

to autos in conjunction with recording devices built into the roads, similarly came apart when the government, in preparation for the colony's change in status in 1999, set up local governments that individually seceded from the scheme. The congestion-reducing effects of such a system had been successfully demonstrated in an experimental phase between 1983 and 1985.

Simpler forms of pricing, such as tolls on congested roads, also have promise for reducing congestion, but raise problems when drivers seek to avoid the tolls by using free roads that were previously uncongested. Federal policy now prohibits tolling of existing roads that have been constructed with federal aid, although nine pilot toll-highway construction projects have been authorized.

Broad economic priorities for highway investment can be based on the prospective rates of return already discussed. Table 5 compares these rates with the projected cost of federal, municipal, and business borrowing (net of inflation), shown in italics. While a clear case can be made for investing to maintain the current condition of the main highway network, a similarly strong and broad case cannot be made for higher levels of spending. Projects aimed at achieving minimum service or safety conditions, and those for new urban highway construction, appear to offer good economic returns but at rates that are likely to be matched by other investment opportunities in both government and business. Moreover, highway spending competes for resources with social programs that can have payoffs equally high or higher. In the final analysis, how much to spend will depend on decisions as to the relative importance of highways among all government programs, and beyond that on what part the government ought to play in investing the nation's capital.

## POLICY OPTIONS FOR THE FEDERAL HIGHWAY PROGRAM

The completion of the national highway program begun in 1956 has created an opportunity to reexamine the federal role. There is reason to believe that the states now have strong incentives to undertake beneficial highway investments without skimping, and that economic savings resulting from highway improvements could provide a basis

for raising taxes to pay for them. The federal government could therefore withdraw from financing highways.

Some room for a federal presence may remain, however. Broad national economic priorities will not be felt equally in all states or regions (in particular, urban congestion will tend to outweigh system maintenance in some regions). Also, even when acting together, states may fail to be effective at some highway operations such as setting or enforcing nationwide safety standards for vehicles and driv-

TABLE 5. ECONOMIC PRIORITIES FOR HIGHWAY INVESTMENT

Investment Strategy	Expected Real Rate of Return on Investment (National averages)
4R Projects to Maintain Current Highway Conditions (Average Present Serviceability Rating of 3.1) <sup>a</sup>	30 percent to 40 percent
New Construction, Urban Areas	10 percent to 20 percent
4R Projects to Upgrade Sections Not Meeting Minimum Service or Safety Standards	3 percent to 7 percent
<i>Projected 1993 Federal, State, and Private 10-Year Borrowing Rate</i>	<i>3 percent to 4 percent</i>
New Construction, Rural Areas	Low <sup>b</sup>
4R Projects to Fix All Deficiencies Above Minimum Service and Safety Standards	Negative

SOURCE: Congressional Budget Office, based on data from the Federal Highway Administration.

NOTE: 4R projects are those involving restoration, resurfacing, rehabilitation, or reconstruction.

- a. Present serviceability ratings rate highway conditions on a scale from 0 (very bad) to 5 (excellent). A rating of 3.1 puts the Federal Aid System in good to very good condition.
- b. Economic returns may be higher for replacement of substandard bridges on the national truck network.

ers, or maintaining a national highway network. Moreover, targeting expenditures toward particular programs has become more important than formerly. Based on some feasible level of federal highway taxation, the government could help to focus maintenance on the national network and on priority tasks. To this end, the conditions attached to federal aid might be more important than the level of spending.

### Withdraw From Federal Participation in Highway Development

Federal leadership in highway engineering may have seen its day. In recent years, particularly since 1983, states and localities, which have traditionally been responsible for most highway maintenance, have evolved systems for programming maintenance budgets that have shown overall good results. The American Association of State Highway and Transportation Officials has developed engineering standards for highways, and its research on highway issues is internationally respected. The association may be as effective at national leadership in highway engineering as the Federal Highway Administration.

