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Ten myths about US urban rail systems

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Abstract

The proponents of rail transit have promulgated a set of stock arguments to help convince officials and the electorate that rail transit is a necessary component of a contemporary urban transportation system. These myths have gradually bored their way into conventional wisdom. We examine and dispel the following rail myths: (1) rail is cost-effective, (2) rail is the people’s choice, (3) rail is fast transit, (4) rail is high capacity transit, (5) rail construction provides jobs, (6) rail promotes superior urban form, (7) rail will be paid for with non-local funds that cannot be used for other purposes, (8) rail will attract new riders to transit, (9) rail will decongest roads, and (10) there are no alternatives to rail. © 1999 Elsevier Science Ltd. All rights reserved.

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1. Introduction

Many cities in the world currently place great emphasis on the development and expansion of urban rail systems—sometimes by constructing new systems, and sometimes by renovating old tram networks. This applies both in the advanced, high income, high car ownership cities of Western Europe, and also in some of the wealthier rapidly developing countries. It is not the object of this paper to comment on or judge the success of those systems. They may be correct for their context. But we argue that similar strategies applied to most cities in the United States simply do not work. For more than a decade, the US proponents of rail transit have promulgated a set of stock arguments in favor of rail construction. Too infrequently challenged, these arguments have gradually bored their way into conventional wisdom. However, a close examination reveals that the rhetoric of rail tends to involve sweeping assertions, uneconomic thinking, and assumptions ranging from difficult to impossible to verify. We have come to think of this collection of arguments as a mythology. We have distilled this religion into a set of ten myths.

By their nature, myths are nearly impervious to theoretical attack. Consequently, our strategy is to measure outcomes as frequently as we can, and to examine the positions of rail advocates in light of these results. Our counter arguments often refer to the Los Angeles experience, which we attempt to evaluate relative to national data.

2. Myth 1. Rail is cost-effective

Prior to 1990, rail advocates seemed fearless about predicting high cost-effectiveness for new rail starts. Beginning about 1970, the Urban Mass Transportation Administration (UMTA, since renamed the Federal Transit Administration) provided substantial capital funding for new starts in several cities. The most intense construction activity occurred after 1980, and there was little available performance data against which to make a systematic assessment of cost-effectiveness claims. By 1990, the situation had changed. The US Department of Transportation issued a report (Pickrell, 1990 comparing the actual ridership and costs for new rail starts to the forecast values used to justify these investments. The report reveals these forecasts to be relentlessly optimistic. Ridership forecasts always tended to be high, while capital and operating cost forecasts almost always tended to be low. The net effect is that actual costs per passenger tended to be much higher than forecast, sometimes by as much as an order of magnitude.

Costs per new US transit trip fare even worse, because new rail investments sometimes cause total transit ridership to decline. Local transit authorities must usually redistribute
available resources to support their new rail systems. This usually requires reducing bus service. If the number of users displaced by reductions in bus funding exceeds the number of boardings on the new rail system, then total transit ridership drops.

Documenting the performance of rail systems has had a profound effect on the rhetoric of rail advocacy. The American Public Transit Association and others (APTA, 1990; Hoover, 1990) have worked diligently to discredit the DOT report. These efforts have been uniformly unsuccessful and the report remains widely cited in the scientific and professional literature. If cornered into reporting quantitative performance measures, rail proponents consistently ignore the opportunity cost of capital. Even in annualized form, this opportunity cost is often the largest component of total system cost. By suppressing measures of opportunity costs and reporting only operating costs, rail advocates make rail transit systems appear much more cost-effective than they are.

Opportunity cost is more difficult to conceptualize and describe than operating cost, but it is no less real. The capital bound up in rail systems is enormous. A lower bound on the opportunity cost of this capital can be computed by assuming public authority does nothing more creative than place this asset on the capital market and provide tax payers with a low risk, long term annual return. This is necessarily a lower bound, because if local authorities have nothing better to do with this capital than invest it in 30-year Treasury bills, then
the capital should certainly be retained by the taxpayers who earned it. Thus, the social discount rate used to measure the opportunity cost associated with public investments should exceed prevailing interest rates. This premium accounts for the special objectives of public investments, objectives sufficiently important they justify collecting taxes.

More concrete examples are available. One of the Los Angeles County Metropolitan Transportation Authority's (MTA) predecessor agencies, the Los Angeles County Transportation Commission (LACTC), finalized a US$877 million capital cost estimate for the Long Beach–Los Angeles Blue Line train in 1989. Based on this official
cost estimate, the annualized net operating and capital subsidy for the Blue Line would be sufficient to cover the net operating and allocated capital subsidy for 17 of the Los Angeles County Metropolitan Transportation Authority’s 22 busiest bus lines in 1992. Collectively, these 17 bus lines carried over 16 times more passengers than the Blue Line, and generated almost five and one half times more passenger miles than the Blue Line. See Fig. 1.

Los Angeles was not included in the US DOT study because its rail system was not yet in service in 1990. It is instructive to apply the US DOT report’s (Pickrell, 1990) cost-effectiveness measures to the four principle modes constituting the Los Angeles transit system (LACMTA, 1993). These modes are bus, light rail (the Blue and Green Lines), heavy rail (the Red Line), and commuter rail (Metrolink). Comparisons are based on the (then) UMTA/FTA ten percent discount rate and the FTA equipment life cycle for each mode, including 12 years for buses, 25 years for rail cars, and 40 for structures. We calculate effectiveness measures for the four principle modes constituting the Los Angeles transit system (LACMTA, 1993). These are bus, light rail (the Blue and Green Line), heavy rail (the Red Line subway) and commuter rail (Metrolink). The US DOT report assumes a 40-year value life cycle for all rail capital. Fig. 2 provides two sets of comparisons. The upper chart compares operating, capital, and total costs per passenger round trip for the Los Angeles modes to the national averages. The Blue Line value accounts for the Los Angeles–Long Beach segment of the Blue Line, which has been in operation since 1990. The Pasadena Blue Line and the Green Line are not included.

Trip lengths tend to vary substantially across modes, so Fig. 2 also compares operating, capital, and total subsidies per passenger mile for the Los Angeles modes. Operating subsidies are computed by subtracting operating revenues from operating costs. Bus has by far the lowest capital subsidy, and the lowest total subsidy per passenger or passenger mile. Rail transit is not a cost-effective alternative relative to bus, and that the Los Angeles rail system fares particularly badly in this respect.

Where density, congestion, and low incomes beget demand, rail may be the best alternative. But in US cities, high-density corridors with linear demand patterns are in short supply. The point-to-point trips between San Francisco and Oakland Central Business Districts served by the Bay Area Rapid Transit (BART) tube is probably provide the best US case for urban rail, and this case is weak.

