

Community Colleges and Local Economic Development: A Quasi Experimental Control Group Analysis

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Abstract: Community colleges are an important and growing segment of the U.S. higher education market. However, few ex post studies of their local economic development impacts exist. This paper presents a quasi-experimental control group analysis of a group of twenty-one counties where community colleges were established during the 1970s and 1980s. It shows that community college counties have a stimulating effect on state and local government employment and that counties with community colleges grew faster than counties without them. However, it does not confirm the existence of more widespread industrial impacts.

Keywords: economic development, economic impact

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1. Introduction

Community colleges are an important and growing segment of the U.S. higher education market. Increasing from 19 in 1915 to 1,077 in 1998, they number more than 1,100 today (Cohen & Brawer, 2003). Still, they remain a somewhat misunderstood and understudied area within the social sciences generally (Cohen & Brawer, 2003) and economics specifically (Kane & Rouse, 1999). Although educational resources and an educated workforce are key factors in regional growth and development (Rauch, 1993; Carlino, 1993; Varga, 1998; Shapiro, 2003) and post-secondary education is recognized as key part of this equation (Mathur 1999; Bartik 2004), the bulk of research focuses on four year colleges and universities, particularly research level universities, and/or the benefits that accrue from obtaining a baccalaureate degree (Goldstein & Drucker, 2006; Moretti, 2004; Varga, 1998; Harris, 1997; Florax, 1992).

There are good reasons to focus more attention on the local and regional economic impacts of community colleges. First, they serve a large number of undergraduate students, including approximately 44% of total undergraduate students and 54% of all public undergraduate students. Second, community colleges are an important gateway to education for many first-generation, minority, and working-age adults and provide opportunities for social mobility that might not otherwise exist (Wilson 2004). Third, associate degree level education, while less beneficial than a baccalaureate degree, offers an attractive private rate of return (Grubb, 2002a; Grubb, 2002b). Fourth, there are significant projected gaps in workforce readiness for future jobs, and the fastest growing occupations are in those semi-professional fields requiring associate degrees and

certificates in fields such as health vocations (U.S. Department of Labor, 2002). These shortages may be more acute in some areas because of significant regional disparities among U.S. counties in the availability of associate degree level educated residents (see Figure 1) and gaps in the community college geographic grid (Rephann, 2006). Fourth, community colleges are important economic development resources for their communities, particularly rural areas that have deficits of “intellectual capital” (Young, 1997).

This paper is concerned with estimating the economic growth effects of community colleges. For the purposes of this paper, a community college is defined as any public educational institution identified as a public two-year institution by the U.S. Department of Education.¹ There are other sectors of the sub-baccalaureate educational market including private junior colleges and technical schools that offer one year certificates and associate degrees. Moreover, some four year colleges and universities offer sub-baccalaureate degree opportunities along with higher degree offerings at their main campuses and branch locations. Each of these kinds of institutions, however, is excluded from the analysis reported here because they play somewhat different roles in higher education and their communities than community colleges.

The paper is divided into several sections. The second (next) section reviews literature concerned with the local economic impacts of community colleges. The third section discusses the quasi-experimental control group method and data sources used for this study. The fourth section provides an analysis of the economic impacts of a group of twenty-one counties where community colleges were established during the 1970s and 1980s. The paper concludes with a summary and conclusion.

2. Community Colleges and Economic Development

Colleges and universities, particularly research level universities, often serve as regional economic catalysts. There is evidence that colleges and universities affect regional development through a variety of channels, including: (1) direct and indirect economic impacts through college expenditures (Florax, 1992; Harris, 1997); (2) improvements to the productivity and earning capacity of graduates who remain in the area (Bartik, 2004), (3) improvement of local innovative capacity and technology transfer (Varga, 1998; Bartik, 2004), (4) stimulation of local entrepreneurship and business spin offs (Bartik, 2004), and (5) enhanced quality of life and or improved social capital (Shapiro, 2003).

