

Municipal Economic Growth, 1960-1990

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This study uses a sample of 597 U.S. municipalities to examine the effects of municipal characteristics in 1960 on municipal population and income growth over the subsequent three decades. This work builds on the analysis of municipal economic growth presented by Glaeser, Scheinkman, and Shleifer (1995). Using a much larger sample of U.S. municipalities (597 versus 203), the results affirm the robustness of several of their key conclusions. The larger sample also produces evidence of convergence across municipalities in levels of per capita real income. A sensitivity analysis of the results suggests that human capital is the most important determinant of municipal economic growth.

Over the last two decades, the amount of theoretical and empirical work devoted to understanding the causes of economic growth has increased rapidly. Most of the empirical analyses have focused on explaining differences in cross-national growth experiences.¹ Others have examined variations in growth across the states and regions of the United States.² The initial impetus for much of this work involved searching for evidence to confirm or refute the per capita income convergence predicted by the neoclassical model of economic growth.³ The search for evidence of

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¹ See Barro (1991), Barro and Sala-i-Martin (1992), Baumol (1986), Baumol and Wolff (1988), DeLong (1988), Dowrick and Nguyen (1989), and Peacock, Killian, and Hoover (1988).

² See Amos (1986, 1989, 1991), Barro and Sala-i-Martin (1991, 1992), Mallick (1993), and Nissan and Carter (1993). Barro and Sala-i-Martin (1991) also examine data on 73 regions of seven western European countries, while Button and Pentecost (1995) investigate data on 51 European Union level one administrative regions.

³ According to the neoclassical growth model, if a group of economies share the same steady-state levels of capital per worker and output per worker but differ in their current levels of

conditional convergence has produced one extremely important by-product: namely, an appreciation of the importance to economic growth of factors such as human capital (i.e., educational attainment); population growth; government monetary, fiscal, and trade policies; and political stability.

U.S. municipalities provide yet another rich source of data for expanding the empirical work on economic growth. In a detailed empirical analysis of the growth experiences of a cross-section of U.S. municipalities, Glaeser, Scheinkman, and Shleifer (1995) point out that national barriers to factor mobility and national policies that promote industrial diversification complicate growth studies that use cross-national data and even cross-state data. Municipalities, on the other hand, are completely open economies between which resources tend to be highly mobile; in addition, they are usually more specialized economic units than are states. Thus, Glaeser, Scheinkman, and Shleifer argue, the concerns that arise with cross-national and cross-state data can be greatly reduced by examining data on municipalities.

Glaeser, Scheinkman, and Shleifer use a sample of 203 U.S. municipalities to explore the relationship between municipal characteristics in 1960 and growth in municipal population and income over the subsequent three decades. Their sample selection is determined by their reliance on Taeuber and Taeuber (1965) for data on the racial characteristics of municipalities. Taeuber and Taeuber (1965) examine all municipalities that in 1960 had over 1,000 housing units with a nonwhite head. Their sample includes all but one of the 100 largest U.S. municipalities, but includes a disproportionate number of Southern municipalities in the next 100. Glaeser, Scheinkman, and Shleifer report that their principal conclusions also hold if they restrict themselves to only the 100 largest municipalities. In this paper, we replicate their process and examine a much broader sample of U.S. municipalities. We include municipalities from all regions of the U.S. that had at least 25,000 population in 1960. This will allow us to assess the broader applicability of their conclusions.

The Empirical Analysis of Municipal Economic Growth

Glaeser, Scheinkman, and Shleifer conduct an empirical investigation of the relationship between municipal characteristics in 1960 and municipal growth over the 1960-1990 period. They draw on the insights provided by recent theoretical and empirical analyses of economic growth to identify those factors that appear to be associated with the observed economic growth in U.S. municipalities. Their results provide the foundation for our empirical analysis of municipal economic growth.

development relative to the common steady state, then the poorer economies will tend to catch up with the richer economies. The initial differences in capital per worker and output per worker will decrease over time as each economy approaches the common steady-state levels of capital per worker and output per worker. This theoretical tendency toward convergence implies that the poorer economies will grow more rapidly than the richer economies during the transition period.

