CLEMSON UNIVERSITY

REGIONAL ECONOMIC DEVELOPMENT RESEARCH LABORATORY

RESEARCH REPORT 03-2004-01

DOES SCHOOL QUALITY CONTRIBUTE TO LOCAL LABOR FORCE QUALITY?

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I. Introduction

A well educated labor force is widely recognized as beneficial to local economic growth and development. Simon and Nardinelli (2002) found, for example, that the 1940 to 1990 employment growth rates for metropolitan areas were positively related to the 1940 levels of human capital (measured as the percentage of the metro population with college degrees). The relationship between base year human capital levels and employment growth rates was found to be similar for manufacturing-dominated cities and metro areas with relatively little manufacturing employment. Gottlieb and Fogarty (2003) showed that an educated workforce (defined as share of adults with college degrees) was a significant determinant of subsequent per capita income growth across a sample of 267 metro areas. This relationship held after controlling for metro size and industrial structure. Finally, Henry, Barkley, and Li (2003) showed that higher 1970 levels of human capital (as measured by share of county workforce with some college) were associated with more rapid per capita income growth rates for Southern counties for the period 1970 to 2000. The impact of human capital on county per capita income growth rates was strongest in metropolitan counties and over the "New Economy" period of 1980 to 2000. However, unlike the findings of the Simon and Nardinelli study for metro areas, Henry et al. found that the role of human capital on nonmetropolitan economic development was influenced by the economic base of the county. Per capita income growth rates were impacted more by additions to human capital levels in service-based nonmetro counties than in manufacturing, government, or nonspecialized nonmetro counties in the South.

A high level of human capital is hypothesized to contribute to more rapid local economic development through a number of channels. First, additional human capital enhances the ability of local business to adopt superior technologies and respond to changing economic conditions

(Barro, 2001). Berman, Bound, and Gilriches (1994) found that the importance of educated labor to businesses increased over time as nonproduction labor replaced production workers and skills were upgraded within occupational categories. Second, a well-educated labor force improved a community's chances of attracting new businesses to the area (Aldrich and Kusmin, 1997). Labor force quality was especially important in the attraction of establishments in high technology industries (Goetz, 1997) and businesses with significant employment in skilled and technical occupations (Barfield and Beaulieu, 1999). Third, entrepreneurial activity and small business development in a community benefited from the availability of skilled people in management, technical, and entry-level positions. A well educated labor force was a critical component to the economic climate conducive to the development, attraction, and retention of entrepreneurs (National Commission on Entrepreneurship, 2000).

In addition to the direct effects of human capital on firm productivity, a well educated labor force also facilitated the generation of external economies that promote local development (Rauch, 1993). For example, knowledge spillovers were a critical component of the Marshal-Arrow-Romer (MAR) dynamic externalities that resulted in competitive advantages for the industry cluster that created the spillovers, and the availability of skilled, educated labor facilitated networking and the spread of ideas throughout the cluster (Kim, Barkley, and Henry, 2000). Glaeser, Laibson, and Sacerdote (2000) also found that people who invest in education tend to invest in social capital. Thus, a well-educated labor force may enhance the level of social capital in the community, and Flora (1988, p. 449) noted that "communities with moderate to high levels of social infrastructure are more likely to have successful, locally-initiated economic development projects than those without." Finally, Florida (2002) argued that a key to economic growth is the ability to attract and retain members of the "creative class," individuals with the ability to create new products and businesses and stimulate regional growth. Florida (2002, p. 5)

noted that a component of this class is “creative professionals,” individuals with “a high degree of formal education and thus a high level of human capital.”

It is important to note that improvements in levels of schooling or human capital benefit the individual as well as the community, thus increases in educational attainment promote both local growth and development. Card and Krueger (1992) showed that the earnings-education relationship was positive for levels of education above a minimum threshold (the second percentile of the education distribution of workers), though there was substantial variation across age cohorts and states. And, with respect to workers in nonmetropolitan areas, Kraybill and Veriyam (1993, p. 13) found that “ . . . raising the level of educational attainment is important for improving rural wages. Our results indicate a significant wage reward for higher levels of education of workers even in a rural community located considerable distance from a major metropolitan area.”

