Regional Disparity for Finance Commission Dissolutions," discovered that equity and equality go hand in hand with effective resource management for social justice and equitable resource distribution across the country.**Swati Raju (2012)** studied the convergence/divergence concept and the growth performance of India's states from 2001 to 2010. Gross domestic product (GDP) growth at 2004–2005 prices was used to gauge growth performance. However, the study of unconditional convergence, which included both the metrics of sigma and beta convergence,

found evidence in favor of convergence in growth for the period 2001–2010. **Reena Kumari (2014)** examined convergence conditions in agricultural sector, industrial sector, service sector, education sector and health sector in three period (1990- 91, 2000-2001 and 2010-2011) in Uttar Pradesh and identified that in all sectors, there existed some evidence of convergence rather than divergence except in health sector.**Dzenita Siljak (2015)** examined the economic uniformity of real GDP per capita in the West European nations between 1995 and 2013. He employed two different measurement techniques. The initial approach proposed sigma convergence, that relies on the variance in real per capita GDP. The second is beta convergence, both absolute/unconditional and conditional, which rests on the neoclassical growth theory. The empirical findings offered support for the economic convergence.**Nitin Tanwar1, Sunil Kumar1, B.V.S. Sisodia1 , B.K. Hooda2 (2016)** dealt with the evaluation of the levels of agricultural, social and industrial developments at district level in the State of Eastern Uttar Pradesh. The level of socioeconomic development in the districts of eastern Uttar Pradesh was found to vary significantly.**H. Kaur, P. K. Mishra (2017)**analyzed Uttar Pradesh's socioeconomic growth in the years following reform. The study discovered a low level of human development and, as a result, a poor level of economic growth in Uttar Pradesh. This finding was adequate to explain why unemployment, poverty, and inequality continued to exist in the state.**Sarvesh Kumar1*, K. K. Mourya1, Ravi Prakash Gupta1 and S. N. Singh (2018)**discovered the overall profile, the development index, and disparities relating Agriculture and Infrastructure in Western Uttar Pradesh. It was discovered that the socioeconomic development levels in the districts of western Uttar Pradesh varied greatly.**Naushaba Naseem Ahmed and Mehebub Rahaman (2022)** investigated with the aid of a few chosen economic indicators the pattern of economic development inequality that exists at the district level in Uttar Pradesh. To rank the districts in terms of economic growth, a composite score was created using principal component analysis (PCA). The study discovered stark inter-district disparities in economic development, with the districts in the western region performing somewhat better than the districts in the eastern region, which were still lagging behind.

We see that most of the studies focused on Inter-state income inequality trends in India whereas some focused on the public sector’s role in loweringregional earnings inequality in the Five Year Plans.The key findings revealed that convergence was primarily caused by the remarkable increase of the agricultural sector during the green revolution. One the other hand the observed

discrepancy appeared to be caused by a slowing of industrial expansion andthe formation of an industrial development pattern based in cities that is concentrated in a few places.A study on the public sector's contribution to lowering regional income inequality found that the public sector has an impact on reducing regional income disparities.One significant study revealed that equity and equality are inextricably linked to successful resource management for social justice and equitable resource allocation across the country.Most of the studies undertaken in this field were conducted either on national level or state level. There are very few studies that are carried at district level. We did not come across any study which attempted to cover the regional disparities in economic development in central-region of Uttar-Pradesh. The study holds significance because understanding the scope and nature of regional disparities assists policymakers in developing targeted policies to promote inclusive development.

Our study seeks to examine the growth performance across districts of Central region of Uttar Pradesh for 2011-2018 as also study the convergence/divergence hypothesis.

The hypothesis tested are:

H0: $\alpha \geq 0$ (there is no absolute convergence)

HA: $\alpha < 0$ (there is absolute convergence)

The null hypothesis states that growth rate of PCNI does not depend on the initial level of Per capita Net income. The alternative hypothesis however, designates that growth rates of Per capita Net income and initial per capita Net income are inversely associated and hence, convergence occurs**(Kalsoom Zulfiqar, 2017)**.

Research Methodology

Study area: The study comprised of 10 districts of Central Uttar Pradesh.Every district encounters situational development variables unique to it in addition to conventional financial and administrative factors. All of the districts' shared characteristics have been used as development indicators.In this paper, we discuss a decade. Central region of Uttar Pradesh is divided into 10 districts, which are: Kheri, Sitapur, Hardoi, Unnao, Lucknow, Rae Bareli, Kanpur Dehat, Kanpur Nagar, Fatehpur and Barabanki.

