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Editor's Introduction

We are pleased to present the third issue of Planning and Markets, a wholly electronic journal, and our forth will be out soon. Although there are many journals that now publish in hard copy and electronic form, there are very few in the social sciences that are solely electronic. We strongly believe that this is the wave of the future.

We welcome papers from both a market-oriented and a planning and more interventionist perspective. We are pleased to welcome the new Dean of our School of Policy, Planning and Development, Dan Mazmanian, to our Editorial Board. Dean Mazmanian is an expert on sustainable communities. We hope that his joining will help us in our goal of attracting more diverse submissions.

The standards for publications in an electronic journal are identical to those of a hard-copy journal. All submissions should be unpublished. Each paper submitted is subject to external review by 2-3 outside referees and is also reviewed by each of the Editors. Please be assured that this is a fully refereed journal, and that its standing will be determined by the papers that we publish in the future.

Our aim is to beat by far other journals in terms of manuscript turnaround. This is where we can gain a competitive edge. We will publish issues as fast as quality manuscripts dictate. The rest is up to you. If you have relevant research, please consider us in your future submissions.

Remember that our journal is free with no subscription rate. In this way, we hope to reach more readers than could be dreamed about by any conventional hard-copy journal. Electronic journals are not only about convenience but about spreading research results fast.

The Editors welcome comments about the authors' contributions or with suggestions for improving our communicability.

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Market-Based Transportation Alternatives For Los Angeles

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ABSTRACT

On January 14, 1998, the Board of the Los Angeles County Metropolitan Transportation Authority (MTA) suspended work on three rail lines, one of which (the Pasadena Blue Line) was already in an advanced state of construction, and decided to complete work on a single subway line currently under construction. Los Angeles County Proposition A passed in November of 1998 by a two thirds majority, prohibiting the MTA from spending sales tax revenues on new subways. We review a variety of market-based transportation alternatives to rail transit for Los Angeles, including busways, reducing barriers to entry to the market for transit services, and high occupancy toll (HOT) lanes.

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I. Introduction

For many years, the health of Los Angeles' culture and economy has been equated with the health of its transportation system. From the Red Cars of the 1940s to the Car-Hops of the 1960s, to the Freeways of the 1970s, perceptions of Los Angeles as being either a futuristic city or a city in decay often involve the performance of the transportation system.

The Los Angeles metropolitan region experienced record growth during the 1980s, sparking a transportation agency response that included accelerated investment in rail transit during the 1990s. These developments are particularly important to Los Angeles because the rail plan is central to virtually all existing transportation development plans in the region. The MTA's rail plan is Los Angeles' longest-range plan, executed at the grandest scale. No other public project places such an enormous call on resources. Many promises ride on this plan: local officials have proffered it as the means by which Los Angeles will decongest roads, clean the air, reconfigure land use, and (prior to the current economic expansion) revitalize the economy.

The first elements of the system came on-line just as Los Angeles entered a period of intense challenge; and, despite large cost overruns, legal actions by transit riders, and a fiscal crisis that has halted rail construction, core political support for the rail plan has proved difficult to erode. Through a multi-year drought, an extended recession, a major correction in the housing market in 1990, the 1992 riot, several large fires, the 1994 Northridge earthquake, and the steady erosion of bus service, Los Angeles' leadership has kept its civic eye on the rail prize. This tenacity comes at high cost. While the residents of Los Angeles County have agreed to tax themselves ever more intensively to pay for rail-transit systems, the County's least fortunate residents have been squeezed into the most crowded buses in the United States.

Unfortunately, initial elements of the Los Angeles rail system performed poorly in terms of cost effectiveness relative to other North American rail systems and to bus modes (Rubin, Moore, and Lee 1999a; Rubin, Moore, and Lee 1999b). Table 1 summarizes capital costs per passenger and per passenger mile for each of the five Los Angeles transit modes. Table 2 shows the number of trips and passenger miles paid for by the same level of subsidy across the four modes. The data in these tables indicate that the Los Angeles experience -- like the experiences of other North American cities -- is that non-rail transit outperforms rail transit systems by a very wide margin in terms of passenger-trips and passenger-miles per dollar of public subsidy.

The low cost-effectiveness of Los Angeles' rail systems has negative impacts on the level of transit and transportation service available in the region. We contend that the most visible result has been the recent and rapid deterioration of the Los Angeles bus system. Like other new rail cities, Los Angeles discovered that optimistic cost and ridership forecasts used to justify construction of rail projects lead to budget shortfalls (Pickrell 1990). And like other cities, Los Angeles made up for those shortfalls by shifting resources from buses to trains, leading to unintended perverse results. Every dollar shifted from buses forces more riders off the system than new rail service can attract.

Troubles with rail transit

Urban rail transit once had an important role in American cities. Prior to the 1940s, public transportation was
often the most common mode of urban transportation, especially for work trips. After World War II, however, mass transit companies lost ridership as a result of several factors, including increasing incomes, growing suburbs, cheaper automobiles, and changes in labor rules. Several transit subsidy programs were enacted during the 1960s and the 1970s to maintain public transportation services in the cities and metropolitan areas. The rationales for these investments included shaping urban growth; providing mobility for the poor, elderly, handicapped, and other transit dependent groups; preserving open space; conserving energy; improving air quality; and reducing traffic congestion (Jones 1985).