The observed relationships between human capital and both individual wage rewards and community economic development encourage local efforts to increase the educational levels of the local labor force. Unfortunately, alternatives to enhance local human capital are relatively limited. The community may attempt to attract “high technology” businesses in hopes that such firms would bring highly educated individuals, or the community may enhance its quality of life to more directly encourage these individuals to reside locally. Alternatively, the community may attempt to “grow its own” human capital by improving the quality of local schools with the hope that better schools will result in better educated residents.

The purpose of this study is to determine if local labor force quality is related to local school quality, where school quality is measured at the time the labor force cohort would have been students. The paper is organized as follows. First, we review earlier studies of the relationship between school quality and student achievement and individual work/residential

location decisions. Next we estimate a reduced form system to determine if county labor force quality in 2000 (as reflected in the percentage of 25-35 year olds with college degrees) is correlated with 1980 to 1990 quality measures for the county's public schools (as measured by 8th grade test scores, pupil-teacher ratios, teacher training, teacher salaries, and instructional expenditures per student). Data are for the 46 counties of South Carolina only, and controls are included for other county characteristics that may influence the supply of or demand for college educated residents in the county. Finally, parts four and five summarize the regression results and suggest policy implications.

II. School Quality and Local Human Capital

A direct role for local school quality in enhancing the educational level of the local labor force requires that: (1) schools influence student educational attainment, and (2) the more highly educated students remain in (or return to) the area after attending college. Local school quality may play a more "indirect" role in improving labor force quality if highly educated individuals are attracted to areas with "good" schools.

The influence of school quality on educational attainment is well documented. Card and Krueger (1986, p. 14) concluded that "a majority of studies of which we are aware have found positive and statistically significant effects of smaller class size on educational attainment." In addition, Sander (1993) showed that an increase in average teacher's salary increases student ACT scores and the percentage of students planning to attend college. More recently, Hanushak (2003, p. 161) stated that ". . . a large body of evidence suggests that schools do have an influence on student outcomes." Hanushak qualified his findings by noting that high-quality schools are not necessarily those that have small class sizes or high expenditures per student. Sander's (1993) findings for Illinois public schools supported Hanuschak by showing that

increased spending on education was related to high test scores, if, and only if, the additional expenditures resulted in more and/or better teachers.

The improvement of student outcomes (e.g., high school graduation rates, college entrance test scores, college attendance rates) will not translate into high local labor force quality if native college graduates do not return home. According to Wirtz (2003), the loss of native college graduates occurs if: (1) there are insufficient job opportunities for graduates, (2) there exists a mismatched demand between the worker characteristics local employers need and the fields/skills the graduates offer, or (3) local employers do not offer competitive salaries or benefits. This potential "brain drain" problem is especially critical in rural areas that are perceived as economically disadvantaged and/or low in natural amenities (Nord and Cromartie, 2000; Gottlieb, 2004; Artz, 2003). Gibbs (1999, 2000) argued, however, that in rural areas local schools may play an important role in increasing the number of college graduates in the local labor market. Specifically, Gibbs found that rural counties in the South, on average, kept or regained 40% of their native college attendees. He concluded that "The local generation of college-trained workers, that is, local youth who attend college and then stay in or return to the area, is a primary determinant of the area's overall supply of well-educated labor" (Gibbs, 2000, p. 39).

Gibbs' research was based on the education and migration experiences of over 9000 individuals as reported in the National Longitudinal Survey of Youth (NLSY). The NLSY is a rich source of data on individuals' characteristics, but it provides no detail on the quality of schools attended by the respondents. Thus the NLSY did not permit Gibbs to determine the extent to which local school quality influenced the local generation or retention of college educated residents.

