

of transit for the next decade. One point is clear: Though strong federal and state assistance will be required, cities will continue to have the leadership role in transit financing.

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## Options for Financing a Regional Transit Authority

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Transit service stoppages for lack of funds and eleventh-hour makeshift financial solutions have become all too common in recent years. Regional taxes dedicated to transit service subsidization are increasingly popular and may be necessary for continued operation in many U.S. metropolitan areas. Although these taxes are relatively new, they are under active consideration in many areas in response to rapidly increasing transit deficits and the current administration's proposed reductions in federal operating subsidies. This paper compares the efficiency and equity of various taxes for these purposes, including motor fuel, real estate, sales, wage and income taxes as well as fare increases. Data on the tax levels required and resulting burdens by income class are reported for the Pittsburgh region. Tax payments per trip are also estimated by income class as an indication of the distribution of net benefits. Broad-based wage or income taxes seem to be the most desirable sources, coupled with close attention to potential reductions in transit expenses. Sales taxes are also an acceptable tax source, although they have a smaller tax base and a slightly more regressive effect than wage or income taxes.

Government assistance for transit service burgeoned in the past decade. In 1970, total subsidy for all modes of public transit was \$541 million in the United States. By 1978, subsidies had increased to \$5.264 billion, representing more than a fivefold increase in real dollars (1,2). Funding the capital requirements and operating deficits of existing and desired transit services has become both a substantial undertaking and a continuing problem in many metropolitan areas. Transit service reductions or stoppages for lack of funds have occurred in several areas recently, including Chicago, Birmingham, and Boston. Eleventh-hour makeshift solutions such as special state appropriations or loans have become all too common in the past few years.

The rapid increase in the level of subsidy has been accompanied by major changes in the sources of subsidy funds. Prior to 1973, no funds for operating assistance were provided by the federal government. By 1978, federal grants for operating assistance totaled \$567 million for the 26 largest metropolitan areas, or 10 percent of total operating revenue in these areas. Revenue from regional taxes and counties also increased, with a 180 percent increase in real dollar contributions from 1974 to 1978. This represents an increase from 25 to 31 percent of operating subsidies. Although contributions from state and local governments increased in dollar amounts from 1974 to 1978 in these large metropolitan areas, the real value of these contri-

butions declined. These changes for 26 large metropolitan areas are generally indicative of the nation since these services represent 92 percent of the total national operating deficit. Assistance for capital investments such as new vehicles, exclusive rights-of-way, and other facilities has also increased dramatically in the period from 1974 to 1978, but there has not been a major shift in the source of funds. Throughout this period, the federal government has provided matching funds to the level of 80 percent of the cost of capital investments, and virtually all transit agencies have taken advantage of this funding opportunity (2).

The current transit funding situation in the United States is marked, then, by rapidly increasing subsidy amounts, increasing reliance on federal and regional taxes for operating subsidies, and continuing reliance on the federal government for the bulk of capital funds. However, the federal government is not only unwilling to substantially increase operating subsidies, but has proposed elimination of all federal transit operating subsidies. Coupled with rapidly increasing deficits, many transit systems are faced with financial crises.

By and large, states seem to be unwilling or unable to assume a larger role in transit funding. Accordingly, regional taxes will become increasingly important as a source of funds for transit service. Based on the principle that the beneficiaries of services should assume their costs, regional financing for transit operation is sensible since the benefits of transit are predominantly regional in nature.

While regional funding is one revenue option, we emphasize that enacting new taxes or increasing existing taxes should certainly be avoided unless these changes are necessary to achieve public objectives. Transit service reductions, cost reductions, or private operation may provide more desirable alternatives to increased transit subsidies in any particular case and should always be carefully considered. The current remarkable increase in transit operating and capital costs coupled with the stagnation of operating revenues must be curtailed at some point in the future. Otherwise, no financing scheme will be adequate. Although cost reduction is extremely important, analysis of the possibility or

desirability of service and cost reductions is beyond the scope of this paper. However, the costs of the taxes discussed below can certainly be used to weigh the relative merits of service reductions and tax increases for such analysis.

In this paper, we shall examine a number of state and regional financing sources. We are particularly interested in regional funding because it may be the most promising method of providing additional operating funds for transit. Our intent is to quantitatively assess the equity and efficiency impacts of a variety of potential regional funding sources, including the possibility of major transit fare increases. Our assessments will be based on an analysis of taxes for the Pittsburgh metropolitan region, but we believe that this analysis and our general conclusions with regard to specific tax types are applicable to most metropolitan areas. In the second section, we describe the existing service and funding of the Pittsburgh transit system. The third section considers the potential of various taxes to yield sufficient revenues. The fourth section reports the incidence of current and potential funding sources. The distribution of transit benefits and tax payments is examined in the fifth section. Difficulties in managing a dedicated transit tax are noted in the last section.

