The Illusion of Transit Choice

by
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For years the debate has raged over urban rail and its potential to attract people from their cars. It sometimes seems like every mayor and city council from Nome to Key West cannot wait to start construction on a light rail line. The dismal record of the 1980s – a decade in which every metropolitan area that built or expanded rail lost transit market share – should have ended the debate. But, alas, it has continued.

And now, early 2000 census data indicates that at least one urban area – Portland, the international paragon of light rail – has seen its transit work trip market share rise from a dismal 6.3 percent to a nearly as dismal 7.4 percent over the last decade. Other light rail cities have done less well, with market share losses of up to 35 percent (St. Louis).[1] Even in Portland, six times as many people started driving alone to work or working at home during the same period, while the average time required to take what would be a 30-minute trip by car in non-congested conditions rose by ten minutes.

In the last 20 years, the United States has spent more than $30 billion to open more than 1,000 miles of urban rail systems, yet transit work trip market share remains stuck at barely over five percent. Overall market share (for all trips, not just work trips) is even less, at just over one percent for areas outside of the New York area. By comparison, European urban areas have overall market shares of 20 percent. Traffic congestion is getting worse everywhere – in urban areas with new rail systems, and in areas without them.

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Rail Does Not Reduce Traffic Congestion

Why is it that the promise of rail is never transformed into reality in terms of traffic relief? Fundamentally, it is because rail simply does not reduce traffic congestion. That does

[1] Calculated from U.S. Census Supplementary Survey, 2000 and 1990 Census.

not keep proponents of new rail systems from making claims about traffic congestion relief. But, they are quick to abandon those claims when consultants who understand the comparative economics and benefits of alternative transportation systems come to town (such as those proposed in The Road Ahead: Innovations for Better Transportation in Texas, a report (available at www.tppf.org) that I co-authored last year with Thomas A. Rubin for the Texas Public Policy Foundation). The mere citation of the pathetic traffic impact data from local feasibility studies is usually enough to put these arguments to flight. When voters understand this reality, they virtually always turn down tax increases to fund new systems.

Transit Choice & Auto Competitiveness

The retreat from indefensible traffic congestion positions often leads to regrouping around another concept called "transit choice." The idea, or at least the implication, is that everyone should have a transit alternative. This further implies transit that is auto competitive, since there is little reason to choose transit if it is too slow or too inconvenient. The minimum requirement for auto competitiveness is service that is as fast or nearly as fast, from origin to destination, as the automobile.

The auto competitiveness issue was a useful addition to the transportation literature by my Amtrak Reform Council colleague Paul M. Weyrich, president of the Free Congress Foundation, who rightly points out that transit has high levels of use where it is competitive with the automobile.

So long as the discussion remains abstract, the rail advocates do well with transit choice. But, like the Maginot Line that fell as soon as the challenge was mounted, transit choice proves illusory when the details are examined.

Transit Choice is Scarce

The modern U.S. metropolitan area generally has a strong central business district (CBD or downtown) at its core. This core is very obvious. The towers of downtown Dallas or Houston can be seen from miles around, which leads to the perception they are the very heart of the urban area. And they used to be.

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But today, decades of suburbanization have moved the vast majority of jobs outside the downtown areas. Downtown Dallas accounts for less than six percent of employment in the Dallas-Fort Worth area, downtown Houston accounts for seven percent, and downtown San Antonio eight percent. Perhaps surprisingly, downtown Austin has the highest metropolitan market share, at 13 percent.[2] And, in all four metropolitan areas, regional projections indicate that downtown will lose further market share over the next two decades. But no one should think that the reputation of Texas for sprawl makes the situation much worse than anywhere else in the high-income world.

The New York CBD represents barely 20 percent of metropolitan employment; Paris and London represent less than 20 percent. The world's largest CBD – Tokyo – has less than 15 percent of regional employment, while Chicago's Loop, with perhaps the highest employment density in the world outside Hong

[2] All data calculated from 1990 U.S. Census Transportation Planning Package (latest data available).

