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Growth and Inequality at the sub-regional and sub-sectoral level: Case of Service sector of Odisha, India

Crecimiento y desigualdad a nivel subregional y subsectorial: Caso de sector de servicios de Odisha, India

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SUMMARY:

This study tests for the presence of both absolute β-convergence (where initially poorer districts tend to grow at a faster rate than initially richer districts) and σ-convergence (where dispersion across the districts reduces with time) across the districts of Odisha with respect to the tertiary sector during the period of 1993-2012. The results of the study suggest that absolute β-convergence exists across the districts during 1993-2012 with regard to the tertiary sector and it is also significant. This implies that the initially poorer districts of Odisha on account of income from the services sub-sectors have displayed growth rates which are faster than that by the initially richer districts during the study period. However on checking for σ-convergence across the districts, it was found that the per capita income from the tertiary sector across the districts did not converge over the period, rather the disparity level (measured by SD, Gini coefficient and Theil index) had escalated and the results were significant at 1 percent level of significance. Thus the objective of the study was achieved by examining the presence of disparity in the tertiary sector across the districts of Odisha and analyzing the existence of convergence at the district-level during the period of 1993-2012. This study can be used to identify those backward districts of Odisha which require additional policy intervention for the development of infrastructure to aid the tertiary sector to flourish. By giving additional assistance to these backward districts, these regions can surely amplify their speed of catch up with the richer districts of the state and the country as a whole.

RESUMEN:

Este estudio prueba para la β-Convergencia absoluta y la σ-convergencia a través de los districtos de Odisha en sector terciario durante el período de 1993-2012. Los resultados sugieren que la β-Convergencia absoluta existe en los distritos durante 1993-2012 en el sector terciario. Para la σ-convergencia a través de los distritos, se descubrió que los ingresos per cápita del sector terciario a través de los distritos no convergieron durante el período. Por lo tanto, al dar asistencia adicional a estos distritos atrasados, estas regiones seguramente pueden amplificar su velocidad de alcanzar los distritos más ricos del estado y del país en su conjunto.

1. INTRODUCTION

One of the key facts of economic growth today is that levels of income and growth rates have differed considerably across countries and regions of the world. Even small differences in these growth rates, when cumulated over a long period, have resulted in substantial impact on the standards of living of people. These inequalities have lingered on for long periods of time and have shaped into massive divergence among the nations of the world. The world has witnessed rapid economic transformation but not in a consistent manner. While some economies have escalated at soaring rates others have shown a very docile rate of growth. As a result of which some countries have progressed to become developed nations and others are still lagging behind as under developed or developing nations. Rapid economic growth has surely brought with it an even bigger issue of inequality in growth rates among the world economies.

Regional inequality in India is a serious concern due to the large size and heterogeneity of the country. This issue of regional economic growth and disparity has attracted substantial attention among researchers, planers and policy makers. Many studies have shown the enlarging gap between the rich states and the rest of the economy. The extent of income inequalities in a country like India is quite significant. Since the time of independence, the Government of India has been apprehensive about how to strengthen national unity and promote balanced regional growth and equity. The Planning Commission of India has also on many occasions tried to curb this disparity and bring about inclusive growth. Nevertheless substantial results are yet to be witnessed. There are also other related disparities in levels of education, literacy, health, infrastructure, population growth, savings, investment expenditure and the structure of regions. Inter-state variations are also seen across different sectors of the economy. Understanding the causes behind such inequalities is indispensable to formulate appropriate policies and bring about required institutional changes in order to spread the benefits of growth processes across regions.

Despite the global economy passing through turbulent weather, India's growth story has largely remained positive by registering a robust growth rate of 7.2% in 2014-15 and 7.6% in 2015-16. The International Monetary Fund (IMF) estimates

suggest an average world growth rate of 3.1% in 2015 which makes India's achievement during these trying times even more special. Other countries like China (6.90%), USA (2.60%), Japan (0.60%) and Australia (2.40%) have also shown varied growth rates during 2015, thus depicting the non-uniformity in the growth rates across the globe. India's contribution to global growth in PPP terms has increased from an average 8.3% during 2001-07 to 14.4% in 2014.

Not only globally, but also at the national level there remains huge disparities in growth rates and contribution to the Indian GDP by the states of India. At the intra-state or inter-district level as well, non-uniformity in growth rates and income per capita is witnessed as a result of which the fruits of development are being borne by some regions and are not being dispersed proportionately. Inter-district convergence studies based on income per head from a particular sector are rare and require emphasis. If only inequality is curbed from the grass-root level, can convergence be noticed at the inter-state and cross-country level.

Not many convergence studies have been carried out with respect to the tertiary sector. Very few studies were found examining the convergence hypothesis at the inter-district level. Research works in Odisha based on inter-district convergence relating to the tertiary sector are negligible. These are some of the research gaps that were identified after going through the literature. Therefore the objectives of the paper were to test the level of inequality across the districts of Odisha in the services sector during the period of 1993-94 to 2011-12 and to check whether the poor districts are performing better (in terms of growth rate) than the rich ones with respect to the services sector during 1993-94 to 2011-12.

The data for this purpose was collected from the District Statistical Handbooks for the years 1993-2011 available at the Directorate of Economics and Statistics, Government of Odisha. The study intends to make an inter-district analysis of convergence in the service sector of Odisha. For this all the 30 districts of Odisha have been incorporated which covers 19 years starting from 1993-94 to 2011-12. Per capita income from the tertiary sector of all the districts has been considered at constant 2004-05 prices. This paper therefore mainly contemplates on inequality and convergence in the tertiary sector among the districts of Odisha during the period of 1993-94 to 2011-12. It will be an important outcome to strategize the development of the state economy by the policy makers.

This paper is organized as follows: The introduction comprising of a glance at the Odisha economy and the theoretical framework implemented in the study. This is followed by the Review of Literature, Research Gap, Objectives, Database and Study Area. The Research Methods give a detailed description of the empirical tools used in the study. The next part describes the status of the tertiary sector in Odisha. There is the Result and Discussion in the succeeding part. Finally the concluding remarks have been given.

2. REVIEW OF LITERATURE

The term 'convergence' is often used in growth economics to imply narrowing down of the disparities in income per capita across economies and thereby displaying a cohesive tendency towards a common steady state equilibrium. Although the concept is quite old, the convergence formula derived by Solow (1956) and Swan (1956) gives the conceptual clarity required for its use in macroeconomic scenarios. Baumol (1986) carried out one of the earliest statistical studies to test the convergence hypothesis.

While a sizeable number of literature is devoted to international, national, inter-state and inter-regional disparities, inter-district disparities have received scant attention. Research studies by Barro and Sala-i-Martin (1991, 1992) showed that convergence occurred when poor economies were able to grow faster than the rich ones in terms of per capita income. They carried out studies based on personal income across U.S. states from the period of 1880 to 1990 and found a negative relationship between the growth rate of state per capita income during 1880-1990 and the log of per capita income in 1880 (i.e. initial income level) suggesting absolute β-convergence for the U.S. states.

Some other inter-country research works on convergence did not find absolute β-convergence but conditional β-convergence was mostly prevalent during the study periods (Mathur (2005), Wu (2006), Hobijn and Franses (2001), Strazicich and List (2003) and Stegman (2005). These works have been based upon disparities in different sectors and have compared mostly the advanced countries with the developing and underdeveloped countries.

In India, a number of research work have been worked out on inter-state convergence (Cherodian and Thirwal (2013), Bandyopadhyay (2011 and 2006), Bhatacharya and Sakthivel Adabar (2004), Somasekharan, Prasad and Roy (2011), Chaterjee (2014), Mukhopadhyay (2014), Sharma (2014), Rath and Madheswaran (2010), Shingal (2012), Ghosh (2006), Cashin and Sahay (1996)). While σ-convergence is mostly not seen, conditional β-convergence has been spotted in some cases.

