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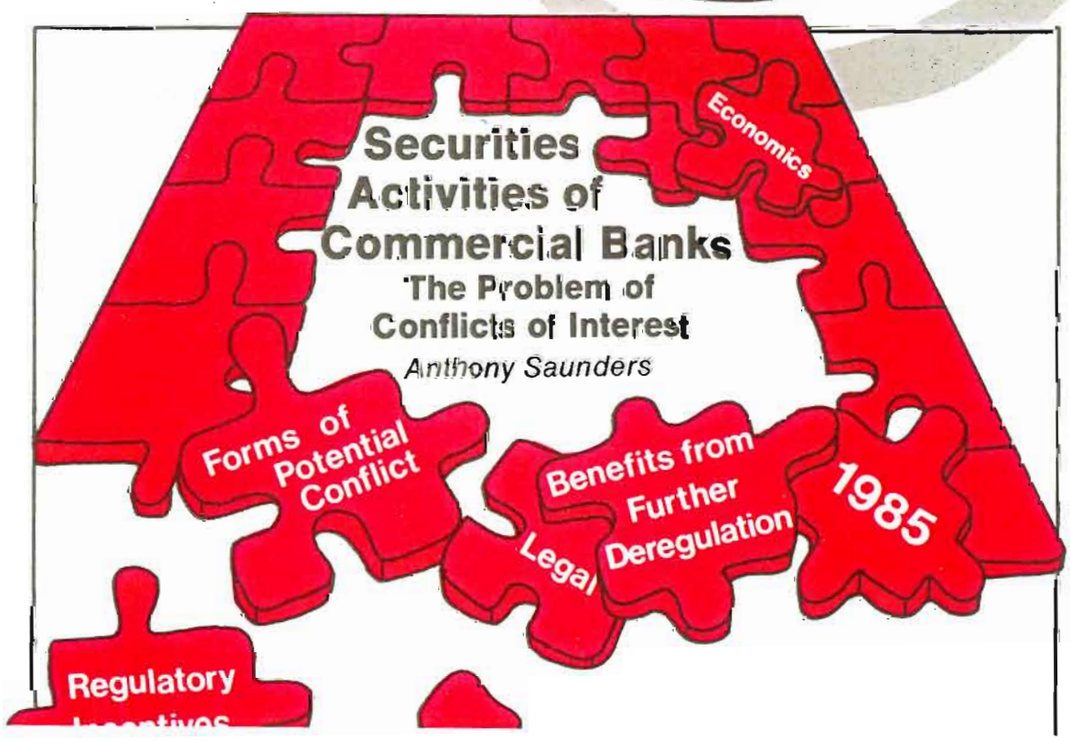

BUSINESS REVIEW

Federal Reserve Bank of Philadelphia
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In the 1970s, new growth patterns emerged over all kinds of regions in the U.S. Population and employment grew fast in the South and West, and in suburbs and rural areas, but grew slowly or declined in other regions and in many cities. An analysis of these changes at the county level indicates that population and employment interact strongly to affect growth. Public policies, such as Industrial Development Bonds or right-to-work laws, however, appear to have small or even insignificant effects on county growth.

As part of the trend toward bank deregulation, banks are lobbying for permission to underwrite corporate securities — an activity expressly prohibited since the 1930s. But regulators maintain both old and new concerns about potential conflicts of interest if banks engage in this activity. Over the course of the litigation, the identification of several issues will be central: forms of potential conflicts; legal, economic, and regulatory incentives *not* to exploit conflicts; and benefits from further deregulation.

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Do Public Policies Affect County Growth?

*Gerald Carlino and Edwin S. Mills**

INTRODUCTION

Between 1970 and 1980, people and jobs moved in unprecedented numbers from the Eastern, Northeastern and North Central regions to the Southeastern, Western and Rocky Mountain regions of the country. For example, in that period, population shrank 13.4 percent in Philadelphia County and employment fell by 18.2 percent, while in Dade County (containing Miami) Florida, population grew by 28.2 percent and employment increased by 29.6 percent. Comparisons as dramatic as these could be matched or exceeded for many other places in the country. In addition to this "frostbelt-to-sunbelt" movement, the 1970s witnessed a new trend where people and manufacturing jobs moved from metropolitan to more rural counties. This "rural revival" reinforced the ill effects that suburbanization of households and firms continued to place on central cities, especially large older ones.

