Forging Ahead and Lagging Behind: An Analysis of Convergence and Economic Development in North Carolina

Abstract

This paper analyzes trends in economic development in North Carolina to determine whether there has been evidence of per capita income convergence in the state during the period 1970-2000. The analyses reveal that (a) there has been a process of convergence of per capita income in the state in the past three decades, and (b) income convergence in NC occurred during a period of economic expansion and divergence during economic decline. However, a comparative analysis of metro and non-metro counties as well as among traditional geographic areas indicates that there was a general trend of divergence in metro areas and convergence in non-metro areas. This trend suggests that there are pockets of affluence and pockets of poverty existing side by side in the state. The regression analyses reveal that while the initial level of per capita income, human resource development and population growth had a significant impact on income growth, the impact of urbanization and investment in infrastructure was weak. The analysis on economic structure shows that employment in manufacturing had a major impact but employment in agriculture and services did not.

Mulatu Wubneh

Introduction

Has there been a narrowing of disparity in income between residents of metro and non-metro counties as well as among the traditional geographic regions – Mountain, Piedmont and Coastal areas – of the state in the last few decades? In other words, are regional economies in North Carolina (NC) converging or diverging?

These are questions that have received surprisingly little attention from academics and policy makers in the state. During the last thirty years, North Carolina policymakers have initiated a number of programs to redress imbalance of growth in the state, including the Rural Initiative Program, the Community Partnership Program, and the Balanced Growth Policy. To date, no evaluation has been conducted to determine the impact of these programs have had in reducing regional income disparities in the state.

The concept of convergence, that is, the tendency for income differences to narrow over time, is important because it can inform policy makers of the need for development policies to promote equity and growth. If regions are converging over time, economic disparities between regions may diminish naturally. On the other hand, an absence of convergence, or convergence at a very slow pace, suggests the need for proactive policies to promote growth and reduce income inequalities.

Mulatu Wubneh is Chair and Professor of the Department of Planning, College of Technology and Computer Science at East Carolina University. Dr. Wubneh's area of interest focuses on economic development and rural planning, particularly in smaller communities.

The Piedmont area traditionally has enjoyed a higher per capita income (PINC) than the Mountain or Coastal regions. The substantial investment in infrastructure and education has spawned a thriving economy in the Piedmont area, while the coastal and mountain areas have lagged behind. In the last three decades, the state has tried to stimulate growth in the lagging western and eastern regions by investing in infrastructure, education and health care, but it has achieved limited success in reducing long-standing regional disparities in the state. For instance, in 1970, average real per capita income in the Piedmont area was about 111 percent of the state average, while in the coastal areas it was 87 percent. By 2000, the PINC for the coastal area further declined to 85 percent of the state average, while the average for the Piedmont area remained relatively stable.

In terms of population growth, North Carolina ranks 6th in the nation. The state population grew by 21.4 percent between 1990 and 2000. A look at the population growth between the metro and non-metro counties shows that many of the counties that lost population in the last census or those that lagged in population growth are non-metro counties. According to the 2000 Census, 18 of the 29 counties (69 percent) that experienced a growth rate below half the state average of 21.4 percent between 1990 and 2000 are in the coastal areas (see Figure 1).

North Carolina has made a major stride in reducing the poverty rate in the state. The poverty rate has dropped from an average of 20.3 percent in 1970 to 12.3 percent in 2000. The poverty rate is significantly higher in the non-metro areas than in the metro areas. The eastern region of the state features the highest rates of poverty (Figure 2). The data for 2000 show that four out of five of the counties that have a poverty rate above the state average are non-metro. A full 57 percent of these counties are located in the Coastal area.

High poverty rates in the non-metro areas and the increasing development gap between the metro and non-metro counties may have serious

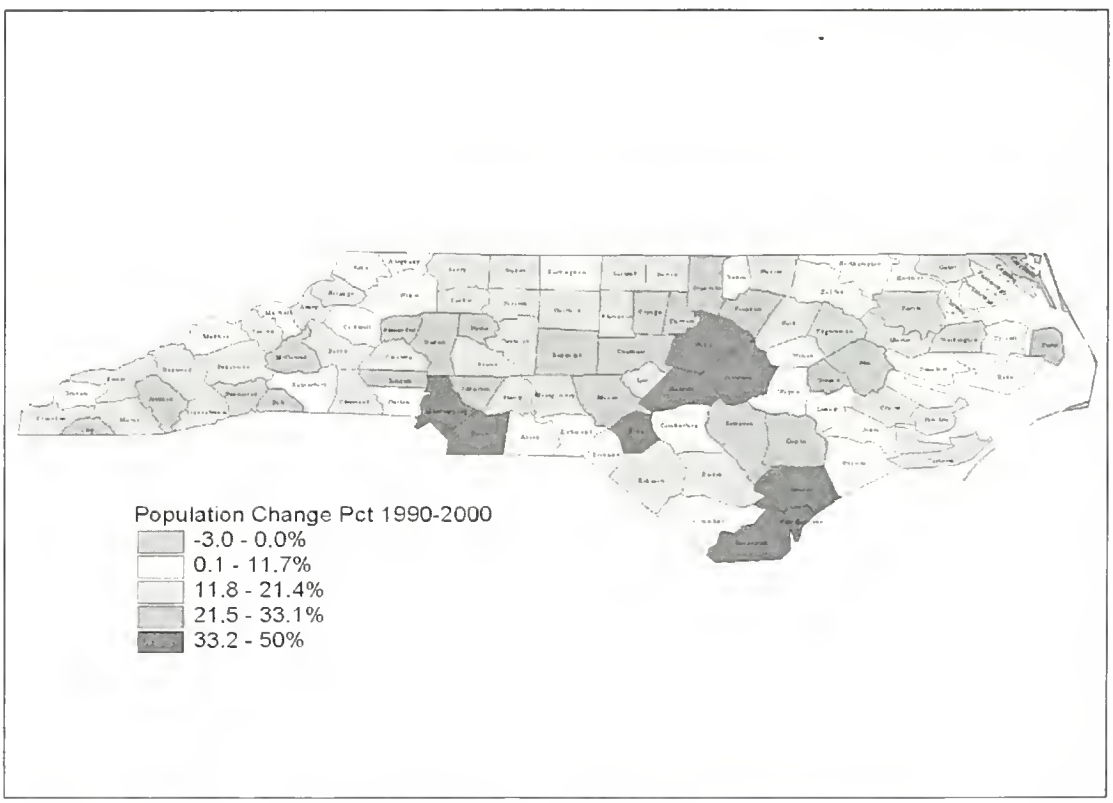


Figure 1: Population Growth in North Carolina, 1990-2000

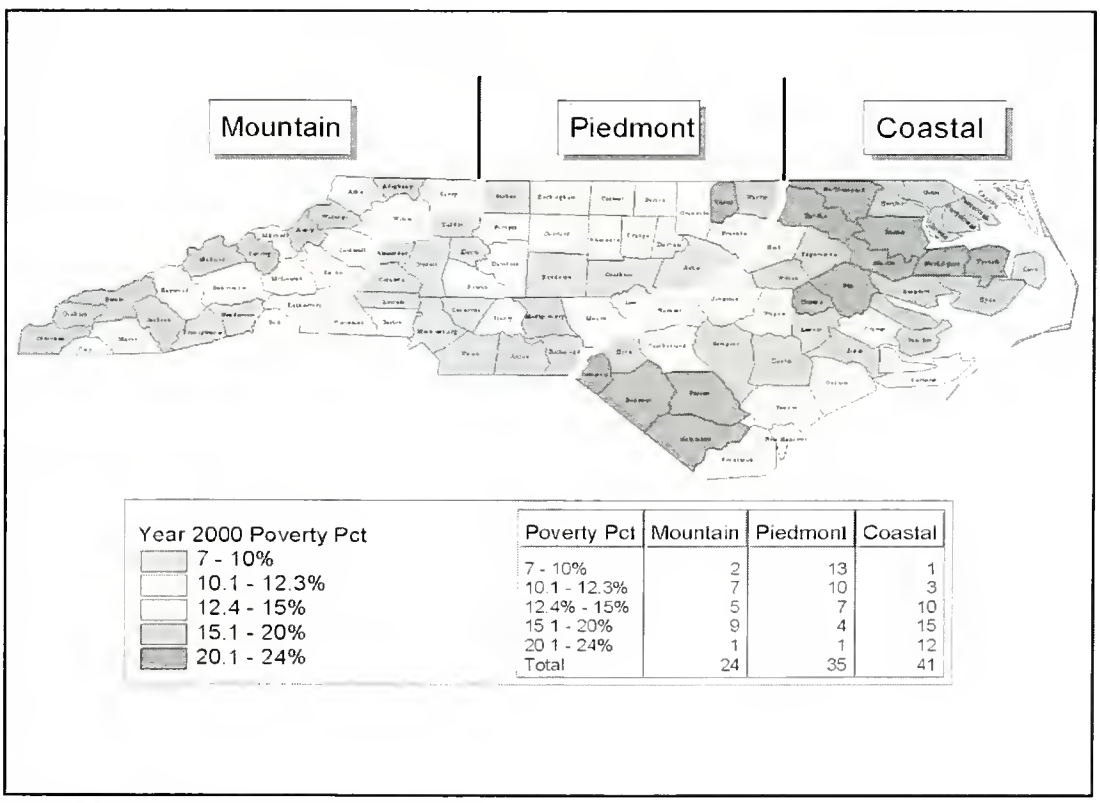
repercussions upon the social, economic and political fabric of the state. A number of community leaders, particularly those from counties that lost population in the last census, are wondering whether economic development in North Carolina is converging or diverging. Hence, the questions regarding economic development trends in the state as well as among the traditional geographic areas are quite appropriate.

