

Taxing Simply

District of Columbia Tax Revision Commission

Taxing Fairly

Full Report

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The Effect of Taxes on Employment and Population in the Washington Area

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Introduction

An important part of a comprehensive evaluation of the District's tax structure is an assessment of the impact of taxes on economic development. A commonly heard criticism is that the District's high tax burden deters businesses from creating jobs and keeps people from locating in the District. Some counter that quality-of-life factors are more important than taxes in explaining the relative performance of the District, while others assert that the District's fortunes are not discernably different from those of other central cities in large metropolitan areas, thus implying that cutting taxes to attract employment and people is not likely to be effective.

This chapter brings systematic evidence to bear on these various assertions. In the next section, we compare recent trends in employment, population, and income of the District and its metropolitan area to those of other central cities and metropolitan areas. This comparison enables us to check the validity of the often-asserted uniqueness of the District's situation. It also provides a context for the detailed analysis of employment and population in the District and its surrounding suburbs.

In this chapter, we investigate whether various factors are possible determinants of employment and population growth in the District and eight surrounding suburbs in Virginia and Maryland. The study is thus one of the effects of various factors, including taxes, on differences in intrametropolitan growth rates. Within the limitations of regression analysis, the results speak to the question of whether taxes, crime rates, or any other factors explain the differences in employment and population growth rates observed across the nine jurisdictions in the Washington metropolitan area. The final section of the report summarizes and interprets our findings.

A comparison of Washington, D.C. to other large cities and their suburbs

To place recent economic and demographic changes in the District and its metropolitan area in context, we compare the performance of the District to that of several

other large cities. To do so, we have compiled two data sets, one consisting of information on 22 cities and their metropolitan areas, and the other consisting of information on seven cities and their surrounding suburbs. The 22-city data set comprises the 20 largest U.S. cities in 1980, including Washington, D.C., as well as Atlanta and Boston since they currently are similar to the District in size.

The seven-city data set contains seven large cities, including the District, that do not have overlying counties. These cities are more comparable to the District than are cities that have overlying counties that also provide government services and impose taxes. While the six other cities are not perfectly comparable to the District because they have overlying state jurisdictions, the comparison is of interest because the District's high taxes often are attributed in part to the lack of overlying jurisdictions.

The data for the 22-city data set were obtained from the Bureau of Economic Analysis (BEA) (for data on metropolitan areas) and the Bureau of the Census (for data on cities). Because these two sources differ, the data are not perfectly comparable, but we are unaware of any other comprehensive source of data that covers several years for metropolitan areas and their component cities. The seven-city data were obtained from the same BEA source. Since the central cities in these seven metropolitan areas are effectively counties, the BEA data set, which provides data by county, covers them. Below, we use these data to compare population, employment, and per capita income growth rates across the District and similar areas.

POPULATION GROWTH

Figure C-1 presents population growth rates for the 22 cities and their metropolitan areas over the time periods 1970–1992 and 1986–1992.¹ The fastest growing metropolitan area over the more than 20-year period was Phoenix, with growth of 122 percent. During this period, three metropolitan areas actually lost population. The average growth rate for the 22 areas was 21 percent. The population growth rate of the District metropolitan area, 35 percent, exceeded the average.

None of the 22 central cities grew as much as its respective metropolitan area from 1970 to 1992. The average growth rate of the cities was essentially zero compared to the average metropolitan area growth rate of 21 percent. While several central cities, largely cities in the west, experienced rapid population growth, many others lost population — including the District, which lost nearly 23 percent. Only Cleveland and Detroit lost greater percentages of their populations than the District during this period, and unlike the District, Cleveland and Detroit lost population at the metropolitan level as well.

The story is much the same for the recent period, 1986–1992. On average, the metropolitan areas grew much faster than the central cities, and the District metropolitan area grew faster than average; several central cities, including the District, lost population over the six-year period.

Figure C-1**Population Growth for 22 Cities and Their Metropolitan Areas**

City	1970–1992 Growth		1986–1992 Growth	
	Metro	City	Metro	City
Atlanta	76.8%	-20.6%	17.7%	-6.4%
Baltimore	16.0	-19.8	6.5	-3.5
Boston	8.3	-13.9	2.2	-3.8
Chicago	6.2	-17.7	3.0	-8.0
Cleveland	-8.2	-33.1	-0.4	-6.2
Columbus	23.1	19.2	8.9	13.6
Dallas	70.6	21.1	10.7	1.9
Detroit	-4.4	-33.0	1.1	-6.8
Houston	83.9	37.1	7.5	-2.2
Indianapolis	83.9	0.3	7.5	3.7
Los Angeles	28.8	23.9	9.0	7.1
Memphis	20.2	-2.2	6.3	-6.5
Milwaukee	3.2	-14.0	4.1	2.0
New Orleans	13.2	-17.5	-3.5	-11.7
New York	-5.9	-7.4	0.6	0.7
Philadelphia	0.9	-20.3	2.1	-5.5
Phoenix	122.2	74.0	16.1	13.2
San Antonio	51.8	47.7	9.4	5.7
San Diego	90.5	64.9	18.4	13.2
San Francisco	10.0	1.9	3.2	-2.7
San Jose	42.6	79.5	7.6	12.5
Washington, D.C.	35.4	-22.6	11.8	-6.5
Average	21.3%	0.3%	6.0%	0.5%
High	122.2	79.5	18.4	13.6
Low	-8.2	-33.1	-3.5	-11.7

Source: U.S. Department of Commerce, Bureau of Economic Analysis, and the U.S. Census Bureau.