To what extent have public policies influenced these movements of people and jobs? Differences in regional growth rates are commonly attributed to differences in the costs of doing business and

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the costs of living, such as differences in local taxes. But regions also differ in terms of their benefits, such as good schools and neighborhoods. Public policymakers can and do influence many of these costs and benefits. Municipal governments control local taxes which influence the quality of schools and the level of crime control. And certain state and even federal government policies have local effects. Industrial Development Bonds (IDBs), as well as right-to-work laws, which may influence the degree of unionization, are avenues for state government influence. The interstate highway network, a federal program, may also contribute to the redistribution of people and jobs among regions. Whether controllable at the local, state, or national government levels, these factors can be referred to broadly as policy variables.

Economic theory generally supports the commonly held view that differences in costs and benefits, including those fostered by public policies, are important in accounting for differences in regional growth rates. Theory, however, also points to complexities in the way these costs and benefits interact. And theory alone cannot reveal the size of their effects. Therefore, an empirical analysis is required to sort out the degrees of the effects of public policies on population and employment movements. The results of such an analysis show that, during the 1970s, variables subject to control or influence by governments had only minimal, if any, effects on population and total employment growth. In addition, these variables did not significantly affect manufacturing employment. These findings help shed some light on issues raised in other studies that take somewhat narrower approaches to analyzing differences in regional growth.

BROADENING THE FOCUS OF STUDIES OF REGIONAL GROWTH

If differences in regional growth were simply and directly attributable to differences in regions' costs and benefits for people and firms, then a comparison among regions would be straightforward. But where does such a simple comparison lead? Consider, for example, the data for the South, a booming region (see Table 1). In the 1970s, wage rates, per capita taxes, percent of the labor force that was unionized, and crime rates were all substantially lower in the South than in other major regions of the U.S. But the West has also been a rapidly growing area, even though its wage rates, per capita taxes and crime rates were higher than any other region. Perhaps the growth in the West is due in part to higher levels of educational attainment (as measured by median school years) and the greater density of the interstate highway network in the West than in any other region. But median schooling and highway density tend to take their lowest values in the South, yet the South has experienced rapid growth. In sum, it may very well be that these factors affect regional growth, but their relationships are far too complex to capture with a simple one-to-one comparison.

Instead, the effect of each factor should be measured while holding other factors constant. To do this we use a statistical technique called multiple regression analysis, which allows you to look at all of the possible forces for which you have data simultaneously. Because many explanatory variables are included, you can pick out the effects of any one factor on growth while holding all other factors constant.[1]

Using this technique, previous research has focused on one of three kinds of movements of jobs and people—from frostbelt to sunbelt, from central city to suburb, or from metropolitan to nonmetropolitan areas. Studies that investigate some of the effects of local conditions on movements among major regions, like frostbelt

[1]While multiple regression analysis helps measure these effects, it does not tell us anything about the direction of causation. For example, suppose the analysis shows that employment growth and high income are strongly correlated in an area—that is, when other things are equal, counties that show one usually show the other. This could imply that growth of employment leads to higher incomes in that area; but it could also imply that higher incomes lead to higher employment growth.

TABLE 1
A SIMPLE COMPARISON AMONG MAJOR REGIONS

	AVERAGE VALUES			
	Northeast	Midwest	South	West
Hourly wage rate (1972)	$3.51	$3.37	$2.89	$3.80
Annual per capita taxes (1972)	$208	$200	$120	$254
Percent of labor force unionized (1970)	29.1	27.3	17.7	25.6
Annual crimes per 100,000 people (1970)	2,794	2,260	2,011	3,751
Educational attainment[a] (1970)	11.8	11.2	10.2	12.0
Interstate highway density[b] (1982)	23.0	10.3	11.8	27.7

SOURCE: Calculated from the data set referenced in Gerald A. Carlino and Edwin S. Mills, "The Determinants of County Growth," Federal Reserve Bank of Philadelphia Working Paper, No. 85-3 (May, 1985).

[a]Median school years.

[b]Miles of highway per square mile of land area in a county.

to sunbelt, date back to the early 1960s.[2] Most of this research also focuses on employment, especially manufacturing employment. The predominant finding is that differences in the local economic environment, especially public policy conditions such as levels of taxes, policies to combat crime, and so forth, do not have much influence on the distribution of business activity among major regions of the nation. Studies that have focused on the location patterns of business activity between cities and suburbs within each region, however, do find that differences in public policies were among the major causes of the suburbanization of business activity.[3] Finally, studies of the metropolitan-nonmetropolitan movement of jobs and people have not tested the effects of public policy, but they do suggest that manufacturing employment led the "rural revival" of the 1970s.[4]

In order to get a more complete picture of regional growth, the analysis can be broadened in several ways. To begin with, all three levels of regional movement—frostbelt-sunbelt, city-suburb, and metro-nonmetro—can be con-

[2]See John Due, "Studies of State-Local Tax Differences on the Location of Industry," *National Tax Journal*, Vol. 14 (June 1961), pp. 163-173; for a more recent analysis, see Roger Schmenner, *The Manufacturing Location Decision: Evidence from Cincinnati and New England*, (Washington, DC: U.S. Dept. of Commerce, GPO, 1978).

