Investigating the Geographic and Demographic Correlates of Economic Prosperity

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Abstract

This study sought to investigate the correlates of economic prosperity (median household income and low unemployment rates) in selected areas and their relationship to the educational attainment levels of the people who live in these areas. Also, the characterization of the areas sampled as urban/metropolitan or rural was taken into account. This was to investigate the validity of earlier findings suggesting that educated individuals locate to densely populated, urban areas more than to rural areas, making these areas more economically successful. Correlation analyses relating variables of economic prosperity and urban population data for 2000 Census tracts in the Carolinas were conducted. The calculation of 95% confidence intervals for the means for educational attainment, unemployment rates, and median household income for selected urban areas led to the conclusion that significantly (p < 0.05) higher educational attainment and median household income levels can be found for Census tracts located within 25 kilometers (km) of cities with populations greater than 50,000. Unemployment rates, however, were not found to significantly vary with urban or rural areas and did not correlate strongly with educational attainment levels or median household income. The findings of this study suggest that urban areas have greater household income levels, on average, due, at least partly, to the high educational attainment levels of theses areas. This trend was dependent on population of the cities which the census tracts surrounded and also the distances these tracts were located from these city centers.

Introduction

The work of Richard Florida (2002) has suggested that the presence of "talent" (a form of human capital defined as the percent of the population with a bachelor's degree or higher) in certain areas contributes to these areas being more economically viable and attractive to companies seeking to hire qualified, skilled workers. In Florida's 2002 research, he concluded that "talented" individuals located more to metropolitan areas (than to other areas) and that these metropolitan areas were the locations of a greater amount of job growth and economic prosperity than others. He also found that a significant correlation (p < 0.05) of 0.5882 existed between "talent" levels and per capita income in his sample of metropolitan areas. This observation can be related to P.M. Romer's (1990) "new growth theory" where he states that the concentration of "talented" individuals in urban areas leads to greater economic growth in these areas. C. Simon (1998) also supports the notion that it is the concentration of human capital—particularly in the form of highly educated individuals—that has driven economic growth in many metropolitan areas in the United States over the past few decades. This project thus sought to investigate the correlates of economic prosperity using the states of North and South Carolina as its dataset to see if Florida's (2002) findings concerning increased economic vitality in large, urban areas could be replicated.

Methods and Data Sources

The 2000 Census tract data was obtained from the U.S. Census Bureau's website. The boundary files for the tracts can be located at <http://www.census.gov/geo/www/cob/tr2000.html> while the tract data was obtained from Summary File 3 (SF3) and can be downloaded at a variety of geographic levels via <http://www.census.gov/support/SF3ASCII.html>.
The following tables from SF3 were uploaded into Microsoft Access for processing and geo-referencing before being imported into Microsoft Excel for final formatting and finally imported into ArcMap and joined with the boundary shape files containing the geographic position of each tract:
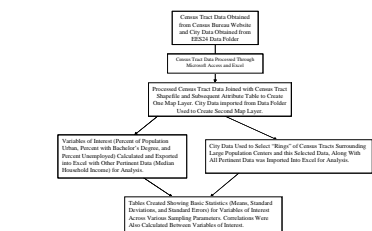
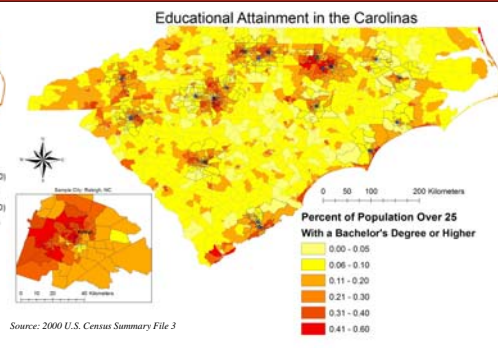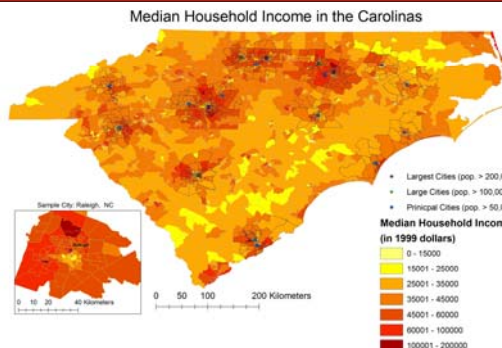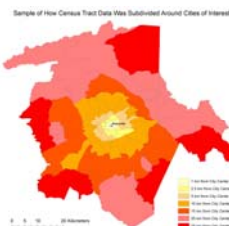| Table in SF3	Data Obtained
P5	Urban and Rural Population (from which total population was calculated)
P53	Median Household Income in 1999 Dollars
P43	Labor Force and Employment Status, by sex (from which unemployment rates were calculated)
P148	Educational Attainment (for population 25 years or older), by race and education level (from which percentage of population with bachelor's degree or higher was obtained)