EMPLOYMENT GROWTH

Employment growth rates in cities compared to those in their metropolitan areas showed an overall trend toward service employment, a trend that was even stronger

Figure C-2

Employment Growth Rates by Sector for 22 Cities and Their Metropolitan Areas 1972-1992

City	Manufacturing		Retail Trade		Services		Wholesale Trade	
	Metro	City	Metro	City	Metro	City	Metro	City
Atlanta	20.3%	-33.1%	112.2%	-20.8%	197.6%	95.7%	104.7%	-43.2%
Baltimore	-35.1	-57.6	37.1	-28.9	116.4	67.3	35.1	-31.4
Boston	-16.5	-45.1	29.1	-6.2	104.0	99.5	36.5	-52.9
Chicago	-29.8	-56.6	29.3	-19.9	105.6	77.6	24.2	-39.3
Cleveland	-29.8	-54.7	20.8	-27.8	72.7	33.3	13.2	-33.9
Columbus	-16.1	-35.3	84.5	66.1	132.9	182.4	70.9	50.9
Dallas	38.0	-14.2	106.2	36.9	208.5	265.8	77.1	6.7
Detroit	-26.6	-65.5	29.3	-47.4	91.4	-14.5	19.6	-57.6
Houston	27.7	15.2	109.2	83.9	196.5	304.4	63.3	48.4
Indianapolis	27.7	-30.0	109.2	49.2	196.5	281.7	63.3	22.3
Los Angeles	-6.5	-14.0	35.4	21.6	114.2	157.2	42.6	22.4
Memphis	-9.6	-25.9	57.4	24.1	87.9	169.6	27.8	3.8
Milwaukee	-14.2	-46.6	27.1	-8.2	110.8	93.1	47.6	-3.1
New Orleans	-16.9	-43.9	51.1	18.2	85.7	85.3	-5.6	-56.7
New York	-52.2	-56.7	-13.1	-14.9	46.8	67.3	-26.2	-22.8
Philadelphia	-36.8	-63.9	21.4	-15.6	90.6	63.4	21.7	-42.8
Phoenix	75.0	36.8	158.6	101.3	274.8	327.5	170.6	82.0
San Antonio	31.2	17.5	103.1	90.2	172.3	356.5	45.1	32.7

Figure C-2, cont.

City	Manufacturing		Retail Trade		Services		Wholesale Trade	
	Metro	City	Metro	City	Metro	City	Metro	City
San Diego	106.7%	68.7%	139.1%	104.5%	240.8%	343.3%	231.0%	147.7%
San Francisco	-6.1	-20.5	51.0	32.5	113.1	138.0	3.8	-24.6
San Jose	93.3	126.1	87.4	89.1	182.3	490.4	210.2	231.4
Washington, D.C.	44.1	-33.0	69.2	-12.7	163.5	125.0	80.1	-50.1
Average	-15.1%	-39.6%	45.8%	10.2%	116.2%	126.9%	33.6%	-10.1%
High	-52.2	-65.5	-13.1	-47.4	46.8	-14.5	-26.2	-57.6
Low	106.7	126.1	158.6	104.5	274.8	490.4	231.0	231.4

Note: Number of employees in Wholesale Trade, 1972 for Houston metropolitan area does not include Montgomery County.
 Source: U.S. Department of Commerce, Bureau of Economic Analysis, and the U.S. Census Bureau.

in cities. Figure C-2 shows employment growth rates for four major industries over the two-decade period, 1972–1992.² Over the two decades, the fastest growing industry in these metropolitan areas was the services industry, with an average growth of 116 percent. Manufacturing employment *declined* by 15 percent on average. For three industries — manufacturing, wholesale trade, and services — the metropolitan areas outperformed the central cities, but service employment grew slightly faster in the central cities than in the metropolitan areas.

Employment growth in the Washington metropolitan area was greater than the average of the metropolitan areas for each of the four industries, and notably so for manufacturing. In contrast, manufacturing employment declined in the District by 33 percent, slightly less than the average decline of the central cities. The District's 125 percent service employment growth was virtually identical to the average for the cities, while its employment growth rates in the two trade industries were much lower than the averages for the cities.

INCOME GROWTH

From 1969 to 1989, real income per capita increased nearly 40 percent on average for the metropolitan areas, while it increased 26 percent for the central cities (Figure C-3). Real income per capita actually fell in the central cities of Cleveland and Detroit. Both the District and its metropolitan area experienced faster than average growth in real income per capita over the period.

In 1989, real income per capita was \$16,745 on average for the cities, and significantly higher, \$23,660 on average, for the corresponding metropolitan areas. Both for the District and its metropolitan area, real income per capita was substantially above the corresponding averages; it was second only to San Francisco and its metropolitan area. (By 1994, the Washington metropolitan area was third behind the San Francisco and New York City metropolitan areas.)

SEVEN-CITY GROWTH RATES COMPARED

On average, over the 25-year time period, population declined by 13 percent in the seven central cities but increased 8 percent in the metropolitan areas (Figure C-4).³ The contrast was even starker for the District as the city lost 26 percent of its population over the period while the metropolitan area gained 42 percent. The same relative patterns held during the recent period of 1991–1994, a period of general expansion in the economy.

On average, the city and metropolitan area growth rates of real income per capita were nearly identical for the seven comparison areas, growing more than 40 percent over the 25-year period. In the District, however, real income per capita grew faster than in the metropolitan area (a pattern the District shared with St. Louis). It is possible that this could be attributable to middle-income flight from the District to its suburbs.

Figure C-3

Real per Capita Income Growth Rates and Real per Capita Income for 22 Cities and Their Metropolitan Areas

City	1969–1989 Growth		Per Capita Income		
	City	Metro	1989 City	1989 Metro	1994 Metro
Atlanta	43.3%	50.6%	\$18,261	\$23,278	\$23,633
Baltimore	23.4	49.9	14,335	24,184	24,046
Boston	49.1	52.6	18,622	26,339	26,093
Chicago	12.2	30.5	15,416	25,043	25,865
Cleveland	-2.9	25.9	11,065	22,361	23,502
Columbus	28.7	36.9	15,718	20,868	22,058
Dallas	30.5	39.9	19,481	23,563	24,480
Detroit	-12.7	31.5	11,286	23,589	24,692
Houston	24.8	44.3	17,044	22,892	24,214
Indianapolis	23.6	35.5	17,304	22,171	23,583
Los Angeles	21.3	22.5	19,347	23,496	21,562
Memphis	23.8	57.4	13,962	20,214	21,564
Milwaukee	3.2	31.4	13,273	22,571	23,948
New Orleans	24.4	31.7	13,591	18,288	19,833
New York	30.3	34.7	19,458	27,552	28,800
Philadelphia	18.6	43.4	14,451	24,323	25,220
Phoenix	28.2	39.0	16,847	20,605	20,999
San Antonio	33.1	41.6	13,008	17,932	18,466
San Diego	38.0	34.0	19,602	22,683	21,627
San Francisco	37.7	45.2	23,539	33,196	34,281
San Jose	47.4	48.5	20,204	28,059	28,250
Washington D.C.	45.4	53.2	22,566	28,891	28,762
Average	26.0%	40.0%	\$16,745	\$23,732	\$24,340
High	49.1	57.4	23,539	33,196	34,281
Low	-12.7	22.5	11,065	17,932	18,466

Note: In 1994 dollars.