In financing, as well as engineering, the federal role may be declining. Critics cite the instability of federal aid, as seen in the extended budget and legislative negotiations of recent years. An increasingly common view is that the federal government has become little more than a clearinghouse for receiving and disbursing dedicated highway taxes. Although this view ignores the extent to which highway spending is still financed directly and indirectly from federal funds, it reflects the idea that technical leadership may now have passed from construction to maintenance management and therefore to the states.

A further argument for federal withdrawal is that, according to econometric studies, federal aid no longer adds to states' spending on highway programs but only substitutes for state financing.<sup>13</sup> This finding reflects the strong local benefits of highway improvements: 10 years ago, a Federal Highway Administration report estimated that

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13. These studies are reviewed in Congressional Budget Office, *Federal Policies for Infrastructure Management* (June 1986).

40 percent of the gaps in Interstate mileage, and 73 percent of the remaining outlays for Interstate construction, were of purely local importance.<sup>14</sup> Given the local benefits, according to this view, states would be likely to replace lost federal financing from their own resources, both on the Interstate network and on other main roads. Interstate highways, after all, are not federal highways operated by the states but state highways that carry more traffic per mile than most other state roads. If the Primary highways can be safely entrusted to state management, runs the argument, so can the Interstates.

On the negative side, a federal withdrawal from highway financing would mean a shift in the distribution of tax revenues. The federal highway program tends to redistribute tax revenue from states with a lot of traffic to states with a lot of roads. This redistribution would disappear if states collected all of the highway taxes. Whether the shift would introduce inefficiencies is unclear. Under state financing, the states with the highest revenue per mile (because of highest traffic) would also tend to be those with the highest maintenance needs per mile. Nevertheless, some states with lower revenue potential have large highway structures to maintain, often constructed to conform with national standards rather than to reflect the needs of local traffic.

A further issue to be faced in a federal withdrawal would be the future of the Federal Highway Administration. Over the years, the FHWA has become expert both in highway engineering and in the management of national highway programs. Much of its engineering expertise could be absorbed by state or local highway agencies, and by the National Highway Traffic Safety Administration. But in its national management role it would still be valuable as an adviser to the Congress and to other jurisdictions, and it might also be of technical assistance to state and local agencies. For example, the FHWA's national monitoring system for highway performance was developed to provide information on highway conditions and needs to the Congress, and it is also used in some states for working out highway budgets. The FHWA's national bridge inspection program provides similar leadership in setting priorities for bridge rehabilitation and

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14. Federal Highway Administration, *Interstate Gap Study*, Report of the Secretary of Transportation to the United States Congress (1977).

replacement. Under a withdrawal strategy, FHWA's role would probably evolve from an engineering-oriented perspective to one of policy analysis and technical assistance.

A real difficulty with a federal withdrawal is that state program priorities are not likely to match the national economic priorities sketched earlier. Even under federal aid, for example, states spend more on rural highways, and counties less, than would be optimum from a national point of view. Moreover, states can be expected to be more interested in intrastate commerce than in interstate commerce when determining which routes to improve. Some may attempt to tax out-of-state drivers more than their own residents. Finally, political support is often more easily won for impressive construction projects than for maintenance.

#### Continue Targeted Federal Aid

If federal highway assistance was continued after completion of the Interstate system, it could focus highway development on activities of national benefit. This would require a program that was highly structured, but not necessarily more structured than the 1956 Federal Aid Highway Act that focused most highway spending for the following 30 years. The 1956 act generated such a high degree of support that 95 percent of the construction on Interstate highways was completed or under way within 10 years. A plan for the 1990s, focused on rehabilitation rather than construction, would need a similar degree of support.

The scope of continued federal aid would be of concern. Some people argue that federal financing in the 1990s should be restricted to routes of national significance, and others that only the Interstates should remain a federal priority. (Routes of national significance might include those most important to interstate commerce--the national truck network, for example--and/or to national defense.) An appraisal of the present and future functions of different parts of the highway system might be necessary in order to determine which routes are of such national significance as to justify federal financing.