[3]Alberta Charney, "Intraurban Manufacturing Location Decisions and Local Tax Differentials," *Journal of Urban Economics*, Vol. 14, No. 2, (September 1983), pp. 184-205; William Fox, "Fiscal Differentials and Industrial Location: Some Empirical Results," *Urban Studies*, Vol. 18, (February 1981), pp. 105-111; Edwin S. Mills, "Metropolitan Central City Population and Employment Growth During the 1970's," Federal Reserve Bank of Philadelphia, Working Paper No. 83-7, (September, 1983); Michael Wasylenko, "Evidence on Fiscal Differentials and Intrametropolitan Firm Location," *Land Economics*, Vol. 56, (May 1980), pp. 339-349.

[4]Gerald A. Carlino, "Declining City Productivity and the Growth of Rural Regions: A Test of Alternative Explanations," *Journal of Urban Economics* (July, 1985).

sidered by examining data at the county level, and by including roughly 3,000 of the counties in the continental U.S. In addition, manufacturing employment can be studied separately. Finally, the analysis can be enriched by considering the effects of population growth on employment growth and vice versa.

JOBS AND PEOPLE AFFECT EACH OTHER

Other things equal, jobs attract people and vice versa. In choosing where to live, households try to get the most satisfaction they can from consuming goods and services, including public services, given their after-tax incomes. Therefore, they are attracted to areas with fast job growth, because those places offer the best prospects for employment and income growth. Firms, on the other hand, try to maximize profits, the difference between revenue and cost. Thus firms choose a location because it enhances revenue, lowers cost, or both. Rapid population growth in an area leads to increased demand for locally produced goods and services. This increased demand means faster revenue growth for firms that sell in the area. In addition, this increased demand draws new firms and, in turn, more people.

Not all the linkages between firms and households work in this mutually reinforcing way, however. In some cases past growth can deter rather than reinforce future growth. For example, fast employment and population growth in an area causes rents to rise, as more firms and people compete for a relatively fixed amount of land (or, at least, for land that is attractively sited for transportation purposes). Thus, population and employment growth are mutually enhancing from households' and firms' revenue perspectives. But for households and firms alike, past population and employment growth can lead to higher rents that impede future growth.

In general, employment and population growth in different areas continues until these reinforcing and deterring effects are in balance. Local rent levels, as well as wages, rise and fall in response to past employment and population growth rates, and thereby determine the rate of growth in future periods. Thus, households migrate until living standards (adjusted for non-financial factors) are equalized across places. Firms either move to, start up, or expand in areas with high profits, and they leave, or contract, in those which offer low profits, until rates of profit are equalized among locales.

Including the interaction between jobs and people helps to capture both the direct effects of various factors on regional or local employment growth, and their indirect effects on local employment that occur through local population growth. If the indirect effects are fairly large, they can substantially influence employment growth. For example, if a policy directly promotes local population growth, then the following sequence unfolds: the increased population affects local employment, which then affects population, which then affects employment, and so on. At each successive round these interactive or indirect effects get smaller and smaller and finally settle down. The same sequence holds for policies that directly affect local employment.

Understanding the interaction of local employment and population can help local policymakers form better economic development strategies. Local government programs designed to increase local employment are often aimed at attracting new employers to the area. But, depending on how increases in local population affect local employment, different strategies to increase employment could operate in quite different ways. Some local programs that might be thought not to have much value in attracting local employment could substantially increase local employment indirectly by attracting people to the area. Since programs to promote local growth can be costly, and since the interaction of employment with population takes time to occur, local policymakers would benefit from understanding how effective different development strategies are at attracting employment directly versus indirectly. Therefore, such

interactions should be taken into account when analyzing the effects of public policies on regional growth.

HOW PUBLIC POLICIES AFFECT JOBS AND PEOPLE

Several factors influenced by public policy affect both population and employment growth directly because they represent costs or benefits to both households and firms. These include crime rates, educational attainment, taxes, and interstate highway density.

The quality of local government's provision of services is important in the location decisions of households and firms. For example, the quality of local police protection influences an area's *crime rates.* Since people fear being victims of crime, they are likely to avoid working and living in areas with high crime rates. High crime rates also drive up firms' insurance premiums, and hence the cost of doing business, and may result in slower employment growth.