The Basic Empirical Framework

Glaeser, Scheinkman, and Shleifer find that both municipal population growth and municipal income growth are (i) positively correlated with the initial (i.e., 1960) average level of educational attainment in the municipality; (ii) negatively correlated with the initial municipal unemployment rate; and (iii) negatively correlated with the initial share of municipal employment in manufacturing. The first result is consistent with evidence from cross-national studies and other studies of municipal growth that human capital is critical to healthy economic growth, as workers with more human capital are better able to adopt new technology and use available capital more efficiently.⁴ The second result suggests that municipalities with high initial unemployment rates declined over time as workers moved away in response to adverse business cycle shocks. The third result suggests that municipalities with higher concentrations of manufacturing employment declined over time as non-manufacturing industries generally failed to move into those municipalities to replace lost manufacturing jobs. Following these results from Glaeser, Scheinkman, and Shleifer, we include in our model the median years of schooling for the municipal population in 1960 as a proxy for the municipality's initial stock of human capital. We also include the 1960 municipal unemployment rate and the 1960 share of municipal employment in the manufacturing sector.

Glaeser, Scheinkman, and Shleifer also find some evidence (albeit weak) that the racial composition of a municipality may affect its growth and that the initial level of public debt may have a positive effect on subsequent growth. We therefore include in our growth equations the 1960 fraction of the municipal population that was nonwhite and the 1960 level of municipal debt per capita. We also include the 1960 levels of both municipal population and municipal per capita income. The initial municipal population variable controls, in part, for negative externalities (e.g., crime, pollution, commuting costs) associated with larger municipalities. A negative coefficient would be consistent with this interpretation. A negative and significant coefficient on the per capita income variable will be consistent with the conditional convergence predicted by the neoclassical growth model.

The population and income growth equations that we estimate are

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + b_{10}X_{10} + e,$$

where:

- Y = Population or per capita real income growth;
- X₁ = The natural logarithm of 1960 municipal population;
- X₂ = The level of municipal per capita real income in 1960;
- X₃ = The unemployment rate in the municipality in 1960;
- X₄ = Median years of schooling of individuals age 25 and older in 1960;

⁴ See, for example, Barro (1991), Barro and Sala-i-Martin (1992), Simon (1998), and Simon and Nardinelli (1996).

- X_5 = The per capita level of municipal debt outstanding in 1960;
- X_6 = A dummy variable for municipalities in Southern states (Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia);
- X_7 = A dummy variable for municipalities in Midwestern states (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin);
- X_8 = A dummy variable for municipalities in Western states (Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming);
- X_9 = The percentage of the employed municipal population working in the manufacturing sector in 1960; and
- X_{10} = The 1960 percentage of the municipal population that was nonwhite.

Population growth is measured as the natural logarithm of the ratio of 1990 municipal population to 1960 municipal population. Per capita real income growth is measured as the natural logarithm of the ratio of 1990 municipal per capita real income to 1960 municipal per capita real income. The omitted regional category in our population and income growth equations is the Northeast, which includes municipalities in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. We include the regional dummy variables to control for differences in U.S. regional economic development between 1960 and 1990.

There is an important measurement issue associated with using per capita income for open economies such as municipalities. Per capita income is computed from total personal income. For a municipality, the dividends, interest, and rent (DIR) component of total personal income is earned primarily from investments outside the area. Thus, it should not be included in a measure of local economic performance. A similar argument can be made about the transfer payments component of personal income. Data on the composition of personal income are not available at the municipal level, but such information is available at the county level for 1990 and at the state level for 1960. Therefore, to adjust the municipal income figures for 1990, we assume that DIR and transfer payments accounted for the same shares of personal income at the municipal level that they did at the level of the county in which the municipality is located. For 1960, we had to assume that the municipal shares were the same as the state-level shares. This introduces a measurement error issue, because the 1960 level of per capita income is a regressor in our specifications. Because this will bias the coefficient estimate toward zero, finding significant effects will be even more convincing evidence of conditional convergence.

Data on U.S. Municipalities, 1960-1990

Socioeconomic data for municipalities are from the *County and City Data Book* (1962 and 1994 editions) and from the Inter-University Consortium for Political and Social Research (ICPSR 7735 and ICPSR 8256). The data used in the ICPSR volumes are from the *County and City Data Book* files and originally were collected by the U.S. Department of Commerce, Bureau of the Census.

County-level data for 1990 on the DIR and transfer payments components of personal income are from the *Regional Economic Information System 1969-1995* (available on CD-ROM from the Bureau of Economic Analysis). State-level data for 1960 on these personal income components are from the Regional Accounts Data available on BEA's web site.