Alternatively, federal aid could be regarded as a subsidy to ensure that nationally beneficial projects would be undertaken, whatever the

network. Priorities for highway improvements vary considerably among states and regions. Also, budget allocations are affected by state and county custodianship of different parts of the networks, and such divisions may work to continue the present underfunding of rural county roads. Federal subsidies applied to projects of economic merit could help to move them up the funding ladder.

Federal aid should focus spending on priority areas, but also be flexible in dealing with regional variations. Two techniques for achieving this are tranching and negotiation. Tranching means dividing aid into several portions, each to be made available when certain conditions are met. Negotiating means allowing state and federal officials to bargain on the share or amount of aid for particular parts of the program, according to local needs and federal interests.

Tranching Aid. Separating aid into tranches would allow federal assistance to be divided among different purposes in amounts reflecting overall federal interests, and at the same time allow states that had already met federal standards for one purpose to trade aid from one tranche to another. They would thus have freedom to vary, within limits, the uses to which they put federal aid, while protecting the overall federal purposes of the program. An example of tranching is shown in the accompanying Box.

The federal share of costs under tranching would be determined by the level of highway taxes federal policymakers were willing to apply to the program. Since the total spent in any state would reflect agreed-upon criteria for maintaining highways (rather than the amount needed to match federal aid), the effective federal share of highway budgets could well vary from state to state.

Federal aid for individual projects should probably be less than the 75 percent to 90 percent range of current programs. Highways play a certain and central part in modern life, and the federal government may no longer have any reason to assume a disproportionate share of the risks of their development. On the other hand, it might be desirable to allow states to vary the federal shares from project to project or from tranche to tranche. For example, some states might want high matches on costly construction to avoid short-term increases in state tax rates, while others might want to spread assist-

**BOX 1.  
AN EXAMPLE OF TRANCHING**

The following example illustrates the principles of tranching aid. Tranches, or portions of federal assistance, could be reserved for different types of projects:

- Tranche A (70 percent)     For 4R projects for highways and bridges on the 1990 federal-aid system
- Tranche B (15 percent)     For projects to remove safety hazards or to upgrade existing highways to minimum standards
- Tranche C (15 percent)     For new construction

States would be required to budget sufficient resources (including federal aid) to meet some basic objective, such as maintaining conditions on the basic network at the base-year standard. Some standard, such as the Present Serviceability Ratings used by FHWA could be used to specify these conditions. Overall state budgets would be set independently of the federal-aid apportionments. Federal apportionments could be according to a formula reflecting prospective maintenance needs—considering both traffic and highway conditions, as well as miles and area served. Those states for which highway needs fell into the 70-15-15 pattern could go ahead and spend the federal money. Those with more than 70 percent 4R needs or more than 15 percent in either of the other categories could trade aid among categories according to set conditions. For example:

Trade	Condition
From A to B	All federal-aid highways to be in fair or better condition (present serviceability rating 2.5 or better); and the average condition to be not less than in the base year
From A or B to C	As above, plus all federal-aid highways to meet minimum standards
From C to A or B	No condition

These illustrative conditions would establish a clear preference for system maintenance or upgrading the existing network. Yet all states would receive some assistance for new construction, and those with fairly sparsely traveled rural highways in good condition would be able to trade in aid to help solve urban congestion. Those with high urban and rural highway needs might have to increase resources from their own tax bases (as they would under a simple continuation of the current program). In this illustration, the measures of highway condition affect both apportionments and trade-ins, so states have no particular incentives to over- or underreport. States that underreported highway conditions would receive larger apportionments but would have less flexibility in spending them; states overreporting could spend federal aid relatively freely but would receive less of it.

ance widely over all projects. Tranching could allow states some discretion on matches by allowing federal cost shares of up to some share, say 50 percent, for projects in each tranche.