Good schools may also influence local labor quality indirectly by attracting residents and businesses (and their skilled/managerial employees) from outside the community. Barkley, Henry, and Bao (1998) used a Carlino-Mills framework to estimate the relationship between local school quality (as reflected in student-teacher ratios and standardized test scores) and census tract-level population and employment change in nonmetropolitan South Carolina from 1980 to 1990. Research findings indicated that population change in the nonmetro fringe census tracts (tracts within 30 miles of the urbanized area of a metro area), but not employment change, was positively and significantly related to standardized test scores at the local schools. For the more geographically-isolated hinterland census tracts (30 plus miles from metro urbanized area), both population and employment growth were negatively (and significantly) related to local schools'student-to-teacher ratios. Barkley et al. (1998, p. 76) concluded that "quality local schools . . . provided a positive influence on rural growth. This influence was evident primarily in terms of the positive relationship between school quality and population change in both fringe and hinterland tracts." The Barkley et al. study does not, however, differentiate census tract population by educational attainment. Thus, this research cannot determine if the increase in population also resulted in an improvement in labor force quality.

III. Estimation Procedures and Data Sources

The number of individuals with specific characteristics (e.g., age 25-34, college graduate in a local labor market is determined by the interaction of the local labor supply and labor demand conditions. Specifically,

(1) $Q_s^l = f(w, x)$

(2) $Q_d^l = g(w, z)$

where Q_s and Q_d are, respectively, the local quantity of young college graduates supplied and demanded, *w* is the local wage rate, and *x* and *z* are non-wage determinants of local supply (*x)* and demand *(z*).

The reduced form model for the local labor market is

(3) $Q^l = L(x, z)$

Of interest to this study are the determinants of the number of young college graduates in the local labor market. Thus Q^l is defined as percentage of individuals aged 25-34 in 2000 with a college degree or higher in the 46 South Carolina counties. Recent research suggests numerous demand side (*z*) and supply-side (*x*) factors that may influence the quantity of skilled labor in a community. On the demand side, the number of skilled workers in an area was found to be positively related to both the availability of job opportunities with high earnings potential (Gibbs, 1998) and the diversity of employment opportunities for skilled labor (Barkley et al., 1998). Proxy variables selected for the relative number and breadth of job opportunities were, respectively, the percentage of county employment in professional and managerial occupations (ProfEmp00) and a dummy variable for metro county (Metro).

Supply-side determinants of highly educated labor in a county are parents' education levels (Gibbs, 1998); students' perceptions of future job prospects as represented by local industry mix (Stahlman and Johnson, 1994) and anticipated job growth (Bils and Klenow, 2000); access to a four-year college (Gibbs, 2000); and the availability of cultural and natural amenities (Gottlieb, 2004; Florida, 2002; McGranhan, 1999). Variables selected to represent supply-side

influences were the percentage of 1990 county population 35 and older with a college degree (AdultEd90) for parents' education; the percentage of county employment in manufacturing in 1980 (MfgEmp80) for industry mix; the percentage change in county total employment, 1990 to 2000 (EmpCh) for future employment growth; a binary variable (1,0) for the presence of a four-year college in the county (College) for proximity to a college or university; and the USDA index score for natural amenities (Amenities) as the proxy variable for the county-level amenities. The supply of college graduates in a county was hypothesized to be positively related to AdultEd90, EmpCh, College, and Amenities, and negatively related to MfgEmp80.

The supply-side variable of principal interest is the quality of local public schools in the county. Based on earlier research (Card and Krudger, 1996) on the returns to higher education, we selected four input measures of local school quality (student-teacher ratio (Stud/Tea80-90); percentage of school teachers with Masters degrees or higher (MA80-90); mean teacher's salary (Salary80-90); and instructional expenditures per student (ExpStud80-90). The output measure of school quality selected was the mean percentage of county eighth graders that passed the state standardized test (TestScore80-90). All five school quality measures were county averages for the period 1980 to 1990. The 8^{th} graders (14 and 15 year olds) in 1980 would be approximately 35 in 2000 and the 8^{th} graders in 1990 would be about 25 ten years later. Thus, the school quality measures were lagged such that they reflect average local school input and output measures at the time the 25 to 34 year old county residents of 2000 would have been in school. (Of course, the current county 25 to 34 year olds did not have to attend county schools). The 10 to 20 year lag in school quality measures also helped to reduce the endogeniety issue between school quality and the educational levels of the local population. School quality measures reflecting test scores, teachers' salaries, instructional expenditures per student, and teachers with graduate degrees were hypothesized to be positively related to labor force quality. Alternatively,

the mean county student-teacher ratio was predicted to be negatively related to the percent of 25 to 34 year olds with a college degree.