**Table 1**: Capital Cost per Passenger and Capital Cost per Passenger Mile for Los Angeles Transit Modes

<table>
<thead>
<tr>
<th>Los Angeles Mode</th>
<th>Capital Cost per Passenger</th>
<th>Capital Cost per Passenger-Mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Bus</td>
<td>$0.25</td>
<td>$0.07</td>
</tr>
<tr>
<td>Light Rail</td>
<td>8.27</td>
<td>0.91</td>
</tr>
<tr>
<td>Heavy Rail</td>
<td>2.63</td>
<td>0.75</td>
</tr>
<tr>
<td>Long-Haul Commuter Bus</td>
<td>1.93</td>
<td>0.05</td>
</tr>
<tr>
<td>Commuter Rail</td>
<td>21.02</td>
<td>0.70</td>
</tr>
</tbody>
</table>

*Notes:*

a. "Urban Bus" and "Light Rail" are Southern California Rapid Transit District (SCRTD) FY92 average bus and Blue Line, respectively.

b. "Heavy Rail" is the Red Line as per EIS/EIR and is understated.

c. "Long-Haul Commuter Bus" isFY92 actual for four such New Jersey bus operators, pricing the actual fleet size at $300,000 per bus, annualizing over 12 years, and adding 20 percent for non-bus capital assets.

d. "Commuter Rail" is the FY95 projection for Metrolink from the FY93 Metrolink Budget and is understated.

*Source:* Los Angeles County Metropolitan Transportation Authority (LACMTA). *A Look at the Los Angeles Metropolitan Transportation Authority.* 1993.

**Table 2**: Los Angeles Public Transit Options Available for the Same Total Subsidy

<table>
<thead>
<tr>
<th>Mode</th>
<th>Passenger Trips</th>
<th>Average Length</th>
<th>Passenger Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban Bus</td>
<td>100</td>
<td>3.83 miles</td>
<td>383 passenger miles</td>
</tr>
<tr>
<td>Heavy Rail</td>
<td>40</td>
<td>3.52 miles</td>
<td>141 passenger miles</td>
</tr>
<tr>
<td>Light Rail</td>
<td>10</td>
<td>9.4 miles</td>
<td>94 passenger miles</td>
</tr>
<tr>
<td>Commuter Rail</td>
<td>6</td>
<td>27.8 miles</td>
<td>167 passenger miles</td>
</tr>
</tbody>
</table>

*Source:* LACMTA. *A Look at the Los Angeles Metropolitan Transportation Authority.* 1993.

By almost any normative measure, these transit-subsidy programs have been markedly unsuccessful. During the 1980s, the number of registered cars in the United States grew three times as fast as that of population (Chinitz 1991). The average vehicle occupancy for all trips has decreased from 1.9 persons per vehicle in 1977 to 1.6 in 1990 (Pisarski 1992). The growth of automobile access and use has contributed substantially to increases in average work-trip speed for all modes, from 29.1 mph in 1983 to 32.3 mph in 1990 (Pisarski 1992). Nationally, transit ridership has decreased steadily, and compared with transit ridership in other industrialized countries, can be considered insignificant.
In most respects, Los Angeles proved no exception to these national trends. Southern California Rapid Transit District (SCRTD) ridership fell from 396.6 million in fiscal year 1980 to 354.1 million in fiscal year 1982. SCRTD base fares increased from $0.55 to $0.85 during the same period.

An important exception to these trends occurred in 1980, when Los Angeles voters passed Proposition A, agreeing to impose a perpetual one-half cent sales tax dedicated to transit. This began the most successful transit ridership experiment in recent history. Beginning in fiscal year 1983, an allocation of approximately 20 percent of Proposition A tax receipts was used to reduce the SCRTD base fare from $0.85 to $0.50. Other fares were reduced as well, as was the price of monthly passes. Over the three years of the $0.50 fare program, District transit ridership rose over 40 percent, and was still increasing in the last month of the experiment. Very little about the bus system was changed except the fare. Revenue service miles increased only 1.5 percent, including special service added for the 1984 Los Angeles Olympics.

Beginning in fiscal year 1986, however, the Proposition A funds that had been used to subsidize the $0.50 bus fare were reallocated to rail construction. This change complied with the terms of the ballot issue presented to voters. The funds transferred away from the fare subsidy program paid for about 35-40 percent of the reported construction costs of the Blue Line. Blue Line ridership peaked in 1995 at 12 million passenger boardings after an earlier dip (LACMTA 1994). The MTA currently predicts an annual Blue Line Ridership of 13.5 million (LACMTA 1996). The addition of the Green line produced a total 1997 light rail ridership of 22.6 million (FTA 1999).

Bus fares were increased to $0.85 in fiscal year 1986 and then to $1.10 in fiscal year 1989. By fiscal year 1990, bus ridership had decreased by over 96 million passenger boardings per year, or 19.3 percent. District ridership has continued to sink further ever since. By 1995, the system had lost 133.5 million boardings per year, and had a ridership of 362.3 million across all modes. Bus ridership was 343.1 million. At this point, the lost ridership was more than ten times that gained by the Blue Line, and exceeded the entire patronage of the seventh largest urban bus system in the US. Losses appear to have to have stabilized. MTA ridership was 351.2 million in 1997, and 385.5 million across all modes (FTA 1999), though cumulative losses across all modes relative to the 1985 peak now exceed 1 billion boardings.

Fare increases are not, of course, the only possible causes for declining bus ridership. Other possible causes include a softening economy, reductions in the level of bus service operated (an outcome also related to rail construction), the low cost of gasoline, current slower County population growth, and perceived increases in street crime. The trend-lines shown in Figure 1 are adjusted for these effects in a limited way, showing average SCRTD/MTA fares in constant 1980 dollars and per-capita ridership on SCRTD/MTA buses, other Los Angeles County transit operators, and trains. Even after these adjustments, the trend toward diminished bus ridership is very clear. The rail system's contribution to the region's inventory of transportation services ranges from negligible to modest.