#### CURRENT FINANCING OF PITTSBURGH TRANSIT SYSTEM

The Port Authority of Allegheny County (PAT) was formed in 1964 and immediately assumed transit service in Allegheny County by purchase of existing transit companies for \$43 million. At the time of its formation, there was considerable interest in maintaining the system throughout the county region; the City of Pittsburgh occupies only 8 percent of the land area of this region. Consequently, funding and operation of the PAT system were always organized on a countywide rather than citywide basis. According to the annual reports for PAT, Allegheny County guaranteed the debt service for the bonds issued by PAT to purchase the assets of private companies in 1964. Since 1964, PAT has maintained the bus, trolley, commuter rail, and inclined-plane service that it assumed at its formation and has expanded bus service into suburban areas.

For the first three years of PAT's existence (1964-1967), fares and other service revenue provided the bulk of operating revenue. In each year, however, deficits were incurred and were financed by grants from Allegheny County. The source of these funds has been a countywide real estate tax. In

1967, the Commonwealth of Pennsylvania initiated a program of providing operating subsidies for mass transit. In 1973, subsidy funds for operating expenses were made available from the federal government. These new subsidy programs were fortuitous for PAT since PAT's deficit was outstripping the subsidy funds available prior to their enactment. Thus, PAT has received operating subsidies from the county in which it operates, the state, and the federal government.

Table 1 shows sources of operating revenue from 1970 to 1979. During this period, the fare revenue as a proportion of expenses dropped from 79 percent in 1970 to less than 46 percent in 1978. Subsidy received from Allegheny County increased in dollar amount from \$3.8 to \$6.7 million but decreased as a percentage of operating revenues from 10 to 8 percent. The subsidy funds from the state and from the federal government showed significant increases; the state funds provided 27 percent of all operating expenses in 1978, whereas the federal government provided 16 percent. During this same period, operating expenses more than doubled, representing a 27 percent increase in operating expenses in real dollars. All these trends are consistent with national patterns.

As with other transit systems, PAT has been more dependent on the federal government for capital subsidy funds than for operating funds. As of 1978, 59 percent of PAT's capital expenditures had been financed by grants from the federal government, 12 percent from the Commonwealth of Pennsylvania, and the remaining 29 percent funded by grants from Allegheny County. During the period 1964-1978, the total capital expenditure was \$295 million. The amount of capital expenditure and capital grant revenue received varies each year but has tended to increase over time. In 1978, capital grants received amounted to \$33 million or 45 percent of all revenue.

#### CURRENT AND POTENTIAL REVENUE SOURCES AND YIELDS

There are a variety of regional taxes that could be used to fund transit subsidies. General sources currently used in particular metropolitan areas include wage, sales, income, and real estate taxes. Motor fuel taxes or vehicle toll revenues have also been used to subsidize transit. Finally, fare and other service revenues also represent a regional base for transit funding.

The benefit principle of taxation suggests that a particular service should be paid for by those who

Table 1. Sources of funding for PAT transit system operating revenue.

Year	Fare Revenue (%)	Other Service Revenue (%)	Allegheny County (%)	Commonwealth of Pennsylvania (%)	Federal (%)	Total Revenue (\$000 000s)
1970	79	3	10	8	-	37.2
1971	73	3	14	10	-	41.2
1972	54	2	11	33	-	56.3
1973	61	2	9	28	-	48.2
1974	55	3	6	36	-	56.9
1975	51	3	9	26	11	62.8
1976	51	2	9	27	11	68.8
1977	48	2	9	28	13	72.8
1978	46	2	8	27	16	79.1
1979	44	2	9	28	17	93.1
1980 (first six months)	44	2	9	28	16	48.0

Notes: Annual revenue is reported on a calendar-year basis until 1979; data for 1979 include the first six months of 1979 plus one half of FY 1980 revenue. Note that the timing of subsidy payments within a fiscal year may affect the reported subsidy percentage from one year to the next, even without a change in the overall level of subsidization. Data for FY 1980 are preliminary. Source: PAT annual reports.

use or benefit from the service. In the case of transit service, this principle would imply that all transit expenses should be paid by those who directly or indirectly benefit from the service. In the absence of indirect benefits, this suggests that fare revenues should be sufficient to cover transit costs. However, benefits of transit services may also accrue to nonusers, for example, by reducing the overall level of congestion for commuters. It might be argued that these indirect benefits that accrue to nonusers suggest that households in areas served by transit should provide subsidy funds.