Finally, as noted earlier in Barkley, Henry, and Bao (1998), the current level of school quality may be positively related to local labor force quality if college educated workers were attracted to a county by the opportunity to send their children to "good" schools. In this case, individuals likely selected their residences based on current local school quality rather than the county quality average. Thus, current school quality (SchQual00) was measured as the percentage of students scoring "proficient" or higher on the state 8th grade standardized exam (PACT: Palmetto Achievement Challenge Test) at the county school with the highest score for 2000.[1] These scores are publicized in newspapers, thus it is common knowledge which schools have students that score well. Current school quality (SchQual00) differs from our earlier measure of lagged test scores (TestScore80-90) in terms of timing and content. SchQual00 measures the share of students at the one county school that scored highest in the county on the state standardized test in 2000 (PACT), while TestScore80-90 measures the average share of students at all county schools that met the minimum passing score on the state standardized test (BSAP: Basic Skills and Aptitude) over the period 1980 to 1990.

In summary, the models to be estimated are:

(4) BA2000 = f (ProfEmp00, Metro, EmpCh, AdultEd90, MfgEmp80, College, Amenities, SchQual00, and School Quality Proxy for 1980-90)

where: School Quality Proxies for 1980-90 (to be entered separately) are:

TestScore 80-90
MA80-90
Stud/Tea 80-90
Salary 80-90
Exp/Stud80-90

Table 1 provides an overview of the county characteristics with respect to labor force quality in 2000 (BA2000), school quality in 1980-90 (TestScore 80-90), and county size in 2000 (total employment). The 46 South Carolina counties exhibited marked differences in labor force educational attainment and test scores. The percentage of population 25-34 with college degrees in 2000 ranged from a low of 6.8% in Marion County to a high of 38.2% in Charleston County. The mean percentage of students who passed the 8^{th} grade standardized test ranged from 38.7% in Jasper County to 75.4% in Lexington County. The descriptive statistics for the school quality and county characteristics variables are provided in Tables 2a and 2b.

All explanatory variables were measured at the county level as well as the regional level (defined as the county plus all adjacent counties in the state). The two regional designations were an attempt to determine the appropriate geography for supply and demand influences on county-level labor quality. For example, is a county's labor force quality (BA2000) a function of prior school quality (e.g., TestScores 80-90) in the county or county plus surrounding region? Preliminary analysis of the data indicated that county-level data were better predictors of labor force quality for all explanatory variables except the demand-side variable percentage of employment in professional and managerial occupations (ProfEmp00). Thus, the regression results presented use county-level data for all variables except ProfEmp00.[2]

Finally, an obvious shortcoming of the models to be estimated is that we have only 46 observations if the analysis is restricted to South Carolina. The use of multiple states was ruled out because each state would have unique standardized exams (especially in the 1980s) and a passing score in one state may not be comparable to passing scores in others. In addition, panel data for South Carolina was precluded by the use of a 10-20 year lag between labor quality in 2000 and school quality at the time today's laborers were students (1980-1990). However, we

attempted to mitigate potential problems arising from limited observations through model specification.

IV. Summary of the Findings

Table 3 provides the regression results for the initial specification of our model. The variables reflecting natural amenities (Amenities) and presence of a 4-year college (College) were never statistically significant and they were dropped from the estimations.[3] The remaining variables reflecting county characteristics generally had the hypothesized relationships with labor quality. Labor quality for 25 to 34 year olds was positively and significantly related to the educational attainment of adults (AdultEd90) in 1990, which was consistent with earlier research on the importance of parents' education and the education of adult role models on students' educational achievements. Educational attainment in the county was negatively related to the percent of county employment in manufacturing in 1980 (MfgEmp80). MfgEmp80 was our proxy for employment prospects in the local labor market at the time the current 25-34 year olds were students. Counties with large shares of manufacturing employment provided numerous examples of employment opportunities for individuals without college degrees (and sometimes without high school diplomas). The more examples/opportunities available for non-college educated workers, the greater the incentives not to attend college. On the other hand, current employment opportunities for college graduates (as measured by share of regional employment in professional and managerial occupations in 2000, ProfEmp00) were positively related to the 2000 share of young adults with a college degree. College graduates located in labor markets where there existed a demand for their skills and training. The 2000 share of young adults with a college degree was positively and significantly related to the 2000 measure of local school

quality (SchQual00). These findings reflect the well-documented settlement pattern of college educated individuals selecting the communities with the best schools.

