

Taxation, Public Borrowing And Economic Development: A Metropolitan Area Analysis

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ABSTRACT

Despite a substantial body of evidence to the contrary, state and local fiscal policy variables loom to many political leaders as important determinants of economic growth. Using instrumental variables regression analysis reveals that prior population growth has a strong and significant influence on subsequent job growth. Differential factor costs, such as earnings per worker and electricity costs, have a statistically significant effect on employment growth. The results for total employment growth and for manufacturing employment growth suggest that factor costs are more important statistically for growth in the 1980s than they were during the 1970s. The degree of labor unionization has had mixed effects on economic growth. Fiscal variables, however, are not generally statistically significant except for the limited effects of per capita state non-property taxes on the change of total employment. There is no demonstrable long term effect of public expenditures on growth patterns over the 20 year period analyzed. Finally, per capita private purpose public bonds do not influence employment growth. The results reveal that, if anything, metropolitan areas with declining employment are more likely to use economic development bonds in unsuccessful attempts to stem employment decline.

Keywords: metropolitan economic development, tax policy, regional growth, private purpose public debt

INTRODUCTION

Policy makers and scholars maintain considerable interest in the economic development of states and regions. Despite a substantial body of evidence to the contrary, state and local fiscal policy variables loom to many as important determinants of economic growth. A mainstay of political campaigns, whether national or local, is the often unsubstantiated presumption that lower taxes lead to the twin effects of economic development and economic growth. Across the nation during recent election campaigns, for example, the idea that state and local governments need to lower taxes and provide low cost financing to encourage economic growth and development has been proposed and to a large extent accepted.

This has been the case for decades, even though existing literature does not support the broad claim that lower taxes can increase economic development, Bartik (1994) and Wasylenko (1997). But the results of the effects of taxes on economic growth in the literature are not stable, so specific studies can be cited to support claims on either side of the issue.

A common problem in the literature is the heavy emphasis on states and statewide economic aggregates as dependent variables and regressors to draw conclusions about economic growth determinants. States are, however, political areas not economic regions, and results obtained using states as units of analysis may be misleading. Mills (1990) contends that metropolitan areas are more appropriate economic regions and the growth of metropolitan areas has not received nearly the attention given to states. Where sub-state areas have received attention, the studies are

dated, have limitations such as focusing on counties rather than metropolitan areas, or have focused the analysis on regions experiencing economic growth rather than on all metropolitan areas regardless of growth or decline.

This study introduces more comprehensive measures of the fiscal variables, including measures of industrial development revenue bonds and examines growing, as well as declining, metropolitan areas. Maintaining metropolitan area boundaries in constant 1990 terms for the entire period of the analysis avoids confounding measures of inherent economic and employment growth within constant boundaries, with changes of employment resulting from changing the boundaries of the metro area. Examining total employment, and manufacturing employment growth in 84 large metropolitan areas from 1970 to 1980 and from 1980 to 1990,¹ enables a comparison of a period in which there existed virtually no public borrowing for private purposes with a time when this type of public financing for private projects nearly dominated the development scene.²

The next two sections summarize the state of the literature and discuss the data and the empirical model. The results are reported in the fourth section and some conclusions follow.

LITERATURE REVIEW

There is a substantial literature analyzing economic growth in states and regions. For example, Bartik (1991) in his review cites over 58 recent studies examining economic growth in states and regions, and since then similar efforts have been made by Carroll and Wasylenko (1994); Goss and Phillips (1994); Hines (1996); and Tannenwald (1996). Most of the research has focused on state economic activity, with some examining states pooled across time. This analysis focuses on metropolitan areas rather than states. Only 21 of the 62 studies noted above limit their analysis to the economic activity in economic regions. However, some use counties and not the metropolitan areas: McConnell and Schwab (1990); Carlino and Mills (1987); and Clark and Murphy (1996); while others O'hUallachain and Satterthwaite (1990) examine only growing regions. Clark and Murphy include local taxes in their model but omit state-level taxes, potentially leading to an incomplete measurement of the taxes affecting firms. For example, regions with higher local taxes but concomitantly lower state taxes will mistakenly be assigned higher tax rates in their analysis.