Some earlier studies on inter-regional convergence in India (Dey (2015), Singh, Kendall, Jain and Chander (2013), Patra (2014)) and abroad (Young, Higgins and Levy (2007)) have shown how inequality in per capita income and in the agriculture sector exists among districts and regions across countries. Recently a district level study was carried out among 18 districts of West Bengal by Dey (2015) which concluded that dispersion had increased among the districts during 1993-94 to 2007-08 and that there was no absolute β-convergence.

Many works on convergence have been more specific in terms of testing convergence of income per head in particular sectors (agriculture, manufacturing and services) and not just per capita income as a whole. This has ensured in determining

the existing discrepancy within a particular sector, say agriculture with respect to labour productivity, use of fertilizer, land productivity and agriculture income as a whole, across different regions (Somasekharan, Prasad and Roy (2011), Chaterjee (2014), Mukhopadhyay (2014), Patra, Ghosh (2006)). Most of these studies have employed techniques to verify spatial convergence in agriculture and have observed the presence of polarization among the agriculturally rich regions and the poor ones. Similarly in the manufacturing sector some studies have checked for convergence in the growth and productivity of the sector giving special emphasis to technological advancement and structural changes Sharma (2014), Rath and Madheswaran (2010)). Inter-regional inequality and absolute β-divergence was observed due to increase in GSDP due to manufacturing among the initially richer states. In the services sector very few studies on convergence was found. One such study by Shingal (2012) highlighted the importance of the service sector and its rate of convergence across the states of India. The role of trade of services in its growth and convergence was also accounted for in this paper. Panel unit root tests showed the presence of β-convergence in per capita services and the importance of inter-state trade of services.

Research works on inter-district disparities with respect to the tertiary sector concerning developing countries like India are scarce and more so in small poor states like Odisha. Some evidence shows the growing inter-regional disparities in India and other states but such work has not been carried out for an emerging state like Odisha whose services sector captures more than 50% of the share to GSDP and grows at a rate (9.2%, 2014-15) much higher than the other sectors in the state.

3. THEORETICAL FRAMEWORK

Regional disparities have become an intensely debated topic in the last couple of decades. In order to study the extent of variability in growth rates among regions, the neoclassical growth economics offers the convergence theory which helps significantly to study the egalitarian growth process of regions in an economy. Inequality within or among countries is unacceptable from the point of view of social and economic justice. There have been a number of studies to emphasize on the growing inter-state inequality by using the method of convergence. To develop a concrete knowledge of inequality in the economy and to formulate effective policies regarding the matter, there is a need for a complete study of the economy based on the theoretical framework.

One of the basic tenets of the growth theory is that economies with lower capital-labour ratio tend to grow faster than those with higher capital-labour ratio. This leads to the poorer regions having an initial lower per capita income to even-

tually congregate with the richer regions by growing at faster rates. The concept of convergence owes its basis to neoclassical growth theories like that of Solow, 1956 which predicts that regional differences in income per head should converge on a common level of income per head provided tastes and preferences and technology are the same across regions. This is because of the neoclassical assumption of diminishing returns to capital. However with the advent of the new or endogenous growth theories by Romer (1986) and Lucas (1988), the diminishing returns were offset by technological progress which prevents the falling of the marginal product of capital as regions get richer. Thus, advocating that convergence can only be conditional, controlling for differences in steady state of regions. Within the neoclassical growth framework, there have been some previous studies that have attempted to scrutinize the differences in growth rates and the presence or absence of convergence across regions (Baumol 1986, Lucas 1988, Barro and Sala-i-Martin 1995, Mankiew, Romer and Weil 1992).

3.1 The Neo-Classical Growth Model and the Convergence Hypothesis

As per the Solow growth model, establishing the link between savings and growth is the chief goal of the model. This relationship eventually leads to capital accumulation which is the main essence of the growth process. According to the model, the production function of the economy is described as:

$$Y = A_t F (K_t, L_t)$$

Where Y = Output at time period t
A_t = Technology at time period t
K_t = Stock of capital at time period t
L_t = Labour at time period t

Assuming a Cobb-Douglas production function of the type of:

$$Y_t = K^{\alpha}_t (A_t L_t)^{1-\alpha} \quad (1)$$

Where Y = Output, K = Capital, L = Labour and A = Total Factor Productivity

The required steady state level of income per capita is y^*, which is derived from the equation given by:

$$y^* = A_0 e^{gt} [s/(n + g + \delta)]^{\alpha/(1-\alpha)} \quad (2)$$

where 's' is the rate of investment, n and g are exponential growth rates of L_t and A_t respectively.

Equation (2) clearly states that the steady state level of income of an economy depends on the above six elements- A_0, s, g, n, δ and α.

The Solow model predicts that in the absence of technical progress, diminishing returns to capital accumulation imply that a long run steady state with constant per capita output exists. Thus, eventually the economies starting from different factor endowments will converge to the same steady state provided technology remains constant. A typical neoclassical growth model is of the form of log-linearization around the steady state and is represented as:

$$\ln y(t) - \ln y(0) = (1 - e^{-\lambda t}) (\ln y^{*} - \ln y(0)) \quad (3)$$

Here y is the measure of per capita income or output and the parameter λ is the speed of convergence to the common steady state of the system, y^{*}.

Thus equation (3) represents the convergence equation which indicates that an economy having an initial per capita income level lower than the steady state level, tends to grow at faster rate (λ) to move towards y^{*}. This proposition of Solow growth model is otherwise known as the absolute or unconditional convergence.

3.2 Types of Convergence

The Barro and Sala-i-Martin (1995) framework elucidates two notion of classical convergence to explain the differences in levels and growth rates of income across different economies or regions in an economy. They are:

Sigma (σ) Convergence
Beta (β) Convergence

The first concept is the σ-convergence. It focuses on the dispersion of per capita income or output over a cross-section of economies at each point of time. Thus, economies are said to satisfy the conditions of σ-convergence, if the dispersion (measured in terms of the coefficient of variation and standard deviation) of real per capita income among economies falls over time. When the deviation in per capita income among economies reduces over time, σ-convergence is acknowledged. It is not directly related to the growth rates of economies.

The second concept is that of β-convergence. The neo-classical theory proposes that if two economies having similar parametric specifications, differing only with respect to their per capita output or income levels at some initial point of time, then at any subsequent point of time, the economy that started off with a lower per

capita income should grow at a faster rate. This leads to the hypothesis of absolute β-convergence, which predicts a negative relationship between the growth rates enjoyed by a cross-section of economies and their per capita income levels at a given initial point of time. Thus the β-convergence measures the speed at which poorer regions catch up with the richer ones.

Further the β-convergence may be classified as Unconditional (or absolute) and Conditional β-convergence. The **Absolute** β-convergence implies that poor economies tend to grow faster per capita than rich ones-without conditioning on any other characteristics of economies. Here the economies have the same steady state values, the only difference being in the starting values of capital per capita. However in reality they may differ in many other aspects like initial level of human capital, measures of government policies, level of investment, level of technology, infrastructure level, population growth rate, propensities to save and so on. These differences may generate different steady states for different regions. Therefore in order to account for these variations in steady state of the regions, the conditional β-convergence is used which helps in holding the steady state of each region as constant. Therefore the **Conditional β-convergence** connotes that an economy at a lower starting value of real per capita income is likely to generate higher per capita growth rate keeping fixed some other conditioning variables of the steady state. If heterogeneity across economies is permitted in terms of dissimilarity in steady state values then conditional convergence is considered. Here the steady states differ across economies as the assumption that all economies have the same parameters is relaxed. Conditional β-convergence seems to be a better empirical exercise because it reflects the convergence of countries or regions after controlling for differences in steady states.