We analyze a sample of 597 municipalities with populations of at least 25,000 in 1960. This is a much larger sample than the 203 municipalities examined by Glaeser, Scheinkman, and Shleifer; however, their selection of municipalities was dictated by the availability of the Taeuber and Taeuber (1965) index measuring the degree of segregation within a municipality. By examining a larger sample that is not constrained by the Glaeser, Scheinkman, and Shleifer selection criterion, we will be able to determine whether their principal conclusions are sample-specific or have broader applicability.

Table 1 presents descriptive statistics for our sample of U.S. municipalities. On average, population in these municipalities grew about 18 percent between 1960 and 1990. By contrast, for the 203 municipalities analyzed by Glaeser, Scheinkman, and Shleifer, average population growth over the 1960-1990 period was only 8.5 percent. In 1960, the municipalities in our sample had an average of 28.4 percent of total employment working in manufacturing, an average unemployment rate of 5.03 percent, average educational attainment of 11.09 years, and nonwhite population equal to 9.7 percent of total population. These characteristics are similar to those of the municipalities examined by Glaeser, Scheinkman, and Shleifer. The principal exception is the racial composition measure; on average, about 18 percent of the population in the Glaeser, Scheinkman, and Shleifer municipalities was nonwhite, nearly double the average share in the municipalities in our sample.

There are also notable differences in the regional composition of the two samples. In our sample, 26 percent of the municipalities are in the South, 31 percent in the Midwest, 20 percent in the West, and 23 percent in the Northeast (the omitted regional category). In the Glaeser, Scheinkman, and Shleifer sample, 40 percent of the municipalities were in the South, 27 percent in the Central region (which corresponds to our Midwest region), 19 percent in the Northeast, and 14 percent in the West. In our sample, 46 percent of the municipalities are in the South and West, while 54 percent of the municipalities in the Glaeser, Scheinkman, and Shleifer sample were in these regions; in particular, 40 percent of the Glaeser, Scheinkman, and Shleifer municipalities were in the South, compared to only 26 percent in our sam-

ple. Our sample should reveal whether the results obtained by Glaeser, Scheinkman, and Shleifer were in any way biased by their (admitted) over-sampling of Southern municipalities.

Table 1—Municipal Characteristics, Descriptive Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
Dependent Variables				
Growth in Log of Population, 1960-1990	0.18	0.45	-1.89	2.52
Growth in Log of Per Capita Income, 1960-1990	0.29	0.21	-0.55	1.07
1960 Starting Variables				
Population	105,712	232,202	25,000	3,550,404
Per Capita Income (\$)	5,983	1,647	2,660	21,836
Unemployment Rate (%)	5.03	1.81	0.70	11.60
Manufacturing Share of Employment (%)	28.39	13.32	4.30	59.30
Median Years of Schooling	11.09	1.19	6.40	15.80
Percent Non-White	9.67	11.88	0	57.50
Per Capita Public Debt (\$)	760	585	0	3,383
Geographical Variables				
South	0.26	0.44	0	1
Midwest	0.31	0.46	0	1
West	0.20	0.40	0	1
Northeast	0.23	0.42	0	1

Empirical Results

In this section, we present the results obtained from estimating equations for both municipal population growth and municipal income growth over the 1960-1990 period. Population growth is especially appropriate for analyzing municipal growth experiences, as population growth “captures the extent to which municipalities are becoming increasingly attractive habitats and labor markets” (Glaeser, Scheinkman, and Shleifer, p. 127).

The Population Growth Equation

The results for the municipal population growth equation are presented in the first column of Table 2. In their empirical work, Glaeser, Scheinkman, and Shleifer did not address the issue of heteroskedasticity, even though it is likely in a cross section of U.S. municipalities. We obtained our estimates by the generalized method of moments to correct for heteroskedasticity, because failure to do so could lead to misleading statistical inferences.