Because of these and related outcomes in Los Angeles and other cities, the Los Angeles rail transit plan has come under fire from a growing number of groups, with dramatic effect (Gomez-Ibanez 1985; Pisarski 1985; Kain 1988; Pickrell 1990; Gordon and Richardson 1989; Wachs 1989; Gordon and Richardson 1994; Moore II 1993). Congress has all but explicitly repudiated the federal government's Full Funding Grant Agreement with the MTA. There is considerable uncertainty regarding the extent of future federal participation in the program and the restrictions this participation might imply for rail construction, transit operations, and other MTA decisions (Rubin, Moore, and Lee 1996a; Rabin 1997). The Congressional appropriation lobbyed for so intensively by the Authority was reduced by more than half. In December of 1996 (former) Secretary of Transportation Frederico Pena and Federal Transit Administrator Gordon J. Linton threatened withhold $31 million in Department of Transportation funds allocated to the agency by Congress. The General Accounting
Office reported that the agency does not have the fiscal resources to pursue its rail plan. In late October of 1996, the agency concluded two years of litigation by agreeing to mitigate the negative impact the MTA's rail plan has imposed on the bus services. US District Judge Terry J. Hatter, Jr. has signed a consent decree in a lawsuit against the agency that is effectively a victory for the Bus Riders' Union, a grass roots organization representing the MTA's largest client group. Former Chief Executive Joseph Drew, on the job less than a year following the firing of his predecessor, Franklin White, resigned under withering criticism from his own board of directors. The board's first candidate for a permanent replacement declined the position, which was subsequently accepted by corporate turn around specialist Julian Burke.

![Graph of Ridership Per Capita on SCRTD/MTA Buses and Other Los Angeles County Transit Compared to Price Adjusted Average Fares](image)

**Figure 1:** Ridership Per Capita on SCRTD/MTA Buses and Other Los Angeles County Transit Compared to Price Adjusted Average Fares.

**Sources:**
- LACMTA. (1993) A Look at the LACMTA.

This combination of events brought the MTA to a crisis-point during 1998. On January 14, 1998, in an action that may mark the end of rail construction in Los Angeles, the MTA Board suspended work on three rail
lines, one of which (the Pasadena Blue Line) was already in an advanced state of construction, and decided to complete work on a single subway line currently under construction (LACMTA 1998a). The three dissenting votes in the 10-3 action felt that the six month suspension did not go far enough. The dissenters wanted to terminate subway construction altogether (Simon 1998, Bloom 1998). November of 1998 saw the passage of Los Angeles County Proposition A by a two thirds majority. The passage Proposition A was widely described in the press as the end of subways in Los Angeles. In truth, Proposition A is a relatively weak measure that merely prohibits the MTA from spending sales tax revenues on new subways once the Red Line's North Hollywood extension is completed this year. MTA likely to circumvent Proposition A and the super majority who voted for it by issuing subway construction bonds against revenue sources other than sales taxes, the same way it used debt issued against farebox and other non-sales tax receipts to construct the Union Station Gateway headquarters building.

The agency now finds itself committed to the FTA and the California Transportation Commission to construct rail lines it cannot afford to build or operate, while simultaneously under court order to decrease bus fares and increase service. Even prior to the action by the Bus Riders' Union, the MTA did not have sufficient funds to complete both the current subway extension to the East San Fernando Valley and the Pasadena Blue Line extension, much less the other eight rail lines it identifies as priorities (LACMTA 1995a). The agency elected to finish the subway extension. Outraged State legislators backed the creation of a new (under funded) construction authority for the Pasadena Blue Line.

In the best case, the legal requirement to commit resources to bus service will force the MTA to acknowledge the trade-offs associated with rail Los Angeles construction and operation. If so, the MTA will finally be positioned to weigh seriously the advantages of a number of options it has ignored in the past. None of these options will keep the myriad promises made in rail's name, but nothing can.

II. Alternative Transit Options

There are other transportation options of great importance to Los Angeles. The mainstay of Los Angeles public transit remains the bus, despite the relative insensitivity of public bus franchises to rider tastes and preferences. Part of this unresponsiveness flows from limited role of the fare box in bus finances. Public buses are financed by tax revenues: The revenues provided by fares are a small part of the fiscal picture. Not even the most dedicated public transit official believes buses can compete effectively with single occupancy vehicles in the minds of those riders with sufficient income to opt for the private mode. In most cases these experts' decisions lead to outcomes consistent with their assumptions. However there are untapped markets for transit. These markets will remain untapped unless the level of bus service can be improved. There are a variety of ways this can be accomplished.

Focus on busways instead of rail transit

Rail's most obvious limitation is its inflexibility. The exceptional capacity provided by exclusive guideways is real, but rail has no monopoly on this advantage. Buses on exclusive guideways do as well as trains in most respects, and better in most others. Busway capacities meet or exceed the capacities of all rail lines except heavy rail trunk lines, in large part because busway speeds are higher, and because buses can be separated by seconds instead of minutes. In addition, buses offer the special advantage of being able to leave the exclusive guideway, and operate at grade as collectors and distributors.

Busway capacity

Ottawa has the most extensive busway system in the world (34 miles), and has plans to almost double its system. Most of Ottawa's busways exclude High Occupancy Vehicles (HOV). The longest such exclusive US
busway is in Pittsburgh. Houston will have 105 miles of HOV lanes by the end of the century. Most of these are reversible freeway lanes that were designed for automobiles, but to which buses were subsequently admitted. This almost double average bus speeds from 26 MPH to 49 MPH.

There are at least three reasons busways are less expensive to construct than railways (Biehler 1988).

1. Busways are roadways, and there are more firms experienced in the design and construction of roadways than firms experienced in the construction of light rail.
2. Buses are better able to negotiate grades than are trains, and light rail lines are more likely to have subway segments.
3. And, even above ground, light rail has special design requirements associated with electrification, train control, computerization, rail alignment, weight, and other considerations.

Busways are also less expensive to operate than light rail lines. Busways do not need operations control centers, have simpler maintenance facilities, and do not require separate communication, power, signal, and propulsion systems. Broken down light rail cars present more of a problem than a malfunctioning bus.

Table 3 summarizes and compares aggregate cost and performance information for light rail systems and busways. The comparison relies a format provided by Biehler (1988), but includes updated cost figures. The comparison includes Los Angeles' El Monte Busway/HOV(3) lane and the Long Beach Los Angeles Blue Line train. The El Monte facility consists of a dedicated lane in each direction along Interstate 10, running from Northeast of the Los Angeles CBD to just East of the City of El Monte. The transit ridership on the El Monte busway is four times greater per mile of guideway than the ridership on the Blue Line. Service is provided at more than twice the speed of the Blue Line. Details are provided in Table 4, along with comparisons to the theoretical maximum service levels achievable by rail systems and busways. Table 4 includes a comparison of passenger miles per hour not provided in Table 3. Rail's relative performance improves in these terms, but the El Monte busway still outperforms the Blue Line train by a factor of 2.5.