The neoclassical model is thus rationalized by diminishing returns to capital which is why poor regions tend to grow relatively faster than rich ones in terms of their per capita income displaying β-convergence. Due to diminishing returns to capital, rate of return is negatively related to the per head capital stock. Therefore the growth rate of an economy declines as it advances towards the steady state. The farther an economy is to its steady state, the faster is its growth rate and vice versa.

4. DESCRIPTION OF THE ECONOMY OF ODISHA AND ITS TERTIARY SECTOR

Odisha is one of the fastest growing states with a growth rate of 7.31% in 2014-15 (Odisha Economic Survey, 2014-15). The structural transformation in the state economy of Odisha has been quite visible over a period of time. There has been a sectoral shift from agriculture towards industry and services sectors in the

recent decade. The tertiary sector has been growing at consistently higher rates compared to the other two sectors at about 9.20% during 2014-15. The estimates of 2014-15 suggested that some of the sub-sectors like community, social and personal services contributed 13.45%, the trade, hotels and restaurants had a share of 13.09%, the transport, storage and communication sub-sector contributed about 10.99% and financial and insurance services sub-sector about 13.64% to the GSDP. The construction sector has a share of 11.69% to Odisha's GSDP and is also an important employment generating sector. Tourism is another sector where Odisha has huge potential and being a labour-intensive activity generates employment on a large scale. The banking sub-sector has grown at 12.08%, trade, hotel and restaurants at 9.36%, storage at 11.60%, transport by other means at 11.15% and other services at 8.50%. Overall almost all the sub-sectors of the service sector have had increased GSDP contribution along with improved growth rates.

TABLE 1

ANNUAL GROWTH RATE OF GSDP BY BROAD SECTORS OF ODISHA (AT CURRENT PRICES)

Year	Agriculture	Industry	Services	Total GSDP	Total NSDP	Per Capita NSDP
1993-94	20.55	7.63	10.99	14.66	14.99	13.11
1994-95	15.98	30.16	17.69	20.13	20.6	18.7
1995-96	26.5	17.68	16.75	21.32	21.75	19.89
1996-97	-7.66	-6.38	7.88	-1.17	-2.92	-4.36
1997-98	27.02	18.1	16.43	21.1	22.08	20.35
1998-99	4.42	17.88	12.65	11.1	11.43	9.9
1999-00	-0.56	11.19	20.13	12.55	20.45	18.63
2000-01	-7.02	2.69	4.72	9.09	0.25	-1.04
2001-02	12.66	0.99	5.94	6.79	6.13	4.83
2002-03	-0.48	9.49	8.07	5.99	6.16	4.96
2003-04	31.28	38.15	10.65	20.62	20.16	18.83
2004-05	-0.22	41.7	17.95	17.59	16.11	14.31
2005-06	5.79	8.67	11.48	9.48	8.18	6.79
2006-07	13.02	28.8	18.49	19.68	19.54	17.99
2007-08	42.4	36.92	15.97	26.94	26.37	24.73
2008-09	1.41	18.01	19.75	14.86	14.77	13.27
2009-10	9.57	-4.97	17.95	9.74	6.53	5.13
2010-11	11.27	26.74	21.74	21.22	21.29	19.71
2011-12	-0.20	16.48	13.01	11.67	11.39	9.93

2012-13	34.08	5.39	13.09	13.89	14.77	13.26
2013-14	0.35	8.13	12.83	8.66	8.19	6.77
2014-15	13.24	12.29	15.25	13.86	14.19	12.69

Source: Odisha Economic Survey, 2014-15, Planning and Coordination Department, Government of Odisha.

The economic growth performance of the state was quite impressive during the last decade. The GSDP of the Odisha economy has shown an average growth rate of about 14% in the last three Five Year Plans. It is one of the fastest growing state economies with structural composition of 29.15% from primary sector, 23.33% from secondary sector and 47.53% from the tertiary and financial services sector.

The annual growth rate of GSDP of the different sectors shows the variability in growth rates over the period. When the agriculture sector has had a negative growth rate, the other two sectors have shown positive and at times high growth rates (1999-00, 2000-01, 2002-03, 2004-05, 2011-12). The agriculture sector of Odisha has had the most ups and downs in terms of its GSDP growth rates during this period. The services sector has been quite consistent in terms of the positive rates of growth throughout this period. In 2014-15, the GSDP growth rates of these sectors have been on the higher side- agriculture (13.24%), industry (12.29%) and services (15.25%). There has been a consistent increase in the total GSDP, total NSDP and NSDP per capita during this period apart from during 1996-97. The growth rates have been fluctuating but have shown mostly an upward trend.

4.1 Status of Tertiary Sector in Odisha

Against the backdrop of many positive changes that are sweeping the Indian economy, one such change is the structural transformation of the economy. From times immemorial, India has proudly lived up to its reputation of being an agrarian economy. Agriculture has been the mainstay for majority of the people in India. This trend seems to be slowly but surely changing since last couple of decades. The Indian economy has witnessed significant structural changes during the post-independence era. An unusual feature of this structural transformation, especially in the post-liberalization period is the ascendancy of the services sector in a large way. During the process of development of many developing nations, it has been seen that the industrial sector acts as the major contributor to the economic growth of a country, but this has not been the case for India. India's industrial sector has played second fiddle to the tertiary sector in terms of share in the national output.

The Odisha economy continues to be on a high growth trend showing a growth rate of 7.31% in 2015-16. There has been diversification of economic activities which has led to a visible structural transformation from an agrarian economy to an industry-led and services-led economy in Odisha. The capacity and growth rate of the services sector in Odisha have proven to be well pronounced to justify this structural shift of the Odisha economy.

TABLE 2
COMPOSITION OF GSDP (PERCENT) AT CURRENT PRICES BY BROAD CATEGORIES (2004-05 BASE)

Year	Primary Sector	Secondary Sector	Tertiary Sector	Finance and Services Sector
1950-51	46.31	9.45	6.22	38.02
1955-56	38.84	13.30	6.56	41.30
1960-61	40.20	17.90	8.60	33.30
1965-66	38.49	20.88	9.59	31.04
1970-71	45.36	15.79	10.67	28.18
1975-76	43.57	17.93	10.62	27.88
1980-81	45.34	17.77	10.58	26.32
1985-86	46.08	18.40	11.29	24.23
1990-91	35.84	25.53	13.27	25.36
1995-96	39.60	23.02	15.56	22.98
2000-01	30.55	26.09	15.12	28.25
2005-06	31.07	25.33	19.70	23.90
2010-11	30.52	24.48	20.68	24.32
2014-15(AE)	29.15	23.33	21.83	25.70

Source: Odisha Economic Survey, 2014-15, Planning and Coordination Department, Government of Odisha.

In Odisha, economic activities are broadly classified into four categories or sectors namely- Primary, Secondary, Tertiary and Finance and Services sector. The primary sector had a share of 46.31% in1950-51, which reduced to 45.36% (1970-71) and to 35.84% (1990-91), 30.55% (2000-01), 30.52% (2010-11) and to 29.15% (2014-15) exhibiting a constant drop in the share to the GSDP of Odisha. The secondary sector of Odisha, on the other hand has shown more or less a steady

escalation in its share towards the GSDP. The percentage share of the sector which was 9.45% during 1950-51 climbed up to 15.79% in 1970-71 and then to 25.53% 1990-91. The share was 23.33% in 2014-15.

