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Exploring variations in income growth in Southeastern United States

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The rise in gross incomes and the decline in poverty in rural areas are considered evidence of economic restructuring and technological development efforts in last three decades in the United States. However, these positive effects of transformations in rural areas still do not match the rate of economic growth enjoyed by urban areas. This paper examined income convergence in 875 counties of the 10-state southeastern region using Census data for 1980 and 2000. Logarithmic difference of average per capita income between those years was regressed on socioeconomic variables using Ordinary Least Square (OLS) model. The study found important roles of human capital development and employment growth in income convergence and variations in income growth in places that differ in demographic attributes, job opportunities, geography, and resource concentrations. The study provided important insights to rural policy makers to formulate place-based economic development strategies which are practical and realistic to address economic development in the most impoverished rural places in the southeastern United States.

Key words: Agglomeration, census, clusters, convergence, industries, employment, income, southeastern.

INTRODUCTION

This study examines income convergence at the county level in the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee.[1] The objectives of this study are to: (1) examine income convergence in these ten states from 1980 to 2000, and (2) identify predictors of income growth over the period 1980 to 2000. The historical events in the southern United States have produced differing impacts and regional variations in demographic, industrial, and overall economic growth across the region. There are significant contrasts between rural and metro counties in demographics such as race, population density, education, industrial firms, jobs, and growing urban structures. Majority of the studies on U.S. income convergence are based on states or multi-state aggregate data, with few examinations in metropolitan areas and counties (Gyawali et al., 2008; Hammond, 2006; Lynch, 2003; Ngarambe, 1998; Rey and Janikas, 2005). This study is aimed at eliciting the role of these variations
in income growth using the data available at the county level, which is the first known effort in the Southeastern United States.

The paper begins with a review of literature. In this section, we provide the discussion of income convergence.

[1]Initially, the state of Virginia was also included in the study, but was later excluded because county-level data suggested this state to be too "urban" and income was "skewed" when that state was included.

REVIEW OF LITERATURE

Convergence theory predicts that low-income regions will exhibit faster growth rates as they eventually catch-up to more developed areas even as the rate of growth in high income regions slows (Barro, 1991; Barro and Sala-i-Martin, 1992; Sala-i-Martin, 1996). While the assumptions for this to occur may seem somewhat strict, capital and other factors of production are assumed to be freely mobile and production must be characterized by diminishing returns to scale (Rey and Janikas, 2005; Solow, 1956). The theory has spawned a large empirical literature aimed at measuring and testing economic convergence between countries and sub-national regions (Baumol, 1986; Loewy and Papell, 1996). The sigma convergence is the strongest and the most intuitive concept of convergence. When the dispersion of real per capita income across a group of economies falls over time, there is σ-convergence (Barro, 1991).

A study conducted by Crown and Wheat (1995) used 1950-1987 data on state per capita income convergence. The study found that South is catching up the income growth of Northern States. They found that income convergence in the South resulted from the South's over-coming of its legacy of slavery, agricultural dependence, high Black population percentages, poor education, and low wage rates. High South-to-North migration contri-buted to raise incomes in the South. The study also found in 1950, all ten southern states (West Virginia, North Carolina, South Carolina, Georgia, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, and Louisiana) recorded income at more than 25% below the national average. However, after 1950, the income gap between southern and non-southern states closed and income growth increased by 161%.

Higgins et al.'s (2006) study identified two opposing forces in economic growth that make regional incomes converge or diverge. On the one hand, they argued that growth necessarily creates divergent productivity growth among different regions through agglomeration econo-mies in the center (the region with higher productivity). Savings in transportation cost due to geographical proximity, external economies of scale of production, increased productivity due to more specialized inputs are often cited as reasons of agglomeration economies. On the other hand, the growth of the center will induce growth of the periphery (the regions with lower productivity) through technological transfers from the center to the periphery and factor movements across regions. These forces tend to make regional per capita income converge (Young et al., 2008; Lopez et al., 2004). Over time, there has been a tendency for weaker rural regions to catch up (Rupasingha, 2002). The relationship is the opposite in metropolitan counties, where leading counties tend to grow wages the fastest (Albrecht et al., 2007). It is also the opposite of the relationship between metropolitan and rural regions, where metropolitan regions on average grew wages more strongly despite starting out with higher initial wages (Albrecht et al., 2007; Rupasingha, 2002). The evidence is consistent with the concept of "conditional convergence" prominent in the growth literature. Rural regions are revealed as a distinct group of regions with underlying characteristics that put them on a different growth path than metropolitan regions. Within their group, rural regions converge to one growth path while the two growth paths of the rural and metropolitan regions do not converge (Higgins et al., 2006; Rupasingha, 2002).

