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POLICY STUDY NO. 218

TEN TRANSIT MYTHS:
MISPERCEPTIONS ABOUT RAIL TRANSIT IN LOS ANGELES AND THE NATION

(PART 2 OF A SERIES ON THE MTA)

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by

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EXECUTIVE SUMMARY

For more than a decade, the proponents of rail transit in Los Angeles and elsewhere have widely promulgated a set of stock arguments in favor of construction of rail transit. Although rail transit can provide advantages in some circumstances, the proponents of rail often mislead decision makers and the public by claiming nonexistent advantages for rail investments. This campaign has helped convince officials and the electorate that rail transit is a necessary component of a contemporary urban transportation system.

Left unchallenged, 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 that range from difficult to impossible to verify. We have come to think of this collection of arguments as a mythology. This paper addresses these ten myths, as follows:

Myth #1: *Adding Rail is Cost-Effective*
Fact: **Rail is economically inferior to conventional bus service. The high cost of rail bleeds existing bus systems.**

Myth #2: *Rail is the People's Choice*
Fact: **Voters have been swayed by what amounts to disinformation.**

Myth #3: *Rail is Fast Transit*
Fact: **Once out-of-vehicle, station access and transfer delay time is accounted for, rail travel times tend to be longer than the time required to complete the same trip by bus.**

Myth #4: *Rail Is High-Capacity Transit*

Fact: **Bus corridors consist of parallel bus lines collectively providing higher capacity than rail lines. Light rail lines cannot deliver more than a small fraction of the carrying capacity provided by dedicated bus rights-of-way. Only the most heavily utilized heavy rail trunks are competitive with busways, and then only at significantly higher costs.**

Myth #5: *Rail Construction Provides Jobs*
Fact: **Bus systems provide far more employment per public dollar expended than do rail systems and much more local employment.**

Myth #6: *Rail Promotes Superior Urban Form*
Fact: **Rail investments cannot defeat the location incentives provided by the market for urban land**.

Myth #7: *Rail Will Be Paid For With NonLocal Funds That Cannot Be Used For Other Purposes*
Fact: **Funds requested for rail must often be spent on rail systems, but local authorities may seek funds for a variety of purposes and have considerable discretion in how local transportation funds are spent.**

Myth #8: *Rail Will Attract New Riders to Transit*
Fact: **Rail seldom increases and often reduces total transit ridership.**

Myth #9: *Rail Will Decongest Roads*
Fact: **Rail is not a decongestant. New facilities cannot decongest existing facilities. The impact of transit on highway level of service is small.**

Myth #10 *There are No Alternatives to Rail*
Fact: **Doing nothing is often better than building a rail system, but there are many low-risk alternatives to rail. We have lacked the political will to pursue them.**

By their nature, myths are nearly impervious to attack, even by sound theory. Consequently, our strategy is to measure outcomes as frequently as we can, and to examine the position of rail advocates in light of these results.

Our counterarguments are often grounded in the Los Angeles experience. However, these myths tend to be advanced anywhere rail advocates congregate to pursue their special interests. Thus, we also rely on national data and explain our Los Angeles conclusions in as broad a context as possible.

There is an eleventh myth we have not addressed. We cannot. No one can, and this provides the myth with a nearly divine status among 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 urban rail systems are not better rail systems; they are more expensive failures.

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MYTH #1: ADDING 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) provided substantial capital funding for new starts in several cities. The most intense construction activity occurred after 1980. Thus, there was little available performance data against which to make a systematic assessment of rail advocates' cost-effectiveness claims. In 1990, the situation changed. The U.S. Department of Transportation issued a report[1] comparing the actual ridership and costs for new rail starts to the forecast values used to justify the U.S. DOT 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, by as much as an order of magnitude.

Costs per new 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. Further, parallel bus routes are usually eliminated when a rail line is added, ensuring that transit dependent bus riders must almost certainly become rail passengers.

Elements of the U.S. DOT report are summarized in Table 1. The report expresses values in 1988 dollars. The values in Table 1 are 1992 dollars.[2] This simplifies subsequent comparisons. The report uses a social discount rate of ten percent to measure the opportunity cost of capital.

The American Public Transit Association has worked diligently to discredit the DOT report. These efforts have been uniformly unsuccessful, and the report remains widely cited in the scientific literature.[3] [4]

Table 1: Cost Data for Recently Constructed Rail Systems in the United States [5]

Rail System	Weekday boardings (thousands)	Annualized total cost (millions, 1992 $)	Cost per passenger round trip
Heavy rail systems			
Washington	411.6	$1,202.93	$20.75
Atlanta	184.5	377.46	14.06
Baltimore	42.6	181.97	30.63
Miami	35.4	206.99	39.76
Weighted Average			$19.69
Light rail systems			
Buffalo	29.2	$101.24	$25.06
Pittsburgh	30.6	75.00	18.83
Portland	19.7	39.12	12.31
Sacramento	14.4	30.94	15.48
Weighted Average			$18.87

Note: The opportunity cost of capital is computed at a ten percent discount rate.

Documenting the performance of rail systems has had a profound effect on the rhetoric of rail advocacy. Confronted by cost-effectiveness measures, proponents of rail systems have shifted their emphasis away from quantifiable effects

1 Donald H. Pickrell, *Urban Rail Transit Projects: Forecast vs. Actual Ridership and Costs*, U.S. Department of Transportation, Urban Mass Transportation Administration report (U.S. Government Printing Office, Washington, D.C.,1990).

2 U.S. Department of Commerce, *Statistical Abstracts of the United States*, Economics and Statistics Administration, Bureau of the Census, 1995.

3 American Public Transit Association, “Urban Rail Transit Projects: Forecast Versus Actual Ridership and Costs,” *APTA Response to UMTA Report*, 1990.

4 J. Hoover, “Ridership and Cost Forecasting,” Paper presented at the American Public Transit Association 1990 Rapid Transit Conference, Vancouver, B.C., June 5, 1990.

5 Calculations are based on data provided in Pickrell, *Urban Rail Transit Projects*., UMTA, 1990.

and turned more frequently to qualitative arguments pertaining to urban form and the unmeasured benefits of transit-oriented developments (TOD). If cornered into computing 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 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 tied up in rail systems is enormous. A lower bound on the opportunity cost of this capital can be computed by assuming that the public authority does nothing more creative than invest this asset in the capital markets and provide taxpayers 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, the capital should be left with the taxpayers who earned it. 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. These objectives should be so important that they justify using government authority to collect taxes from households and firms. In many cases, there is a cash component to the amortized cost of rail capital, namely the debt service on the funds borrowed. MTA has borrowed between one-third and nearly all of the capital cost of its various rail lines. Debt service payments are quite large, currently in excess of $225 million a year and growing.

UMTA prescribed use of a ten percent discount rate for evaluation of federally funded projects, but the Federal Transit Administration (FTA) planning criteria now prescribe a value of seven percent,[6] in part because of today's lower interest rates. Long-term, low-risk tax-exempt interest rates have recently fluctuated in the range of six to seven percent. The UMTA ten percent rate is more appropriate than the FTA seven percent rate, because the premium implicit in the UMTA value reflects the different roles of social discount and interest rates. Further, retaining the ten percent discount rate permits comparisons with similar calculations for Los Angeles and other systems published previously. Consequently, the figures in Table 1 have not been adjusted to reflect this change in federal standards.

Accounting for opportunity costs of social capital involves more than a choice of discount rate; it also requires appropriate definitions for cost categories. One of the Los Angeles County Metropolitan Transportation Authority's (MTA) predecessor agencies, the Los Angeles County Transportation Commission (LACTC), finalized a $877 million cost estimate for the Blue Line in 1989. This has remained the official cost estimate ever since. A review of project costs reported by Peterson shows no costs for many items necessary for the construction of rail lines.[7] These omissions include

- ❶ capitalized interest costs during the period of construction (interest accrued on funds borrowed for construction of capital projects, net of interest earnings on such funds, from the time of borrowing to the commencement of operations),
- ❷ force account costs of employees dedicating time to Blue Line construction (LACTC's definition of force account costs differs from the industry standard), and
- ❸ general and administrative costs.

Both California law and Generally Accepted Accounting Principles require that these costs be accounted for.[8] We cannot calculate these costs from the data available, but the capitalized interest costs alone may be sufficient to increase total Blue Line construction costs to over $1 billion. Also, the MTA cost figures do not include interest expense after the Blue Line went into operation. Again, we cannot calculate these interest costs precisely, but they are on the order of several hundred million additional dollars.

Based only on the LACTC's official cost estimate, the annualized subsidy for the Blue Line is still sufficient to cover the operating and allocated capital subsidy for 17 of the MTA's 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 (Figure 1).

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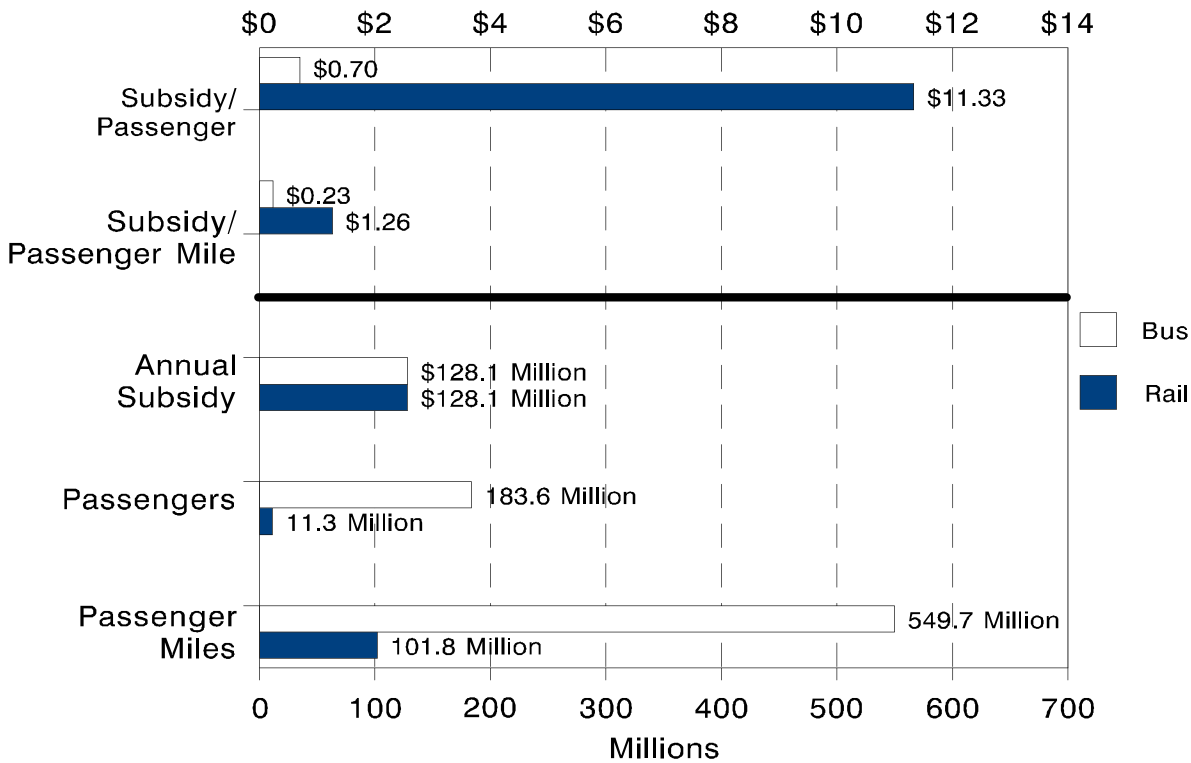
6 Federal Transit Administration, "Revised Measures for Assessing Major Investments: A Discussion Draft" (September 23, 1994).