The objective of this study is to analyze economic development in the state and to determine if there has been evidence of per capita income convergence during the period 1970-2000. The study also seeks to identify factors that account for differences in income change by examining trends in population growth, urbanization, infrastructure investment, human resource development and employment structure. The analysis employs the economic convergence model (Box 1).

Regional Disparity in North Carolina

Regional economic convergence analysis among North Carolina counties will be conducted at three levels. First, regional income difference over the period 1970 to 2000 will be examined by comparing income trends between metro and non-metro counties. This analysis should provide insight into the long-term trend in income growth among the counties resulting from a process of urbanization. Urbanization, which is a good measure of the relative concentration of economic activities, is often associated with large growth potential. The classification between metro and non-metro counties is based on population. According to the Census Bureau, in 1999 North Carolina had 35 counties classified as metro counties (Appendix A).

The second approach will analyze income growth among the three major geographic regions of the state. Geographically, North Carolina can



Poverty Pct	Mountain	Piedmont	Coastal
7 - 10%	2	13	1
10.1 - 12.3%	7	10	3
12.4% - 15%	5	7	10
15.1 - 20%	9	4	15
20.1 - 24%	1	1	12
Total	24	35	41

Figure 2: Poverty in North Carolina, 2000

Box 1: Regional Economic Convergence Model - The Debate and Measures

The question of whether economies exhibit convergence, that is, a tendency of income differences to narrow over time, has been a focus of many studies for several decades. The problem has been examined at the global and national levels and various explanations have been offered on which factors cause convergence or divergence in income among regions. No consensus seems to have emerged on the explanations. Despite the divergence in views, the theory on regional economic convergence can be broadly divided into two major streams of thought.

The first relates to advocates of the convergence theory. Based on traditional neoclassical theory of economic growth, advocates of the convergence theory argue that because of factor mobility and problems of diminishing returns to capital, regional differences in income will decline over time. The tendency for disparities to decline over time is associated with factor costs being lower and profit opportunities being higher in poorer regions than in richer ones. A related argument is that poorer regions have low ratios of capital to labor, hence a higher marginal product of capital. This implies that capital would flow from richer to poorer areas. The expected outcome is that poorer regions will grow faster than richer regions, resulting in the equalization of income between richer and poorer regions. Trade and free flow of factors will also facilitate the equalization of factor prices between the poorer and richer regions

The second , which advocates the views of the divergence theory, maintains that because of problems of cumulative causation, economic development occurring in a leading region goes through a process of self-sustaining and self-reinforcing which leads to divergence in growth among regions. The leading region that takes advantage of agglomeration economies and technology and innovation benefits will grow faster than the lagging regions. Advocates of the divergence theory also argue that factor mobility, for instance labor mobility, may be impeded by high cost of living, infrastructure problems, or inadequate institutional structure and poor managerial skills.

Another important factor associated with regional convergence is related to the economic structure of regions, specifically to the characteristics of industries in the region. For instance, a relatively higher share of agriculture may be problematic for a regional growth potential since prospects for growth in agriculture demand have been limited in the last few decades. On the other hand, a relatively higher share of services in employment can be interpreted as an indication of a more dynamic and diversified regional economy. Therefore, one could hypothesize that the relationship between per capita income growth and employment share in agriculture would be negative whereas the relationship between per capita income and the share of employment in services would be positive. If the hypothesized relationships are valid, then the growth reducing effects of agriculture are stronger than its growth inducing effect. In the case of services, the opposite is true, except when the service sector is dominated by comparatively low-skill, low value-added activities such as hotels, tourism, and retail. If the service sector is dominated by low value-added activities, its growth potential is low, and, therefore, we would expect a negative relationship with income. With respect to manufacturing, a relatively higher share of employment in manufacturing is likely to have a larger growth potential as large number of employees may be engaged

Interest in convergence analysis has led to the development of several ways of measuring convergence often categorized as static and dynamic measures. The static measures provide a snapshot of inequalities at a point in time. One major example of this method is the Gini-coefficient index [1].

The second sets are the dynamic measures, which are used to examine long-term growth/change in income. Two of the major dynamic measures are:

a. Sigma (ó) Convergence – This measure tracks the intertemporal change in the level of income among regions. Both the standard deviation and the coefficient of variation (CV) are used in the ó-Convergence. Basically, if the CV (standard deviation divided by the mean) for a group of economies is smaller at the end of a period than at the beginning, then the economies have converged.

b. Beta (â) Convergence – This measure focuses on the change in the mobility or position of individual economies within a distribution and it is used to answer the question of whether poorer economies are catching up to richer countries. Another way of looking at this measure is to compare the growth rates of the lowest income economies and the growth rates of the highest income economies. This method is often derived by regressing growth in per capita income on initial income.

Table 1: Ranking of the Top 10 Counties in the state, 1970-2000
(Note: Ranking based on 1970 PINC. Data refer to real values.)

County	PINC 1970			County	PINC 2000	Average Ann Gr. 70-2000
Top 10						
Mecklenburg	11099			Mecklenburg	22041	3.29%
Forsyth	10921			Wake	21404	3.20%
Guilford	10777			Forsyth	18791	2.48%
Wake	10436			Chatham	17774	2.34%
Durham	10032			Guilford	17678	2.54%
Catawba	9808			Moore	17654	2.67%
Orange	9442			Polk	17602	2.88%
Alamance	9266			Durham	17342	2.91%
Cabarrus	9083			Davie	17046	2.92%
Polk	9045			Cabarrus	16955	2.92%
NC	**8494**			**NC**	**15665**	**2.81%**

be divided into three major regions – Mountains, Piedmont and Coastal. These areas are identified based on elevation, and geographers have used the regions to analyze the physical and socioeconomic characteristics of the State (see Lonsdale, 1967). Appendix B depicts the geographic classification of the state. These three areas have developed at different rates with the Piedmont area leading in economic and population growth in contrast to the Mountains or Coastal Regions (see figure 1).

The third level of analysis will look at the growth in income among the metro and non-metro counties within the three geographic areas. This analysis is conducted to further investigate if urbanization or the lack of it had any impact in influencing the growth in income among the three geographic areas.

The analysis will be based on regional real per capita income (PINC) growth for the period 1970 to 2000. Regional per capita levels are the most commonly used indicators for analyzing differences in economic development. The per capita income measures were derived from the North Carolina State Data Center – Log Into North Carolina (LINC). The figures were converted into real values by using the consumer price index (CPI). [2] The succeeding analysis will present trends in income growth based on the different levels.

Trends in Per Capita Income

North Carolina counties have experienced steady growth in PINC since the 1970s. While the state has grown at an average of 2.81 percent per annum, growth rates were much lower in some regions, particularly in the coastal areas. What is of interest to our study is whether the growth experience has been shared equally across the state to the extent that the fastest growth has taken place in the counties/regions that were relatively poor at the start of the study period.