3. Myth 2. Rail is the people’s choice

Conventional transit in the United States has been a declining industry for more than 70 years. Large and growing subsidies have done no more than maintain local transit at a ridership plateau, while transit trips as a share of total trips has consistently declined. Between 1978 and 1988 transit use grew by only 1.1 percent per year nationally, while the transit industry’s expenses grew by 13.7 percent per year. To cover costs, passenger fares and total operating assistance increased by 9.3 and 15 percent per annum, respectively. During the same period, Federal assistance grew by 3.3 percent per year (three times the rate of ridership increase), while state and local subsidies rose at an average annual rate of 18.1 percent (USDOT, 1990).

Still, local transportation authorities labor mightily to convince voters to tax themselves to construct rail systems. Once these special purpose taxes are in place, the agencies promoting these special taxes treat these measures as mandates. When measured performance reveals rail systems to be poor performers, local authorities still have a trump card to play. The people have spoken at the ballot box. No matter how inefficient or inequitable the system might be, it is now the will of the people, and it must be built.

Transit agency budgets and influence continue to grow, fed more regularly by local revenues than any other source. The voice of the electorate is a key element in the fiscal plans of local transportation agencies. Given the disproportionate increase in nonfederal subsidies, local transportation authorities must approach the electorate with a powerful message. Consider the following excerpt from a November 6, 1990, letter to the Los Angeles Times by Neil Peterson, past Executive Director of the LACTC. “The idea of rail transportation in Southern California has been derailed many times by old-fashioned attitudes…. One attitude is that Southern California is so spread out that only a handful of us will benefit from rail transit. Another is that many commuters can’t – or won’t – use rail transit regularly. Both of these attitudes are wrong. Times have changed!”

Messages like Peterson’s deflect attention from the real solutions, and ensure that the prospect of evacuating freeways by building rail lines remains attractive. Between 1911 and 1980, there were almost 20 serious attempts to sell rail to the residents of Los Angeles (Green, 1985). Four of these proposals were failures in popular votes. Others failed elsewhere in the process. Los Angeles rail interests did not succeed until voters passed Los Angeles County Proposition A in 1980. Propositions A (1980) and C (1990) currently provide an annual contribution of more than US$900 million in sales tax revenues to the MTA (Crane, 1996a). Rail investments are an important part of these packages, but the ballot language provides the MTA with considerable spending latitude. The Authority chooses to use this latitude to pursue its fixed rail mission.

Even when the electorate catches on, as it almost did in Dallas in 1988 (Kain, 1990), transit authorities can still bankrupt themselves with construction projects they cannot afford; and then use these works in progress to try and tease new tax revenues out of voters untutored in the importance of ignoring sunk costs. This is a high-risk strategy because failure to execute the ploy correctly can be politically fatal. In Los Angeles, the MTA Board is losing just such a game
of fiscal chicken. State Propositions 156 and 181 were to have provided approximately US$800 million in rail bond funds for the MTA’s Pasadena Blue Line and the San Fernando Valley East/West Line, but these measures were rejected by the voters. The California Transportation Commission (CTC) has committed to replacing these funds by 2002, but the CTC cannot create funding. It is subject to acts of the State legislature and administrative decisions in executive branch. Funding for the Pasadena Blue Line is tenuous at best, and the MTA has attempted to corner the both the State legislature and the electorate by proceeding with construction. It has not worked. The MTA Board voted in January of 1998 to suspend work on the Pasadena Blue Line for at least six months. Even if the MTA succeeds in retaining State funding, the likely delay in funding lengthens the construction period, and increases costs (Rubin and Moore II, 1996; Rubin et al., 1998).

Local transportation authorities understand well the political mechanisms available to them, and they continue to apply their misinformation tools with full cognizance and considerable effect. Voter propositions may fail, but there is nothing to prevent local authorities from studying their message, refining the marketing context of their appeals, and proceeding again. In the end, “They can lose as often as they have to. They only need to win once.” (Gordon, 1994).

4. Myth 3. Rail is fast transit

Proponents of rail transit expound the speed advantages heavy and commuter rail systems provide. This has been a favorite ploy of Los Angeles authorities:

“Transit operating in mixed traffic would also run too slowly to be effective in this corridor. Systemwide, MTA bus schedules currently reflect an average speed of 13.5 miles per hour (mph). In the Los Angeles central business district, however, this speed drops to 9.6 mph, and these speeds will decrease further as traffic congestion increases. In contrast, the Red Line operates at 24 mph — 2.5 times the speed of buses — and provides the mobility needed to attract and maintain patrons in the future (emphasis in the original.) (Shikada, 1994).”

The facts are correct, but they are very incomplete. The MTA implies that rail will provide a far faster ride than bus in this corridor. Quite the opposite is true. The MTA ignores out-of-vehicle access time, waits during transfers, and intrastation time. For the great majority of corridor riders, total travel time will be longer on the Red Line subway than on existing bus lines. This increase comes from increases in out-of-vehicle time, suggesting a considerable decrement in the level of service provided by rail relative to bus.

Red Line stations are usually further from the origins and destinations of most riders than are bus stops. In the downtown Los Angeles area there are only three Red Line stations and a total of seven exits. The original Red Line proposal for Operating Segments 1, 2, and 3 North, Union Station–North Hollywood, and Union Station–Wilshire/Western includes 16 stations. There are thousands of bus stops in this corridor. The great majority of rail passengers will have to walk longer distances from their origins to reach rail boarding stations and to reach their destinations than if they had taken a bus. Most Red Line passengers will have to walk at least two blocks further on the downtown end of their trips than they would have to walk to a bus. The time penalty is far larger on the other end of the trip. Some Red Line passengers bound for destinations West of the CBD would experience improvements, but passengers bound for the CBD would usually have made better time on the bus. The story is similar for other bus lines serving the Los Angeles CBD. The average travel time for Red Line riders is consistently higher than for bus riders taking the same trip.

Similar results hold for the remainder of the Los Angeles rail system. Long train trips are slowed by frequent station stops, resulting in an average travel speed less than half the average of most MTA express bus lines, particularly for the freeway portion of express bus trips. Many former Long Beach–Los Angeles Express Line 456 passengers found their total travel time increased when Line 456 was eliminated and they were forced to use the Blue Line train.

After many attempts, we were unable to find a single case in which it is faster to complete a trip in the MTA service area by taking a Metrolink commuter train than it is to use bus service. Metrolink is far slower in every case. Aside from special exceptions provided by Metrolink’s reduced fare promotions, the bus trips also had significantly lower fares, required fewer transfers, and had shorter headways. Buses operated for longer periods of the day and on weekends and holidays, and offered more convenient access.

