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Transit Cross-Subsidies

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ALL public services involve some redistribution—income is transferred from certain groups to others. Hansen and Weisbrod,¹ for instance, revealed how wealthier school districts received disproportionately large shares of California's educational subsidies, a finding that established a legal basis for the landmark *Serrano v. Priest*² ruling on educational parity. Only recently, however, have the redistributive effects of transit financing been called into question. Vast differences in the costs of providing various transit services coupled with a growing reliance on flat fare systems and government subsidies have resulted in the redistribution of income among population groups. Evidence suggests that, on the whole, the gainers have been those transit users with higher incomes, living in suburbia, making longer trips during peak periods, and patronizing rapid rail services. Losers, on the other hand, are generally characterized as transit-dependent, central city residents who travel shorter distances, often during the off-peak, and who are primarily bus users. This article reviews the evidence on transit's effects on income redistribution, followed by a more in-depth examination of who cross-subsidizes

1. W. Lee Hansen and Burton A. Weisbrod, *Benefits, Costs and Finance of Public Higher Education*. (Chicago: Markham Publishing Co., 1969).

2. California Supreme Court, *Serrano v. Priest*, 5 C3d 584 (96 CaR 601, 487 P2d 1241). 1971. The court held that an educational financing system that relies heavily on local property taxes supplemented by a per pupil state allowance causes substantial disparities among individual school districts in the amount of revenue per pupil available; invidiously discriminates against the poor.

whom under the current pricing practices of three California transit systems.

EVIDENCE ON CROSS-SUBSIDIZATION

Income is redistributed in the finance and pricing of transit services in several ways. From a national perspective, income flows from the population at large to individual transit users through the tax financing of transit subsidies. There is also evidence of cross-subsidies between transit modes (rail and bus) as well as among the services and routes operating within each mode. Finally, income redistribution also occurs among individual users, due largely to the failure of flat fare structures to recoup reasonable amounts of the costs incurred in serving long distance, peak period trips. These different sources of income redistribution are discussed below, primarily in terms of who is most affected and by how much.

Redistribution from Taxpayers to Transit Users

Taxpayers of all levels of government currently participate in the finance of public transit services. Those taxpayers who do not use transit end up subsidizing those who do. In 1978, federal dollars financed 14.6 percent of the nation's transit expenses while state and local governments picked up 12.0 and 20.8 percent of the tab, respectively.³ Table I gives some indication of who the gainers and losers have been in the transfer of income from non-user taxpayers to transit patrons. Again in 1978, those with annual household incomes below \$6,000 comprised about one-quarter of the nation's transit ridership yet contributed less than 6 percent to any transit tax source. However, those with incomes over \$25,000 constituted only about 14 percent of the nation's transit riders but provided over half of all transit tax dollars. Moreover, larger percentages of lower income persons frequented the transit mode than did higher income persons.

Clearly, the direction of income transfer in 1978 was from rich to poor. That is, those paying the most into tax coffers used to fund transit tended to be affluent, non-users; those riding transit the most, on the other hand, were from the lowest income group and contributed the least to government treasuries. This is not to suggest that non-users have not benefited from others riding transit. To the contrary, many would argue that the social benefits that rebound to

3. American Public Transit Association, '78-'79 *Transit Fact Book*, Washington, D.C., 1979.

TABLE I—COMPARISON OF TRANSIT RIDERSHIP PATTERNS AND
TRANSIT TAX BURDEN DISTRIBUTION BY INCOME CLASS.
1978, U.S. AGGREGATE DATA, ALL TRANSIT MODES.

	<i>Income Class (in 000s)</i>					
	<6	6-10	10-15	15-20	20-25	>25
% of Total Transit Ridership from Income Class: ^a	24.9	17.8	19.1	14.1	10.0	14.1
% of Total Trips by Transit Mode for Income Class: ^b	6.9	4.8	3.0	2.5	2.4	2.3
% of Total Tax Burden Borne by Income Class for: ^c						
Federal Transit Taxes	2.8	3.6	6.1	11.8	13.2	62.5
State and Local Transit Taxes	5.3	5.9	8.7	13.1	15.8	51.2

^aSource: J. Pucher, C. Hendricksen, and S. McNeil, "Socio-Economic Characteristics of Transit Riders: Some Recent Evidence," *Traffic Quarterly*, 35, 3 (July, 1981), pp. 463-83. Table I. Data are for all U.S. Metropolitan Areas, 1977-78.