The weight of the evidence presented by Wasylenko (1997) suggests that state and local taxes and expenditures play a very limited role in economic growth. Few studies, however, have examined the effect that state and local issues of public bonds for private purposes have had on economic growth. Policy makers often used these debt instruments in attempts to foster economic development and economic growth in metropolitan areas and/or central cities. Since Wasylenko's review, there has been a noticeable decrease in research examining the impact of taxation and other types of fiscal activity on economic development at the state level. Though Poot (2000) provides an overview of countrywide analyses of the impact of fiscal behavior on growth, concluding that education and public infrastructure expenditures seem to have a positive impact on growth. Even more noticeable is the absence of research on the impact of taxation policy at the metropolitan or county level. The few debt oriented research initiatives that exist are metropolitan or county area specific case studies, such as Marlin's (1985) study of industrial revenue bonds and employment growth in the Norfolk-Virginia Beach MSA. A more recent example is Mark, McGuire, and Papke's (2000) examination of the influence of taxes on employment and population growth in the Washington, DC metropolitan area.

To the authors' knowledge, no other study has analyzed the effect of region-specific public bonds for private purposes on regional employment growth. Where this variable has been included in other studies, only state-level per capita figures are measured. Bania, Gray and Stone (2007) found a non-monotonic effect of fiscal policy for states, with initial positive effects that eventually turned negative, consistent with Barro (1990, 1992, 1995) growth hills. Where Bania et al. assume that publicly provided inputs to be rival, this analysis allows for the possibility that taxes can be used to produce either publicly provided private services, as would be the case in publicly subsidized private debt, or non-rival, non-excludable pure (or quasi-) public goods.

One reason that most researchers in this area have not used data on public-issued debt is that this information was not always readily available in census reports.³ Thus, the question of whether these bond-financed interest subsidies to businesses made a difference to economic growth is still an open and important public policy issue. Public bond debt for private purpose is the measure for cities, counties and special districts within each metropolitan area in this analysis, and this measure pertains to the bond activity specific to the metropolitan area rather than to statewide averages.

The major finding of the existing research on regional growth is that employment growth is most strongly related to past growth. Once past performance is taken into account, crime, fiscal factors and other variables appear to have little effect. These hypotheses about metropolitan growth are reexamined using more consistent data on fiscal variables and regional boundaries, as noted above, and using data for the 1980 to 1990 period as well as the 1970 to 1980 period.

EMPIRICAL MODEL

The empirical model of total employment growth and manufacturing employment growth is rooted in the firm's profit function and the derived demand for labor. At this level of aggregation, however, the model is empirical in nature and can make no claim of a direct link between employment growth and profits of particular firms. Rather the profit function methodology guides the regressors that are included in the model, though the model may also include what Greenhut (1959) referred to as purely personal matters in firm location, such as lower state and local personal income taxes for owners or managers who might be relocating.

The dependent variables in the model are the percentage change in total employment and in manufacturing employment. For each period of analysis, 1970 to 1980 and 1980 to 1990, a percentage change value is computed for each of 84 of the largest metropolitan areas in the United States. The independent variables include net migration to the region over the decade; changes in the population for the previous decade; agglomeration economies measured as population size; labor cost; electricity cost; demographic and socioeconomic variables, such as the percentage of the population in poverty, the percentage of the population that is black, and labor unionization; fiscal variables, including state and local tax burdens, expenditures on education and welfare, and public debt for private purposes.

Percent change employment = F (metropolitan net migration, lagged percentage change in metropolitan population, metropolitan population, earnings per worker, electric cost per 1000 kwh, demographic and socioeconomic variables, fiscal variables)

A traditional profit or derived labor demand model would include the unit cost of all factors of production; these cost variables include earnings per worker as a proxy for labor costs and electric costs per 1,000 kilowatt hours. Capital is assumed to be perfectly mobile among metro areas, the net cost of capital is assumed to be the same among regions. The gross price of capital may, however, differ among metro areas due to variations in local tax rates among metro areas. The variations in the state and local tax rate variables in the model presumably capture these gross capital price variations.