As a prelude to the formal investigation of the convergence hypothesis, this section will examine the change in per capita income in the state over the period 1970 – 2000. Table 1 reports the ranking of the top 10 counties in the state based on per capita real income between 1970-2000. Average annual growth rates are also shown for each county for the same period. The table clearly demonstrates that the top 10 counties have grown above the state annual per capita income growth rate of 2.81 percent and counties such as Mecklenburg have maintained their rank

throughout the study period. However, some counties, particularly those in the Piedmont area have shown a tremendous growth. For instance, Wake and Chatam counties moved from 4th and 28th rank in 1970 to 2nd and 4th respectively in 2000. Conversely, Warren and Hoke, which ranked 90th and 88th in 1970 dropped down to 99th and 100th respectively in 2000. The growth rate also indicates that the many of the counties in lower ranking grew at a rate much lower than the state average of 2.81 percent during the same period. For example, Warren and Hoke's annual growth rate was 2.75 and 1.69 percent respectively. Overall, with slight exceptions, there was no major shift in the relative positions of the top 10 counties.

Metro Vs. Non-metro Areas

Table 2, Part A, shows the difference in real per capita income between metro and non-metro counties for the period 1970 – 2000. Two important facts can be discerned from the table. First, average real per capita income in non-metro areas has slightly declined from about 85 percent of the state average in 1970 to 83 percent in 2000. The share of income for metro counties has essentially remained the same during this period. Second, the gap in per capita income between metro and non-metro counties has continued to increase from $2,087 in 1970 to $3,904 in 2000. Third, the coefficient of variation shows an increasing trend in metro areas and a slight decrease in the non-metro areas[3]. This trend suggests that there has been a steady state of income levels in the non-metro areas and a trend toward divergence in the metro areas.

Geographic Areas

Income difference in North Carolina can also be discerned by examining trends in income growth among the three geographic regions: Mountain, Piedmont and Coastal Areas. As illustrated in Table 2, Part B, the Piedmont area, which has had a history of higher per capita income in the state, has continued to lead throughout the study period. It is interesting to note that this trend has remained the same in the last three decades –

Table 2: Average Per Capita Real Income Dispersion by Region, 1970-2000

	1970		1980		1990		2000	
	Average	%of NC	Average	%of NC	Average	%of NC	Average	%of NC
Region [Part A]								
Metro	9259	108.9%	10802	107.6%	14377	107.7%	16932	108.1%
Non-metro	7172	85.0%	8692	86.6%	11337	84.9%	13028	83.2%
NC Average	***8494***		***10038***		***13344***		***15665***	
Geog Areas [Part B]								
Mountains	7515	88.5%	9082	90.5%	11995	89.9%	13851	88.4%
Piedmont	9412	110.8%	11029	109.9%	14864	111.4%	17307	110.5%
Coastal	7404	87.2%	8800	87.7%	11248	84.3%	13325	85.1%
NC Average	***8494***		***10038***		***13344***		***15655***	
Metro Counties [Part C] By Geog Areas								
Mountains	7903	93..1%	9370	93.3%	12443	93.2%	14599	93.2%
Piedmont	9827	115.6%	11457	114.1%	15473	115.9%	18034	115.1%
Coastal	8037	94.6%	9350	93.2%	11741	88.0%	14212	90.7%
NC Average	***8494***		***10038***		***13344***		***15655***	
Non-metro Counties by Geog Areas [Part D]								
Mountains	7364	86.7%	9062	90.3%	11946	89.5%	13453	85.9%
Piedmont	7730	91.0%	9261	92.3%	12066	90.4%	13656	87.2%
Coastal	6801	80.1%	8218	81.9%	10634	79.6%	12394	79.1%
NC Average	***8494***		***10038***		***13344***		***15655***	

Table 3: Poverty in NC, 1970-2000

Region	1970 Average	1980 Average	1990 Average	2000 Average
State (NC) [Part A]	20.3	14.8	13.0	12.3
Metro and Non-metro [Part B]				
Metro	19.0	13.0.7	11.9	11.6
Non-metro	28.7	19.5	17.7	15.8
Geographic Areas [Part C]				
Mountains	25.2	17.9	16.3	13.9
Piedmont	18.8	13.2	11.9	11.7
Coastal	30.9	21.0	18.5	16.9
Metro Counties by Geographic Areas [Part D]				
Mountains	19.5	14.4	13.6	13.3
Piedmont	15.2	11.3	10.0	10.0
Coastal	26.7	18.7	15.2	14.2
Non-metro Counties by Geographic Areas [Part E]				
Mountains	26.4	18.6	16.8	14.0
Piedmont	24.0	16.0	14.9	14.3
Coastal	32.3	21.7	19.6	17.7

average per capita income in the Piedmont areas in 1970 was 110.8 percent of the state average; the same trend prevails in 2000. However, the gap in income between the Piedmont and other geographic areas has continued to widen. For instance, the gap between the Piedmont and the Coastal areas in 1970 was $2,008; in 2000, this gap has almost doubled to $3,982. Similarly, in 1970, 9 of the top 10 counties in the state were in Piedmont area. A similar situation existed in 2000. The coefficient of variation for per capita income by geographic regions shows an increasing trend in the Piedmont area, a decline in the mountain areas and a relatively stable trend in the Coastal areas [4]. See also Figure 3.

Metro Counties by Geographic Areas

The relative share of income for Metro counties [Table 2, Part C] shows that those in the Mountains and the Piedmont areas have essentially maintained their share whereas the metro counties in the Coastal areas have experienced a decline. The coefficient of variation for the metro areas confirms this pattern.

