

## INTRODUCTION

# City Problems and Suburban Reactions

*Richard W. Lang\**

The relationship between a major city and its surrounding suburbs is often similar to a love-hate relationship between lovers who feel they can't live with each other but can't live apart either. When large cities experience a problem, whether an increase in crime or a fiscal crisis, many of its residents and businesses consider moving to the suburbs. The perspective of people already living in the suburbs is that the

city should keep its problems to itself. Often one hears suburbanites claim that they would be just as well off without a major city and its problems living next door to them. The City of Philadelphia and its surrounding suburbs are typical in these respects.

During the past few years, the City of Philadelphia has been embroiled in a fiscal crisis, as revenues have fallen far short of the city's expenditures and its cumulative deficit has mounted. To aid the city in returning to fiscal health, the state passed legislation in June 1991 creating the Pennsylvania Intergovernmental

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Cooperation Authority (PICA), an oversight body authorized to issue bonds to fund the city's deficit while it reorganizes its spending and revenue streams to balance the budget and repay the PICA borrowing. As part of this arrangement, the city was required to prepare a five-year fiscal plan to restore the city to fiscal health.

One feature of Philadelphia's five-year plan has surprised some: it does not include increases in the city's major taxes on wages, property, and businesses. The presumption in the plan is that major tax increases would be detrimental to the city's long-term economic health. This assumption is examined in this issue's first article by Bob Inman. Inman's article is the first study to look at the private costs of raising each of Philadelphia's taxes; that is, the effect on jobs, property values, and business revenues and profits of an increase in taxes on wages, property, or businesses, respectively. In each case, Inman estimates that any increase in the tax rate from its current level would seriously reduce the tax base, thereby limiting the increase in revenues that an increase in each tax rate would yield for the city. This analysis leads to two major conclusions: 1) Given the magnitude of the budget deficits facing the city of Philadelphia, the city cannot close the budget gap with tax increases alone; the potential increase in tax revenues would not be large enough to balance the budget. 2) The city could raise some revenues through tax increases, but the costs to the private sector would be very high. Inman estimates these costs in terms of the lost private income of raising a dollar of revenue for the city: the cost of lost jobs and wage income; the cost of lower

property values; the cost of lower business profits. Citizens always have to make a value judgment about the trade-off between public tax revenues and private costs. Inman's analysis makes clearer for city residents what such trade-offs entail.

Historically, higher taxes in a city have spelled out-migration to the suburbs, which in the short run yields faster growth of suburban jobs and income. Although the suburbs obtain this short-term benefit from out-migration, the second article in this issue suggests that over the long run the decline of a city will mean slower growth for the entire metropolitan region. Dick Voith analyzes whether, over the long run, suburban growth of jobs and income is a substitute for city growth (that is, suburban growth is at the expense of the city), or whether suburban and city growth are complements (that is, suburbs have healthy growth when cities do too).

Voith finds that suburbs in metropolitan areas where cities are declining tend to grow more slowly than suburbs in areas where cities are healthy. So although suburbs grow strongly for a while when cities decline as people and businesses shift to the suburbs, eventually the decline of the city is accompanied by slower growth or stagnation in the suburbs as well. Suburbs therefore should care about the economic health of the city. Voith's conclusion is that both a city and its suburbs can improve their long-run economic health by cooperating to stem the economic decline of the city. In the Philadelphia metropolitan area in particular, the residents of the suburbs ought not be indifferent about how the City of Philadelphia solves its fiscal crisis.

# Can Philadelphia Escape Its Fiscal Crisis With Another Tax Increase?

*Robert P. Inman\**

**T**he current crisis in Philadelphia's public finances has captured national attention. In the fall of 1990, what should have been a routine borrowing to meet city expenditures until anticipated tax revenues could be collected became an international financial embarrassment as potential lenders and guarantors from the United States, Europe, and Japan all refused to lend the city its needed funding. Yet one year

earlier, the city's request for short-term funding had been eagerly accepted by investors; the city's short-term debt received the highest rating from Moody's and Standard and Poor's and sold at 6.20 percent, well below the national average yield that year for such short-term borrowing. In just one year, Philadelphia's debt went from one of Wall Street's favorites to, according to Standard and Poor's revised 1990 rating of CCC, a nearly bankrupt credit. What happened to the city's finances?

On one level the answer is easy. What was seen as a balanced city budget in 1989 had become, by the fall of 1990, a budget with an eventual cumulative deficit of \$153.5 million, roughly 6 percent of the year's anticipated revenues. Lenders were being asked to give the

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city an extra \$153.5 million dollars, with no clear assurances that the city had the revenues to pay them back. In this light it is easy to understand investors' nervousness.

Understanding exactly why Philadelphia faced this large deficit in 1990 requires a deeper look into the underlying forces behind city spending and city revenues, however. Unexpected realities on both sides of the city's balance sheet produced the deficits of 1990, realities still at work today, producing a cumulative city deficit of \$248 million for this just completed fiscal year (1991-92). On the spending side the city had been asked to shoulder increasing outlays for its lower income households and for the county court system, expenditures often mandated by federal and state regulations. We also saw the approval, either through labor negotiations for city blue and white collar workers or through arbitration for police officers and firefighters, of costly labor contracts running into the summer of 1992. While city expenditures were running higher than anticipated, city revenues fell short of initial expectations. Three factors contributed to the unexpected slowing of city revenues. First, the state of Pennsylvania had been less generous with state assistance than the city's budget had assumed. Second, the recent recession ran deeper, and lasted longer, than originally projected, costing the city anticipated business, wage income, and property tax revenues. Third, previous increases in Philadelphia's taxes, for a city already the highest taxed municipality in the metropolitan region and one of the highest taxed nationally,<sup>1</sup>

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<sup>1</sup>Comparisons of Philadelphia's tax rates on families show the city's residents to be the highest taxed of all residents in the five-county area, with overall tax payments as a percent of resident income of 12.15 percent in Philadelphia, compared with average suburban tax payments as a percent of resident income of 5.98 percent in Bucks County, 5.44 percent in Chester County, 6.62 percent in Delaware County, and 2.97 percent in Montgomery County.

Nationally, Philadelphia residents earning \$25,000 per

drove families and businesses from the city, making the tax system less and less productive as a revenue-raiser. Unless these tax and spending realities are addressed with substantive policy actions, the city will continue to face a future of fiscal deficits.

This article examines the city's ability to raise tax rates as one means to close its current deficits and to avoid fiscal collapse. It first outlines the general economic theory of tax revenues, focusing on the important economic effects that follow when increases in local tax rates cause residents and businesses to curtail their taxable activities or, perhaps, even leave the city. The article then puts this theory to the test, estimating from historical data the past effects of changes in city tax rates on the tax base for property, business, and wage taxes. I find that for all three taxes, past increases in tax rates have significantly reduced the city's tax bases.

The section on "Mapping the City's Tax Revenue Hills" shows that these estimated declines in city tax bases imply a significant offset in revenues from any increase in tax rates. At current tax rates the positive effect on revenues of an increase in rates is significantly reduced by the negative effect on revenues that follows from the loss in tax base. Given this hard economic reality, the final section asks: can Philadelphia escape its current fiscal crisis with a tax increase? From the evidence presented here, the answer is *no*.

#### UNDERSTANDING THE TAX REVENUE CURVE: ECONOMICS, NOT ACCOUNTING

As a simple matter of fiscal *accounting*, tax revenues flow from taxing some tax base such as income or property value at a chosen tax rate.