Kong or New York, contains less than 10 percent of the area's employment.[3]

Transit's Niche Market: Downtown

Why the focus on downtown? Because, in most metropolitan areas, nearly all of the automobile competitive transit service is provided to or from downtown. This is not so in other parts of the metropolitan area. Whether in a Houston suburb, or the suburbs of Paris, Portland or Perth, it is virtually impossible to get to a job in another suburb by transit that is auto competitive. Indeed, for all practical purposes, it is only to downtown that transit is able to attract substantial numbers of people who would otherwise travel by car – people with the choice of automobility.

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More than 70 percent of downtown workers use transit in New York, London, Paris, Tokyo, and Sydney. Even smaller urban areas in the U.S., such as Portland, Minneapolis and Houston (yes, Houston) have downtown transit work trip market shares of more than 15 percent.

Outside downtown is another thing. Even the strong and dense "edge city" employment centers like Greenway and Galleria in Houston or Irving, or the North Tollway in Dallas, have small transit market shares. The reason is simple. You can't get there from most places in the urban area, because there is little or no auto competitive service. For example, a resident of South Dallas commuting to work at Irving Mall using transit would have a daily round-trip travel time of 3.9 hours instead of a 1.5 hour round-trip commute by car. (See case study at the end of this article).

Transit commuting to areas outside downtown is dominated by people who do not have cars. Census data indicates that the average metropolitan household income is 10 percent higher than that of the average downtown transit commuter. But the average income is 70 percent more than the average transit commuter to a non-CBD job. At least in high-income nations, most people have the option of the automobile, and progress is being made in lower income nations. Few people with a choice choose transit service that is too slow or too inconvenient. That is what makes auto competitive transit service so crucial to attracting automobile drivers.

So, 80 to 95 percent of jobs in the modern metropolitan area are not downtown. Even in smart growth Portland which has experienced significant recent increases in transit service,[4] only a small percentage of residents can reach non-CBD jobs by auto competitive transit. The average non-downtown employment location is accessible by no-transfer transit service to barely five percent of the area's residents.[5] Future planned increases, while significant in percentage, are so modest in relation to overall travel that there will be comparatively less auto competitive service in the Portland area 20 years from now. No-transfer service is important, because the long transfer times that

[3] www.demographia.com/db-intlcbddens.htm.

[4] Review of transit timetables to 81 locations in the Portland urbanized area, outside the downtown area for trips taking 40 minutes or less by transit.

[5] Automobile competitive transit is considered to be trips that can be completed within 40 minutes, approximately twice the average automobile commute times.

are typical of U.S. transit systems render them incapable of auto competitiveness for most trips. With preliminary census data showing that the average work trip remains at only 24 minutes, it doesn't take long for a 10- to 30-minute transfer to make auto competitiveness an impossibility.

The False God of Density

Many rail debates get mired on arguments about density. Transit professionals pontificate about density thresholds that justify certain types of transit systems. For example, some suggest that light rail needs densities of more than 7,500 people per square mile to be successful.[6] But while that figure may be useful for some analytical purposes, the simple fact is this: For transit to have any hope of attracting people out of cars, it must be available in a form that is auto competitive. And, it must take people from where they are to where they want to go at an auto competitive travel time. What the particular density is where their trip begins or where it ends is of no importance whatsoever.

Take, for example, an employee who works just beyond the eastern fringe of Shanghai's Pudong business district (an "edge city" on the east bank of the Pu River, across from downtown) and lives in the Changling ward of western Shanghai, less than 10 miles away. The Shanghai urban area has a density of more than 40,000 per square mile, many times that of the 1,500 to 2,500 average Texas urban area, seven times that of any U.S. area, and much higher than that of any western European, Australian, Canadian, or Japanese urban area.

The Changling resident's neighborhood might have a population density of more than 100,000 per square mile. But, if the Changling resident cannot walk out the door and enter the work place, using transit, in a time that is competitive with the automobile, then the automobile will be used, if it is available. And, increasingly, automobiles are available, even in lower income nations.

