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Evaluating Household Savings From High Quality Public Transit Service

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Summary

High quality public transit consists of service sufficiently convenient and comfortable to attract travel that would otherwise be by automobile. This report uses data from U.S. cities to investigate the incremental costs and benefits of high quality transit service. It indicates that high quality public transit typically requires about $268 in additional subsidies and $104 in additional fares annually per capita, but provides vehicle, parking and road cost savings averaging $1,040 per capita, plus other benefits including congestion reductions, increased traffic safety, pollution reductions, improved mobility for non-drivers, improved fitness and health. This indicates that residents should rationally support tax increases if needed to create high quality public transit systems in their communities. Current planning practices tend to overlook or undervalue many of these savings and benefits and so result in underinvestment in transit quality improvements.

Introduction

Most North American cities, and many cities in other parts of the world, currently have low to moderate quality public transit service, intended to provide basic mobility for *captive users* (travelers who lack alternatives, also called *dependent riders*). High quality public transit can attract *discretionary users* (travelers who have alternatives, particularly automobile travel, also called *choice riders*). This reduces vehicle ownership and use, which increases overall transport system efficiency and reduces problems such as traffic and parking congestion, accidents, and pollution emissions.

High quality transit requires the following features:

- Covers a large portion of regional destinations, such as business districts, major sport and cultural facilities (arenas, theaters and conference centres), college and university campuses, and residential neighborhoods.
- Service is relatively frequent and relatively fast (a significant portion of service is grade separated and so avoids congestion).
- Waiting areas and vehicles are comfortable, safe, and easily accessible.
- Attractive stations that are well integrated into neighborhoods, creating transit oriented development (compact, mixed use development around stations).
- Affordable and convenient pricing.
- Support and encouragement features, including good walking and cycling conditions, and efficient parking management in station areas.

Conventional public transit service is comparable to economy class airline travel; it transports people with minimal convenience, comfort or prestige. High quality public transit service is comparable to first class airline travel, which responds to affluent consumers' demands for convenience, comfort and respect. Airline travelers can choose the service quality they prefer: inexpensive basic service or more expensive higher quality service. Transit users do not usually have such options. To obtain higher quality service public transit users must convince public officials that service improvements are cost effective compared with other transport system investments, and convince citizens to support any required tax increases.

This report examines the cost efficiency of public transit service quality improvements. It investigates the degree that such investments are cost effective from an average household's perspective, in particularly, whether household financial savings offset additional tax burdens.

Incremental Costs

Of the fifty largest U.S. cities, the seven with high quality transit service[1] spent $329 per capita on average on transit capital and operating expenses in 2006, of which $128 (39%) was from fare revenue and $201 from subsidies. The other 47 cities spent $104 per capita on average on transit, of which $22 (21%) was from fares and $82 was subsidies.

Table 1 **Per Capita Public Transit Expenditures, 2006** (APTA Data)[2]

	Basic Transit	High Quality Transit[1]	Difference
Fares	$22 (21%)	$128 (39%)	$106
Subsidies	$82 (79%)	$201 (61%)	$119
Total Expenditures	*$104 (100%)*	*$329 (100%)*	*$225*

The seven U.S. cities with high quality public transit spent $201 per capita on transit subsidies, compared with $82 in cities with basic quality transit.

This indicates that financing high quality public transit requires on average $119 in additional annual taxes per capita, that is, beyond what is required for basic service. In practice, larger subsidies are usually required to raise a city from basic to high quality since high quality transit systems require decades of capital investments (systems such as New York, Philadelphia and Boston are more than a century old). Table 2 indicates per capita annual public transit subsidies in three cities selected for their current efforts to significantly improve transit service quality. This suggests that residents would typically need to spend $250-350 annual per capita in additional subsidies over several decades to develop high quality public transit systems, although actual costs will vary depending on specific geographic and urban development patterns. Much of this investment can be provided by shifting money from other sources, particularly federal and state highway funding, so in most cases little or no actual tax increases are required.