^b*Ibid.*, Table II.

^cSource: Estimated from: Table E of R. Musgrave, K.E. Case, and H. Leonard, "The Distribution of Fiscal Burdens and Benefits," *Public Finance Quarterly*, 2 (July, 1974), pp. 259-311; Tables 6, 7, 9, 11, 14, 15, 18 and 19 of E.K. Browning and W.R. Johnson, *The Distribution of the Tax Burden*, American Enterprise Institute for Public Policy Research, Washington, D.C.; and Tables A-1, A-2, A-13, A-15, A-38, A-87 and A-91 of Phares, D. *Who Pays State and Local Taxes*. Oelgeschlager, Gunn and Hain, Publishers, Inc. Cambridge Massachusetts. All figures were indexed to 1978 to reflect income growth and changes in tax composition.

non-users (reduced traffic congestion, cleaner air) more than compensate their tax expenditures. All that can be inferred from these statistics, then, is that income flows from the pocketbooks of the rich to predominately lower income transit users in the form of tax support for transit.

Table I looks at the national cross-subsidy picture only in absolute terms. It is also instructive to examine the percentages of various groups' incomes collected by tax sources that go to transit. Tax incidence is concerned with the degree to which the tax burden falls on different income classes—to what extent are taxes progressive, regressive, or proportional.⁴ For 1978, Pucher and Hirschman⁵ have shown the net U.S. transit tax burden to be progressive—federal income and corporation taxes, both of which are progressive, more than offset the regressivity of state and local sales and property taxes. Those earning over \$25,000 annually paid three times as large a share of their income

4. A progressive tax collects larger percentages of income from the well-to-do than the poor. A regressive tax is the obverse—the percentage burden falls as income rises. A proportional tax collects equal percentages from all income groups.

5. John Pucher and Ira Hirschman, "Distribution of the Tax Burden of Transit Subsidies in the United States," *Public Policy*, 29, Summer 1981, pp. 341-67, Tables 4 and 5.

to support federal transit subsidies as did those making less than \$6,000 per year. However, the same group paid only 75 percent as large a share of its income to support local and state transit subsidy programs as did the under \$6,000 group. The authors conclude that, even with the most regressive assumptions, the total transit tax burden paid by those earning over \$25,000 amounted to 0.475 percent of their annual income compared with 0.402 percent for lowest income class—a differential of 18 percent.

Though more affluent groups appear to be shouldering a large share of the transit tax burden, this could markedly change over the next decade. The planned phase out of federal operating subsidies can be expected to result in a substantial expansion of state and local assistance programs. State and local transit support has already grown from one-third of nationwide transit revenues in 1975 to 40 percent in 1980.⁶ Should the non-federal share continue to increase, the tax incidence of transit subsidies may actually prove regressive in the future.

The potential regressivity of local and state revenue sources is well-documented. Webber showed that local sales and property taxes used to finance the construction of San Francisco's BART (prior to the inception of UMTA's Section 3 program) were decisively regressive.⁷ On average, those making less than \$3,000 per year in 1975 paid 1.25 percent of their annual income to taxes used to finance BART's construction. By contrast, those from households with annual incomes above \$25,000 transferred only 0.24 percent of it to BART tax sources. However, in BART's case, the direct beneficiaries have come from higher income groups. In 1975, 18.9 percent of the District's population with incomes over \$25,000 were BART riders compared with only 2.6 percent of those District residents earning under \$3,000 annually. Given BART's reliance on regressive funding sources, then, Webber concluded the rich ride and the poor pay.

More recently, Rock has shown that sales and motor fuel taxes used in funding Chicago area transit services have placed a far greater tax burden on the region's poor than rich.⁸ Other possible future

6. American Public Transit Association, Preliminary estimates for the *Transit Fact Book* publication provided by the APTA Statistical Department, 1981.

7. Melvin M. Webber, "The BART Experience—What Have We Learned?" *The Public Interest*, 45, 1976. Tax incidence estimates were based on 1970 census and financial data for the BART District as well as 1975 ridership information.