All technical documentation regarding the 2000 Census Summary File 3 can be found in a PDF document created by the Census Bureau, found at <http://www.census.gov/prod/cen2000/doc/sf3.pdf>.
The cities point file and population data was obtained from the Census 2000 "census places" folder in the GIS data archives maintained by Furman University's GIS department (N:\Data\USA\census\places.shp).
Once all data had been incorporated into one ArcMap file consisting of a city and census tract layer, data analysis began by sampling tracts located within various distances of selected cities using the "select by location" query tool. New map layers were created from each successive distance query (an example of which would be: "select features from" Census Tract Data shape files (and their subsequent attribute tables) that "are within a distance of" ___ km from City point files of interest) and then all census tract data lying within various distance "rings" from city centers were exported into Microsoft Excel for analysis. These "rings" or "radii" from city centers were obtained by selecting out the unique tracts added as the selection distance from the city centers was increased from 1 to 25 km at various increments. Below is a flow chart depicting the method in which the data was processed and prepared for analysis as well as a map depicting how census tracts (and their data) within varying distances of city centers were selected and created as new map layers for later data processing and analysis.

Visit my website, <http://gis.furman.edu/~smith> for more info on this project!

Median Household Income in the Carolinas
Educational Attainment in the Carolinas

Source: 2000 U.S. Census Summary File 3

The above maps show data from the two variables in this analysis that were determined to be the most strongly correlated with one another. Note how areas with high median household incomes seem to have high percentages of persons with bachelor's degrees or higher. The inset of the Raleigh, NC, area shows that both household income and educational attainment are very high in this metropolitan area and also seem to correlate well with one another.