The school quality measures for 1980 to 1990 (the period during which the 25-34 year olds of 2000 were in school) were entered separately into the regression equations (see estimations 1-6 in Table 3). The coefficients of all the proxy variables for local school "inputs," except average teacher's salary (Salary80-90), had the hypothesized signs and were statistically significant. Specifically, the 2000 labor force education levels were positively related to 1980-90 instructional expenditures per student and the proportion of teachers with advanced degrees. Alternatively, high student-teacher ratios in 1980-90 were negatively related to the 2000 share of young adults with college degrees. The 2000 labor force education levels were not significantly related to our local school quality "output" measure (TestScore80-90: proportion of students who passed the standardized test) in equation 1. However, the current school quality measure (SchQual00) and county test scores 10 to 20 years earlier (TestScore80-90) were highly correlated (correlation coefficient equaled .735). The past school quality measure (TestScore80-90) was positively and significantly related to current labor quality after SchQual00 was dropped from the regression (Equation 2). Thus school test scores were positively associated with county labor force quality, however, we could not determine if it was current or past test scores (or both) that were related to higher educated labor in the county.

The measure selected to represent the diversity of employment opportunities in a county (metro) was not statistically significant in the estimations provided in Table 3. South Carolina's metropolitan counties vary greatly in terms of size, ranging in 2000 employment from 290,000 (Greenville) to just 6,500 (Calhoun). To better control for county size differences, we substituted county total employment in 2000 (TotEmp00) for the metro designation in the regression estimations (see Table 4). None of the five 1980-90 school quality measures were

statistically significant after the inclusion of total employment, though all school quality measures had the anticipated signs. The current school quality measure (SchQual00), however, remained positively and significantly related to current labor force quality. The findings in Table 4 reflect the high correlation in South Carolina between county size and school quality measures (refer back to Table 1), thus we were unable to differentiate the influences of current market size and past local school quality.

Another consideration in estimating the school quality – labor force quality relationship is the role of local economic development in encouraging students to further their education. Bils and Klenow (2000) showed that faster economic growth encouraged more schooling because future growth reflected the returns to schooling in terms of prospective jobs and income. We tested the Bils and Klenow hypothesis by substituting the 1990-2000 county employment change (EmpChge) for total county employment in the regression estimations (see Table 5). The coefficients on the EmpChge variable were not significant in any of the six model specifications. Thus, for South Carolina, rapid county employment growth did not contribute to high labor force quality. However, four of the five 1980-90 school quality measures were significantly related to labor force quality after substituting county employment growth rates for total employment in the estimations.

The findings presented in Tables 3, 4, and 5 indicate a strong relationship between current school quality (SchQual00) and the proportion of young adults with college degrees (BA2000). Good schools help attract the college educated to the county, or alternatively, the college educated 25-34 year olds may encourage and support good local schools. The direction of causality was investigated using a two-stage least squares (2SLS) procedure to estimate the system of equations provided in (5) and (6). As before, the share of 25-34 year olds that are college graduates was modeled as a function of the education levels of older adults, share of jobs

in manufacturing, share of jobs in professional and managerial occupations, size of labor market, and current school quality. In addition, current school quality in 2000 was specified as a function of the 2000 share of young adults that are college graduates (BA2000), county median income (MedInc00), and proportion of county students that were nonwhite (Nonwhite00). The results provided in Table 6 support the dual direction of causality hypothesis. In sum, good local schools were an attraction to college educated young adults and the college educated encouraged the improvement of local school quality.