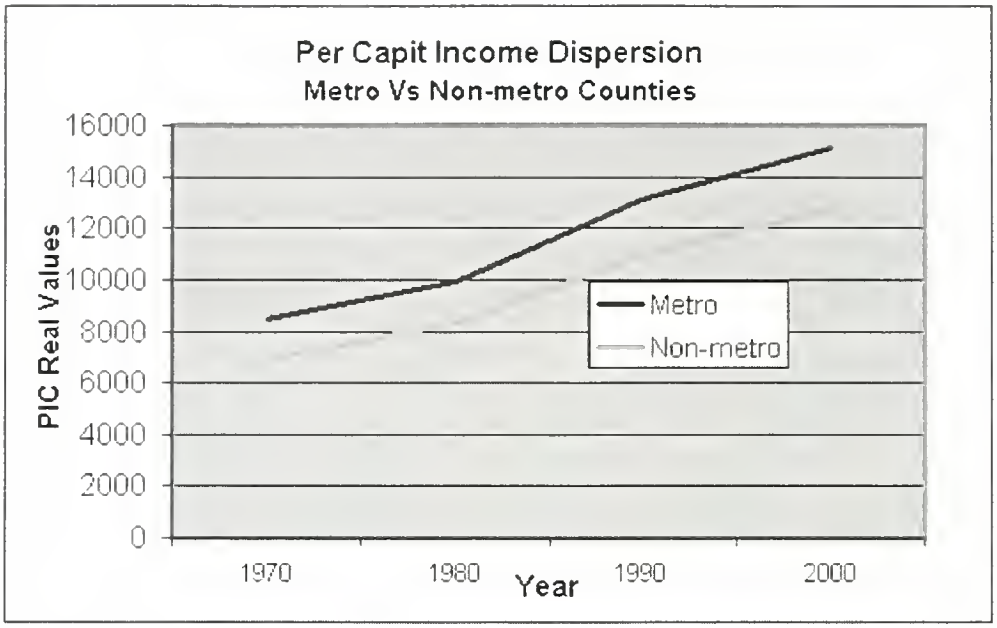
Non-metro Counties by Geographic Areas

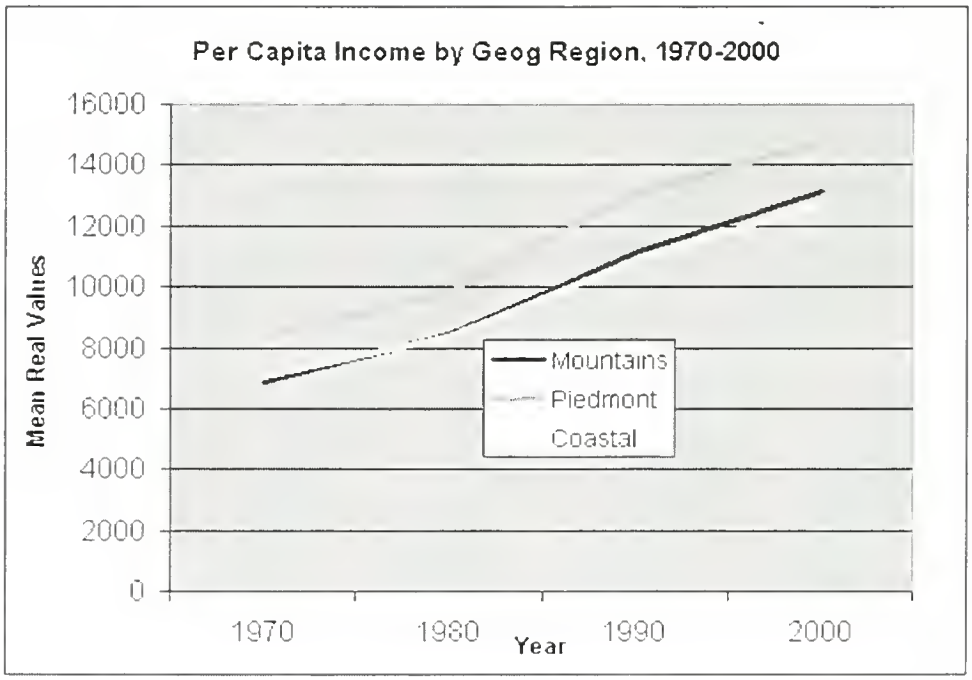
The next level of analysis focuses on the trend in real per capita income growth among non-metro counties in the state. This analysis helps to determine if the rural counties in North Carolina have benefited from the state's income growth in the last three decades. It also helps to examine (a) if there are significant differences in income growth among the rural communities in the three geographic areas of the state, and (b) if the State's rural initiative program has made a significant difference in improving the relative share of the rural communities.

As illustrated in Table 2, Part D the relative share of income among the non-metro counties in the three geographic regions has declined throughout the study period. Even the rural communities in the Piedmont area have not been spared this relative decline (the decline in the Piedmont area was from 91 percent of the state average in 1970 to 87 percent in 2000). By contrast the metro counties in the Piedmont area have managed to maintain their relative share.

An analysis of the poverty rate by metro versus non-metro areas as well as among the three geographic areas also shows a similar trend. As illustrated in Table 3, North Carolina counties in general have done very well in reducing their poverty level; the Mountains and Coastal areas have cut their poverty rate almost in half in the last three decades. The Piedmont area, which has had a relatively low poverty rate, still maintains a rate below the state average of 12.3 percent in

Figure 3: Per Capita Income Dispersion





Box 2: â-convergence Measure

The literature on economic convergence is largely based on the neoclassical growth theory, which uses concepts such as ó–convergence and â-convergence to evaluate the growth performance of various economies. According to the convergence theory, for ó–convergence to occur, the dispersion in per capita income must decline over time, that is, over a given period, say time t to t_{t+1}, $ó_{t+1} < ó_t$ must hold true.

The â-convergence predicts that due to the neoclassical assumption of diminishing returns, poorer economies will grow faster than richer economies, and in due course all economies will converge to the same steady state. This type of economic growth leading to convergence is called the unconditional â-convergence. To test for unconditional â-convergence, the commonly applied equation, which approximates the transitional growth process in the neoclassical model, takes the following form.

$$Yi_{t+1} = a - b \log (Y_{io}) + e_{it} \qquad (1)$$

where Yi_{t+1} = the average growth rate of per capita income over the period t to $t+_1$, log (Y_{io}) is the logarithm of the initial level of per capita income, b indicates the rate of â-convergence, and e_{it} is the error term. Convergence in an economy implies that the derivative of growth of per capita income over initial level of income is negative.

$$\frac{d(Yi_{t+1})}{d(Y_{io})} < 0 \qquad (2)$$

A positive sign of the coefficient estimate for log (Y_{io}) indicates divergence.

The second type of convergence is called the conditional â-convergence, which argues that only once the determinants of an economy's steady-state growth level are controlled will the economy converge to its individual steady state. To test for conditional â-convergence, a vector of X_i variables that control for cross-economies variation in steady state values are added to equation (1).

$$Yi_{t+1} = a - b_1 \log (Y_{io}) + b_2 X_{it} + e_{it} \qquad (3)$$

A negative coefficient estimate of log (Y_{io}) is again interpreted as evidence of convergence.

The literature on convergence theory uses a number of control variables to explain the growth process among various economies and to evaluate if there has been conditional convergence. The control variables have been identified as policy or "core" and economic variables. The core variables serve as proxy for the fundamental determinants of the steady state in the neoclassical model and the economic structure variables are included to further isolate those factors that influence the movement towards the steady state. Some examples of the core variables are infrastructure investment and human resources, and of the economic structure are those representing employment in different sectors of the economy.

The estimation procedure used the pooled time-series method, also known as the panel analysis method. The panel method is used because of its ability to account for the effects of time and space. For the estimation, we selected the ordinary least square (OLS) method. The estimation based on the general least square (GLS) method gave essentially the same results.

2000. The Mountain and the coastal areas have a rate of 14 percent and 17 percent respectively (see also Figure 2).

III. Methodology

Interest in regional income inequality has led to the development of several ways of measuring income dispersion over time. Box 2 illustrates the regression approach, the most widely used method based on the works of Barro and Sala-I-Maratin (1995).

VI. Variables and Data

The data used in this study are for the period 1970-2000, grouped into three ten-year intervals as 1970-80, 1980-90, and 1990-2000. This grouping gives the advantage of smoothing the periodic fluctuation and making the data less prone to serial correlation, which is a major problem in using annual data. Data are derived from the North Carolina State Data Center – LINC.

The dependent variable is average annual growth of per capita income (AGPINC) in NC counties for the three periods pooled together. The value of the independent variables represents the initial level of average per capita income for each decade. This approach helps to eliminate the simultaneity bias problem, which is a major issue in convergence analysis.

The core variables include:

Initial level of per capita income (LPINC). This variable serves as a proxy for the steady-state level of physical capital, initial resource endowments and technology (Barro 1991). If there is income convergence, we expect the coefficient of LPINC to be negative throughout the study period. A log form of the variable is used in the analysis.

Total population growth (POPCH). This variable captures the change in income as a result of change in capital-labor ratio. In the neoclassical growth model, growth in population will cause the level of income (Y) to decline through a lowering of the capital-labor ratio, as capital must spread over a greater population. Therefore, we expect the coefficient of population growth to be negative.

Urbanization (URBAN). The share of urbanization (urban as a proportion of total population) serves as a proxy for agglomeration economies, which intensifies growth creating a positive impact on the growth of income (Y). Therefore, we expect a positive relationship between share of urbanization and growth of per capita income.

High school and college graduates (age 25+) as a percentage of population (EDPOP). This variable is used as a proxy for human capital. The literature on economic convergence argues that increase in the level of human capital will increase the steady-state level of per capita income by improving the ability of workers to adopt new technology and ideas, thus raising the productivity of labor (Barro and Sala-i-Martin 1995, Coulombe and Tremblay 2000). Based on this assumption, we expect the coefficient of EDPOP to be positive.

Per capita expenditure on infrastructure (PCEXINF). This variable includes per capita expenditure on utilities, road and other capital facilities spent by local government. Expenditures in infrastructure are expected to enhance the level and quality of infrastructure and thereby increase the steady-state level of income (Y). Therefore, it is expected that the coefficient of PCEXINF would be positive.

Total paved mileage of primary and secondary roads (PVDHIGH). The development of highways is important in enhancing the infrastructure capacity of counties and their potential to increase productivity. Increase in productivity will lead to an increase in income in a region. Therefore, we expect a positive relationship between PVDHIGH and growth in income.