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year (approximately the median family income) pay the third highest tax on income of residents living in our nation's largest cities. See "Tax Rates and Tax Burdens in the District of Columbia: A Nationwide Comparison," Government of the District of Columbia, Department of Finance and Revenue, June 1991.

Tax revenues ( $R$ ) equal tax rate ( $r$ ) times tax base ( $B$ ), or  $R = r \times B$ . It is customary to measure the tax base and therefore revenues in terms of dollars per resident. For example, if the base is resident income and equals \$10,000 per resident and the tax rate is .05, revenues will equal \$500 per resident ( $\$500 = .05 \times \$10,000$ ). In this example, if the government were to double its tax rate to .10 of resident income, then the fiscal accounting relationship would predict revenues would double too, increasing to \$1000 per resident ( $\$1000 = .10 \times \$10,000$ ). Conversely, if tax rates were to be cut in half, then by  $R = r \times B$ , revenues would also fall by half—in our example, to \$250 per resident ( $\$250 = .025 \times \$10,000$ ). Under the accounting revenue relationship, doubling tax rates doubles revenues, while halving tax rates will halve revenues. The accounting relationship between revenues and tax rates is therefore a straight line, or a *linear* relationship (Figure 1).

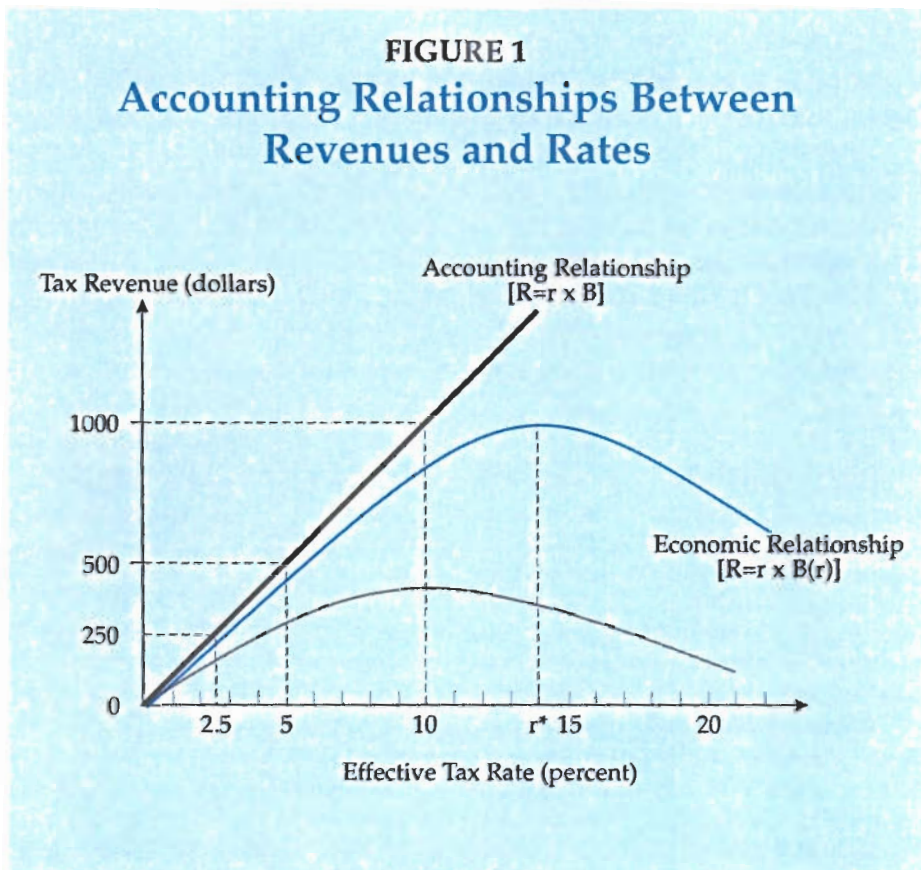
As a matter of fiscal *economics*, however, the relationship between tax revenues and tax rates is not so simple. While the accounting relationship holds the tax base ( $B$ ) constant as we change rates, the economic relationship between tax revenues and rates does not. The economic relationship between revenues and rates allows the tax base to change as tax rates are increased or decreased. In the example above, the increase in the tax on residents' incomes might well cause residents to work less as their incomes are taxed or even cause wealthier families to leave the taxing jurisdiction, as,

for example, tennis star Bjorn Borg's move from Sweden to Monaco. Both of these *economic* responses to the increases in the tax rate may act to reduce the available tax base per resident. As the tax base declines, so too will the government's anticipated revenues.

While increases in tax rates often cause a decline in the government's tax base, reductions in tax rates often enhance taxing capacity. A decrease in a tax on resident incomes might cause residents to work harder and earn more and may even induce richer families from outside the jurisdiction to relocate. In this case, the resulting increase in the tax base helps to raise tax revenues above what might have been initially expected following the tax cut.

The economic relationship between tax revenues and tax rates allows for possible changes in the tax base engendered by changes in tax rates. Economists specify this relationship by

**FIGURE 1**  
**Accounting Relationships Between Revenues and Rates**



estimating how changes in rates are likely to affect tax bases, using economic theories of how taxpayers respond to such changes. For example, economists have shown that increases in taxes on wage incomes cause primary earners to work fewer hours and some secondary earners to drop out of the labor market altogether.<sup>2</sup> Economists have also established that taxes on savings and investment income reduce savings and investment,<sup>3</sup> while taxes on consumption and sales reduce family spending on the taxed commodities.<sup>4</sup> Finally taxes on property values, a particularly important revenue source for local governments, will discourage family investments in larger houses and home improvements and firm investments in business property.<sup>5</sup> In each case these economic adjustments cause the base for each tax to fall when its tax rate is increased.

Importantly, the negative effect of tax rates on tax base may be even stronger for local governments. Not only do families and firms that stay within the community make these economic adjustments in their work effort, savings, consumption, and investments, but tax increases may also cause some families and businesses to leave the city. If so, the end result will be a loss of jobs and retail outlets and a loss in property values, losses whose value may well exceed the changes in tax base resulting from the adjustments of those families who stay behind.<sup>6</sup> For economists, the issue is not

whether changes in tax rates change tax bases—they surely do. The important issue is by how much.

To answer the question “how much?” economists estimate statistically the effects of tax rates on the tax base from the past responses by taxpayers to changes in rates. The estimated relationship is described generally by a tax base equation that measures the negative influence that tax rates ( $r$ ) have on tax base ( $B$ ). This equation will differ from tax to tax; the wage tax base is likely to respond to changes in wage tax rates differently from the way the sales tax base responds to changes in sales tax rates. For each tax, however, the base is likely to decline with increases in the rate and, conversely, to increase with reductions in the rate. As a consequence of the economic behavior of families and firms, tax bases will be inversely related to their rates.

The inverse economic relationship between tax rates and bases determines each tax’s *economic* revenue curve. Like the accounting revenue curve, the economic revenue curve sets tax revenues ( $R$ ) equal to tax rate ( $r$ ) times tax base ( $B$ ), but now we allow tax base to adjust to changes in tax rates. We describe the economic relationship between tax base and tax rates by writing  $B = B(r)$ ; thus tax revenues become  $R = r \times B(r)$ . In contrast to the accounting revenue curve, which defined revenues as the simple straight-line relationship of Figure 1, the economic revenue curve will be nonlinear, assuming the shape of a “revenue hill.” A typical revenue hill is drawn in Figure 1 as the curve,  $R = r \times B(r)$ . The revenue hill first rises as tax rates rise, but since tax base declines as rates increase, we raise less and less revenue for each incremental increase in tax rates—that is, the revenue hill flattens. In fact, it is very possible

<sup>2</sup>See Hausman (1985) for a survey of the relevant literature.