Table 3: Cost and Performance of Busways and Light Rail Systems

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Light Rail</strong>&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buffalo</td>
<td>6.4</td>
<td>29,200</td>
<td>4,563</td>
<td>854.4</td>
<td>133.5</td>
<td>13.7</td>
<td>1.8</td>
</tr>
<tr>
<td>Pittsburgh</td>
<td>10.5</td>
<td>30,600</td>
<td>2,914</td>
<td>736.1</td>
<td>70.1</td>
<td>9.6</td>
<td>1.2</td>
</tr>
<tr>
<td>Portland</td>
<td>15.1</td>
<td>19,700</td>
<td>1,305</td>
<td>314.8</td>
<td>20.8</td>
<td>6.9</td>
<td>1.4</td>
</tr>
<tr>
<td>Sacramento</td>
<td>18.3</td>
<td>14,400</td>
<td>788</td>
<td>222.5</td>
<td>12.2</td>
<td>8.2</td>
<td>2.2</td>
</tr>
<tr>
<td>San Diego</td>
<td>20.4</td>
<td>27,000</td>
<td>1,324</td>
<td>207.1</td>
<td>10.2</td>
<td>8.5</td>
<td>1.2</td>
</tr>
<tr>
<td></td>
<td>21.6</td>
<td>36,669</td>
<td>1,698</td>
<td>1,000.0+</td>
<td>46.3</td>
<td>44.3e</td>
<td>3.68</td>
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<td>unlinked</td>
<td>(Rubin,</td>
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<td></td>
<td>1995c)</td>
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<td>trips</td>
<td>Moore II</td>
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<td></td>
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<td></td>
<td>12,260k</td>
<td></td>
<td></td>
<td>and Lee</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1999b)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simple Average</td>
<td>15.38</td>
<td>26,262</td>
<td>2,097</td>
<td>555.8</td>
<td>48.9</td>
<td>15.2</td>
<td>1.91</td>
</tr>
<tr>
<td>Mile Weighted Average</td>
<td>26,132</td>
<td>1,708</td>
<td>518.4</td>
<td>36.1</td>
<td>17.0</td>
<td>2.05</td>
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<tr>
<td>Ridership</td>
<td>2,269</td>
<td>629.2</td>
<td>54.6</td>
<td>17.8</td>
<td>2.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weighted Average</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

|                      | 6.8      | 29,000   | 4,300   | 156.2    | 23.0 | 3.7   | .43  |
|                      | Pittsburgh|         |         |          |      |       |      |
| East                |          |          |         |          |      |       |      |
| Pittsburgh South     | 4.5      | 18,000   | 4,500   | 42.6     | 9.5  | 3.0   | .56  |
|                      |          |          |         |          |      |       |      |
| Los Angeles          | 11.5     | 16,000e  | 1,400   | 103.4    | 9.0  | No comparable data is available. |
| El Monte            | (LACMTA  |          |         | excludes |      |       |      |
|                     | 1994)    |          |         | buses    |      |       |      |
|                      |          |          |         | (Rubin and Moore 1997; US Dept. of Commerce 1995) | |       |      |
| Simple Average       | 7.6      | 21,000   | 3,400   | 100.7    | 13.8 | 3.35  | .50  |
| Mile Weighted Average| 20,272   | 2,763    | 107.1   | 13.3     | 3.42 | .48   |
| Ridership            | 3,621    | 110.3    | 15.6    | 3.43     |      |       |      |
| Weighted Average     |          |          |         |          |      |       |      |
Notes:  

a. These are bidirectional miles.

b. The data for the Buffalo, Pittsburgh, Portland, and Sacramento light rail systems are from Pickrell (Pickrell 1990; US Department of Commerce 1995). Costs have been adjusted to 1992 $ (Rubin, Moore II, and Lee 1999a). The data for the San Diego light rail system are cost adjustments to figures provided by Biehler (Biehler 1988; US Department of Commerce 1995), and are optimistic. The Blue Line data are from the MTA and Rubin and Moore II, as indicated.

c. MTA reports a Blue Line operating cost of $30,443,433 for fiscal year 1995 (LACMTA 1995c). This is incorrect because it excludes over $ 10 million in Blue Line security costs that were classified as bus expenses. The figure reported here is an average of fiscal year 1994 Blue Line costs (LACMTA 1994) and the fiscal year 1996 Blue Line budget (LACMTA 1995b), ($43,943,461 + 44,700,000)/2.

d. The two Pittsburgh facilities include the South Busway and the Martin Luther King Jr. East Busway. The Pittsburgh data includes price adjustments to Biehler’s figures. The Los Angeles’ El Monte busway consists of a dedicated lane in each direction along Interstate 10, running from the Northeast corner of the Los Angeles CBD to just East of the City of El Monte.

e. Most of the service on the El Monte busway is provided by Foothill Transit rather than MTA. This conservative estimate is based on a Caltrans survey reporting 49 buses per peak hour and an average occupancy of 31 passengers per bus. Adding two passengers per bus to account for mid-corridor boardings, and multiplying by 10 to convert peak hour totals to daily totals produces an estimate of 1,617 daily riders. This excludes HOV passengers, which is a much larger number (Rubin, Moore II, and Lee 1999b).

f. Biehler’s operating cost basis is unknown, making it difficult to generate comparable values for the El Monte facility (Biehler 1988). Averages relating to operating costs are based on the two Pittsburgh facilities.