Tranching would give states the advantage of managing their own highway budgets, subject to meeting agreed-upon performance targets. Since state governments are closer to local needs, they may be able to assign aid more effectively under existing priorities than can any broad-based federal allocation formula. On the other hand, states have different interests from the federal government, and might be tempted to turn the program to their own advantage. Safeguards against this would be provided by states' agreement to the minimum condition rating, and by their preparation of budgets conforming with overall maintenance needs.

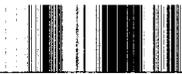
Negotiating Aid. Within broad parameters set by federal policy, negotiating aid could have many of the advantages of tranching, and answer some of the concerns about whether states would achieve federal performance levels. Federal and state representatives could negotiate agreements covering the amounts to be spent for maintenance and rehabilitation and for new construction; the parts of the highway system where aid would be spent; overall state maintenance targets and budgets; and federal project matching shares. The time period could be that of the authorized federal program, or any shorter period. Subsequent negotiations would take note of a state's actual performance compared with negotiated targets, and adjust penalties and incentives appropriately.

Under negotiated aid, states could attempt to match both the amount and the conditions of aid to their circumstances, while federal negotiators would attempt to move state budgets and policies more into line with federal interests. Federal agents could, for example, offer easier terms for maintenance aid in states where federal-aid networks were in generally worse condition than other states, or they could seek to get states to enlarge their maintenance budgets in exchange for construction aid.

Negotiating would therefore tend to distribute aid more closely in line with national needs than formula distributions could. It would also avoid setting arbitrary aid conditions that some states might have difficulty meeting, since each state would agree to the package of

aid and conditions. As with tranching, the overall level of federal assistance could be set by a decision by policymakers on the rate of federal highway taxes, reflecting a judgment as to how much assistance would be needed to exert federal influence on priority choices for highways.

Negotiating aid would leave highway assistance much more open to manipulation than would tranching. Also, the administrative effort would be much greater than that needed for formula or even tranche apportionments. States not wishing to comply with agreements might tend to seek legislated relief from the terms of their federal-aid contracts, or might simply ignore some of the terms knowing that federal agents would have difficulty enforcing penalties. Federal negotiators, for their part, might (as has happened in the past) seek performance conditions couched in terms that would be easy to verify but that would be unnecessarily expensive--such as maintenance standards that reflect engineering excellence rather than good average performance of the highway system and good levels of service to users. Any transition to negotiated aid would have to be managed closely, with a view to applying the lessons in future negotiations.



## CHAPTER II

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### MASS TRANSIT

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Despite more than 25 years of federal assistance, mass transit carries only about 5 percent of people who commute to work. The other 95 percent mostly use automobiles, although more than one-fifth of them share rides in carpools or vanpools. New federally assisted transit systems have not added to mass transit; instead, they have replaced flexible bus routes with costly fixed-route services to a few downtown areas, while the growth in jobs and population has been in the suburbs and in smaller cities. At the same time, transit costs are rising: transit fleets in general are greatly underused, and the new transit systems have for the most part added to costs and to unused capacity without attracting riders from cars. Transit remains important in the older and larger cities where it carries upward of 25 percent of commuters, and public transportation services are disproportionately important to the poor, the old, the young, and the disabled. Special transit services for elderly and handicapped riders are increasingly expensive and polluting, and do not meet the needs of those in the community who depend most on public transportation.

#### THE CHANGING FEDERAL ROLE IN MASS TRANSIT

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Federal financial assistance for mass transit began in 1961 when the Department of Housing and Urban Development initiated a small program for transit demonstration projects and loans. The current program--and the Urban Mass Transportation Administration (UMTA)--date from the Urban Mass Transportation Act of 1964. This act spelled out a federal purpose of modernizing transit and also reestablishing it in 105 cities that lost service between the mid-1950s and the mid-1960s.