Unfortunately, identifying the extent to which individual taxpayers receive any such nonuser benefits is quite difficult. One possible approach would be to determine whether such nonuser benefits resulted in increases in property values in the areas served by transit. Special taxes might then be imposed within the areas surrounding transit services. However, there are no reliable means to attribute real estate values or value changes to transit services. Empirical studies suggest only a weak relationship, if any at all, between real estate values and transit service, particularly bus service (3).

Regardless of the distribution of benefits among different groups, it is clear that nearly all the user and nonuser benefits from transit service accrue within the region served by the transit service. Accordingly, the benefit principle would suggest that regional taxes or fare revenues should fund the service. It is difficult to extend the principle to the level of charging for individual nonuser benefits, and the expense of current transit services generally precludes operation from only fare revenues without service cutbacks. The general presumption in favor of regional financing is quite clear under the benefit principle, which indicates that examination of regional sources is worthwhile.

If enacted, regional transit taxes might be expected to replace existing sources of subsidy as well as to accommodate increased transit deficits. Table 2 reports the tax rates that would have been required to replace various categories of subsidy funds in 1978. Required revenue yields range from \$13 million, to replace federal operating subsidies alone, to \$74 million, to replace all federal, state, and county operating and capital subsidies to transit. For example, \$19 million in revenue is required to replace federal and county operating sub-

sidies in 1978. This could be accomplished by a 0.53 percent sales tax, a 0.26 percent wage tax, a 0.21 percent income tax, or a 0.35 percent real estate tax imposed on residents of Allegheny County. Alternatively, a \$0.03/gal motor fuel tax could be imposed. Other desired revenue yields can be obtained by proportionally increasing or decreasing these rates.

The fare increases necessary to replace subsidy funds reported in Table 2 require a strong qualification. These fare increases are derived by assuming either no patronage decline with increased fares or, alternatively, transit expense reductions that are directly proportional to patronage declines. Actually, patronage and transit expenses would be expected to decline with fare increases, but transit costs would decrease by a much lower percentage. Assuming a transit fare elasticity of -0.3 (6) and no reduction in costs with patronage reduction implies that a fare increase of 183 percent is required to replace federal operating subsidies. The actual fare increase required would be somewhere between 36 percent (reported in Table 2) and the 183 percent increase required without any cost savings. Thus, the fare increases reported in Table 2 are underestimates of the actual required fare increases to replace subsidy amounts.

Of course, levying any of the taxes reported in Table 2 may result in a decline in the total tax base just as transit patronage might be expected to decline with fare increases. For example, an increase in the motor fuel tax within Allegheny County might induce residents to purchase motor fuel outside the county. Similarly, regional sales taxes may be avoided by purchasing outside the county. Thus, all the tax rates reported in Table 2 are underestimates of the actual tax rate to yield the desired revenue target. However, the possibilities of substitution, causing a decline in the tax bases, due to the tax rates reported in Table 2 are likely to be smaller than the decline in transit patronage due to fare increases.

Obviously, the tax rates required to raise particular revenue targets depend crucially on the magnitude of the tax base. Thus, the required income tax rate is less than half of the sales tax rate in all cases. To replace all subsidy funds, the required tax rates are appreciable increases on existing taxes. For example, the required regional gasoline tax of \$0.10/gal would be only slightly

Table 2. Required regional tax rates to achieve possible subsidy targets in 1978.

Item	Subsidy Target				
	Federal Operating Subsidy	Federal and County Operating Subsidy	Total Operating Subsidy	Total Subsidy	Tax Base (\$ billions)
Revenue required (\$000 000s) <sup>a</sup>	13	19	41	74	-
Regional sales tax (%) <sup>b</sup>	0.37	0.53	1.12	2.08	3.56
Regional wage tax (%) <sup>c</sup>	0.17	0.26	0.55	0.99	7.45
Regional income tax (%) <sup>c</sup>	0.15	0.21	0.46	0.83	8.91
Regional property tax (%) <sup>d</sup>	0.24	0.35	0.76	1.37	5.40
Regional gasoline tax (cents/gal) <sup>e</sup>	1.9	2.7	5.9	10.6	-
Fare increase (%) <sup>f</sup>	36+	53+	114+	206+	0.036

<sup>a</sup>PAT annual reports.