Table 4: Peak Hour Ridership: El Monte Busway and the Blue Line

<table>
<thead>
<tr>
<th></th>
<th>Busway: Theoretical Maximum</th>
<th>El Monte Busway: Actual</th>
<th>Blue Line: Actual</th>
<th>Heavy Rail: Theoretical Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trains / Hour (Peak Direction)</td>
<td>720a</td>
<td>49</td>
<td>12</td>
<td>30b</td>
</tr>
<tr>
<td>Cars / Train</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Average Vehicle Load</td>
<td>270c</td>
<td>31.2</td>
<td>62.6</td>
<td>301d</td>
</tr>
<tr>
<td>Average Operating Speed</td>
<td>55e</td>
<td>52</td>
<td>21</td>
<td>35f</td>
</tr>
<tr>
<td>Passenger Miles / Hour</td>
<td>10,692,000g</td>
<td>79,498</td>
<td>31,565</td>
<td>3,160,500</td>
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<tr>
<td>Divided by: Average Trip Length</td>
<td>10.5</td>
<td>9.0</td>
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<tr>
<td>Passengers / Hour</td>
<td>7,571</td>
<td>3,506</td>
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<td>Bi-Directional Guideway Miles</td>
<td>11.5</td>
<td>21.6</td>
<td></td>
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</tr>
<tr>
<td>Passengers / Hour / Mile</td>
<td>658</td>
<td>162</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Notes:

a. This implies a headway if five seconds and vehicle separations of about 400 feet, which is feasible at speeds of 55 MPH.
b. Bay Area Rapid Transit (BART) is attempting to achieve headways as low as 2 minutes.
c. This is the passenger crush load for a double-articulated bus.
d. This is the passenger crush load for a Red Line car, which greatly exceeds the rating for BART cars.
e. This implies operating speeds of 65 MPH and skip-stop operations with full off-line stations.
f. This speed is possible if the distance between stations is large. BART operates in this range. One other US operator exceeds 30 MPH, and most operate at much lower speeds.
g. This exceeds by a factor greater than four the combined capacity of all freeways serving the Los Angeles CBD.

Retrofit rail rights of way for use as busways

Placing a new emphasis on exclusive guideways for bus suggests a new destiny for the MTA's light and heavy rail rights of way. The standard political perspective is that the MTA should ultimately finish the rail system to avoid wasting the resources it has already committed to the project. This is good public relations, but bad economics. The objective of the MTA and everyone else should be to spend the next dollar as wisely as possible, and ignore resources that cannot be retrieved from past mistakes. This approach helps firms and households maximize benefits and control costs, but invites scrutiny of public sector failures. This scrutiny is something that agencies very logically prefer to forego. Unfortunately, attempts to avoid scrutiny and controversy often lead to more uneconomic decisions, and larger failures.

At first glance, the MTA's rail rights of way appear to be sunk costs; and as long as they remain dedicated to rail cars, they are. However, the capacity, range of services, and level of service available from these facilities can all be simultaneously increased by substituting buses for trains. This is certainly cost effective for the above ground rights of way, because these facilities could accommodate the existing bus fleet. Further, more busways usually reduce vehicle requirements. The high speeds made possible by exclusive guideways, tends to reduce the size of the fleet needed to provide service, at least until the improved level of service the busway provides stimulates demand.

In 1990, Seattle opened a 1.3 mile bus tunnel running underneath its central business district. One mile consists of twin bore 18 ft. diameter tubes; and 5 stations, 3 underground and 2 more open air, below grade facilities. The Seattle bus tunnel and stations cost $490 million to plan and construct (Simpson 1994). Delivered on time and ten percent over budget, the bus tunnel cuts transit travel time thru the CBD from 20 minutes to 8, and provides a 20 percent reduction in buses operating on the surface. Observed capacity is constrained by the size of the current bus fleet to about 40,200 riders per day. The current fleet consists of 236 dual mode diesel/electric buses and two tow vehicles costing a total of $124 million. 173 buses are assigned to weekday tunnel service. 47 are assigned to Saturday tunnel service. The remainder are used on diesel surface routes, are used for spares and training, or are receiving maintenance. These vehicles provide 843 bus trips per weekday, 250 bus trips on Saturday, and 110 buses per peak hour, 55 in each direction. About 25 percent of all rush hour bus trips through the downtown take place in the tunnel. Seattle Metro authorities predict this value will be 40 percent in the year 2000 (King County Department of Transportation 1991). The maximum theoretical capacity, unconstrained by fleet size, is 18,000 riders per hour. This presumes 290 coaches per hour, 145 in each direction operating on 25 second headways.

The Seattle tunnel includes rail track, and was constructed to eventually accommodate both buses and trains on the same right of way. The grade and clearance requirements associated with rail vehicles are more restrictive than bus requirements. If Seattle can accommodate buses in a facility built to handle trains, then so can Los Angeles.

The existing bus fleet probably could not make use of the MTA's underground rights of way: Vehicle emissions are too high. The MTA would have to emulate Seattle and place dual mode electric buses in tunnels. Dual mode vehicles can operate from an external electric power source or as a standard diesel coach.
Dual mode vehicles would allow bus tunnel operations to be integrated with operations on other exclusive rights of way, and to serve as collectors and distributors on streets. Even if dual mode buses were used only for collection and distribution related to underground service, this is more utility than a train can provide. Combining dual mode buses with exclusive, counter flow lanes on city streets would make even better use of these vehicles.

The MTA should subject the option of retrofitting the Red Line tunnel for use by dual modes buses to a full scale engineering and cost study. Converting the subway tunnels for use by electric buses would require a number of engineering changes. Facilities permitting vehicle access and egress to the street would have to be constructed. Further, most MTA rail stations are constructed with center platforms that require riders to board the left side of the vehicle. A few stations have outside boarding platforms requiring riders to board the right side of the vehicle. Tunnel buses would have to permit boardings from both sides, like trains, Alternatively, crossovers or flyovers would have to be constructed. These changes might or might not be more efficient than simply scrapping the trains and closing the tunnel, but there is reason to take the tunnel retrofit option seriously.