The share of the tertiary sector to the GSDP has also increased from 6.22% (1950-51) to 10.67% (1970-71), 13.27% (1990-91) and to 20.68% (2010-11). In 2014-15, the share of the sector to GSDP was 21.83%. The last broad sector which is the finance and services sector has shown an uneven trend over the period. Its share was 38.02% during 1950-51 which increased to 41.30% in 1955-56 and then descended to 28.18% in 1970-71. In 2014-15, the share of the sector to GSDP was 25.70%.

TABLE 3
PERCENTAGE SHARE OF DIFFERENT SECTORS IN TOTAL GSDP (1950-51 TO 2014-15)

Year	Agriculture	Industry	Services
1950-51	44.50	7.82	47.68
1955-56	35.48	9.16	55.36
1960-61	36.82	11.43	51.75
1965-66	35.32	12.55	52.13
1970-71	42.74	11.53	45.73
1975-76	39.80	13.29	46.92
1980-81	42.40	12.97	44.63
1985-86	42.56	12.46	44.98
1990-91	31.81	16.33	51.86
1995-96	34.17	17.81	48.03
2000-01	25.68	17.59	56.74
2005-06	22.70	23.53	53.77
2010-11	19.46	35.54	45.00
2014-15(AE)	18.81	33.67	47.52

Source: Odisha Economic Survey, 2014-15, Planning and Coordination Department, Government of Odisha.

The above table shows the contribution of the three most important sectors of the economy of Odisha- Agriculture, Industry and Services. The changing picture of the share of the sectors to the GSDP of Odisha suggests the evolving structu-

ral transformation of the economy. The fall in share of the agriculture sector from 44.50% in 1950-51 to 18.81% in 2014-15 and the rise in the share of industries from 7.82% (1950-51) to 33.67% (2014-15) prove the change in the structure of the Odisha economy. The share of the services sector has had a high share to GSDP throughout the time period. Its share was 47.68% in 1950-51 which increased to 51.86% in 1990-91and to 56.74% in 2000-01. In 2014-15, the share of services were 47.52%.

TABLE 4

GROSS STATE VALUE ADDED BY ECONOMIC ACTIVITY OF ODISHA AT CURRENT BASIC PRICES (2011-16)

Economic Activity (Service Sector)	Percentage Share				
	2011-12	**2012-13**	**2013-14**	**2014-15**	**2015-16**
Services	38.71	39.36	41.57	42.92	45.28
Trade, repairs, hotels and restaurants	9.25	9.69	10.21	10.37	10.86
Transport, storage, communication and services related to broadcasting	6.83	7.08	7.52	7.86	8.42
Railways	0.84	0.96	1.02	1.08	1.15
Transport by means other than Railways	3.75	3.88	4.13	4.40	4.81
Storage	0.07	0.07	0.08	0.08	0.09
Communication and services related to broadcasting	2.17	2.17	2.30	2.30	2.38
Financial services	3.69	3.79	3.85	3.87	3.99
Real estate, ownership of dwelling and professional services	6.92	7.06	7.48	7.70	8.24
Public administration and defence	4.18	4.19	5.29	5.21	5.48
Other services	7.85	7.55	7.23	7.90	8.29

Source: Odisha Economic Survey, 2015-16, Planning and Coordination Department, Government of Odisha.

The percentage share of the services sub-sectors to the GSVA (at current basic prices) shows an increasing trend during the past few years. Among the different sub-sectors trade, repairs, hotels and restaurants (10.86%) have contributed the maximum towards the GSVA followed by transport, storage and communication (8.42%), other services (8.29%) and real estate, ownership of dwellings and professional services (8.24%) during 2015-16. Overall the services sector contribution to the GSDV has also increased significantly in the last five years from 38.71% (2011-12) to 45.28% (2015-16).

4.2 Growth Rate of Services Sector of Odisha

The sector is expected to grow at a rate of 9.65% and has an approximate share of 51% to the GSDP of Odisha during 2015-16. The annual growth rate of the sector has mostly been on the higher side. There was a double digit growth rate in 1950-51 (10.80%), in 1970-71 the annual growth rate collapsed to 5.10%, during 1990-91 the growth rate again increased to 17.14% and in 2010-11, the highest annual growth rate of 21.74% was noticed in the state economy. The table below lists the annual growth rate of the services sector of Odisha at every five year interval:

TABLE 5

ANNUAL GROWTH RATE IN PERCENT OF THE SERVICE SECTOR (1951-52 TO 2014-15)

Year	Annual Growth Rate (%)
1951-52	10.80
1955-56	13.43
1960-61	8.14
1965-66	11.31
1970-71	5.10
1975-76	11.32
1980-81	11.42
1985-86	15.89
1990-91	17.14
1995-96	16.75
2000-01	4.72
2005-06	11.48
2010-11	21.74
2014-15(AE)	15.25

Source: Odisha Economic Survey, 2014-15, Planning and Coordination Department, Government of Odisha.

The growth rates of the services sub-sectors in the past years mostly show a downward trend. Though the growth rates are quite high compared to that of the agriculture and allied sectors and the industrial sector, it has dropped in 2015-16. While trade, hotels and restaurants grew at 18.77% (2012-13), its growth rate has fallen to 14.17% (2015-16). Similarly the growth rates of transport and storage have fallen from 17.60% to 12.60%, railways from 30.29% to 16.54% and financial

services from 16.38% to 14.11% during the last few years.

TABLE 6
GROWTH OVER PREVIOUS YEAR IN SERVICES SUB-SECTORS (2012-16)

Economic activity	Growth Rates (in %)			
	2012-13	2013-14	2014-15	2015-16
Trade, repairs, hotels and restaurants	18.77	14.53	16.01	14.17
Transport, storage, communication and services related to broadcasting	17.60	15.46	17.88	12.60
Railways	30.29	15.39	18.18	16.54
Transport by means other than Railways	17.22	15.74	18.23	11.54
Storage	14.96	19.49	11.20	10.46
Communication and services related to broadcasting	13.46	14.87	11.62	9.90
Financial services	16.38	10.30	14.34	14.11
Real estate, ownership of dwelling and professional services	15.80	15.01	9.48	12.21
Public administration and defence	13.88	36.87	21.29	11.93
Other services	9.08	3.97	10.99	6.65

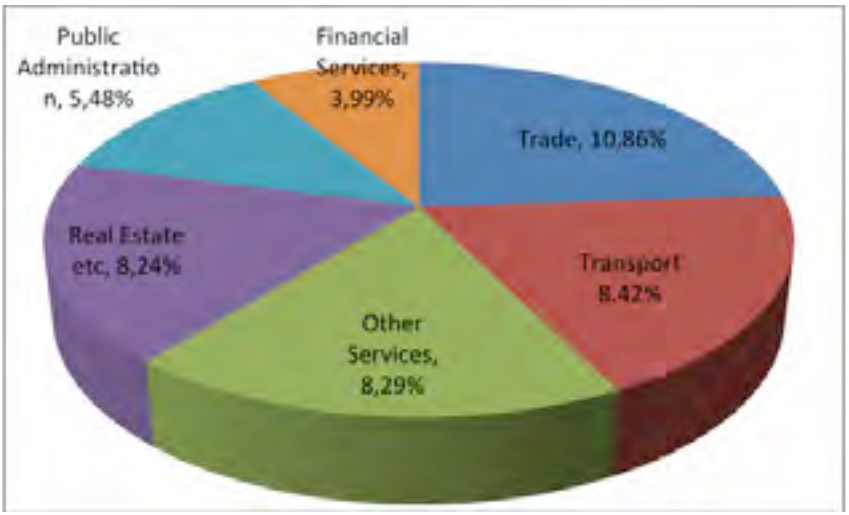
Source: Odisha Economic Survey, 2015-16, Planning and Coordination Department, Government of Odisha

4.3 Services Sub-Sectors of Odisha

The services sector of Odisha comprises of sub-sectors like trade, hotel and restaurants, transport, storage and communication, financial services, real estate, public administration and other services. Some of the major sub-sectors and their shares to the services sector at large during 2015-16 at current prices in 2011-12 base of Odisha are presented in a graphical manner

The services sector with its delivery of intangible goods in all social and economic sectors in the Odisha economy has developed into one of the major sectors in the past couple of decades. Among the various sub-sectors of the services sector, the leading one is the trade, hotels and restaurants segment with a share of 10.86% to the GSDP at current prices in 2015-16. Following it is transport which includes

Railways (8.42%), other services (8.29%) and real estate etc (8.24%). Some of the broad sub-divisions of the services sector and their status and shares to the GSDP of Odisha have been discussed briefly as per the Odisha Economic Survey 2015-16.