8. Steven M. Rock, "Income Equity of Two Transit Funding Sources." *Transportation Research Record* 791, Washington, D.C., 1981, pp. 10-14.

transit funding sources, such as household taxes, cigarette taxes, and vehicle registration fees, have likewise been singled out as potentially burdensome to the poor.⁹ It is apparent that radical changes in transit funding mixes would likely hurt the poor the most.

Unequal Subsidies Among Transit Modes and Routes

Some transit modes are more heavily subsidized than others. In 1978, for example, the nationwide operating subsidy per passenger was around 37¢ for bus and streetcar, 41¢ for rapid rail transit, and \$1.53 for commuter rail.¹⁰ Moreover, for the past 15 years the capital subsidy per passenger has been approximately eight times as great for the rail transit mode as for bus transit.¹¹ This subsidy bias in favor of rail transit is significant in view of the fact that higher income groups generally patronize rapid rail and commuter rail services. In 1978, for instance, those earning over \$20,000 annually made up about 58 percent of commuter rail ridership compared with 25 percent of rapid rail's and 20 percent of bus transit's.¹² Thus, transit modes receiving the highest subsidies per passenger also tend to serve more affluent persons.

Cross-subsidization among modes can also be traced within transit agencies. In the case of the Golden Gate Bridge, Highway, and Transit District (GGBHTD) that serves the Marin County-San Francisco area, the bus transit mode covered 48 percent of its operating costs between 1975-80 compared with a recovery rate of only 34 percent for the ferry transit mode.¹³ In that the District's overall transit operating ratio was 44 percent during this period, bus users were effectively cross-subsidizing ferry passengers. A passenger survey from the summer of 1977 found that 70 percent of the District's ferry patrons compared with 53 percent of its bus passengers had annual family incomes above \$15,000.¹⁴ Thus, the net incidence of

9. Steven M. Rock, "New Funding Sources for Chicago Area Transit: Who Pays," *Transit Journal*, Spring 1981, pp. 47-55.

10. John Pucher, "Equity in Transit Finance," *Journal of American Planning Association*, October, 1981, Table 2.

11. *Ibid.*, Table 3.

12. John Pucher, Chris Hendrickson and Sue McNeil, "The Socioeconomic Characteristics of Transit Riders: Some Recent Evidence," *Traffic Quarterly*, 35, July 1981, pp. 461-83.

13. Golden Gate Bridge, Highway, and Transit District, *Annual Report, 1975-1976 through 1979-1980*, unpublished reports, San Francisco, 1975-1980.

14. Golden Gate Bridge, Highway, and Transit District, *Analysis of Bus and Ferry Transit Questionnaire: Summer '77*, unpublished report, San Francisco, 1977.

GGBHTD's inter-modal cross-subsidies was unquestionably regressive.

Cross-subsidization among a system's transit routes is also quite common. One study, for example, found that the profits from routes less than 3.5 miles in length were used to offset the deficits of longer ones for three small Pennsylvania transit properties using flat fares.¹⁵ Recent line-by-line performance audits conducted by most major transit operators also reveal considerable route cross-subsidization. During the fourth quarter of 1979, for instance, 14 of San Diego Transit's 33 bus lines were found to return less than 30 percent of their costs through the farebox while six of its routes met over half of their daily expenses.¹⁶ Least profitable services generally operated in lower density, suburban areas whereas more cost-efficient routes ran along dense corridors within the city. Disparities are even more striking in the case of San Mateo Transit. In 1980, the six mainline services operating along the 34-mile peninsula stretch between Palo Alto and San Francisco met over 56 percent of their costs through the farebox compared with a recovery rate of only 18 percent for the system's 55 local bus routes.¹⁷ As in San Diego's case, high density services cross-subsidized lower density ones. Several studies have found such cross-subsidies among lines to be markedly regressive, with wealthier suburban transit patrons generally netting the most benefits, usually at the expense of lower income, inner city residents.¹⁸

Cross-subsidization Among Users

Different levels of cost recovery among a system's routes means, of course, that individual users are cross-subsidizing one another. Although trip costs are known to vary considerably by distance and time-of-day, flat fares are still the industry rule. Uniform pricing generally results in short distance, off-peak users subsidizing part of the cost of serving long-haul, rush hour trips.