Rather than spending billions of dollars on rail pursuing illusory improvements in level of service, US transit planners should examine the costs and benefits of speeding up bus transit. Busways have a number of advantages over rail systems. Mixed use HOV/busways provide important advantages to car- and vanpool passengers. The average speed of busway travel is generally almost double that of heavy rail. Time lost to transfers is generally significantly reduced because collector buses not only convey passengers to busways, but can also carry them on the busway without requiring a transfer. Also, buses leaving a busway to serve CBDs or suburban collection/distribution areas can make more stops than a rail line, which means passengers alight closer to their final destinations. And finally, when the entire cost of carrying a passenger is accounted for, including the costs of collector and distributor bus systems needed at each end of rail lines, busways are generally far less expensive to operate than rail lines. In Los Angeles, the El Monte
Table 1
Calculating productive capacity indices for freeway and light rail transportation modes

<table>
<thead>
<tr>
<th></th>
<th>Freeway Lane</th>
<th>HOV Lane (Bus)</th>
<th>HOV Lane (Car Pool)</th>
<th>HOV Total</th>
<th>Light Rail High&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Light Rail Low</th>
<th>Blue Line Actual (1993)&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicles Per Hour</td>
<td>1700&lt;sup&gt;a&lt;/sup&gt;</td>
<td>49</td>
<td>1213</td>
<td>1262</td>
<td>12</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Cars per Train</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Average Load</td>
<td>1.12</td>
<td>31.2</td>
<td>3.2</td>
<td>4.3</td>
<td>82</td>
<td>55</td>
<td>62.6</td>
</tr>
<tr>
<td>Operating Speed</td>
<td>27</td>
<td>52</td>
<td>55</td>
<td>54.9</td>
<td>27.5</td>
<td>15.0</td>
<td>21.0</td>
</tr>
<tr>
<td>Productive Capacity Index</td>
<td>51,408</td>
<td>79,498</td>
<td>213,488</td>
<td>292,986</td>
<td>75,866</td>
<td>9000</td>
<td>26,292</td>
</tr>
<tr>
<td>Divided By Freeway Index</td>
<td>51,408</td>
<td>51,408</td>
<td>51,408</td>
<td>51,408</td>
<td>51,408</td>
<td>51,408</td>
<td>51,408</td>
</tr>
<tr>
<td>Freeway Lane Equivalent</td>
<td>1.00</td>
<td>1.55</td>
<td>4.15</td>
<td>5.70</td>
<td>148</td>
<td>.19</td>
<td>.51</td>
</tr>
</tbody>
</table>

<sup>a</sup> A directional flow of 1700 cars/hour is slightly below the Southern California norm for freeway lanes during peak travel times, but it is an acceptable sketch planning value.

<sup>b</sup> Despite the fact that the Blue Line may have the highest total utilized capacity of all light rail lines in the nation, it does not qualify as high capacity light rail transit because station lengths limit the line to two car trains.

<sup>c</sup> The Blue Line has by far the highest system average passenger load of all US light rail lines. It may also have the highest peak passenger load. This is to a large extent the result of uniquely low fares.
busway delivers ten times the peak hour capacity of the Blue Line train, moving four times as many passengers two and one-half times as fast, at a fraction of the Blue Line’s subsidy.

5. Myth 4. Rail is high capacity transit

Rail proponents frequently argue that there is not enough room on the streets of Los Angeles to accommodate all the buses that needed to carry the passengers served by a single rail line (Crane, 1996a, 2). This is not the case. Rail proponents seem to confuse bus lines with bus corridors. Corridors are normally served by several parallel bus lines. Bus has a significantly larger carrying capacity than rail in almost every transit corridor. In Los Angeles, the Red Line subway will not be accommodating a large volume of riders that cannot be handled by buses. Rather, riders currently traveling on buses will be forced to transfer to rail for part of their journeys.

The California Department of Transportation (Caltrans) measures relative modal capacity with a productive capacity index (Vuchic, 1981) that is the product of four terms. Define flow to be the number of trains or vehicles per hour.

1. Headway is the inverse of flow.
2. Length is the number of cars per train. Buses and automobiles have a length of one.
3. Average load is average vehicle occupancy. This is an observed value.
4. Operating speed is average speed.

Multiplying these values together produces an index useful for comparing the relative carrying capacity of different modes. The reference value is the throughput index for a standard freeway lane. Table 1 summarizes Caltrans data for the El Monte Busway in Los Angeles, comparing busway capacity to results for a standard freeway lane and for light rail. Empirical results for other busways will vary. Three index values are computed for light rail systems. These include a high value for a light rail line operating near maximum real world loads, a low value for a light rail line operating near lowest acceptable use, and a value reflecting fiscal year 1993 data for the Long Beach-Los Angeles Blue Line train (LACMTA, 1993).

The most important mechanism for tapping the capacity of transit is also the simplest. In 1980, the voters of Los Angeles began the most successful transit ridership experiment in US history. Southern California Rapid Transit District (SCRTD) ridership had fallen from 396.6 million in fiscal year 1980 to 354.1 million in fiscal year 1982.
Table 2
Public subsidies per Los Angeles bus and rail operations jobs

<table>
<thead>
<tr>
<th></th>
<th>Bus</th>
<th>Rail</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported Fiscal Year 1996 Subsidy(^a) Divided by</td>
<td>$351.2 million</td>
<td>$86.4 million</td>
<td>$437.6 million</td>
</tr>
<tr>
<td>Operations Jobs(^a)</td>
<td>5425</td>
<td>979</td>
<td>6404</td>
</tr>
<tr>
<td>Subsidy per Job</td>
<td>$64,737</td>
<td>$88,253</td>
<td>$68,332</td>
</tr>
</tbody>
</table>

\(^a\) The MTA defines interest and debt service expenditures for bus as bus expenditures, but does not count interest and debt service associated with building rail lines as a rail operating subsidy. While bus debt is relatively minor, rail debt service is well over twice the operating subsidy reported by MTA.

\(^b\) The budget identifies direct employment associated with bus operations as 4798, with rail operations as 866 and indirect employment supporting both areas as 740. This indirect employment is allocated here to bus and rail operations proportionately. Certain other jobs arguably related to operations, such as MTA Transit Police, are not included in the employment values, or in the operations budget. The operations categories account for 77 percent of all MTA employees. Source: LACMTA (1996, p. 31).

During the same period, base fares increased 55 percent from US$0.55 to US$0.85. Beginning in fiscal year 1983, an allocation of approximately 20 percent of Proposition A tax receipts was used to cap the SCRTD base fare at US$0.50. See Fig. 3.