7 N. Peterson, "The Future is Here," *Passenger Transport* (July 16, 1990), p. 5.

8 Public Utility Code §130513, formerly the Los Angeles County Transportation Commission Revenue Bond Act.

Figure 1: Bus and Blue-Line Performance Measures



Note: The opportunity cost of capital is computed at a ten-percent discount rate. This data is for fiscal year 1992 and is expressed in 1992 dollars.
Source: LACMTA, A Look at the Los Angeles County Metropolitan Transportation Authority, March 1993.

Los Angeles was not included in the U.S. DOT study because its rail system was not yet in service in 1990. There were no actual values against which to compare the forecasts for the Los Angeles system. Parts of the system are now in service. Other elements are under construction or are still on the drawing board. Consequently, there are no observed ridership values for the Los Angeles system as originally designed. However, some of the existing components are of sufficient vintage to exhibit mature ridership. Unfortunately, performance to date indicates Los Angeles fits the pattern established elsewhere. Construction of the Los Angeles rail system has helped reduce total transit ridership, and is likely to reduce it further.

It is instructive to apply the U.S. DOT report's cost-effectiveness measures to the four principal modes constituting the Los Angeles transit system (MTA 1993).[9] 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 UMTA ten percent discount rate. An equipment life cycle of 12 years is assumed for buses and 40 years for buildings and land. The U.S. DOT report assumes a 40-year value life cycle for all rail capital. This is conservative: the current FTA standard is 25 years. Figures 2a and 2b provide two sets of comparisons. Figure 2a compares operating, capital, and total costs per passenger round trip for the Los Angeles modes to the national averages.[10] 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 and the Green Line are not included.

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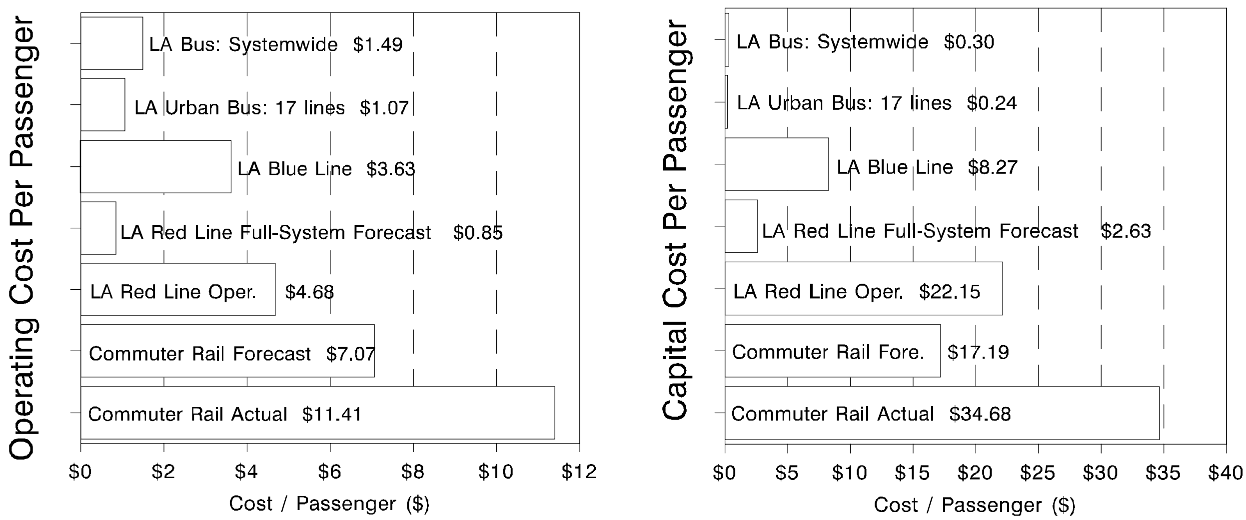
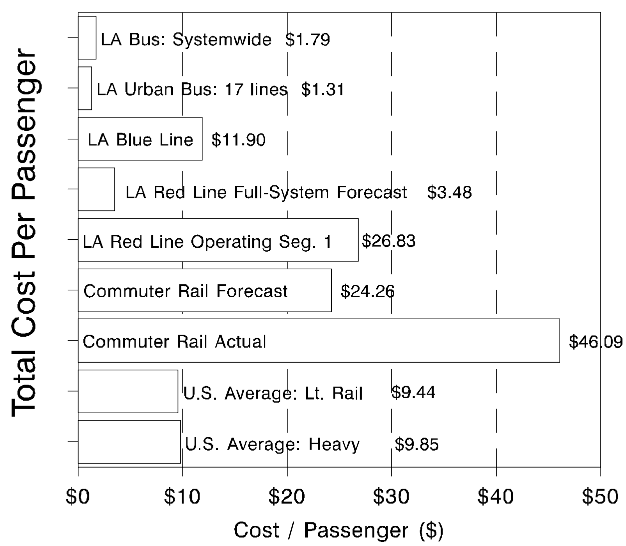
9 Pickrell, *Urban Rail Transit Projects*, UTMA (1990).

10 Pickrell, *Urban Rail Transit Projects*, UTMA (1990).

Figure 2a: Operating, Capital, and Total Costs per Passenger by Mode





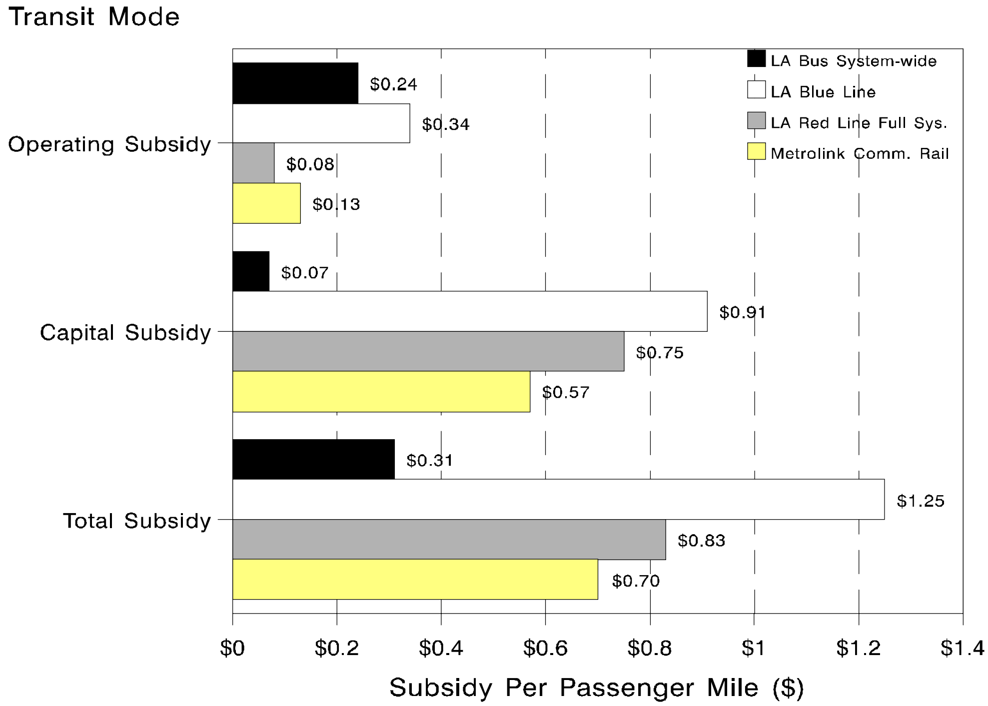
Notes: Streets and roads have total construction, operating, and maintenance costs that are only a fraction of rail right-of-way costs. In most cases, the cost of constructing and maintaining the streets and roads that buses operate on is not included in analysis of bus costs. Bus transit makes relatively minor use of most streets, but should be allocated a small portion of these costs. The capital subsidy for "Urban Bus" includes an estimate of guideway costs based on performance of Los Angeles' El Monte busway. This procedure overestimates guideway costs. Costs are expressed in 1992 dollars.

Sources: LACTMA, *A Look at the Los Angeles County Metropolitan Transportation Authority*, 1993; Southern California Regional Rail Authority, *Preliminary Budget Fiscal Year 1994–95*, 1993; "SCRTD Section 15 FY 1992" (requoted from LAMTA, *A Look at the LAMTA—1993*); SCRTD*, Draft Supplemental Environmental Impact Statement/ Draft Subsequent Environmental Impact Report* (DEIS/DEIR) (requoted from LAMTA, A Look at the LAMTA, 1993), November 1987; SCRTD, *Final Supplemental Environmental Impact Statement/Final Subsequent Environmental Impact Report* (FEIS/FEIR), July 1989.

Since trip lengths tend to vary substantially across modes, Figure 2b 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. Since subsidies are taxpayer costs, we contend that they provide a better measure for public-sector decisions than total cost. Bus has by far the lowest capital subsidy, and the lowest total subsidy per passenger or passenger mile. The Red Line has by far the lowest operating subsidy per passenger or passenger mile. These low subsidy figures are obtained from the Red Line Environmental Impact Statement which, consistent with the pattern reported for other U.S. rail projects, overstates ridership and understates cost.