<sup>3</sup>See Boskin (1978), Evans (1983), and Auerbach (1983). Tax increases are found to reduce savings and investment.

<sup>4</sup>See Philips (1974) and Deaton (1977). They find that increases in commodity taxes reduce demand.

<sup>5</sup>Rosen (1985) provides an overview of the effects of taxation and subsidies on housing decisions.

<sup>6</sup>Grieson (1977, 1980), Gruenstein (1980), and Inman (1987) provide evidence that higher city taxes drive sales and employment from the city. Oates (1969) is the standard reference on the effects of property taxation on house values. Ladd and Bradbury (1988) and Sexton (1987) also study

the effects of property tax rates on taxable property values. Each of these studies finds that increased taxes depress housing investment and house values.

for the hill to have a peak, the point  $r^*$  in Figure 1, where a small increase in tax rates reduces the tax base enough that tax revenues,  $R$ , simply remain constant! The top of the revenue curve measures the taxing capacity of government. If tax rates increase still further, the revenue loss from the decline in the base more than offsets the revenue-raising capacity of the rate increase. In the extreme, if tax rates get so high that people simply stop participating in the taxed activity, revenues will fall to zero.

The exact shape of each tax's revenue hill depends on how responsive its base is to changes in rates. If the tax base responds only marginally to big changes in its tax rate, the revenue hill will be very steep. It may even appear to rise like the straight-line accounting relationship, at least for a while. However, when tax bases respond noticeably to changes in tax rates, the revenue hill tends to be flatter, assuming a shape similar to the revenue hill  $r \times B(r)$  of Figure 1. If the tax base is very responsive to tax rate changes, the revenue hill can be almost flat, perhaps as flat as the broad dashed-line hill of Figure 1. The more responsive a tax's base is to changes in its rates, the less revenue we can raise from that tax.

Numerous studies have estimated the shape of the economic revenue curve for various taxes. Arthur Laffer argued in support of President Reagan's 1981 tax cuts that the national revenue curve for personal taxes (or the "Laffer curve" as it became known in the subsequent supply-side debate) peaked to the left of the average income tax rates at the time and that the Reagan tax cuts would, according to Laffer's revenue curve, increase national income tax revenues (see Laffer, 1977). In fact, the recent history of federal revenues and a more careful specification of the national revenue curve by Donald Fullerton (1982) have shown Laffer's prediction to be wrong. For local taxation, Ronald Grieson (1977) presented evidence that in 1969 New York City might have been near the top, or even past, the peak of its revenue curve for business taxes. Helen Ladd and Katharine Bradbury

(1988), however, provide evidence that for a large cross-section of U.S. cities in the 1970s tax rates were well to the left of the peak of their property tax revenue hills. Douglas Holtz-Eakin and Harvey Rosen (1990) reached a similar conclusion for smaller New Jersey governments, as did I (Inman, 1977) in my study of Long Island school districts.

No one has yet estimated the tax revenue curves for the City of Philadelphia, however.<sup>7</sup> Given that tax increases are one possible route to escape our current fiscal crisis, it is important to have good measures of each tax's revenue potential. Estimates of Philadelphia's tax revenue curves are what we need.

#### DO TAX RATES REDUCE TAX BASE IN PHILADELPHIA?

Philadelphia uses three different taxes to raise most of its revenues: a property tax on residential and business property, levied to support city and school district spending; business taxes on firms' gross receipts and net income earned within Philadelphia, again levied to support city and school district spending; and a wage tax on residents and nonresidents who work within the city, levied to support city services.

Property taxes in Philadelphia are levied on residential, commercial, and industrial property located within the city. The tax is paid both to the city and to the school district through separately levied tax rates on the assessed value of the property. A property's assessed value need not equal the property's market value. However, the tax on market value is the relevant one for a family's or a firm's economic decisions. Assessed values are usually deter-

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<sup>7</sup>Studies by Grieson (1980), Gruenstein (1980), and Inman (1987) have examined the effects of the Philadelphia wage tax on jobs in Philadelphia, but these studies have not used the information to calculate the tax revenue curve for wage taxation.

mined at the time of purchase of the property, but market values are determined every year as economic circumstances change and properties become more or less valuable. Since economic decisions determine the economic tax revenue curve, we must examine the effects of tax rates on the *market value* of city properties.<sup>8</sup>

Business taxes in Philadelphia are levied on the gross receipts (sales) and on the net income of businesses located in Philadelphia. Taxes on businesses' gross receipts have included the city's mercantile license tax and the school district's general business tax. Both of these taxes were discontinued in fiscal year 1985 but were replaced by a portion of the city's new business privilege tax, which also falls on gross receipts. Taxes on business incomes include the city's net profits tax on individually owned (but not incorporated) businesses, on partnerships, and on business associations, and the city's new tax on net income due from all businesses (including corporations) as part of the city's new business privilege tax. Businesses pay taxes only on that portion of their activities conducted in Philadelphia according to an apportionment formula based on a weighted average of the firm's sales, payroll, and property in Philadelphia.

The city's wage tax is assessed at the rate of 4.96 percent on the wage income of all residents of Philadelphia, whether they work within Philadelphia or not, and at the rate of 4.3125 percent on the wage income of nonresidents who work within the city. Historically, the resident and nonresident tax rates were identical until fiscal year 1984, when the resident rate

was raised to 4.96 percent but the nonresident rate remained at 4.3125 percent. Residents and nonresidents who work within the city have the tax withheld by their city employers. Residents who work outside the city are responsible for paying the tax. Collecting tax payments from city residents working outside the city has proven difficult.

How do the rates of these taxes affect the tax base of Philadelphia? The details of a statistical analysis of the effects of each tax rate on its tax base are reported in the Appendix. For each of the three taxes, increases in the tax rates lead to statistically significant, and quantitatively important, decreases in their associated tax bases.

For the property tax base, I estimate that an increase of one percentage point in the combined city and school district effective tax rate on market value—say, from its current value of 2.48 percent to 3.48 percent—will reduce the market value of the average Philadelphia property by \$3961 per resident, a reduction of 25 percent from the estimated (1992) market value of \$16,139 per resident. More realistically, even a modest increase in the combined tax rate from 2.48 percent to 2.98 percent—a 20 percent increase—will reduce market values by 12 percent, or by \$1964 per resident. This is the estimated effect of raising property tax rates alone on the market value of city properties. The statistical analysis controls for the separate influences of the business cycle (rising city unemployment reduces market values) and the general trend in city property values over the past 20 years (upward in real terms as market values in Philadelphia have risen faster than inflation); see *Property Tax Base Per Resident* page 18 of the Appendix. The economic decisions negatively affected by an increase in city and school district property tax rates include the decision by residents to remain within the city or to make significant home improvements and by nonresidents to move into the city. The statistical analysis shows that increases in the city's property tax rate have

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<sup>8</sup>Since we will be examining the effects of tax rates on market value, we will be using the city and school district's effective tax rates on market value, defined as the tax rate on assessed value multiplied by the ratio of assessed value to market value in the city. For this study, the State Tax Equalization Board's ratio of assessed value to market value (called the STEB ratio) for the City of Philadelphia will be used.



discouraged such investments within Philadelphia. Importantly, the estimated effect of tax rates on tax base is statistically significant; there is less than a 1 in 100 chance that the estimated negative effect of rate on base is really no effect at all.