Several studies have documented these inequities in terms of

15. Hoyt G. Wilson and G. John Kurgan, "Some Implications of a Flat Bus Fare Structure," *Proceedings: Transportation Research Forum*, 15, 1974, pp. 160-65.

16. San Diego Transit, *San Diego Transit Five Year Plan Update: 1981-85*, unpublished report, 1980.

17. San Mateo Transit, *SamTrans: Five Year Transportation Development Plan*, unpublished report, 1981.

18. Mark Frankena, "Income Distributional Effects of Urban Transit Subsidies," *Journal of Transport Economics and Policy*, 7, 1973, pp. 215-30; Steven Rock, "Redistributive Effects of Public Transit: Framework and Case Study," *Transportation Research Record* 589, 1976, pp. 1-7.

differences in the fare per mile paid by different user groups. One study found that transit riders in the Albany area traveling ten minutes or less paid an average fare of 32¢ per mile compared to the systemwide average of 18¢ per mile.¹⁹ In contrast, users traveling an hour or more paid only 4¢ per mile. With regards to time period of travel, the study showed that midday users' fares per mile were 1¢ and 7¢ higher than the fare rates paid by morning and evening riders respectively. A similar study in New York City found that with a 50¢ flat fare system for all transit modes, bus users generally paid 25¢ per mile for their trips while subway users averaged only 7¢ per mile.²⁰ Disparities were particularly glaring in view of the fact that the mean income of subway users was nearly twice that of the average bus rider.

A problem with using fare per mile in examining the redistributive effects of current fare policies is that the cost per mile of all passengers' trips are assumed to be the same. The cost of a mile of operation of a suburban route in a low density, free-flow setting, for example, is likely to be lower than that of an inner-city, more congested service. To trace cross-subsidization among users, then, it is necessary to compare the fare per mile of particular trips with the cost per passenger-mile of providing them. This approach was used in examining the redistributive effects of three California transit properties' predominately flat fare structures. The findings from this case study are reviewed next.²¹

CASE STUDY ANALYSIS OF USER CROSS-SUBSIDIZATION

The Southern California Rapid Transit District (RTD), the Alameda-Contra Costa County Transit District (AC), and San Diego Transit (SDT) all abandoned zonal fares in the early seventies in favor of a flat fare system. During the period of this analysis, 1977 through 1979, AC and SDT priced basic services at 35¢ per ride while RTD charged most users 45¢ a trip. In 1979, RTD served 334 million passengers in the Los Angeles region and returned approximately 40

19. Wayne R. Ugolik and Clark B. Leutze, "Who Pays the Highest and Lowest Per-Kilometer Transit Fares," *Transportation Research Record* 719, 1979, pp. 32-34.

20. D. L. Weiss, D. T. Hartgen and G. S. Cohen, "Equity in New York State Transit Fares," unpublished report (Albany, New York: State Department of Transportation, 1974).

21. For a more detailed discussion, see: Robert B. Cervero, Martin Wachs, Renee Berlin and Rex Gephart, *Efficiency and Equity Implications of Alternative Transit Fare Policies* (Washington, D.C.: Urban Mass Transportation Administration, 1980).

percent of its costs through the farebox. By comparison, AC carried 52.6 million East Bay passengers and SDT served 36.6 million riders. Both of the smaller properties recovered about one-third of their costs through fares during the study period.

Information on users' fares and trip length for the three study sites were obtained from over 10,000 on-board survey responses compiled by each agency. The cost per passenger-mile estimated for each survey respondent's trip reflected his or her particular route and time-of-day of travel. Thus, cost allocation procedures captured the unique operating features of different services and also reflected the impacts of restrictive labor contracts and peak demands on costs. Combining data inputs, then, a ratio of fare per passenger-mile to cost per passenger-mile (FPM/CPM) was estimated for each surveyed user. In this way, each system's operating ratio was effectively disaggregated to the individual user level.

In all three study cases, the mean FPM/CPM for trips under 6 miles was significantly higher than the mean ratio for trips 6 or more miles. Table II indicates that shorter journeys returned between 2.7 and 5.2 times as much of their costs through the farebox as longer ones. Clearly, short haul patrons heavily cross-subsidized long haul ones—their high rates of fare payment were used to offset losses incurred in serving long distance journeys.