The additional control variables are related to the employment structure of the economy in the region:

Percent of employment in farming (EMPFRM). Employment in farming as a proportion of total employment. This variable controls for the level of dependence of the regional economy in agriculture. A relatively lower share of employment in agriculture indicates the shift in the structure of the local economy as employment moves from agriculture to higher productivity sectors such as manufacturing. Hence, we expect a negative sign for the coefficient of EMPFRM.

Percent of employment in manufacturing (EMPMANF). Employment in manufacturing as a proportion of total employment. A higher employment in manufacturing has the potential for labor to be engaged in high-value activities. Therefore, we expect a positive relationship between EMPMANF and the growth of income.

Percent of employment in services (EMPSERV). Employment in service as a proportion of total employment. This variable serves as an indicator of a more dynamic and diversified economy. Therefore, we expect the coefficient of EMPSERV to be positive.

Geography (GEOG). GEOG represents a set of regional variables to account for spatial difference among the three traditional geographical areas. The values are indicted as 1 if within the geographic region, 0 if otherwise. This variable is included to examine if regional variation makes a difference in the growth of PINC.

Trends in Infrastructure Investment, Human Resources Development and Economic Structure

This analysis is based on Table 4 which depicts growth tends among the different regions used in the study.

Metro Vs. Non-Metro Areas

Metro areas have experienced a significantly higher growth rate in population in the last three decades than non-metro areas. In the last census, metro counties increased at an average of 22 percent compared to 15 percent for non-metro counties.

Urbanization is increasing at a higher rate in metro areas. The percent of urban population increased from 39 percent in 1970 to 54 percent in 2000. The corresponding figures for non-metro counties are 17 and 25 percent respectively.

Per capita local expenditure on infrastructure is at about the same level in both metro and non-metro areas.

There is almost twice as much paved highway in metro areas as in non-metro areas.

About 64 percent of the population (25 + age) in metro areas is high school and college graduates. The corresponding figure for non-metro areas is 59 percent. Figure 5 depicts the geographic distribution of educational level in the state.

Employment in farming and manufacturing has experienced a decline in the last three decades in both metro and non-metro areas. On the other hand, the service sector has continued to increase in both areas.

Geographic Regions/Areas

Population increase in the Piedmont area was significantly higher than that in the Mountain or Coastal areas.

The share of urbanization in the Piedmont area in 2000 was 45 percent of the total population whereas that of the Mountain and Coastal areas share was 22 and 33 percent respectively.

The trend in local per capita infrastructure expenditure shows an increasing trend in all regions. The difference in local infrastructure expenditure among the three regions is not significant.

In terms of paved highways, the Piedmont area has about 25 percent more paved highway than the Mountain or Coastal areas. Figure 4 illustrates that in terms of accessibility, 83 percent of the counties in the Piedmont area have over 50 percent of their population within 10 miles of a 4-lane highway. The corresponding figures for the Mountain and coastal areas are 58 and 59 percent respectively.

Over 60 percent of the population (25+ age group) in the Mountain and Piedmont areas have above high school education. By contrast only one out of every three persons in the Coastal area has an above high school education. For a

Table 4: Trend in Population Growth, Infrastructure, And Human Development

	Metro vs. Non-metro		Geographic Regions		
Year	Metro	Non-metro	Mountain	Piedmont	Coastal
Population Change (%)					
1970-80	19.7	14.8	17.7	17.0	15.5
1980-90	15.1	5.6	5.5	11.6	8.7
1990-20	22.5	15.3	15.9	21.3	16.0
Share of Urbanization (%)					
1970	39.2	17.0	13.3	33.7	23.8
1980	43.8	16.8	13.2	36.3	25.3
1990	45.4	17.3	14.4	36.8	26.3
2000	54.0	24.6	22.3	45.5	33.2
Per Capita Infrastructure Expenditure					
1980	236.1	229.8	214.5	231.0	243.1
1990	524.8	536.7	473.4	518.8	578.9
2000	1043.5	1043.1	960.3	975.4	1149.8
Paved Highway (in miles)					
1980	752.4	471.3	377.5	734.3	541.7
1990	815.3	513.4	419.7	794.1	586.3
2000	928.2	593.3	525.7	898.5	658.3
High School and College Grad as % of Pop					
1970	23.0	19.6	21.2	22.3	23.8
1980	38.0	32.9	35.3	36.7	25.3
1990	54.2	48.0	50.4	52.6	26.3
2000	63.6	58.7	62.3	62.2	33.2
Emp in Farming as % of Total Emp					
1970	11.0%	18.1%	10.0%	11.7%	22.1%
1980	6.9%	12.8%	9.8%	8.2%	13.5%
1990	3.5%	7.3%	6.3%	4.5%	7.2%
2000	2.5%	5.3%	4.6%	3.4%	4.9%
Emp in Manufacturing as % of Total Emp					
1970	31.3%	26.6%	33.0%	36.0%	18.8%
1980	29.7%	26.3%	29.6%	33.8%	20.9%
1990	25.0%	24.0%	25.3%	29.8%	19.1%
2000	19.3%	17.3%	17.2%	23.2%	14.0%
Emp in Services as % of Total Emp					
1970	13.5%	14.7%	16.3%	13.1%	14.0%
1980	14.4%	14.2%	15.9%	14.4%	13.2%
1990	18.8%	17.8%	20.2%	18.5%	16.6%
2000	24.4%	23.6%	25.8%	23.9%	22.7%

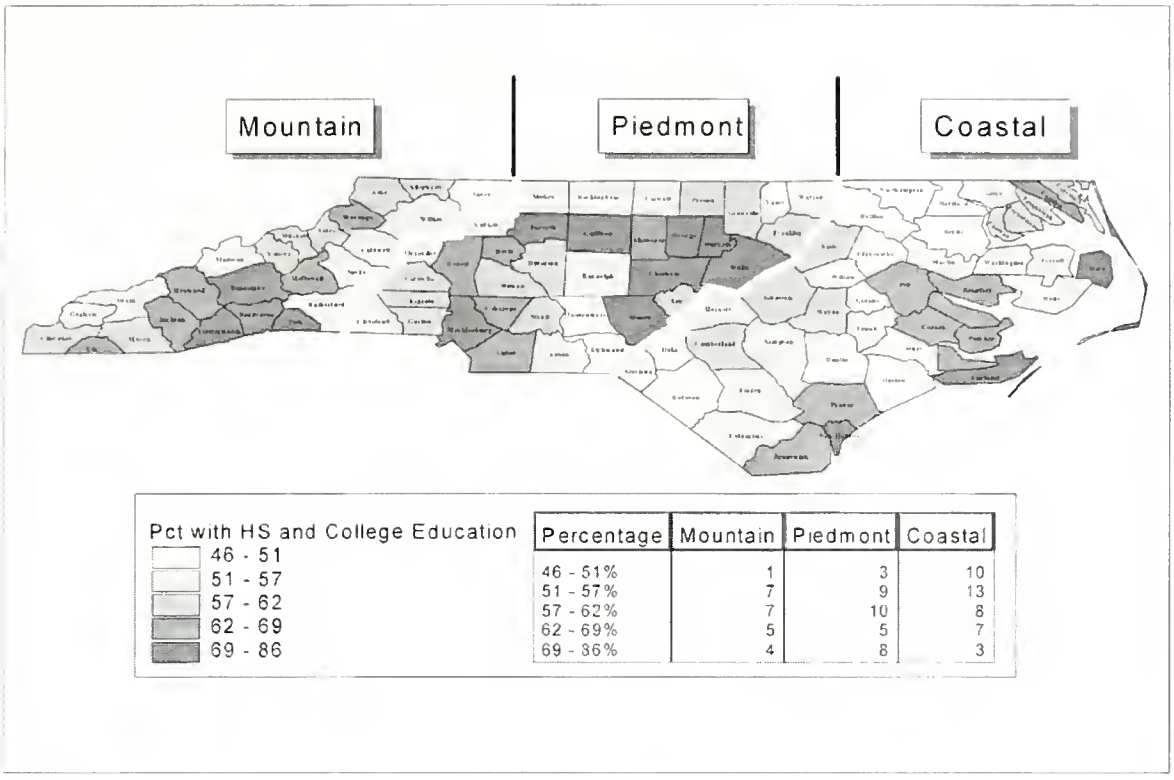


Figure 4: Education

distribution of the population by level of education, see figure 5.