Any assessment of the likely economic impacts of community colleges must recognize that many of the elements of research universities are missing. Community colleges are typically much smaller than four year colleges and universities and have smaller budgets both because of lower overhead and personnel costs and the preponderance of part-time students. They are teaching institutions and do not engage in the kinds of specialty research made possible by graduate and professional programs, large endowments, and professional grantsmanship. For this reason, they are unlikely to result in the kinds of research and development business spin offs found at universities. Community college involvement in technology transfer is also generally much less than public four year colleges and universities. Whereas land grant universities host Cooperative Extension Services, there is no counterpart at community colleges, although some community colleges do conduct outreach activities and offer technology transfer

services. The wage and salary benefits of associate degree level education are also lower. While community college associate degrees have a favorable private rate of return, they are lower than bachelor degrees (Surette, 1997; Kane & Rouse, 1999; Grubb, 2002a; 2002b). In addition, some questions have been raised about the effect of community college attendance on lifelong educational achievement and earning if obtaining a bachelor's degree is the student's ultimate goal. For instance, Monk-Turner (1994) finds that they baccalaureate degree completers who begin at community colleges earn less than those who start their educational careers at four year colleges. For these reasons, one would, all else the same, expect community colleges to have fewer linkages with the local economy and fewer local economic impacts.

The primary advantage of community colleges is in providing educational access to local residents. They are able to provide geographical and financial access to higher education to residents who would otherwise be unable to undertake study. Evidence suggests that geographic access is an important determinant of college attendance (Jones & Kauffman, 1994; Sá, Florax, & Rietveld, 2004, Rephann, 2002; Frenette, 2006). Residents located further away from technical schools, colleges and universities are less likely to matriculate than those who are closer. Also, community colleges can offer community economic development leadership in settings which have "few resources exist for promoting economic development" (Young, 1997). While community colleges are not a significant source of research and development activities, there are successful community college models of involvement in extension activities such as technology transfer and entrepreneurship training (Liston & Swanson, 2001; Rosenfeld, 2001) that rival programs found at universities. Moreover, community colleges have a good

reputation for offering specialized business services such as contract training, small business training, and business financing services.

There have been a handful of attempts to measure the contribution that community colleges make to regional growth and development in the last several years. Efforts range from simple before and after studies of student and graduate wage and salary data (Gracie, 1998; Sanchez & Laanan, 1997) to relatively basic quasi-experimental studies of economic impact (Pennington, Pittman, & Casey 2001). One Idaho-based research firm, ccBenefits (<http://www.ccbenefits.com>), has developed a full-time consulting business by generating community college economic impact studies—over four hundred have been conducted so far using input-output and social cost-benefit methodologies which quantify the multiplier effects of college expenditures, improved productivity/wages of the local workforce, and various quantifiable non-market benefits that derive from reduced crime and improved health (Christophersen & Robison, 2003). Compared to the breadth and quality of research conducted on the economic impacts of colleges and universities, however, the results are relatively meager and do not offer conclusive results or identify patterns that are easy to generalize.

3. Quasi-experimental Control Group Method

Quasi-experimental control group methods have been used repeatedly in the geographical and regional science literature, including Isserman and Merrifield (1982, 1987), Rephann and Isserman (1994) and Isserman and Rephann (1995) to measure the effects of local economic development investments and policies. The method uses a control group of counties that is selected to resemble the counties which receive a

particular policy stimulus. In the case of community colleges, the stimulus is the establishment of a community college. The control group serves as a baseline for measuring the effects of the treatment.

For this application, a treatment or study group was selected with the assistance of the Integrated Postsecondary Educational Data System or IPEDS for short (U.S. Department of Education, 2003).² The file contains information on every public and private one year, two year, and four year college and university in the United States, including enrollment and location (here for fall 2001). The data are compiled from individual reports submitted to the Department of Education by higher education providers. The reports are mandated in order for institutions to qualify for title IV student financial aid programs, but, many non-title IV institutions respond to the survey as well. IPEDS data has been shown to be more accurate than a leading proprietary source of higher education data (Jackson et al., 2005). Because the year that each college was established is not part of the IPEDS data set, this information was obtained from the Higher Education Directory (2004).

A group of study counties³ was selected using several criteria. First, the county had to have a community college that was established during the period 1973-1989.⁴ This condition was imposed in order to be able to an income and employment series described below which is available for the period 1969-2000. Since most community colleges were built in the 1960s, this severely constrained the list of county candidates. Second, each community college had to have an enrollment of 300 or more. Third, each county could have no other higher education institutions within its boundaries. These criteria resulted in the list of twenty-one counties described in table 1.