In order to explore regional wage disparities, observationally equivalent workers must be compared. The role of regional workforce differences in the relative wages of regions should be isolated from pay differentials that comparable workers would receive in other regions. Most sources of wage disparity are accounted for by evaluating the typical differences in returns associated with worker characteristics, including education levels, experience, industry, race, and sex.

If income or wages of the component parts of the nation's regions or states are converging (decreasing) over time, then there is no basis to infer rising inequality among those spatial units. If income or wages are diverging (increasing) however, that is a basis for inferring rising inequality among spatial units. The movement of capital serves as the key and automatic force driving regional convergence. Economic conver-gence, at least in theory, is attained when differences in rates of marginal returns to capital between regions is equal to zero. When such occurs it is assumed that income per capita would also have equalized between regions (Hall and Ludwig, 2006).

Sigma convergence is the tendency for variation of income or wages among nations or sub-parts of a nation to diminish over time. It is measured by the variance, or standard deviation, or coefficient of variation of per capita income or wages for spatial units over time. A long-term decline in the annual measure of variation indicates sigma convergence (Young et al., 2008). Friedman (1992) considers sigma convergence to be the only valid measure of convergence because the usual tests for beta convergence are subject to Galton's fallacy of regression to the mean (Drennan et al., 1996).

The most thorough study of convergence among parts of the United States was done by Barro and Sala-i-Martin (1992). Testing for sigma convergence using state per capita income data, 1880 to 1988, their results support sigma convergence for all decades except the 1920s and the 1980s, which they dismiss as aberrations. Their test is for unconditional sigma convergence because to test

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for conditional sigma convergence their argument would require measuring the dispersion between the actual per capita income and the steady-state value, which is unknown. The data set used by Barro and Sala-i-Martin (1992) ends in 1988, and as noted, they found evidence of divergence of per capita personal income among states for the decade of the 1980s.

MATERIALS AND METHODS

Empirical model

Following Young et al. (2008), Higgins et al. (2006), Rey and Montouri (1999), Sala-i-Martin (1996), and Mankiw et al. (1992), income convergence in the 10-state southeastern region was estimated by ordinary least squares. Two income convergence models were estimated: (1) Absolute income or β-convergence (Equation 1) and (2) Conditional Income Convergence (Equation 2).

Initially, a univariate *β*-convergence model was estimated to determine if there was an absolute income convergence over the 20-year period (Sala-i-Martin, 1996):

$$\ln\left(\frac{y_t}{y_{t-1}}\right) = \alpha + \beta_0(\ln y_{t-1}) + \varepsilon\,, \quad (1)$$

Where y_t is the average per capita income in year *t* (2000), *ln* is natural logarithm, *t-1 is* initial year (1980), α is a constant, β_0 is a coefficient vector, and *ε* is an error term. However, the absolute income convergence may not occur due to differences in the steady-state conditions. Differences in demographics, employment, industry structures, and other factors may affect a region and lead to unbalanced growth in the region. That is, the income growth process may be conditioned by these factors and a conditional income convergence model has to be estimated (Barro and Sala-i-Martin, 1992; Sala-i-Martin, 1996). Such a model is:

$$\ln\left(\frac{y_{i,t}}{y_{i,t-1}}\right) = \alpha + \beta_0(\ln y_{i,t-1}) + \beta_i(X_{i,t} - X_{i,t-1}) + \beta_j X_j + \varepsilon_{i,t}, \quad (2)$$

where y_i is the average per capita income of county *i* in year *t* (2000), *ln* is natural logarithm, *t-1* is initial year (1980), X_j indicates initial conditions of the explanatory variables in year 1980, $X_{i,t-1}$ is a vector of growth in explanatory variables, β_i is a vector of X_i parameters, and $\varepsilon_{i,t}$ is an error term. The conditioning factors are initial and changed conditions of population, race, education, age structure, employment, and travel time to work that control per capita income growth (Table 1 for descriptions of the variables used).