Increases in the city's business taxes also reduce their tax bases. Because of the difficulty of analyzing many small city business taxes, a single measure of the city's business tax base and a single average business tax rate were used in the statistical analysis. The base is measured by a revenue-weighted sum of business gross receipts, business net profits, and business net income earned within the city. Accordingly, the business tax rate is a revenue-weighted sum of the tax rates on gross receipts, on net profits, and on net income. The analysis shows that a one percentage point increase in the weighted average business tax rate, from its current value of 1.50 percent to 2.50 percent, will reduce the average business tax base by \$3471 per resident, a 28 percent reduction from the estimated 1992 value of the average business tax base of \$12,625 per resident. Even a more modest 20 percent increase in business tax rates, from 1.5 percent to 1.8 percent, still has an important economic effect on the business tax base, reducing the base by \$1041 per resident, or 8.2 percent from its 1992 value.

Raising business taxes reduces the business tax base in two ways. First, the tax on a firm's gross receipts acts like a sales tax, and like a sales tax, it will reduce firms' sales when passed on to customers. Second, the taxes on firms' income discourage firms from locating in the city or expanding their Philadelphia-based activities. These estimated negative effects of business tax rates on the business tax base are the singular effects of tax rates. Again, the statistical analysis controls for the separate effects of the business cycle (reducing tax base) and general trends in the Philadelphia economy (enhancing tax base); see *Business Tax Base Per Resident* on page 18 of the Appendix. As with

property taxation, this estimated effect of business tax rates on the business tax base is statistically significant; here too there is less than a 1 in 100 chance that the estimated negative effect of the rate on base is really no effect at all.

Finally, the city's wage tax is shown to have a statistically significant, and quantitatively important, negative effect on the city's wage tax base. The city's wage tax base is the product of the number of jobs within the city and the average pay for these employees. Statistical analysis revealed no significant effect of the city wage tax on the average employee's salary. The city's wage tax has driven jobs from Philadelphia, however, because the burden of the city's wage tax falls to an important degree upon the business firms within the city. When employees, whether residents or nonresidents, have the opportunity to work outside the city and not pay the wage tax, city employers will have to pay a compensating wage premium to attract employees.<sup>9</sup> This compensating wage premium equals the burden of the wage tax on Philadelphia businesses. The burden will have two adverse effects on city employment: it will induce existing Philadelphia firms to hire fewer workers than they might have done without the tax, and it will discourage new firms from locating in Philadelphia.

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<sup>9</sup>Nonresidents can legally avoid the wage tax by working outside Philadelphia. To attract these workers back into Philadelphia, city firms must raise their wages to compensate nonresidents for paying the city wage tax.

Residents can evade the wage tax de facto by not reporting wage income to the city when they work outside Philadelphia. Precise estimates of such residents' tax avoidance are not available, but it is thought by city officials to be significant. From the point of view of economic decision-making, however, all residents need do is convince their prospective city employer that they are one of the residents who do not pay the tax and that they have an offer from a suburban firm. If they are persuasive, then the city employer will have to match the suburban wage package that excludes the wage tax burden. Wages paid to city residents must therefore rise.

How important are these effects? A statistical analysis of Philadelphia's share of national employment over the past 21 years estimates that a 20 percent increase in the city's average wage tax rate, to 5.952 percent on residents and to 5.175 on nonresidents, will reduce city employment by about 80,600 jobs, or by 12.7 percent from current employment levels (see *City Employment and the Wage Tax Base Per Resident* on page 19 of the Appendix).<sup>10</sup> This loss in employment will have an important negative effect on the city's wage tax base. For a 20 percent increase in the average wage tax rate, the city will suffer a decline in its current wage tax base of about \$1289 per resident, a 12.7 percent fall from the estimated 1992 value of \$10,132 per resident. Again, these estimated effects of the wage tax on city employment and tax base are estimated separately from the effects of the national business cycle on employment (since estimates are of the effects of tax rates on the city's share in national employment) and from the historical downward trend in city jobs due to economic influences other than local taxation (e.g., the decline of manufacturing). Finally, as with our estimates of the effects of other city taxes on the tax base, the estimated effect of the wage tax on employment is statistically significant; once again there is less than a 1 in 100 chance that the estimated negative effect of tax rates on tax base is really zero.

As large as the estimated negative effects of

tax rates on tax bases are for Philadelphia, there are good economic and statistical reasons to suspect that even these estimates understate the true long-run negative effects of rates on base in Philadelphia today. Because we have only 20 years of complete data for the three taxes, it is difficult to estimate very long-run changes with great precision. The jobs and families that leave the city as taxes rise are likely to be the best paying jobs and the wealthier families. The loss of high wage firms is likely to discourage educational investments by current residents and to deter the in-migration of good jobs and skilled workers in the future. As the population of the city becomes less skilled, average wages are likely to decline, and falling incomes often create additional pressure for local government services. Rising service demands and falling tax bases means more, not less, pressure on the city's deficit. These additional, adverse consequences of tax increases on the city's economy and budget are not likely to be fully captured in our 20 years of data.

As a statistical matter too, these estimates of tax rates on tax base are likely to be conservative. Not all the possible variables that might influence city tax base could be included in this study. While I suspect the bias such omitted variables might impose on the estimated tax effects is likely to be small, it is possible to show as a matter of statistical theory that even if the omitted variables are important, the direction of their bias will be toward understating the true negative effect of rates on base.<sup>11</sup> If anything, then, the estimates here are conservative

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<sup>10</sup>The statistical analysis uses the revenue weighted average of the resident and nonresident wage tax rates, after those rates diverged in 1985. I have repeated the analysis of the effects of rates on city employment using only the nonresident tax rate and again using only the resident tax rate, and the results are nearly identical to those reported here. I have also tested whether the two rates have had different effects on employment for the period from 1985 onward, and I could not reject the hypothesis that both rates reduced city employment. This result is consistent with the argument that with lax tax enforcement residents can also shift the city wage tax onto employers; see footnote 9.

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<sup>11</sup>The key variables which I could not measure precisely and which are therefore omitted from the estimated tax base equations are: 1) local government outputs in Philadelphia, 2) taxes and government service levels in the suburbs surrounding Philadelphia, and 3) the stock of Philadelphia debt that might demand future tax increases.

Their omission is not serious, however. Their collective influence on tax base is probably well measured by the included time-trend variable, TIME, in each tax base equation. Variation in these omitted variables around their

measures of the true, long-run adverse effects of rising city taxes on the city's tax base.

### MAPPING THE CITY'S TAX REVENUE HILLS

Having estimated the effects of tax rates on tax base we now can map the city's economic tax revenue curves, using the relationship  $R = r \times B(r)$ . The revenue curves are based on current 1992 values for economic trends, city unemployment, and national employment.<sup>12</sup> The

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trend is slight, at least as indicated by various proxy measures. Public employees per capita, crime rates, school dropout rates (as Philadelphia output measures) and suburban tax rates and suburban school test scores (as measures of suburban rates and services) either have remained constant or show smooth trends over the past 20 years; see Inman (1987). The stock of Philadelphia debt has also shown little variation over time, except in the last two years of our sample, FY 1989 and FY 1990, when the city entered its current fiscal crisis. Re-estimating the equations omitting these last two years of data did not change the estimated effects of tax rates on tax bases significantly.