Local policies on schooling may influence an area's level of *educational attainment.* High educational attainment by the resident population is likely to attract people and perhaps jobs as well. High educational attainment undoubtedly stands for several amenities that create prime residential areas (such as high income and good schools), which should attract households. High educational attainment in an area also may be attractive to firms, since it signals a highly skilled labor force.

There is a cost side, however, to providing these services—*local taxes.* And both firms and households tend to shun areas with high taxes. In sum, households and firms are attracted to areas that offer a high level and quality of these public services at low cost (taxes).

The development of the *interstate highway network* has steadily increased the accessibility of many areas to one another as well as to major markets. Increased accessibility is important to both households and firms, since it lowers costs in terms of both the money and the time spent on traveling. Increased accessibility should therefore stimulate the growth of local population and jobs. Local officials can encourage or discourage highway building. So although interstate highway building is a federal program, local policymakers are not without influence in this matter.

Other policies tend to affect firms directly and households only indirectly, that is, via employment's effect on population. Two that we consider are the *degree of unionization* and *IDBs.* While many factors can influence the degree of unionization in an area, state policies can limit it through right-to-work legislation. In general, right-to-work laws provide that people need not belong to a labor union to get or keep a job, and also that people may not be denied a job because they belong to a union. Nineteen states, most of which are in the South, have such laws.

Since the degree of unionization varies from state to state partly because of right-to-work laws, to some degree it can be considered a policy variable, although one that operates at the state rather than local government level. In general, a higher degree of unionization may repel employers for several reasons: unionized workers tend to earn higher than average wages, unions can impose rigidity on firms' ability to adjust quickly to changing conditions, and they can disrupt production during periods of strikes. So greater unionization would be expected to reduce local employment growth.

Similarly, *Industrial Development Bonds* (IDBs) are another public policy variable available to state governments. IDBs have been used by many states to attract employment by offering loans below going market interest costs to firms that agree to locate an operation within the state issuing the IDB. Reduced interest charges are possible because lenders are not required to pay taxes on the interest payments they receive from IDB borrowers. Only two states, Idaho and Washington, had issued no such bonds by 1981, whereas Pennsylvania led the nation in the volume of tax exempt financing. Greater issuance of IDBs would be expected to increase local employment growth.

While some public policy variables could affect one group (local population or employment) directly, they nonetheless could have effects on the other group indirectly, as is the case with IDBs and the degree of unionization. To understand the total (direct and indirect) effects it is important to incorporate the interaction between these two groups when empirically analyzing regional growth.

MEASURING THE DIRECTION AND DEGREE OF THE EFFECTS

This analysis of the impact of certain public policies on local employment and population growth is based on a larger study of the determinants of county growth in the U.S. That study estimated the effects of a wide range of factors, including several public policy variables, on county employment and population to allow for interaction between employment and population growth (see the APPENDIX p. 13). As a result, both direct and indirect effects of the public policy variables were calculated.[5]

The study was based on data collected for roughly 3,000 counties in the continental U.S.[6] These data included employment, resident population, educational attainment, taxes per capita, crimes per 100,000 people, the percent of the nonagricultural labor force that belongs to unions (available only by state), miles of interstate highways per square mile of land area in the county, and the total value of IDBs outstanding (also available only by state). Other variables were used to account for regional differences in employment or population due to noneconomic factors (for example, climate) for which data were not available.[7] A statistical analysis (multiple regression analysis) of the relationships among these factors was used to determine how county population and total employment—and, separately, county population and manufacturing employment—were affected during the 1970s by the other factors included in the study, including the public policy variables.[8]

One problem with analyzing the results from multiple regression analysis is that the variables are generally measured in different units. For example, per capita taxes are measured in *dollars*, and median schooling is measured in *years*. To facilitate the comparison of the effects of different variables, we must standardize our findings. A common approach couches relationships in percentage terms—the percent change in one variable associated with the percent change in another. This unitless measure is known as an elasticity. An elasticity for employment growth, for example, tells us the percentage change in employment given a

[5]For details of the estimation process underlying the results given in the Appendix, together with caveats, see Gerald A. Carlino and Edwin S. Mills, "The Determinants of County Growth," Federal Reserve Bank of Philadelphia Working Paper No. 85-3, (May 1985).

[6]Not all counties in the continental U.S. were included in this study because of lack of available data in some cases. Of the 3,137 counties in the U.S., this study includes 2,964.

[7]Our analysis relies on data found in *County Business Patterns* to measure area employment. These data gauge area employment using establishment location, the appropriate measure. One problem with *County Business Patterns* data is that coverage is limited to employees covered by the FICA act. Thus, those not covered by Social Security (largely government, railroad, agriculture, and domestic services) fall outside of *County Business Patterns* scope.