Metrolink performs better in terms of costs per passenger mile than in terms of cost per passenger because commuter rail trips tend to be much longer than other transit trips. While the cost per passenger mile of commuter rail service appears low in Figures 2a and 2b, commuter rail service in Los Angeles is actually an extremely expensive way to move people. Metrolink's fiscal year 1996 budget shows a cost per passenger mile of 40¢ and a subsidy per passenger mile of 24¢. In fiscal year 1993, four long-haul commuter express bus operators under contract to the New Jersey Transit Corporation (NJTC) reported average cost and subsidy per mile of 17¢ and 2.8¢, respectively. These values are inflation-adjusted for comparison with 1996 figures. Metrolink's cost per passenger mile was 235 percent of the comparable NJTC operators. Metrolink's subsidy per passenger mile was 857 percent of the NJTC bench mark

Figure 2b: Operating, Capital, and Total Subsidies per Passenger-Mile by Los Angeles Mode



Source: LACTMA, *A Look at the Los Angeles Co. Metropolitan Transportation Authority*, 1993.

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Figures 2a and 2b suggest rail transit is not a cost-effective alternative relative to bus, and that the Los Angeles rail system fares particularly badly in this respect. Shifting attention from costs per rail passenger to costs per new rail passenger provides even more dramatic evidence. The MTA predicts costs per new passenger trip ranging from approximately $16 to $98 for the 14 rail lines studied in the agency's 20 Year Plan. [11]

Rail transit works best when large numbers of travelers want to get from the immediate neighborhood of point A to the immediate neighborhood of point B. Kowloon and Hong Kong Island provide an excellent example. Where density, congestion, and low incomes beget demand, rail may be the best alternative. But in U.S. 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 may provide the best U.S. case for urban rail, and this best case is weak. Analyses touting the efficacy of rail transit are rife with optimistic assumptions and uneconomic arguments that crumble at the touch. The circular arguments of rail proponents ultimately boil down to assertions that if rail were inexpensive and convenient, it would be a good deal. It is not.

MYTH #2: RAIL IS THE PEOPLE'S CHOICE

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 that promoted these taxes treat these measures as mandates. When measured performance reveals rail systems to be poor performers, local authorities have a trump card to play.

[11] "Cost Effectiveness Indices," Appendix (December 16, 1994), "Year 2015 Rail Ridership Estimates—Cost Effectiveness Indices," Attachment 8 to Exhibit K.

The people have spoken at the ballot box. No matter how inefficient or inequitable the system might be, it must be built.

Forecasts are cheap and mysterious enough to most voters that agencies can manipulate forecasts with little risk of getting caught. Pickrell's 1990 DOT report estimates that:[12]

❶ the recently installed heavy rail systems in Atlanta, Baltimore, Miami, and Washington have ridership shortfalls averaging 35 percent of their respective forecasts;

❷ the new light rail facilities in Buffalo, Pittsburgh, Portland, and Sacramento show average ridership shortfalls of 65 percent; and

❸ three of these eight transit districts (Buffalo, Sacramento, and Miami) lost net system patronage after rail facilities were added.

The forecasts in these cases were used to justify these systems to federal and state partners, but were also put before the public as part of local funding campaigns, usually in support of new sales taxes.

Transit ridership and cost forecasts, like any forecast, must inevitably include error.[13] Responsible engineering economic forecasts are as likely to be low as they are to be high.[14] The official transit forecasts inventoried by the DOT all overestimate ridership and, in every case except the Pittsburgh system, underestimate costs. Los Angeles has proved no exception.

The Los Angeles rail system, it has been said, will alleviate road congestion, clean the air, and even reconfigure the city. This is an appealing message, and voters eventually responded. Between 1911 and 1980, there were almost 20 serious attempts to sell rail to the residents of Los Angeles.[15] 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) provide an annual contribution of almost $800 million in sales tax revenues to the MTA. Rail investments are an important part of these packages, but the ballot language provides the MTA with considerable spending latitude. The MTA chooses to use this latitude to pursue its fixed-rail mission.

None of this is surprising. Economists of the “public choice” school have long recognized public agencies' strong interest in policies and financial arrangements that ensure their own growth and expansion.[16] More recently, scholars have also begun to account for simultaneous public-sector growth and public-service decline by explaining interest group success, hidden cost policies, and declining public interest in politics.[17] Political activism is a difficult, expensive process. Attempts to advance economically via interest group politics are most often a last resort for households and firms. Access to attractive market prospects quickly makes politics and voting irrelevant activities. Voters remain rationally ignorant if they can afford to, having better things to do than investigate the opportunistic assumptions underlying agency forecasts or undertake the calculations necessary to annualize the opportunity and replacement costs of the capital tied up in government projects.

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12 Pickrell, *Urban Rail Transit Projects*, UMTA (1990).

13 Martin Wachs, “Ethical Dilemmas in Forecasting for Public Policy,” in ed. M. Wachs, *Ethics in Planning* (New Brunswick, NJ: Center for Urban Policy Research, 1985), pp. 246–258. See also, Martin Wachs, “Technique vs. Advocacy in Forecasting: A Study of Rapid Rail Transit,” *Urban Resources*, No. 4 (1986), pp. 23–30. See also Martin Wachs, “Technique vs. Advocacy in Forecasting: A Study of Rapid Rail Transit,” *Urban Resources*, No. 4 (1986), pp. 23–30.

14 Charles Lave, “Contriving LRT ‘Winners:’ Spin-Control in the Forecasting Business,” *LRT News*, 6 (1991), pp. 3–4.

15 Maria L. Green, “A History of Rail Transit Setbacks,” *Mass Transit* (September 1985), pp. 59–64.

16 James E. Moore II, “Ridership and Cost on Long Beach-Los Angeles Blue Line Train,” *Transportation Research* A 27A (1993), pp. 139–152.

17 Y. Barzel and E. Silberberg, “Is the Act of Voting Rational?,” *Public Choice*, vol. 16 (1973), pp. 51–58; S. Kelman, “Public Choice and Public Spirit,” *Public Interest*, vol. 87 (1987), pp. 80–94; C. Wolfe Jr., “A Theory of Non-market Failures,” *Public Interest*, vol. 55 (1979), pp. 114–133; E. K. Browning, “Inequality and Poverty,” *Southern Economic Journal*, vol. 55 (1989), pp. 819–830; Peter Gordon and Harry W. Richardson, “Why Local Policies Fail,” Working paper, School of Urban and Regional Planning, University of Southern California, Los Angeles, CA 90089-0042, (1991).

Transit politics present a particularly dense thicket. The electorate's endorsement of local taxes for transit is, first and foremost, a vote for open roads. In this case, the outcome is a variant of Reich's (1991) "secession of the successful."[18] But, instead of opting for private transportation services, the electorate is buying into the objective of providing a second-class transportation alternative intended to siphon off ever larger proportions of the population least able to pay.

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. 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.[19]

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 vision of evacuating freeways by building rail lines remains attractive.

Even when the electorate catches on, as it almost did in Dallas in 1988,[20] transit authorities can still bankrupt themselves with construction projects they cannot afford, and then use these works in progress to tease new tax revenues out of voters untutored in the importance of ignoring sunk costs. This is a higher-risk strategy than an optimistic forecast, because failure to execute the ploy correctly can be politically fatal. In Los Angeles, the MTA Board has involved itself in just such a game of fiscal chicken. State Propositions 156 and 181 were to have provided approximately $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 the executive branch. Funding for the Pasadena Blue Line is tenuous at best, and the MTA is attempting to corner both the state legislature and the electorate by proceeding with construction. Further, the MTA has had to forego designating many other projects that might otherwise be funded as part of the State Transportation Improvement Plan (STIP). Even if the MTA succeeds in retaining state funding, the likely delay in funding lengthens the construction period, and increases costs.[21]

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. They can lose as often as they have to. They only need to win once.[22]

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18 R. B. Reich, "Secession of the Successful," *New York Times* (January 20, 1991), Section 6, 16.

19 J. Kelly, *National Transportation Statistics Annual Report–1990*, U.S. Department of Transportation, Research and Special Programs Administration report DOT-TSC-RSPA-90-2, U.S. Government Printing Office, Washington, D.C. (1990).

20 John Kain, "Deception in Dallas: Strategic Misrepresentation in Rail Transit Promotion and Evaluation," *Journal of the American Planning Association*, vol. 56 (1990), pp. 184–196.

21 Thomas A. Rubin and James E. Moore II, "Why Rail Will Fail: An Analysis of the Los Angeles County Transportation Authority 20-Year Long Range Plan," Policy Study No. 210, Reason Foundation, 1996.

22 Interview with Peter Gordon, Professor of Urban Planning and Development, and Economics, University of Southern California, Los Angeles.

MYTH #3: RAIL IS FAST TRANSIT

Proponents of rail transit expound the speed advantages provided by heavy and commuter rail systems.

> ***Transit operating in mixed traffic would also run too slowly to be effective in this corridor.*** *System-wide, 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.).*[23]

These 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 intra-station time. For the great majority of corridor riders, total travel time will be longer on the Red Line than on existing bus lines. This increase in total time comes from increases in rail access and out-of-vehicle time, suggesting a considerable decrease in the level of service provided by rail relative to bus.

The Red Line's Environmental Impact Statement projects the average Red Line trip length to be 3.52 miles.[24] At bus speeds of 9.6 miles per hour, the travel time for this average trip would be 22 minutes. Since a significant part of such a bus trip is taken outside of the central business district (CBD) at a higher average vehicle speed, this overestimates average trip time. If the entire trip was made at the bus system average speed of 13.5 mph, the trip would take 15.6 minutes. At the 24 mph speed for the Red Line, the trip will take 8.8 minutes.

However, this calculation accounts only for in-vehicle time, not the total travel time. Once the rail station is reached, the passenger must access the station platform. Red Line stations are all underground. Intra-station travel time will be a minimum of two minutes, and far more for people with mobility constraints. Doubling this value to account for boarding and alighting stations adds a minimum of four minutes to the Red Line trip time. If zone fares are ever implemented, add a minimum of one minute for those riders who must buy a transfer upgrade at a ticket vending machine.

Once the passenger reaches the platform, he or she must wait for a train. The average wait time will vary by line, time of day, and the passenger's destination but will vary from a minimum of 1.5 minutes for peak-period trips on the Red beginning and ending at points between the Wilshire/Vermont Wye and Union Station to approximately 7.5 minutes for 15-minute headway, off-peak trips on light rail.