Table 2 **Public Transit Annual Subsidies In Selected Cities** (APTA Data)

City	Year	Population	Revenue	Operating	Capital	Subsidy
Denver	2008	1,984,889	$89,942,987	$435,523,277	$282,758,380	*$317*
	2003	1,984,889	$51,319,917	$283,122,632	$277,944,080	*$257*
	1998	1,517,977	$41,749,416	$151,618,781	$72,497,436	*$120*
Portland	2008	1,583,138	$82,511,223	$362,110,546	$317,524,313	*$377*
	2003	1,583,138	$54,444,840	$265,580,988	$130,738,567	*$216*
	1998	1,172,158	$35,785,575	$154,924,613	$214,054,131	*$284*
Seattle	2008	2,712,205	$121,823,960	$550,227,162	$101,408,907	*$195*
	2003	2,712,205	$75,485,244	$393,903,253	$112,914,852	*$159*
	1998	1,744,086	$67,769,721	$314,294,998	$296,488,917	*$311*

This table indicates annual public transit subsidies for three cities currently investing to increase their public transit service quality. This suggests that creating high quality systems requires about $250 annual per capita in additional taxes, beyond the $82 required for basic service. (Population data from most recent census).

[1] New York, Washington DC, Boston, San Francisco, Chicago, Philadelphia and Baltimore (Litman 2004).
[2] Analysis in the *2009 Urban Transport Performance Spreadsheet* (www.vtpi.org/Transit2009.xls), based on data from the American Public Transportation Association (www.apta.com), the National Transit Database (www.ntdprogram.gov), and sources described in Litman 2007.

Is this expensive? Are such investments justified? Such funding represents a major increase in *transit* spending but is small compared with total *transportation* expenditures. U.S. households currently spend about $3,500 annually per capita on vehicles and fuel. Urban households, businesses and governments spend an estimated $2,000 annually per capita for parking facilities (residential garages, parking lots and on-street parking). Governments spend about $600 annual per capita on roadway facilities and traffic services, of which about $300 is from user fees (special fuel taxes, vehicle registration fees and tolls). In addition, households also pay about $100 annually to subsidize public transit services and $50 in transit fares. Table 3 summarizes these expenses.

Table 3 **Typical Transportation Expenditures Per Capita** (Litman 2009)

Expenses	Current Average
Vehicles	$3,500
Parking	$2,000
Road subsidies (excluding vehicle taxes and fees)	$300
Transit subsidies	$100
Transit fares	$50
Totals	*$5,950*

Automobile transportation requires vehicles, parking and roads, the cost of which totals about $5,800 annually per capita. Transit expenditures total about $150 annual per capita.

Transportation Impacts and Savings

High quality public transit attracts travel that would otherwise be made by automobile, and leverages vehicle travel reductions by creating more accessible, multi-modal communities. People who live or work in communities with high quality public transit tend to own fewer vehicles, drive less and rely more on alternative modes than they would in more automobile dependent areas ("Transit Oriented Development," VTPI 2009). In automobile-dependent communities automobiles are used for most trips, and sprawled land use increases travel distances. In transit oriented communities residents use a mixture of modes. In carfree communities, most trips are by non-motorized modes and public transit, automobile travel is reserved for work trips (such as delivery and service vehicles) and out-of-town travel. Table 4 illustrates this concept.