Automatic transit systems

Intelligent Transportation Systems (ITS) have important implications for public transit, though these probably are not the Advanced Public Transportation System (APTS) technologies conventionally associated with ITS/transit applications. Bus Rapid Transit (BRT) technologies such as the signal priority LADoT grants MTA buses traveling along Wilshire Blvd. provide measurable improvement in the level of service available to transit users (Transportation Management & Design, Inc., 1999), but exclusive guideways for transit will do much more enhance the use of technology to further increase capacity. The institutional mechanisms for establishing technical standards needed by Automated Highway Systems are much investigated, but remain largely unknown. The set of institutional decisions needed to implement an Automated Transit System (ATS) is no smaller, but standards are easier to establish if both the guideway and the fleet are under the control of public authority. It is technically simpler and more cost effective to establish an ATS system architecture for public transit vehicles with access to an exclusive guideway than it is establish standards for the AVCS elements required by private vehicles operating as part of an AHS.

Public transit properties have deeper pockets than households; and, at present, are less likely to be punished by the market place for taking risks than are private firms. Consequently, public transit agencies and have demonstrated a useful willingness to experiment with alternative fuel vehicles, automatic fare payment systems, vehicle monitoring systems, new materials, and other technologies. They are equally likely to be willing to participate in ATS demonstration projects, particularly if participation is voluntary, and the on-vehicle components of the system are provided at no charge.

Thus a transit first approach to automation circumvents the deployment problem that constraints AHS initiatives. Once ATS technology is in the field, it will be more likely to penetrate other, more risk sensitive markets. Introducing private competition into the field provides an important intermediate step. Once technical standards have been established for public fleets, elements of these same standards can be applied to private transit fleets hoping to provide ATS services. Private fleet vehicles are more likely to be shuttle size than bus size, and thus the equipment designed for the transit entrepreneur could also be introduced into the consumer market.

Competitive transit

Public resources are used to provide transit services because the objective is to serve those who would not otherwise be served, and to ensure at least a minimum degree of mobility and access for all. The objective is
Laudable, but the results most often are not. The goal of most bus riders is not a seat on a cleaner, faster, more timely bus. The goal of most bus riders is automobile ownership. Public buses are usually the carrier of last resort, and the travelers who ride them are usually captives with no alternatives.

Municipal bus franchises are insulated from the economic forces that refine decisions in the private sector, while simultaneously subject to political constraints that do not apply to private firms. Still, these franchise operators remain economic decision makers within the context defined by their own states of information and the incentives they face. Most of the income accruing to municipal operators consists of tax revenues. Because the farebox is most often nearly irrelevant by comparison, there is no substantive way for public transit's market to punish franchise operators for poor service performance. Bus riders have no access to competing alternatives, because competition is prohibited by law. Even if the bus rider does withhold his or her patronage, he or she is only withholding fare revenues, and these are minuscule. It is no surprise that municipal bus properties tend to be characterized by decisions that are informed by the transit markets these properties serve. This produces outcomes ranging from using vehicles that are too large to paying excessive wages, poor utilization of inventories, and customer relations that can only be interpreted as hostile by private sector standards. Los Angeles is something of an exception. The MTA's bus system remains so crowded that bus capital at work in Los Angeles is achieving record efficiencies (Rubin, Moore, and Lee 1999b).

Equity arguments

The fundamental rationale for public transit systems is improved equity. Consequently, public transit agencies frequently counter arguments for private by noting that private providers of transit services will not be motivated by equity: They will be motivated by profit. If market barriers are dissolved and private enterprises are allowed to compete with public transit, these private operators will only serve profitable routes. Because the private operators will be smaller, their coordination costs will be lower, and entrepreneurs will be able to both provide a wider range of services than public transit, while at the same time undercutting public fares. This will effectively eliminate the fare box revenues available to the public operator, while leaving unprofitable routes unserved. Thus, the public operator would be left with fewer resources; and sole responsibility for addressing the equity objectives, i.e., for ensuring the mobility of those least able to pay.

A wholly privatized market for transportation services would not treat the equity concerns conventional public transit was originally chartered to address. However, neither does the status quo. There is a genuine trade-off between equity and efficiency, but this does not mean that everything that is inefficient automatically improves fairness.

Ideally, wealth transfers should not be implemented with subsidies to carriers, public or private. Instead, the subsidy should be provided to the rider in the form of a voucher (Rubin, Moore, and Lee 1999b). Unfortunately, this is likely infeasible. The administrative costs of such a program would be large. The alternative, then, is to permit competition against a subsized service provider. The MTA's service performance would necessarily improve if the Authority faced the discipline imposed by competition. Private carriers should be allowed to compete with the MTA in the same market, with the rider free to select the best alternative, presumably the cleanest, most frequent, most responsive, least expensive service. Further, allowing competition would reconcile two fundamentally inconsistent objectives currently imposed on public transit authorities, serving the interests of the poor, while simultaneously providing services capable of attracting travelers with the means to drive alone.

There is nothing new about private transit, particularly in Los Angeles. The nation's first jitneys were private Los Angeles automobiles used to provide short rides for nickel fares. The jitney innovation spread east across the US before restrictive new regulations increased costs and put jitneys out of business (Lombardo
The potential for jitney service in Los Angeles remains high: Los Angeles' ethnic immigrant community is an excellent source of both supply and demand.

Common carrier options

The standard arguments against privatization imply that transit is necessarily an inferior good, and that consumption decreases as income increases. But this does not have to be the case. The demand for transit is not a fixed quantity. Premium services can be provided that will compete effectively with the private automobile. The high level of service made possible by exclusive guideways is a potentially important part of this formula. Legalized private transit competing with public transit on the same exclusive guideway will greatly expand the market for transit services. The existing transit dependent population would benefit from efficiencies induced by competition. These efficiencies would be expressed as some combination of lower fares, and increased quality and quantity of service.