Standard deviation (**σ**): SD is the unit of measurement for change. This root square deviation accurately depicts the disparity in per capita net income levels and growth between the districts.

Co-efficient of Variation (CV): Between 2011-12 and 2020-21, the coefficient of variation method is used to gauge the degree of variance between the chosen indicator. The CV will be zero in the event of perfect equality, meaning there is absolutely no disparity and no variance in the series of observations. The degree of variance increases as the computed coefficient of variation value rises. To measure the level of variation in the selected indicatorthe following formula is used **(Nachimuthu, 2009)**.

CV=Standard deviation/Mean*100

In this study, the convergence hypothesis—which contends that poor countries frequently increase more swiftly than wealthy ones when it comes to of per capita net income—is assessed using two measures of convergence, which refers Sigma and Beta.

The first metric is the so-called **Sigma-convergence**, which is used to compare the presence or lack of unconditional convergence.Sigma convergence is a straightforward assessment of convergence considering the standard deviation / coefficient of variation.The standard deviation is determined as the mean divided by the coefficient of variation. When the coefficient of variation declines, there is convergence; when it rises, there is divergence. Simple averages instead of averages with weights will be used in the context of convergence because it is not desired for a nation to be left behind, irrespective of the total number of its population. Since Daniel Quah's early 1990s research, the sigma-convergence technique has gained popularity. Daniel Quah (1993) demonstrated that the standard growth-initial level relationship does not provide a clear response about convergence since the relationship tends to be negative even while the income gaps have not shrunk using the connection with Galton's well-known error. Sigma-convergence, referred to fall in the cross-sectional dispersion of per capita incomes over time. According to Quah (1993), Sigma convergence is important since it directly determines whether or not the distribution of income across economies is improving.When the standard deviation appears to decrease over time, we say there is a-convergence(Paas, 2007).

The second measure is the so-called *beta-convergence*.Beta convergence can be either absolute/unconditional or conditional. Convergence is absolute when it is anticipated that all nations will eventually reachthe same steady-state level or finalpoint(Paas, 2007).Beta-convergence analysis (growth-initial level regression) is a well-established and popular method for assessing convergence hypotheses. Baumol (1986) served as the foundation for the beta-convergence investigations, and the methodology has gained enormous popularity since then (Barro 1991, Barro andMartin 1992, Martin 1996, Fischer and Stirböck 2004).A negative link between the starting income level and the pace of subsequent income growth is known as beta-convergence (or convergence).A needed but not sufficient criterion for σ-convergence is β-convergence(Young et al., 2008).

Here, we perform a regression between the starting level of per capita Net Income and the proportionate growth in per capita net income. If the initial income coefficient, designated by the letter b, is negative and statistically significant, we say that there is b-convergence. There should be a negative association between initial income level and growth rate if impoverished economies grow faster than richer ones.The absolute -convergence hypothesis presupposes that there is a negative connection between the beginning income level and the growth rate. As a result, weaker economies expand more quickly than wealthier ones and eventually overtake them. The following cross-sectional equation is typically used to test the absolute -convergence hypothesis. Regression analysis is used to examine it.The per capita net income growth rate is the dependent variable, and the per capita net income starting point is the independent variable.

$\log(yi,t) = \alpha + \beta\log(yi,t-1) + \varepsilon i$

α – the constant term

β – the convergence coefficient β

$\beta<0$

$\log(yi,t)$ – the growth rate of per capita net income in period t for regioni.

yi,t-1 – initial per capita net income for regioni

εi – the stochastic error of the equation.

The beta coefficient is determined without the use of any additional variables because it is considered that the areas do not significantly differ in terms of the degree of technology in order, investments proportions, structure of the economy, workforce qualifications, and other factors **(Siljak, 2015).**The beta coefficient measures the speed of convergence or the rate at which the real GDP per capita of a nation approaches its steady state rate of growth. A positive beta value denotes divergence, whereas a negative beta coefficient denotes convergence. The rate at which impoverished countries catch up to rich countries in terms of real GDP per capita over a given period of time is measured as betaconvergence.Economic convergence requires a negative relationship between the mean annual rate of growth of the nations' real per capita GDP over a certain time period and the per capita GDP in the first year.