Finally, even if the omitted variables were to prove important, the direction of the omitted variable bias would probably be toward understating the true negative effect of rates on base, implying that Philadelphia is even closer to the top of its revenue hills. When city tax rates are low, city services are likely to be low and city debts are likely to be large. Low services and high debts will tend to reduce city tax base, therefore biasing the regression coefficients on tax rates toward zero and away from their true, larger negative effect. Similarly, if the city competes against improving suburban services and taxes by lowering its own tax rates, then low city tax rates will again be associated with low city tax bases (now because of attractive suburbs), once again biasing the regression coefficients for tax rates toward zero and away from their true negative effect. A clear discussion of the statistics of omitted variable bias can be found in Kmenta (1971, pp. 392-95).

<sup>12</sup>When specifying the revenue relationship, I use the estimated tax base equations that appear in the Appendix, *Do Philadelphia Tax Rates Affect the Philadelphia Tax Base?* The property tax base and the business tax base relationships are evaluated at current (1992) TIME trend values and a current city unemployment rate of 8.0 percent. The employment share relationship is evaluated at current (1992) TIME trend values and the current (end of 1991) national employment level of 116,877,000 jobs.

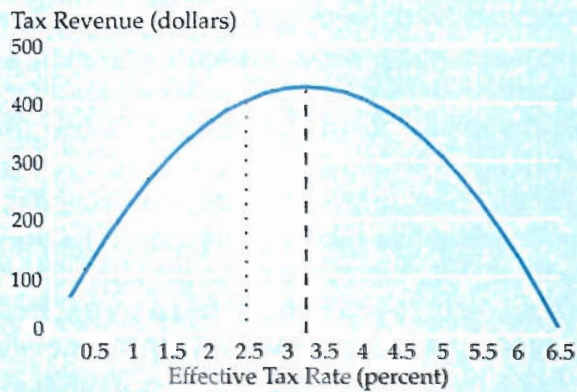
curves will therefore predict the final revenues the city can expect from increasing or decreasing city tax rates from current 1992 tax rates. Revenue curves for each of the city's three major taxes are shown in Figures 2 (Property Tax Revenues), 3 (Wage Tax Revenues), and 4 (Business Tax Revenues). The city's current tax rates (shown in the figures by the vertical dashed line) place us to the left of, but near, the peak of each revenue hill. Nonetheless, the city's ability to raise additional revenues from its major taxes is severely constrained, particularly for property and wage taxes. The one possible source of significant new revenues for the city is business taxes, but this is true only because the city made a decision in 1984 to significantly reduce rates and to move business taxes off the peak of the business tax revenue curve.

For both the property tax and the wage tax, Philadelphia is currently very near its revenue capacity. The current combined city and school district property tax rate on market value is 2.48 percent (shown as the vertical dashed line in Figure 2), and at this rate, the city and school district together raise \$400 per resident in revenues. The revenue-maximizing tax rate that would take us to the top of the revenue hill for property taxation is 3.25 percent, but at that rate the city and the school district could expect to raise only \$425 per resident (Figure 2). As we near the top of the property tax revenue hill—and we are now very near the top—our ability to raise additional revenues is significantly curtailed because of the strong negative effects of tax rates on tax base.<sup>13</sup> The loss in property

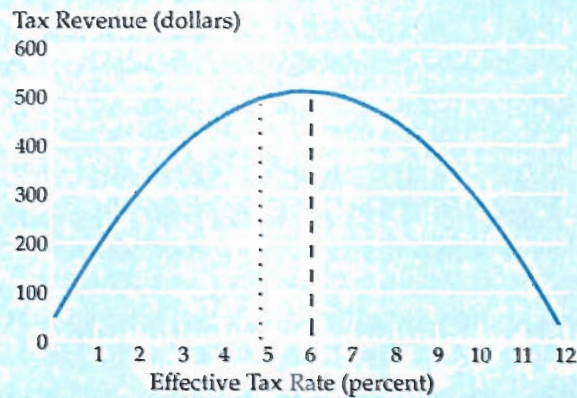
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<sup>13</sup>As a statistical matter, it is important to know if the sample range of property tax rates used to estimate the tax base equation,  $B(r)$ , includes the top of the revenue hill. If not, then we can place less confidence in predicted revenues for that maximum tax rate. In fact, for property taxation, the sample's range of tax rates on the market value of city properties—from a low of 2.30 to a high of 3.30—does include the estimated peak for the property tax revenue curve.

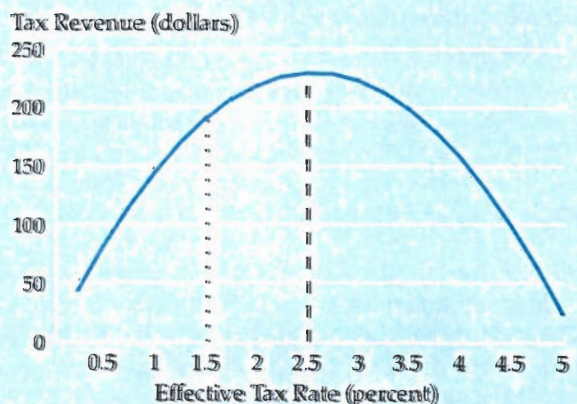
**FIGURE 2**  
**Property Tax Revenues**



**FIGURE 3**  
**Wage Tax Revenues**



**FIGURE 4**  
**Business Tax Revenue**



values is estimated to be \$3050 per resident as the property tax rate rises from 2.48 to 3.25 percent. Today, the maximum additional revenues the city and school district might hope to raise from increasing the tax on properties are only about \$25 per resident (= \$425 - \$400). To raise this revenue, the city sacrifices \$3050 per resident of its property base. Each one dollar of additional property tax revenues will cost city residents \$122 in reduced property values (-\$3050 in lost value/\$25 in new revenues = -\$122) or, with current after-tax interest rates of 4 percent per annum, about \$5 per year in lost income for city residents from their home investments (-\$122 x .04 = -\$4.88).<sup>14</sup>

The additional revenue potential from the city's wage tax is also limited. In fact, the city is nearly at the top of the wage tax revenue hill. Figure 3 shows the potential wage tax revenues the city might raise were it to increase the city's average wage tax rate on residents and non-residents from its current value of 4.765 percent (raising about \$483 per resident) to the revenue-maximizing average tax rate of 6.0 percent. Raising the wage tax rate to 6.0 percent would bring very little additional tax revenues, however. At an average wage tax rate of 6.0 percent the city is estimated to raise \$503

<sup>14</sup>This result implies that Philadelphia property taxes are more than 100 percent capitalized into reduced property values as the city nears the top of its property tax revenue hill. At an annual after-tax interest rate of 4 percent, \$1 of additional property taxes would, if fully capitalized, imply a decline in property values of about \$25 per resident (-\$1/.04 = -\$25). The estimates here imply a fall in market value of \$122 per resident. The estimated rate of capitalization as the city moves to the top of its revenue hill is 4.88 times greater (-\$125/-25 = 4.88) than full capitalization. An extra burden of taxation is at work here, causing property values in Philadelphia to fall by more than simply the direct burden of taxation. Possible causes of this extra burden include the observed and anticipated effects of taxation on property maintenance and, perhaps most important, negative neighborhood externalities as middle and upper income families leave the city.

per resident, a revenue gain of only \$20 per resident from our current levels (\$503 - \$483).<sup>15</sup> Unfortunately, increasing the average wage tax rate from 4.765 to 6.0 percent is estimated to cost the city approximately 104,000 private sector jobs, or 5200 jobs for each \$1 per resident of additional city revenues (-104,000 jobs/\$20 in new revenue = -5200 jobs per dollar). For this \$1 of additional wage tax revenue, city residents bear an economic cost in reduced job opportunities, an annual economic burden valued conservatively at \$8 per resident.<sup>16</sup>

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<sup>15</sup>Again it is important to examine the range of tax rates used to estimate the economic relationship  $B(r)$  and to compare that range to the implied peak of the revenue curve. The sample range for the weighted average wage tax rate is from 1.01 percent to 4.765 percent for this study. The sample range excludes the tax rate that defines the peak of the revenue hill. However, the revenue curve is very flat near this peak and very flat around the current rate as well. For example, a decrease in the current rate from 4.765 percent to 4.25 percent will cost the city only \$25 per resident in wage tax revenues. Since the city's current rates place it so near the top of its revenue hill, it seems likely that we do have a good approximation of the revenue adjustment that might occur as the city moves to the maximum rate, even though that rate is outside our sample range.