Source: U.S. Department of Commerce, Bureau of Economic Analysis, and U.S. Census Bureau.

Figure C-4

Growth Rates for the Seven Cities and Their Metropolitan Areas

	CITIES				METRO AREAS							
	Popu- lation	Per Capita Income	Total Private Employ- ment	Manu- factur- ing	Whole- sale Trade	Retail Trade Services	Popu- lation	Per Capita Income	Total Private Employ- ment	Manu- factur- ing	Whole- sale Trade	Retail Trade Services
Baltimore												
1969-1994	-22.7%	42.5%	93.6%	-65.5%	-36.1%	-37.0%	46.6%	18.6%	49.1%	45.4%	-47.2%	43.0%
1991-1994	-4.0	4.7	3.6	-10.7	-17.3	-8.6	0.5	1.9	1.8	1.8	-10.4	-3.2
												53.1%
												3.7
												6.5
												150.8%
New Orleans												
1969-1994	-19.4	47.9	-9.2	-54.6	-50.4	-3.3	41.8	15.4	42.9	36.8	-22.3	5.6
1991-1994	-1.4	8.2	-0.7	-10.6	-13.8	5.0	6.5	1.4	5.8	3.1	-3.5	-0.4
												67.7
												5.9
												8.8
New York												
1969-1994	-6.7	39.4	-10.7	-65.1	-39.5	-23.1	47.0	-4.9	40.8	-5.4	-62.4	-34.4
1991-1994	0.3	4.5	-1.0	-8.6	-6.1	-1.6	3.9	0.6	4.1	-1.2	-9.9	-6.0
												-17.4
												-1.1
												3.8
Philadelphia												
1969-1994	-22.0	34.8	-29.8	-74.7	-56.7	-34.2	35.2	2.5	48.7	21.8	-46.4	21.0
1991-1994	-2.7	2.4	-3.8	-14.9	-19.2	-5.6	2.4	0.4	3.8	1.4	-6.1	-3.8
												27.6
												1.2
												5.6
San Francisco												
1969-1994	1.2	44.8	17.9	-33.1	-41.7	26.2	87.4	11.1	49.9	31.7	-18.9	-9.2
1991-1994	1.2	4.4	-3.6	-4.5	-7.6	-3.2	-1.7	2.0	3.8	4.8	-5.1	-7.9
												50.7
												-2.2
												0.3
St. Louis												
1969-1994	-42.8	62.8	98.0	-64.1	-53.7	-32.3	4.1	5.1	45.5	48.5	-29.8	19.8
1991-1994	-6.0	7.1	3.4	-4.1	-6.4	-0.5	8.2	1.1	4.5	-2.7	-5.6	1.1
												54.8
												5.3
												10.0
Washington, D.C.												
1969-1994	-25.6	66.8	21.7	-31.1	-69.9	-25.1	80.3	41.8	52.6	119.7	47.5	97.5
1991-1994	-4.6	8.5	-0.3	-9.5	-24.5	-4.0	2.9	4.0	2.5	4.9	-0.4	1.3
												93.1
												3.4
												7.8
Average												
1969-1994	-12.9	43.8	25.9	-64.8	-44.1	-22.1	48.9	7.7	45.5	42.6	-46.2	-3.7
1991-1994	-0.8	4.9	-0.3	-9.0	-9.3	-2.5	3.1	1.4	3.7	1.8	-7.0	-3.5
												28.7
												1.8
												5.6

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Total private employment grew only slightly faster on average for the seven cities than it did in the District from 1969 to 1994. On the other hand, the Washington metropolitan area experienced significantly more rapid total employment growth than the average of the seven metropolitan areas, both over the 25-year time period and in the 1990s.

From 1969 to 1994, the decline in the District's manufacturing employment was smaller than the average decline of the seven central cities. An interesting comparison can be made between the District and its metropolitan area and the averages for the seven cities and their suburbs. Manufacturing employment declined significantly for the average of both the cities and the metropolitan areas. By contrast, while manufacturing employment declined in the District, it grew rapidly in the metropolitan area.

The Washington metropolitan area performed well relative to the average of the seven metropolitan areas for each of the four industries displayed during both time periods. The District performed well (relative to the average of the seven central cities) only in manufacturing and services and only during the 25-year time period.

Intraregional econometric analysis

In this section, we use regression analysis to determine which factors are the key determinants of population and employment growth in the District and surrounding metropolitan area.

Regression analysis is a systematic method of determining whether the measure of interest, say employment growth, is related to a number of possible explanatory factors, such as taxes. By testing all factors at the same time, the method allows each factor to be examined while holding all other factors constant. In other words, having controlled for all other factors, the method asks if the factor in question has an additional impact on the variable of interest. This is important because it is often the case that two variables will be correlated, but the correlation reflects the effect of another relevant factor that was not included in the analysis. The method also provides a measure of the amount of variation in the variable of interest that is explained by the set of factors tested.⁴

Employment growth is of interest for obvious economic development reasons. But population or choice of residence has more than the usual implications for economic activity since the District is not allowed to tax nonresident workers.