The net migration and the percentage change in the metropolitan population in the previous decade variables capture previous growth in the region and perhaps lagged adjustment of employment change due to population or labor force change. The population of the metropolitan area captures agglomeration economies and to some extent the market demand for goods and services.

The demographic and socioeconomic variables include the percentage of the population in the metro area living below the poverty level at the beginning of the decade, the percentage of the metro population that is black at the beginning of the decade, and the percentage of the workforce in the area that is unionized at the beginning of the decade. The state and local fiscal variables for each metropolitan area include per capita local taxes, state-level per

capita non-property taxes, per capita expenditures for primary and secondary education, state and local per capita expenditures for welfare.

For the 1980 to 1990 decade, the variable measuring per capita public debt for private purposes outstanding as of 1990 has been included. Private purpose public debt grew dramatically in the 1980s, and often is an attempt to influence significantly employment growth and economic development.⁴

To avoid endogeneity in general, a concern in empirical studies using aggregate data, most of the right-hand-side variables are lagged to the beginning of the decade. Instrumental variables were used for net migration and public debt for private purposes.⁵

The lagged values of net migration, lagged population growth and population size variables are expected to have positive coefficients. In the cases of the first two variables, population growth can precede employment growth as “jobs follow people.” Population size may represent agglomeration economies and a positive coefficient is expected. However, in our sample of large metropolitan areas, larger areas may not necessarily attract more employment growth once metropolitan areas pass a “large size” threshold. If that threshold is at the lower end of the size of this sample of large metropolitan areas, population size may then exert in this sample little influence on metropolitan employment growth.

The coefficients on factor costs and unionization are expected to have negative signs as are the coefficients on taxes. Coefficients on education expenditures are expected to have positive signs as these are considered desirable services in most areas. Public welfare expenditures are expected to have negative coefficients, as more of these services are not necessarily desirable.

The coefficient on the percentage of the population in poverty is expected to have a negative coefficient as a larger share of less-skilled workers is expected to lead to lower employment growth. No particular sign is expected for the coefficients on the percentage of the population that is black. In some studies, this variable has served as a proxy representing the southern region of the country, as metropolitan areas in the South have larger shares of blacks in their population than other regions. With higher growth rates in the South, the coefficient on the proportion of blacks may be positive.

The coefficient of the public debt for private purposes variable is expected to be positive, if subsidized loans to businesses do indeed result in larger employment growth. However, if firms that obtain publicly supported funds engage in labor substituting capital formation then the coefficient could be negative. This result would be reinforced if some firms received such support in the region, while others did not. Those firms that obtain low cost capital financing could have lower costs of production than firms located in the same labor market area and operating in the same product market, leading to reductions in employment or relocation for the non-recipient firms. Thus, total employment in a metropolitan area could fall, even if the public borrowing for private purposes attained its goal of making firms located in the targeted area more efficient. Still, another possibility is that areas lagging behind in employment growth may turn to private purpose public bonds in an effort to increase employment growth. If this policy of using public debt to attract employment is largely unsuccessful, the sign on the coefficient on the debt variable may be negative, which may imply that the debt variable is endogenous with employment growth.⁶

DATA

Table 1 lists the variables used in the analysis and their complete definitions. The sources of the data are listed in an appendix table. Of special interest for this study is the significance of using constant boundaries definitions as they existed in 1990 for the metropolitan areas over the entire period between 1970 and 1990. During the 20-year period, population changed by 52 million in the 84 metropolitan areas, however, within constant 1990 boundary definitions, population grew by only 37 million. When a county is added to a metropolitan area as a result of changes in commutation patterns, the entire population of the county is included in the newly defined metropolitan area, potentially leading to a substantial overestimate of the growth of the region. Holding metropolitan area

boundaries constant for the entire period of analysis makes a tighter link between the estimated growth, or decline, of regions and ultimately in the conclusions that are drawn about determinants of economic growth in metropolitan areas.⁷