Result and Discussion

Economic development is a multifaceted term with many different indicators, but per capita income is the most used indicator for gauging economic progress. Regional imbalance is a common feature of emerging countries.An analysis of the inter-district discrepancy in the geographical regions of the central part of UP has been attempted in this section.The process of development raises people's standards of living.

One of the primary goals in developing plans has been an incremental decrease in regional inequalities in the rate of development, hence growth initiatives have been implemented across the state in a planned manner to bring about uniform regional development. The implementation of modern, improved techniques has led to commendable progress in the industrial sector and increased crop production overall in the agricultural sector, but regional gaps in development are not decreasing over time.In the current study, a few development-related issues have been highlighted and investigated in terms of Per capita Net income. Inter-District variations in terms of income have been examined.

First of all we discuss the per capita Net income of the different districts during the period as shown in table. It is clear from table that Lucknow, Kanpur Nagar, and Kanpur Dehat have been the top districts in terms of PCNI. This superiority is maintained throughout the period under

consideration as is evident from the table. As shown from table, Lucknow (54682), Kanpur Nagar (42104) and Kheri (31060) were above average in terms of PCNI (Per capita Net Income) in 2011-12, whereas Rae Bareli (19943), Hardoi (21607) and Fatehpur (25798) were below average. In 2015, again Lucknow and Kanpur Nagar stayed above average, on the contrary Barabanki, Hardoi, and Sitapur were below average. In 2020-21, Lucknow and Kanpur Nagar again were at top and above average, however Rae Bareli, Hardoi and Sitapur were below average. The levels of PCNI (Per capita Net Income) depicts inter-district disparity declined as shown by the decreasing coefficient of variation. The coefficient of variation has increased from 36.53% in 2011-12 to 37.98% in 2017-18 showing increased inter-district disparity in economic development, but in 2020-21 it fell to 29.40% which depicts reduction in inter-district disparity.

Table 1 :Levels of Per capita Net income (PCNI) across Selected districts of Central region of Uttar Pradesh (2011-12 to 2020-21)

District	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Kheri	31060	28802	30634	31991	32437	33062	34089	36658	37678	35478
Sitapur	25182	27090	27738	24368	29180	29261	29052	31485	32415	31052
Hardoi	21607	21739	23607	22768	24580	24421	26047	26574	28442	29019
Unnao	25692	25463	29258	27074	30782	33577	36437	35761	35559	34101
Lucknow	54682	56469	55498	54534	58007	60102	67496	72117	67065	62867
Rae Baraeli	19943	20357	23961	23810	24294	25028	23421	25014	25353	24596
Kanpur Dehat	26817	28164	29639	28717	36605	36570	38560	41481	43410	39288

Kanpur Nagar	42104	40471	44940	46795	44750	54853	60392	62406	59071	53161
Fatehpur	25798	25984	29513	27499	31486	34116	33101	39539	40518	38849
Barabanki	22677	23202	24355	24958	31456	33556	32183	41386	45070	41616
Mean	29556.20	29774.10	31914.30	31251.40	34357.70	36454.60	38077.80	41242.10	41458.10	39002.70
S.D	10799.35	10889.19	10286.71	10731.65	10160.76	11825.10	14463.49	15014.47	13095.06	11468.73
C.V %	36.53	36.57	32.23	34.33	29.57	32.43	37.98	36.40	31.58	29.40

Basic convergence Regression

Equation 1 displays the regression analyses in the p-convergence measurements. Here, we perform a regression between the initial value of per capita Net Income and the growth in per capita Net Income. When the coefficient on initial income, represented by the letter p, is negative and statistically significant, we say there is p-convergence. In other words, Convergence is deemed to be occurring if the calculated beta coefficient is negative. On the other hand, divergence occurs among the chosen districts if the beta coefficient is positive.

Calculating a regression equation that connects the initial level of per capita net income (PCNI) and the growth rate of the per capita net income over time, yields the following results:

Y = 12.95 - 0.93X R2=0.277

In this equation:

- The resultant value of the explained variable is represented by Y.
- X stands for the independent variable's value.
- The y-intercept, or a value for Y when X is 0, is 12.95.
- The slope of the line, which represents how Y varies with an increase of one unit in X, is -0.93X.