INFLUENCES ON POPULATION GROWTH RATES

We examined the influences on the population growth rate for the District and eight surrounding counties from 1969 to 1994. Over this period, the average annual

growth rate in population for all jurisdictions was 1.75 percent, ranging from a minimum of -1.18 percent in the District to a maximum of 4.38 percent in Loudoun County.

We related the resident population growth rate to three sets of variables. First, we included the tax rates of taxes paid by individuals: sales tax, property tax, and personal income tax on incomes of \$25,000. Second, we included: per capita income, a per capita crime index derived from the FBI Uniform Crime Reports, per capita AFDC expenditures, and total per capita local expenditures. Third, we included variables characterizing the industrial composition of employment (the fraction of private employment in manufacturing, for example) because there is some evidence suggesting that different types of employment may influence growth. It is natural to think that population does not respond instantly to certain changes, such as change in the income tax rate, so we used the one-year lag of these variables in the regressions.

We allowed for a flexible annual growth rate for the entire region, and controlled for aggregate effects that affected either population growth or the policy and environmental variables. In addition, we included controls for permanent differences across the jurisdictions or qualitative differences that we were unable to measure. Thus, all estimates measured the effect of, for example, the personal income tax on population growth rates net of aggregate regional trends over time and long-term differences between the jurisdictions.

Because we included these general controls, in our discussion below we extend the conventional significance level of statistical tests from 5 percent to 15 percent. For example, we consider a variable to have a statistically significant influence on population growth if the estimated coefficient's p-value (the probability of observing that coefficient if the true coefficient is zero) is 0.15 or less. We also report p-values for all coefficients for the interested reader.

Our calculation of the local personal income tax rate (on incomes of \$25,000) indicates that the District does not stand out as a particularly high personal income tax jurisdiction — the District's rates are similar to those of Charles, Montgomery, and Prince George's counties. The District does have the highest sales tax rates. In 1994, the last year in our time series, the District rate was an average of 6.69 percent, compared to 4 percent or 4.5 percent elsewhere in the region. The District's residential property tax rates, while higher in the early years of our panel, have fallen (as have the other jurisdictions' rates) to be comparable with or below those of its neighbors.

Figure C-5 reports our results for population growth. Column 1 in Figure C-5 indicates how each jurisdiction grew on average. While all counties except Loudoun County grew more slowly than Prince William County (the jurisdiction against which we measured other jurisdictions), the District's growth rate was the slowest, averaging about 5.1 percentage points less each year.

Most of the variation in population growth rates (63.2 percent) is explained by permanent differences between the counties. However, a comparison of the unchanging attributes of the District across each column of Figure C-5 indicates that once differences in tax rates, environmental and expenditure policy variables, and employment shares are considered, the District's population growth rate experience no longer stands out. Systematic differences in the explanatory variables explain variations in population growth rates.

Column 4 of Figure C-5 presents the most complete picture. Tax rates do not appear to influence population growth rates in the region. The taxes that are exclusively paid by residents — the personal income and property tax — have a negative sign as expected, but the estimates are not statistically significant. The growth rate in population and the tax rates are measured in decimal; a one percentage point increase in the personal income tax rate is predicted to reduce the population growth rate by 0.63 percentage points. A one mill increase in the property tax rate is estimated to reduce the population growth by 0.69 percentage points. Because neither of these has a p-value of 0.15 or less, the effects are not statistically different from zero. A one percentage point higher sales tax, with its potential for export to nonresidents, is estimated to increase the growth rate by 0.79 percentage points, but again, the level of precision does not meet our standard (a p-value of 0.17). We also find that as a group, the tax rates have no influence on population growth in this region.

Of the environmental variables, per capita income plays a statistically significant role in attracting residents. A 10 percent increase in per capita personal income implies a 0.61 percentage point increase in the population growth rate (with a p-value of 0.08). The District's average per capita income places it in the middle of these jurisdictions.

The District is a standout in per capita crime, however. The District averaged about nine crimes per hundred residents over this period, while most of the jurisdictions averaged about four, except for the city of Alexandria with 7.7. The crime index, however, is not statistically significant and has a small estimated effect as well. This lack of an effect of the crime index has two possible explanations. First, the crime data from the FBI may be of poor quality so that our crime index may be an inaccurate measure. Second, and more importantly, our evidence indicates that once we control for the other important factors, the crime index does not appear to have an additional, independent effect.

Of the expenditure policy variables, per capita AFDC expenditures are estimated to be a statistically significant and negative influence on the growth rate of population. The estimates indicate that a 10 percent increase in per capita AFDC expenditures implies a 0.17 percentage point drop in the growth rate (with a p-value of 0.03). We had no measure of poverty rates at the jurisdiction level, but since AFDC expenditures are driven primarily by caseload, this variable may be a proxy for the

Figure C-5

**OLS Regression: Population Growth Rate
1969-1994**

	(1)	(2)	(3)	(4)
Washington, D.C.	-0.051 (0.004) [0.000]	-0.040 (0.012) [0.001]	-0.025 (0.034) [0.456]	-0.015 (0.044) [0.732]
Charles County, Md.	-0.005 (0.004) [0.253]	0.007 (0.014) [0.637]	0.016 (0.019) [0.418]	0.022 (0.024) [0.348]
Montgomery County, Md.	-0.021 (0.004) [0.000]	-0.006 (0.014) [0.675]	-0.031 (0.031) [0.321]	-0.022 (0.030) [0.556]
Prince George's County, Md.	-0.032 (0.004) [0.000]	-0.017 (0.014) [0.244]	-0.005 (0.027) [0.866]	0.010 (0.031) [0.746]
City of Alexandria, Va.	-0.038 (0.004) [0.000]	-0.031 (0.004) [0.000]	-0.049 (0.017) [0.004]	-0.044 (0.025) [0.085]
Arlington County, Va.	-0.039 (0.004) [0.000]	-0.029 (0.004) [0.000]	-0.064 (0.017) [0.000]	-0.065 (0.032) [0.043]
Fairfax County, Va.	-0.012 (0.004) [0.003]	-0.007 (0.004) [0.048]	-0.036 (0.020) [0.073]	-0.030 (0.028) [0.290]
Loudoun County, Va.	0.005 (0.004) [0.218]	0.005 (0.005) [0.241]	-0.023 (0.016) [0.156]	-0.032 (0.024) [0.181]
Personal income tax rate, income = \$25,000		-0.409 (0.488) [0.403]	-0.779 (0.523) [0.139]	-0.625 (0.541) [0.250]
Sales tax rate		0.171 (0.462) [0.711]	0.870 (0.574) [0.132]	0.794 (0.570) [0.166]
Residential property tax rate		-0.472 (0.748) [0.529]	-1.278 (0.869) [0.144]	-0.688 (0.956) [0.473]