The income convergence models were estimated using Ordinary Least Squares (OLS). The convergence model was estimated in two steps. The absolute convergence (a univariate β_0) model was first tested using only initial income to determine if there was absolute income convergence. If the R^2 value is low, the conditional income convergence model is used by including more variables to examine convergence if conditioned by other variables. Both models were employed using the stepwise method to reduce the effects of multicollinearity among independent variables.

The dependent variable is the natural log value of per capita income in 2000 to real (in year 2000 dollars) per capita income in 1980 for each county in the study area. The independent variables are initial and changed conditions, which included: population, race, education, age structure, employment, population density, and travel time to work. Table 1 shows the description of the variables used.

The independent variables used in this study were drawn from the previous studies. These studies reported that six socioeconomic factors play important role in income growth. These factors are population, race, labor structure, age, education, and employment (Sala-i-Martin, 1996). The convergence model included initial and changed variables of African-American Population, labor force population, retiree population, high school graduates, college graduates, employed population, rural population, population density, and travel time to work including initial and changed conditions of the control variable, helps to distinguish whether income change was a result of initial conditions, changes, or both.

Descriptions of variables

Previous income convergence studies have reported six socio-economic factors play important role in income convergence. These factors are population, race, labor structure, age, education, and employment. In this study, initial levels and changes in population density, population between 16 and 64 years old, African-American population, college education, unemployed population, and travel time to the workplace were used in the model. Heterogeneity and endogeneity biases were controlled by including the initial conditions of the variables. Inclusion of both initial and changed conditions of the control variables help show whether the income change was a result of initial conditions, some changes of their conditions, or both.

Descriptive statistics

Total population shows a 51% increase in population in the study area over a 20-year period (Table 2). The race variables are categorized into African American, White, and Other population. The white population shows the only decline in population by 3%, African American population increased by 53%, and other population by 663% over the 20-year period. The population class variables are categorized into young, labor force (eco), and retiree population. The labor force population increased by 14%, the young population decreased by -30%, and the retiree population increased by 10%. The education class includes the high school and college graduates. Both high school and college population show a significant increase at 112% for high school and 154%, respectively. Employment is also a factor in population change and resulted in an increase at 5%. Next, rural and urban population is examined. Rural population shows an increase by 1%, while urban population shows an increase by 31%, Population density is also explored to estimate the amount of people per square mile. Population density shows an increase at 51%. Lastly, per capita income is observed with 34% increase over a twenty year period. Overall, the most significant variables changed are other groups of population, high school, and college population.

Table 3 shows the total number of urban counties by state. Overall, urban counties are consistently increasing. This observation is consistent with previous findings (Wenk and Hardesty, 1993). More people are leaving rural areas in exchange for urban areas. In 1980 there were 209 urban counties, in 1990 there were 230 counties, and in 2000 there were 258 urban counties. Georgia shows the most increase in urban counties by 38. Louisiana showed the lowest increase of urban counties by 4.

RESULTS

Absolute convergence, 1980 and 2000

Table 4 shows the results of the absolute income

Table 1. Variables used in income growth model.

Variable	Description	Variable type
Change in the Income Growth	Natural log of the ratio of PCI of each county in 2000 to real (in 2000 $-value) PCI in 1980 for each county	Dependent
Initial condition		
African Americans (AA)	Initial (1980) population, 50% or more AA	Independent
Labor Force Population (ECO)	Initial (1980) population in 16-64 age bracket	Independent
Retiree Population (RET)	Initial (1980) population, 65 years of age and above	Independent
High School Population (HS)	Initial (1980) high school graduate population	Independent
College Population (COLL)	Initial (1980) population with at least a bachelor degree	Independent
Employed Population (EM)	Initial (1980) employed population, 16 years and above	Independent
Urban Population (URB)	Initial (1980) 50,000 or more population in county	Independent
Travel Time (TRAVT)	Initial (1980) average travel time to work (in minutes) per person in a county	Independent
Population Density (PDEN)	Initial (1980) people per square mile at the county level	Independent
Changed condition		
Changed African Americans	Difference in % of AA population, 1980-2000	Independent
Changed Labor Force Population	Difference in % of 16-64 age group population, 1980-2000	Independent
Changed Retiree Population	Difference in % of 65-and-over age group population, 1980-2000	Independent
Changed High School Population	Difference in % of High School graduate population, 1980-2000	Independent
Changed College Population	Difference in % of Bachelor degree holder population or over, 1980-2000	Independent
Changed Employed Population	Difference in % of employed population, 1980-2000	Independent
Changed Urban Population	Difference in % of urban counties with 50,000 or more population	Independent
Changed Travel Time	Difference in % of the average travel time to work (in minutes) per person in a county, 1980-2000	Independent
Changed Pop. Density (PDEN)	Difference in % of people per square mile at the county	Independent

Table 2. Descriptive statistics of variables for 1980 and 2000.