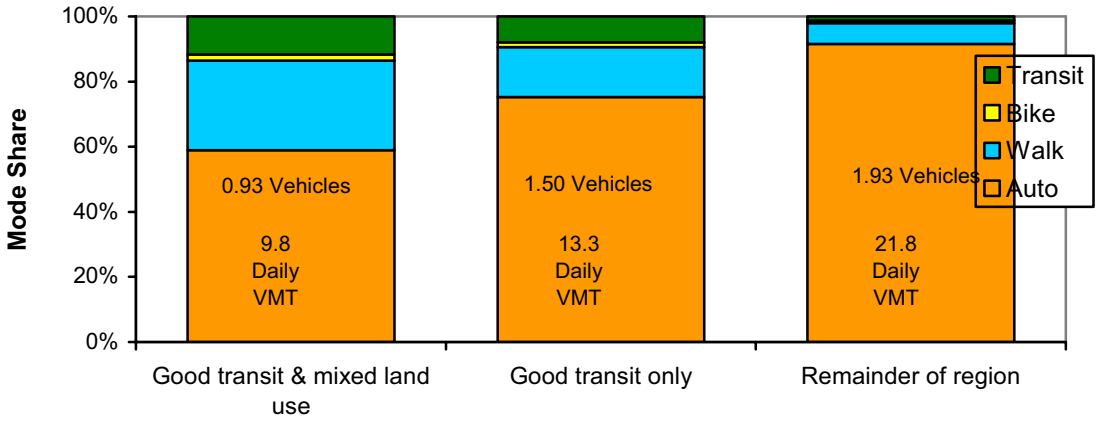
Table 4 **Typical Mode Share By Trip Purpose For Various Transport Systems**

Trip Purpose	Automobile Dependent	Transit Oriented Development	Carfree
Work commuting	🚗🚗🚗🚗🚗	🚲🚌🚌🚗🚗	🚶🚲🚲🚌🚌
School commuting	🚲🚌🚗🚗🚗	🚶🚲🚲🚌🚗	🚶🚶🚲🚲🚌
Work-related business	🚗🚗	🚌🚗	🚲🚗
Personal travel (errands)	🚶🚗🚗🚗🚗🚗🚗	🚶🚶🚲🚲🚗🚗🚗	🚶🚶🚲🚲🚌🚌🚗
Social and recreation	🚶🚗🚗🚗🚗🚗	🚶🚶🚲🚌🚗🚗	🚶🚶🚲🚲🚌🚗
Total car trips	*21*	*9*	*3*
Total transit trips	*1*	*5*	*6*
Total non-motorized trips	*3*	*11*	*16*
Total trips	***25***	***25***	***25***

Residents of automobile-dependent communities use automobiles for most trips. Transit oriented development results in the use of mixed modes. Carfree development results in minimal driving.

Cervero and Arrington (2008) found that transit oriented developments generate about half as many automobile trips as conventional, automobile-oriented development. Some of these reductions result from differences in household size (urban households tend to be smaller than suburban households) and self selection (people who, due to need or preference, minimize their driving tend to choose more accessible, transit-oriented neighborhoods), but studies that account for these factors still show that households tend to significantly reduce vehicle ownership and mileage when they shift to locations with high quality transit (Bailey 2007; Evans and Pratt 2007; Renne 2005). Households located in Portland, Oregon's transit-oriented neighborhoods own about half as many vehicles and drive about half as many annual miles as residents of more automobile-oriented neighborhoods, as indicated in Figure 1.

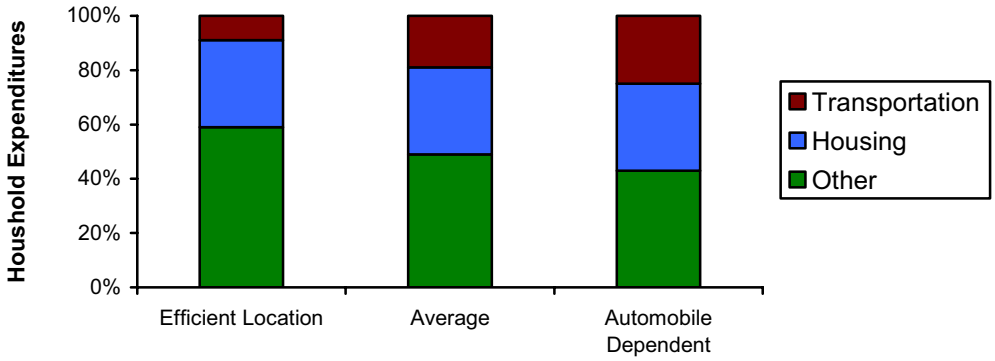
Figure 1 **TOD Impacts On Vehicle Ownership and Use** (Ohland and Poticha 2006)



Residents of transit oriented developments tend to own fewer vehicles, drive less, and use alternative modes more than in automobile-oriented communities. "VMT" = vehicle miles traveled.