<sup>16</sup>A precise measure of the value of these lost private sector jobs is complicated, but a first approximation might consider what an unemployed resident would pay a job search firm for finding him or her a "typical" Philadelphia job, namely one that pays about \$25,000 per year. Most job search firms charge 10 percent of the applicant's first year's salary. If the search firm gives the applicant one additional year of employment (i.e., saves the employee a year of searching), then this would imply an annual willingness to pay \$2500 for each lost job. At this rate, the \$1 of additional wage tax revenues costs Philadelphians 5200 private sector jobs valued at \$2500 per job, or \$13 million per year (5200 jobs  $\times$  \$2500/job = \$13 million). The added economic cost per resident of wage taxation is about \$8 (\$13 million/1.586 million residents = \$8.20 per resident).

Of course, some residents might follow their jobs, even if it means commuting to the suburbs or moving outside the Philadelphia region. For these residents, the loss of a Philadelphia job imposes an added commuting burden, conservatively estimated at \$10 per day for 250 working days a year, or \$2500 per lost job. For those who relocate, selling a house and moving to a new area typically results in a loss of

The one set of city taxes that do show potential to raise significant additional revenues is city business taxes, but here too there are adverse consequences for tax base. My estimates show the revenue-maximizing average tax rate to be 2.50 percent (Figure 4). At that rate, business taxes would raise approximately \$229 per resident. Today's average business tax rate of 1.50 percent raises about \$189 per resident. Thus in its business taxes the city still has some revenue potential—namely, the ability to raise as much as \$40 per resident in new revenues. With a tax increase, however, the business tax base declines by \$3471 per resident, or by about \$87 per resident for each \$1 of new business revenues. This additional loss of \$87 per resident in the city's business tax base has important implications for business income, perhaps reducing profits earned by city businesses by as much as \$8 per resident.<sup>17</sup> This is the annual economic cost to residents of one more dollar of city business tax revenues.

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\$3000 or more, even for short moves. Again, the cost for each lost job is about \$2500, even if a Philadelphian keeps the job!

Finally, these calculations ignore any wider social costs from neighborhood decay or increased crime that might follow from having fewer job opportunities in the city.

<sup>17</sup>The city's business tax base is composed of gross receipts, or sales, and business profits. Gross receipts constitute about 30 percent of the business tax base as measured here, while business profit is the remaining 70 percent. Today the return on gross receipts of manufacturing corporations implies that each dollar of additional sales yields about \$.03 of additional profits; see *Economic Report of the President*, February 1992, Table B-89, p. 401. If this relationship between gross receipts and profits holds true for Philadelphia firms, then the Philadelphia business tax base will be a fixed share of Philadelphia business gross receipts, here estimated as: Business Tax Base = .321  $\times$  Gross Receipts (Business Tax Base = .7  $\times$  Profits + .3  $\times$  Gross Receipts, where Profits = .03  $\times$  Gross Receipts). A decline of \$87 per resident in the city's business tax base must therefore imply a \$271 per resident decline in gross receipts ( $-\$87 = .321 \times -\$271$ ). Finally, the \$271 per resident fall in gross receipts suggests a fall in profits for city businesses of about \$8 per resident, assuming each dollar of gross receipts generates \$.03 in business profits ( $-\$271 \times .03 = -\$8.13$ ).

The reason the city now has a significant revenue potential in business taxes is that it made a clear decision in 1984 to reduce those taxes when it discontinued the city's mercantile license tax and the school district's general business tax. In 1984, the average business tax rate was 2.01 percent.<sup>18</sup> To raise business tax rates to their 1984 levels is to return the city once again to very near the top of the business tax revenue hill and to even higher economic costs from new revenues.

### CAN PHILADELPHIA ESCAPE ITS FISCAL CRISIS WITH A TAX INCREASE?

Current estimates by the new administration in City Hall predict that the final fiscal deficit for the current 1992 fiscal year will be \$248.3 million. If no new policy decisions are made in the coming 1993 fiscal year, either to control spending or to raise taxes, the expected annual deficit will be an additional \$204 million, bringing the cumulative deficit at the end of FY 1993 to \$452.3 million (\$248.3 million + \$204 million).<sup>19</sup> If no actions are taken in FY

1994 to alter revenue and spending trends, then the annual deficit is expected to reach \$278.3 million in that year, even without contributions toward the accumulated \$452.3 million of prior IOUs. By the summer of 1994, the new cumulative deficit will have grown to \$730.6 million! It is clear that investors will not lend the city additional funds if its deficits continue at these levels. Yet without additional outside funding the city faces a serious cash shortfall and an almost certain fiscal collapse. To close these projected deficits, and thus attract Wall Street funding, the city must either raise taxes, cut spending, or both.<sup>20</sup> Will a tax increase alone be sufficient to close anticipated deficits? The analysis in this article says no.

To eliminate its projected annual deficits over the coming years, the city must either cut spending or raise taxes in some combination to cover the anticipated shortfalls. The deficit projections assume city tax rates will remain at their current 1992 values. Therefore if the revenue strategy is to be used, tax rates must be increased. In the previous section, we have seen that the maximum potential revenue from an

<sup>18</sup>The sample range for the city's and school district's average tax rate on businesses is from .46 percent to 2.02 percent. In 1983, the year in which business tax rates reached their historical peak, business tax revenues equalled \$183 per capita (1992 dollars). The peak of the business tax revenue hill in that year occurred at the rate of 2.32 and would have yielded a maximum revenue of \$187 per capita (1992 dollars). From these calculations, I conclude the sample range for business taxes has put us close enough to a historical peak of the revenue curve to feel confident that the curvature of the hill near today's maximum rate of 2.50 percent, and thus potential revenues, is well estimated.

<sup>19</sup>See City of Philadelphia, *Revised Amended Five-Year Financial Plan, FY 1992-FY 1996*, May 18, 1992, p. 80. The cumulative deficit from FY 1993 of \$452.3 million will be carried over into FY 1994 to become an additional 20 percent burden on that year's projected revenues of \$2292.2 million (\$452.3 million/\$2292.2 million = .197). It is important to emphasize that all deficit projections presented here are based upon the five-year plan's assumption of business as usual. Thus these deficit projections already assume no additional wage or benefit increases for city employees, no additional federal or state mandates, and no further reductions in federal or state grants assistance.

<sup>20</sup>Fortunately, the city has been able to avoid an absolute fiscal collapse through a successful borrowing of \$474.55 million. The borrowing was completed through the newly established Pennsylvania Intergovernmental Cooperation Authority (PICA), a state-created oversight board to monitor the finances of Philadelphia. The new debt will be used to repay the existing \$248.3 million of cumulative city deficits from prior years, to assist the city with its short-term cash needs in FY 1993, and to support needed city capital expenditures. The new debt is secured by guaranteed revenues from the city's residential wage tax. What made this new borrowing possible was assurances by the new administration and the PICA board that the city would live within the balanced budget guidelines of the City of Philadelphia Five-Year Financial Plan.