	(1)	(2)	(3)	(4)
log (per capita AFDC expenditures)			-0.014 (0.007) [0.062]	-0.017 (0.008) [0.034]
log (per capita income)			0.064 (0.032) [0.049]	0.061 (0.035) [0.080]
log (total crime index)			-0.002 (0.010) [0.865]	-0.005 (0.012) [0.692]
log (total expenditures)			-0.003 (0.009) [0.753]	-0.003 (0.009) [0.744]
Fraction of manufacturing employment				-0.084 (0.124) [0.498]
Fraction of construction employment				-0.113 (0.109) [0.300]
Fraction of service employment				-0.136 (0.057) [0.018]
Fraction of wholesale trade employment				-0.276 (0.178) [0.123]
Fraction of retail trade employment				-0.166 (0.087) [0.057]
Constant	0.039 (.003) [0.000]	0.037 (0.028) [0.184]	-0.531 (0.354) [0.137]	-0.365 (0.374) [0.330]
Observations	225	173	162	162
R-squared	0.632	0.767	0.797	0.812

Note: Prince William County, Va., is the omitted county, and Finance, Insurance, and Real Estate is the omitted employment share category. Regressions in Columns 2–4 include year dummies. Standard errors are in parentheses, and p-values are in brackets.

number of welfare recipients per capita. If so, our results indicate that concentrations of poverty negatively affect population growth. The District's per capita AFDC expenditures are much higher than those of the surrounding counties.

We had no proxy for the quality of public services; total expenditures at the jurisdiction level has the wrong sign and is statistically insignificant (with a p-value of 0.74). This is likely to be a measurement error problem due to the political economy of the region. The level of public services (leaving aside quality) is a difficult concept to compare across these jurisdictions, since the District is responsible for a vast array of state-type services, including those that Virginia and Maryland provide for the other jurisdictions. The District's per capita total expenditures are far higher than those of the surrounding areas.

We included the employment shares from major industrial groups to determine if certain industries attract or repel residents. Industrial composition of an area may affect the desirability of a place to live. An increase in the employment share in either the service industry or retail or wholesale trade (with a corresponding reduction in finance insurance and real estate employment share) is estimated to reduce the population growth rate. A one percentage point increase in service, retail, or wholesale employment is estimated to reduce the population growth rate by 0.14 (with a p-value of 0.02), 0.17 (with a p-value of 0.06), and 0.28 percentage points (with a p-value of 0.12), respectively. Higher employment shares in manufacturing or in construction do not appear to influence resident population growth.

INFLUENCES ON THE GROWTH RATE OF PRIVATE EMPLOYMENT

In this section, we move from residents to jobs, examining the influences on the growth rate in private employment from 1969 to 1994. Over this period, the average annual growth rate for the region is 4.4 percent, ranging from a minimum of 0.78 percent in the District to a maximum of 7.36 percent in Prince William County.

In this section, we use models that are similar to those for population growth, but we employ a slightly different set of explanatory variables. We relate the growth rate in private employment to three sets of variables — tax costs as well as environmental and employment composition variables (again, lagging them one year) — but we replace the tax rates faced by individuals with those tax rates or costs that are applicable to business (the sales tax, the property tax, the corporate income tax, the personal property tax, and the average cost of unemployment insurance).

With the exception of the personal property tax, District business taxes are highest on average over this period. The District's commercial property tax averaged 1.98 percent of value, while the next highest average is Prince William County's with 1.44 percent of value. The District's franchise tax rate (similar to a state corporate income tax on corporate net income) averages well above the others (9.3 percent compared to 7 percent or 6 percent for the two states). As mentioned above, the

District has the highest sales tax rate. The sales tax is a revenue source traditionally used by states more than localities, but the District is heavily dependent on it. The District's average unemployment insurance costs were the highest for the region over this period.

Nationally, fewer and fewer states tax business tangible personal property — many specifically exempt it as an investment incentive. However, all the jurisdictions in this region do use a personal property tax on tangibles. The tax is levied on machinery, equipment, and inventories, and it is not particularly high in the District, where it ranked sixth in a comparison of average rates. The tax also exempts inventories — a fact not reflected in our data. Column 1 of Figure C-6 indicates that the District employment growth rate averaged 6.6 percentage points less than that of Prince William County (the base jurisdiction used for comparison). About 23 percent of the variation in employment growth rates is explained by permanent differences between the counties. But again, as with population growth, the District's experience is not unique once systematic differences in the explanatory variables are taken into account.

The most complete model is presented in Column 4 of Figure C-6. Two business taxes, the personal property tax and the sales tax, appear to reduce employment growth. The personal property tax is estimated to have a statistically significant and large negative effect on employment growth. Our estimate indicates that a one percentage point increase in the tax rate reduces employment growth by 1.76 percentage points (with a p-value of 0.01).

The sales tax also has a large negative effect, and it is close to meeting our standard for statistical significance. We estimate that a one percentage point increase in the sales tax rate is estimated to reduce the growth rate in employment by 1.92 percentage points (with a p-value of 0.16).

The commercial property tax and corporate income tax variables have positive effects on private employment but are imprecisely measured. A positive effect of the property tax on employment growth is difficult to explain. If high property taxes are correlated with high spending on schools, this result may be picking up an effect of good schools on business location decisions.