Growth in population is (i) positively related to the initial level of educational attainment in the municipality and (ii) negatively related to the initial municipal unemployment rate. These findings corroborate the conclusions reached by Glaeser, Scheinkman, and Shleifer. They also find population growth to be negatively related

Table 2—Determinants of Municipal Population and Income Growth in the U.S., 1960-1990

Variable	Population Growth	Income Growth
Constant	0.84117 (2.53)*	0.22827 (1.26)
Log of 1960 Population	-0.10306 (-6.73)*	-0.02364 (-2.80)*
Per Capita Income 1960	-0.00005 (-5.72)*	-0.00002 (-2.48)*
Unemployment Rate 1960	-0.02351 (-2.09)*	-0.02229 (-4.09)*
Median Years of Schooling 1960	0.06126 (2.99)*	0.04637 (3.87)*
Per Capita Public Debt 1960	0.00014 (5.12)*	0.00004 (2.84)*
South	0.30569 (5.25)*	0.04605 (1.34)
Midwest	0.07542 (2.40)*	-0.14092 (-5.66)*
West	0.57931 (10.14)*	-0.02382 (-0.66)
Percent of Employment in Manufacturing 1960	-0.00223 (-1.42)	0.00175 (2.03)*
Percent Nonwhite 1960	-0.00667 (-4.53)*	-0.00047 (-0.46)
Sample Size	597	597

* Significant at the 0.05 level or better

to the initial share of municipal employment in manufacturing. This relation is also negative in our results, but the coefficient is not significant at conventional levels. In addition, we find that population growth is positively related to the initial level of municipal public debt and negatively related to the initial percentage of the municipal population that is nonwhite.

Glaeser, Scheinkman, and Shleifer find only weak evidence of a negative correlation between municipal growth and percent nonwhite; specifically, the negative correlation they find disappeared when controls such as median years of schooling, initial unemployment, and manufacturing share are added. In our results, percent nonwhite has a strong negative effect on municipal population growth even with a broad set of controls included.

The coefficients on the regional dummy variables indicate that municipalities in the South, Midwest, and West grew more rapidly than those in the Northeast (the omitted regional category in our equation). A comparison of the coefficients of the three reported regional dummy variables also indicates that municipalities in the South grew more rapidly than those in the Midwest and that municipalities in the West grew most rapidly of all.

The Income Growth Equation

The results for the municipal per capita income growth equation are presented in the second column of Table 2. Once again, estimation is by the generalized method of moments to correct for heteroskedasticity. Per capita real income growth over the 1960-1990 period is negatively related to the initial level of per capita income. Thus, when controlling for other determinants of municipal income growth, it appears that municipalities with lower per capita income levels in 1960 had faster growth in income over the next 30 years than initially wealthier municipalities. This finding is consistent with the conditional income convergence effect predicted by neoclassical growth theory and documented in many other empirical studies of non-municipal economic growth.

Consistent with the evidence presented by Glaeser, Scheinkman, and Shleifer, we find that income growth is (i) positively related to the initial level of educational attainment in the municipality and (ii) negatively related to the initial unemployment rate. In contrast to Glaeser, Scheinkman, and Shleifer, we find that income growth is *positively* related to the initial share of municipal employment in manufacturing. We also find, again consistent with Glaeser, Scheinkman, and Shleifer, that income growth is positively related to the initial level of public debt. The coefficients on the regional dummy variables indicate that per capita real income grew significantly more slowly in the Midwest than in the Northeast, whereas income growth in the West and in the South were not significantly different from income growth in the Northeast.

Sensitivity Analysis

In Tables 3 and 4, we present sensitivity analyses for our population and income growth equations. Because we have allowed for differences in average growth rates across regions, each table is organized by region. To establish a reference point for comparison, we compute for each region the percent growth between 1960 and 1990 that would be predicted for a municipality with the average characteristics in the sample. These results are reported in the columns labeled "Benchmark." To assess the economic significance, as opposed to the statistical significance, of each determinant of municipal growth, we proceed as follows: We compute for each region the predicted growth rate that would result if one particular determinant were increased in value by 10 percent, with all other determinants held constant at their sample mean values. We make this computation for each of our explanatory variables in turn and report the results in the columns headed by each variable name. For example, entries in the columns labeled "Unemployment Rate 1960" are the predicted growth rates that would result from increasing the average 1960 unemployment rate by 10 percent while holding constant the values of the other determinants of municipal growth. The last row of each table shows the uniform difference between the pre-

Table 3—Determinants of Municipal Population Growth in the United States, 1960-1990, Sensitivity Analysis*