Twenty-five years ago, federal intervention was felt to be needed to avert widespread abandonment of transit services in the central areas of older cities. Testimony at Congressional hearings on the 1964

act emphasized the effects on urban development and congestion that would follow from a continued decline of mass transit. Estimates were presented that, if commuter rail services were abandoned in Boston, Chicago, Cleveland, Philadelphia, and New York, the highways needed to replace them would cost \$31 billion. In Chicago, for example, 600,000 more automobiles, 160 new expressway lanes, and extensive parking areas would be needed. Nationwide, costs were cited of \$5 billion a year for lost time, fuel, and other consequences of traffic congestion.<sup>1</sup> The first priority of the Urban Mass Transit Administration in administering the transit capital grants program was to be "preservation of existing transit systems which would otherwise be abandoned," by modernizing rundown fleets and taking over failing private bus companies. Efforts to improve and extend transit services received only second- or third-level attention.<sup>2</sup>

All federal aid initially took the form of discretionary project financing. Modernization projects of states, localities, and their agencies were eligible for support if they were part of an areawide transportation plan. Within the total aid, separate financing tiers were set aside for bus and rail projects. The federal share was originally set at up to two-thirds of project costs (allowing UMTA some discretion in setting grant conditions), and raised to a mandatory 80 percent in 1973.

Federal aid broadened after 1970, when financing for highway transit (and urban highway) projects became available from the Highway Trust Fund under the Federal Aid Urban Systems program. Project financing remained discretionary, but it could include highway-related transit projects that provided bus lanes, traffic control devices, or passenger facilities to substitute for urban highway development projects of equivalent capacity. Beginning in 1971, federal aid was extended to assist the construction of new transit (mostly rapid rail) systems. Between 1973 and 1983, transit projects were able to use funds authorized for unbuilt segments of the Interstate highway

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1. House Banking and Currency Committee, *The Urban Mass Transportation Act of 1964*, Report No. 204 to accompany H.R. 3881 (April 9, 1963).
  2. George W. Hilton, *Federal Transit Subsidies: The Urban Mass Transportation Assistance Program*, American Enterprise Institute Evaluation Studies, No. 17 (Washington, D.C.: AEI, June 1974).

network, which were then withdrawn from the highway construction plan. The Rehabilitation Act of 1973 required that publicly financed transit systems be accessible to all, including the elderly and the disabled.

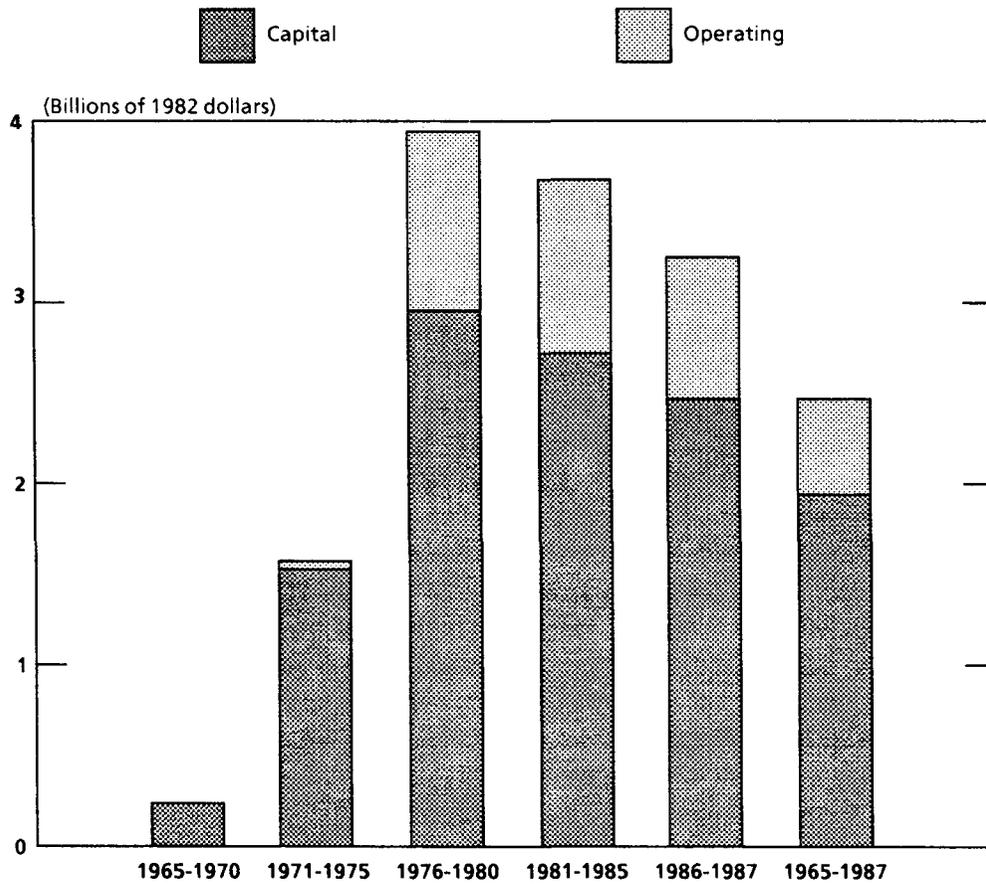
Federal formula grants for mass transit were authorized in 1974. These grants provided aid to urban areas nationwide based on population and population density, and extended aid to include operating subsidies for transit. Federal aid was available for capital grants at an 80 percent federal share, or for operating assistance at up to 50 percent of agencies' operating losses. During the late 1970s, over 80 percent of formula grants, on average, were used for operating assistance, and transit subsidies were seen as part of the national energy conservation effort.