Over the three years of the US$0.50 fare program, District transit ridership rose over 40 percent, and was still increasing in the last month of the experiment. Very little about the bus system changed except the fare. Revenue service miles increased only 1.5%, including special service added for the 1984 Los Angeles Olympics.

Beginning in fiscal year 1986, the Proposition A funds that had been used to subsidize US$0.50 bus fare were reallocated to rail construction. The funds transferred away from the fare subsidy program paid for about 35–40 percent of the reported construction costs of the Blue Line. Blue Line ridership peaked in 1995 at just over 12 million passenger boardings after an earlier dip. The MTA proposed Fiscal Year 1998–99 Budget (LACMTA, 1998a) includes contradictory figures implying a projected annual Blue Line ridership of between 13.25 and 16.1 million.

Fares were increased to US$0.85 in fiscal year 1986 and then to US$1.10 in fiscal year 1989. Bus ridership began to decline and bus service miles began to decrease as soon as fares began to increase. By 1995, the system had a ridership of 362.3 million across all modes, bus ridership of 343.1 million, and had lost 133.5 million boardings per year relative to the 1985 peak.

There have been more concomitant changes in economy and the level of bus service during the past decade than there were in the 1983–1985 interval. Thus fare increases are not the only reason bus ridership has dropped, but steady diversion of resources from bus operations to rail construction is the most important part of the story. We cannot control for all of the intervening effects, many of which seem to be driven by the MTA’s desire to make bus transit a truly unattractive option.

6. Myth 5. Rail construction provides jobs

Proponents of US rail construction promote rail projects as a way to improve economic conditions and provide jobs (Shikada, 1994). In truth, rail construction is not a very effective means of promoting local economic development nor of creating jobs, especially compared to bus operations. The American Public Transit Association (APTA, 1983) reports that US$100 million spent on US transit operations creates 9610 jobs, or 20.2 percent more than the jobs created by rail capital investment. The same amount spent on bus capital will generate 7450 jobs, or only 6.75 percent fewer than rail.

The Los Angeles experience is different. No net new jobs have been created by construction of the Los Angeles rail system. The MTA tracks jobs created by rail construction. Their report for September 1994 (LACMTA, 1994b, ii) bases employment provided by Operating Segment 2 of the Red Line on an average of 29 job months per US$1 million expended. This corresponds to one person-year of employment per US$413 793. Referring to the MTA budget for fiscal year 1996 provides the information summarized in Table 2. Comparing the US$64 737 public subsidy needed to create an MTA bus operations job to the $413 793 needed to create a rail construction job produces a ratio of approximately 1 : 6.4. Thus a public dollar spent on bus operations in Los Angeles produces 6.4 times as much employment as a dollar spent on subway construction.

Even more important to the local economy is what type of jobs are created and where they are located. In Los Angeles, over 90% of all bus operations spending is local, which means that the multiplier and job effects are local. In contrast, a high percentage of rail construction costs are not spent locally, in part because many rail construction expenditures are for materials and other non-personnel costs. Many rail components such as cars, rail, power supplies, communications gear, seats, ticket vending machines, computer hardware and software, signaling equipment, etc. are not produced by local nor even domestic suppliers. A large portion of the personnel costs are paid to contractor employees who do not work locally. Many of the Architectural and Engineering firm employees who fill rail construction jobs are specialists who follow rail projects from city to city. Some do not move their families to their job sites, commuting home on weekends instead.
In Los Angeles, the largest rail capital expenditures have little or no job creation impact. More than one billion dollars was spent on the purchase of right-of-way from commercial railroads, but this has resulted in no new local economic activity. The opposite is true. The Santa Fe Railroad wanted to keep its tracks in service and had to be threatened with condemnation before selling its rights of way. Consequently, these purchases actually have negative economic multipliers, because they take productive assets out of service.

Economic activity multipliers reported by the APTA (1984) for different types of transit expenditures as summarized in Table 3. These multipliers are derived from national data. The first three items in Table 3 are capital expenditure categories, which generally produce no revenues. However, transit operations generate additional revenues through farebox and other sources, such as advertising. The operating ratio is the percent of operating costs covered by operating revenues. As a result, the operations subsidy multiplier is greater than the operations expenditure multiplier. The formula for conversion of the operating expenditure multiplier to the operating subsidy multiplier is

\[
\text{Operating Subsidy Multiplier} = \left(1 - \frac{\text{Operating Expenditure Multiplier}}{\text{Operating Ratio}}\right)
\]

Bus operating expenditures offer particular advantages over rail construction expenditures with respect to job creation. Table 4 shows the operating subsidy multiplier for an operating expenditure of US$1.00 given an operating ratio of 40 percent, which is typical of Los Angeles.

US rail advocates point out that the local portion of capital subsidy is only a fraction of the total. The Federal share of these expenditures can be as high as 80 percent, and even higher for a few specialized capital projects. The logic of rail advocacy dictates that if only 20 percent of the cost of a capital project consists of local resources, the multiplier for local capital subsidies should be multiplied by a factor of five.

In Los Angeles, the federal share of rail capital barely approaches 40% (LACMTA, 1998b). Further, this argument does not apply exclusively to rail. Bus capital projects receive a higher Federal share of funding than do rail capital projects. In Los Angeles, the Federal share of virtually every bus purchase in recent years has been 80 percent. Also, there are both Federal Section 9 operating and State of California State Transit Assistance grants for bus operations.

In any event, APTA and other US rail advocates' focus on economic multipliers is misplaced. Transit systems should not be constructed or operated because doing so provides jobs. Rather, people use transit to go to get their existing jobs and to find new ones. Many transit dependent riders would have great difficulty in retaining their employment without transit. Expansion of urban bus systems would allow additional residents to find work. Expansion would also improve transit-dependent residents' access to shopping, medical treatment, and other economic activities, increasing the benefits provided. These benefits are the correct basis for transit investment decisions, not the direct employment provided by new public works. Spending local funds on local projects has no clear impact on employment, since the people who earn this money would either spend it or save if the funds had not been taxed away from them.

7. Myth 6. Rail promotes superior urban form

Some urban design professionals disparage low-density urban form, arguing that cross-hauling between decentralized locations is wasteful. US rail advocates are quick to employ these arguments, calling for a reorganization of cities and suggesting rail investments are the best way to concentrate activities and reduce urban sprawl.

Land use certainly does influence transportation outcomes. Reviewing statistics from the major cities of the world, Gordon and Willson (1985, 159–75) identified a small set of variables that serve as reliable predictors of urban train ridership. Logically enough, two of these variables are population density and average income. Their results identify circumstances under which rail is a sensible investment. Very dense, highly congested cities with low-income residents are the best candidates for rail service.