These reductions in automobile ownership and use cause significant household transportation cost savings.

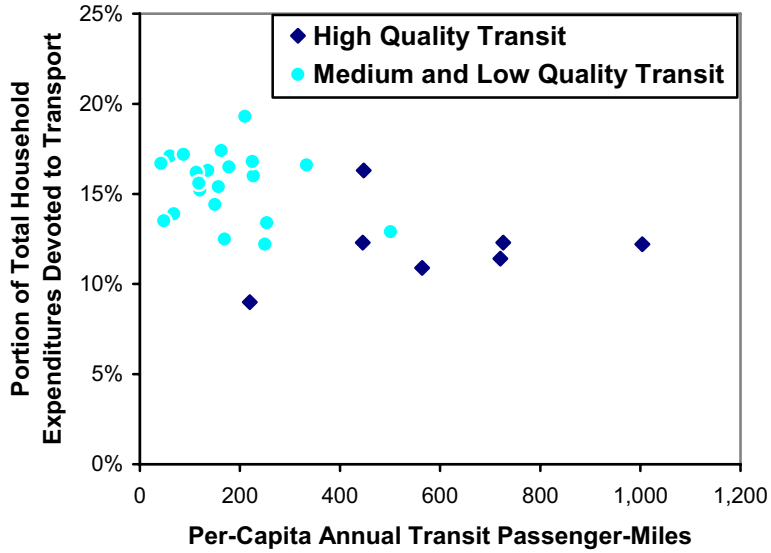
Figure 2 **Household Expenditures** (CTOD 2009)



More efficient location (accessible and multi-modal neighborhoods) reduces the portion of household budgets devoted to transportation, leaving more money to spend on other goods.

Other studies have similar results (CTOD and CNT 2006; Lipman 2006; Polzin, Chu and Raman 2008; ULI 2009). Figure 3 shows that the portion of household expenditures devoted to transportation tends to decline with increased per capita transit travel, and is particularly low in cities with high quality rail transit systems.

Figure 3 **Percent Transport Expenditures** (Litman 2004)



The portion of total household budgets spent on transportation (automobiles and transit) tends to decline with increased transit ridership and tends to be lower in cities with high quality transit.

Improving public transit service quality can provide savings in various ways:

- Travelers shift from driving to public transit, reducing variable costs (fuel, vehicle wear-and-tear, parking fees and tolls).
- More accessible, compact and mixed development reduces driving distances, and allows more trips to be made by walking and cycling.
- Improving transportation options reduces the need to chauffeur non-drivers.
- With better transportation options, some households reduce their vehicle ownership, often avoiding the need for a second or third vehicle, and if transport options are very good, some households may give up vehicle ownership altogether.
- Reduced vehicle ownership reduces residential parking costs, which can provide additional household savings.

Actual impacts vary depending on individual household's needs and preferences. Some may not change at all, while others will reduce their automobile use and expenditures

more than average. People who are physically or economically disadvantaged are particularly likely to use alternative modes and take advantage of opportunities for financial savings, proving affordability and equity benefits. Because they spend less on transportation overall and have more opportunities to save even more if faced with a financial stress (such as fuel price spikes, a vehicle failure or reduced household income, households in more accessible, multi-modal neighborhoods also tend to have lower home foreclosure rates (NRDC 2010).