<sup>b</sup>Based on sales tax collections from firms located in Allegheny County tabulated by Pennsylvania Bureau of Research and Statistics. Data exclude untaxed sales and may include some sales by outlets located outside the region. Sales tax collections are based on fiscal years. Calendar-year figures reported here are the average of the two relevant fiscal years.

<sup>c</sup>Regional wages and incomes as reported in income tax returns (instituted 1972) and tabulated by the Pennsylvania Department of Revenue. The wage tax considered in this analysis is based on the wages of residents of Allegheny County; an alternative scheme would be to levy the wage tax by place of employment or on all those who work in Allegheny County. For the regional income tax, taxable income is defined to be identical to taxable income under the state individual income tax.

<sup>d</sup>Pennsylvania State Tax Equalization Board, annual certification, as reported in 1979 (4).

<sup>e</sup>Volume sales of gasoline estimated as the total state sales in 1978 (5) multiplied by the percentage of vehicles registered in Allegheny County in 1978.

<sup>f</sup>Increase assumes no patronage decline with fare increases, thereby underestimating the required fare increase.

less than the \$0.11/gal state tax that was imposed on motor fuel sales in 1978. The required sales tax would be one-third of the current 6 percent sales tax, whereas the required income tax rate would be nearly two-fifths of the state income tax rate in 1978. Although these tax rate increases are substantial, only two revenue sources in Table 2 would be unlikely to yield sufficient revenue to replace operating and capital subsidies. These are the transit fare increases and the motor fuel tax for which a substantial diversion of motor fuel purchases outside the county might be expected.

In addition to the adequacy of the yield from a potential tax source, the ease of administration of the tax is also a concern. In Pennsylvania, income and sales taxes are collected by the state, so any regional taxes might simply be included in the state reporting and collection process. Wage taxes might be collected at the workplace, as they are currently for local jurisdictions, or filed with the state income tax returns. Real estate taxes are collected at the local level and additional levies would not be administratively burdensome. However, no administrative structure currently exists to collect motor fuel taxes at the county level. Imposing a special surcharge within the region would require additional reporting by firms that retail motor fuels since they currently do not report sales by county. Thus, on the criterion of administrative ease of collection, the various tax sources in Table 2 are relatively equal, with the exception of the motor fuel surcharge, which would require additional accounting and reporting.

#### INCIDENCE OF CURRENT AND POTENTIAL TAX SOURCES

In addition to sufficient yield and administrative ease in collection, there are several other considerations that can be examined when evaluating a tax to fund a particular service. The traditional public finance literature proposes the ability-to-pay principle in addition to the benefit principle. Under the ability-to-pay principle, the revenue target or total revenue necessary to fund a public good or service is set by a broader decision process. Taxes imposed to yield this revenue target should ensure that the contribution of each taxpayer is in accord with his or her ability to pay. Under the principle, taxpayers with equal capacity should contribute equal amounts, whereas those with greater capacity should pay more. In the transportation literature, it is often argued that public transportation provides substantial benefits to the poor although it may be a rather blunt instrument for this purpose (7,8). If providing these benefits to the poor is a goal of public transit, it may be argued that the funding sources should be based on the ability to pay. This argument would suggest, for example, that a broad-based income tax with perhaps a progressive rate structure would be an appropriate source of revenue. The primary justification for this type of tax would be that the resulting tax burdens would be equitable.

While the distribution of tax burdens among particular groups such as the elderly and minorities is of concern when designing new taxes, the most common concern in the evaluation of the equity of a particular tax source is the income incidence. Although there is some debate as to what income base (e.g., current income, permanent income, wealth) to consider when measuring burden, current income is the most common base, given the data problems with alternatives.

In Table 3, the distribution of payments among income classes for various tax sources in 1978 is reported. The table provides the distribution of

payments for the major revenue sources to the state's General Fund as well as current and potential regional (county) revenue sources. The distribution of payment is very similar for the state individual income tax and the current Pennsylvania sales tax. Adding clothing to the Pennsylvania sales tax base has little impact on the distribution of payments. Since it is difficult to determine the distribution of payments by income class for the state corporate net income tax, the distribution is evaluated under two assumptions. First, if the tax is assumed to be borne by the owners of capital, the distribution of payments is assumed to be similar to the distribution of net profits income. Note that 63 percent of net profits income is in the income class of \$25 000 and more. If the corporate income tax is assumed to be passed on to consumers, the distribution of payments is assumed to be similar to the distribution of the sales tax. The distribution of payments of the gasoline tax is similar to that for the individual income and sales tax although a higher percentage of gasoline tax payments comes from the lower-income groups.