Unfortunately, proponents of rail tend to get the relationship between density and ridership backwards. The standard claim is that building rail systems will induce land use
patterns that feed rail ridership, but this is not how the world works. Even if a rail network was capable of promoting compact urban form, what would be the point? The objective of building a transportation system is to serve the objectives of urban residents. Suggesting that travelers should reconfigure their lifestyles to fill trains confuses ends and means. There is no intrinsic value to a full train. The values that should be served lay elsewhere, in lifestyles and opportunities.

There are numerous surveys demonstrating pronounced preferences for low-density residences (Altshuler, 1979). Low-density living arrangements in the United States are a combination of market and policy outcomes, such the deductibility of home mortgage interest. Regardless of the impetus for lower densities, the dispersion of urban activities erodes the market for conventional public transit, especially rail transit (Pegrum, 1964). The Congressional Budget Office (US Congress, 1988) reports that

"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. ...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 the 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."

Enormous subsidies for transit have not reversed transit's decline, nor will new interventions in the urban land market. Still, such interventions persist at a sometimes grand scale. The City of Portland attempts to ensure compact urban form with a dictated growth boundary. Portland's rail advocates contend that an extensive urban rail system will further promote compactness by providing the transit service most suited to Portland's compacted residents. But even if the residents of Portland rigorously respect their self-imposed limits, there will still be high dispersion of employment and residential activities inside the development zone. This pattern is not well served by rail.

Nor will smaller scale approaches such as transit oriented developments (TOD) (Duany and Plater-Zyberk, 1991; Calthorpe, 1993). Proponents of rail contend that dense, transit villages built up around rail stations will reduce housing costs, commute time, road traffic, and air pollution (Cervero, 1994b). The effects of these developments are the subject of much debate, but there is no evidence TODs shift travel from cars to rail (Boarnet and Crane, 1995, Crane, 1996a). For trains to be attractive, it is just as important for travelers' destinations to be close to a rail station as it is that their origins be proximate to rail. The best empirical evidence indicates neo-traditional neighborhood designs contribute little to transit use (Cervero, 1994a; Downs, 1994; Gordon and Richardson, 1996a). TOD's effects on auto use are equally uncertain. If neo-traditional neighborhoods increase access then these designs will increase travel by all modes, possibly resulting in more trips by car (Crane, 1996b).

Attempts to intensify densities run counter to contemporary urban economic trends. Activities co-locate because doing so provides advantages. High rise structures are the ultimate co-location strategy. This extreme strategy makes sense if transportation costs are high enough to dominate attendant construction costs. Even when such conditions persist, the values of locations are not static. The innovations urban life engenders also affect the way cities function. Examples include electrification, radio communications, the development of trucking and highway systems, telephony, and the marriage of computing and telecommunications. The constant in these changes is that they extend the advantages of co-location over wider areas. Consequently, transportation, communication, and other interaction costs are dropping precipitously, and taking incentives for concentrated settlement patterns with them.

The market for urban land, to the extent that it is allowed to operate, organizes activities in ways that respond to these changes. In most economic sectors, job growth is in the suburbs, in patterns conspicuously difficult to serve with rail systems (Linnemann and Summers, 1991; Gordon and Richardson, 1995a, 1996a, 1996b). The opportunity to suburbanize is crucial to producers, because decentralization is an economic relief valve that mitigates congestion costs. It is unlikely that any public policy short of forced relocations will reverse the current trend toward decentralization. US rail advocates misread these trends at considerable cost to everyone but themselves.

8. Myth 7. Rail will be paid for with non-local funds that cannot be used for other purposes

US rail advocates often mount a use-it-or-lose-it argument that local rail plans should proceed because so much federal and state money is available for these projects (Shikada, 1994). This argument implies that the only non-local funds available are for rail projects, which is not the case.

US urban rail systems are constructed with a number of Federal, State, and some local funds that can be used only for specific purposes. However the degree of flexibility in use varies considerably across fund sources. In some cases there is no flexibility, and local authorities' only alternatives are to request funds for the purpose designated by the provider, or else not to request funds at all. An example is the US$1 billion in State of California rail construction bond funds that were approved by the State electorate in 1990. These funds can only be used for the construction of rail lines.

In other cases, funds are restricted to specific uses, but
local authorities retain considerable latitude with respect to what sort of funds it requests. Federal Section 3 capital grant funds can be used only for purposes specified in the grant application and contract. Until recently, Section 3 funds were divided into categories. These included funds for new rail starts, which was the primary Federal funding source for the Los Angeles Red Line subway; funds for renewal and replacement for old rail systems such as those of New York City, Chicago, and Boston; and bus capital. Current law (49 USC 5309.4[a]) no longer identifies a separate new rail starts program. New start funds may now be sought for rail or bus, including the purchase of buses and supporting capital assets such as operating and maintenance facilities (49 USC 5309.4[a] [1] [A]) and for construction of busway/HOV lanes lanes (49 USC 5309.4[a] [G]).

Historically, Federal Section 3 (now 49 USC 5309) new start funds have been 100 percent specified by Congress. Los Angeles had received by far the largest allocation of these funds for many years. For fiscal year 1995, Congress allocated US$397.0 million in Section 3 funding, with US$184.3 million, or 46 percent, recommended for Los Angeles. For fiscal year 1996, the US DOT recommended US$158.85 million in funding for the MTA (USDOT, 1995), but Congress is debating values that are much lower. Any success in this dimension comes at some political cost because Los Angeles does not receive as large an allocation of bus capital funds as the region otherwise might. It also comes at some risk, because it is impossible to control the future flow of external funds.

There are dozens of other US regions seeking access to Federal new start funds. Consequently any applicant that drops out of this pool can expect to receive a far larger share of Section 3 bus capital funds and other resources. This shift would simultaneously convert the remaining rail applicants from former competitors into a core of active supporters favoring allocation of more bus capital.

For example, if Los Angeles could trade the US$150 + million per year in Federal rail construction funds it currently receives for US$50 million per year in bus capital funds, the region would be far better off. MTA could stop dedicating its political resources to fighting for a dwindling share of rail capital. This US$50 million would pay for 80 percent of the cost of approximately 150–200 new buses, plus the new operating divisions to run and maintain them. Over the normal 12-year useful life of a bus, this would mean that the number of local buses could be increased by approximately 2 000 vehicles, almost doubling the current operating fleet. Some of these buses should be used to reduce overcrowding on local buses, improving the level of service for both new and existing passengers. If the remainder were used to provide new service, bus ridership might be increased by as much as 50 percent over this 12-year period. This is about 175 million boardings per year. These 175 million new boardings greatly exceeds the total number of passengers the MTA claims would be accommodated on all of the rail lines the agency has ever threatened to build.