In an effort to construct a control group with similar growth dynamics to this treatment group, it is important to control for various potential causes of growth disparities. For this study, the control variables selected were informed by various theories of regional economic growth, including reduced form equations of regional economic growth used by Richardson (1973) and von Böventer (1975). These theories highlight the influence of spatial context, prior economic growth, the cost of labor and capital, and industrial structure in regional economic growth. Variables that attempt to measure these factors are listed in table 2. They are used as selection variables in choosing the control group.

Control counties meet four conditions. First, they contain no higher education institutions of any kind, be it four year, two year, or one year, public or private. Second, they must be located at least 60 miles away from a treatment county with a college in order to protect against spatial interdependencies. Third, they have no suppressed data for variables used in the control group selection process. Fourth, they are similar to the community college counties in terms of the control group selection variables. A similarity index based on the Mahalanobis metric is computed for each potential treatment-control match. Unique control county matches for each community college county are then assigned using a network flow optimization procedure to maximize the fit of the group taken as a whole. Table 3 contains the list of control counties selected in this manner.

After a control group has been selected, an additional evaluative check of the fit of the control group is made by examining the results of a statistical pretest using a conventional difference of means t-test. In the pretest, the growth rate of the community

college counties as a group is compared to the control group in the period (1969-70) before the community colleges are established and before any construction was likely to have commenced.

Economic impacts are measured using personal income and employment data obtained from the Regional Economic Information System (REIS) (U.S. Department of Commerce, Bureau of Economic Analysis, 2005). Since the Bureau of Economic Analysis changed its industrial classification system from the Standard Industrial Classification (SIC) to the North American Industrial Classification System (NAICS) in the past five years, a continuous data series that includes more recent years (2001-2004) is not available. However, the older series which has data for the period 1969-2000 is adequate for making inferences about the impact of community colleges constructed during the 1970s and 1980s. The REIS data measures employment and earnings at the sectoral level and include industries such as services, retail trade, and state and local government. In addition, the REIS personal income series contains data for population, per capita income, residential adjustment (a measure of net earnings leakages paid to nonresidents), transfer payments, and dividends, interest, and rent.

Cumulative growth rate differences by sector serve as the basis for impact measurement. Growth rates were calculated with respect to the base year of 1969. The period 1970-2000 is broken into two periods for analysis. 1970 serves as a pretest period during which one can verify that the counties followed similar growth trajectories. The years thereafter are used to assess the impacts of the community colleges.

4. The Effects of Community Colleges on Local Growth and Development

A pre-test shows no statistically significant discrepancy between the treatment group and control group for personal income or employment sectors examined here (see table 3). Therefore, subsequent growth rate differentials can plausibly be attributed to the community colleges.

Results for the entire study period are presented in Figures 1 and 2 for selected economic and demographic variables. Statistically significant years for each sector are identified in the legend. The results show some rather dramatic differences in employment growth rates for construction, services, and state and local government. However, only the state and local government differences are statistically significant by the end of the study period. This finding is not altogether surprising since public college employee earnings and employment would be assigned to this sector. Population grows about 10 percent faster and per capita income is 25 percent larger but neither result is statistically significant. Moreover, none of the earning categories that are not pictured were statistically significant.

Altogether the findings are suggestive but not conclusive that community colleges provide an economic stimulus to counties where they are established. However, these colleges do provide a clear boost to the state and local employment sector. The lack of more widespread statistically significant results, perhaps caused in part by the relatively small size of the study sample, the staggered dates of opening, or the genuine absence of more far reaching economic impacts, prevents more definitive conclusions.

5. Summary and Conclusion

For counties without easy access to other educational institutions, the community college can, theoretically at least, serve an important role as an economic development catalyst, not only by providing an injection of local expenditures and educating the local workforce but by serving as an information clearinghouse between government and business, stimulating business startups, and helping to facilitate community planning in areas with fewer “intellectual resources.”

A quasi-experimental control group study of twenty-one counties that established community colleges during the period 1973-1989 showed that community colleges stimulate the state and local employment sector. It also shows that community college counties generally outpace control counties in other important sectors, including per capita income, population, and total employment, and total personal income. The lack of more widespread statistically significant results may reflect the relatively small size of the study sample or the actual absence of definitive more widespread economic effects.