Public transit service improvements allow, but do not force, households to reduce their automobile travel and expenditures. As a result, these travel changes and savings generally reflect consumer surplus gains, that is, households are better off overall, since they can still travel by automobile when best for them overall (possible negative consumer impacts of transit oriented development are discussed later in this report).

Net Savings

The consumer savings provided by high quality public transportation are generally many times greater than the incremental costs of such service. On average, creating high quality systems requires residents to pay $268 in annual subsidies and $108 in additional fares, but saves about $1,040 in vehicle, parking and roadway costs, providing 277% annual return on investment. Table 5 and Figure 4 illustrate these impacts.

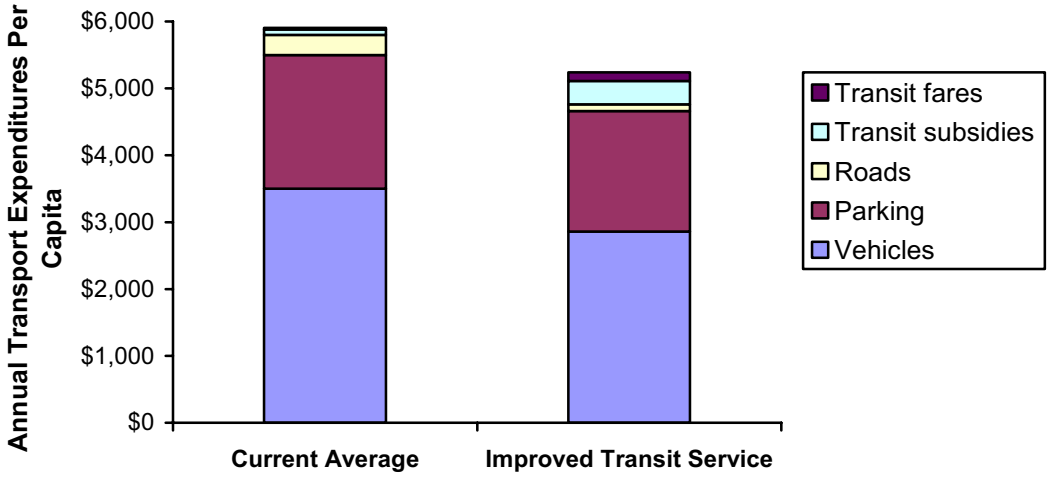
Table 5 **Transportation Expenditures In Basic and High Quality Transit Areas**

Expenses	Basic Transit	High Quality Transit	Savings
Vehicles (excluding taxes spent on roads)	$3,500	$2,860	$640
Parking	$2,000	$1,800	$200
Road subsidies (from general taxes)	$300	$100	$200
Total Automobile	*$5,800*	*$4,760*	*$1,040*
Transit subsidies	$82	$350	-$268
Transit fares	$22	$130	-$108
Total Transit	*$104*	*$480*	*-$376*
Totals Transportation	***$5,904***	***$5,240***	***$664***

High quality public transit requires an additional $268 in subsidies and $108 in fares, but saves $1,040 in vehicle, parking and roadway costs per capita annually, providing net savings.

Transportation costs are not usually aggregated in this way. Transportation economic analysis generally compares transit system costs with just roadway costs; by tradition vehicle and parking costs are not considered, although road use requires a vehicle and parking facilities at each destination, costs that are reduced or eliminated if the same trips are made by public transit. As a result, such analysis underestimates the total costs of accommodating increased roadway travel and underestimates the total savings and benefits that would result from public transit improvements that allow residents to reduce their vehicle ownership and use.

Figure 4 **Typical Per Capita Savings From High Quality Transit Service**



Residents of communities with high quality public transportation spend significantly less on average on motor vehicles and transport overall, even taking into account additional subsidies.