The last major changes in transit assistance were made in 1982. In that year, a mass transit account was set up in the Highway Trust Fund, financed with revenues from a tax of one cent a gallon on fuels. The transit account finances discretionary (capital) projects, including bus and rail modernization and new starts, at a federal share of 75 percent of cost. Federal shares remain at 80 percent for capital grants and up to 50 percent for operations in the formula program, but a cap limits operating assistance. A new program established in 1982 provides aid for services in rural areas.

The late 1970s saw the highest levels of federal assistance for transit. Not coincidentally, this period was also one of great concern about foreign oil supplies, high fuel prices, and energy conservation. Overall, in real terms, federal aid to transit increased two and one-half times, from average annual levels of just over \$1.5 billion in the 1971-1975 period to just under \$4 billion a year in the 1976-1980 period (see Figure 2). Since the first half of the 1980s, however, average annual aid levels have fallen about one-eighth overall, with a steeper fall in operating aid (about a one-fifth drop) than in capital grants (down about one-tenth). Ninety percent of the drop in average capital grants arises from the tailing off of transit financing from Interstate transfers (trade-ins of unwanted Interstate highway segments). New obligations for transit aid in 1987 included \$2.5 billion for capital grants and \$860 million in operating subsidies, for a total of \$3.4 billion.

More dramatic than the recent shifts in levels of aid, however, have been the changes in its distribution. Appropriations for capital aid are now fairly evenly divided between formula and discretionary (trust fund) programs (about \$1 billion each), with an additional \$400 million or so coming from older authorizations for Interstate transfers and from appropriations for the transit system in Washington, D.C. Over 40 percent of federal capital assistance is thus made available according to a broad formula based on population, population density, and transit performance levels. By contrast, in 1980 less than 15

Figure 2.  
Average Annual Obligations of Federal Aid for Transit



SOURCE: Congressional Budget Office, based on data from the Urban Mass Transportation Administration.

percent of capital aid was available for such general assistance: about seven-eighths of all federal capital grants in 1980 went to specific projects approved either under discretionary programs or as Interstate transfers. While overall capital assistance is less now than in 1980, much more is available, on very general criteria, to medium and small cities, and relatively much less for major transit projects.