Most importantly, Red Line stations are usually further from the origins and destinations of most riders than are bus stops. In the downtown 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. On most MTA bus lines, the typical distance between adjacent bus stops is two blocks. Measuring from the closest station entrances, the closest set of Red Line stations (Civic Center and Pershing Square) are three blocks apart and the second closest set (Seventh and Flower and Pershing Square) are five blocks apart. Outside of the CBD, the distances between stations are much greater. One mile is the most common interstation distance. The Hollywood/Highland and Universal City Stations are almost three miles apart, without many routine destinations in between. 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.

Bounding the Los Angeles CBD by the Hollywood Freeway on the North, the Harbor Freeway on the West, Olympic Boulevard on the South, and Main Street on the East defines an area slightly in excess of one square mile. This

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[23] Edward Shikada, *For the Record: A Practical Approach to Providing Mobility for All Los Angeles County [*A Response to the "Counterplan for Transportation in Southern California: Spend Less, Serve More," by Peter Gordon and Harry Richardson] (Los Angeles County Metropolitan Transportation Authority: Los Angeles, CA, May, 1994), p. 2.

[24] U.S. Department of Transportation, *Los Angeles Rail Rapid Transit Project—Metro Rail, Supplemental Environmental Impact Statement/Subsequent Environmental Impact Report,* 1989.

includes approximately .28 square miles within two blocks walking distance to or from the CBD's seven station entrances. This includes hills with difficult elevations. 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. Assuming an average of 12 city blocks per mile and an average pedestrian walking speed of 2.5 mph, it takes two minutes to walk a block. This adds at least four more minutes on the CBD side of the trip to the total travel time. This is a lower bound, because it assumes a fully mobile pedestrian and ignores the time required to negotiate traffic signals and other urban hazards. Given that the majority of transit-dependent riders have slower walking speeds than 2.5 mph, this four-minute penalty is conservative for current transit users.

The time penalty is far larger on the other end of the trip. There are very few potential Red Line patrons living within the traditional quarter mile maximum walking distance to a transit station. According to the Red Line EIS/EIR, approximately 66.2 percent of Red Line riders with trip origins and destinations outside the CBD will not walk to or from the station. They take a bus or use other means. This adds another four to five minutes to the trip.

In-vehicle travel time on the Red Line will also be longer than for bus trips because the Red Line does not take the most direct route to downtown. Consider a Red Line passenger who boards in the San Fernando Valley with a destination in the CBD. According to the EIS/EIR, there will be approximately 25,000 such round-trip passengers per day. The Red Line travel distance from the Universal City to the Pershing Square stations will be 11.4 miles. At the Red Line operating speed of 24 mph,[25] this trip will take 28.5 minutes. This does not include a minor time penalty for speed limits subsequently imposed on curves to reduce wheel and track wear. Canoga Park-Warner Center Ventura Boulevard Los Angeles Express Line 424, which takes the Hollywood Freeway from the San Fernando Valley to downtown, travels approximately ten miles to make the same trip, making the trip in approximately 26 minutes during peak-travel periods and approximately 19 minutes during off-peak periods. For example, a rider proceeding from the bus stop closest to the Universal City Red Line Station to the Kenneth Hahn Hall of Administration in the Los Angeles Civic Center must currently invest between *19 and 27 minutes* in a 9.3 mile trip. On the Red Line, the trip will take *39 minutes*. 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.

There are current and new transit passengers who will prefer the Red Line to bus transit options, but they will be greatly outnumbered by current bus passengers who will be disadvantaged by the shift to rail. As a practical matter, this means the MTA may find it difficult to eliminate or reduce bus service on lines or line segments the Red Line is intended to replace. Prior to the opening of the Blue Line, the daily ridership on Express Line 457 was 311.[26] After the Blue Line began operations, the SCRTD attempted to cancel Express Line 457, which runs from Eastern Long Beach to downtown Los Angeles. The fewer than 200 riders on this line were able to mount a campaign that induced the MTA Board to retain their service. As of 1993, the number of round trip riders stood at 47, with an average passenger load of 7.8.[27] The number of bus passengers that would be disadvantaged by a total elimination of bus service competing with the Red Line would be in the tens of thousands.

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 that is less than that of most MTA express bus lines, particularly for the freeway portion of express bus trips. Many former Long Beach-Downtown Los Angeles Freeway Express Line 456 passengers found their total travel time increased when Line 456 was eliminated and they were forced to use the Blue Line. The Blue Line's time disadvantage relative to bus will increase now that the Harbor Transitway has entered service.

After Metrolink service began in 1992, the SCRTD Scheduling and Operations Planning staff was unable to find a single case in which it is faster to complete a trip in the MTA service area by taking Metrolink. Bus was faster in every case. Without the special exceptions provided by Metrolink’s reduced fare promotions, the bus trips also had

[25] Shikada, *For the Record*, LACMTA, 1994, p. 2.

[26] SCRTD, *Line Performance Trends*, ridecheck for December 7, 1989.

[27] SCRTD, *Line Performance Trends*, ridecheck for March 15, 1993, p. 43.

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, Los Angeles transit planners should examine the costs and benefits of speeding up bus transit. At the low end of the cost continuum are options such as signal preemption on bus and light-rail lines. Signal pre-preemption for the Blue Line in downtown Los Angeles and Long Beach would reduce the current 58–59 minute travel time by seven to eight minutes. This would reduce operating costs by reducing the number of trains needed to operate the line.

At the high end of the cost continuum are options such as the El Monte and Harbor Freeway facilities. Busways have a number of advantages over rail systems. Mixed-use HOV/busways provide important advantages to car- and van-pool 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 the CBD or a suburban collection/ distribution area can make more stops than a rail line, which means passengers alight closer to their final destinations. The El Monte Busway results in a real peak-period speed increase of from 27 to 54 mph, and a real time savings of over 13 minutes per end-to-end trip. 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. The El Monte busway delivers ten times the peak-hour capacity of Blue Line, moving four times as many passengers two and one-half times as fast, at a fraction of the Blue Line’s subsidy.

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 would be needed to carry the passengers served by a single rail line.

> *Rail transit is the best means of serving heavily traveled corridors where needed transit capacity and speeds cannot be provided on existing streets.*[28]

This is not the case. There are several Los Angeles streets that have the capacity to carry at least as many riders as the Blue Line carries.

The MTA seems to confuse bus lines with bus corridors. Corridors can be served by several parallel bus lines. Bus has a significantly larger carrying capacity than rail in almost every single Southern California transit corridor. The Red Line 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. Most of these passengers are already being accommodated on parallel bus lines.

The LACTC's 30-Year Plan includes two figures the MTA frequently uses to compare the capacity of rail, bus, and freeway modes.[29] The information in these figures is summarized in Table 2. A directional flow of 1,700 cars/hour is slightly below the Southern California norm for freeway lanes during peak travel times, but it is an acceptable sketch planning value.

[28] Shikada, *For the Record*, LACMTA, 1994, p. 2.

[29] Los Angeles County Transportation Commission, *30-Year Integrated Transportation Plan,* April 1992, pp. 18–19.

Table 2: Summary of LACTC/LACMTA Mode Capacity Comparisons		
Transportation Technology	Freeway Lane Equivalent* (One Direction)	Equivalent Number of Buses Needed to Provide 1 Hour of Service in 1 Direction
High Occupancy Vehicle (HOV) Lane	5 Lanes	
Commuter Rail	2 Lanes	60
Light Rail	7 Lanes	230
Heavy Rail	14 Lanes	480

* One Freeway Lane = 1,700 Cars/Hour/Direction.

Caltrans measures relative modal capacity with a productive capacity index that is the product of four terms.[30] Define flow to be the number of trains or vehicles per hour. Then:

❶ Headway is the inverse of flow.

❷ Length is the number of cars per train. Buses and automobiles have a length of one.

❸ Average load is average vehicle occupancy. This is an observed value. In other applications, it could be a design value.

❹ 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 conventional freeway lane. Table 3 summarizes Caltrans data for the El Monte Busway, 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: 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 Blue Line.[31]

Table 3: Calculating Productive Capacity Indices for Freeway and Light Rail Transportation Modes							
	Freeway Lane	HOV Lane (Bus)	HOV Lane (Car/ Van Pool)	HOV Total	Light Rail High	Light Rail Low	Blue Line Actual (1993)
Vehicles per Hour	1,700	49	1,213	1,262	12	6	10
Cars per Train	1	1	1	1	3	2	2
Average Load	1.12	31.2	3.2		82	55	62.6
Operating Speed	27	52	55		27.5	15.0	21.0
Productive Capacity Index Value	51,408	79,498	213,488	292,986	75,866	9,900	26,292
Divided By Freeway Index	51,408	51,408	51,408	51,408	51,408	51,408	51,408
Freeway Lane Equivalents	1.00	1.55	4.15	5.70	1.48	.19	.51

Note: The Blue Line has by far the highest system average passenger load of all U.S. light rail lines. It may also have the highest peak passenger load. This is partially a result of uniquely low fares. Despite the fact that the Blue Line may have the highest total utilized capacity of any light rail line in the nation, it does not qualify as high capacity light rail transit because stations lengths limit the line to two car trains.

This calculation relies on *actual average passenger loads* rather than maximum capacity per vehicle or rail car. The HOV value of 5.7 freeway lane equivalents, which includes contributions from high-occupancy vehicles and buses sharing the same lane, is fairly close to the value of five reported by the MTA. None of the light rail freeway lane equivalents approaches the value of seven reported by the MTA. Under the most favorable Blue Line speeds, loads, and train lengths, a freeway lane equivalency of seven would imply an annual Blue Line ridership of 162 million and a headway of 1.62 minutes between trains. No manually controlled rail system has operated with this short a headway for an extended period of time. Three-minute headways for heavy rail systems with fully grade-separated guideways is about the minimum achievable for manually controlled trains. Automatic train control can produce headways in the neighborhood of 1.62 minutes, but this option is not feasible for systems that includes street running (like the Blue

30 V. Vuchic, *Urban Public Transportation Systems and Technology* (Englewood Cliffs: Prentice-Hall, Inc., 1981), p. 70.

31 LACMTA, Blue Line Ridecheck, October 25, 1993, Peak Hour/Peak Direction (7:00-8:00 am, Northbound) Load by Line Segment.