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In the final analysis, whether in the sprawl of Portland, Austin, or the crowding of Shanghai or Mumbai, density is of no account. All that matters is auto competitive service so far as the commuter is concerned.[7]

So, that means that providing auto competitive service to downtown Dallas, downtown Houston, downtown San Antonio, or downtown Austin just isn't enough. If transit choice is the reason for building new transit systems financed by people throughout the urban area, then auto competitive service must also be available for travel to and from destinations throughout the urban area. Auto competitive service should be available to the medical center from throughout San Antonio. The high-tech businesses in Williamson County need auto competitive service from throughout the Austin area. Workers need to be able to travel by auto competitive service to Arlington from all of the Dallas-Fort Worth area. And, the Galleria needs to be accessible by auto com-

[6] These kinds of statements are often based upon the work of Boris S. Pushkarev with Jeffrey M. Zupan and Robert S. Cumella, Urban Rail in America An Exploration of Criteria for Fixed-Guideway Transit (New York: Regional Plan Association, 1982). But such citations are a fundamental misreading of this work, which is devoted to examining criteria for downtown-oriented rail transit, not transit with trip ends in other parts of the urban area.

[7] This is not to suggest that density is not an important consideration. Generally, transit systems can be designed and operated more economically in higher density areas.

petitive service from throughout the Houston area. Just as importantly, auto competitive service needs to be available from throughout the urban area to the corner of Huebner and Lockhill-Selma Roads in San Antonio and the host of similar, low density employment areas throughout urban areas that constitute the majority of jobs. The rail systems and park-and-ride buses that provide auto competitive service to downtown need to be made available to all work locations throughout the urban area.

The reality, of course is different. The rail advocates will never tell you this. But there is no plan to make auto competitive transit service available to these locations, not even in the unfunded wish lists found in 25-year transportation plans. But that does not keep the rail advocates from giving the impression that if just this or that tax is raised, or this or that bond issue approved, people will be able to walk from their house to a fast, convenient train that delivers them to a station within a few feet of their work place. It just isn't in the cards, not by a long shot.

Costing Transit Choice

So what about transit choice? It is theoretically possible to provide a much higher level of transit service, and to provide automobile competitive services to areas other than downtown. It may be possible to provide transit service that is so quick that any employment location can be reached in an auto competitive travel time from any location in the urban area.

If transit choice were to be adopted as the genuine object of policy, the starting point would be a metropolitan transit service specification, a concept virtually unheard of in the United States or abroad.

Examples of hypothetical "transit choice" service specifications are:

- 100 Percent Trip Specification: All people in the metropolitan area should be able to reach any other location in the service area within a time that is no more than 50 percent greater than that of an automobile trip (data just released by the U.S. Bureau of the Census indicates that transit commute times remained more than double that of automobiles in 2000).

- 80 Percent Residence-Work Trip Specification: 80 percent of residences can reach 80 percent of the jobs in an urban area by auto competitive transit. This would provide for 64 percent connectivity between jobs and residences in the urban area (0.8 x 0.8 = 0.64).

There are many other alternatives and combinations of alternatives. But like any endeavor that seeks to use scarce resources to solve expensive problems, the starting point is determining what needs to be done – the objectives.

A Transit System Offering Transit Choice

To test the cost of the ultimate service specification (the "100 Percent Trip Specification" above), a model was constructed of a 400 square mile urban service area, called Smartland for the sake of this exercise (a name chosen in honor of the smart growth advocates who sometimes fail to examine ultimate costs of their well marketed proposals). For simplicity, it was assumed that the urban area would measure 20 miles by 20 miles and would have a downtown area at the core. It was also assumed that the urban service area would have approximately 3,000 people per square mile, which is similar to the U.S. average for urbanized areas over 1,000,000 in population (the approximate population density of the Portland urban area). Thus, the population of Smartland would be 1.2 million persons, also similar to that of Portland.

Because of the great affinity so much of the transit industry has for rail systems, it was assumed that the system would be rail based. Moreover, to make it possible to achieve the journey speed required by the service specification, it is necessary for the rail system to be fully grade separated (elevated or subway). Otherwise, traffic signals and cross-traffic would make the required speed unattainable.

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Generally, people with a choice – people who have cars – will walk no further than a quarter of a mile to reach a transit stop. Thus, there must be stations and service within one-quarter mile of every point within the service area. This means that rail lines must be spaced no more than one-half mile apart. It is assumed that the most efficient transit system design meeting the service specification would be a grid, with rail lines running east to west and north to south every one-half mile. This would enable travel from any point in Smartland to any other, with most trips requiring a transfer.