Population figures, as well as many of the explanatory variables, come from the Census Bureau's *City and County Data Book Tape*. The tape contains resident population, educational attainment, taxes per capita, and other census data by county.

In an effort to increase the scope of our enquiry, we supplemented the census data with information from other sources. This includes the FBI index of major crimes per 100,000 people; percent of the nonagricultural labor force that belongs to unions (available only by state); the miles of interstate highways per square mile of land area in the county; and the total value of IDBs outstanding (also available only by state).

[8]In the estimation procedure, the variables to be explained, county population and employment, were expressed as the end-of-period (1980 for population and 1979 for employment) values, whereas the explanatory variables are measured at beginning-of-period values (1970 when possible). Inclusion of only pre-1980 values of the explanatory variables prevents them from literally being affected by population and employment which are expressed in end-of-the-1970s values. This was not possible to do for IDBs and the interstate highway variable, which use 1981 and 1982 values, respectively.

percentage change in any one of the explanatory variables, while holding all other explanatory variables constant, and likewise for population elasticities. Elasticities facilitate comparisons of the influence that a specific change in a variable exerts on population versus employment. They allow us to compare, for example, the differential impact of a 10 percent increase in educational attainment on population and employment even though each variable is scaled differently.

The Interactive Effects of Population and Employment. A major finding of this study is that an increase in county population growth significantly increases county employment (for a summary of all the direct effects, see Table 2). For example, a 10 percent increase in a county's 1970 population resulted in a 4.9 percent increase in the county's total employment in 1979, and a 4.1 percent increase in the county's manufacturing employment for 1979.[9] The 4.1

[9]The precise interpretation of these results is that a 10 percent increase in the county's 1970 population, relative to the sample mean of all the counties, resulted in a 4.9 percent increase in the county's total employment in 1979, again relative to the sample mean. Note that in the results, a 10 percent increase in the *level* of population is being interpreted as an increase in population *growth*. The equations were not estimated using growth rates directly.

TABLE 2

DIRECT EFFECTS OF A 10 PERCENT INCREASE IN INTERACTIVE AND PUBLIC POLICY VARIABLES[a]

	PERCENT CHANGE		
	County Population	County Total Employment	County Manufacturing Employment
Interactive County Variables			
Population, 1980	—	4.9	4.1
Total Employment, 1979	1.1	—	—
Manufacturing Employment, 1979	0.3[b]	—	—
Public Policy County Variables			
Per Capita Local Taxes, 1972	-1.4	—	—
Crime Rate per 100,000 People, 1975	-0.2[c]	—	—
Educational Attainment, 1970	5.9	3.8	-0.6[c]
Interstate Highway Density, 1982	0.2	0.3	0.1[c]
Percent of Labor Force Unionized, 1970	—	-0.6[c]	-1.6
IDBs, 1981	—	0.2[c]	0.3[c]

[a]Elasticity estimates from semi-structural equations, using two-stage least-squares multiple regression.

[b]Estimated in an equation system that used county manufacturing employment rather than total employment.

[c]The estimated value is not significantly different from zero.

percent increase in county manufacturing employment is not significant in a statistical sense, however. In other words, the interaction of county manufacturing employment and county population is less certain. Because the effect of county population growth on a county's total employment growth is fairly large, public policies that substantially affect county population but have no direct effect on county employment nevertheless have an important indirect effect on county employment. Further, policies that enhance both county employment and population directly have an amplified effect on county employment, again through population.[10]

The direct effect of an increase in county employment on county population, however, is relatively small. A 10 percent increase in base period (1969) county total employment led to only a 1.1 percent increase in county population during the decade. So policies that affect only county employment directly have little indirect effect on county population growth.

Taking the interaction of county employment and population into account, the direct, indirect, and total effects on county employment of the public policy variables can be compared (Table 3). The total effect (Column 3) is the sum of direct (Column 1) and indirect effects (Column 2). The indirect effects are calculated by multiplying the direct effect of the public policy

[10]This study does not consider the impact of public policies on county *unemployment rates* directly. Public policies that are designed to increase county employment and draw population (or vice versa) may ultimately increase the county's unemployment rate. This could happen if a change in the county's labor force exceeds the number of new jobs created by that policy. A check of the results of this study suggests that, in general, policies that stimulate county employment do not result in increased county unemployment rates.

TABLE 3

COUNTY TOTAL EMPLOYMENT
The Effects of a 10 Percent Increase in Public Policy Variables

	Direct Effect[a]	+	Indirect Effect (through population)	=	Total Effect[b]
Local Taxes	—		-0.7		-0.7
Crime Rate	—		0.1[c]		0.1[c]
Education	3.8		3.2		7.0
Interstate Highways	0.3		0.2		0.5
Percent Unionized	-0.6[c]		—		-0.6[c]
IDBs	0.2[c]		—		0.2[c]

[a]From structural equation estimates, Table 2.