In the case of the regional tax sources, the distribution of payments among income classes is similar for an income tax and a wage tax. The real estate tax has a higher concentration of payments in the lower-income groups when compared with the income and wage taxes. The distribution of fare revenues is particularly interesting. In essence, the distribution of transit fare payments is equal across our income classes. As a result, the highest-income category (with incomes of more than \$25 000) contributed only 16 percent of fare revenues, whereas the minimum contribution of this high-income class is 30 percent for the other tax sources reported in Table 3.

The distribution of the burden of potential tax sources by income class is reported in Table 4 for 1978. Each entry in this table represents the average ratio of tax payments to income within each income category. In contrast to the contribution proportions in Table 3, the ratios in Table 4 reflect the actual burden experienced by an average household in each income group. Any concentration of tax payments among the lowest-income households in an income class is reflected in Table 4 but not in the aggregate measures of Table 3. Thus, Table 4 represents a more accurate description of the distribution of household burdens than does Table 3. For comparison purposes, the burden of a hypothetical wage tax (at a 2 percent rate) and a sales tax without a clothing exemption (at the current Pennsylvania rate of 6 percent) is also included in this table. By comparing the relative burdens across income classes, the regressiveness or progressiveness of the various general tax sources may be assessed. The real estate tax is the most regressive tax appearing in Table 4; the lowest-income category has an average burden eight times larger than that of the highest-income category. The income tax in Pennsylvania is a flat rate, so the burden of the tax equals the tax rate for each income category. The wage tax is relatively progressive, although there is a reduction in the burden of this tax in the highest-income category. The effect of withdrawing the clothing exemption from the current state sales tax would be to make the sales tax slightly more regressive.

The average burdens reported in Table 4 deserve several caveats. First, the burdens were calculated on the basis of current income. Since public assistance payments are known to be underreported, current income for the lowest-income groups may be underestimated. As a result, the tax burden may be overestimated. The net effect on the distribution

**Table 3. Distribution of payments for current and potential state and regional financing mechanisms.**

Revenue Source	Percentage of Payments per Income Level					
	Less Than \$6000	\$6000-9999	\$10 000-14 999	\$15 000-19 999	\$20 000-24 999	\$25 000 and More
<b>State</b>						
Individual income tax <sup>a</sup>	6.0	8.1	13.6	17.0	16.0	39.2
Current PA sales tax <sup>b</sup>	5.5	7.6	13.4	17.9	16.5	39.2
PA sales tax without clothing exemption <sup>b</sup>	5.6	7.6	13.3	17.7	16.4	39.3
Net profits <sup>c</sup>	3.8	5.7	9.2	9.6	8.7	63.0
Gasoline tax <sup>d</sup>	6.4	9.2	18.5	20.0	15.6	30.4
General revenue <sup>e</sup>	5.7-5.3	7.8-7.4	13.5-12.7	17.6-16.0	16.4-14.8	39.2-43.8
<b>Regional</b>						
Individual income tax <sup>f</sup>	5.4	7.1	11.5	15.6	15.6	44.8
Wage tax <sup>g</sup>	4.4	7.3	12.2	17.1	17.2	41.8
Real estate tax <sup>h</sup>	8.0	9.6	15.2	21.7	15.6	29.8
Fare revenue <sup>i</sup>	17.0	16.6	19.5	15.2	16.1	15.7

<sup>a</sup>Since the income tax was a flat 2.2 percent in 1978, the distribution of payments is the same as the distribution of taxable income. There are some exemptions for income among the lowest-income categories in the Pennsylvania tax, but their effect is minor. In 1977, the state individual income tax rate was 2.0 percent. The effective rates for those with incomes below \$6000 ranged from 1.97 to 1.99 percent as a result of the special provision for low-income households (9). A progressive income tax enacted in 1972 was found to be unconstitutional by the State Supreme Court, and the current flat tax was enacted subsequent to that finding.

<sup>b</sup>This distribution of taxable consumption by income class was obtained by using a simulation model developed by the Pennsylvania Tax Commission to examine the current sales tax and the tax without the clothing exemption. This analysis is based on U.S. Department of Labor Statistics (10). We assume that consumption patterns in Pennsylvania are similar to those of the New England region. For this analysis, income was inflated to 1978 dollars. The underlying assumption is that the relationship between taxable and nontaxable consumption is not affected by inflation.

<sup>c</sup>The distribution of net profits income by income class was obtained from a summary of 1978 individual income tax return data from the Pennsylvania Department of Revenue. Since it is difficult to determine the incidence of the state corporate net income tax, we evaluate the incidence under two assumptions. If the tax is paid by the owners of capital (assuming that none of the tax is shifted to consumers), the distribution of the tax payments is considered to be the same as the distribution of net profits income by income class. If it is assumed that the tax is shifted forward to consumers, the distribution is assumed to be the same as that for the sales tax.