Source: Odisha Economic Survey 2015-16, Government of Odisha.

5. RESEARCH METHODOLOGY

Studies of convergence have mostly tended to consider two alternative concepts of convergence- β-convergence and σ-convergence. The β-convergence refers to the presence of a negative relationship between the growth rate of per capita income and the initial income level, implying that poor countries will eventually 'catch-up' to the income levels of richer countries. The σ-convergence refers

to a reduction in the dispersion of the income levels across the regions over time. Thus, convergence is accepted if the dispersion (measured in terms of coefficient of variation) of real per capita income among economies falls over time (Barro and Sala-i-Martin, 1995). Tests for convergence have been conducted by using different methods of analysis like Panel Data Analysis, Measure of Standard Deviation, some income inequality indices like Gini Coefficient and Theil Index.

5.1 Empirical Test for Absolute β-convergence

To test for absolute β-convergence, panel regression is carried out between the growth rate of per capita income from the tertiary sector (regressand) and the initial per capita income from the tertiary sector (regressor).

The two concepts of convergence are better understood by using a neoclassical growth model which enumerates the relationship between the growth rate of income per capita between two points in time to the initial level of income. The required growth model is as follows:

$$(1/T) \cdot \log [y(T)/y(0)] = x + (1 - e^{-\lambda T})/T \cdot \log [\hat{y}^*/\hat{y}(0)] \quad (4)$$

where, x = steady state growth rate
λ = speed of convergence
T = the average time interval
y(0) = growth rate of per capita output at initial time period
y(T) = growth rate of per capita output at any future time T, T ≥ 0

Keeping x, β and T fixed for a moment, Eqn (1) implies that the average per capita growth rate of output depends negatively on the ratio of $\hat{y}$ (0) to $\hat{y}^*$. Therefore, the effect of the initial position $\hat{y}(0)$ is conditioned on $\hat{y}^*$, which is the steady state position. The coefficient $(1 - e^{-\beta T})/T$ expresses the relationship between the growth rate of y and log $[\hat{y}^*/\hat{y}(0)]$ and declines with T for a given β.

When the above growth model is applied for discrete time units and a disturbance term is included, the equation transforms into:

$$\log (y_{it}/y_{i,t-1}) = c - (1 - e^{-\beta}) \cdot \log (y_{it-1}) + u_{it} \quad (5)$$

where,
i = individual or entities, here districts of Odisha
t = particular year
y_{it} = per capita income of the tertiary sector for time period 't'
$y_{i,t-1}$ = per capita income of the previous year

c = intercept term assumed to be constant across districts

u_{it} = error term having mean zero, constant variance (σ^2_u) and is independent over t and i

The theory denotes that, when $\hat{y}_i^*$ is the steady state level of $\hat{y}_i$, the intercept term 'c' equals $x + (1- e^{-\beta}) . [\log (\hat{y}_i^*)m + x . (t - 1)$. Holding 'c' constant, if $\beta > 0$, then equation (2) implies that poor economies tend to grow faster than the rich ones.

At any moment, if observations are available at two points of time, 0 and T, then equation (2) derives the average growth rate over the interval from 0 to T and the required regression equation is as follows:

$$1/T \log (y_{iT} / y_{i0}) = c + \beta \log (y_{i0}) + u_{iT} \quad (6)$$

where,

y_{i0} = initial per capita income of the tertiary sector

y_{iT} = per capita income of the tertiary sector for time period 't'

β = slope coefficient

i = individual or entities, here districts of Odisha

T = future time, here 2011-12

A negative β value implies a negative relation between the growth rate and initial per capita income level of the tertiary sector across the districts of Odisha. This would ensure the presence of absolute β-convergence in the services sector, whereby the poorer districts tend to catch up with the richer districts of Odisha.

5.2 Panel Data Regression Analysis

For the empirical analysis of the convergence hypothesis, the panel data regression model is used. Panel data is a multi-dimensional data involving measurements of variables over time. It is a multi-dimensional analysis where data are collected for two or more dimensions like time, individuals and some other dimensions and then a regression is run over these dimensions. The panel data analysis allows for the control of variables which cannot be measured or observed on account of individual heterogeneity. A typical panel data regression model looks like

$$Y_{it} = a + bX_{it} + U_{it} \quad (7)$$

where, '*Y*' is the dependent variable, '*X*' is the independent variable, '*a*' and '*b*' are intercept and slope coefficients respectively, '*i*' and '*t*' are indices for individuals and time respectively. U_{it} is the error or disturbance term.

The β-convergence can be determined from the slope coefficient of the regression equation (*b*). If the value of '*b*' is less than zero that is it has a negative value then it can be concluded that there is the presence of β-convergence.

Similarly to check for σ-convergence, the equation that can be used is

$$G_t = \alpha + \beta G_{t-1} + U_t \quad (8)$$

Where G_t = Value of any inequality index (SD/ Gini Index/ Theil Index) at time period 't'

G_{t-1} = Value of any inequality index at previous time period 't-1'

α = intercept term

β = slope coefficient

U_t = Disturbance term at time period 't'

If the coefficient of G_{t-1} i.e. 'β' is negative then it would indicate that σ-convergence exists because the inequality level would have fallen over time. If the value of 'β' is positive, then there is σ-divergence.

Similarly to determine the trend of dispersion of per capita income over time, the following equation may be used:

$$G_t = \alpha + \beta T + U_t \quad (9)$$

If $\beta < 1$, then σ-convergence because the dispersion level would have reduced over the period

If $\beta > 1$, then σ-divergence because this would indicate that the disparity in income levels would have increased over the time.

After establishing the analytical tools to test for absolute β-convergence across the districts of Odisha with respect to the tertiary sector, we need to see whether the income inequality across the districts is reducing or not. For this σ –convergence is to be checked whereby the level of disparity across the districts goes on reducing with time. This can be measured by using different measures of dispersion which are discussed below.

5.3 Empirical Test for σ-convergence

The spread or variability of the per capita income levels in the tertiary sector across the districts of Odisha can be well measured by computing the standard deviation (SD) of the data set. This helps in verifying the presence of σ-convergence across the regions. Standard deviation is a type of coefficient of variation whose downward trend over the time period implies the existence of σ-convergence in the tertiary sector across the districts of Odisha. The standard deviation of the data set can be defined as:

$$\sqrt{\frac{1}{N}\sum_{i=1}^{N}\ln(Y_i - \bar{Y})^2}$$

$$SD(\sigma_t) = \qquad (10)$$

where, N = sample size i.e. the number of districts of Odisha

y_{it} = per capita income of the tertiary sector across the districts of Odisha

$\bar{Y}_t$ = sample mean of (ln) of income of the tertiary sector (mean of y_{it}) over the state at time 't'

The higher the value of the sample standard deviation, greater is the dispersion in the per capita income levels in the tertiary sector across the districts of Odisha. This denotes greater inequality across the districts in terms of the income in the tertiary sector.