### WHAT HAS BEEN ACCOMPLISHED?

Transit presents a confused picture. On the one hand, transit is important for commuters in older cities, and for the young, the old, and the poor. But nationally, transit systems suffer from declining patronage, underused facilities, and mounting deficits. Thus, assessing the transit program raises the following questions:

- o Who uses transit? In modern American cities, what is the role of transit services?
- o How well do transit agencies provide services? and
- o Do federal aid programs focus on the right role?

### Who Uses Transit?

Transit services are used mainly by commuters to downtown jobs and by those for whom autos are not as readily available as for the population at large. While commuters are 40 percent of transit riders, transit represents only 5 percent of national commuting. Nationally, almost 90 percent of Americans drive to work.<sup>3</sup> Commuter transit assumes more importance in the older and larger cities. According to the Nationwide Personal Transportation Study of 1983-1984, over 80 percent of public transportation use on journeys to work occurs in cities with a population of more than 1.25 million. Public transportation services bring a little more than 15 percent of people to work in

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3. About 7 percent of workers walk to work, work at home, or are making an intercity trip on any business day. See Department of Transportation, *Personal Travel in the U.S., 1983-1984 Nationwide Personal Transportation Study* (November 1986).

cities with over 3 million people, compared with less than 1 percent in cities of under 250,000 people, and 3 percent to 5 percent in medium-sized cities. Census results for 1980 show that about 60 percent of New Yorkers rely on public transportation to get to work; 33 percent or more in Chicago, San Francisco, Washington, D.C., Boston, and Jersey City; and around 25 percent in older industrial cities like Baltimore, Hoboken, and Newark.<sup>4</sup>

Even in the cities, however, transit is important only for residents of central areas; suburban residents overwhelmingly use other means to commute and have been doing so increasingly. Table 6 shows how patterns of commuting changed between the 1970 and 1980 population censuses. In 1970, 30 percent of workers resident in the central areas of the largest 25 cities rode transit to work. (This includes the 34 percent who lived and worked in the central cities and the 14.8 percent who lived in the central cities and worked elsewhere.) In 1980, the proportion had fallen to 26 percent. Transit shares for all types of commute fell over the 10 years except for those traveling from the suburbs to downtown, where the percentage using transit increased very slightly. At the same time, the downtown areas themselves became less important as job centers. Downtown work trips dropped from 49 percent to 43 percent in the largest 25 cities, and from 58 percent to 56 percent overall. Of the 36 percent of workers who live and work in the suburbs--the fastest growing segment of the commuter market--only 2 percent (about half the rate of 1970) commute by transit.

Apart from downtown commuters, transit is of particular importance to children, teenagers, the elderly, those with low incomes, and women. The young and the elderly together represent nearly 40 percent of all transit riders. Workers with household incomes of less than \$20,000 a year make up 44 percent of transit riders. Women use public transport for roughly one-fifth to one-third more of their trips than men do.

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4. Bureau of the Census, *County and City Data Book 1983* (November 1983). Census data include both transit and taxi trips as public transportation.

### How Well Do Transit Agencies Provide Services?

After 25 years of federal aid, transit agencies have modern fleets and many own considerably more vehicles than they need for rush-hour traffic. Yet most of the equipment in service is underused, and the federal operating subsidies go largely to pay for buses and trains running empty rather than for service improvements or fare discounts.

TABLE 6. WORK TRIPS AND TRANSIT USE IN 1970 AND 1980

Journey Type	Percent of All Work Trips		Percent of Work Trips by Transit	
	1970	1980	1970	1980
<b>All Cities</b>				
Within the Central City	42.6	37.2	17.3	15.7
From the Central City to All Other Places	10.5	8.6	9.6	5.4
From the Suburbs to the Central City	15.8	18.6	11.6	11.4
Within the Suburbs	31.0	35.7	4.1	2.0
All Journeys	100.0	100.0	13.0	9.1
<b>Largest 25 Cities</b>				
Within the Central City	33.9	26.7	34.0	29.7
From the Central City to All Other Places	8.3	6.2	14.8	9.2
From the Suburbs to the Central City	15.1	16.4	16.3	18.2
Within the Suburbs	35.1	41.5	4.8	2.4
Place of Work Not Reported	7.7	9.3	24.8	15.5
All Journeys	100.0	100.0	18.8	13.9

SOURCE: Joint Center for Political Studies, *Demographic Change and Worktrip Travel Trends*, prepared by Urban Mass Transportation Administration (February 1985).