The positive and statistically insignificant corporate tax coefficient may result from the lack of variation over time in this variable. The corporate tax rate varies only across states, and Maryland and Virginia did not change their rates over this time period. The only variation left to relate to employment levels is the variation over time in the District, and this does not appear to influence employment growth.

Higher unemployment insurance costs also reduce employment growth, but the estimated coefficient is not statistically significant. A 10 percent increase in the average cost of unemployment insurance reduces employment growth by 0.17 percentage points (with a p-value of 0.25).

Figure C-6

**OLS Regression: Growth Rate in Private Employment
1969-1994**

	(1)	(2)	(3)	(4)
Washington, D.C.	-0.066 (0.011) [0.000]	-0.067 (0.055) [0.220]	-0.171 (0.094) [0.073]	-0.119 (0.126) [0.345]
Charles County, Md.	-0.017 (0.011) [0.141]	0.003 (0.024) [0.895]	0.041 (0.034) [0.227]	0.025 (0.042) [0.556]
Montgomery County, Md.	-0.035 (0.011) [0.003]	-0.016 (0.021) [0.443]	-0.087 (0.065) [0.187]	-0.058 (0.087) [0.508]
Prince George's County, Md.	-0.040 (0.011) [0.000]	-0.025 (0.020) [0.222]	-0.053 (0.058) [0.368]	-0.004 (0.067) [0.955]
City of Alexandria, Va.	-0.050 (0.011) [0.000]	-0.017 (0.010) [0.097]	-0.074 (0.036) [0.039]	-0.051 (0.061) [0.409]
Arlington County, Va.	-0.045 (0.011) [0.000]	-0.004 (0.012) [0.711]	-0.061 (0.039) [0.120]	-0.023 (0.077) [0.768]
Fairfax County, Va.	-0.007 (0.011) [0.516]	0.011 (0.009) [0.199]	-0.057 (0.047) [0.230]	-0.015 (0.067) [0.823]
Loudoun County, Va.	-0.006 (0.011) [0.583]	0.036 (0.011) [0.001]	0.041 (0.039) [0.300]	0.015 (0.058) [0.792]
Sales tax rate		-2.029 (1.104) [0.047]	-2.434 (1.358) [0.076]	-1.915 (1.364) [0.163]
Commercial property tax rate		3.410 (1.459) [0.021]	3.001 (1.637) [0.069]	2.204 (1.734) [0.206]
Corporate tax rate		0.691 (1.278) [0.590]	0.844 (1.460) [0.564]	0.706 (1.467) [0.631]

	(1)	(2)	(3)	(4)
Personal property tax rate		-1.586 (0.652) [0.016]	-1.719 (0.675) [0.012]	-1.755 (0.707) [0.014]
log (unemployment insurance cost)		-0.018 (0.013) [0.160]	-0.018 (0.014) [0.185]	-0.017 (0.014) [0.252]
log (per capita income)			0.091 (0.076) [0.234]	0.094 (0.083) [0.262]
log (total crime index)			0.018 (0.025) [0.481]	-0.001 (0.029) [0.962]
log (total expenditures)			0.035 (0.022) [0.110]	0.033 (0.022) [0.138]
Fraction of manufacturing employment				-0.091 (0.314) [0.772]
Fraction of construction employment				0.462 (0.265) [0.084]
Fraction of service employment				0.114 (0.141) [0.420]
Fraction of wholesale trade employment				-0.627 (0.443) [0.159]
Fraction of retail trade employment				-0.030 (0.197) [0.878]
Constant	0.074 (0.008) [0.000]	0.154 (0.089) [0.087]	-1.286 (0.834) [0.126]	-1.208 (0.925) [0.194]
Observations	225	171	162	162
R-squared	0.228	0.706	0.716	0.736

Note: Prince William County, Va., is the omitted county, and Finance, Insurance, and Real Estate is the omitted employment share category. Regressions in Columns 2–4 include year dummies. Standard errors are in parentheses, and p-values are in brackets. All regressors are lagged one year.

Two environmental variables play a role in employment growth. There is some evidence that total per capita income may have a positive effect on employment growth. A 10 percent increase in per capita income is estimated to increase private employment growth by 0.94 percentage points (with a p-value of 0.26). While public expenditures do not appear to play a role in population changes, they do appear to influence private employment growth rates — a 10 percent increase is predicted to increase employment growth by 0.33 percentage points (with a p-value of 0.14). However, the remaining environmental variable, the per capita crime rate, does not appear to influence employment growth.

Higher existing employment shares in construction appear to increase employment growth, while wholesale trade appears to reduce it. A one percentage point increase in construction share is associated with an increase in total private employment of 0.46 percentage points (with a p-value of 0.08), while a one percentage point increase in wholesale trade share reduces the total employment growth rate by 0.63 percentage points (with a p-value of 0.16).

INFLUENCES ON EMPLOYMENT GROWTH BY SECTOR

To paint a more detailed picture of how taxes affect local economic performance in the Washington area, we analyzed the sensitivity of employment in a number of different industrial sectors. The regressions employed an array of explanatory variables similar to those used to explain total private employment. We now focus our discussion on the role of taxes for four broadly defined industries and on the influence of industrial revenue bonds for the subsector of health services.

Services and retail trade are the two industrial sectors with the most employees in the District. They represent 66 percent and 11 percent, respectively, of workers employed by private industry in the District. We also analyzed employment in construction because the regressions for total private employment indicate that the share of construction jobs in a jurisdiction may be a significant predictor of employment growth. We included manufacturing because of the impressive growth this sector has experienced in the metropolitan area. We think it is notable that the decline in the District's manufacturing sector has been slower than the average major city. In 1994, 75 percent of manufacturing jobs in the District were in the subsector printing and publishing.

Health services account for more than 22 percent of the employment in services and 15 percent of total private employment in the District. This is one of the few sectors in which the number of District jobs has increased. In fact, the growth of this subsector in the District has outpaced its growth in the metropolitan area. As the District also has an active industrial revenue bond program (IRB) targeted to this industry, we tested whether the issuance of health-related IRBs affects employment growth in health services.