Variable	Minimum		Maximum		Mean		Change (%)
	1980	2000	1980	2000	1980	2000	1980-2000
Total population	2,032	2,077	1,625,781	2,253,362	51,853	69,023	51.51
White	15.04	13.31	99.99	99.56	77.87	75.52	-3.15
African American	0.00	0.00	84.16	86.13	21.37	21.25	53.73
Other	0.00	0.28	35.45	41.83	0.75	3.22	662.52
Young	15.83	12.80	41.01	28.04	30.34	20.88	-30.92
Labor Force Pop	46.04	51.39	72.88	76.97	57.21	65.49	14.72
Retiree	0.81	1.80	33.96	34.72	12.45	13.63	12.20
High school	7.32	15.87	29.91	47.43	16.76	34.34	112.45
College	1.60	4.86	21.35	44.10	5.30	13.26	154.11
Employed	8.42	20.94	70.66	71.48	51.35	53.84	5.49
Rural	0.08	0.11	100.00	100.00	67.65	63.84	1.96
Urban	0.00	0.00	99.92	99.89	32.35	36.16	31.61
Population density	3.49	4.09	2542.29	2457.90	96.21	121.81	51.51
PCI	6,756	9,629.0	21,614.68	32,496	12,164.56	16,265.06	34.22

convergence model testing only log of initial per capita income. This model was significant at (F=34, *df*=1,873, p<=.001), explained 3.7% (adjusted R^2=.037) of the total variation. The convergence coefficient (β value) was negative (-.195) and significant at the 5% level (t=-5.883) demonstrating convergence of per capita income in the

Table 3. Urban counties by state.

State	1980	2000	Change	1990	2000	Change
Alabama	21	24	3	21	24	3
Arkansas	10	15	5	11	15	4
Florida	33	39	6	36	39	3
Georgia	22	36	14	30	36	6
Kentucky	12	15	3	13	15	2
Louisiana	21	22	1	22	22	0
Mississippi	12	12	0	12	12	0
North Carolina	40	46	6	43	46	3
South Carolina	20	24	4	21	24	3
Tennessee	18	25	7	21	25	4
Total	209	258	49	230	258	28

Table 4. Results of Absolute Convergence Model (1980 and 2000).

Variable	β-coefficient	Std. error	t-value
Constant	1.551	0.215	7.216
Initial condition (1980)			
Initial per capita income 1980	-0.195***	0.023	-5.883

southeastern U.S. counties. A negative sign suggests that poor counties are growing faster than rich counties. The convergence rate is estimated to be 1.09% per year[2]. The low R^2 value indicates that a large amount of variation in average per capita income convergence is unexplained by the absolute model and more variables need to be explored to examine convergence further.

Conditional Income Convergence, 1980 and 2000

Table 5 shows the results of the conditional income convergence model using the initial and changed variables. The model was significant (F-165,d*f=15*,859, p=0.001). The initial and conditional variables explain a 73.8% of the total variation (adjusted R^2=0.738) in per capita incomes between 1980 and 2000. The coefficient for initial per capita income level is negative and significant (β =-0.962, t= -27.532) suggesting that there was conditional income convergence over the 20-year period. The convergence rate per year is 16.3%. This relationship is expected to be negative as suggested by neoclassical growth theory. Using the stepwise method, the best model shows all significant variables. Since the goal of the stepwise method is to produce a strong model by eliminating variables that are strongly correlated among each other, it has identified the variables that best predict the dependent variable and has eliminated those that contribute no significance. College population, rural population, and population density were eliminated.