Line). Such extremely short headways are only realistic on trunk segments of rail network that must simultaneously accommodate trains from several different branches.

The Blue Line ridership imputed from the MTA's lane equivalency figure is similarly specious. In 1992, Philadelphia's Southeastern Pennsylvania Transportation Authority operated the most heavily used light rail system in the United States, carrying 41.6 million passengers.[32] All 15 U.S. light rail systems combined carried 187.4 million passengers.

Calculations of high, low, and actual values for the other rail modes indicate that the MTA's heavy rail and commuter rail freeway lane equivalences are also exaggerated, though to a lesser degree. In these comparisons, actual values are based on the Los Angeles Red Line downtown section east of the Wilshire/Vermont Wye, where capacity is greatest, and on Metrolink, respectively.

Comparing productive capacity indices for urban, express, and busway bus service to the index values for rail service provides bus equivalents for the rail modes. In most cities, light rail trips are very short, and it is usually not appropriate to compare these trips to express bus service. But in Los Angeles, light rail is being designed to carry passengers very long distances. The Blue Line 1995 average trip length of 8.4 miles is by far the longest of any light rail line in the nation. Long-haul commuter express service is the logical alternative to commuter rail. This type of bus service generally travels long distances at high speeds with few or no intermediate stops.

The index for urban bus service is calculated from the 17 most cost-effective and heavily used MTA bus lines in 1992. The express bus service values are for the five most cost-effective and heavily used express bus lines, excluding lines providing busway service.[33] Express service generally includes extensive local service, which tends to suppress average speeds. The busway data are provided by Caltrans District 7 traffic census personnel and apply only to the El Monte busway. Dividing the productive capacity indices per bus into the productive capacity indices per hour of service provided in Table 3 gives the buses needed to provide the equivalent of one hour of rail service. Table 4 summarizes the observed bus equivalents for light, heavy, and commuter rail service and compares these to the values provided by the MTA. The MTA does not identify the number of rail vehicles needed to provide one hour of the various train services. Table 4 appends this information.

Table 4: LACTC/LACMTA Bus Equivalents Versus Observed Bus Equivalents for Los Angeles Rail Modes

	Bus Equivalent: MTA Calculation	Bus Equivalents: Observed	Rail Cars*	Ratio, Buses:Rail Cars
Blue Line / Light Rail	230	103 in local service, or 57 in freeway express service	20	from 2.85:1 to 5.15:1
Red Line / Heavy Rail	480	741 in local service, or 409 in freeway express service	120	from 3.41:1 to 6.18:1
Metrolink / Commuter Rail	60	22 in busway service	18	1.22:1

Note: Standard 40-foot buses currently cost approximately $250-350,000 each, depending upon features and power plant. The price for the most recent Los Angeles light rail car order was over $3 million per car, and for the most recent heavy rail car order was approximately $2 million per car. The price for last commuter rail care order, including an allocation of the cost of locomotives, was also approximately $2 million per car.
* The commuter rail car count only includes passenger cars, not locomotives.

32 LACMTA, *Line Performance Trends Report Fiscal Year 1992* (1992).

33 LACMTA, *Line Performance Trends Report Fiscal Year 1992* (1992).

MYTH #5: RAIL CONSTRUCTION PROVIDES JOBS

Proponents of rail construction promote rail projects as a way to improve economic conditions and provide jobs.

> Los Angeles transportation investment directly stimulates construction and other support industries such as manufacturing of vehicles, durable goods like electronics, steel, and other materials. *It has been estimated that each $100 million in rail system investment generates approximately 7,990 full-time jobs, including direct employment in the construction and operation of services and indirect employment among material suppliers and service industries...Each $100 million in bus investment generates approximately 7,450 full-time jobs. These factors are completely ignored by the Reason Foundation's taxpayer savings estimate*.[34] (emphasis in the original)

In fact, no net new jobs have been created by construction of the Los Angeles rail system. Rail construction is not a very effective means of promoting local economic development nor of creating jobs, especially compared to bus operations.

The same American Public Transit Association study cited by the MTA reports that $100 million spent on transit *operations* creates 9,610 jobs, or 20.2 percent more than the jobs created by rail capital investment.[35] The same amount spent on bus capital will generate 7,450 jobs, or only 6.75 percent fewer than rail.

The MTA's experience is a little different. The MTA tracks jobs created by rail construction. The report for September 1994 puts employment provided by Operating Segment 2 of the Red Line at an average of 29 job-months per million dollars expended.[36] This corresponds to one person year of employment per $413,793. The MTA budget for fiscal year 1996 provides the information summarized in Table 5. Comparing the $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. Every MTA employee involved in the provision of bus service works, lives, and spends the majority of his or her paycheck in Southern California, most in Los Angeles County. All but a tiny minority have their families resident in Los Angeles. Most other bus operating costs, including parts, fuel, services, utilities, taxes, rent, etc., are also spent with local suppliers. In all, over 90 percent of all bus operations spending is local, which means that the multiplier and job effects are local.

Table 5: Public Subsidies per Los Angeles Bus and Rail Operations Jobs[37]

	Bus	Rail	Total
Reported Fiscal Year 1996 Subsidy* Divided by	$351.2 million	$86.4 million	$437.6 million
Operations Jobs **	5,425	979	6,404
Subsidy per Job	$64,737	$88,253	$68,332

* 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.
** The budget identifies direct employment associated with bus operations as 4,798, with rail operations as 866, and indirect operating 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 nor in the operations budget. The operations categories account for 77 percent of all MTA employees.

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34 Shikada, *For the Record*, LACMTA, 1994, p. 12.

35 American Public Transit Association, *Employment Impacts of Transit Capital Investment and Operating Expenditures*, Washington, D.C. (April 1983).

36 LACMTA, *Executive Report Rail Program Status* (September 1994), p. ii.

37 LACMTA, *Fiscal Year 1996–1997 Budget* (1996), p. 31.

A high percentage of Los Angeles rail construction costs is not spent locally, in part because many rail construction expenditures are for materials and other nonpersonnel costs. Over $500 million has been or is being spent for rail vehicles. The Blue Line cars came from Japan, the Red Line cars came from Italy, and the Green Line cars are coming from Germany. With the exception of a small number of short-term assembly jobs, these expenditures have only a minor impact on the Los Angeles economy. Many other rail components such as rail, power supplies, communications gear, seats, ticket vending machines, computer hardware and software, signaling equipment, etc. are not produced by Southern California suppliers. A large portion of the personnel costs are paid to contractor employees who do not work in Los Angeles. 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.

Many of the largest Los Angeles rail capital expenditures have little or no job creation impact. More than $1 billion 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. The amount spent on Los Angeles rail right-of-way acquisition alone is enough to operate the entire MTA bus fleet for over two years. It would take Metrolink commuter trains more than a century to carry the number of passengers that the MTA bus system carries in two years.

Just prior to merging with the LACTC to form the LACMTA, members of minority groups and/or females accounted for 78.5 percent of SCRTD employees.[38] This percentage rose steadily until the merger. Most of the jobs generated by rail capital expenditures are construction and manufacturing jobs. While the construction trades have made significant progress in raising their minority and female employment in recent years, their shares of minority and female employees do not approach SCRTD/MTA's employment statistics.

Economic activity multipliers reported by the APTA for different types of transit expenditures are summarized in Table 6. These multipliers are derived from national data. We find it useful to calculate multipliers based on public-sector subsidies rather than costs. The first three items in Table 6 are capital expenditure categories, which generally produce no revenues. These capital expenditures consist entirely of subsidies, and multipliers for capital expenditures and capital subsidies are thus identical in these categories.

However, transit *operations* generate revenues through farebox and other sources, such as advertising. The operating ratio is the percent of operating costs covered by operating revenues. In recent years, the Los Angeles bus operating ratio has been approximately 40 percent. This means that $.60 in taxpayer funds generates $1.00 in spending.

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:

$$\text{Operating Subsidy Multiplier} = \frac{\text{Operating Expenditure Multiplier}}{(1 - \text{Operating Ratio})}$$

The operating subsidy multiplier for an operating expenditure of $1.00 and an operating ratio of 40 percent is derived in Table 7. Thus, bus operating expenditures offer particular advantages over rail construction expenditures with respect to job creation.

It is not meaningful to compute operating ratios for Los Angeles rail lines. The Blue Line reported an operating ratio of approximately 15 percent for fiscal years 1992 to 1994, and the Red Line reports approximately five percent. These calculations are made on the basis of accounting assumptions that inflate operating ratios. Our best estimate of the true Blue Line operating ratio is 5–10 percent. However, even this is misleading. On a fully allocated cost basis, it currently costs more to collect the Red, Blue and Green Line fares than the cash fares collected.

[38] SCRTD, *Form EEO-4*, (March 1993).

Table 6[39]: Expenditure Multipliers	
Type of Expenditure	Multiplier
Modernization of Rail Transit	3.15
New Rail Systems	3.07
Bus Capital Projects	3.50
Transit Operations	3.05

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.

This argument does not apply exclusively to rail, and the extent to which it does apply varies considerably by line. Although all proposed MTA rail lines appear to fail federal grant cost-effectiveness qualifying tests, MTA may be able to gain federal funding through political action. MTA is projecting 50 percent federal funding for the Red Line extensions. MTA has recently experienced difficulty in getting funds appropriated by Congress, due in large part to MTA's poor performance in construction management. Also, there is a political limit to how long a county with under four percent of the national population can continue to receive 20–40 percent of the nation's total transit new start major investment funds. Bus capital projects receive a higher federal share of funding than rail capital projects. 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.

Table 7: Calculating An Operating Subsidy Multilpier	
Operating Subsidy	$0.60
Farebox Revenue	0.40
Total Operating Expenditures	1.00
Operating Expenditure Multiplier	3.05
Total Economic Impact	3.05
Divided By: Operating Subsidy	0.60
Subsidy Multiplier	5.08

In any event, APTA and other rail advocates' focus on economic multipliers is misplaced. Transit systems should not be constructed or operated because doing so provides jobs. People use transit to get to their existing jobs and to find new jobs. Many transit-dependent riders would have great difficulty in retaining their employment without transit. Expansion of the bus system would allow additional residents to find work. Expansion would also improve transit-dependent residents' access to shopping, medical treatment, and other economic activities, creating additional indirect employment. If substantial bus service must be given up to make new rail lines available, this reduction in transit reduces the benefits transit provides. These benefits are the correct basis for transit investment decisions, not the direct employment provided by new public works.