〈 Employment in farming has continued to decline in all areas, and in 2000 employment accounted for less than 5 percent of the employment in all regions.

〈 Employment in manufacturing has continued to decline in all areas while employment in services has continued to increase.

Results

ó–convergence

The ó-convergence was examined by deriving cross-sectional standard deviations of the log of per capita income for the state and the different geographic regions. As illustrated in Table 5, the ó–convergence for the state over the three decades shows that there has been a slight

Table 5: ó–convergence

State	1970	1980	1990	2000	Trend
NC [State]					
σ–NC	0.0191	0.0174	0.0177	0.0170	Convergence
Metro Vs. Non-metro					
σ–Metro	0.0151	0.0142	0.0164	0.0159	Divergence
σ–Non-metro	0.0155	0.0149	0.0145	0.0141	Convergence
Geog Regions					
σ–Mountain	0.0187	0.0158	0.0175	0.0142	Convergence
σ–Piedmont	0.0174	0.0166	0.0183	0.0188	Divergence
σ–Coastal	0.0144	0.0144	0.0116	0.0138	Divergence

Table 6: Unconditional â-Convergence Across North Carolina Counties

State/Region	1970-80	1980-90	1990-2000	1970-2000	Trend
β-NC [A]	-.206***	-.009	-.134**	-527***	Convergence
	(-4.127)	(-1.457)	(-2.873)	(-4.576)	
Metro Vs Non-metro Areas [B]					
β-Metro	-.139*	0.154*	-0.105	-236	Convergence
	(-1.851)	(-1.735)	(-1.382)	(-1.072)	
β-Non-metro	-.241**	-.279**	-.194*	-.804***	Convergence
	(-2.752)	(-2.793)	(-2.556)	(-4.396)	
Geographic Regions [C]					
β-Mountains	-.235**	-.002	-.309**	-.874**	Convergence
	(-2.761)	(-.148)	(-3.271)	(-3.492)	
β-Piedmont	-.121	0.008	0..001	-.122	Convergence
	(-1.590)	-0.899	-0.028	(-.570)	
β-Coastal	-.277**	-.505***	-.003	-.649**	Convergence
	(-2.149)	(-4.349)	(-.316)	(-2.981)	
* Significant at .05 level					
** Significant at .001 level.					

decrease of the value between 1970 and 1980, then a slight increase between 1980 and 1990 and again a decline between 1990 and 2000. Although there are cyclical changes during each decade, the general trend shows that there has been ó–convergence in income in North Carolina between 1970 and 2000. These findings are important for two reasons. First, the analysis suggests that the economies of the poorer counties are catching up with the richer ones in terms of growth in per capita income. Second, as illustrated by the ó– and â-convergence measures, convergence seems to have occurred during good times and divergence has occurred during bad times. The period 1980-90 was characterized by major economic crises that affected many states in the country. On the other hand, the period 1970-80 was a period of economic growth and 1990-2000 was a period of economic expansion as the national economy spiraled upwards, thanks to the bullish stock market associated with the dot-com economy.

The ó–convergence analysis between metro and non-metro areas and among geographic regions shows mixed results: there was a general trend toward divergence in metro counties and geographically, in the Piedmont and Coastal areas.

The findings of the ó–convergence indicate the presence of unconditional â-convergence in the state, and among the different regions of the state. The implications of these findings are further explored in the next section. The estimates based on the regression equations illustrate the speed of convergence as well as the robustness of the estimates.

β-convergence

Table 6 presents regression estimates of the unconditional β-convergence as proposed by the neoclassical growth model. As illustrated in the table, the coefficients of â for the state are negative and statistically significant except for 1980-90. These findings are consistent with the neoclassical growth theory. Therefore, we can conclude that, on the average, there is clear evidence of convergence in the state, that is, counties with low per capita initial income are growing faster than those with initial high per capita income.

The β estimates for the various regions show evidence of convergence and divergence. The estimates for the metro and non-metro areas [Part B] show a trend toward convergence. The result of convergence by geographic area shows mixed results. In the Piedmont area, the rate of

Table 7 : Conditional â-Convergence with Core and Economic Structure Variables

	Core Variables	Econ Structure Variables	Regional Dummy
Constant	10.4015	10.3117	10.3117
LPINC	-2.3957***	-2.3936***	-.2.408***
	(-15.45)	(-15.48)	(-15.37)
POPCHG	-0.3844*	-.4248*	-0.4466**
	(-3.06)	(-3.35)	(-3.52)
URBAN	-0.0005	-.0007	.0007
	(-.75)	(2.05)	(1.07)
EDPOP	0.0119***	.0128***	.0124***
	(4.53)	(4.82)	(4.53)
PCEXINF	-0.0002	-0.0002	-.00008
	(-0.94)	(0.91)	(-0.37)
PVDHIGH	0.00005	0.00008	0.00006
	(1.20)	(1.67)	(1.31)
EMPFRM		0.1024	0.1239
		(1.21)	(1.46)
EMPMANF		0.0299*	0.0275*
		(1.79)	(1.66)
EMPSERV		-0.0053	-0.0006
		(-0.35)	(-0.04)
GEOG1			0.0481
			(1.32)
GEOG 2			0.0955**
			(3.05)
R^2 Adjusted	0.7496	0.7540	0.7598
df	6, 293	9, 290	11, 288
F-Value	150.16	102.65	86.98

Note: The independent variable is average growth of per capita income (AGPINC).

***Statistically significant at .001 level.

**Statistically significant at .05 level.

*Statistically significant at .10 level.

convergence shows a consistent decline over time. On the other hand, the rates in the case of the Mountain show a decline in 1980-90 and then an increase in 1990-2000. In the case of the Coastal areas there was an increase in 1980-90 and then a decrease in 1990-2000. In general, the â estimates show a decline and the conclusion is that the North Carolina counties have experienced an income growth leading toward a similar (not identical) steady state. The extent to which policy variables and a change in the structure of the regional economy have played a role in accelerating convergence can be further examined by including the core and other control variables (mainly economic structure variables) in the regression equation as presented below.

Table 7 depicts estimates of the conditional â-convergence with core and economic structure variables. It reveals that the coefficients of:

LPINC are negative and statistically significant for all the models confirming the findings based on ó–convergence.

POPCHG are negative and significant as postulated in the hypothesis.

Urbanization (URBAN) is negative, opposite to the hypothesized relationship, and statistically insignificant, except for Model 2. The result suggests that urbanization had no significant impact on growth of PINC.

Education (EDPOP) has a positive and statistically significant relationship for all the models as hypothesized.

Infrastructure expenditure (PCEXINF) and mileage of paved highway (PVDHIGH) are not significant suggesting that local governments' expenditure on infrastructure did not have significant impact on growth in PINC.

In terms of the economic structure and regional variation variables:

The coefficients of employment in farming (EMPFRM) are positive but they are not statistically significant. This finding suggests that agriculture had a low growth potential for the region since agricultural demand in the last few decades had been on the decline.

The coefficients of employment in manufacturing (EMPMANF) are positive and statistically significant, which suggests that the manufacturing sector plays a major role in income convergence in North Carolina.

The coefficients for EMPSERV are negative and they are not statistically significant. The result may be an indication of the employment characteristics of the service sector. The service sector in North Carolina is dominated by low value-added and low skill activities such as hotels, tourism and restaurants.

The geography variable representing the Piedmont area (GEOG2) is statistically significant. The variables for other geographic areas are not statistically significant.

VII. Summary and Conclusion

This study has attempted to shed light on the question of income convergence in North Carolina. A major conclusion of the paper is that there has been convergence of per capita income across the state during the period 1970-2000. The evidence from the data set shows that both in terms of â–convergence and ó–convergence, income inequality among North Carolina regions is narrowing. This result can also be interpreted as an indicator of the high growth potential of the poorer counties. However, an analysis of trends between metro and non-metro areas as well as among traditional geographic areas indicates that there was a general trend of divergence in the metro areas and convergence in the non-metro areas; and among the traditional geographic regions, the Mountain areas have experienced convergence, whereas the Piedmont and Coastal areas have experienced divergence.

The results of both the conditional and unconditional convergence analyses indicate that the initial level of PINC, population growth and human capital development (education) had a significant impact on PINC growth in North Carolina. However, the impact of urbanization and infrastructure investment was minimal. Geographic variation had an effect on the growth of PINC, although not consistent.