Further, the nonlocal contribution to rail projects is not a fixed proportion of total cost. Every Los Angeles rail project has had significant cost overruns, with some final costs running as high as four to six times original planning estimates. For example, the Full Funding Grant Agreement (FFGA) for Segment 1 of the Red Line subway includes a budget of US$1,249.9 million, with a Federal share of US$699 million. The Federal share includes flexible Federal Section 9 grants allocated to the region by formula. Cost overruns pushed the total cost to at least US$1,417.9 million. Federal or State government funded none of this nearly US$168 million overrun. MTA and the City of Los Angeles must absorb all. MTA is responsible for all overruns on all of its other projects. These currently total over US$1.5 billion, and are increasing.

The cost-effectiveness measures in Fig. 2 show that, at best, rail is ten times more expensive than bus in terms of total capital cost per unit of transit service consumed. Federal funds can be used to pay for 80 percent of the capital acquisition costs of bus transit, but the MTA experience with rail is that non-flexible Federal funds will cover no more 50 percent of the budgeted cost of rail transit projects, and a lower proportion of actual costs. The MTA reports that the federal share of funding for its rail projects is 31%. If the MTA used generally accepted accounting procedures (GAAP), this figure might be as low as 25%. Thus not only does rail require ten times the capital investment needed to provide bus service, the local share of this cost is at least two-and-one-half times as large. Overall, the Los Angeles rail option is at least 20 times as costly as the bus option in terms of local capital funds.

9. Myth 8. Rail will attract new riders to transit

Los Angeles is a very transit intensive city with a large, crowded bus system. The size of Los Angeles transit market provides one of the strongest cases in the nation for investing in rail, but this strongest case is weak. To fill a train in Austin, Charlotte, Cincinnati, Columbus, Detroit, Kansas City, Memphis, Milwaukee, Minneapolis, Norfolk, Orlando, Salt Lake City, Seattle, Tampa, or any of the other US cities debating, committing to, or constructing rail transit systems; something has to happen that does not happen in Los Angeles, Baltimore, Buffalo, Denver, Miami, Pittsburgh, Portland, San Jose, Sacramento, Washington or any other member of the new rail club. Many people have to be willing to get on a bus, switch to a train, and then switch to another bus to reach their final destinations. Even the poor, who are a lot like the rest of us, would opt for two rides on the bus before undertaking a bus–train–bus odyssey. The riders who do show up on these systems are the ones who do not have to link up three trips, but there are not enough of these riders to fill these trains.
In the minds of most policy makers, attracting choice riders to transit means attracting riders from the economic classes to which the policy makers belong. We suppose that one of the reasons why middle and upper income residents do not use buses is that they do not want to associate with the existing population of lower income, transit-dependent bus riders. The response from many transit board members and transit managers is to provide a new mode of transit that does not have a history of carrying the transit-dependent, because it has no history at all. US decision-makers hope middle and upper income residents do not associate rail with the type of people whom already ride the bus.

Low-income transit users are captives. They have no alternatives to public transit, no matter how low the quality nor how high the cost of service. They will put up with long walks to reach transit routes; long waits for infrequent and unreliable service; surly bus operators; unclean buses that are in poor mechanical condition and covered with graffiti; extreme crowding; and occasional riding companions who are unfamiliar with the finer points of personal hygiene.

In the US, such riders are not quick to complain because

1. they are often working poor, and their lives are a daily struggle against great odds,
2. English is often not their first language, or they may not be literate,
3. they come from cultures in which complaints to authority are unacceptable, or
4. they are undocumented immigrants and do not want to bring themselves to the attention of government officials.

In contrast, middle and upper income travelers are choice riders. They have alternatives, including the single passenger automobile, car- and vanpooling, and telecommuting. These choice riders will use transit only if it is their best alternative. These riders reject the typical conditions transit-dependent riders encounter everyday.

In general, within a given mode, the longer the trip, the greater the subsidy per passenger, but the lower the subsidy per passenger mile. Longer trips generally have higher average passenger loads than shorter trips. A large portion of transit costs is hourly costs, such as drivers' pay and benefits. As longer trips are generally taken at higher average speeds, hourly operating costs are distributed over more passenger miles. As a result of the differences in location and travel patterns, middle and upper income option riders tend to receive a higher subsidy per ride than lower income, transit-dependent riders.

This frames a difficult policy decision. Should US transit managers configure service to maximize trips, which would favor service for the shorter trips taken by lower income riders, or try to maximize passenger miles, which would favor service for the longer trips taken by middle and upper income riders? Implicitly or explicitly, US transit board members and professional managers choose between groups when they target market segments.

The lower income, transit-dependent group includes a large number of potential new consumers. They already make extensive use transit services. They tend to be located in densely populated areas. And their tastes and incomes are such that they cost comparatively little to serve. The middle and higher income, choice group consists primarily of people who have not made previous use of transit services. They are located in a dispersed pattern that is far less dense than that of the first group. And, their tastes and incomes are such that they cost a great deal more to carry.

If the objective in providing transit service is to do the greatest good for the greatest number of people, then the efficient course is to devote a large share of available resources to expanding bus service for the first group. The most important improvements are also the simplest. A variety of ridership surveys (SCRTD, 1992; Maritz Marketing Research, 1991; Maritz Marketing Research, 1989) have consistently indicate that the most important improvements to US transit service are

1. more frequent service,
2. longer service hours,
3. new bus lines
4. faster service, such as express and/or limited stop routes; and
5. fewer and/or more convenient transfers.

Such quantity improvements also lead to quality improvements. If increasing the frequency of service means more passengers can find seats, these riders will perceive a quality improvement.

Once demand in the first group is saturated, the next step is to subdivide the middle and high-income group. Operators should target those members of the second group that can be attracted to transit with the lowest investment per new passenger. There are additional aspects of transit quality that must be improved to attract middle and upper income riders. These include:

1. clean buses with good physical appearances that are free of graffiti;
2. a very high degree of mechanical reliability to preclude missed bus runs, malfunctioning air conditioning, and poor quality rides;
3. strict adherence to schedules;
4. courteous, responsive bus operators;
5. fast, accurate, easy-to-use sources of information;
6. easy available fare media such as automatic monthly distribution of passes by mail, charges to the passengers' credit cards, and smart fare card technologies; and
7. a high level of security, both on vehicles and at bus stops.

These improvements will, over time, attract more choice riders to the bus system. They will also provide a higher quality of service to transit dependent riders, who have an equal right to expect high quality service. Only when these relatively inexpensive bus improvements have been pursued
to the point of diminishing marginal returns should opera-
tors turn their attention to higher cost options.