Inequality in itself is considered as a negative term indicated by Cowell, (1995) as- "*inequality obviously suggests a departure from some idea of equality*". Equality may convey different meanings in different situations but here it is used in the simplest sense of quantitative equality. While most of the indicators of inequality cater to the issue of individual inequality, they can easily be adapted to deal with per capita income inequality among regions. These indicators are able to portray a clear picture of the level of income inequality existing across regions. By computing the values of these indices over the years, the trend can show whether the per capita income inequality levels have reduced or amplified during the time period. Some commonly used inequality indicators are the Gini Index, the Theil Index and the Atkinson Inequality Index.

The Gini coefficient can be defined as a measure of inequality of a distribution. It is expressed as a ratio with values between 0 and 1. Here, the numerator is the area between the Lorenz curve of the distribution and the uniform distribution line whereas the denominator is the area under the uniform distribution line. The Gini index is equal to the Gini coefficient multiplied by 100. (Gini coefficient= ½ of the relative mean difference).

Income inequality where the underlying assumption is that everyone has the same income whereas 1 corresponds to perfect income inequality which implies that one person has all the income while everyone else has zero income.

$$G_1 = 1 - \sum_{k=1}^{n} (X_k - X_{(k-1)})(Y_k - Y_{(k-1)})$$

It is calculated as a ratio of the area between the Lorenz curve and the 45° line to the whole area below the 45° line.

$$G_1 = 1 - \qquad (11)$$

X_k is the cumulated proportion of the population variable, for k = 0,…,n, with X_0, X_n = 1.

Y_k is the cumulated proportion of the income variable, for k = 0,…,n, with Y_0

$$E(\alpha) = 1/n(\alpha^2 - \alpha) \sum_{i=1}^{n} \left[\left(\frac{Y_i}{\bar{Y}} \right)^2 - 1 \right]$$

= 0, $Y_n = 1$.

The Theil index is another inequality indicator based on the concept of entropy. Entropy is a concept which when applied to income distributions, refers to deviations from perfect equality. It summarizes the dispersion or variability in the income distribution across households, economies and so on. The index is at its absolute minimum when the distribution of income is equal. Deviation from the equality leads to an increase in the value of the inequality measure.

Equation (9) is an expression which defines a class because the inequality index $E(\alpha)$ may take any form depending on the value of α. Since α is a parameter, it may take values ranging within $-\infty$ to ∞ i.e. all possible real values. When α is positive, it captures the sensitivity of the index (E) to a specific part of the income distribution. In case of a positive and large α, the inequality index is even more sensitive to the upper tail of the income distribution and it is highly sensitive to the lower tail when α is positive and small. Thus, α is mostly taken as a non-negative value.

The Atkinson Index of Inequality ($A\varepsilon$) measures the disparity in the income levels. The coefficient ε is used to assign weight to incomes. ε is the level of inequality aversion. As ε [illegible] to the variation in the lo[illegible] 0, the index becomes mo[illegible] tribution. The Atkinson index varies between 0 and 1 and it is used to judge the need for complete redistribution of the income distribution. Lower the value of $A\varepsilon$ better is the income distribution and vice versa. The Atkinson Inequality Inde may be defined as follows:

$$A_\varepsilon(Y_1,\ldots,Y_N) = 1 - \frac{1}{\mu}\left(\frac{1}{N}\sum_{i=1}^{N} Y_i^{1-\varepsilon}\right)^{1/(1-\varepsilon)} \quad \text{for } 0 \le \varepsilon \ne 1$$

$$A_\varepsilon(Y_1,\ldots,Y_N) = 1 - \frac{1}{\mu}\left(\prod_{i=1}^{N} Y_i\right)^{1/N} \quad \text{for } \varepsilon = 1$$

where Y_i is the per capita income for i = 1, 2, ..., N and μ is the mean income

If the value of these indices and standard deviation reduces over time then it can be concluded that σ- convergence exists. Thus these indicators help in knowing whether the inequality in income distributions among the districts of Odisha have declined over time or not.

6. RESULTS

The following set of tables try to establish whether the initially poorer districts of Odisha in terms of per capita income from the tertiary sector and its sub-sectors are indeed growing at a faster pace or not than their rich counterparts. If so then β-convergence would exist across the 30 districts of Odisha and the income inequality level from the tertiary sector would reduce in the long run.

6.1 On the Absolute β-convergence

TABLE 7

RATIO OF INITIAL BOTTOM 5 TO TOP 5 DISTRICTS OF ODISHA WITH RESPECT TO THEIR AVERAGE OF AVERAGE ANNUAL GROWTH RATE

Sl. No.	Sectors	Ratio
1	Trade	4.413
2	Railways	NA
3	Transport	1.399
4	Storage	1.746
5	Communication	0.613
6	Total	1.034

Source: Calculated from secondary data collected from various issues of District Statistical Handbooks of all the districts.

It is evident from the above table that the ratio of the bottom five poorer districts to the top five richer districts (w.r.t. the per capita income from the tertiary sector) is greater than one for most of the services sub-sectors which means that there is the presence of β-convergence. Trade (4.413), transport (1.399), storage (1.746), real estate (1.869) and the total services sector (1.034) seem to show the existence of Absolute β-convergence across the districts of Odisha during 1993-2012.

The following tables ascertain the existence of β-convergence by using econometrical tools like panel data regression.

For Convergence Equation 5: $\log (y_{it}/y_{i,t-1}) = c - (1 - e^{-\beta}) \cdot \log (y_{it-1}) + u_{it}$, the resultant regression table is as follows.

Table 8 clearly denotes the existence of Absolute β **Convergence across the districts of Odisha with respect to the per capita income from the tertiary sector. Since the slope coefficient (β) values for all the sub-sectors are negative and significant at 1% level of significance, absolute β convergence can be concluded.**

TABLE 8
REGRESSION RESULT FOR CONVERGENCE EQUATION 5

Subsector	C	β	R^2 Between	F Value	Absolute β Convergence or Not
Trade	0.101	-0.062* (0.017)	0.445	1.160	Absolute β Convergence
Railways	0.004	-0.123* (0.022)	0.125	44.230	Absolute β Convergence
Transport	0.049	-0.011* (0.011)	0.070	1.170	Absolute β Convergence
Storage	0.127	-0.147* (0.023)	0.488	1.960	Absolute β Convergence
Communication	0.038	-0.090* (0.012)	0.611	1.940	Absolute β Convergence
Total	0.091	-0.046* (0.015)	0.622	1.120	Absolute β Convergence

Source: Calculated from secondary data collected from various issues of District Statistical Handbooks of all the districts.
* implies significant at 1% level of significance

For Convergence Equation 6: $1/T \log(y_{iT} / y_{i0}) = c + \beta \log(y_{i0}) + u_{iT}$ the resultant regression table is as follows:

TABLE 9
REGRESSION RESULT FOR CONVERGENCE EQUATION 6

Subsector	C	β	F Value	Absolute β Convergence or Not
Trade	0.111	-0.086* (0.021)	17.297	Absolute β Convergence
Railways	-0.005	-0.008** (0.008)	0.381	Absolute β Convergence
Transport	0.051	-0.028* (0.007)	5.015	Absolute β Convergence
Storage	-0.006	-0.022*** (0.031)	0.778	Absolute β Convergence

Communication	0.029	0.025* (0.004)	1.617	Not Determined
Total	0.039	-0.012* (0.026)	0.205	Absolute β Convergence

Source: Calculated from secondary data collected from various issues of District Statistical Handbooks of all the districts.
* implies significant at 1% level of significance
** implies significant at 5% level of significance
*** implies significant at 10% level of significance

Table 9 shows that Absolute β **Convergence exists across the districts for income per head from some of the services** sub-sectors like trade (-0.086*), railways (-0.008**), transport (-0.028*), storage (-0.022***) and total services (-0.012*). Since these sub-sectors have a negative regression coefficient (β) during the period of 1993-94 to 2011-12, absolute β convergence is expected to exist across the districts of Odisha.