Other Impacts

High quality public transit service, transit oriented development, reduced vehicle ownership and travel, and increased use of alternative modes have other economic, social and environmental impacts. High quality public transit tends to provide these benefits (Litman 2007):

- Reduced per capita traffic congestion delay.
- Road and parking facility cost savings.
- Reduced per capita traffic fatality rates.
- Improved mobility for non-drivers, and reduced chauffeuring burdens for drivers.
- Improved public fitness and health.
- Energy conservation and emission reductions.
- Increased economic productivity and development opportunities.
- Openspace protection (less farmland and habitat lost to urban development).
- More efficient transit service (lower costs per passenger-mile) and higher cost recovery.

There are also some possible negative impacts.

- More compact, mixed development tends to reduce private gardens and other local greenspace, and increase noise exposure.
- More compact, mixed development may increase traffic and parking congestion.
- Transit encouragement efforts may include negative incentives such as parking pricing.

Land use policies that concentrate urban development tend to increase unit land costs (dollars per acre), which can increase housing costs, and so burden lower-income households, although this can be offset by increased development density which reduces land requirements per housing unit, and other policies that increase housing affordability.

Some people believe that compact urban development increases social problems such as poverty, drug use and crime. While it is true that such problems are often concentrated in urban neighborhoods, this resulted from the movement of wealthier household away from cities, they are not caused by urban environments themselves. There is no evidence that increasing the number of middle- and high-income households living in urban neighborhoods increases social problems, on the contrary, such problems can be reduced with more demographic mixing (low, medium and high income households locating in the same neighborhoods) and local economic development (more jobs and services located in urban neighborhoods, which increases local tax revenues).

Conventional Analysis

Conventional analysis often implies that investments in high quality public transit are wasteful because it underestimates many public transit benefits (Litman 2007).

- Conventional economic analysis only considers roadway expenses, ignoring vehicles and parking costs. It assumes that everybody (or at least, everybody who matters) has an automobile available that would otherwise be unused, and so assigns no vehicle or parking cost savings to transit improvements that reduce household vehicle ownership.

Table 6 **Impacts Considered and Overlooked In Conventional Planning**

Generally Considered	Often Overlooked
Congestion reduction Vehicle operating costs Vehicle crash rates Transit fares	Vehicle ownership costs (and savings if transit improvements allow households to reduce vehicle ownership) Parking cost savings Downstream congestion (increased congestion on surface streets caused by increased highway capacity). Additional accidents, energy use and pollution emissions caused by induced travel.

This table indicates which impacts are considered or overlooked by conventional transportation economic evaluation. Many significant benefits of high quality public transit are often overlooked.

- Conventional analysis evaluates transport system performance based on *mobility* (vehicle traffic speeds) rather than *accessibility* (people's ability to reach goods, services and activities). It ignores the tendency of highway expansion to stimulate dispersion, and therefore reduce land use accessibility, and the tendency of transit improvements to support more compact, mixed development and therefore improve accessibility.
- Public transit systems operate on congested urban corridors where transport facilities tend to be costly to construct and operate. Although transit projects are costly, resulting in relatively high costs per route-mile, vehicle-mile and passenger-mile, this is often cheap compared with the full costs of expanding urban highway and parking facilities.
- Simply increasing public transit service may provide insufficient vehicle cost savings to repay the investments (Polzin, Chu and Raman 2008). However, an integrated set of transit improvements with support policies (transit oriented development and incentives such as reduced parking subsidies) provide much larger vehicle travel reductions and consumer savings, and so increase economic returns.
- Conventional analysis often implies that transit travel is slow, and therefore inefficient. This is not necessarily true, particularly for high quality transit integrated with transit oriented development. Where this occurs overall accessibility (the number of destinations people can reach within given time and financial costs) can be increased compared with automobile-dependent sprawl.
- Critics argue that public transit receives an *excessive* portion of transportation investments, more than their mode share, but these are the investments needed to improve accessibility on the major urban corridors where transport problems are most severe and to make up for decades of underinvestment in alternative modes.