(5) SchQual00 = f (BA2000, MedInc00, Nonwhite00)

(6) BA2000 = f (AdultEd00, MfgEmp80, ProfEmp00, TotEmp00, SchQual00)

V. Conclusions

The findings of this research indicate a correlation between county labor force quality (as measured by the proportion of young adults who are college graduates) and the quality of schools in the county at the time the young adults would have been students (as measured by test scores, pupil-teacher ratios, spending per student, and teachers' experience). The statistical findings for South Carolina counties were not, however, robust enough to determine the role of school quality in improving local labor force quality. School quality over the period 1980 to 1990 also was highly correlated with current county size, as measured by population, thus we could not distinguish the supply-side influences of good schools from the demand-side influences of abundant local job opportunities. In South Carolina, "good" schools were most likely to be found in the more densely populated counties, the same counties that offered numerous employment opportunities for young college graduates. "Good" schools and job opportunities provided reinforcing effects that resulted in a higher proportion of young adults with college degrees.

An unambiguous, and unsurprising, finding of the analysis was that current school quality was significantly correlated with local labor force quality. The well-educated young were attracted to, or were remaining in, counties with good local schools. The relationship between current school quality and labor force education levels remained after controlling for county size and growth rate.

In conclusion, our findings support earlier research on the importance of local public schools in enhancing local labor force quality and improving area economic development potential. Young college graduates were more likely to be found in counties with good schools today as well as good schools at the time these individuals would have been students. Thus, improvements in school quality is a viable local economic development strategy, and current

reductions in school expenditures as a result of state and local budget problems will have long-run implications in terms of reduced economic development potential. From a public policy standpoint, it is not critical to know if “past” good schools or “current” good schools are most strongly correlated to current labor force quality. Either way, the recommended policy for improving local labor force quality is to improve local school quality. Thus, local governments can “pay” now (expenditures on schools) or “pay” later (loss of competitiveness in national economy). The “smarter “ long-run alternative appears to be improving local school quality with the goal of producing, retaining, and attracting more college graduates.

Endnotes

1. School district (as well as individual school) scores on the Palmetto Achievement Challenge Test (PACT) are presented as percent below basic level, percent basic, percent proficient, and percent advanced. The state average for percent proficient or higher (this includes the percent advanced) was 24 percent for 2000.

2. The lack of significant results for regional data also indicates that spatial autocorrelation is not a problem.

3. Our findings should not be interpreted to suggest that amenities or proximity to college have no influence on labor force quality. However, most South Carolina counties had similar high ratings for amenities because of the availability of outdoor recreational opportunities (mountains, forests, lakes, and ocean). Also, many South Carolina counties have four-year colleges. Thus, there may not have been enough variation among counties in the Amenities and College variables to lead to significant influences on county labor quality.

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Table 1. County Labor Force and School Test Score Characteristics, South Carolina

County	% Population 25-34 with B.A. + 2000	Mean % of 8th Graders Passing Standardized Test, 1980-1990	Total Employment, 2000
Charleston	38.2	62.8	248,234
Richland	36.8	60.8	268,356
Greenville	29.5	67.1	291,837
Lexington	29.2	75.4	110,637
Beaufort	24.5	50.8	82,325
Dorchester	22.1	67.2	35,017
Florence	22.1	59.2	80,590
York	21.3	69.0	79,769
Greenwood	21.1	56.3	40,069
Pickens	20.4	71.7	50,344
Kershaw	19.8	67.4	24,462
Horry	19.7	66.6	129,097
Aiken	19.3	63.8	75,734
Spartanburg	19.1	65.2	150,117
Oconee	17.9	65.3	32,507
Anderson	17.3	67.8	83,717
Orangeburg	17.1	51.0	44,990
Georgetown	16.8	57.9	30,148
Berkeley	16.4	64.6	44,888
Sumter	16.3	53.0	56,755
Calhoun	15.8	46.7	6,524
Darlington	15.5	53.1	29,469
Colleton	14.8	54.9	15,607
Bamberg	14.8	53.2	7,148
Saluda	14.5	63.6	6,943
Abbeville	13.1	59.1	12,587
Newberry	13.0	62.0	16,838
Barnwell	12.9	59.7	11,190
Clarendon	12.9	54.0	11,776
Chester	11.5	49.7	16,089
Williamsburg	11.1	45.1	12,853
Edgefield	10.8	60.7	8,366
Fairfield	10.7	43.6	9,729
Hampton	10.3	50.1	8,439
Jasper	10.3	38.9	7,041
Laurens	10.0	60.1	26,867
Union	9.9	68.9	13,058
Lancaster	9.5	57.8	25,486
Chesterfield	9.3	56.9	20,686
Lee	9.3	44.1	6,388
McCormick	9.2	51.2	3,212
Cherokee	9.2	51.5	25,951
Marlboro	9.0	43.9	10,214
Dillon	8.7	52.4	12,938
Allendale	7.7	50.5	5,112
Marion	6.8	53.7	14,578