Service sector

As in the total private employment regressions, the sales tax is negatively related to growth in the service sector, but in the service sector, the effect is more than twice as large (Figure C-7). The estimate indicates that a one percentage point increase in the sales tax rate reduces the employment growth rate by 4.9 percentage points (with a p-value of 0.01). The service sector apparently is especially sensitive to the sales tax. Finding a strong sales tax effect on this huge sector of the economy reinforces the finding for total private employment. The other taxes shown exhibit smaller effects on services employment growth, and these effects are not statistically significant.

Health services

Many of the institutions that constitute the health services sector are hospitals, which are specifically exempted from local taxation. We thus omit business tax rates from our health services regression. We include industrial revenue bond (IRB) issuances that are targeted to health-related institutions. The issuance information for these bonds is available only for the District, Alexandria, and the Virginia counties. IRBs are measured in thousands of dollars per capita. Four years of health IRB issuances are included in the regression displayed in Figure C-7. Statistical tests indicate that the IRB policy plays a role in attracting health services employment. Including four IRB variables in the regression increases the percentage of the variation explained from 41 percent to 49 percent.

Three-year-old issuances have a statistically significant effect, indicating that three years after the issuance of industrial revenue bonds of \$100 per capita, an increase in the growth rate of 4.1 percent can be predicted. On average, the District has issued about \$75 million of health-related IRBs, or about \$135 per capita. Our regression results suggest this accounts for about 60 percentage points of the 125 percent growth in health services employment between 1985, the inception of the District's IRB program, and 1994.

Retail sector

The retail sector accounted for 51,161 jobs in the District in 1994. The results indicate that the sales tax and the personal property tax have highly significant effects, both negative (Figure C-7). For example, a one percentage point decrease in the sales tax rate is predicted to produce a four percentage point increase in the growth of the retail sector in the following year. The p-value associated with this variable is 0.03. A one percentage point decline in the personal property tax rate is predicted to boost the growth rate of retail employment 2.6 percent. The p-value for this effect is 0.01. The other tax rates have smaller effects and are not statistically significant.

Figure C-7

**Sectoral OLS Regressions: Employment Growth Rate
1969-1994**

	(1)	(2)	(3)	(4)	(5)
	Services	Retail	Health Services	Manufacturing	Construction
Washington, D.C.	0.469 (0.194) [0.017]	-0.350 (0.208) [0.095]	0.091 (0.488) [0.852]	-0.781 (0.509) [0.128]	-1.390 (0.457) [0.003]
Charles County, Md.	-0.114 (0.068) [0.096]	0.137 (0.073) [0.063]		-0.045 (0.178) [0.801]	0.044 (0.160) [0.784]
Montgomery County, Md.	0.374 (0.135) [0.007]	-0.159 (0.145) [0.274]		-0.533 (0.356) [0.137]	-0.796 (0.319) [0.014]
Prince George's County, Md.	0.305 (0.114) [0.008]	-0.062 (0.122) [0.614]		0.032 (0.299) [0.916]	-0.419 (0.269) [0.121]
City of Alexandria, Va.	-0.009 (0.094) [0.928]	-0.015 (0.101) [0.885]	0.198 (0.295) [0.505]	-0.434 (0.248) [0.083]	-0.391 (0.222) [0.081]
Arlington County, Va.	0.123 (0.109) [0.260]	-0.070 (0.117) [0.552]	0.045 (0.347) [0.898]	-0.624 (0.286) [0.031]	-0.617 (0.257) [0.018]
Fairfax County, Va.	0.332 (0.111) [0.003]	-0.109 (0.119) [0.363]	-0.138 (0.346) [0.691]	-0.447 (0.292) [0.128]	-0.574 (0.262) [0.030]
Loudoun County, Va.	-0.134 (0.093) [0.153]	0.119 (0.100) [0.237]	-0.265 (0.263) [0.317]	-0.410 (0.245) [0.097]	0.174 (0.220) [0.429]
Sales tax rate	-4.943 (1.712) [0.005]	-3.978 (1.834) [0.032]		-5.286 (4.500) [0.242]	-1.526 (4.039) [0.706]
Commercial Property tax rate	1.865 (2.361) [0.431]	3.039 (2.529) [0.232]		5.071 (6.205) [0.415]	5.583 (5.569) [0.318]

	(1)	(2)	(3)	(4)	(5)
	Services	Retail	Health Services	Manufacturing	Construction
Corporate tax rate	-0.353 (2.015) [0.861]	-1.166 (2.159) [0.590]		1.154 (5.296) [0.828]	4.701 (4.753) [0.325]
Personal property tax rate	-0.244 (0.956) [0.799]	-2.596 (1.025) [0.013]		-0.151 (2.513) [0.952]	-6.269 (2.256) [0.006]
log (unemployment insurance cost)	-0.026 (0.019) [0.174]	-0.024 (0.021) [0.256]	0.022 (0.143) [0.877]	0.049 (0.051) [0.338]	-0.032 (0.046) [0.489]
log (total crime index)	-0.025 (0.042) [0.559]	0.061 (0.045) [0.182]	-0.097 (0.124) [0.436]	-0.178 (0.111) [0.112]	0.082 (0.100) [0.412]
log (per capita income)	-0.118 (0.113) [0.299]	-0.175 (0.121) [0.151]	0.000 (0.319) [1.00]	0.258 (0.297) [0.388]	0.101 (0.267) [0.705]
log (expenditures on public works)	0.040 (0.018) [0.027]	0.044 (0.019) [0.023]	-0.240 (0.071) [0.001]	0.038 (0.047) [0.417]	0.068 (0.042) [0.108]
log (population)	-0.176 (0.065) [0.008]	0.094 (0.070) [0.183]	0.087 (0.182) [0.635]	0.015 (0.171) [0.932]	0.204 (0.154) [0.187]
Fraction of manufacturing employment	-0.304 (0.480) [0.528]	0.191 (0.515) [0.711]	-1.965 (1.634) [0.233]	-5.019 (1.262) [0.000]	-1.689 (1.133) [0.139]
Fraction of construction employment	0.627 (0.352) [0.077]	0.929 (0.377) [0.015]	0.990 (1.167) [0.399]	-0.186 (0.926) [0.841]	-2.809 (0.831) [0.001]
Fraction of services employment	-0.550 (0.215) [0.012]	0.426 (0.231) [0.067]	-0.292 (0.652) [0.655]	-0.109 (0.566) [0.848]	0.021 (0.508) [0.968]
Fraction of retail employment	0.238 (0.301) [0.432]	-0.826 (0.323) [0.012]	-2.228 (1.190) [0.065]	-2.441 (0.792) [0.003]	-0.969 (0.711) [0.175]
Fraction of wholesale trade employment	0.219 (0.666) [0.743]	-1.296 (0.714) [0.072]	-0.961 (2.277) [0.674]	-5.851 (1.751) [0.001]	-3.178 (1.571) [0.045]