Table II also reveals that off-peak users cross-subsidized their rush hour counterparts under uniform pricing. Midday and night services, which accounted for around half of each operator's total passenger trips, provided the highest returns on costs. Morning and afternoon peak operations, however, ran considerably in the red. On

TABLE II—DIFFERENCES IN FPM/CPM MEANS BY TRIP DISTANCE AND TIME-OF-DAY

	<i>RTD</i>	<i>AC</i>	<i>SDT</i>
<i>Trip Distance Analysis:</i>			
Mean FPM/CPM for trips <6 miles	0.637	0.574	0.492
(% above system average FPM/CPM)	(37.6%)	(44.6%)	(39.0%)
Mean FPM/CPM for trips ≥6 miles	0.122	0.139	0.183
(% below system average (FPM/CPM)	(279.5%)	(185.6%)	(93.4%)
<i>Time-of-Day Analysis:</i>			
Mean FPM/CPM for off-peak trips	0.555	0.437	0.418
(% above system average FPM/CPM)	(19.9%)	(10.0%)	(18.1%)
Mean FPM/CPM for peak trips	0.367	0.352	0.323
(% below system average FPM/CPM)	(26.2%)	(12.8%)	(9.6%)
System Average FPM/CPM (all sampled trips)	0.463	0.397	0.354

average, revenue-to-cost ratios of peak services were between 25 and 50 percent below those of non-peak services.

The breakdown of FPM/CPM estimates by user socioeconomic characteristics and trip type produced fairly mixed results among the three study sites (Table III). Only in the cases of AC and SDT were flat fares found to be regressive. Disparities, however, were rather small in these instances. AC patrons with annual family incomes above \$15,000 met 37 percent of their trip costs compared with a recovery rate of 40.4 percent for those in the under \$15,000 category. A similar recovery rate differential was found among SDT's lower and higher income groups. Surprisingly, the net transfer effect of

TABLE III—DIFFERENCES IN FPM/CPM MEANS BY USER SOCIOECONOMIC CHARACTERISTICS AND TRIP TYPE.

	<i>FPM/CPM Estimates</i>		
	<i>RTD</i>	<i>AC</i>	<i>SDT</i>
<i>Annual Family Income:</i>			
≤\$15,000	0.458	0.404	0.365
>\$15,000	0.480	0.370	0.327
<i>Vehicles Owned^a or Available:</i>			
None	0.471	0.393	0.401
≥1	0.452	0.401	0.335
<i>Ethnic or Language Background:</i>			
Whites	—	0.382	—
Others ^b	—	0.443	—
English-Speaking	0.460	—	0.356
Spanish-Speaking	0.477	—	0.287
<i>Gender:</i>			
Females	0.482	0.396	0.360
Males	0.440	0.398	0.347
<i>Age Groups:^c</i>			
Youth	0.502	0.255	0.349
College	0.559	0.463	0.360
Middle	0.424	0.405	0.378
Senior	0.191	0.208	0.238
<i>Trip Type:</i>			
Work	0.455	0.393	0.328
Non-Work ^d	0.467	0.401	0.396
Medical	1.049	—	—
<i>All Sampled Trips</i>	0.463	0.397	0.354

^aRTD and SDT inquired as to the number of vehicles owned by the user's family whereas AC Transit only asked whether passenger's had a car available or not.

^bIncluded in AC Transit's "Others" category are Asians, Blacks, and Hispanics.

^cAge categories are defined as follows. "Youth": RTD and AC Transit = <17; SDT = <16. "College": RTD = 18-22; AC Transit = 18-30; SDT = 16-24. "Middle": RTD = 23-62; AC Transit = 31-64; SDT = 25-60. "Senior": RTD = >62; AC Transit = >64; SDT = >60.

^dRTD's non-work trips exclude medical journeys.

RTD's flat fares was found to be mildly progressive, although the FPM/CPM differential between riders with family incomes above and below \$15,000 was less than 3 percent.

Table III also reveals that those without auto access tended to cross-subsidize users with other travel alternatives under both RTD and SDT operations. In SDT's case, carless passengers returned 40.1 percent of their costs compared to a recovery rate of only 33.5 percent for those with auto access. Disproportionately high fares were also paid by AC's minority users. On average, AC's non-white passengers covered 22 percent more of their trip costs than whites. Conversely, SDT's Hispanic passengers returned below average shares of their trip costs through the farebox, primarily because of their low average fares and their patronage of sample routes that were the least profitable.