Table 2a. Descriptive Statistics for County Characteristics' Variables

Variable Name	Variable Description	Minimum	Maximum	Mean	Standard Deviation
BA2000	% county population, 25-34, with B.A. or higher, 2000	6.82	38.25	16.00	7.19
AdultEd90	% county population 35+ with B.A. or higher, 1990	4.95	28.85	12.74	4.90
SomeCol	% county population, 25-34 with some college, 2000	29.9	68.2	44.51	10.07
MfgEmp80	% County employment in manufacturing, 1980	2.85	53.15	31.03	12.30
ProfEmp00	% regional employment in professional and managerial occupations, 2000[a]	19.36	29.85	23.30	2.53
Amenities	USDA score for natural amenities in county[b]	-1.11	3.55	.32	.96
TotEmp00	Total county employment, 2000	3,212	291,837	50,102	68,023
EmpChg	% change in total county employment, 1990-2000	86.94	146.69	117.29	13.16
College	Dummy variable for 4-year college in county	0	1	.33	.47
Metro	Dummy variable for county in metropolitan area in 2000	0		.35	.48

[a] The region was defined as the county plus all adjacent South Carolina counties.
[b] Source: McGranahan, 1999.

Table 2b. Descriptive Statistics for County School Quality Variables

Variable Name	Variable Description	Minimum	Maximum	Mean	Standard Deviation
SchQual00	% students scoring advanced or better on standardized test, at highest scoring school in county, 2000	2.10	58.20	24.06	13.47
TestScore 80-90	Mean percentage of county 8th graders that passed standardized test, 1980-1990	38.88	75.39	57.57	8.45
MA80-90	Mean county percentage of public school teachers with M.A. or higher, 1980-1990	25.06	54.86	37.54	7.86
Stud/Tea80-90	Mean county student-teacher ratio, 1980-1990	15.86	21.11	17.92	.91
Exp/Stud80-90	Mean county instructional expenditures per student, 1980-1990 ($)	1,285	1,840	1,449	97.79
Salary80-90	Mean county teacher's salary, 1980-1990 ($)	18,462	22,331	20,115	1,057

Table 3. Regression Results A: Dependent Variable is Percent of Population, 25-34 Years Old, with College Degree or Higher, 2000

Variable	*Coefficients (t values in parentheses)*					
	1	*2*	*3*	*4*	*5*	*6*
Intercept	-5.42 (-.98)	-10.82 (-2.14)	-3.97 (-.90)	24.89 (2.22)	-15.95 (-1.91)	-14.67 (-1.23)
AdultEd90	.75 (5.07)	.91 (6.98)	.62 (3.96)	.63 (4.35)	.60 (3.70)	.66 (4.02)
MfgEmp80	-.12 (-2.47)	-.11 (-2.45)	-.14 (-3.02)	-.12 (-3.00)	-.11 (-2.61)	-.12 (-2.58)
ProfEmp00	.32 (1.65)	.37 (1.84)	.27 (1.43)	.32 (1.80)	.32 (1.70)	.37 (1.89)
Metro	.35 (.26)	1.37 (1.04)	-.32 (-23)	1.17 (.94)	.49 (.38)	.18 (.13)
SchQual00	.15 (2.06)		.19 (3.15)	.24 (3.89)	.24 (3.50)	.18 (2.87)
TestScore80-90	.07 (.81)	.17 (2.09)				
MA80-90			.15 (1.89)			
Stud/Tea80-90				-1.50 (-2.66)		
Exp/Stud80-90					.01 (1.85)	
Salary80-90						.66 (1.07)
R^2	.85	.83	.86	.87	.86	.85
F	35.54	38.68	38.63	42.33	38.45	36.04