MYTH #6: RAIL PROMOTES SUPERIOR URBAN FORM

Rail advocates in the 1990s frequently couch their arguments in terms of broader urban design schemes, claiming that rail systems can be used 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 identified a small set of variables that serve as reliable predictors of urban train ridership.[40] 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 it works. Even if a rail network was capable of promoting compact urban form, what would be the point? The objective of

39 American Public Transit Association, *National Impacts of Transit Capital and Operating Expenditures on Business Revenues*, Washington, D.C. (January 1984).

40 Peter Gordon and R. Willson, "The Determinants of Fixed-Rail Transit Demand—An International Cross-Sectional Comparison," *International Railway Economics*, ed. K. Button & D. E. Pitfield (Hans, England: Gower Publishing Company Ltd., 1985) pp. 159–175.

building a transportation system is to serve the objectives of urban residents. Suggesting that travelers should reconfigure their life-styles to fill trains confuses ends and means. There is no intrinsic value to a full train. The values that should be served lie elsewhere, in lifestyles and opportunities.

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

Numerous surveys demonstrate people's pronounced preferences for low-density residences.[41] Low-density living arrangements in the United States are a combination of market and policy outcomes, such as the deductibility of home mortgage interest. U.S. residents are fortunate that public policy and the market for land operate with a degree of agreement in this respect. More often, domestic policies are driven by ill-informed attempts to circumvent market outcomes.

Regardless of the impetus for lower densities, the dispersion of urban activities erodes the market for conventional public transit, especially rail transit. This is not news. In 1964, University of California at Los Angeles economist Dudley Pegrum asserted that:[42]

> *Most of the transport planning for the older metropolitan centers... projects a continuation to 1980 of past trends, with particular emphasis on the central business district and the need to preserve its present status and function. Even in Los Angeles, with its radically different structure, this objective seems to be the prime motivation of the proponents of rapid transit. Their planning savors of an endeavor to turn back the clock to an earlier period of transport technology, ignoring the developments of the past 40 years. Unless the centrifugal influence of transportation can be eliminated... the rapid transit scheme will most likely be futile, and it will most certainly be expensive.*

Pegrum's prophecy has come to pass. Almost 25 years later, the Congressional Budget Office reports that:[43]

> *...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, 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 fixed-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 development (TOD).[44] Proponents of rail contend that dense, transit villages built up around rail stations will reduce housing costs, commute time, road traffic, and air

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[41] Alan A. Altshuler, *The Urban Transportation System: Policies and Policy Innovation* (Cambridge: MIT Press, 1979).

[42] Dudley F. Pegrum, "Residential Population and Urban Transit Facilities in the Los Angeles Metropolitan Area," Occasional Paper No. 3, UCLA Bureau of Business and Economic Research, Los Angeles, CA. (1964).

[43] Congress of the United States, Congressional Budget Office, "New Directions for the Nation's Public Works," U.S. Government Printing Office, Washington D.C. (1988).

[44] Andres Duany and Elizabeth Plater-Zyberk, *Towns and Town-Making Principles* (New York: Rizzoli, 1991); Peter Calthorpe, *The Next American Metropolis: Ecology, Community, and the American Dream* (New York: Princeton Architectural Press, 1993).

pollution.[45] The effects of these developments are the subject of much debate, but there is no evidence that TODs shift travel from cars to rail.[46] 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 neotraditional neighborhood designs contribute little to transit use.[47] TOD's effects on auto use are equally uncertain. If neotraditional neighborhoods increase access then these designs will increase travel by all modes, possibly resulting in more trips by car.[48]

Attempts to intensify densities at any scale 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, the costs of transportation, communication, and other interactions 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. The opportunity for suburbanization is crucial to industry, because decentralization is an economic relief valve that mitigates congestion. In most economic sectors, job growth is in the suburbs, in patterns conspicuously difficult to serve with rail systems.[49]

A closer look at Los Angeles demonstrates just how pronounced these trends are. Decennial population census data on employment can be aggregated from the census tract level to study dispersion. Work-trip generation densities may be computed for these areas on the premise that the presence of jobs varies with activity levels. Gordon, Richardson and Giuliano apply this approach to 1980 census data to compute trip generation densities for Los Angeles analysis zones.[50] In 1980, areas with job densities above 12,500 per square miles (1.8 standard deviations above the mean density) accounted for just over 17 percent of the jobs in Los Angeles' five-county metropolitan area (Los Angeles, Riverside, Orange, Ventura, and San Bernardino Counties). These were spread over 19 centers, including a CBD defined by an area larger than the spatial definition used by the census bureau. The remaining 83 percent of the jobs were outside of discernible centers, generally dispersed throughout the five-county area.

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45 Robert Cervero, *Transit Supportive Development in the United States: Experiences and Prospects*, Report to the Federal Transit Administration and IURD monograph number 46, UC Berkeley (1994); Ruth E. Knack, “BART’s Village Vision,” *Planning* 61, (January 1995), pp. 18–21; Duany and Plater-Zyberk, *Towns and Town-Making Principles* (1991).

46 Marlon G. Boarnet and Randall Crane, *Public Finance and Transit-Oriented Planning: New Evidence from Southern California*, Department of Urban and Regional Planning and Institute for Transportation Studies, UC Irvine, CA 92717-5150 (1995); Randall Crane, “On Form Versus Function: Will the New Urbanism Reduce Auto Travel, or Increase It?,” Working paper, University of California, Irvine (1995).

47 Robert Cervero, “Transit-Focused Development: Does it Draw People into Transit and Buses?” *IURD*, Universe 4 (1994), pp. 3–5; Anthony Downs, *New Visions for Metropolitan America* (Washington, D.C.: The Brookings Institution and Cambridge: Lincoln Institute of Land Policy, 1994); Peter Gordon and Harry W. Richardson, “The Case for Suburban Development,” Report prepared for the Building Industry Association of Northern California and The Home Ownership Advancement Foundation (March 1996).

48 Randall Crane, “Cars and Drivers in the New Suburbs: Linking Access to Travel in Neotraditional Planning,” *Journal of the American Planning Association*, Winter 1996.

49 Peter D. Linnemann and Anita A. Summers, “Patterns and Processes of Employment and Population Decentralization in the U.S., 1970–1986,” Paper presented at 38th North American Meeting of the Regional Science Association (1991); Peter Gordon and Harry W. Richardson, “Geographic Factors Explaining Worktrip Length Changes.” U.S. Department of Transportation, Federal Highway Administration, Office of Highway Information Management (1990); NPTS Report Series: Special Reports on Trip and Vehicle Attributes (1995); Peter Gordon and Harry W. Richardson, “Beyond Polycentricity: The Dispersed Metropolis, Los Angeles, 1970–1990,” *Journal of the American Planning Association*, Vol. 62, pp. 289–295 (1996); Peter Gordon and Harry W. Richardson, “The Case for Suburban Development,” the Building Industry Association of Northern California and The Home Ownership Advancement Foundation (March 1996).

50 Peter Gordon, Harry W. Richardson and Genevieve Giuliano, “Travel Tends in Non-CBD Activity Centers,” Report No. CA-11-0031 to the Urban Mass Transit Administration, U. S. Department of Transportation, Washington, D.C. (1989).

Gordon and Richardson analyze the same level of Los Angeles employment data for 1970, 1980 and 1990, redefining job centers in each year according to the criteria applied in their previous work.[51] [52] Table 8 locates the number and the proportion of the region's jobs in centers across each year. Jobs in centers tend to fall in both relative and absolute terms over time. On the main diagonal, the proportion of jobs in centers falls consistently over time. Moving across a row holds the spatial definition of centers fixed. The proportion of jobs accounted for by any year's centers falls in all but one case. Moving down the columns holds the year constant and varies the spatial definition of centers. In all cases, a diminishing share of jobs is accounted for by subsequent years' centers. In 1990, just over 14 percent of the jobs were in locations that qualified as centers in 1970. Just under 12 percent of the jobs were in locations that qualified as centers in 1990. Thus, the trend in Los Angeles is toward continued decentralization.

Table 8: Percentages of Los Angeles Regional Employment in Centers, by Census Year[53]

	1970 (Number of jobs)	1980 (Number of jobs)	1990 (Number of jobs)
1970 20 centers in 69 analysis zones.	19.20 % (686,036)	16.97 % (791,708)	14.16 % (893,616)
1980 23 centers in 63 analysis zones.	16.75 % (598,572)	17.01 % (793,553)	13.24 % (835,475)
1990 12 centers in 48 analysis zones.	13.08% (467,302)	12.59% (587,080)	11.89% (750,331)
Total Jobs: Los Angeles, Orange, Ventura, San Bernardino, and Riverside Counties	3,572,799	4,664,825	6,310,505

Los Angeles is arguably different from older U.S. cities, but Gordon and Richardson report that Los Angeles is not unique with respect to decentralization. Decentralization is occurring everywhere in the United States to varying degrees, but is most pronounced in growth areas.

> *The Wharton data also show that in the 1980s (the period of greatest downtown focused investment), Central Business District (CBD) job growth was either negligible or negative. Together, the top ten cities' CBDs (i.e. New York, Los Angeles, Chicago, Philadelphia, Dallas, San Francisco, Boston, Detroit, Washington, D.C., and Houston) grew at merely over one percent per year during the period 1980–86.*[54]

If Los Angeles is different, it is only because it offers other cities an example of the trends that will define their futures. It is unlikely that any public policy short of forced relocations will reverse the current trend toward decentralization. Rail advocates misread these trends at considerable cost to everyone but themselves.

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51 Gordon and Richardson, "Beyond Polycentricity."

52 Peter Gordon, Harry W. Richardson and Genevieve Giuliano, "Travel Tends in Non-CBD Activity Centers," Report to the UMTA, U. S. DOT, 1989.

53 Gordon and Richardson, "Beyond Polycentricity." Data are from 1970, 1980, 1990 U.S. Censuses.

54 Gordon and Richardson, "The Case for Suburban Development," the Building Industry Association of Northern California and The Home Ownership Advancement Foundation (1996).

MYTH #7: RAIL WILL BE PAID FOR WITH NONLOCAL FUNDS THAT CANNOT BE USED FOR OTHER PURPOSES

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.