For example, California Senate Bill 63 opened the El Monte Busway to HOV-2 traffic effective January 1, 2000. Up to this date, the transit capacity delivered by the El Monte facility swamped the service provided by the Blue Line train by a factor approaching five, but transit accounted for only a small fraction of the passenger miles delivered by the El Monte. Most of the travel on this busway/HOV facility was accounted for by HOV-3 traffic. This suggests that throughput could greatly be increased if a larger proportion of the vehicles using the El Monte were buses. SB 63 moved management of the facility in the wrong direction, saturating the El Monte with new HOV-2 traffic. Prior to this, the most important reason for the paucity of buses on the El Monte busway was the difficulties associated with entering the bus business. If exclusive guideways for public buses are a better idea than exclusive guideways for trains, then guideways for public and private bus services may be the best idea of all.

The El Monte is not the only facility available to the MTA. The $498 million, 10.3 mile Harbor Transitway running above the Interstate 110 Harbor Freeway opened in June of 1996. Caltrans District 7 designed and built the facility with the intention it provide priority bus and HOV service, but the facility receives no new use from MTA buses. Buses currently operating on the busway are serving lines that existed before the facility was constructed. No new service has been added. The agency has no buses to spare because agency's capital is tied up in rail facilities and rolling stock.

Alternatively, MTA may be avoiding more bus service on the Harbor Transitway to avoid competing with the Blue Line. The former SCRTD Planning Department forecast that expanding express bus service on the Harbor Transitway would reduce Blue Line ridership by 20 percent or more, even with zone based bus fares greatly exceeding the Blue Line fare. This predicted shift is due to reduced transfers, time savings, and access to downtown stations closer to the riders' ultimate destinations.

HOT lanes

The incentives for privatization also reinforce the rationale for construction of High Occupancy Toll (HOT) lanes. Access to an extensive network of high occupancy lanes would greatly enhance the quality of service that could be provided by shuttle van operators. The level of service provided by public transit is unlikely to ever be sufficient to attract significant numbers of riders able to afford alternatives. These riders are sensitive to level of service. For them public transit is an expensive option: The level of service is too low to be acceptable. Combining an extensive network of HOT lanes with new opportunities to enter the transportation market would make it possible for transit entrepreneurs to configure new, flexible, relatively low cost, high level of service options that cannot be provided by public systems. The entrepreneurs who get it right will attract riders from single occupancy vehicles. The ones who get the formula wrong will either adjust to attract more ridership, or shift their carefully shepherded capital resources to other opportunities.
HOT lanes are one of several models available for introducing pricing (May 1992; Hau 1992). Successful implementation of congestion pricing in Los Angeles or anywhere else will have include certain key elements. Public support for congestion pricing can be maximized if public authority (Jones 1995)

1. makes certain the scheme speaks to the public's largest concerns;
2. demonstrate that there are no effective alternative solutions;
3. predicts the revenue stream;
4. keeps the scheme as simple as possible;
5. anticipates technological problems and opportunities; and
6. addresses equity concerns.

Practical steps for facilitating the implementation of congestion pricing include (DeCorla-Souza and Kane 1992)

1. introducing charges for non-qualifying vehicles on high-occupancy vehicle (HOV) lanes which are under-utilized;
2. initiating tolls on new or improved segments with toll charges related to the cost for providing new capacity;
3. standardizing toll charges to make it simpler for the tripmaker to calculate the cost of the trip; and
4. developing compatible toll collection technology nationwide to allow non-local vehicles easy access to toll systems.

These steps are largely consistent with measures identified by the Task Force to Reduce Emissions and Congestion on Highways (REACH) and others. REACH is funded by the FHWA under ISTEA Section 102(b) in response to a proposal by SCAG and Caltrans; and includes SCAQMD, the California Air Resources Board (CARB), MTA, LADoT, and several other foundations, agencies, and private sector groups. Perhaps the most striking prediction provided by the REACH Task Force is the prospect that the efficiency gains associated with congestion pricing may be sufficient to suggest pricing has much smaller equity implications than most assume, particularly if tolls are rebated. Table 5 summarizes preliminary calculations summarizing the vertical and horizontal equity impacts of the REACH Task Force's base case pricing scenario. These projections are sensitive to a number of assumptions, particularly with respect to how toll revenues are rebated to individuals. These are crude bench marks at best. The Task Force calls for much further study.

Prospects for change

Wholesale privatization of the transit market, however desirable, is unlikely. Incremental changes are much more likely. The liberalization of the California Public Utility Commission's position with respect to airport shuttle vans is an excellent example (Poole, Jr. and Griffin 1994). In this case, reducing unnecessary market barriers produced a burst of activity benefitting providers and consumers alike. Airport vans are an unsubsidized airport transit option that reduces congestion and subtracted 84.2 tons of emissions from the South Coast Air Basin in 1993(Poole, Jr. and Griffin 1994). The airport shuttle industry remains an intensely competitive, cost effective alternative. Opportunity keeps the services available, competition keeps fares to an efficient minimum, and airport authorities keep the peace at the curb. Competition is so intense that the largest providers are beginning to call for new regulations for owner/operators. This is understandable, but undesirable. The largest operators face the highest coordination costs, and are being out competed by smaller, nimble entrepreneurs.

Table 5: Net Equity Impacts of Pricing, With Selected Mitigation Measures
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<tr>
<td>Median Income per Capita</td>
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<td>Share of Income</td>
<td>5.1%</td>
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<td>Share of Vehicle Miles</td>
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<td>Share of Transit Person Miles</td>
<td>22.2%</td>
<td>20.2%</td>
<td>19.1%</td>
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<td>(Cameron 1994)</td>
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<td>Assumed Value of Time per Hour</td>
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<td>Base Case</td>
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<td>Net Annual Transportation</td>
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<tr>
<td>Priced Case(^a)</td>
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<tr>
<td>Percent Change: Pricing(^b)</td>
<td>+3%</td>
<td>+4%</td>
<td>+5%</td>
<td>+5%</td>
<td>+8%</td>
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<tr>
<td>Percent Change: Pricing + Coupon</td>
<td>+10%</td>
<td>+3%</td>
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<td>+2%</td>
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<tr>
<td>Percent Change: Pricing + Enhanced Transit(^d)</td>
<td>+7%</td>
<td>0%</td>
<td>+1%</td>
<td>0%</td>
<td>+1%</td>
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<tr>
<td>Percent Change: Pricing + Coupon + Enhanced Transit</td>
<td>+22%</td>
<td>+7%</td>
<td>+6%</td>
<td>+4%</td>
<td>+4%</td>
</tr>
</tbody>
</table>

Notes:  
\(^a\) 90 percent direct rebate to individuals.  
\(^b\) $.05/mile on uncongested freeways, $.10/mile on congested freeways, and an average emissions fee of $.016/mile on all highways.  
\(^c\) $100 coupon good for vehicle maintenance and repair of public/private transportation alternatives.  
\(^d\) Moderate public investment and addition market enhancements such as smart shuttles.