After observing Absolute β-convergence (i.e. initially poorer districts growing at a faster growth rate than the richer ones, thus catching up with them) across the districts of Odisha for most of the services sub-sectors, it is important to check whether the gap between the poorer and richer districts with respect to the per capita income from the tertiary sector has reduced over the time period (1993-94 to 2011-12) or not. For this we need to examine the potentiality of σ-convergence across the districts of Odisha.

6.2 On the σ-convergence

The following table exhibits the result of different measures of dispersion (Standard Deviation) and inequality indices (Gini Index, Theil Index and Atkinson Index). These will ensure in providing an insight towards the trend of inequality existing among the districts of Odisha with respect to the income per head from the tertiary sector. An increase in the value of these inequality measures and indices over the years (1993-94 to 2011-12) would denote that the gap or the disparity level among the 30 districts has risen over the time period (implying σ-divergence) and a drop in their values will result in σ-convergence. The values are presented as follows.

In Table 10, the coefficient of SD was 2.860 in 1993-94 which fell to 1.978 in 1994-95 and then gradually picked up to reach the initial value of 2.860 in 2011-12. The value of the Gini coefficient was seen to fluctuate during 1993-94 to 2001-02 with values of 0.289, 0.275 and then again to 0.284. Since 2002-03 its value has steeply increased to 0.444 and then dropped a bit to 0.424 in 2011-12. The Theil Index (denoted by P90/P10 (ratio of 90 percentile to 10 percentile), P90/P50 (ratio of 90 percentile to 50 percentile), P10/P50 (ratio of 10 percentile to 50 percentile), and

P75/P25 (ratio of 75 percentile to 25 percentile)) shows a fluctuating trend, increasing and decreasing intermittently. Similar is the trend for the Generalised Entropy (GE(-1), GE(0) and GE(1)), and Atkinson's Index (A(0.5), A(1), A(2)).This gives no indication of reduction in the gap between the districts in terms of the income from the total services sector during the concerned period (1993-93 to 2011-12).

TABLE 10
INEQUALITY INDICES OF TOTAL SERVICES SECTOR ACROSS 30 DISTRICTS OF ODISHA (1993-2012)

Year	Std. Dev	P90/P10	P90/P50	P10/P50	P75/P25	GE(-1)	GE(0)	GE(1)	GE(2)	GINI	A(0.5)	A(1)	A(2)
1993-94	2.860	4.498	1.733	0.385	2.396	0.209	0.156	0.134	0.129	0.289	0.070	0.144	0.295
1994-95	1.978	4.632	1.780	0.384	2.680	0.210	0.158	0.137	0.133	0.293	0.071	0.146	0.295
1995-96	2.008	4.383	1.693	0.386	2.310	0.213	0.156	0.131	0.123	0.283	0.069	0.144	0.299
1996-97	2.021	4.324	1.705	0.394	2.485	0.211	0.153	0.129	0.122	0.282	0.068	0.142	0.297
1997-98	2.093	4.452	11.808	0.406	2.536	0.195	0.147	0.126	0.120	0.279	0.066	0.137	0.281
1998-99	2.075	4.746	1.789	0.377	2.171	0.209	0.155	0.132	0.128	0.287	0.069	0.143	0.295
1999-00	2.097	4.232	1.793	0.424	2.201	0.180	0.139	0.121	0.116	0.275	0.063	0.130	0.264
2000-01	2.126	4.406	1.724	0.391	2.143	0.197	0.146	0.125	0.120	0.279	0.066	0.136	0.282
2001-02	2.160	4.798	1.752	0.365	2.433	0.194	0.149	0.130	0.125	0.284	0.067	0.138	0.280
2002-03	2.497	14.952	2.854	0.191	2.703	0.667	0.388	0.347	0.427	0.444	0.167	0.322	0.571
2003-04	2.530	14.952	2.854	0.191	2.703	0.667	0.388	0.347	0.427	0.444	0.167	0.322	0.571
2004-05	2.638	14.221	2.832	0.199	2.851	0.647	0.379	0.337	0.410	0.440	0.163	0.316	0.564
2005-06	2.723	14.235	2.847	0.200	2.886	0.647	0.379	0.335	0.404	0.440	0.163	0.315	0.564
2006-07	2.795	14.172	2.885	0.204	2.886	0.648	0.379	0.335	0.403	0.440	0.163	0.315	0.565
2007-08	2.805	14.143	2.920	0.206	2.969	0.650	0.378	0.331	0.395	0.439	0.162	0.315	0.565
2008-09	2.823	13.711	2.855	0.208	2.986	0.631	0.369	0.324	0.385	0.434	0.158	0.308	0.558
2009-10	2.859	13.503	2.862	0.212	2.976	0.629	0.368	0.321	0.378	0.433	0.158	0.308	0.557
2010-11	2.841	13.336	2.874	0.216	2.950	0.615	0.357	0.306	0.349	0.425	0.152	0.300	0.551

2011-12	2.860	13.297	2.877	0.216	2.970	0.610	0.355	0.302	0.342	0.424	0.151	0.299	0.550

Source: Calculated from secondary data collected from various issues of District Statistical Handbooks of all the districts.

To empirically examine the presence of σ-convergence further among the 30 districts of Odisha with regard to the per capita income from the tertiary sector, we use the following regression equations. The first equation enables us to know how far the disparity level across the districts has been increasing or decreasing with respect to the tertiary sector income per head. The second equation facilitates in fitting a trend line graphically to establish the above idea further. The two required equations are as presented below:

$$G_t = \alpha + \beta G_{t-1} + U_t \quad (11)$$

$$G_t = \alpha + \beta T + U_t \quad (12)$$

Where G_t = Value of any inequality index (SD/ Gini Index/ Theil Index) at time period 't'

G_{t-1} = Value of any inequality index at previous time period 't-1'

α = intercept term

β = slope coefficient

U_t = Disturbance term at time period 't'

If $\beta < 1$, then σ-convergence because the dispersion level would have reduced over the period

If $\beta > 1$, then σ-divergence because this would indicate that the disparity in income levels would have increased over the time.

The results of the regression equations are arranged in a tabular and graphical manner respectively.

Regression Results for Equation (11) for Total Services Sector; 1993-2012

TABLE 11.1

DEPENDENT VARIABLE: $GINI_T$ (G_T)

Independent Variable	Value	Standard Error	t Value	R^2 Value	σ-convergence or not
Constant	0.053	0.043	1.235	0.779	σ-divergence
G_{t-1}	0.874*	0.116	7.513		

Source: Calculated from secondary data collected from various issues of District Statistical Hand-

books of all the districts.

TABLE 11.2
DEPENDENT VARIABLE: STD. DEV$_T$ (SD$_T$)

Independent Variable	Value	Standard Error	t Value	R^2 Value	σ-convergence or not
Constant	0.521	0.381	1.369	0.618	σ-divergence
SD_{t-1}	0.786*	0.154	5.092		

Source: Calculated from secondary data collected from various issues of District Statistical Handbooks of all the districts.

Since $\beta > 1$ in case of both G_{t-1} and SD_{t-1} (0.874 and 0.786 respectively), it can be deduced that inequality levels have increased across the districts with regard to the per capita income from the total services sector during the period of 1993-94 to 2011-12. Thus σ-divergence can be concluded.