The means, standard deviations and ranges of the dependent and right-hand-side variables are listed in Table 2. The percentage change in total employment in these metropolitan areas ranged from -0.06 to 67.0 in the 1980 to 1990 sample period and from -9.9 to 94.2 in the 1970 to 1980 sample period. Mean total employment growth was 6 percentage points lower in the sample for the 1980 to 1990 period than in the same sample for the 1970 to 1980 period. For manufacturing employment growth, the ranges were wider than for total employment growth and spanned -44.9 to 72 percent in the 1980 to 1990 sample period and -36.1 to 137.2 percent in the 1970 to 1980 sample period. The mean percentage change in manufacturing employment was -2.9 percent for the sample from 1980 to 1990, and was 15.8 percent for the sample from 1970 to 1980.

The populations of the sample metropolitan areas range between 250,000 and 9 million in 1970 and between 250,000 and 8 million in 1980. The average population size of the metropolitan area in this sample is about 1.4 million in 1970 and 1.5 million in 1980.

There is a considerable amount of variation in all of the other right-hand-side variables among the regions in each time period. For example, while the percentage of the total employment that is unionized fell from 22.0 to 20.5 between 1973 and 1985, the percentage of the total employment that is unionized ranged from 5.7 to 41.2 in our sample metropolitan areas for 1985 and the range was somewhat wider in 1973. This substantial range in the values of each of the right-hand-side variables suggests there is considerable scope for employment growth rates to vary systematically with our right-hand-side variables.

RESULTS

The results are reported in Table 3. Due to missing values in the original data set of 84 metropolitan areas, the regressions for the 1970 to 1980 period have 82 observations, and the regressions for the 1980 to 1990 period have 80 observations.

For percentage change in total employment from 1970 to 1980, both net migration into the region in prior periods and lagged population growth have positive and statistically significant effects on employment growth. The costs of electricity and the percentage of the total employment unionized negatively affect employment growth and are statistically significant. The coefficients on the fiscal variables are not statistically significant and the coefficient on earnings per worker is likewise not statistically significant. Metropolitan areas with a higher percentage of the population in poverty appear to have had higher employment growth rates, while metropolitan areas with a larger percentage of blacks in the population have had lower employment growth rates.

These results suggest that population growth leads employment growth and that agglomeration “economies” (population size) and fiscal variables do not have a statistically significant effect in the 1970 to 1980 period. Higher energy costs and greater unionization, on the other hand, reduce employment growth during the period.

With the exception of this coefficient for net migration and lagged population growth, the employment growth determinants are somewhat different for the 1980 to 1990 period, although the coefficients on net migration and lagged population growth continue to be statistically significant. The coefficient on population size has a positive and statistically significant effect on employment growth. Interestingly, a greater percentage of unionized labor and higher per capita welfare expenditures appear to augment employment growth. Higher factor costs, such as earnings per worker and electricity costs, reduce employment growth and their coefficients are statistically significant. The percentage of families in poverty reduces employment growth and the percentage of the population that is black in the metropolitan area has not had a statistically significant effect on employment growth in the 1980 to 1990 period. For the fiscal variables other than welfare expenditures, state per capita non-property taxes has a

negative and statistically significant effect on employment growth. Noteworthy is that per capita private purpose public debt does not have a statistically significant effect on employment growth.

Much of the empirical literature on employment change and economic development has dwelled on manufacturing industries. Moreover, industrial development bonds are typically oriented toward manufacturing industries and the results for manufacturing might provide a more direct test of the effectiveness of public bonds for private purposes for fostering employment growth.

The empirical results for manufacturing growth in the 1970 to 1980 period reveal only three statistically significant coefficients. Manufacturing employment grew in metropolitan areas experiencing net in-migration of population and workers. It also grew in metropolitan areas with a higher concentration of poverty and with a lower percentage of blacks in the population. The coefficients for fiscal variables and factors costs were not statistically significant for this time period.