<sup>d</sup>The distribution of gasoline expenditures by income class was derived from U.S. Department of Labor Statistics (10). The original data reported expenditures on gasoline in the New England Region for 1972-1974. Assuming that the distribution of expenditure remained constant from 1973 to 1978, the distribution was developed by inflating 1973 income ranges to 1978 levels. When the income ranges from the Consumer Expenditure Survey were different from those used in this analysis, we interpolated to make the results compatible.

<sup>e</sup>The individual income tax, the general sales and use tax, and the corporate net income tax accounted for 73 percent of total general fund revenue for Pennsylvania in 1978-1979. Of the 73 percent of the general fund, the individual income tax accounted for 36.4 percent, the sales and use tax accounted for 43.9 percent, and the corporate net income tax accounted for 19.7 percent. By applying these weights, the distribution of payments to the general fund was derived. A range is provided because the distribution of payments of the corporate net income tax varies depending on the assumption made concerning who pays the tax. In the first case, it is assumed that the tax is shifted to consumers and therefore the distribution is similar to the distribution of payments of the current sales tax. In the second case, we assume that the tax is paid by the owners of capital and therefore that the distribution is similar to the distribution of net profits income.

<sup>f</sup>The distribution of taxable income under the Pennsylvania individual income tax for Allegheny County is based on summary individual income tax return data for Allegheny County provided by the Pennsylvania Department of Revenue. The distribution of wages by income group is based on a summary of individual income tax return data on compensation.

<sup>g</sup>The distribution of real estate taxes paid by income class is based on data from the Bureau of the Census (11). For this analysis, income is inflated to 1978 dollars.

<sup>h</sup>Calculated by us from the Household Travel Survey conducted by the Southwestern Pennsylvania Regional Planning Commission, 1977-1978.

**Table 4. Distribution of burdens of current and potential state and regional financing mechanisms.**

Revenue Source	Mean Tax per Income Level					
	Less Than \$6000	\$6000-9999	\$10 000-14 999	\$15 000-19 999	\$20 000-24 999	\$25 000 and More
<b>State</b>						
Individual income tax <sup>a</sup>	0.022	0.022	0.022	0.022	0.022	0.022
Current PA sales tax <sup>b</sup>	0.030	0.016	0.015	0.015	0.014	0.013
PA sales tax without clothing exemption <sup>b</sup>	0.036	0.018	0.018	0.017	0.017	0.015
<b>Regional</b>						
Individual income tax (at 2 percent rate) <sup>c</sup>	0.02	0.02	0.02	0.02	0.02	0.02
Wage tax (at 2 percent rate) <sup>d</sup>	0.004	0.009	0.015	0.017	0.017	0.014
Real estate tax <sup>d</sup>	0.165	0.066	0.045	0.037	0.032	0.028

<sup>a</sup>The current Pennsylvania individual income tax is at a flat rate of 2.2 percent.

<sup>b</sup>The current Pennsylvania sales tax is 6 percent. In this analysis, we computed the sales tax paid by households included in the Consumer Expenditure Survey given the definitions of taxable consumption under Pennsylvania law (see note b, Table 3).

<sup>c</sup>The burden of a flat regional individual income tax is simply equal to the tax rate.

<sup>d</sup>The burdens of a regional wage tax of 2 percent and the real estate tax are calculated from household data provided by the Bureau of the Census (11). For this analysis, income was inflated to 1978 dollars.

of the burden among income classes would depend on the distribution of unreported income among these classes. Second, the burdens reported in Table 4 reflect the initial rather than the ultimate burden of tax payments. State and local tax payments represent a deduction for federal income tax purposes, and the progressive nature of the federal income tax results in an ultimate burden that is more regressive than that reported in Table 4. Since the higher-income classes generally have a higher marginal tax rate, an equal state or local tax deduction results in greater tax savings for high-income households relative to low-income households.

By using the data reported in Tables 3 and 4, the distribution of the average burdens and payments may be calculated for the various potential taxes discussed earlier. Table 5 reports these distributions

for a revenue target of \$19 million in 1978, which would be sufficient to replace all federal and county operating subsidies.

The burdens and payments reported in Table 5 permit comparisons of different tax sources within any one income class. For taxpayers with incomes between \$10 000 and \$15 000 in 1978, the individual income tax results in the lowest average payment (\$21), whereas the sales tax represents the lowest average burden (0.0013). The wage tax would result in the lowest average payment and the lowest average burden to the lowest-income class. Thus, the wage tax has the most progressive impact of all the sources listed in Table 5, although there is a slightly lower burden on the highest-income class compared with the middle-income classes for this tax source.