All of the changed and initial condition variables were significant at the 1% level confidence interval (p<0.1) except the change in high school population, which was significant at the 5% (p<0.5) confidence interval. All of the initial condition variables showed a positive significant relationship. A 1% increase in labor force population in 1980 will cause income growth by 39.9%. A 1% increase in retiree population in 1980 will increase income by 53.6%. A 1% increase in high school population in 1980 will cause income growth by 19.3%. A 1% increase in employed population in 1980 will cause income growth by 49.5%. A 1% increase in travel time in 1980 will increase income by 13.8%. The labor population and employed population show the strongest relationship to income convergence, whereas the African American population and travel time to work show the least responsiveness to income convergence.

The changes in African American and rural population were the only changed variables negative and significant. The negative relationship suggests that a high level of income growth occurred in areas with low African Americans, which are mostly in rural areas. This means, higher levels of income growth occurred in non-African American areas of the region, and in areas where the African American population (AA) was in decline over 20 years.

Counties with higher population changes were more likely to have experienced positive income changes. The results show income growth in labor force population (ECO), retiree population (RE), high school graduate population (HS), college graduates (CO), employed

[2] The convergence rate is calculated using $\theta = ln(\beta+1)/t$, where t(=20) is the number of years in the time period and β is the coefficient (Rey and Montouri, 1999).

Table 5. Results of Conditional Income Convergence Model, 1980 and 2000.

Variable	β-coefficient	Std. error	t-value	Elasticity[1]
Constant	4.507	0.246	18.326	
Initial condition (1980)				
Initial Per Capita Income, 1980 (PCI_80)	-0.962**	0.024	27.532	-9.049
African American Population (AA)	0.155***	0.000	5.951	3.312
Labor Force Population (ECO)	0.399***	0.001	9.569	22.827
Retiree Population (RE)	0.536***	0.001	14.617	6.673
High School Population (HS)	0.193***	0.001	6.439	3.235
Employed Population (EM)	0.495***	0.000	17.288	25.418
Travel Time to work (TRT)	0.138***	0.001	6.096	0.000
Changed condition (1980-2000)				
Change in African American Population (∆AA)	-0.115***	0.000	-5.889	-6.179
Change in Eco Population (∆ECO)	0.260**	0.002	5.805	3.827
Change in Retire Population (∆RE)	0.490**	0.002	13.113	5.978
Change in High School Population (∆HS)	0.075	0.001	2.271	8.434
Change in College Population (∆CO)	0.628***	0.001	17.556	96.781
Change in Employed Population (∆EM)	0.374***	0.001	11.861	2.053
Change in Rural Population (∆RPOP)	-0.099***	0.000	-5.178	-0.194
Change in Travel Time (∆TRT)	0.116**	0.002	5.217	0.000

[1]Elasticities were calculated at the means, by multiplying the β-coefficients with the means of the respective variables, as in a typical log-lin model (Gujarati, 1988). In that light, any particular β equals the ratio of the relative change in income to the absolute change in the relevant independent variable.

population (EM), and increased travel time (TRT). Within the changed conditions, college graduates and employed population show the strongest relationship to income change. This observation is expected because counties with higher educated people and a large employed class are economically faster than counties without these characteristics. These findings concur with Lim (2004) and Henry et al. (2004) who suggest areas with little improvement in higher education levels or low levels of job growth were more likely to have experienced declining or relatively lower income growth.

DISCUSSION AND CONCULSION

The objective of the paper was to examine income growth from 1980 to 2000 in the southeastern United States. Income convergence showed a steady increase during this study period. This observation showed that poorer counties are growing faster than relatively rich counties economically based on the positive convergence rate in both study periods.

This study used county-level data in 10 states to explore income convergence between 1980 and 2000. Both absolute and conditional convergence models were estimated to accurately measure income growth. First, absolute convergence was estimated for both time periods. Then conditional income convergence models were estimated employing the initial and changed conditions of the variables for both periods. The conditional convergence model for 1980 and 2000 was the most significant model based on the R^2. This study employed cross-section data for 1980 and 2000 to determine if income convergence was present in the southeastern U.S. counties.

The income convergence model results indicate strong evidence of income convergence in the region for 20-year periods. It is evident that poorer counties' income was growing at higher rates than wealthier counties. The conditional convergence rates was 16.3% for 1980 to 2000 period.