Nothing short of very major changes in the economic and
legal structure of US transportation is going to make transit
an appealing option for most middle and upper income
travelers. Aside from a legal mandate for middle and
upper income people to give up their cars, the only way to
attract them to transit is to provide them with a service that
is genuinely responsive to their needs. This means high
quality, frequent service; from the front doors of their
homes to the entrances to their offices; whenever they
want to travel; all high speed; with few or no stops in
between; and at low out-of-pocket cost. Public transit falls
short of this standard, but the further transit operations move
in this direction, the greater the likelihood of attracting
middle and upper income riders. Rail transit offers the
least in terms of the attributes most important to middle
and upper income travelers.

10. Myth 9. Rail will decongest roads

One of the favorite premises of US rail transit advocates
is that rail will decongest roads by absorbing demand. There
are examples of short term improvements in road conditions
produced by opening new rail links. The most notable US
example is probably the beginning of BART’s trans-Bay
operations between San Francisco and Oakland in 1974.
But in the US, there is no known, post World War II case
of any new rail system producing long term improvements
in traffic conditions. This is no surprise. We should not
expect to build our way out of congestion with new facilities
of any sort. Even if rail transit systems were inexpensive to
build and attracted so many riders that the level of service on
the road network improved each time a new rail line was
introduced, reducing the cost of road travel reduces the cost
of whatever objective the trip meets. In the short run, this
leads to more trip making. In the long run, the eventual
result is activity shifts in location and timing that intensify
land use, the demand for transport, and eventual traffic
volumes.

An uncongested road is wasteful. Time has value, and
congestion is a cost that should be traded off against road
construction and operating costs. Delay begins to accrue at
higher volumes on higher design facilities, but such facil-
ities cost more to provide. If a facility is uncongested during
peak use, it is over designed. A more efficient design would
minimize the combined cost of congestion, capital, and
operations, rather than trying to optimize performance in
only one dimension.

While it is difficult to persuade an individual to use transit
him- or herself, it seems to be relatively simple to convince
some people in the US that transit is a viable option for their
neighbors. Unfortunately, the prospect of attracting every-
body else to rail transit is not very promising. Rail systems
tend to absorb demand from bus transit far more quickly
than they attract drivers from automobiles. For example,
Richmond (1991) reports that 63 percent of the passengers
on the Los Angeles Blue Line train responding to a Novem-
ber 8, 1990, onboard survey indicated that they were bus
patrons prior to the new train service. Six percent indicated
that others previously drove them, six percent had walked,
and four percent were taking a trip they would not have
made if the Blue Line had been available. Only 21 percent
of the respondents indicated that they were riding the Blue
Line instead of driving alone. This surprisingly high propor-
tion is almost certainly related to the unusually low fare
charged on the Blue Line. However, even if the fare charged
for rail transit service was zero, most rail passengers would
still be bus refugees who were already doing their share to
decongest roads.

Rail advocates often amplify the specious role of rail as a
decongestant by predicting that US freeway speeds will fall
to catastrophically low values unless rail systems are built
(LACTC, 1992; LACMTA, 1995a). These doomsday
scenarios are premised on a static view of urban form and
travel that extrapolates short-term trends. This view ignores
the adjustments these trends induce in land markets, travel
behavior, migration patterns, and other developmental
mechanisms. Changes in travel costs change the accessibil-
ity and value of sites, which leads to spatial and temporal
changes in activities, and to changes in the demand for
transportation. Changes in demand lead to adjustments in
the level of service provided by the transportation system.
In short, urban residents look for options to improve their
experiences. Simple-minded forecasts ignore this, and thus
exclude the changes most relevant to the outcomes being the
forecast.

Empirical evidence suggests US cities have been able to
adjust to growth in ways that mitigate its costs very effec-
tively. Gordon and Richardson (1994, 1997) report that
evidence from National Personal Transportation Surveys
(1977, 1983, 1990), a commuting questionnaire included
in the American Housing Surveys (1985, 1989), and the
two decennial census reports (1980 and 1990) all indicates
metropolitan area commuting times are essentially
contained.

While commuting times have remained constant, average
trip speeds have actually improved. Most commutation is
now suburb to suburb (Gordon et al., 1986; Gordon and
Richardson, 1989). Only a small fraction of North Ameri-
ca’s commuters still work downtown. The result is an
empirically verifiable improvement in North American
speeds reported in the 1983–84 and 1990 National Personal
Transportation Survey (NPTS) by trip time of day (AM
peak, PM peak, other), trip purpose (work vs. other), place
of residence (inside central cities vs. outside central cities),
and five categories of city (MSA) size. They report that
average 1990 trip speeds are significantly higher than aver-
age 1983 speeds for 58 of the 60 cells defined by their
classification scheme.
This pervasive improvement comes without systematic changes in trip durations or trip lengths across place of residence, place of employment, time of travel, or city size. It comes despite a staggering boom in non-work travel, and despite population increases in the nation’s largest cities. The population of the Los Angeles CMSA increased by more than 3 million between 1980 and 1990. This is growth of more than 26 percent. The Dallas CMSA grew by more than 33 percent during the same period. Even the New York CMSA added more than half a million souls.

In contrast, many members of the class of medium sized, monocentric cities that US rail transit advocates describe as the best candidates for light rail transit systems tended to either lose population or grow very slowly between 1980 and 1990. For example, Buffalo, Detroit, Cleveland, and Pittsburgh all shrank.

These ongoing adjustments in the spatial structure of US cities not only help alleviate congestion, they further dilute any residual demand for rail transit services. Still, rail transit advocates continue to cast congestion as the boogy-man. Urban congestion is real, but as long as land markets and the travel patterns they engender are allowed to adjust, the congestion boogy-man will stay under the bed.

11. Myth 10. There are no alternatives to rail

Justifying a rail system is so difficult that US rail advocates must frequently mount arguments intended to diminish the importance of alternatives. Bus transit is usually the first target. Rail advocates describe buses as too slow, too unappealing to riders, or of too little capacity to provide service to a world class city. A closer look at bus operations suggests that buses usually dominate rail in all these dimensions. Rail trips tend to take more time than bus trips because access and egress are more difficult in the case of rail. Buses can be made very appealing, if fleets are sufficiently large and well maintained that frequent, reliable service can be provided by vehicles carrying loads below crush capacity.

When coupled with an exclusive right of way, buses combine flexible access and egress with high speeds, and capacity second only to heavy rail. A special advantage of busways is that they make for truly seamless transportation, because the same vehicles that provide express service can function as local collectors and distributors, reducing or eliminating transfers and out-of-vehicle waiting time.