**Table 5. Average payments and burdens per household to replace federal and county operating subsidies.**

Revenue Source	Income Class					
	Less Than \$6000	\$6000-9999	\$10 000-14 999	\$15 000-19 999	\$20 000-25 000	More Than \$25 000
Individual income tax (0.21 percent)						
Burden <sup>a</sup>	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021
Payment (\$) <sup>b</sup>	11	17	21	30	49	104
Sales tax (0.53 percent)						
Burden <sup>a</sup>	0.0027	0.0014	0.0013	0.0013	0.0012	0.0011
Payment (\$) <sup>b</sup>	11	18	25	35	52	91
Wage tax (0.26 percent)						
Burden <sup>a</sup>	0.0004	0.0012	0.0020	0.0022	0.0022	0.0018
Payment (\$) <sup>b</sup>	9	18	22	33	54	97
Real estate tax (0.35 percent)						
Burden <sup>a</sup>	0.0057	0.0023	0.0016	0.0013	0.0011	0.0010
Payment (\$) <sup>b</sup>	16	23	28	42	49	69
Fare increase (53 percent)						
Payment (\$) <sup>b</sup>	33	40	36	30	50	37

<sup>a</sup>Income, sales, wage, and real estate tax burdens calculated as proportional to existing tax burdens (Table 4).

<sup>b</sup>Average taxpayer payments are calculated as proportional to the ratio of the percentage of payments by tax source by income class (Table 3) to the percentage of households in each class as given by Bureau of the Census (11) with incomes inflated to 1978 dollars.

**Table 6. Tax payments per trip for potential regional tax sources to replace federal and county operating subsidies.**

Revenue Source	Income Class					
	Less Than \$6000	\$6000-9999	\$10 000-14 999	\$15 000-19 999	\$20 000-25 000	More Than \$25 000
Income tax	0.06	0.08	0.11	0.19	0.19	0.53
Wage tax	0.05	0.08	0.12	0.21	0.20	0.49
Sales tax	0.06	0.08	0.13	0.22	0.19	0.46
Real estate tax	0.09	0.11	0.14	0.26	0.18	0.35

Note: Each entry represents the total local tax contribution for each income class divided by the number of transit trips made by each income class. Fare payments and state and federal contributions are excluded. Transit trips for each income class are calculated as total trips (103 million) times the percentage distribution of trips by income as indicated by the Household Travel Survey conducted by the Southwestern Pennsylvania Regional Planning Commission, 1977-1978. Total tax payments by income class are calculated as \$19 million times the appropriate payment percentage distribution as shown in Table 5.

#### DISTRIBUTION OF BENEFITS AND TAX PAYMENTS

The incidence estimates presented in the previous section are only one side of the equity issue in transit finance. As noted earlier, policymakers may be interested in the relationship between the benefits received and the tax payments by income group as well as the distribution of tax payments in relation to the ability of households to pay.

Unfortunately, identification of the distribution of transit benefits is not an easy task. Transit riders obviously benefit from the improved service and lower fares made possible by subsidies. Owners of real estate may benefit from the improved access to their property provided by transit service. In addition, transit service may provide a variety of indirect social and environmental benefits such as reduced congestion, improved air quality, and increased mobility to the elderly and handicapped. Because of the difficulties associated with measuring these indirect benefits, we have restricted our attention to the direct benefits to transit riders. These are likely to represent the largest category of benefits, since environmental and other indirect benefits were found to be small in several studies (12-14). Even when restricting our consideration to direct benefits, we must make the simplifying assumption that the distribution of benefits in each income class is equal to the distribution of trips. In fact, we expect that some trips are valued more than others, but because of data limitations we cannot properly weigh each trip by its actual value.

The tax payments per trip for each income class under the four alternative regional taxes are reported in Table 6 for 1978. Assuming that the distribution of benefits is identical to the distribution of trips, these figures represent the relative level of benefits from regional tax payments within each income class. Fare payments and transit tax

payments made through the state and federal governments are excluded from Table 6.