With respect to the impact of structural change of the economy on income convergence, the empirical estimates suggest that the growth-inducing effects of agriculture are stronger than its growth-reducing effects as illustrated by the positive values. However, none of the coefficients of employment in agriculture is significant. Therefore, agriculture in North Carolina had no effect in reducing income difference in the State.

In the case of manufacturing and services, a relatively high share of employment in both sectors is considered to be an indicator of a more diversified and dynamic economy. The empirical analyses show that employment in manufacturing had a significant impact on income convergence and its growth-inducing effects are strong. The statistical insignificance of services shows that employment in services had no impact on income convergence. This result also suggests that a large number of employees in manufacturing are engaged in high-value activities whereas those employed in service activities are engaged in low-skill activities such as hotels restaurants and retail trade. The negative relationship between employment in services and growth in PINC also signals that the growth inducing effects of the service sector is weak. The poor performance of the service sector in reducing income divergence can also be explained by the low-paying characteristics of service jobs. This finding is consistent with the argument that many families in North Carolina employed in the service sector are working, but remain poor.

Policy implications

First, initial level of income in North Carolina had a significant impact in influencing subsequent income growth rates. Consistent with the neoclassical growth model, North Carolina has experienced income convergence in the last three decades. The convergence process has narrowed income differences among many counties. Nevertheless, the analysis by metro versus non-metro areas as well as among the traditional geographic areas show that North Carolina is far from achieving the goal of reducing long-standing regional disparities in the state.

Second, the trend over the period 1970-2000 suggests that convergence occurred during the period of economic expansion and divergence occurred during the period of decline. North Carolina experienced convergence during the period 1970-80 and 1990-2000, both periods characterized by economic expansion. On the other hand, the period 1980-90 was characterized by economic crises and divergence occurred during this period.

Third, local government expenditure in infrastructure, considered to be an important variable in increasing the growth performance of regions, had very little impact in reducing income inequality in the state. The value for per capita expenditure in infrastructure is not statistically significant throughout the study period. This result should be viewed with caution for two reasons. First, the data on infrastructure expenditure reflect only expenditure by local governments; data on Federal as well as state infrastructure expenditures were not available. A data set that reflects total infrastructure expenditure of local, state as well as Federal Government may give a different result. Additionally, there are problems of simultaneity in using infrastructure expenditure in a regression model. Do economies grow because they spend money on infrastructure or do they invest in infrastructure because they experience economic growth? This issue of chicken and egg has not been successfully dealt with in the literature.

Fourth, the results on the relationship between population growth and PINC are consistent with the argument presented by the neoclassical theory, that is, growth in population will cause the level of PINC to decline since total income has to be spread over a larger population. The results of the urbanization variable are counterintuitive.

Fifth, although there has been PINC convergence in the state, the regional analyses show that the Piedmont and Coastal areas of North Carolina are experiencing divergence as opposed to the Mountain areas. This trend suggests that that there are pockets of affluence and pockets of poverty existing side by side in the state, particularly in the Piedmont and Coastal areas.

The poverty areas, instead of being integrated into the regional economy stubbornly exist as islands of poverty with poor endowment of infrastructure and human capital. Indeed, an analysis of the income difference among the three regions shows that the income range (difference between the lowest and highest income among the counties) in 2000 varies from $12,317 in Piedmont to $7,597 in the Mountain areas to $4,880 in the coastal areas. The trajectory shows that this gap is likely to continue widening in the next decade. This finding underscores the notion that North Carolina's traditional approach of developing broad statewide policies are not effective in eliminating pockets of poverty in the state. It is imperative that the state develops policies that target poverty areas to improve their economic conditions and to enhance their comparative advantage to attract investment.

Notes

1. The Gini Index is widely used in measuring income inequality. See Kakwani (1980).

2. The CPI used for deflating are as follows: 1970=38.8; 1980=82.4; 1990=130.7; 2000=172.2. Base year: 1982-84=100.0. See www.minneapolisfed.org/Research/data/US

3. In metro areas, the CV increased from .14 in 1970 to .16 in 2000. Conversely, in the non-metro areas, it dropped from .14 in 1970 to .13 in 2000.

4. Change in the coefficient of variation (CV) by region.

5. The initial equation used by Barro and Sala-I-Martin (1991) takes the following form:

Region	1970	1980	1990	2000
Mountain	0.1726	0.1459	0.1649	0.1346
Piedmont	0.1555	0.1517	0.1741	0.1856
Coastal	0.1245	0.1258	0.1067	0.1238

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Acknowledgements

The author would like to thank Tom Richter of the NC Department of Commerce, Division of Community Assistance, Wes Hankins and Mac Simpson of East Carolina University for reviewing an earlier draft of the paper and Al Burne of East Carolina University for drawing the maps.

Appendix A: North Carolina Metropolitan Counties

County	Metropolitan Area
Alamance	Greensboro-Winston-Salem-High Point, NC MSA
Alexander	Hickory-Morganton-Lenoir, NC MSA
Brunswick	Wilmington, NC MSA
Buncombe	Asheville, NC MSA
Burke	Hickory-Morganton-Lenoir, NC MSA
Cabarrus	Charlotte-Gastonia-Rock Hill, NC-SC MSA
Caldwell	Hickory-Morganton-Lenoir, NC MSA
Catawba	Hickory-Morganton-Lenoir, NC MSA
Chatham	Raleigh-Durham-Chapel Hill, NC MSA
Cumberland	Fayetteville, NC MSA
Currituck	Norfolk-Virginia Beach-Newport News, VA-NC MSA
Davidson	Greensboro-Winston-Salem-High Point, NC MSA
Davie	Greensboro-Winston-Salem-High Point, NC MSA
Durham	Raleigh-Durham-Chapel Hill, NC MSA
Edgecombe	Rocky Mount, NC MSA
Forsyth	Greensboro-Winston-Salem-High Point, NC MSA
Franklin	Raleigh-Durham-Chapel Hill, NC MSA
Gaston	Charlotte-Gastonia-Rock Hill, NC-SC MSA
Guilford	Greensboro-Winston-Salem-High Point, NC MSA
Johnston	Raleigh-Durham-Chapel Hill, NC MSA
Lincoln	Charlotte-Gastonia-Rock Hill, NC-SC MSA
Madison	Asheville, NC MSA
Mecklenburg	Charlotte-Gastonia-Rock Hill, NC-SC MSA
Nash	Rocky Mount, NC MSA
New Hanover	Wilmington, NC MSA
Onslow	Jacksonville, NC MSA
Orange	Raleigh-Durham-Chapel Hill, NC MSA
Pitt	Greenville, NC MSA
Randolph	Greensboro-Winston-Salem-High Point, NC MSA
Rowan	Charlotte-Gastonia-Rock Hill, NC-SC MSA
Stokes	Greensboro-Winston-Salem-High Point, NC MSA
Union	Charlotte-Gastonia-Rock Hill, NC-SC MSA
Wake	Raleigh-Durham-Chapel Hill, NC MSA
Wayne	Goldsboro, NC MSA
Yadkin	Greensboro-Winston-Salem-High Point, NC MSA

Source: *US Census Bureau, Metropolitan Counties by State, 1999.*

Appendix B: NC Counties by Geographic Area

#	Mountains	Piedmont	Coastal
	Alleghany	Alamance	Beaufort
	Ashe	Alexander	Bertie
	Avery	Anson	Bladen
	Buncombe	Cabarrus	Brunswick
	Burke	Caswell	Camden
	Caldwell	Catawba	Carteret
	Cherokee	Chatham	Chowan
	Clay	Cleveland	Columbus
	Graham	Davidson	Craven
	Haywood	Davie	Cumberland
	Henderson	Durham	Currituck
	Jackson	Forsyth	Dare
	McDowell	Franklin	Duplin
	Macon	Gaston	Edgecombe
	Madison	Granville	Gates
	Mitchell	Guilford	Greene
	Polk	Iredell	Halifax
	Rutherford	Lee	Harnett
	Surry	Lincoln	Hertford
	Swain	Mecklenburg	Hoke
	Transylvania	Montgomery	Hyde
	Watauga	Moore	Johnston
	Wilkes	Orange	Jones
	Yancey	Person	Lenoir
		Randolph	Martin
		Richmond	Nash
		Rockingham	New Hanover
		Rowan	Northampton
		Stanly	Onslow
		Stokes	Pamlico
		Union	Pasquotank
		Vance	Pender
		Wake	Perquimans
		Warren	Pitt
		Yadkin	Robeson
			Sampson
			Scotland
			Tyrrell
			Washington
			Wayne
			Wilson
N	**24**	**35**	**41**

Appendix C:

Definition and sources of variables used. Data for 1970, 1980, 1990 and 2000 are from LINC (www.linc.state.nc.us) unless otherwise indicated.