Busways need not be restricted to express service. Bus contraflow/HOV/emergency service lanes can be striped on city streets. This reduces capacity for single occupancy vehicles, but the additional capacity delivered by buses operating on an exclusive right of way exceeds this loss under almost all circumstances. Coupled with bus malls and preferential signaling schemes, urban busways can provide a level of service sufficient to attract significant new ridership.

North America provides many other examples of highly successful busway/HOV projects; including the Shirley Highway HOV lane approaching Washington, D.C. from Northern Virginia, facilities in Pittsburgh and Houston, and the Ottawa busways built and operated by OC Transpo. Los Angeles’ El Monte busway was a true bargain by today’s construction cost standards, costing US$36.19 million in the early 1970s (SCRRTD, 1972), or US$85.3 million in 1988. This compares to the US$877 million (officially) spent on the Blue Line light rail line, and several billion dollars to be spent on the Red Line subway.

Another bus service improvement option is urban bus malls, which can speed both bus and pedestrian travel. Excellent examples can be found in Portland and Denver. Bus malls can be constructed for a tiny fraction of the cost of building rail lines, and can handle far larger loads than any light rail line. The downtown portion of Portland’s Banfield rail line serves approximately 10 000 passengers on a daily basis. Portland’s bus mall serves approximately 90 000, and cost only a small fraction as much as the Banfield to build and to operate. Because the construction costs of bus malls are so much lower than rail right-of-ways, it can be economical to build malls not only in the CBD, but also in suburban business centers. In most cases, bus malls cause bus operating costs to decrease as a result of faster and more cost-effective use of vehicles.

The list of transit alternatives begins with buses, but it does not end there. Transportation economists have contended for 30 years that congestion tolls are the systemic solution worthy of greatest attention. Traffic congestion is perceived to be a problem because it is an external cost of the decision to travel. These costs consist of delays and emissions inflicted on others. These costs are real, but they diffused. They are incident to everyone on the guide-way, not just the traveler who inflict them. Rational, self-interested travelers ignore the external costs of their choices because they can.

An optimal congestion toll accounts for the value of the delay and any other external costs each traveler inflicts on all others. If a facility is uncontested, introducing one more traveler has no effect on anyone else, and thus no toll is needed. During peak periods, additional users inflict delays on a large number of other travelers, and the optimal toll is high. Historically, this sort of pricing scheme has not been feasible because of transaction costs and information constraints. Tollbooths usually create more congestion than they alleviate, and truly dynamic time of day pricing requires knowledge of fluctuating traffic flows and some means of communicating price information to consumers.

HOV lanes are actually a special class of toll lane. Users pay their tolls with time instead of money. The price of entry is the inconvenience of forming a car pool. However, once a dedicated right of way has been made available, there is no
technical obstacle to introducing out of pocket pricing schemes and implementing electronic tolls.

New technologies have recently made very sophisticated road pricing schemes feasible. Intelligent Transportation System (ITS) technologies include new Automatic Vehicle Identification (AVI) tools that may ultimately make it as simple to pay a congestion toll as it is to pay for a long distance telephone call. This technology is deployed on California's new State Route 91 (SR91) toll lanes. The California Department of Transportation has recently adopted standards for AVI applications on bridges that are consistent with the transponder technology deployed on SR91.

The toll lanes on the SR91 right of way are important for other reasons too. The facility is an unique example of public/private cooperation. These lanes were constructed with private capital in the median of an existing freeway. The California Private Transportation Company (CPTC) operates the facility with objective of earning a profit on its investment, setting time of day responsive tolls that ensure an acceptable level of service. The SR91 toll lanes provide an institutional template for expanding the road inventory at the expense the users benefiting most directly from the investment.

The guidance provided by market approaches such as tolls is not restricted to managing the private automobile. These approaches also bear on the provision of transit. The social rationale for public transit is ensuring a minimum degree of mobility for all residents, including low-income residents. This is an equity objective, grounded in a sense of fundamental fairness.

Municipal bus franchises are an exclusive license to serve coupled with an obligation to serve. Unfortunately, once an enterprise has been removed from the discipline provided by the market place, it becomes very difficult to know how to allocate scarce resources to objectives. If an organization is shielded from competition, demand is made captive, and any incentives to control costs, innovate, or respond to consumer tastes disappear. The public transit result is usually unclean, crowded, poorly maintained buses that provide unreliable service of last resort to a market desperate for alternatives. The worst case outcome is an expensive rail system that can only be provided by bleeding an already deficient bus system. The situation is so common the public now regards it as natural. In truth, a municipal bus franchise is about as natural a means of providing transportation services as a municipal shampoo franchise would be of providing soap.

It is time to unshackle the supply side of the US transportation market, reduce regulatory barriers, and allow private interests to compete with municipal transit. Competing operators would have every incentive to identify market segments and tailor services to tastes. Vehicles would likely be much smaller than municipal buses. Owner-operator jitney and shuttle services would dominate. Subscription services would exist in a variety of forms, particularly in lower density areas where roving would be unprofitable. Roving in higher density areas would suppress search and transaction costs. Pricing would be highly responsive to demand, with low prices during off peak periods that would be very near the marginal cost of providing service.

Private services cannot address the equity objectives. The innovations engendered by competition between private providers would tend to expand service by attracting new riders, but only riders who are able to pay. Subsidizing demand instead of supply can generate equity improvements. The subsidies provided to public transit systems are intended to be wealth transfers to transit users who might not otherwise have access to transportation. There are simpler mechanisms for accomplishing wealth transfers. Lower income groups could be subsidized directly under a travel voucher scheme.

Unfortunately, maximizing the benefits from vouchers implies a considerable information burden. The authority providing an optimal subsidy must have some sense of how low-income households trade-off the value of transportation against the value of other goods and services. Providing cash instead of vouchers places the burden of information and decision on the consumer, where it belongs. However, this introduces the possibility that low-income individuals might spend their wealth transfers in ways inconsistent with the values of the electorate. Wealth transfers are intended to improve the lot of low-income people, but those willing to help also tend to insist on some degree of control over the decisions their help make possible. Consequently transportation vouchers remain an attractive option because of the degree of control they permit over consumer choices.

12. Conclusion

There is an eleventh rail myth we have not addressed. We cannot. No one can, and this provides the myth with a nearly divine status among US rail advocates. The eleventh myth is "Rail will ultimately perform as required, but only if the rail system is constructed in its entirety." Thus no matter how dismally existing rail systems might perform, proponents have an argument for building more. We cannot disprove this argument conclusively because it is grounded in blind faith, and we cannot afford to build rail systems large enough to test it. However, we can draw informed conclusions from the best evidence available. Larger US urban rail systems are not better rail systems, they are more expensive failures.

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