> *Other funding sources are also statutorily restricted. Examples are Federal Section 3 New Rail Starts funds which can only be used for new rail capital projects, and State rail bonds (Propositions 108 and 116) which are for use on rail capital or other specific projects identified in law.* Without rail construction, these funds would not come to Los Angeles *(emphasis in the original)*.[55]

This argument implies that the only nonlocal funds available are for rail projects, which is not the case. Further, the assertion that Federal Section 3 capital funds are restricted to new rail starts is false.

The Los Angeles rail system will rely on 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 MTA's only alternatives are to request funds for the purpose designated by the provider or not to request funds at all. An example is the $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 because the rail proponents who placed this bond issue on the ballot stipulated that these funds could not be used for other purposes.

In other cases, funds are restricted to specific uses, but MTA retains considerable latitude with respect to what sort of funds it asks for. 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 Red Line; funds for renewal and replacement for old rail systems such as those of New York City, Chicago, and Boston; and bus capital. Current legislation no longer identifies a separate new rail starts program.[56] New start funds may now be sought for rail or bus. This includes the purchase of buses and supporting capital assets such as operating and maintenance facilities,[57] and even for construction of busway/HOV lanes.[58]

Historically, Federal Section 3 new start funds have been 100 percent specified by Congress. MTA has received by far the largest allocation of these funds for many years. For fiscal year 1995, Congress allocated $397 million in Section 3 funding, with $184.3 million, or 46 percent, recommended for Los Angeles. In both fiscal years 1996 and 1997, the U.S. DOT recommended $158.85 million in funding for the Red Line. Congress appropriated only $85 and $70 million, respectively, reflecting concern over MTA construction management.[59] Even this success comes at some political cost. Los Angeles does not receive as large an allocation of bus capital funds as it otherwise might.

There are dozens of other regions seeking access to federal rail new start funds, and the MTA focuses the main thrust of its lobbying efforts on continuing to receive a large share of these funds. If the MTA were to drop out of this pool, the agency could expect to receive a far larger share of Section 3 bus capital funds and other resources. This shift would convert Los Angeles' former competitors for rail funds into a core of active supporters favoring allocation of more bus capital to Los Angeles.

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55 Shikada, *For the Record* (1994), p. 6.

56 United States Code Title 49, section 5309(a).

57 United States Code Title 49, section 5309(a)(2).

58 United States Code Title 49, section 5309(a)(7).

59 U.S. Department of Transportation, "Report on Funding Levels and Allocations of Funds," Report of the Secretary of Transportation to the United States Congress Pursuant to 49 USC 5309(m)(3) (Formerly Section 3(j) of the Federal Transit Act), Washington, D.C., May 1995, p. 2.

For example, if the MTA could trade the $150+ million per year in federal rail construction funds it currently receives for $50 million per year in bus capital funds, Los Angeles would be far better off. This $50 million would pay for 80 percent of the cost of approximately 150-200 new buses each year, 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 2,000 vehicles, almost doubling the current MTA 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 50 percent over this 12-year period. This is an annual increase of about 17.5 million passengers per year. The 10-year total of 210 million new passengers greatly exceeds the total number of passengers the MTA claims would be accommodated on all of the rail lines the agency has ever suggested building.

Further, the nonlocal contribution to rail projects is not a fixed proportion of total cost. Every MTA 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 the Red Line Segment 1 includes a budget of $1,249.9 million, with a federal share of $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 $1,417.9 million. None of this nearly $168 million overrun was funded by the federal or state governments. All must be absorbed by MTA and the City of Los Angeles.

Agreements require the City of Los Angeles to pay half of rail construction cost overruns. The city share of the Red Line Segment 1 cost overrun is approximately 7 percent of the segment's total cost. Segment 2 also has large cost overruns. It is unclear that the city will continue to cover its share of the cost overruns on Red Line construction. The Red Line Segment 1 overruns cost the city almost $100 million, and the Segment 2 Hollywood Boulevard and other construction problems have exposed the city to hundreds of millions of dollars of additional cost overruns. If the city were to cap its total contribution for rail construction, the MTA would be forced to bear the entire risk of future cost overruns, which will make it much more difficult for MTA to retain the funding provided by federal and state partners.

Los Angeles County sales taxes provide local revenue for transit improvements, but offer considerably more flexibility than the MTA reports. Only 35 percent of the funds generated by Proposition A must be dedicated to rail. Some of the Proposition A funds are returned to local cities. These account for 25 percent of the total funds available. These must be used for transit purposes, but specifics are left to the local cities and the county supervisors. The supervisors are individually allocated formula funding for residents in the unincorporated areas of the county. Fully 40 percent of both Proposition A and C funds are completely discretionary. The MTA may dedicate these resources to any transportation project allowed by the propositions that it deems worthy. A small share of the Proposition C funds (10 percent) are dedicated to rail, and even these commuter rail funds can be used to a limited extent for bus purposes. Twenty-five percent of Proposition C funds is allocated to Transit Related Highway Improvements. The MTA Board has shown considerable creativity in defining these improvements, making the legally innovative decision to cover a funding shortfall for the Green Line with bonds issued against this share of funds. The board's argument is that a rail line down the center of a freeway is a transit-related highway improvement. This same funding source was used to begin construction of the Pasadena Line. Even more creativity is required in this case, because the Pasadena Line merely *crosses* a highway.

The MTA's current Long Range Plan designates almost half ($29,703.9 million) of all Proposition A and C funds for "Transit and Other."[60] Proposition C 40 percent discretionary funds are forecast to be $5,115.3 million.[61] Over 80 percent of this funding is dedicated to rail. This is separate from transfers from Proposition C 25 percent Transit Related Highway Improvement funds that MTA has succeeded in programming for rail construction.

The MTA also plans to divert approximately 15 percent of Transportation Development Act (TDA) Article 4 funds traditionally used for bus operations and capital purposes to rail.[62] The MTA plan dedicates $230 million in TDA

[60] LACMTA, *A Plan for Los Angeles County*: *Transportation for the 21st Century*, Los Angeles, 1995, p. 104.

[61] LACMTA, *Transportation for the 21st Century: A Plan for Los Angeles—Supporting Cash Flows* (March 22 (adopted), 1995), pp. 68–69.

[62] LACMTA, *A Plan for Los Angeles County* (1995), p. 104.

funds to “Misc. Rail/Rehabilitation” and $754.5 million to “MTA Rail Operations and Metrolink.” The net effect of Proposition C 40 percent discretionary and TDA Article 4 fund decisions is to reduce funding for bus by $454.3 million over 20 years. Overall, the MTA's 20-Year Plan directs over 60 percent of transit funds to rail.

This is an unfortunate trade-off. The cost-effectiveness measures in Figure 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 nonflexible federal funds will cover no more 50 percent of the budgeted cost of rail transit projects, and a lower proportion of actual costs. 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 rail option is at least 20 times as costly as the bus option in terms of local capital funds.

MYTH #8: RAIL WILL ATTRACT NEW RIDERS TO TRANSIT

Rail proponents argue that trains are inherently able to attract more riders than buses, particularly middle-class riders. In Los Angeles, the MTA's transportation model forecasts that, in terms of boardings per station, the five most heavily used light rail lines in the United States would all be in Los Angeles.[63] This is wishful thinking.

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 still very weak. To fill a train in Austin, Charlotte, Columbus, Denver, Detroit, Kansas City, Memphis, Milwaukee, Minneapolis, Norfolk, Orlando, Salt Lake City, Seattle, Tampa, or any of the other cities debating construction of rail transit systems; something has to happen that is not happening in Los Angeles, Buffalo, Portland, San José, Sacramento, or any other member of the new rail club. That is, 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 U.S., opt for two rides on the bus before undertaking a bus-train-bus odyssey.

We contend that nothing short of very major changes in the economic and legal structure of 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; at 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.

Most people tend to make decisions based on the context provided by their own experiences. In Los Angeles, over 80 percent of transit riders are members of minority groups, and almost 60 percent are female. The majority of transit policymakers are neither. Much more important, very few of these policymakers have ever ridden transit on a regular basis, nor do members of their social circles. They do not have a clear idea of how travelers make transit choices, or how to configure options in ways to which users are likely to respond.

In the minds of these policymakers, attracting riders to transit means attracting riders from the economic classes to which the policymakers 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. Decision makers hope middle- and upper-income residents do not associate rail with the type of people with whom upper- and middle-income residents do not want to associate.

[63] *Ibid*, p. 26.

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 in poor mechanical condition and covered with graffiti; no place to sit because of extreme crowding; occasional riding companions who are unfamiliar with the finer points of Emily Post, personal hygiene, and the California Criminal Code; and just about anything else. They have to.

Such riders are not quick to complain because:

❶ they are often working poor, and their lives are a daily struggle against great odds;

❷ English is often not their first language, or they may not be literate;

❸ they come from cultures in which complaints to authority are unacceptable; or

❹ 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 option riders. They have alternatives, including the traditional Southern California single-passenger automobile, car- and van-pooling, and telecommuting. These option riders will use transit only if it is their best alternative. These riders reject the typical conditions transit-dependent riders encounter everyday.

In U.S. cities, and especially in Los Angeles, members of the middle- and upper- income groups tend to live further from their jobs than do lower-income residents. The MTA route system is mostly oriented toward central business district (CBD), home-to-work commute trips. As a result, middle- and upper-income option riders tend to take longer trips than transit-dependent riders. In addition to work trips, the transit-dependent also tend to make many short trips on transit, including trips to the grocery store, to the doctor, to church, for social calls, etc. Option riders tend to make these trips by automobile.

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 are hourly costs, such as drivers' pay and benefits. Since longer trips are generally taken at higher average speeds, hourly operating costs are distributed over more passenger miles. Because of 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 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, 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 of 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. Further, there is ample evidence of latent demand for transit services. When SCRTD/MTA has shifted buses to lines that are more crowded than the norm in the past, it has often taken only a few months for average passenger leads to return to previous levels. People who had given up on taking transit because they were being passed up by full buses return to the system.

The middle- and higher-income option 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. Further, we are informed by rail advocates that members of the second group are so repulsed by the bus option they can only be attracted to transit via provision of new rail services.

Thus, if the objective in providing transit service is to do the greatest good for the greatest number of people, the efficient course is to devote a large share of available resources to expanding bus service for the first group. The number of riders, and new riders, carried per dollar invested will be far greater if service targets the first group rather than the second group.

The most important improvements are also the simplest. A variety of ridership surveys have consistently indicated that the most important improvements to transit service are:[64]

❶ more frequent service;

❷ longer service hours;

❸ new bus lines;

❹ faster service, such as express and/or limited routes; and

❺ fewer and/or more convenient transfers.