The breakdown of FPM/CPM rates by sex, age, and trip type generally showed females, young adults, and non-work trip-makers to be cross-subsidy losers. In RTD's case, females met almost 10 percent more of their trip costs than males while college-age users exceeded the system's average recovery rate by 21 percent. Work and school trips produced recovery ratios that were only 2 percent higher than those of non-work trips in AC's case, however 20 percent higher in the case of SDT. By far, RTD's medical trip-makers, whose fares actually exceeded trip costs, suffered the most from uniform pricing; their mean recovery ratio was over twice that of the average user. In general, these fare inequities resulted from female, young adult, non-work journeyers taking relatively short trips and concentrating their travels more in the off-peak than other passengers. Obviously, flat fares penalize such behavior.

The major beneficiaries of cross-subsidization were the recipients of fare discounts—seniors and AC's youth. The farebox recovery rates of the senior group were less than 50 percent of each property's average, indicating that current fare practices are at least in compliance with UMTA's Section 16 mandate on elderly fare discounts.

Figures 1 through 3 summarize the findings of this section by rank-ordering the "subsidizers" and "subsidizees" for each study site. By far, disparities were greatest in terms of users' trip distances. Since both the six mile mark and peak/off-peak dichotomy generally divided each property's total number of trips into equal halves, it's evident that inequities were a much greater function of how far as opposed to when someone traveled. It follows that fares based on

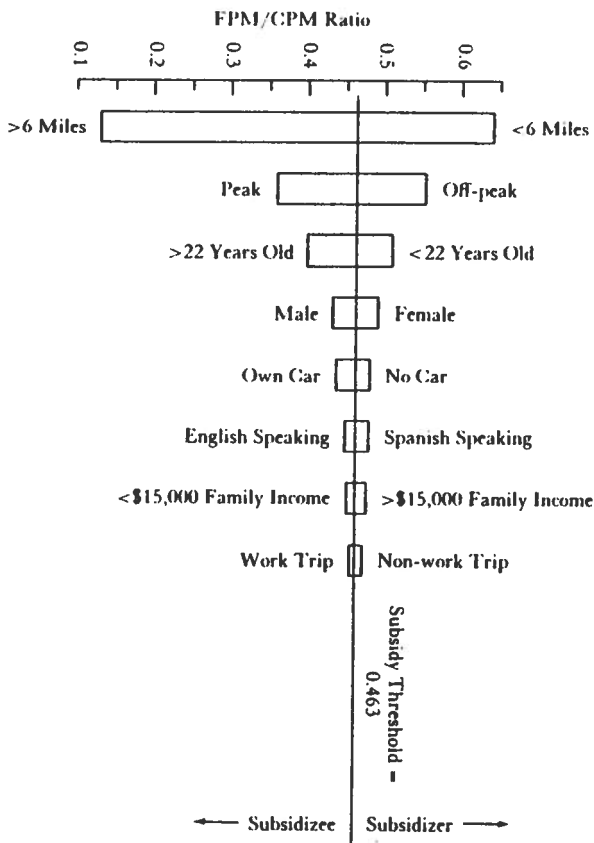


Figure 1. Rank-ordering of factors for RTD

distance as opposed to time-of-day would be most effective in eliminating current cross-subsidies. Disparities appeared fairly modest in terms of users' socioeconomic characteristics, although some groups—notably RTD's patrons who were college-age and female, AC's low income and minority users, and SDT's autoless passengers—emerged as clear cross-subsidy losers. In sum, the incidence of cross-subsidization did not seem overly regressive; however, those traditionally thought to be most dependent upon transit and socially-disadvantaged were found to lose more under current pricing policies than other groups.