One potential extension of this paper would be to extend the use of this quasi-experimental control group method to other segments of the higher education market, including research-level universities, to provide impact benchmarks against which to compare these community colleges impacts.

Notes

¹ This definition will exclude some colleges that offer baccalaureate in combination with associate degrees but self-identify themselves as community colleges. A growing number of community colleges are beginning to offer four year degrees (Fliegler, 2006).

² One might raise several objections with using IPEDS data. First, it sometimes excludes information about branch campuses, never includes information about other remote sites where courses could be offered, and neglects to consider the role of distance learning opportunities through television and the Internet. This limitation is likely to be less restrictive for community colleges than college/universities where branch campuses frequently cross county boundaries. Furthermore, the purpose of this analysis is to assess the effects of institutions which offer the full range of community college services. Branch campuses are often scaled down versions that offer only a small subset of the program opportunities available at the main campus and lack support services. Indeed, the rationale for branch campuses is often to offer basic level coursework and feed students into the main campus for more specialized programs.

³ The analysis uses all 3,141 counties, parishes, independent cities, boroughs and other county-equivalents contained in the 2000 U.S. Census. The reason for using these units is mainly practical rather than conceptual. Main campus or host counties will admittedly not represent the entire market area of most community colleges but they generate the bulk of enrollment for most institutions. For instance, in the state of Maryland, which has

three institutions with multi-county service regions, approximately 80% of statewide enrollment is derived from enrollment in counties where the main community college campus is located.

⁴ Community colleges were assigned to counties by using the IPEDS institutional address zip codes and a commercial zip code product which relates zip codes to county fipscodes (Ziplist5, 2004).

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Figure 1. Percent of residents 25 years or older with Associate's degree