It is a well-known fact that automobile users are particularly averse to transferring between transit vehicles. This aversion may be mitigated by making service intervals so frequent that transfer times are very short. Moreover, it is necessary to minimize transfer times between rail lines so that journeys can be completed within the time required by the service specification. Providing a no-transfer system meeting the service specification would cost many times more. Automated single-car trains could be operated one minute apart, using technology similar to the Skytrain system in Vancouver, British Columbia.

Costs: A Rail System

Based upon current capital and operating costs, such a system would be very expensive indeed. It is estimated that the annual capital and operating costs for a comprehensive system providing transit choice to the entire community would be more than the total personal income of the metropolitan area, equal to approximately 110 percent of per capita income. This is nearly 350 times the present annual expenditure of less than $100 per capita on transit in major metropolitan areas (over 1,000,000 population). The total annual cost would exceed $35 billion.

Costs: A Bus System

A lower estimate can be obtained by relying on the work of UT-Dallas and former Harvard economist John Kain[8] and the United States Government Accounting Office,[9] which indicates that bus rapid transit solutions tend to cost one-fifth or less than that of rail systems (capital and operating costs per passenger mile). If it is assumed that the transit choice service specification can be provided with buses for one-fifth the cost of the rail system, the cost is still prohibitive, equal to more than 20 percent of metropolitan Smartland's income (less than $6,000 per capita), or nearly 70 times the current average national transit spending level of less than $100 per capita. While the bus alternative would be less expensive (and it might be possible to design a less expensive rail solution), the annual total cost of more than $7 billion is still well beyond any amount that can be imagined as reasonable or achievable.

[8] John Kain, Ross Gittell, Amrita Daniere, Tsur Summerville and Liu Zhi, "Increasing the Productivity of the Nation's Urban Transportation Infrastructure," United States Department of Transportation Federal Transit Administration, January 1992.

[9] www.publicpurpose.com/pp-brt.htm.

Scaling Back the Specification

It might be suggested that, if transit choice is too expensive to provide for all, then perhaps it could be provided for a more modest service specification. For example, a service specification might be adopted to provide transit choice to 50 percent of the origins and destinations in the urban area. But, as the service specification is made more modest, there is a diminishing return. Such a system would not provide for 50 percent of the trips, but rather 25 percent of the trips (0.50 x 0.50).

Transit Choice for the Few

Because of the cost structure of transit and the limited demand in areas other than downtown, transit choice can only be provided for the few. For example, it is estimated that, on average, no-transfer transit service is available for perhaps 15 percent of work trips in the Portland area. The figure would be much smaller for other trips, such as shopping or visiting friends.

People will use quality transit service where it is provided. There is good evidence for this, as the experience of services to central New York, Paris, London, and Sydney indicate. But in each of these places, the trips to the central area represent a small fraction of travel, even among work trips. Whether in the suburbs of Phoenix, Portland, London, or Paris, unless the trip is to the central area, there is little or no transit choice because there is little or no auto competitive transit service. And, virtually every year, the proportion of trips beginning or ending in the central area drops.

Transit choice is beyond the means of the modern metropolitan area, except for the few headed to downtown. That is why the Texas Public Policy Foundation performance reviews suggested that metropolitan transit authorities would be more accurately labeled as downtown transit authorities.

If transit choice is the object of policy, then it is even more urgent that urban rail projects be abandoned as quickly as possible. Because rail systems tend to cost five times as much per passenger mile as bus-based rapid transit systems, each rail corridor means that four bus corridors are not built. And, transit choice is made available to one-fifth the number of residents that it might otherwise be.

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Lack of Vision

All of this indicates a fundamental problem with transit: It is bereft of vision. Transit agencies stumble from ad hoc usually rail project to project, massively over-investing in a small number of corridors that principally serve downtown areas. Even their long-range plans anticipate little measurable improvement in transit's market share.

The Limits of Vision

Even if transit had a vision to make transit choice a reality, there would be significant limits. Because of the high costs of providing transit choice to more than the few, there is little that can be done to provide genuine transit choice.