[b]From reduced form estimates.

[c]The estimated value is not significantly different from zero.

variable on county population by the effect of population on county employment.

Taxes and Crime Rates. In principle, taxes and crime should affect both county employment and population directly. The data available on local taxes and crime, however, were not appropriate for analyzing a direct effect on employment. Local taxes per capita was the only tax measure consistently available at the county level, which is an appropriate policy variable for household decisionmaking, but not for firms. The correct tax measure for total and manufacturing employment is the county tax rate, which is not available. Similarly, the crime rate variable is measured per 100,000 people and is not measured by firms. As a result, the direct effects of both local taxes per capita and major crimes per 100,000 people were estimated only for county population. The effects of taxes and crime on county total employment and manufacturing employment show up only indirectly through population's interaction with employment.

For taxes, the -0.7 percent indirect effect on a county's total employment is equal to the -1.4 percent effect of taxes on county population times the 0.5 percent effect of county population on employment. Because per capita taxes have no direct effect on county employment, the total effect on county employment is equal to the indirect effect. For a 10 percent increase in local taxes per capita, then, the decline in county employment is quite small—less than 1 percent.[11] Unlike taxes, the crime rate's indirect effect on county employment is not even statistically significant. Because the direct effect of crime on county population is essentially zero (in a statistical sense), the indirect effect on county total employment is also zero. Thus, the total effect of crime on county employment is zero also. These findings are broadly consistent with those reported in other studies.[12]

Education and Highways. Unlike taxes and crime, educational attainment and interstate highway density affect *both* county population and employment directly. Not only is there a direct effect of education and highways on county employment, but since these policy variables also influence county population growth directly, there is also an indirect effect through county population on employment.

Median school years attained by the resident population represent a major attraction to nonresidents. Our results show that a 10 percent increase in educational attainment (from 10.9 years to 12 years) leads directly to a 5.9 percent increase in county population. That same 10 percent increase also boosts county employment by 7 percent, both directly (3.8 percent) and indirectly, via a county's population increase (3.2 percent)—see Table 3. These findings characterize educational attainment as an important public policy instrument for promoting the growth of local population and employment, a conclusion supported by a broad range of studies analyzing the positive effect of educational attainment on local growth.[13]

Highways. County population and employment also respond to the availability of the interstate highway network, but to a smaller extent. A 10 percent increase in a county's interstate highway density would lead to only a 0.5 percent increase in total employment—0.3 percent through a direct employment effect, and 0.2 percent through an indirect population effect.

Unionization and IDBs. In contrast to educational attainment and highways, other local policy variables such as degree of unionization

[11] Our results do suggest that reductions in local taxes per capita, which draw population, result in increases in a county's labor force that exceed the number of new jobs created. This is the only policy variable that, on average, would cause county unemployment rates to rise.

[12] See Edwin S. Mills, "Metropolitan Central City Population and Employment Growth During the 1970's," Federal Reserve Bank of Philadelphia, Working Paper No. 83-7, (September, 1983); and Edwin S. Mills and Richard Price, "Metropolitan Suburbanization and Central City Problems," *Journal of Urban Economics*, (forthcoming 1985).

[13] See Mills, and Mills and Price, ibid.

and Industrial Development Bonds affect county employment only directly. But neither of these factors had statistically significant effects on employment, nor were their estimated effects large in absolute size. A 10 percent increase in the fraction of the area's work force that is unionized reduced a county's total employment by 0.6 percent—a rather small response. Likewise, a 10 percent increase in the value of IDBs outstanding resulted in only a 0.2 percent increase in a county's total employment. This lack of response to IDBs might be explained by the fact that since so many states offered them, they were of little *relative* advantage to firms.

Public Policy and Manufacturing. The separate analysis of county population and manufacturing employment suggests that the policy variables had essentially no impact on county manufacturing employment (Table 4), which corroborates earlier work in this area.[14]

[14]See Due, "Studies of State and Local Tax Differences...," and Schmenner, *The Manufacturing Location Decision.*

Of the variables we considered, only the degree of unionization, which may be influenced by right-to-work laws, significantly affects county manufacturing employment. Specifically, a 10 percent increase in the degree of unionization resulted in a 1.6 percent reduction in county manufacturing employment.