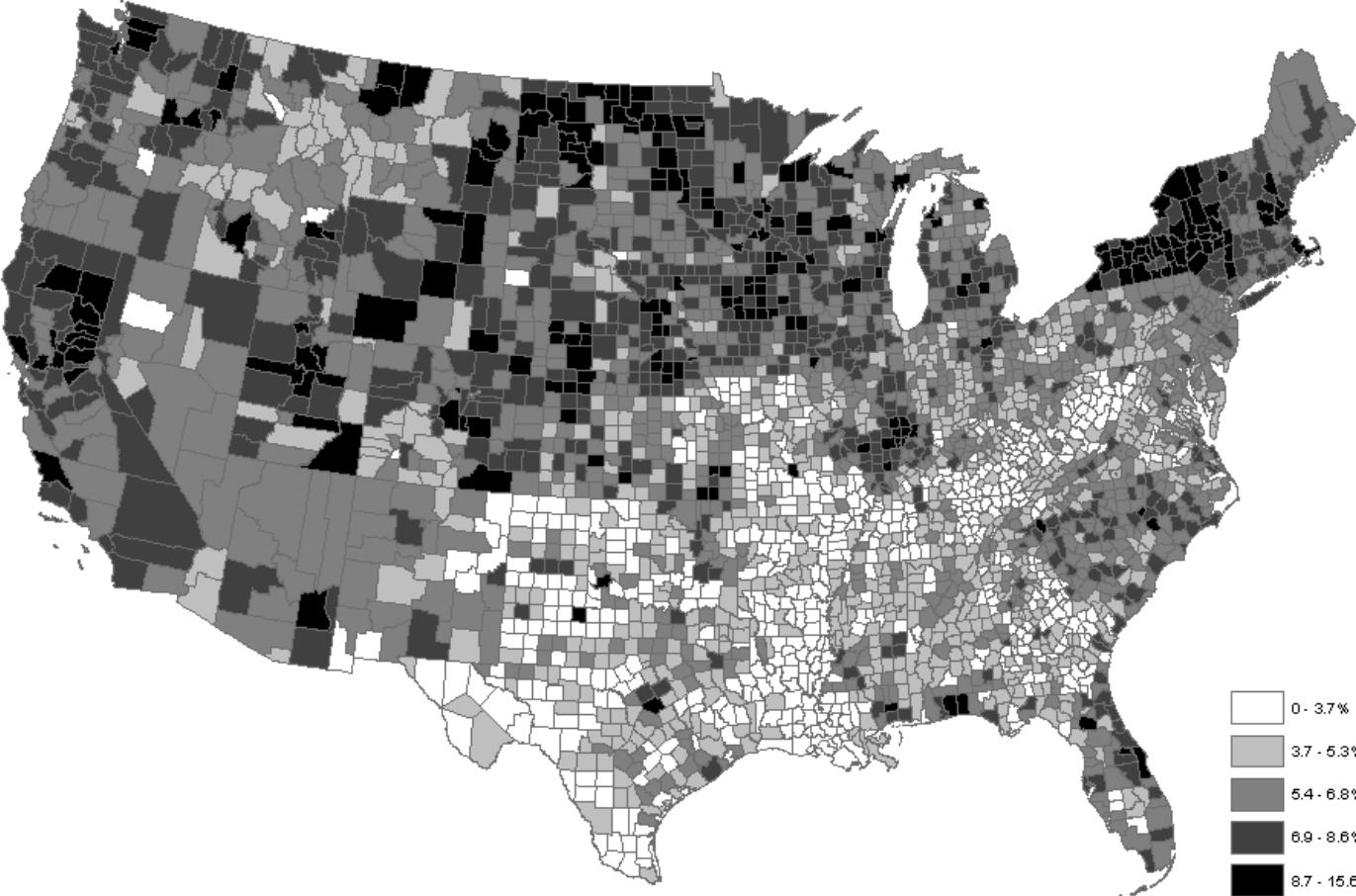


Figure 2. Employment Mean Growth Rate Differences