Figure C-7, cont.

	(1)	(2)	(3)	(4)	(5)
	Services	Retail	Health Services	Manufacturing	Construction
Constant	2.581 (1.247) [0.041]	1.502 (1.336) [0.263]	0.624 (2.894) [0.830]	-2.015 (3.277) [0.540]	-1.427 (2.941) [0.628]
IRB health issuance per capita (-1)			-0.223 (0.167) [0.186]		
IRB health issuance per capita (-2)			0.172 (0.175) [0.329]		
IRB health issuance per capita (-3)			0.408 (0.185) [0.031]		
IRB health issuance per capita (-4)			0.181 (0.128) [0.160]		
Observations	162	162	111	162	162
R-squared	0.584	0.660	0.488	0.462	0.721

Note: Figures in parentheses are standard errors. Figures in brackets are p-values.

Manufacturing sector

The business tax rates do not seem to have a statistically significant impact on growth in the manufacturing sector (Figure C-7). A one percentage point decline in the sales tax rate is predicted to yield an increase in the growth rate of manufacturing of 5.3 percentage points, but with a p-value of 0.24, the estimate is unreliable. The effects of the other taxes also are not statistically significant.

Construction sector

Of the tax variables, only the personal property tax is significant. The negative coefficient of -6.3 on the personal property tax rate suggests a one percentage point drop in the tax rate imposed in a local county or city would yield a 6.3 percentage point increase in the growth rate of construction jobs.

LIMITATIONS OF OUR ECONOMETRIC ANALYSIS

Our conclusions regarding influences of policy variables on economic development in the District and surrounding area must be qualified by the limitations of our data. We have used publicly available tax information, but with the exception of Industrial Revenue Bond issues, we have not controlled for the various incentives that jurisdictions offer to business, either as a matter of course or through individual negotiations. Further, in addition to crime, primary concerns in the District area include quality of education services and quality of infrastructure. Limitations in school expenditure data reduced the sample size in our regressions to the point that we considered the results to be unrepresentative of the area. We could find no reliable measures of public infrastructure quality to use.

Summary

With respect to population growth over the last 20 to 25 years, the District and its metropolitan area looked similar to other comparable cities and metropolitan areas. Like other areas, Washington metropolitan area population growth outpaced the population growth (in many cases decline) of its central city. With respect to income and employment, the District's performance was somewhat different from the average of comparable areas. The growth rate of income per capita over the more than two-decade time period was higher in the District and its metropolitan area than for the averages of other areas. In terms of employment growth over this period, the Washington metropolitan area outperformed other metropolitan areas across all industries, while the District generally, but not for each industry, performed poorly relative to other central cities. Relative to the average of seven cities with similar overlapping jurisdictional arrangements, the District performed poorly in terms of population growth and wholesale and retail trade employment growth, especially in recent years. On the other hand, the Washington metropolitan area outperformed the seven-metropolitan-area average both in recent years and over the past 25 years.

INTERPRETATION OF FINDINGS

In our econometric analysis, we found that taxes paid by individuals do not influence population growth (choice of residence), but that two business taxes, the personal property tax and the sales tax, have statistically significant and large negative effects on employment growth. These two taxes also appear to influence employment growth in the services sector (sales tax only), the retail trade sector, and construction (personal property tax only).

There is some evidence that higher unemployment insurance costs also reduce employment growth. A higher construction employment share appears to increase employment growth while a higher share in wholesale trade appears to reduce it.

Higher per capita incomes attract both population and employment, and population growth is reduced by concentrations of poverty (as proxied for by per capita AFDC expenditures). Higher public expenditures do not affect population growth, but they do increase employment growth. Higher crime rates do not affect either population or employment growth. Both population and employment growth are sensitive to the existing composition of industry. Higher employment shares in service, retail, or wholesale trade appear to reduce population growth.

We are able to explain much about the District's experience with population and employment growth with systematic differences in tax rate, environment, and quality of life variables. The District is not special — another jurisdiction with its same tax rates and environmental qualities would have a similar experience. The question is, are these explanatory variables under the control of policymakers?

There appears to be little direct action policymakers can take to influence population growth. Our evidence suggests that residents are attracted primarily by higher per capita incomes and lower concentrations of poverty. Of course, these characteristics are influenced by the availability of higher-paying jobs, programs that increase employability, and other measures that raise incomes. The District has a high fraction of service employment (66 percent). Policymakers may want to take measures to increase employment in other sectors.

Our analysis indicates that employment growth in the region is sensitive to the level of the sales tax and personal property tax. Reducing the sales tax rate (currently highest in the area) or the tax rate on personal property by one percentage point is predicted to increase employment growth by almost two percentage points. Employment growth also may be encouraged by higher local public expenditures, although our conclusions are tentative here.

Endnotes

¹ 1992 is the most recent year available from the Census Bureau for cities.

² While we are limited to these four industries by the coverage of the Census data, in 1995 these four industries represented 77 percent of total private employment in the United States.

³ Recall, these seven cities are of interest because they have similar intergovernmental arrangements in that their central cities do not have overlying counties.

⁴ For more information about this data or methods of calculation, please contact the authors directly.