In the 1980 to 1990 period, manufacturing employment increased more in metropolitan areas that had experienced more population growth in the 1970 to 1980 decade, suggesting again that jobs follow labor force growth. The coefficients on factor costs, that is, earnings per worker and electricity costs, were both negative and statistically significant, suggesting that manufacturing firms avoided or downsized in higher cost metropolitan areas in the 1980s. Except for per capita welfare expenditures with its positive and statistically significant coefficient, the standard tax and expenditure variables did not have statistically significant coefficients for manufacturing employment. The coefficient on per capita private purpose public bonds has a negative and statistically significant coefficient. This suggests that not only do bonds not attract more manufacturing employment growth, but that the use of these fiscal instruments is associated with greater decline in manufacturing employment. This could indicate that firms receiving low cost public funds were able to make labor substituting capital expenditures, or that non-recipient firms were placed at a competitive disadvantage and reduced the level of manufacturing employment.

Elasticities of the percentage change in employment growth with respect to the right-hand-side variables are presented in Table 4. The elasticities for earnings per worker and for electricity cost are relatively large especially during the 1980 to 1990 period when the coefficients on these variables are also statistically significant. Lagged population growth has a larger elasticity than net migration, which suggests that overall population growth is more important for employment growth than net migration per se. The elasticity for public debt for private purposes is large for manufacturing growth for the 1980 to 1990 period. Its negative sign implies that the use of this debt instrument has a large negative effect on employment growth.

These results are best compared with those found by Carlino and Mills (1987), Clark and Murphy (1996), and O'hUallachain and Satterthwaite (1992). The two former papers examine employment change in all counties in the United States and the third paper examines employment change only for those areas of the United States experiencing positive employment growth. In all cases, population growth or lagged employment growth are major determinants of employment growth or employment density. Differential regional growth can be explained largely on the basis of economic and demographic conditions (specifically lagged population and employment changes). Public policies through their effect taxes, expenditure and industrial revenue bonds issued by the state have little impact on either county population or employment levels, although Clark and Murphy (1996) find that industrial revenue bonds have some influence on employment change in non-manufacturing sectors.

O'hUallachain and Satterthwaite (1992) find urbanization and localization economies most often influenced growth in manufacturing industries. Industrial revenue bonds often had a coefficient with the wrong sign and did not significantly increase employment growth, although they use a statewide measure of industrial revenue bonds and not a measure specific to each metropolitan area as in our model. As already noted, their sample is restricted to counties that experienced employment growth, and their sample limits the extent to which their results can be generalized.

CONCLUSIONS

The results for total employment growth and for manufacturing employment growth suggest four general conclusions about the determinants of employment growth in larger metropolitan areas. First, prior population growth has a strong and significant influence on subsequent job growth. It appears that employment growth is also influenced by net migration into an area. Population size alone does not influence employment growth in this sample of large metropolitan areas. As mentioned above, population size may not appear that important in a sample of relatively large regions, but may be a more important influence on growth differences between smaller regions and this sample of larger regions.

Higher factor costs, such as earnings per worker and electricity costs, have a statistically significant negative effect on employment growth during the 1980s. The results for total employment growth and for manufacturing employment growth suggest that factor costs are more important statistically for growth in the 1980s than they were during the 1970s. The coefficient on unionization is negative and statistically significant for total employment growth in the 1970s. However, the coefficient is positive and statistically significant in the regression explaining total employment growth on the 1980s. The coefficients on unionization are not statistically significant in the manufacturing employment growth equations.

The coefficients on the fiscal variables are not statistically significant except the per capita state non-property taxes in the regression for the growth of total employment in the 1980s. The coefficient on per capita state and local welfare expenditures is statistically significant for total and manufacturing employment growth on the 1980s, but the coefficient is positive, contrary to what might be expected.

Finally, per capita private purpose public bonds do not influence employment growth in the 1980s. Our results reveal that, if anything, metropolitan areas with declining employment are more likely to use bonds in unsuccessful attempts to stem employment decline.

From the standpoint of instruments within the influence of policy makers, regions should focus on attracting working populations, and thus pay attention to variables that influence population growth or at least stability. Jobs, it seems, over the 1970s and the 1980s follow those variables that influence population growth. Furthermore, the effects of publicly sponsored workforce training programs, tax abatements and the subsidization of inputs from energy to transportation may have an effect on location that have not been revealed by the fiscal variables measured in this analysis. It would seem to be unwise to attribute either positive or negative growth effects for these tools of economic development without verifiable empirical analysis.