TABLE 7. PERFORMANCE AND CONDITION OF TRANSIT FLEETS, 1985

Mode	National Fleet Total	Number of Transit Agencies	Annual Passenger Miles of Travel (In billions)	Typical Useful Life of Vehicles (In years)	Average Fleet Age (In years)
<b>Commuter Rail</b>					
Locomotives	420	12			18
Passenger Coaches	1,823	13	6.5	35	20
Other	2,212	6			13
Rapid Rail	9,326	11	10.4	35	17
Streetcars	797	8	0.3	20-30	21
<b>Buses</b>					
Articulated Buses	1,491	29			3
Class A Buses	46,548	315			8
Class B Buses	2,613	178	18.7	12-20	6
Class C Buses	1,926	195			5
Trolley Buses	676	10		15-20	8
Passenger Vans	2,427	155	0.1	7-15	4
Demand-Response Systems <sup>d</sup>	6,400	250	0.1	d	d

SOURCES: Congressional Budget Office based on data from Urban Mass Transportation Administration, *National Urban Mass Transportation Statistics 1985, Section 15 Annual Report* (August 1987); D. Dunoye and W. Diewald, *Trolley Bus and Motor Coach Operational Cost Comparisons Utilizing Section 15 Data* (Washington, D.C.: 67th Annual Meeting, Transportation Research Board); John C. Bennett, *Strategic Planning as a Basis for Capital Investment Programming: Case Study of the Regional Transportation Authority in Chicago* (Washington, D.C.: Transportation Research Board, January 1988); and Joint Center for Urban Mobility Research, *Revenue Forecasts for Innovative Light Rail Financing Options*, Denver Case Study, prepared for Urban Mass Transportation Administration (September 1983).

(Continued)

Modernization of transit systems has been more successful in bus than in rail fleets. As Table 7 shows, the average age of the bus fleet is broadly within its expected half-life, so that accelerated programs of modernization are no longer needed. But the national rail fleet is relatively older. For rapid rail this reflects the dominance of the New York area in rail systems; for commuter rail, aged fleets are more generally the rule.

TABLE 7. Continued

Mode	Percent of Active Fleet Used in Rush Hour	Passenger Load Factor (Percent) <sup>a</sup>	Cost per Passenger Mile (In cents) <sup>b</sup>	Average Fuel Efficiency (Btu per passenger mile) <sup>c</sup>
Commuter Rail				
Locomotives				
Passenger Coaches	85	28	60-70	2,500-5,000
Other				
Rapid Rail	79	12	120-180	3,000-5,000
Streetcars	67	18	320-360	4,000-6,000
Buses				
Articulated Buses				
Class A Buses				
Class B Buses	82	20	30-40	3,000-5,000
Class C Buses				
Trolley Buses			50-60	
Passenger Vans	91	96	10-15	1,200-1,800
Demand-Response Systems <sup>d</sup>	76	13	160-200	8,000-14,000

Continued

- a. Passenger miles carried as a percentage of capacity miles operated.
- b. Includes capital, operations, and maintenance.
- c. Btu = British thermal units.
- d. Vehicles used on demand-response systems are included in bus and van totals.

The overcapacity of existing transit fleets can be seen from two indicators in Table 7. First, only about 80 percent of the national bus fleet is regularly used in peak service. Nine out of 12 rapid rail transit agencies have fleets exceeding their peak requirements by 20 percent or more; only two-thirds of streetcars are used regularly in rush hours. Second, load factors--that is, the percentages of capacity miles of service used by passengers--are low, averaging less than 30 percent for