Regression Results for Equation (12) for Total Services Sector; 1993-2012

TABLE 12.1
DEPENDENT VARIABLE: GINI$_T$ (G$_T$)

Independent Variable	Value	R^2 Value	σ-convergence or not
Constant	0.247	0.691	σ-divergence
G_{t-1}	0.011		

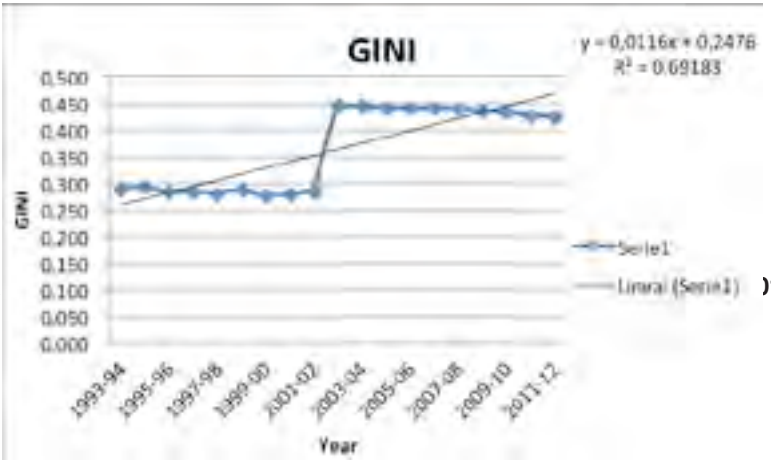
Source: Calculated from secondary data collected from various issues of District Statistical Handbooks of all the districts.

TABLE 12.2
DEPENDENT VARIABLE: STD. DEV$_T$ (SD$_T$)

Independent Variable	Value	R^2 Value	σ-convergence or not
Constant	1.982	0.562	σ-divergence
SD_{t-1}	0.048		

Source: Calculated from secondary data collected from various issues of District Statistical Handbooks of all the districts.

The rising trend and the positive slope coefficients of G_{t-1} and SD_{t-1} (0.011 and 0.048 respectively) shows the increasing gap among the richer and poorer districts of Odisha during 1993-94 to 2011-12 with respect to the income from the total services sector.



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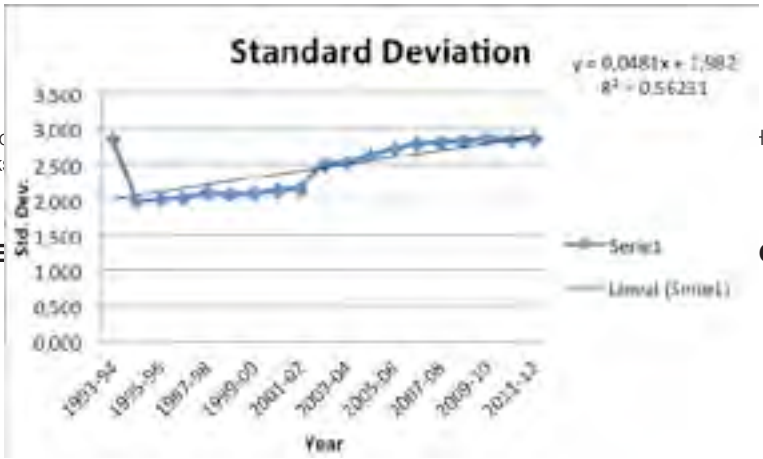

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Source: Calculated from secondary data collected from various issues of District Statistical Handbooks of all the districts.

The results from the empirical analysis suggest that there exist absolute β-convergence across the districts of Odisha with respect to the tertiary sector during the period of 1993-94 to 2011-12 (based on the findings from the regression analysis of Convergence Equation 5, Table 9.3). Further when the disparity across the districts in terms of the per capita income from the tertiary sector was examined, it was found that the inequality level (measured by standard deviation, Gini index, Theil index and Atkinson index) had increased over the years (1993-2012). This means that the gap between the districts with respect to per capita income from the tertiary sectors had widened over the period resulting in σ-divergence across the districts of Odisha.

7. CONCLUSION

Researchers and policy makers have largely emphasized on the issue of regional economic growth and disparity. With growth there comes the hindrance of inequality because all economies do not grow at the same rate. Due to the innate variances among economies or regions, there arises variation in their growth rates. Disparity anywhere is an obstruction to growth and development. This paper examines the level of inequality existing across the 30 districts of Odisha pertaining to the tertiary sector during the period of 1993-94 to 2011-12.

To study the dynamics of long run growth paths and the basis of the existing inequality in the tertiary sector of the Odisha economy, the neoclassical growth model has been used. The Barro and Sal-i-Martin framework of the convergence hypothesis has two basic concepts- the β-convergence and the σ-convergence. The absolute or unconditional β-convergence postulates that regions with initially lower income level tend to grow at faster rates than regions with initially higher income levels due to the assumption of diminishing rate of capital. The σ-convergence implies that the dispersion in income levels among the regions gradually reduces over time, ensuring the initially poor regions to move up the rung with respect to their income levels.

The Odisha economy is one of the fastest growing economies in the country and most of the credit goes to its flourishing services sector. Once an agrarian economy, Odisha has come a long way in becoming a services led economy. The share of the tertiary sector to the GSDP of Odisha in 2014-15 was 47.52% as against the shares of the primary (18.81%) and secondary (33.67%) sectors. The growth rate of the sector has also improved in the recent times. The tertiary sector has grown at more than 9% and the services sub-sectors (trade (14.17%), railways (16.54%), transport (12.60%), storage (10.46%), financial services (14.11%)) have also shown very sharp growth rates in 2015-16.

The results of the study conducted to test for convergence across the 30 districts of Odisha with respect to the tertiary sector indicate the presence of absolute β-convergence (at 1%, 5% and 10% level of significance) for the total services sector. But no evidence of σ-convergence was seen during the period of 1993-2012. In fact σ-divergence (measured by log SD) significant at 1% level of significance was found for all the sub-sectors across the 30 districts of Odisha.

The ratio of the initially bottom five to top five districts of Odisha with respect to their average AAGR suggested that some of the services sub-sectors had ratios greater than 1 (trade 4.4, transport 1.4, storage 1.4, total services 1.03) which meant that absolute β-convergence could exist across the districts for these sub-sectors during the concerned time period. The empirical analysis further derived (using Convergence Equation 5) negative slope coefficient values (trade -0.06*, railways –0.12*, transport -0.01*, storage -0.15*, communication -0.09*, total -0.05*) confirming the presence of Absolute β-convergence. Using Convergence equation 6, absolute β-convergence was again verified for some of the services sub-sectors (trade -0.09*, railways -0.01**, transport -0.03*, storage -0.02***, total services -0.01*).

To check for σ-convergence standard deviation and other inequality indices have been used. The resultant values (Tables 11.1, 11.2, 12.1 and 12.2) show an upward trend of the dispersion and inequality measures. This indicates that the disparity level with respect to per capita income from the tertiary sector has increased over the period (1993-2012) implying σ-divergence.

There are some limitations in the study which can be addressed to carry out better research works in the future. This study has tested only for absolute β-convergence and σ-convergence across the districts of Odisha for the tertiary sector during the period of 1993-2012 but the conditional β-convergence has not been tested. So there is still scope for improvement in the study. The analysis also does not provide any measures to curb the income inequality existing in the state with respect to the tertiary sector. The reason for sudden rise or fall in the coefficient of SD and the Gini coefficient during the years of 2001-02, 2002-03 and 2005-06 could not be clearly defined in the study. However it certainly provides greater opportunities for research

in this area of study in the future.

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