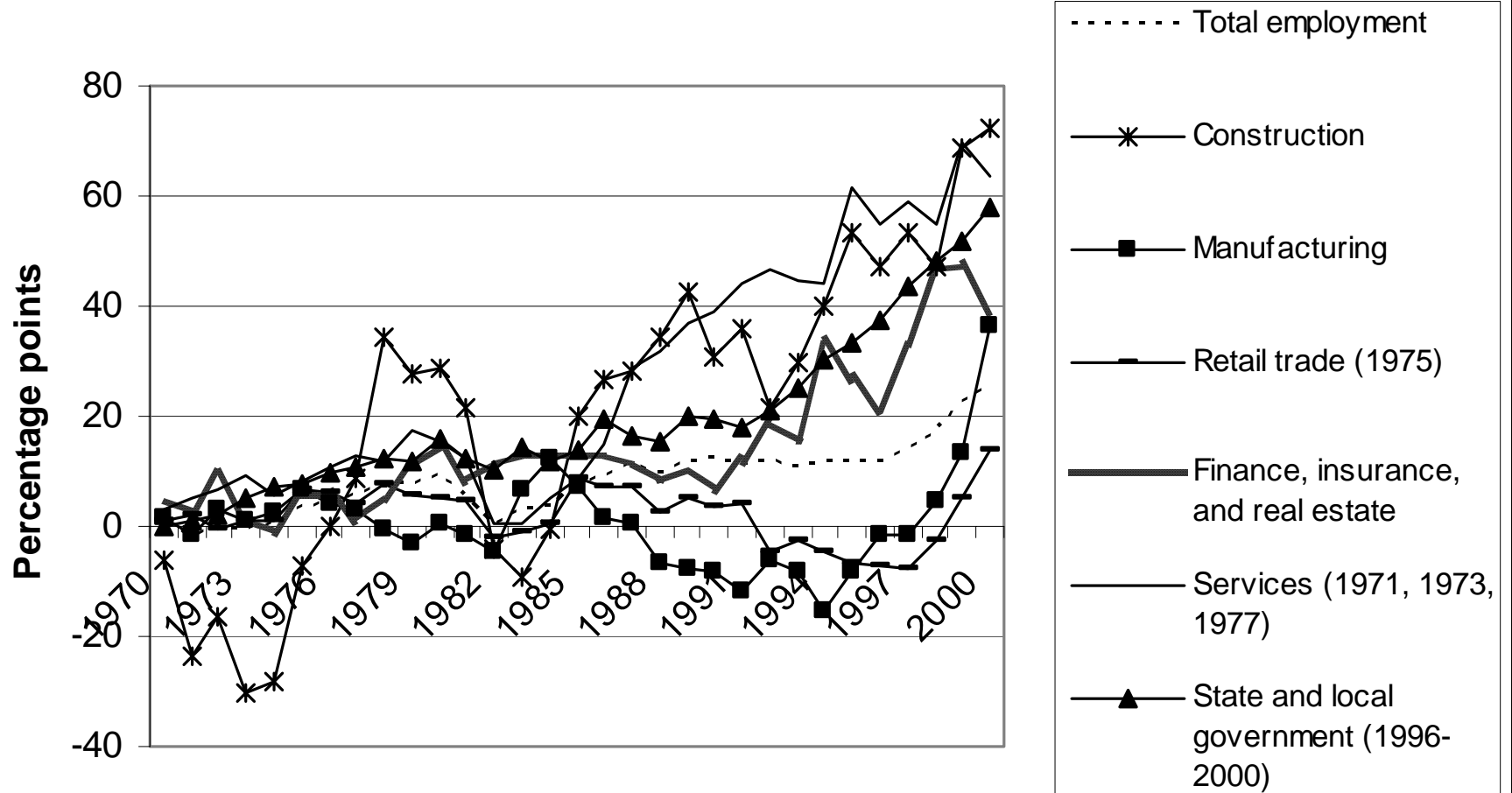


Figure 3. Total Employment, Population, and Per Capita Income Mean Growth Differences