LPINC	Log of per capita income
AGPINC	Average annual growth of per capita income
POVERTY	Percentage of population in poverty
POPCHG	Population growth between censuses
URBAN	Urban population as a percentage of total population
EDPOP	High school and college graduates (25+ age) as percentage of total population
PCEXINF	Per capita infrastructure expenditure by local governments. The variable was derived by dividing total expenditure on roads, utilities and other services by total population
PVDHIGH	Total mileage of primary and secondary roads
EMPFRM	Employment in farming as a proportion of total employment
EMPMANF	Employment in manufacturing as a proportion of total employment
EMPSERV	Employment in services as a proportion of total employment

Appendix D: Per Capita Income, 1970-2000 (nominal values)

County	METRO	GEOG	PINC70	PINC80	PINC90	PINC20
Alamance	1	2	3577	8792	17574	25932
Alexander	1	2	3034	7262	15688	23738
Alleghany	2	1	2475	6529	13923	25413
Anson	2	2	2394	6339	14214	21883
Ashe	2	1	2192	5788	13333	22681
Avery	2	1	2179	5889	13710	24162
Beaufort	2	3	2771	7503	14941	22530
Bertie	2	3	2213	6088	12695	21436
Bladen	2	3	2455	6208	12511	21494
Brunswick	1	3	2864	6783	14091	21707
Buncombe	1	1	3236	8468	17971	27221
Burke	1	1	3216	7630	15760	21729
Cabarrus	1	2	3511	8195	18027	28961
Caldwell	1	1	3145	7450	15173	24707
Camden	2	3	2395	7771	13808	22755
Carteret	2	3	2832	7857	15214	26090
Caswell	2	2	2538	5967	12613	19494
Catawba	1	2	3787	8637	18781	27937
Chatham	1	2	3133	8339	18534	30386
Cherokee	2	1	2242	5825	12176	18323
Chowan	2	3	2636	6884	14797	23532
Clay	2	1	2258	5786	12927	21292
Cleveland	2	2	3008	7900	15721	22259
Columbus	2	3	2505	6379	13228	21640
Craven	2	3	3149	8273	15888	25342
Cumberland	1	3	3190	7912	15141	24899
Currituck	1	3	3054	7928	15628	24515
Dare	2	3	3276	7174	16270	25454
Davidson	1	2	3321	8113	16536	25327
Davie	1	2	3176	8616	19346	29156
Duplin	2	3	2650	5577	14381	20560
Durham	1	2	3890	9663	20272	29739
Edgecombe	1	3	2767	7084	13530	20827
Forsyth	1	2	4211	10521	22218	32291
Franklin	1	2	2654	6449	14291	23276
Gaston	1	2	3230	8240	16628	25006
Gates	2	3	2594	6754	13566	19260
Graham	2	1	2160	6363	10464	18732
Granville	2	2	2540	6774	14051	21650
Greene	2	3	3120	6449	15055	20894
Guilford	1	2	4170	10121	21302	30372
Halifax	2	3	2407	6428	13003	19674
Harnett	2	3	2605	6270	13404	19781
Haywood	2	1	2917	7622	15229	22571

Appendix D, cont.: Per Capita Income, 1970-2000 (nominal values)

County	METRO	GEOG	PINC70	PINC80	PINC90	PINC20
Currituck	1	3	3054	7828	15628	24515
Dare	2	3	3276	7174	16270	25454
Davidson	1	2	3321	8113	16536	25327
Davie	1	2	3176	8616	19346	29156
Duplin	2	3	2650	5577	14381	20560
Durham	1	2	3890	9663	20272	29739
Edgecombe	1	3	2767	7084	13530	20827
Forsyth	1	2	4211	10521	22218	32291
Franklin	1	2	2654	6449	14291	23276
Gaston	1	2	3230	8240	16628	25006
Gates	2	3	2594	6754	13566	19260
Graham	2	1	2160	6363	10464	18732
Granville	2	2	2540	6774	14051	21850
Greene	2	3	3120	6449	15055	20894
Guilford	1	2	4170	10121	21302	30372
Halifax	2	3	2407	6428	13003	19874
Harnett	2	3	2605	6270	13404	19781
Haywood	2	1	2917	7622	15229	22571
Henderson	2	1	3304	8895	18365	26593
Hertford	2	3	2454	6732	12280	20384
Hoke	2	3	2295	5424	11445	13408
Hyde	2	3	2474	6086	13597	20600
Iredell	2	2	3096	8508	16826	25767
Jackson	2	1	2419	6501	13683	21221
Johnston	1	3	2907	7443	15952	24851
Jones	2	3	2199	5259	12272	20032
Lee	2	2	3092	8400	17183	26983
Lenoir	2	3	2945	7554	15450	22953
Lincoln	1	2	3122	7850	16091	20899
McDowell	2	1	2600	6964	13556	22979
Macon	2	1	2397	6951	14459	20279
Madison	1	1	2219	5984	12719	20638
Martin	2	3	2829	6890	13780	20374
Mecklenburg	1	2	4300	10455	23297	37737
Mitchell	2	1	2399	6680	13067	20510
Montgomery	2	2	2923	6658	13456	20766
Moore	2	2	3094	8566	20751	30238
Nash	1	3	3093	8166	17141	27024
New Hanover	1	3	3275	8560	17806	27588
Northampton	2	3	2133	6351	12266	20487
Onslow	1	3	3403	7189	13151	22847
Orange	1	2	3636	9012	21424	28864
Pamlico	2	3	2709	7519	14211	22788
Pasquotank	2	3	2766	7672	14715	22701
Pender	2	3	2446	6770	14045	20044

Appendix D, cont.: Per Capita Income, 1970-2000 (nominal values)

County	METRO	GEOG	PINC70	PINC80	PINC90	PINC20
Perquimans	2	3	2312	5963	12385	20056
Person	2	2	2824	6805	15205	22015
Pitt	1	3	2887	7695	16438	24599
Polk	2	1	3500	9039	20823	30161
Randolph	1	2	3405	7996	15987	23548
Richmond	2	2	2749	6606	13618	20643
Robeson	2	3	2390	5753	11638	17473
Rockingham	2	2	3444	8348	15521	21989
Rowan	1	2	3302	8372	15995	23327
Rutherford	2	1	2824	7349	14282	21101
Sampson	2	3	2564	6693	15338	20437
Scotland	2	3	2803	7156	13058	20714
Stanly	2	2	3343	7785	15769	23090
Stokes	1	2	2953	7571	15277	22429
Surry	2	1	3297	7666	16282	23319
Swain	2	1	2069	5870	10593	17160
Transylvania	2	1	2774	7938	16497	25254
Tyrrell	2	3	2093	5135	13563	19257
Union	1	2	3046	8174	16957	24356
Vance	2	2	3012	6749	14394	20923
Wake	1	2	4016	10468	22488	36581
Warren	2	2	2280	6306	11323	16779
Washington	2	3	2824	6612	13722	19443
Watauga	2	1	2603	6321	14367	23328
Wayne	1	3	3071	7158	14202	21550
Wilkes	2	1	2821	7221	15641	24162
Wilson	2	3	2938	8333	16382	24477
Yadkin	1	2	3058	7527	15883	22816
Yancey	2	1	2008	5611	12390	19383
North Carolina	0	0	3285	8247	17367	26882

Source: NC State Data Center - LINC
Metro: 1= Metropolitan, 2= Non-metropolitan counties
GEOG: 1= Mountain, 2= Piedmont, 3= Coastal counties

www.secretary.state.nc.us/kidspg/geog.htm