Education was a significant contributor to income growth in the southeastern region, which is consistent to the previous findings of Higgins et al. (2006), Young et al. (2008) and Rupasingha et al. (2002). Increasing levels of high school and college education in the population have improved the local labor force and increased their earning potential. Employment was another significant contribution to income growth. With more employed and/or qualified people bringing in revenue to the area, the counties are growing more economically.

There are some limitations of this study. The models were not as strong due to the relatively sparse data. Further research should be done perhaps with more appropriate variables using recent census data from 1950 until 2010 to better understand the trend. We could not

use 2010 Census data since it was not available during the study. Additionally, more variables could be examined such as: location of industries, road networks, wage disparity, and other social and environmental indicators.

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REFERENCES

Albrecht DE, Albrecht CM, Albrecht SL (2007). Poverty in Nonmetropolitan America: Impacts of Industrial, Employment, and Family Structure Variables. Rural Sociol. 65:87-103.

Barro RJ (1991). Economic Growth in a Cross Section of Countries. Quart. J. Econ. 106:407-443.

Barro RJ, Sala-i-Martin X (1992). Convergence. J. Polit. Econ. 100:223-251.

Baumol WJ (1986). Productivity Growth, Convergence and Welfare: What the Long-Run Data Show. Am. Econ. Rev. 76:1072-1085.

Crown WH, Wheat LE (1995). State Per Capita Income Convergence Since 1950 Sharing Cropping's Demise and Other Influences. J. Reg. Sci. 35:527-552.

Drennan MP, Tobier E, Lewis J (1996). The interruption of income convergence and income growth in large cities in the 1980s. Urban Stud. 33:63-82.

Friedman M (1992). Do Old Fallacies Ever Die? J. Econ. Lit. 30:2129-2131.

Gujarati DN (1988). Basic Econometrics, 2nd edition. New York: McGraw-Hill, Inc.

Gyawali BR, Fraser R, Bukenya J, Schelhas J (2008). Income Convergence in a Rural, Majority African-American Region. Rev. Reg. Stud. 38:45-65.

Hall JB, Ludwig U (2006). Economic convergence across German regions in light of empirical findings. Cambridge J. Econ. 30:941-953.

Hammond GW (2006). A Time Series Analysis of U.S. Metropolitan and Nonmetropolitan Income Divergence. Ann. Reg. Sci. 40:81-94.

Higgins MJ, Levy D, Young AT (2006). Growth and Convergence across the U.S.: Evidence from County-Level data. Rev. Econ. Stat. 88:671-681.

Lopez-Bazo E, Vaya E, Artis M (2004). Regional Externalities and Growth: Evidence from European Regions. J. Reg. Sci. 44:43-73.

Loewy MB, Papell DH (1996). Are U. S. Regional Incomes Converging? Some Further Evidence. J. Monet. Econ. 38:587-598.

Lynch RG (2003). Estimates of Income and Income Inequality in the United States and in each of the fifty states: 1988-1999. J. Reg. Sci. 43:571-587.

Mankiw NG, Romer D, Weil DN (1992). A Contribution to the Empirics of Economic Growth. Q. J. Econ. 107:407-437.

Ngarambe O, Goetz SJ, Debertin DL (1998). Regional Economic Growth and Income Distribution: County-Level Evidence from the U.S. South. J. Agric. Appl. Econ. 30:325-337.

Rey SJ, Janikas MV (2005). Regional Convergence, Inequality, and Space. J. Econ. Geogr. 5:155-176.

Rey SJ, Montuori BD (1999). US Regional Income Convergence: A Spatial Econometric Perspective. Reg. Stud. 33:143-156.

Rupasingha A, Goetz SJ, Freshwater D (2002). Social and Institutional Factors as Determinants of Economic Growth: Evidence from the United States Counties. Papers Reg. Sci. 81:139-155.

Sala-i-Martin X (1996). Regional Cohesion: Evidence and Theories of Regional Growth and Convergence. Eur. Econ. Rev. 40:1325-1352.

Solow MR (1956). A Contribution to the Theory of Economic Growth. Q. J. Econ. 70:65-94.

Wenk D, Hardesty C (1993). "The Effects of Rural-to-Urban Migration on the Poverty Status of Youth in the 1980s." Rural Sociol. 58(1):76-92.

Young AT, Higgins MJ, Levy D (2008). Sigma Convergence versus Beta Convergence: Evidence from U.S. County-Level Data. J. Money Credit Bank. 40:1083-1094.