CONCLUSION

Current transit financing and pricing programs embody considerable cross-subsidies and promote income redistribution. Income flows

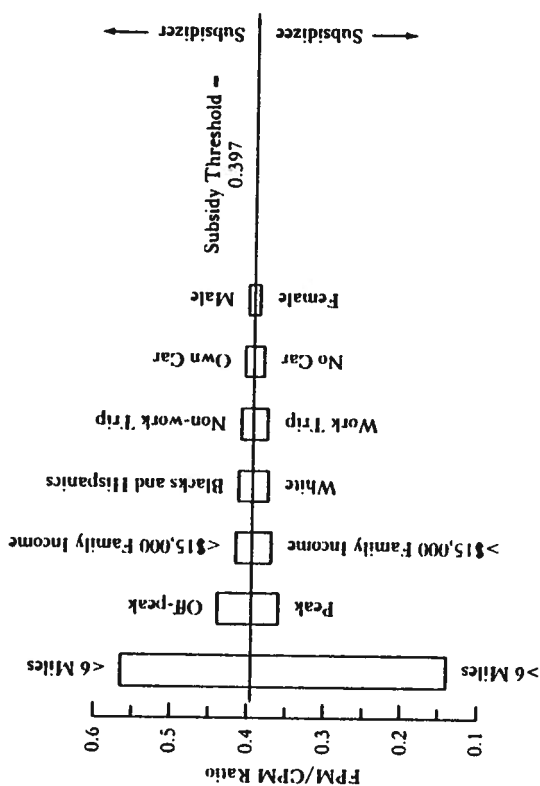


Figure 2. Rank-ordering of factors for AC

between taxpayers and users, between transit modes and routes, as well as between individual passengers. It is tempting to hazard a guess as to what is the net impact of transit cross-subsidies, (overall, who are the gainers and who are the losers); however, the imprecise nature of much of the evidence obviously precludes doing so. Still, certain things are clear. Government subsidies, which met 55.5 percent of the nation's transit costs in 1980, transfer income from the rich to the poor and are slightly progressive overall. The farebox, which covered 37.8 percent of the 1980 expense, transfers income from those most transit-dependent to relatively well-off, non-captive users, though the overall incidence appears only mildly regressive. It is probably fair to say that the net effect of these different sources of redistribution is somewhat close to proportional—rich and poor, on average, benefit to an equal degree. It is also apparent that wealthy rapid and commuter rail passengers who travel long distance during peak hours are primary beneficiaries of the redistribution. The biggest losers are

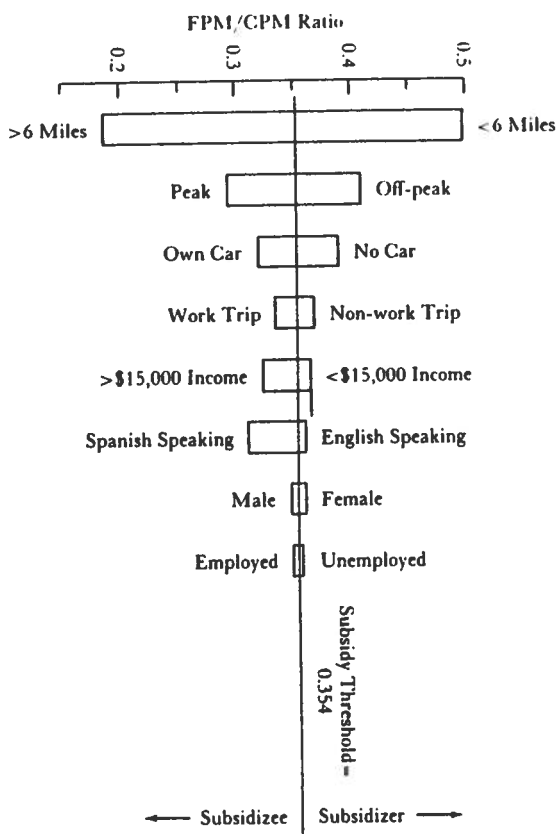


Figure 3. Rank-ordering of factors for SDT

probably those low income persons who do not use transit, and perhaps those who do, but only for very short, non-peak trips.

Whether these redistributive effects represent blatant violations of Title VI of the Civil Rights Act of 1964 or not is perhaps debatable. Though transit policy-makers have not conscientiously conspired to discriminate against certain groups through funding and pricing programs, cross-subsidization has nonetheless materially hurt some socially-disadvantaged persons. This becomes important in view of transit's universally accepted role in providing travel opportunities to the poor, elderly, and other mobility-restricted groups. Should current federal support for mass transit be substituted by local and state tax dollars, current inequities could seriously worsen. Accordingly it is imperative that close attention be paid to the distributional consequences of changes in transit financing during the eighties.