It is important to remember that though PICA was able to successfully borrow funds from Wall Street to cover the past deficits of \$248.3 million, those deficits are not now off the books. On the contrary, the PICA borrowing simply moved these cumulated past obligations into the future. They must still be repaid from city tax revenues.

increase in the property tax rate was \$25 per resident. An increase in the wage tax rate is likely to net the city only \$20 per resident. Finally, an increase in city business taxes would yield a maximum of \$40 per resident. The maximum revenue the city might expect from an across-the-board increase in all its major tax rates is therefore only \$85 per resident, or about \$135 million ( $\$85/\text{resident} \times 1.586 \text{ million residents}$ ). I conclude that a tax increase alone can close only a bit more than 60 percent of the projected annual deficit of \$204 million for FY 1993. This still leaves an annual deficit gap of \$69 million ( $\$204 \text{ million} - \$135 \text{ million}$ ) for FY 1993. Further, there is no money available for paying off the nearly \$250 million of past city deficits from the revenue strategy. To avoid sizable future deficits and to begin to repay its past obligations, the city must plan and enact significant expenditure savings too.<sup>21</sup>

While Philadelphia taxes can still raise revenues, and at least make a partial contribution

toward closing the city's deficit gap through higher taxes, there remains the final question of whether this is a prudent long-run fiscal strategy. This analysis indicates that using the tax strategy is very costly. Raising city tax rates to their maximum revenue potential costs city residents more than just their tax payments. House values decline, jobs are lost, and business sales and profits fall. This study has estimated that each additional \$1 per resident of city revenue will cost that resident approximately \$5 annually because of falling home values if the property tax is used, or \$8 annually in lost private sector job opportunities if the wage tax is used, or \$8 annually in reduced business profits if business taxes are increased. These are the prices city residents must pay for any tax increase.<sup>22</sup> Is the \$1 per resident of additional city revenues and the public services it can support worth these costs in lost private incomes? This is the question that Philadelphians and their newly elected city government must now answer.

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<sup>21</sup>The revenue-only strategy will be more effective if the city's economy moves out of its current recessionary state, but even under the most optimistic projections for an economic recovery, a major deficit remains. I have recalculated the revenue hills of Figures 2, 3, and 4 assuming that the city and national economies were to return to the very low unemployment experiences of 1987. If we assume that Philadelphia could once again achieve the 1987 unemployment rate of 5.4 percent—its lowest unemployment rate in 20 years—then the peaks of the revenue hills will rise to \$440 dollars per resident for property taxation, to \$257 dollars per resident for business taxation, and to \$506 for wage taxation. Even using these very optimistic revenue projections, the city still faces an annual deficit gap of \$3 million for city budgets based on no wage or benefit increases. Further, there are no additional revenues to repay the \$250 million of past city deficits. The thought that Philadelphia might escape its current fiscal crisis simply through an upturn in the economy is wishful thinking. Even under the best of circumstances, major deficits are likely if the city continues with "business as usual."

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<sup>22</sup>These economic prices for city revenues may seem high, but two points should be noted here. First, Philadelphia is very near the top of its revenue hills where the adverse incentive effects of taxation are particularly acute. Most previous studies of the incentive effects of taxation have been for governments well away from the peaks of their revenue curves. Philadelphia has been climbing an uncharted course. Second, and most important, Philadelphia's economic losses are, in large measure, someone else's economic gains. When jobs leave Philadelphia, they relocate in other cities. Residents who leave the city, thereby depressing Philadelphia house values, move to other locations and drive up property values there. And the decline in sales by Philadelphia firms is made up nationally by increased sales by other firms (or branches) outside the city. Residents' losses are roughly matched by many small gains spread nationally to nonresidents. The overall economic inefficiencies imposed on the national economy from Philadelphia's high tax rates may be very low, even as the economic losses to Philadelphians are very high.

## DO PHILADELPHIA TAX RATES AFFECT THE PHILADELPHIA TAX BASE?

To examine the question of whether Philadelphia's tax rates on property, business activities, and wage income affect the value of the tax base for each of these important taxes, regression equations were specified and estimated for each of the three tax bases. For each of the city's three major taxes, an increase in the relevant tax rate was found to have significantly reduced the value of each tax's taxable base.

### PROPERTY TAX BASE PER RESIDENT<sup>a</sup>

$$\text{BASE} = 24480 + 92.14 \times \text{TIME} - 183.07 \times \text{UE} - 3961.39 \times \text{PRATE}_{-1}$$

(4176.2) \*\* (52.12)\* (105.13)\* (1394.33)\*\*

The estimated regression coefficients (with their standard errors in parentheses) imply that for the sample period from 1970-90 (the most complete period for all variables), the real (inflation adjusted to 1992 dollars) market value per resident of the city's property tax base (BASE) has an intercept value of \$24,480 per resident and has been growing each year at the rate of \$92.14 per resident because of the effects of TIME. Property values have declined (increased) by \$183.07 per resident for each one percentage point increase (decrease) in the city's unemployment rate, UE. The property tax rate lagged one year to allow for full economic adjustments (PRATE<sub>-1</sub>) has reduced (increased) the per resident market value of city property by \$3961 for each percentage point increase (reduction) in the tax rate. The variable PRATE<sub>-1</sub> is measured as the sum of the effective property tax rates of the school district and the city, lagged one fiscal year. The one-year lagged response seems sufficient to measure the full equilibrium adjustment of property values to changes in tax rates. Effective rates are measured as the State Tax Equalization Board's rate of assessed property values to market values (the "STEB rate") multiplied by the school district's and the city's nominal tax rate on assessed value.

The estimated regression coefficient on PRATE<sub>-1</sub> implies that a 20 percent increase in the city's effective property tax rate from its current value of 2.48 percent will reduce city property values by -\$1964 per resident (-\$3961.39 x (.20 x 2.48)), or by 12 percent from the estimated 1992 market value of \$16,139 per resident.

### BUSINESS TAX BASE PER RESIDENT<sup>b</sup>

$$\text{BASE} = 12598 + 266.46 \times \text{TIME} - 411.69 \times \text{UE} - 3471.06 \times \text{BRATE}_{-1}$$

(683.4)\*\* (52.71)\*\* (78.45)\*\* (1159.76)\*\*

The estimated regression coefficients (standard errors in parentheses) imply that for the sample period 1967-90 (the most complete period for all variables) the real (inflation adjusted to 1992 dollars) tax base for city business taxes measured as a weighted average

<sup>a</sup>Single (\*) or double (\*\*) asterisk by the coefficients' standard error indicates that the estimated coefficient is statistically different from zero at a .90 (.99) level of confidence—that is, there is less than a 1 in 10 (1 in 100) chance that the true coefficient value is zero and the variable has no effect on city tax base.

As measured by the adjusted R<sup>2</sup> this regression explains 81 percent of the variation in the market value per resident of city properties for the sample period, 1970-90. The estimated equation is corrected for possible serial correlation using a one-period moving average specification for the error term; the Durbin-Watson statistic for the corrected regression has a value of 2.02, not allowing us to reject the null hypothesis of no serial correlation.