Responding To Consumer Demands

Because transportation projects often take years to implement and planning decisions have impacts that often last for decades it is important that current transport planning decisions and investments anticipate long-term future demands.

A number of current trends are increasing the value of high quality public transit and transit oriented development (Litman 2006):

- *Aging population.* As people age their automobile travel tends to decline and demand for alternative modes and more accessible location tends to increase.
- *Rising fuel prices.* As fuel prices rise, demand for alternative modes and transit oriented locations tends to increase.
- *Growing congestion.* As traffic and parking congestion increase, the value of high quality, grade-separated public transit tends to increase.
- *Changing attitudes about urban living.* Until recently cities were considered dirty, dangerous and impoverished. Increasingly, cities are considered exciting, healthy and attractive places for successful households to reside.
- *Increasing health and environmental concerns.* High quality public transit and transit oriented development help achieve health, safety, and environmental objectives.
- *Shifting assumptions about suburban real estate value.* Recent suburban housing market devaluation eroded the assumption that suburban real estate is a superior investment.

These trends will not eliminate automobile travel but market research indicates that an increasing portion of households prefer to drive less, rely more on alternative modes, and live in more accessible, multi-modal communities, provided that those options are convenient, comfortable, safe and affordable (Nelson 2009). Rising housing prices in many urban neighborhoods is an indication of this demand. One of the most effective ways to insure that these consumer demands are met is to invest in high quality public transit and implement policies to support more transit oriented development (Reconnecting America 2004).

Failure to invest in high quality public transportation deprives many households, particularly lower-income households, of their preferred transportation options, forcing them to drive more, spend more on transportation, and live in more automobile dependent communities than they consider optimal, and increasing external costs such as traffic congestion and pollution emissions.

Conclusions: Raise My Taxes, Please!

Most North American cities offer only basic public transit service, with limited coverage and frequency, modest speeds, unattractive waiting areas, poor land use integration, and few amenities. Such service is used primarily by people who lack alternatives. In such communities, as soon as they can riders tend to abandon public transit.

In cities with high quality public transit even affluent people often use alternative modes. In addition to travel shifted directly to transit, high quality transit tends to leverage additional vehicle travel reductions by stimulating compact, mixed, walkable development. As a result, residents of communities with high quality public transit tend to own fewer vehicles and drive less, and spend less on transportation, than they would in communities that offer only basic transit service.

Providing high quality public transit service typically requires about $268 in annual subsidies and $108 in additional fares per capita, but reduces total transportation expenditures about 20%. For an average household this works out to $775 annually in additional public transit expenses and $2,350 in vehicle, parking and roadway savings, or $1,575 in overall net savings.

Transportation costs are not usually evaluated in this way. Conventional economic evaluation compares transit investments with just roadway costs; vehicle and parking costs are generally ignored, although roadway transport requires a vehicle and parking for each trip. As a result, conventional analysis underestimates the full savings and benefits that result from public transit improvements that reduce vehicle use.

High quality public transport and transit oriented development provide other benefits including congestion reductions, road and parking facility cost savings, improved safety, improved accessibility for non-drivers, energy conservation, emission reductions, economic development, efficient land use, and improved public fitness and health. Physically and economically disadvantaged people tend to enjoy particularly large savings and benefits since they rely on alternative modes and are price sensitive.

Improving public transit service quality is therefore a win-win solution: most people benefit overall, including those who currently rely on alternative modes, those who switch from driving to alternative modes in response, and those who continue to drive who enjoy reduced traffic and parking congestion, reduced accident risk, reduced need to chauffeur non-drivers, and various indirect savings and benefits.

This is a timely issue. Current demographic and economic trends are increasing demand for alternative modes. Many transportation policies and planning practices that may have been justified in the past are not appropriate for the future. More comprehensive planning is needed to identify truly transportation policies and projects.

When all impacts are considered, consumers have every reason to demand, *Raise my taxes!* to create high quality public transportation in their communities.

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