CONCLUSION

This study explores how public policies influenced the distribution of population, total employment, and manufacturing employment among counties in the 1970s. This research indicates some general conclusions about the relative importance of several public policies for county employment growth; however, the limitations of the data suggest that precise statements about the magnitudes of the effects are probably not warranted. In addition, specific policies that are designed to increase county employment and population may result in an expansion of its labor force that exceeds the number of new jobs created by such policies. As

TABLE 4

COUNTY MANUFACTURING EMPLOYMENT
The Effects of a 10 Percent Increase in Public Policy Variables

	Direct Effect	+ Indirect Effect (through population) =	Total Effect
Local Taxes	—	-.02	-.02
Crime Rate	—	-.01	-.01
Education	-0.6[a]	-.00	-0.6[a]
Interstate Highways	0.1[a]	.00	0.1[a]
Percent Unionized	-1.6	—	-1.6
IDBs	0.3[a]	—	0.3[a]

[a]The estimated value is not significantly different from zero.

a result, one must be careful not to infer that county employment growth always leads to reduced county unemployment rates.

What we do find is that variables that depend on public policies, such as taxes, crime rates, and Industrial Development Bonds (IDBs), exert little impact on either county population or total employment growth. Indeed, the study points to an interesting irony: IDBs, which were intended to promote local growth, had even less of an effect on local population and total employment than did interstate highways, which were constructed for wholly different purposes—although the effect of highways was also small. More strikingly, with the exception of right-to-work laws which influence the degree of unionization, public policies seem to have had no effect on county manufacturing employment whatsoever.

Instead, we find that the features about a county that are most positive for local employment growth are its people and their level of educational attainment. That is, county population seems to attract county employment more than county employment attracts county population. Moreover, the level of educational attainment proved to be the most powerful of all the public policies. This finding, together with the small effects of other public policies on county employment, runs counter to many local development strategies that are directed only at attracting businesses to their regions. Given the condition of most local budgets, using public policies to gain a moderate increase in local employment may require a substantial share of public expenditures. Instead, limited public funds may be better spent on educating, retaining, and attracting population, provided they also create sufficient jobs so that unemployment rates do not rise.

APPENDIX

Steinnes and Fisher develop a theoretical model of interaction between regional population and employment that reduces to:[a]

(1) $E^* = A_E(P) + B_E(S)$

(2) $P^* = A_P(E) + B_P(T)$

where E and P are regional employment and population, S and T are vectors of exogenous variables that affect E and P, and asterisks indicate equilibrium values. A_E and A_P are coefficients of the endogenous variables and B_E and B_P are vectors of coefficients of exogenous variables; subscripts indicating counties are suppressed. These two equations are called a semi-structural model because the wage, rent, and other endogenous variables in the original model have been solved out.

Following Mills and Price, regional population and employment are assumed to adjust to equilibrium with distributed lags:[b]

(3) $E = E_{-1} + \lambda_E (E^*-E_{-1})$

(4) $P = P_{-1} + \lambda_P (P^*-P_{-1})$

where subscript -1 refers to the value of the indicated variable lagged one period, a decade in our data, and λ_E and λ_P are speed of adjustment coefficients with $0 < \lambda_E, \lambda_P < 1$.

[a]Donald N. Steinnes, and Walter D. Fisher, "An Econometric Model of Intraurban Location," *Journal of Regional Science*, Vol. 14, February 1974, pp. 65-80.

[b]Edwin S. Mills, and Richard Price, "Metropolitan Suburbanization and Central City Problems," *Journal of Urban Economics*, (forthcoming, 1985).

Equations (1) and (2) can be used to solve for E^* and P^* in terms of only the exogenous variables in the model.

Substituting (1) and (2) for E^* and P^* in (3) and (4), and rearranging terms, gives

$$(5) \quad E = \lambda_E A_E P + \lambda_E B_E S + (1 - \lambda_E) E_{-1}$$

and

$$(6) \quad P = \lambda_P A_P E + \lambda_P B_P T + (1 - \lambda_P) P_{-1}$$

which are simultaneous equations in the observable endogenous variables E and P. Each depends on the other endogenous variable, on a set of exogenous variables, and on its own lagged value.

THE EMPIRICAL MODEL

The variables that were considered in the empirical model include the public policy variables discussed in the text, plus other variables that affect county employment and population, and regional dummy variables that are intended to capture noneconomic factors (such as climate) that affect households' or firms' decisions to locate in different areas. These other variables are discussed more thoroughly in a technical paper by the authors.[c]