Table 1
Variable Names and Definitions

| | |
|--|--|
| Dependent Variables | Percent change in total employment in the metropolitan area, 1970 to 1980, or 1980 to 1990. Percent Change in manufacturing employment in the metropolitan area, 1970 to 1980, or 1980 to 1990. |
| Metro Net Migration | Net Migration to Metropolitan area 1970 to 1977 as a percentage of 1970 population and 1980 to 1990 as a percentage of 1980 population. |
| Percentage Change In Metropolitan Population | Percentage change in metropolitan population 1960 to 1970 and 1970 to 1980. |
| Metropolitan Population | Population size 1970 or 1980. |
| Earnings Per Worker | Earnings per worker for all workers in 1970 or 1980. |
| Electric Cost Per 1000 KWH | Residential rate for 1,000 kilowatt hours as reported for the largest city in each metropolitan area. |
| Per Capita Metropolitan Area Local Taxes | Local government taxes per capita collected in the metropolitan area in 1971 or 1981. |
| Per Capita Metropolitan Area Education Expenditures | Local government expenditure per capita on primary and secondary education in the metropolitan area, 1971 or 1981. |
| Percentage Black In Metro | Percentage of the metropolitan population that is black, 1970 or 1980. |
| Percentage Families In Poverty In Metro | Percentage of the families in the metropolitan area in poverty, 1970 or 1980. |
| Percentage Total Employment Unionized | Percentage of the metropolitan area total employment that is unionized, 1973 or 1985. |
| State Per Capita Non-Property Taxes | State per capita non-property taxes, 1971 or 1981. |
| State & Local Per Capita Welfare Expenditures | State and local per capita expenditure on welfare, 1971 or 1981. |
| Per Capita Private Purpose Public Debt | State and local accumulated public debt for private purposes for the metropolitan area, 1990. |

Table 2
Means & Standard deviations of Variables

| Variable Names | Mean | Standard Deviation | Minimum | Maximum |
|---|-----------|--------------------|----------|-----------|
| Percent Change in Total Employment 1980-1990 | 24.1 | 14.7 | -0.061 | 67.4 |
| Percent Change in Total Employment 1970-1980 | 30.2 | 21.5 | -9.9 | 94.2 |
| Percent Change in Manufacturing Employment, 1980-1990 | -2.9 | 21.6 | -44.9 | 72.0 |
| Percent Change in Manufacturing Employment, 1970-1980 | 15.8 | 32.1 | -36.1 | 137.4 |
| Metro Net Migration Between 1980 and 1990 as a % of 1980 population | 3.7 | 12.1 | -12.3 | 51.2 |
| Metro Net Migration Between 1970 and 1977 as a % of 1970 population | 2.4 | 11.3 | -17.0 | 39.6 |
| Percentage change in metropolitan population 1970 to 1980 | 13.3 | 15.2 | -8.8 | 53.5 |
| Percentage change in metropolitan population 1960 to 1970 | 19.2 | 14.3 | -0.32 | 89.2 |
| Population Size, 1980 (1990 metro definitions) | 1,498,890 | 1,536,610 | 254,700 | 8,280,900 |
| Population Size, 1970 (1990 metro definitions) | 1,387,380 | 1,565,040 | 249,500 | 9,080,600 |
| Earnings per worker, 1980 | \$15,253 | 1,714 | \$11,596 | \$20,893 |
| Earnings per worker, 1970 | \$ 7,375 | \$845 | \$5,543 | \$9,289 |
| Electric Cost per 1,000 kwh, 1987 | \$74.66 | \$17.60 | \$33.50 | \$113.51 |
| Electric Cost per 1,000 kwh, 1977 | \$35 | \$8.79 | \$9.72 | \$55.48 |
| Per capita metropolitan area local taxes, 1981 | \$430 | \$153 | \$207 | \$1,028 |
| Per capita metropolitan area local taxes, 1971 | \$250.08 | \$83 | \$106 | \$495 |
| Per capita metropolitan area education expenditures, 1981 | \$446.89 | \$86 | \$284.63 | \$778.07 |
| Per capita metropolitan area education expenditures, 1971 | \$240.07 | \$59 | \$124.73 | \$451.03 |
| Percentage Black in Metro, 1980 | 13.4 | 10.2 | 1.0 | 44.9 |
| Percentage Black in Metro, 1970 | 11.6 | 9.2 | 0.7 | 37.2 |
| Percentage Families in Poverty in Metro, 1980 | 8.8 | 3.0 | 4.4 | 18.0 |
| Percentage Families in Poverty in Metro, 1970 | 9.2 | 4.0 | 4.1 | 19.8 |
| Percentage Total Employment Unionized, 1985 | 20.5 | 8.0 | 5.7 | 41.2 |
| Percentage Total Employment Unionized, 1973 | 22.0 | 10.0 | 5.9 | 55.0 |
| State Per capita Non-Property Taxes, 1981 | \$693 | \$198 | \$93 | \$1,871 |
| State Per capita Non-Property Taxes, 1971 | \$304 | \$119 | \$37 | \$830 |
| State & Local Per capita Welfare Expenditures, 1981 | \$249 | \$117 | \$90 | \$553 |
| State & Local Per capita Welfare Expenditures, 1971 | \$97 | \$48 | \$40 | \$194 |
| Per capita Private Purpose Public Debt, 1990 | \$1,092 | \$702 | \$193 | \$4,004 |