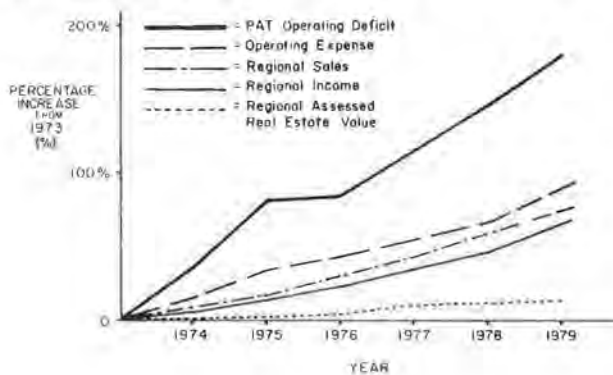
With the inclusion of direct benefits to transit riders, the net distributional impact of the Pittsburgh transit service is quite progressive. For example, under a wage tax, a household with income less than \$6000 would make a \$0.05 tax contribution per trip, on average, whereas a household with an income of more than \$25 000 would pay \$0.49 per trip, on average. While each of the tax sources reported is progressive, the real estate tax is less progressive than other tax sources. We should note, however, that these figures represent tax payments per trip by income class rather than the average tax payment per trip for households within each income class. As noted earlier, average burdens based on individual household data rather than aggregate data for the income class are more indicative of the progressiveness of tax sources. Given the household burdens reported in Table 4, we expect that net benefit calculations by using household data would show the sales tax to be more regressive relative to the income and wage taxes.

#### MANAGEMENT OF DEDICATED TAXES

A desirable feature of a dedicated tax for transit subsidies would be to match over time the revenues received with the need for transit subsidy funds without continual tax rate changes. For the transit service offered in Pittsburgh in the mid-1970s, this would not have been possible; the increase in the transit service deficit was much greater than the increase in any of the tax bases discussed above. Throughout the past 10 years, tax rates would have had to have been adjusted upwards to match revenues with the increase in required subsidies.

From 1973 to 1978, operating expenses for transit services increased by slightly more than 70 percent

Figure 1. Percentage increases in regional tax bases, transit expenses, and transit deficits since 1973 in Allegheny County.



[Figure 1 (data from PAT annual reports, Pennsylvania Bureau of Research and Statistics, and Pennsylvania Department of Revenue)]. During the same period, service revenues increased much more slowly than expenses. Consequently, the operating deficit increased at a much faster rate than expenses, with a total increase of nearly 150 percent during this five-year period. During the same five-year period, the tax bases of the wages and income each increased by approximately 50 percent, whereas sales increased 60 percent and assessed real estate value increased only 15 percent. Thus, the revenues from a dedicated transit tax at a given tax rate would not have kept pace either with the increase in transit expenses or with the increase in the transit deficit. For example, a wage or income tax imposed to cover the transit service deficit in 1973 would have had to triple by 1978 to continue to cover the deficit.

Of course, this increase in the tax rates could be alleviated or avoided by different transit operating policies. Fare increases, cost controls (such as wage reductions), or service cutbacks could reduce the deficit for transit services. However, patronage levels have not been increasing rapidly (if at all), so fairly severe service cutbacks or cost savings would have been necessary to restrain deficit increases to the growth in the regional tax bases.

#### CONCLUSIONS

We have examined a variety of potential regional tax sources for transit subsidy funds from the standpoints of sufficient yields, administrative ease, conformance with the ability to pay and the benefit principles of public finance, and the difficulties in managing revenues over time. We found that regional tax sources are viable alternatives to state and federal subsidies. From the standpoint of equity, several of these tax sources would be more desirable than the property taxes currently used for the local share of subsidy funds in Allegheny County. By and large, we have concluded that a broad-based wage or income tax would be the most preferred source on which to base a dedicated tax. These two taxes are relatively easy to administer and are somewhat more progressive than the other alternatives considered. Sales taxes are somewhat more regressive and have a smaller tax base than these two options. Motor fuel taxes would be difficult to administer and have an insufficient tax base. Motor fuel taxes and to some extent a regional sales tax to fund transit subsidies may result in significant amounts of sales diversion to other counties.

While the analysis in this paper related to a single metropolitan area, the conclusions are likely to be applicable to a wide variety of urban areas. Regional wage and income taxes seem to be the tax sources that deserve greatest attention. One problem with any dedicated tax is that the growth in revenues will not keep pace with the current rate of increase in transit deficits. Either relatively frequent increases in tax rates or controls on deficit increases would have to be undertaken to match revenues to deficits over time.

Of course, the problem of financial management is part of a broader investment problem with regard to transit. Fare revenues will never be sufficient to cover PAT transit operating expenses as transit service is currently operated. Before imposing or increasing a dedicated transit tax, decisionmakers should carefully consider the benefits and costs of particular system configurations and fare structures in order to reduce the necessary level of subsidy.

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