Such quantity improvements also lead to quality improvements. If increasing the level 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. There is likely a segment of the second group that cannot be attracted to transit except by the provision of extremely expensive options, such as rail. This should not be transit operators' next target group. Instead, 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:

❶ clean buses with good physical appearances that are free of graffiti;

❷ a very high degree of mechanical reliability to preclude missed bus runs, malfunctioning air conditioning, and poor quality rides;

❸ strict adherence to schedules;

❹ courteous, responsive bus operators;

❺ fast, accurate, easy-to-use sources of information;

❻ 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

❼ a high level of security, both on vehicles and at bus stops.

These improvements will, over time, attract more option 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 operators turn their attention to higher-cost, less-flexible options such as rail transit.

MYTH #9: RAIL WILL DECONGEST ROADS

One of the favorite premises of rail transit advocates is that rail will decongest roads by absorbing demand. But 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 time cost of road travel reduces the cost of whatever objective the trip

[64] SCRTD, Attitudes About Public Transit in Downtown Los Angeles: Results from SCRTD's FY *92 Survey of Transit Users and Non-Users, Final Report* (December 1992); Facts Consolidated for SCRTD, Presentation Notes for Report to SCRTD Board of Directors, (August 13, 1992); Maritz Marketing Research, Inc. for SCRTD, *Bus Operations Study*, September 30, 1991; Maritz Marketing Research, Inc., *Riders/Non-Riders Attitudes Towards Fare/Payment Media/Distribution Outlets* (December 1989).

meets. In the short run, this leads to more trip making. In the long run, this increases the value and accessibility of sites used to pursue these objectives. The eventual result is activity shifts in location and timing that intensify land use, the demand for transport, and eventual traffic volumes.

Investing in rail has even less effect on the level of service available from the transportation network than does building new highways. The MTA projects about 38.2 million daily linked trips in 2015.[65] Even if the Metrolink commuter rail system increases to 50,000 unlinked trips per day by 2015, this would still account for only part of 0.13 percent of total trips, or one in every 764.

In any event, 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 facilities cost more to provide. If a facility is uncongested during peak use, it is overdesigned. 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 is relatively simple to convince some people that transit is a viable option for their neighbors. Unfortunately, the prospect of attracting everybody 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 reports that 63 percent of the passengers on the Los Angeles Blue Line train responding to a November 8, 1990, onboard survey indicated that they were bus patrons prior to the new train service.[66] Six percent indicated that they were previously driven by others, 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 is a surprisingly high proportion, almost certainly related to the unusually low fare charged on the Blue Line. However, even if the fare charged for rail transit service were 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 freeway speeds will fall to catastrophically low values unless rail systems are built. For example, the LACTC's 30-year plan predicted that, without construction of the 400 miles of rail lines identified there, average travel speeds in Los Angeles during peak periods would drop from 29 miles per hour in 1991 to 17 miles per hour by the year 2010.[67] The 30-year plan's successor document, the MTA's 20-year plan, includes a baseline projection that morning peak freeway speeds will decline from 41 miles per hour in 1990 to less than 17 miles per hour in 2015. Arterial speeds are predicted to drop from 17 miles per hour to under 11.[68]

None of this will come to pass. 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 equilibratory mechanisms. Changes in travel costs change the accessibility 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. Simplistic forecasts ignore this, and thus exclude the changes most relevant to the outcomes being forecast.

Empirical evidence suggests that cities have been able to adjust to growth in ways that mitigate its costs very effectively. Gordon and Richardson report that evidence from National Personal Transportation Surveys (1977, 1983,

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[65] *LACMTA Long-Range Transportation Plan—Performance of Individual Projects and Programs* (November 18, 1994), p. 8.

[66] Jonathan E. D. Richmond, "Transport of Delight—The Mythical Conception of Rail Transit in Los Angeles," Ph.D. Dissertation, Massachusetts Institute of Technology, Cambridge, MA (1991).

[67] Los Angeles County Transportation Commission (LACTC), *30-Year Integrated Transportation Plan* (Los Angeles, April 1992), p. 55.

[68] LACMTA, *A Plan for Los Angeles County* (1995), p. 29.

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 have essentially stabilized.[69]

While commuting times have remained constant, average trip speeds have actually improved. Most commuting is now suburb to suburb.[70] Only a small fraction of North America's commuters still work downtown. The result is an empirically verifiable improvement in North American trip speeds. Gordon and Richardson classified trip 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.[71] They report that average 1990 trip speeds are significantly higher than average 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 nonwork 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 of the medium-sized, monocentric cities which 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 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 boogie man. Urban congestion is real, but as long as land markets and the travel patterns they engender are allowed to adjust, congestion will stay under the bed.

MYTH #10: THERE ARE NO ALTERNATIVES TO RAIL

Justifying a rail system is so difficult that proponents must present arguments intended to dismiss the viability of alternatives. Bus transit is often 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, and then only in an extremely small number of corridors in the United States. The 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.

Further, 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 capacity delivered by buses

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[69] Peter Gordon and Harry W. Richardson, "Curbing Gridlock: Peak-Period Fees to Relieve Traffic Congestion," *Congestion Trends in Metropolitan Areas* (Washington, D.C.: National Research Council, National Academy Press, 1994); Peter Gordon and Harry W. Richardson, "Are Compact Cities a Desirable Planning Goal?," *Journal of the American Planning Association*, forthcoming.

[70] Peter Gordon, Harry W. Richardson and H. L. Wong, "The Distribution of Population and Employment in a Polycentric City: The Case of Los Angeles," *Environment and Planning A*, vol. 18 (1986); Peter Gordon and Harry W. Richardson, "Notes From the Underground: The Failure of Urban Mass Transit," *The Public Interest*, vol. 94 (1989), pp. 77-86.

[71] Peter Gordon and Harry W. Richardson, "Sustainable Congestion," *Cities in Competition: Productive and Sustainable Cities for the 21st Century*, ed. J. Brotchie, et al. (Melbourne, Australia: Longman House, 1995).

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.

Los Angeles' El Monte busway was a true bargain by today's construction cost standards, costing $36.19 million in the early 1970s.[72] This compares to the several billion dollars to be spent on the Red Line. The Harbor Freeway busway is the world's most expensive, but even this $800 million, high-capacity facility costs much less per mile than the Red Line. Unfortunately, the MTA does not currently have the resources to provide bus service on the Harbor transitway, in large part because the agency is spending so much on its rail system. Still, 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 Busway built and operated by OC Transpo.

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 rights-of-way, 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 due to 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 the 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 are diffused. They affect everyone on the guideway, not just the traveler who inflicts them. Rational, self-interested travelers ignore the external costs of their choices because they can.

Trips only occur when the benefits accruing to the traveler exceed his or her private costs. But because of external costs, many trips occur for which the combination of private and social costs exceeds the private benefits. This is inefficient. If these social costs could be made internal to the decision to travel, then trips would not be taken unless the benefit accruing to the individual exceeds the combined cost to the individual and to society.

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 uncongested, 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. Toll booths usually create more congestion than they alleviate, and such time-of-day pricing requires knowledge of fluctuating traffic flows and some means of communicating price information to consumers.

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) Express 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 excellent 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 91 Express Lanes are an institutional template for expanding the road inventory at the expense of the users benefiting most directly from the investment.

[72] SCRTD Engineering Department, Summary, San Bernardino Busway Project.

The 91 Express Lanes are actually high occupancy/toll (HOT) lanes that accommodate both paying and car pool vehicles. California Department of Transportation District 7 in Los Angeles and Ventura Counties is in the process of adding HOV lanes to its entire freeway inventory. District 11 in Orange County and District 8 in San Bernardino and Riverside Counties are also adding HOV lanes identified by the Southern California Association of Government's (SCAG) Regional Mobility Plan. Pure 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. District 7's new elevated Transitway constructed above the median of the Harbor Freeway is an excellent example. The HOV lanes planned for this facility should be implemented as high-occupancy toll (HOT) lanes.

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. Social policymakers think in terms of an equity/efficiency trade-off, tolerating some loss in economic efficiency if the loss delivers obvious improvements in equity.

Municipal bus franchises are an exclusive license to serve coupled with an obligation to serve. It is illegal for other providers to enter the market and offer competing services. Extensive service obligations result in many municipal lines that are operated at a loss, and such losses are usually sufficient to require that municipal bus properties be subsidized by public resources. Unfortunately, the enforced absence of competition and the prospect of subsidy also contribute to the likelihood of losses.

Once an enterprise has been removed from the discipline provided by the marketplace, 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 best-case public transit result is too often 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.

It is time to unshackle the supply side of the transportation market, reduce regulatory barriers, and allow private interests to compete with municipal transit. Such services would be quite different from existing services. Privately operated transit services cannot operate at a loss. Some private routes or lines might be loss leaders, remaining in service only because they make other routes more profitable, but any private system must ultimately make a profit to survive. 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 likely 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 lower people’s 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.

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. Private services cannot address the equity objectives. Equity improvements can be generated by subsidizing demand instead of supply. 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. These resources would make it possible for low-income individuals to purchase transportation services they would not otherwise be able to afford, and the objective of ensuring mobility would be met.

Vouchers of any sort are double-edged swords. By definition, they can only be used to make certain classes of purchases, such as for transportation services. 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, or allowing vouchers to be sold, 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 makes possible. Consequently, transportation vouchers, like food stamps, remain an attractive option because of the degree of control they permit over consumer choices.

There is an appropriate role for regulation in such an environment. At a minimum, operators should be licensed subject to safety inspections. This increases operating costs, but protects the uninformed, who might not otherwise realize that the lowest-cost ride is likely to be a high-risk experience. Safety inspections also suppress the frequency of accidents, and the external costs they impose. But beyond basic public-safety concerns, there is little economic justification for the transportation market barriers that currently exist. Not surprisingly, the loudest proponents of the current regulatory climate tend to be the largest operators, i.e., the largest taxi companies, the largest airport shuttle operators, and the municipal bus companies. These organizations experience the highest coordination costs. Free entry into their markets would place them in competition with roving, metered owner-operators which current regulations effectively prohibit. These smaller operators are nimbler. They are able to respond to market opportunities more quickly because they face simpler planning problems. They are able to under-price larger operators, who respond to this threat by becoming some of the most entrenched of all special interests.

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