It is clear, however, that more cost-effective solutions, such as bus rapid transit, and more cost-effective strategies, such as competitive contracting (the use of less costly private operators to provide services, as in London, Adelaide, Stockholm, and Copenhagen), could greatly increase transit service and increase its impact in the community, if ever so slightly. However, in the final analysis, at any reasona-

bly achievable investment level, there is little transit can do to solve the problem of traffic congestion.

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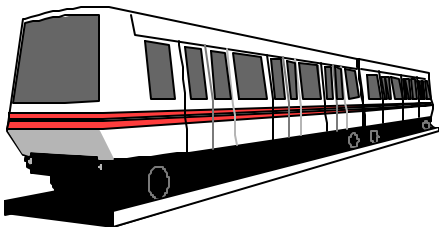
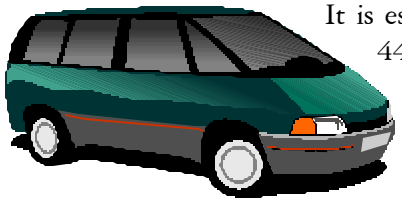
Case Study:

Auto Competitiveness & Non-Downtown Commuting



The problem of non-downtown commuting and the lack of auto competitive transit service is illustrated by the example of a resident living within walking distance of Beckley and Overton in South Dallas and working at Irving Mall.



It is estimated that the automobile commute would require approximately 44 minutes for the 20-mile trip each way, for a total daily travel time of 1:28 (approximately 1.5 hours).

If the resident used transit instead (DART buses, light rail and commuter rail), the trip would require 3:52, (approximately 3.9 hours daily) – almost 2.5 hours longer than the automobile commute time.

Three transfers would be required – at a light rail station, to commuter rail at Union Station and to a local bus in Irving (Table 1).[10]

Table 1:
South Dallas Commuting: Auto and Transit
Round Trip Travel Time

South Dallas Resident Commute	Auto	Transit	Excess Time on Transit	Auto Distance (Miles)
Beckley/Overton - Irving Mall	01:28	03:52	02:24	20.1
Beckley/Overton – Downtown	00:44	01:50	01:06	7.5
Kiest Light Rail Station-Downtown	00:38	01:00	00:22	6.0

Assumes peak hour trip takes 1.47 times non-peak trip (Travel Time Index)
Transit trip includes five-minute walk to and from residential transit boarding point
Work schedule assumed 8:00 a.m. to 5:00 p.m. Employee must exit transit no later than 7:55 a.m. and enter no earlier than 5:05 p.m.
Walking distance assumed to be 0.25 miles.

[10] It would also be possible to make the trip on a cross-town route, which would avoid the downtown transfer. Two transfers would still be required, and the total daily travel time would approach five hours. The cross-town route takes longer because all of it is on local bus services, while the downtown Dallas routing takes advantage of express bus service at least in one direction.

If the resident instead worked in downtown Dallas, it would take 1:06 longer each day to get to work, considerably better than the commute to suburban Irving, but still more than double the travel time by car. If the South Dallas resident instead lived within walking distance of the light rail station (Kiest), the round trip commute by car would take 38 minutes, while the direct light rail commute to Union Station would take 1:00, approximately 50 percent more. Thus, even where there is substantial transit investment, transit commute times may not be auto competitive.

Based upon 1990 data, it is estimated that:[11]

- 750,000 jobs were within a 45-minute automobile commute of Beckley and Overton.
- Virtually no jobs were available by transit from Beckley and Overton in a time that is competitive with the automobile.
- Even with the billion dollar light rail system, it takes approximately 50 percent longer to reach downtown jobs from within walking distance of the Keist light rail station.
- Few, if any, jobs were available by auto competitive transit from the Kiest light rail station. It is estimated that at most, 200,000 jobs are within a 45-minute transit travel time of Kiest Station.

As noted earlier, a disproportionate share of people who commute on transit to non-downtown locations do not have access to cars. With less choice, low-income people without cars tend to walk further distances to access transit service. In some cases, walking for a longer distance could make it possible to avoid long transfer times and marginally reduce travel times.

[11] Based upon analysis of data in the 1990 Census Transportation Planning Package.