<sup>b</sup>As measured by the adjusted R<sup>2</sup> this regression explains 87 percent of the variation in the business tax base per resident for the sample period, 1967-90. The estimated equation is corrected for possible serial correlation using a one-period moving average specification for the error terms; the Durbin-Watson statistic for the corrected regression has a value of 1.98, not allowing us to reject the null hypothesis of no serial correlation.



of business gross receipts and business income per resident (BASE) has an intercept value of \$12,598 per resident and has been growing at the annual rate of \$266.46 per resident because of the effects of TIME. The business tax base has declined (increased) by \$411.69 per resident for each one percentage point increase (decrease) in the city's unemployment rate, UE. Finally, the business tax base per resident has declined (increased) by \$3471.06 per resident for each one percentage point increase (decrease) in the one-period lagged average tax rate on business gross receipts and business income, BRATE<sub>-1</sub>. The one-year lagged response seems sufficient to measure the full equilibrium adjustment of gross receipts and business income to changes in tax rates. The variable BRATE<sub>-1</sub> is measured as the revenue weighted sum of each of the city's and school district's taxes on business gross receipts and business income and is lagged one fiscal year to allow for full economic adjustments to changes in rate.

The estimated regression coefficient on BRATE<sub>-1</sub> implies that a 20 percent increase in the city's business taxes from their current weighted average value of 1.50 percent is estimated to reduce the business tax base by -\$1041 per resident (-\$3471.06 x (.20 x 1.50)), or by 8.2 percent from the estimated 1992 business tax base of \$12,625 per resident.

### CITY EMPLOYMENT AND THE WAGE TAX BASE PER RESIDENT<sup>c</sup>

The city's wage tax base is the product of the number of jobs in the city multiplied by the average wage per employed city worker. Like national wages per worker, the average wage per Philadelphia worker adjusted for inflation—called the worker's real wage—has proven to be very stable over the sample period of this study, 1969-90, fluctuating around the sample mean of \$23,400 per worker. Variation in the city's wage tax base must come, therefore, from variations in city employment.

The city's employment relationship is estimated as the city's share of national employment (EMPSHARE). The specification of employment as EMPSHARE allows us to control for the effects of the national business cycle on Philadelphia employment. The estimated EMPSHARE relationship for our sample period, 1969-90 (again the most complete period for all variables), is:

$$\text{EMPSHARE} = .0137 - .00015 \times \text{TIME} - .00072 \times \text{WRATE}_{-1}$$

(.0003)\*\* (.00003)\*\* (.00020)\*\*

The estimated regression coefficients (standard errors in parentheses) imply that for our sample period 1969-90, Philadelphia's share of national employment has an intercept value of .0137 (1.37 Philadelphia workers per 100 U.S. workers) that has been declining over time at the annual rate of .00015 city workers per U.S. workers because of the effects of TIME. The city's weighted average wage tax rate lagged one fiscal year, WRATE<sub>-1</sub>, reduced (increased) the Philadelphia employment share by .00072 city workers per U.S. worker for each one percentage point increase (reduction) in the average tax rate. Because the wage tax rate has changed only four times over our sample period (1970, 1972, 1977, 1984) the precise time pattern of the response of employment to tax rates cannot be statistically estimated. The one-period response measured here is likely to be an underestimate of the full equilibrium response of employment to tax rates. The variable WRATE<sub>-1</sub> is measured as the revenue weighted sum of the tax rate on nonresident commuters and the tax rate on residents. (The two rates were identical until 1984, but now differ.)

The estimated regression coefficient on WRATE<sub>-1</sub> implies that a 20 percent increase in the city's weighted average wage tax rate from its current value of 4.765 percent will reduce Philadelphia's share of national employment by -.00069 city workers per U.S. worker (.00072 x (.20 x 4.765)), or by 12.7 percent from the estimated 1992 employment share. Multiplying this lost employment share by the national level of employment in 1992 means a loss of approximately 80,600 Philadelphia jobs. In 1992, each lost job contributes an average of \$25,376 per employee to the city's wage tax base. The total estimated decline in the city's wage tax base because of the 20 percent increase in the average wage tax rate therefore equals \$2.035 billion (80,600 lost jobs x \$25,376/job), or approximately \$1289 per resident (\$2.035 billion/1.586 million residents). The \$1283 decline in tax base per resident is 12.7 percent of the city's estimated \$10,132 wage tax base per resident in 1992.

<sup>c</sup>As measured by the adjusted R<sup>2</sup> this regression explains 97 percent of the variation in the city's share of national employment for the sample period, 1969-90. The estimated equation is corrected for possible serial correlation using a one-period moving average specification for the error terms; the Durbin-Watson statistic for the corrected regression has a value of 1.95, not allowing us to reject the null hypothesis of no serial correlation.

## REFERENCES

- Auerbach, Alan. "Taxation, Corporate Financial Policy, and the Cost of Capital," *Journal of Economic Literature* (September, 1983).
- Boskin, Michael. "Taxation, Savings, and the Rate of Interest," *Journal of Political Economy* (April, 1978, Part 2).
- Deaton, Angus. "Equity, Efficiency, and the Structure of Indirect Taxation," *Journal of Public Economics* (December, 1977).
- Evans, Owen. "Tax Policy, the Interest Elasticity of Savings and Capital Accumulation: Numerical Analysis of Theoretical Models," *American Economic Review* (June, 1983).
- Fullerton, Donald. "On the Possibility of an Inverse Relationship Between Tax Rates and Government Revenues," *Journal of Public Economics* (October, 1982).
- Grieson, Ronald, William Hamovitch, Albert Levenson, and Richard Morgenstern. "The Effect of Business Taxation on the Location of Industry," *Journal of Urban Economics* (April, 1977).
- Grieson, Ronald. "Theoretical Analysis and Empirical Measurements of the Effects of the Philadelphia Income Tax," *Journal of Urban Economics* (July, 1980).
- Gruenstein, John. "Jobs in the City: Can Philadelphia Afford to Raise Taxes?" *this Business Review* (May/June, 1980).
- Holtz-Eakin, Douglas, and Harvey Rosen. "Federal Deductibility and Local Property Tax Rates," mimeo, Princeton University, 1990.
- Hausman, Jerry. "Taxes and Labor Supply," in Alan Auerbach and Martin Feldstein, eds., *Handbook of Public Economics*, Volume I. North-Holland Publishing, 1985.
- Inman, Robert. "Micro-fiscal Planning in the Regional Economy: A General Equilibrium Approach," *Journal of Public Economics* (April, 1977).
- Inman, Robert. "Philadelphia's Fiscal Management of Economic Transition," in Thomas Luce and Anita Summers, eds., *Local Fiscal Issues in the Philadelphia Metropolitan Area*. University of Pennsylvania Press, 1987.
- Kmenta, Jan. *Elements of Econometrics*. Macmillan Publishing, 1971.
- Ladd, Helen, and Katharine Bradbury. "City Taxes and Property Tax Bases," *National Tax Journal* (December, 1988).
- Laffer, Arthur. Statement Prepared for the Joint Economic Committee, May 20, 1977.
- Oates, Wallace. "The Effects of Property Taxes and Local Public Spending on Property Values," *Journal of Political Economy* (November/December, 1969).
- Phlips, Louis. *Applied Consumption Analysis*. North-Holland Publishing, 1974.
- Rosen, Harvey. "Housing Subsidies: Effects on Housing Decisions, Efficiency, and Equity," in Alan Auerbach and Martin Feldstein, eds., *Handbook of Public Economics*, Volume I. North-Holland Publishing, 1985.
- Sexton, Terri. "Forecasting Property Taxes: A Comparison and Evaluation of Methods," *National Tax Journal* (March, 1987).