The negative sign suggests that as X increases, Y will decrease.The equation represents a straight line on a graph with the y-intercept at Y = 12.95 and a negative slope of -0.93.The line will slant downward from left to right, demonstrating that as X grows, Y decreases.The likelihood of

getting the observed outcomes (or more extreme results) under the supposition that the null hypothesis is true is shown by a p-value of 0.118. The p-value is used in statistical hypothesis testing to determine how strong the evidence is against the null hypothesis.A p-value of 0.118 exceeds the significance level (typically indicated by alpha), which is set at 0.05. The obtained results are not statistically significant at the 0.05 significance level when the p-value is bigger than alpha. As a result, at the significance level of 0.05, we are unable to reject the null hypothesis. At the 0.05 significance level, the null hypothesis cannot be ruled out due to the p-value of 0.118. It implies that there is insufficient support for a statistically significant effect or relationship between the variables under examination from the observed data.Growth and starting per capita net income have a statistically insignificantly negative relationship. Similar to many other Indian states, Central Uttar Pradesh has a substantial economic divide between urban and rural areas. Lucknow and Kanpur have seen more fast expansion as a result of their commercial and industrial activity, educational institutions, and improved infrastructure. Rural communities, on the other hand, have frequently trailed behind in terms of development, having to deal with issues like restricted access to necessities, reduced employment possibilities, and poor infrastructure.Major cities and industrial hubs have seen the most economic growth in Central Uttar Pradesh. Strong industrial bases in cities like Kanpur have drawn investment and led to significant economic growth. However, it's possible that not all portions of the region reaped the rewards of this prosperity equally, creating gaps between urban and rural communities.

In a linear regression model, the amount of the dependent variable's variation that can be predicted from the independent variable or variables is expressed statistically as R-squared (R2) also known as the coefficient of determination. R2 has a range of 0 to 1.

In our situation, R2 = 0.277, which indicates that the independent variable(s) in the linear regression model account for around 27.7% of the variance in the dependent variable. The linear regression model appears to explain around 27.7% of the variability in the dependent variable, according to the value of 0.277.The model does not account for the remaining 72.3% of the variability, which is probably caused by other factors or random fluctuation (error term).A higher R2 value (closer to 1) would suggest a better fit since a bigger fraction of the variability is

explained by the model. In contrast, a lower R2 value (closer to 0) would suggest a lesser explanatory ability for the model.

Conclusion

The paper seeks to examine growth performance of the districts as also analyze the convergence/divergence in growth across districts for the period 2011-12 to 2017-18 in central Uttar Pradesh. Two measurements of convergence were used: beta convergence, which relies on neoclassical growth theory, and sigma convergence, which measures the spread of per capita net income using the coefficient of variation. Here, we perform a regression between the starting point of per capita Net Income and the rate of growth of per capita Net Income over time. We say that there is p-convergence if the coefficient on initial income, denoted p, is negative and statistically significant.The table clearly shows that the top districts in terms of PCNI have been Lucknow, Kanpur Nagar, and Kheri. This dominance persisted throughout the time period under investigation. The coefficient of variation has increased from 36.53% in 2011-12 to 37.98% in 2017-18 showing increased inter-district disparity in economic development, but in 2020-21 it fell to 29.40% which depicts reduction in inter-district disparity. Estimating a regression equation that links growth over a time period to the PCNI's initial per capita income log, we found that the value of the coefficient (-0.93), shows a negative relationship between the two variables.Growth and starting per capita net income had a negative statistical insignificant relationship across the whole time.

Policy Implication

In order to analyze and resolve trends in inter-district income disparities in Uttar Pradesh's central area, a comprehensive policy strategy that takes into account economic, social, and infrastructural elements is necessary.Develop a thorough regional development strategy that outlines the advantages and disadvantages of each district in the core region. In order to promote balanced economic growth, this strategy should give priority to investments and resources in industries where districts have a competitive edge.Infrastructure for electricity, digital, and transportation should be developed and improved in underdeveloped areas. A more inclusive growth can result from increased investment and job possibilities brought about by improved

connectivity.In economically underprivileged areas, improve educational infrastructure and chances for vocational training. This could equip the local workforce with the abilities needed for increased employment opportunities and entrepreneurship.Ensure that underserved areas have access to high-quality healthcare facilities. Enhancing healthcare can boost human capital, which can result in higher output and overall economic growth.To ensure that district-level development plans are successfully carried out and that resources are allocated in accordance with local priorities, strengthen local governance structures.

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