Table 4. Regression Results B: Dependent Variable is Percent of Population, 25-34 Years Old, with Some College, 2000

Variable	*Coefficients (t values in parentheses)*					
	1	*2*	*3*	*4*	*5*	*6*
Intercept	-6.11 (-1.40)	-8.40 (-2.26)	-3.80 (-1.04)	10.36 (1.05)	-11.20 (-1.63)	-8.58 (-.91)
AdultEd90	.56 (4.52)	.60 (5.28)	.52 (4.00)	.51 (4.11)	.48 (3.54)	.52 (3.88)
MfgEmp80	-.08 (-2.23)	-.08 (-2.28)	-.08 (-2.13)	-.08 (-2.33)	-.07 (-2.15)	-.08 (-1.99)
ProfEmp00	.41 (2.67)	.44 (2.84)	.40 (2.54)	.41 (2.69)	.41 (2.69)	.44 (2.82)
TotEmp00	.04 (4.82)	.04 (5.54)	.04 (4.28)	.04 (4.13)	.04 (4.49)	.04 (4.59)
SchQual00	.06 (1.00)		.10 (2.11)	.14 (2.59)	.13 (2.50)	.09 (1.99)
TestScore80-90	.08 (1.14)	.12 (2.15)				
MA80-90			.06 (.88)			
Stud/Tea80-90				-.74 (-1.49)		
Exp/Stud80-90					.01 (1.33)	
Salary80-90						.29 (.60)
R^2	.90	.90	.90	.91	.90	.90
F	60.46	72.36	59.71	62.12	61.38	59.03

Table 5. Regression Results C: Dependent Variable is Percent of Population, 25-34 Years Old, with Some College, 2000

Variable	*Coefficients (t values in parentheses)*					
	1	*2*	*3*	*4*	*5*	*6*
Intercept	-2.21 (-.31)	-8.79 (-1.30)	1.25 (.19)	30.33 (2.34)	-12.73 (-1.46)	-12.54 (-1.02)
AdultEd90	.76 (5.15)	.95 (7.31)	.63 (4.15)	.64 (4.42)	.59 (3.68)	.67 (4.11)
MfgEmp80	-.13 (-2.71)	-.14 (-2.90)	-.15 (-3.29)	-.13 (-3.27)	-.12 (-2.94)	-.13 (-2.78)
ProfEmp00	.29 (1.48)	.33 (1.62)	.24 (1.24)	.28 (1.57)	.27 (1.47)	.34 (1.79)
EmpChge	-.03 (-.76)	-.03 (-.80)	-.04 (-1.07)	-.04 (-1.04)	-.05 (-1.16)	-.02 (-.60)
SchQual00	.15 (2.29)		.19 (3.82)	.28 (4.94)	.27 (4.53)	.19 (3.55)
TestScore80-90	.10 (1.07)	.23 (3.12)				
MA80-90			.16 (2.17)			
Stud/Tea80-90				-1.52 (-2.69)		
Exp/Stud80-90					.02 (2.16)	
Salary80-90						.71 (1.20)
R^2	.85	.83	.86	.87	.86	.85
F	36.09	38.19	39.88	42.57	39.84	36.41

Table 6. Two-Stage Least Squares Estimation Results, 2000

Variable	*Coefficients (t values in parentheses)*	
	BA2000	*SchQual00*
Intercept	-2.44 (-.63)	16.39 (1.47)
AdultEd90	.50 (3.48)	
MfgEmp80	-.07 (-2.06)	
ProfEmp00	.39 (2.40)	
TotEmp00	.04 (3.76)	
SchQual00	.14 (1.84)	
BA2000		1.25 (5.70)
MedInc00		.00 (.00)
Nonwhite00		-.25 (-3.96)
R^2	.90	.78
F	70.21	48.86