Table 3
Instrumental Variables Models

| | Percentage Change in Total Employment | | | | Percentage Change in Manufacturing Employment | | | |
|--|---------------------------------------|---------|--------------|---------|---|---------|--------------|---------|
| | 1970 to 1980 | | 1980 to 1990 | | 1970 to 1980 | | 1980 to 1990 | |
| | N= 82 | | N=80 | | N=82 | | N=80 | |
| | Coefficient | T-Value | Coefficient | T-Value | Coefficient | T-Value | Coefficient | T-Value |
| Intercept | 16.060 | 0.773 | 83.068 | 6.267* | 1.310 | 0.027 | 87.430 | 2.100* |
| Metropolitan Net Migration | 0.780 | 3.721* | 0.463 | 2.533* | 1.727 | 2.814* | 0.240 | 0.252 |
| Percentage Change Metro Population (Lag) | 0.768 | 6.964* | 0.663 | 6.442* | 0.445 | 1.346 | 0.967 | 1.797* |
| Metropolitan Population (Lag) | -0.001 | 0.789 | 0.002 | 2.212* | 0.000 | 0.134 | 0.001 | 0.310 |
| Earnings Per Worker | 0.003 | 0.947 | -0.003 | 4.391* | 0.002 | 0.195 | -0.004 | 1.894* |
| Electric Cost Per 1000 Kwh | -3.172 | 2.233* | -0.111 | 1.914* | 0.127 | 0.378 | -0.289 | 1.701* |
| Per Capita Metro Area Local Taxes | -0.004 | 0.137 | 0.008 | 0.791 | -0.021 | 0.288 | 0.006 | 0.200 |
| Per Capita Metro Area Education Expenditures | -0.024 | 0.713 | -0.014 | 0.977 | 0.033 | 0.420 | 0.007 | 0.175 |
| Percentage Black In Metro | -0.496 | 2.885* | 0.140 | 1.059 | -1.203 | 3.262* | 0.027 | 0.069 |
| Percentage Families In Poverty In Metro | 1.148 | 2.227* | -1.660 | 3.758* | 2.092 | 1.935* | -0.356 | 0.268 |
| Percentage Total Employment Unionized | -0.445 | 2.632* | 0.339 | 2.054* | -0.538 | 1.404 | 0.131 | 0.265 |
| State Per Capita Non-Property Taxes | -0.001 | 0.120 | -0.016 | 3.103* | -0.024 | 1.013 | -0.013 | 0.887 |
| State & Local Per Capita Welfare Expenditures | 0.002 | 0.068 | 0.037 | 3.518* | -0.019 | 0.270 | 0.068 | 2.107* |
| Per Capita Private Purpose Public Debt | - | - | -0.0060 | 1.202 | - | - | -0.032 | 1.862* |

Data are for the largest 84 metropolitan areas. Absolute values of t-statistics are in parentheses.