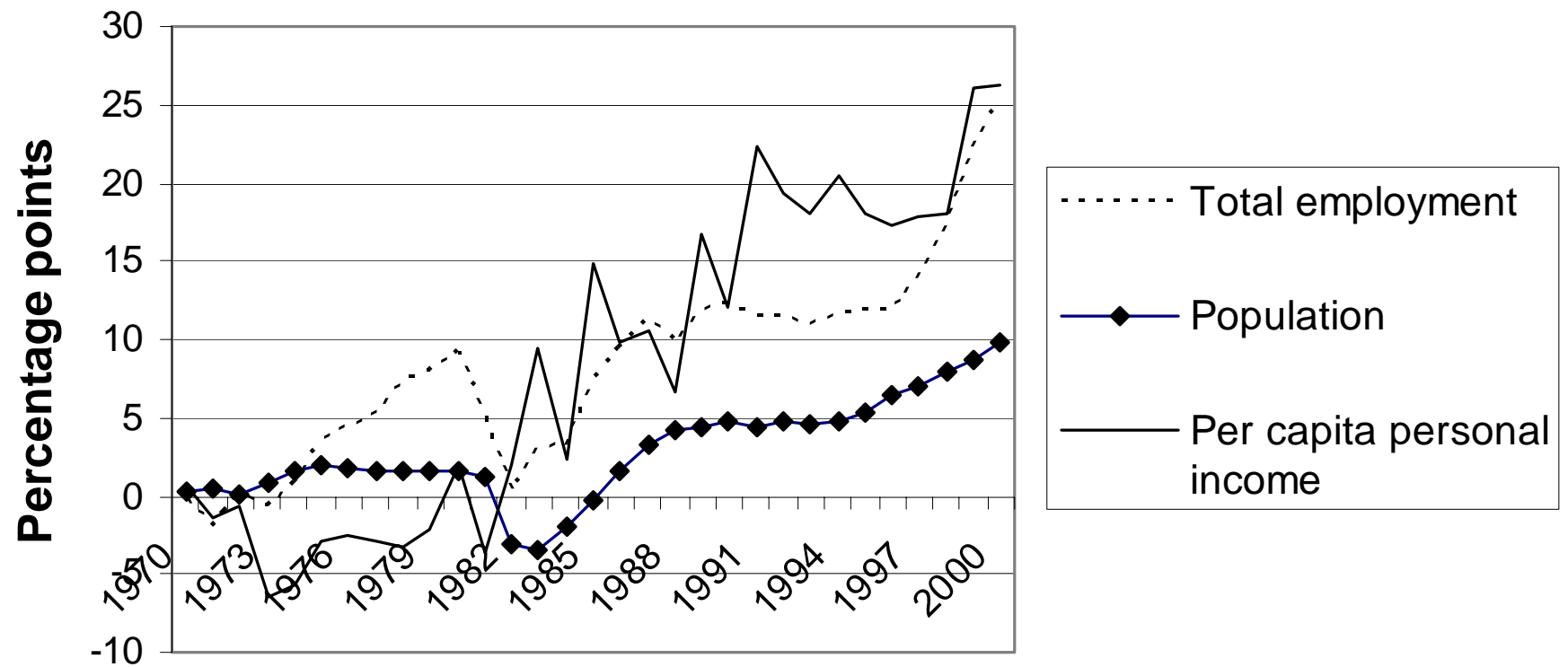


Table 1. Community College Study Counties

Institution	County/Parish	State	Year	Enrollment	County/Parish	State
Chattahoochee Valley Community College	Russell	AL	1973	1,889	Catoosa	GA
Northland Pioneer College	Navajo	AZ	1973	5,084	Montrose	CO
North Arkansas College	Boone	AR	1974	1,889	Shenandoah	VA
Lake Tahoe Community College	El Dorado	CA	1975	3,305	Sutter	CA
Mendocino College	Mendocino	CA	1973	5,016	Tehama	CA
Heart of Georgia Technical College	Laurens	GA	1984	1,307	Elbert	GA
Southeastern Technical College	Toombs	GA	1989	1,278	Crisp	GA
Altamaha Technical College	Wayne	GA	1989	1,284	Hampton	SC
Frontier Community College	Wayne	IL	1976	1,913	Fulton	IN
Louisiana Technical College-Tallulah Campus	Madison	LA	1977	430	Chicot	AR
Louisiana Technical College-Lamar Salter Campus	Vernon	LA	1978	341	Dale	AL
Fond du Lac Tribal and Community College	Carlton	MN	1987	1,023	Roseau	MN
Minnesota West Community and Technical College	Yellow Medicine	MN	1985	3,155	Watonwan	MN
Sussex County Community College	Sussex	NJ	1982	2,481	Calvert	MD
Mesalands Community College	Quay	NM	1980	474	Sevier	UT
University of New Mexico-Valencia County Branch	Valencia	NM	1981	1,466	Fayette	OH
Brunswick Community College	Brunswick	NC	1979	978	Putnam	WV
Southern State Community College	Highland	OH	1975	2,038	Decatur	IN
Collin County Community College-Central Park	Collin	TX	1985	14,497	Montgomery	TX
Northeast Texas Community College	Titus	TX	1984	2,212	Marion	MS
Lac Courte Preilles Ojibwa Community College	Sawyer	WI	1982	516	Benton	MO

Table 2. Variables used in selecting control-group counties

Industrial structure

Farm earnings as share of total personal income, 1970
Mining earnings as share of total personal income, 1970
`Manufacturing earnings as share of total person income, 1970
Federal government, civilian earnings as share of total personal income, 1970
Federal government, military earnings as share of total personal income, 1970
State and local government earnings per capita, 1970

Population, demand and spatial aspects

Log of population (based 10), 1970
Log of population potential for counties within 60 miles, 1970
Log of population potential for counties within 60-500 miles, 1970
Residential-adjustment income as share of total personal income, 1970
Transfer-payments income as share of total personal income, 1970
Dividends, interest, and rent income as share of total personal income, 1970
Per capita personal income, 1970
Population density, 1970
Distance to city with 25,000 or more residents, 1970
Distance to city with 100,000 or more residents, 1970
Distance to city with 250,000 or more residents, 1970
Distance to city with 500,000 or more residents, 1970
Distance to city with 1,000,000 or more residents, 1970

Growth

Total person income growth rate, 1969-70
Population growth rate, 1969-70

Table 3. Pre-test results

Sector	% change
Total employment	-0.037
Wage and salary employment	-0.021
Proprietors employment	0.752
Farm proprietors employment	-0.264
Nonfarm proprietors employment	1.453
Farm employment	-0.517
Non-farm employment	0.162
Private employment	1.148
Agricultural services, forestry, and other	0.129
Mining employment	3.569
Construction employment	-6.194
Manufacturing employment	1.476
Transportation and public utilities employment	10.341
Wholesale trade employment	-5.579
Retail trade employment	0.991
Finance, insurance, and real estate employment	4.611
Services employment	2.821
Federal, civilian employment	-1.336
Military employment	-0.112
State and local government employment	0.237
Total personal income	0.982
Population	0.261
Per capita personal income	0.648