In order to implement the model empirically, (5) and (6) are assumed to be linear in their arguments

$$(7) \quad P_i = A_O + A_1 E_i + A_2 P_{i-1} + A_3 PB_i + A_4 I_i + A_5 T_i + A_6 CR_i + A_7 LA_i + A_8 MS_i + A_9 CC_i + \sum_{j=10}^{11} A_j NM_i + \sum_{k=12}^{19} A_k R_i$$

$$(8) \quad E_i = B_0 + B_1 P_i + B_2 E_{i-1} + B_3 PB_i + B_4 I_i + B_5 U_i + B_6 LA_i + B_7 IDB_i + B_8 CC_i + \sum_{j=9}^{10} B_j NM_i + \sum_{k=11}^{18} B_k R_i$$

where

P_i = 1980 population in county i

E_i = 1979 total employment in county i

P_{i-1} = 1970 population in county i

E_{i-1} = 1969 total employment in county i

PB_i = percent black in i in 1970

I_i = interstate highway density (miles of interstate per square mile of land area) in i by 1982

T_i = local government taxes per capita in i in 1972

[c]See Gerald A. Carlino and Edwin S. Mills, "The Determinants of County Growth," Federal Reserve Bank of Philadelphia, Working Paper No. 85-3, (May 1985).

CR_i = Crime rate per 100,000 people in i in 1970

U_i = Union membership as a percent of employees in nonagricultural establishments, by *state*, 1970

LA_i = square miles usable land area in county i.

MS_i = median school years attained in i in 1970

IDB_i = total value of Industrial Development Bonds issued through 1981 by state

CC_i = Center City dummy variable assigned a value of one if county i contains a central city, zero otherwise.

NM_j = two metropolitan-nonmetropolitan dummy variables
The first of these dummies is one if the county is adjacent to a metropolitan one. The second is one if the county is neither metropolitan nor adjacent. Thus, metropolitan counties are the base case.

R_k = regional dummies, where $R_i = 1$ if the county falls in the i-th region; i takes the values

New England
Middle Atlantic
East North Central
West North Central
East South Central
West South Central
Mountain
Pacific
South Atlantic is the base case

In both (7) and (8), the dependent variables refer to end-of-period values, whereas most of the independent variables are at beginning-of-period values. This reduces the simultaneity and reduces direction of causation issues, since end-of-period values of the dependent variables cannot affect beginning-of-period values of the independent ones. Beginning-of-period values for IDBs and interstate highway density were not available, so 1981 and 1982 values, respectively, were used in those cases.

Equations (7) and (8) were estimated by two-stage least-squares techniques. The results of these regressions are presented in Table A.1.[d] The estimated coefficients for the county population column are those that interact with a county's total employment. Quite similar coefficient estimates were obtained for the county population equation that interacted with county manufacturing employment (Column 4). These estimated coefficients for county population interacting with manufacturing are not presented in Table A.1 to save space.

The estimated coefficients in Table A.1 are used to compute the estimated elasticities presented in Table 2 of the text. These estimated parameters (Table A.1) were also used to obtain the reduced form estimates for county population, total employment and manufacturing employment. These reduced form results (available from the authors on request) were used to compute the elasticities reported in Tables 3 and 4 of the text.

[d] In addition, the regressions were run in double-log form, and the main results were essentially the same, particularly for the employment equations.

SEMI-STRUCTURAL EQUATION ESTIMATES OF DETERMINANTS OF COUNTY GROWTH

	County Population	County Total Employment	County Manufacturing Employment
Constant	-10.08221	-8.9378*	-1.1534
Population, 1970	0.8698*		0.0390
Population, 1980[t]		0.1599*	
Total Employment, 1969		0.7417*	
Total Employment, 1979[t]	0.3308*		
Manufacturing Employment, 1969			0.6604*
Square Miles of Land Area	0.0040*	-0.0006*	-0.0028
Percent Black, 1970	-0.2289*	-0.0752*	-0.0355*
Interstate Highway, 1982	0.1172*	0.0499*	0.0056
Per Capita Local Taxes, 1972	-0.0576*		
Percent Unionized		-0.0627	-0.0547*
Industrial Revenue Bonds, 1981		0.0012	0.0005
Crime Rate, 1975	-0.0006		
Education, 1970	3.9543*	0.8224*	-0.0420
New England	-13.0530*	-5.6233	0.0983
Middle Atlantic	-20.6356*	-15.9645*	-3.4863*
East North Central	-15.3736*	3.6478*	0.9940
West North Central	-6.0509*	-0.5831	-0.3517
East South Central	-15.3736*	-3.6478*	0.3994
West South Central	-13.1736*	-1.9551	-0.1326
Mountain	-15.9635*	1.5203	0.2621
Pacific	11.9105*	0.4825	1.1865
Exurban	-10.4084*	2.2122*	0.9770
Rural	-12.1158*	2.4869*	0.8595
Central City	8.5025*	5.3237*	0.6776
R-square	.9849	.9806	.9709

[t]Estimated using two-stage least-squares multiple regression.

*Denotes that the coefficient is statistically significantly different from zero.