Region	Benchmark	Log of Population 1960	Per Capita Income 1960	Unemployment Rate 1960	Median Years of Schooling 1960	Percent of Employment in Manufacturing 1960	Per Capita Public Debt 1960	Percent of Population Nonwhite 1960
North	-0.110	-0.120	-0.140	-0.122	-0.043	N/A	-0.100	-0.117
South	0.195	0.185	0.165	0.183	0.263	N/A	0.206	0.189
Midwest	-0.035	-0.045	-0.065	-0.047	0.033	N/A	-0.025	-0.042
West	0.469	0.459	0.439	0.457	0.537	N/A	0.479	0.462
Uniform Difference from Benchmark		-0.010	-0.030	-0.012	0.068	N/A	0.011	-0.007

* Entries in column (2), labeled "Benchmark," are the growth rates that would be predicted for a municipality with the average characteristics in the sample. Entries in columns (3)-(9) represent the predicted growth rates that result from increasing the individual variable shown in the column heading by 10 percent, while holding all other variables constant at their sample mean values

Table 4—Determinants of Municipal Income Growth in the United States, 1960-1990, Sensitivity Analysis*

Region	Benchmark	Log of Population 1960	Per Capita Income 1960	Unemployment Rate 1960	Median Years of Schooling 1960	Percent of Employment in Manufacturing 1960	Per Capita Public Debt 1960	Percent of Population Nonwhite 1960
North	0.313	0.311	0.301	0.302	0.364	0.318	0.316	N/A
South	0.359	0.357	0.347	0.348	0.410	0.364	0.362	N/A
Midwest	0.172	0.170	0.160	0.161	0.223	0.177	0.175	N/A
West	0.289	0.287	0.277	0.278	0.341	0.294	0.292	N/A
Uniform Difference from Benchmark		-0.002	-0.012	-0.011	0.052	0.005	0.003	N/A

* Entries in column (2), labeled "Benchmark," are the growth rates that would be predicted for a municipality with the average characteristics in the sample. Entries in columns (3)-(9) represent the predicted growth rates that result from increasing the individual variable shown in the column heading by 10 percent, while holding all other variables constant at their sample mean values

dicted growth rates shown in each of columns (3)-(9) and the benchmark growth rates shown in the second column; that is, for any non-benchmark column in the tables, the difference between the values in the column and the corresponding benchmark value is the same (hence, the differences are uniform).

The results suggest that education had the greatest impact on both population growth and income growth over the 1960-1990 period. A 10 percent increase in educational attainment (roughly from 11 years of schooling to 12 years of schooling) would have increased population growth almost 7 percentage points and income growth about 5 percentage points. Our findings add to a growing body of evidence about the importance of human capital as a determinant of municipal economic growth. For example, Simon (1998) has found a strong positive relationship between human capital and U.S. metropolitan area (i.e., MSA) growth over the 1940-1986 period. In addition, Simon and Nardinelli (1996) have found evidence of the importance of human capital to the growth of English cities over the 1861-1961 period. Taken together, all of these results suggest that municipalities that want to enhance their future growth prospects should focus on encouraging human capital formation.⁵

Conclusions

We have used a sample of 597 U.S. municipalities to examine the effects of municipal characteristics in 1960 on municipal population and income growth over the subsequent three decades. Our work has built on the analysis of municipal economic growth presented by Glaeser, Scheinkman, and Shleifer (1995), but we have examined a much broader sample of U.S. municipalities.

We find that over the 1960-1990 period, both growth in municipal population and growth in municipal per capita real income are positively correlated with the initial average level of educational attainment in the municipality and negatively correlated with the initial municipal unemployment rate. The Glaeser, Scheinkman, and Shleifer conclusions about the negative correlation of the initial share of municipal employment in manufacturing with both municipal population growth and municipal income growth prove not to be robust to expansion of the sample. We also find some evidence of convergence across municipalities in per capita real income. Overall, then, our results allow us to affirm the robustness of several key conclusions reached by Glaeser, Scheinkman, and Shleifer (1995).

We also have conducted a sensitivity analysis of our results in order to determine which factors are most important to municipal economic growth. Our findings affirm that the level of human capital in a municipality (as measured by educational attainment) is critical for successful economic development.

⁵ Future research also might profitably consider the role of institutional factors, such as annexation and municipal government structure, in shaping municipal economic development. These issues are beyond the scope of this study, however, since our present purpose is to extend the analysis previously conducted by Glaeser, Scheinkman, and Shleifer (1995).

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