Sources:  

The case for reducing barriers to market entry (and exit) will almost certainly have to be made at the State and local levels: There is almost no genuine constituency for privatization in the Federal Department of Transportation (DOT), quite the opposite; and most of the barriers are the product of State or local jurisdiction. Local rules are a jumble, so there is much to be learned from the changes that engendered the airport van industry. The same authority that permitted the California PUC to legalize airport vans could be used to create a private transit industry.
Perhaps the only regrettable aspect of the State Legislature's decision to replace the South Coast Air Quality Management District's (SCAQMD) Regulation XV with Rule 2202 is the effect this has had on Transportation Management Associations and Organizations (TMA/TMO). Under Regulation XV, companies of 100 or more employees were required to file acceptable employee trip reduction plans with the SCAQMD. The plans did not have to succeed, but they were subject to District approval. Failure to achieve approval could lead to fines of up to $25,000 per day. This was a burdensome but compelling incentive for employers to sponsor or join active TMAs as one way of demonstrating commitment to the District's cause. Some of these TMAs were sources of considerable innovation with respect to providing private transportation alternatives to their members' employees. The legislature's weakening of Regulation XV and subsequent rules raised the threshold for compliance to 250 or more employees and introduced alternatives to filing employee trip reduction plans, with the unfortunate effect of reducing the role of the TMAs in promoting effective private transit.

III. Conclusion

Congestion is an external cost of travel that occurs because drivers do not (usually) pay for the time costs their transportation choices impose on others. The result is a misallocation of scarce resources, including both motorists' time and the capital invested in road capacity. For several decades, the prospect of an urban rail system has been held up to the electorate as the key to overcoming congestion, ensuring mobility, and improving air quality. Unfortunately, an examination of system performance reveals is none of these. We should not expect it to be. The most important Los Angeles responses to congestion have been economic responses, not policy responses. Los Angeles' development is more recent than other large US cities. Rapid growth occurred during a period in which the incentives for co-location of activities were relatively weaker than the incentives driving the land markets in older cities. At the same time, growth occurred during a period of rising income and growing demand for access to transportation services. The market for land in Los Angeles was able to respond to congestion costs by decentralizing employment do a degree unique among the largest US cities. Consequently, the Los Angeles Central Business District (CBD) is of low economic importance relative to the CBDs of other large US cities. This makes Los Angeles perhaps the nation's weakest candidate for a downtown-focused transportation system such as rail (US Department of Commerce 1983; Pushkarev, Zupan, and Cumella 1982).

Some scholars argue that land use in the United States is more a creature of policy making than market responses. For example, Goldberg and Mercer (1986) identify a number of differences between Canadian and US cities, suggesting policy explanations for the elevated densities in Canada. Gordon and Richardson (1996, 1997) explain that the land markets in Canadian cities are behaving just like the land markets in US cities, but are subject to a time lag. The same argument applies to land uses in older US cities relative to the Los Angeles benchmark. Los Angeles may not be so much an outlier as it is a leading indicator.

The Los Angeles rail plan is essentially a failed experiment in transit provision. Expanding the rail system will only increase the cost of the failure, even if the rail system operates at capacity. The plan is harmful to existing transit options. The Los Angeles rail system has been steadily diminishing public transportation services in a city that should be much more respectful of the gap between the transit-optimal haves and the transit-dependent have-nots. Transportation planning in Los Angeles requires an approach that recognizes the region's existing investment in congestion mitigation, i.e., an approach that emphasizes existing trends toward decentralization, not an approach predicated on the objective of defeating the market for urban land.

The Los Angeles County Metropolitan Transportation Authority's (LACMTA) commitment to the region's rail plan has placed it in a political conundrum. The MTA knows the system is a failure and that further investment in rail is harmful, yet the rail plan has been such a high profile project for so long that the prospect of abandoning the project is a source of political terror. Alternatives are available, and MTA has the
legal latitude to pursue them. At minimum, the MTA should proceed aggressively to meet its obligations under Judge Hatter's consent decree to the court and to the Bus Riders Union. The consent decree provides the best sort of institutional latitude for doing the right thing without publicly reversing itself.

The transportation advantages provided by exclusive rights of way are squandered if use of these guideways is restricted to rail cars. The MTA can build busways instead, facilities with greater flexibility, lower costs, and higher capacities than rail lines (Rubin and Moore II 1997). If the agency stops rail construction, it can afford to place buses in service on the elevated Harbor transitway. Further, there are ways to leverage the current investment in the Los Angeles rail system that are likely to be both economically and politically sensible. Existing rail rights of way can be retrofitted for use as exclusive busways. Seattle is providing excellent service in its downtown bus tunnel. Los Angeles can do as well, even better. Buses can be granted priority access to city streets along the Blue Line right of way and elsewhere.

The MTA or many of its services might be privatized to improve efficiency. If the fare box is the only source of revenue available, then configuring service to capture fares becomes the order of the day. Alternatively, entrepreneurs can be allowed to enter the transit market and compete with the MTA, allowing the Authority to remain a public entity, but forcing it to accept the discipline imposed by the market decisions. Los Angeles' existing, planned, and potential investments in HOV and HOT lanes would provide important opportunities for private transit, if such enterprises were legal.

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