*indicates statistical significance at the 0.05 level or higher.

Table 4
Elasticity's with Respect to Right-hand-side Variables

| | Percentage Change in Total Employment | | Percentage Change in Manufacturing Employment | |
|--|---------------------------------------|--------------|---|---------------------------|
| | 1970 to 1980 | 1980 to 1990 | 1970 to 1980 | 1980 to 1990 ^a |
| | N= 82 | N=80 | N=82 | N=80 |
| Metropolitan Net Migration | 0.062 | 0.071 | 0.262 | 0.201 |
| Percentage Change Metro Population (Lag) | 0.488 | 0.066 | 0.541 | 2.375 |
| Metropolitan Population (Lag) | -32.158 | 105.731 | 26.343 | 0.116 |
| Earnings Per Worker | 0.708 | -1.899 | 0.714 | -6.696 |
| Electric Cost Per 1000 Kwh | -3.633 | -0.345 | 0.277 | -2.639 |
| Per Capita Metro Area Local Taxes | -0.035 | 0.053 | -0.334 | 0.298 |
| Per Capita Metro Area Education Expenditures | -0.194 | -0.261 | 0.500 | 0.367 |
| Percentage Black In Metro | -0.190 | 0.059 | -0.883 | 0.052 |
| Percentage Families In Poverty In Metro | 0.350 | -0.606 | 1.218 | -0.359 |
| Percentage Total Employment Unionized | -0.324 | 0.288 | -0.750 | 0.331 |
| State Per Capita Non-Property Taxes | -0.012 | -0.455 | -0.469 | -1.097 |
| State & Local Per Capita Welfare Expenditures | 0.007 | 0.382 | -0.119 | 2.276 |
| Per Capita Private Purpose Public Debt | | -0.272 | | -4.261 |

*The mean value of manufacturing employment growth is negative for the 1980 to 1990 period, and for that equation the elasticities are evaluated at the 75th percentile of the variables. At that percentile the dependent variable is positive and the elasticities have the same sign as the estimated coefficients.

AUTHOR INFORMATION

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Craig Rogers, Ph.D. Dr. Rogers has written in the fields of urban geography and economic development with a focus on entrepreneurship. He has recently published an analysis of employment clusters in the Buffalo metropolitan area. He has had a long term interest in inner city business development and the spatial mismatch of employment opportunities and low income laborers.

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NOTES

¹ Initially a pooled sample was used to analyze total employment growth, for example, changes from 1970 to 1980 and from 1980 to 1990 in a single regression. However, the data do not support a pooled regression for the entire time period. We therefore split the sample and analyzed the two decades separately. For an analysis with similar non-pooling, see Carroll and Wasylenko (1994).

² An overview of the nature and limitations of public borrowing for private purposes can be found in Temple (1993).

³ The public debt for private purposes reported in the census includes industrial revenue bonds as well as other non-traditional debt such as that used for hospitals and in this sample increased from virtually nothing in 1980 to \$1092 per capita in 1990.

⁴ Since public debt for private purposes was very small in magnitude before 1980, this variable is not included in the 1970 to 1980 employment growth equations.

- ⁵ The instrumental variables for net migration and private purpose public debt are growth in the state population in the previous decade (1960 to 1970 in the case for 1970 to 1977 net migration to the metropolitan area), lagged metropolitan area per capita income, and dummy variables for region of the country (Northeast – excluded region, North Central, South and West). The estimation results for the employment growth models are similar when instrumented variables and when the original variables are used in alternative regression models.
- ⁶ The potential endogeneity of private purpose public debt with employment growth is taken into account by using instrumental variable estimation. See the previous footnote.
- ⁷ Of course maintaining constant boundaries forever could destroy the integrity of the analysis, thus this sample is limited to the 1970 to 1980 period when there was little public borrowing for private projects and the 1980 to 1990 period when this practice became quite widely used as a tool of economic development.

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