Results

Across all tracts in the dataset, a relatively strong positive correlation (Pearson product moment correlation coefficient (r) = 0.702) was found between "talent" levels (percent of population over 25 with a bachelor's degree or higher), as defined by Florida (2002), in each tract and the median household income of that tract (i.e., as the percent of the population with a bachelor's degree or higher increased, the median household income increased). Only a modest positive correlation (r = 0.381) was found, however, between the percent of the population living in urban areas and the percent of the population with a bachelor's degree or higher (data not in line with Florida's previous findings). When the percent of the population living in urban areas was plotted versus signs of economic prosperity (median household income and percent of population unemployed), very weak positive correlations were found between the percent of the population living in urban areas and median household income (r = 0.117) and between unemployment rates and the percent of the population living in urban areas (r = 0.137).
To further look at the question of whether urban areas are more economically prosperous than rural areas, another method was used to investigate the data. All census tract data was divided into two groups. One group consisted of all census tracts within 25 km of principal cities (population > 50,000) while the other group consisted of all remaining census tracts not within 25 km of principal cities. This division was made to try to investigate whether areas near relatively large cities were different than all other areas in either unemployment rate, educational attainment, or median household income.
Re-examining the correlatin between educational attainment levels and median household income for these two groups, it was found that those tracts within 25 km of principal cities had a correlation value similar to that of the entire dataset (r = 0.704) while the tracts not within 25 km of these cities had a lower correlation value (r = 0.597) between two variables.
After constructing 95% confidence intervals for variable means, it was found that the percent of the population 25 years of age or older with a bachleor's degree or higher was significantly (p < 0.05) higher in those tracts within 25 km of principal cities (mean = 0.180 or 18%) than those that were not within 25 km of these cities (mean = 0.105 or 10.5%). Similarly, the average median household income for census tracts within 25 km of principal cities was found to be significantly (p < 0.05) higher (mean = $42,200) than the average for tracts not within 25 km of these cities (mean = $34,400). Unemployment rates, however, were not statistically different between the two groups. This method of data analysis was continued by subdividing the area around each city of interest into different radii measuring 0-1, 1-2.5, 2.5-5, 5-10, 10-15, 15-20, and 20-25 km. Data was also sampled from areas surrounding cities of populations greater than 50,000, 100,000, and 200,000 and variables of interest were averaged to see if any differences were present based on the size of the cities examined.
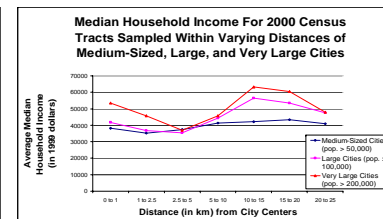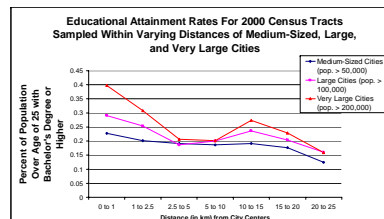
The graphs above show the mean values obtained from the radii sampled around cities of varying sizes in the dataset. A similar trend in educational attainment and median household income was found in all three city classifications examined. The largest cities in the sample saw the highest educational attainment rates and highest household incomes in their downtown areas (0-1 km from city centers) and also in their suburbs (10-15 and 15-20 km from city centers) compared to the smaller cities.

Discussion

The correlation analyses conducted in this study confirm pervious findings[1,2,3] relating the presence of educated individuals in an area to that area's economic vitality (measured in this experiment as median household income and low unemployment rates). The r value calculated in this experiment between the percentage of the population with a bachelor's degree or higher and median household income across all census tracts in the Carolinas of 0.702 was in fact greater than Florida's (2002) correlation of 0.5882 found between educational attainment levels and per capita income in metropolitan areas.
The fact that educational attainment and median household incomes were found to be statistically higher in areas within 25 km of cities of populations greater than 50,000 seems to confirm Florida's (2002) hypothesis (that educated individuals locate to densely populated urban areas more than rural areas and that their presence leads to those areas having greater household incomes and economic prosperity). Interestingly, the trend across all cities sampled, seems to imply the presence of "suburban rings of prosperity" around large cities with incomes for the entire region around these cities highest for those census tracts located between 10 and 20 km from the city centers. In addition, the most educated populations in these urban regions seemed to be concentrated in the downtown areas between 0 and 2.5 km from the city centers.
In conclusion, educational attainment and median household income are correlated and are higher in urban areas than in rural areas. The size of the city around which the census tracts are located also seems to impact the percentage of educated individuals located in these areas as well as the median household incomes of these areas; larger cities have a greater percentage of educated people and also have higher median household incomes.

References:
1) Florida, Richard (2002). "The Economic Geography of Talent." *Annals of the Association of American Geographers*, 92 (4), 743-755.
2) Romer, P.M. (1990). "Endogenous Technological Change." *Journal of Political Economy*, 98 (5), S71-S102.
3) Simon, C. (1998). "Human Capital & Metropolitan Employment Growth." *Journal of Urban Economics*, 43, 223-243.