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"Efficiency - Equity - Clarity"

AN ECONOMIC EVALUATION OF SMART GROWTH AND TDM

Social Welfare and Equity Impacts of Efforts to Reduce Sprawl and Automobile Dependency

DRAFT

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Abstract
This paper evaluates the economic impacts of alternative transportation and land use polities. It defines sprawl, Smart Growth, automobile dependency and Smart Growth and Transportation Demand Management (TDM), and examines their costs, benefits and equity impacts. It identifies several transportation and land use market distortions that favor sprawl and automobile dependency, and considers possible justifications for these distortions. This analysis indicates that unjustified market distortions significantly increase automobile use and urban dispersion. It suggests that in more efficient and equitable market conditions, consumers would drive less and consume less land, and be better off overall as a result. A number of specific criticisms of Smart Growth and TDM are evaluated, including claims that they are ineffective, fail to reflect consumer preferences, increase local traffic congestion and air pollution, require wasteful transit investments, increase regulatory burdens, and reduce affordability and opportunity. The analysis indicates that Smart Growth and TDM can help correct market distortions. Even strategies that involve market interventions, such as urban growth boundaries and transit subsidies, may be justified as second-best solutions to existing market distortions. This indicates that, if implemented effectively, Smart Growth and TDM strategies can increase social welfare and equity.

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Introduction

Until recently there was little objection to planning that favored low-density, automobile-oriented development and transportation system. Land use planning consisted of accommodating urban growth, and transport planning consisted of accommodating motor vehicle traffic. But many people and groups now advocate alternative planning practices. This shift is occurring within many jurisdications, agencies and professional disciplines.

In land use planning this is considered a debate between "sprawl" and "Smart Growth." In transport planning it is a debate between "automobile dependency" and "transportation demand management" or TDM. Because land use and transportation are closely connected, these are actually two facets of the same debate. Smart Growth can be considered the land use component of TDM, and TDM can be considered the transport component of Smart Growth.

There is considerable debate over whether sprawl is "bad" for society, and whether Smart Growth policies are superior to current practices. Similarly, there is debate over whether current levels of automobile use are "good" or "bad" for society, and whether TDM policies are desirable. This paper attempts to apply a more rigorous analysis by evaluating current and alternative land use and transportation policies based on standard economic principles related to efficiency and equity.

There are several ways to explain the broad interest in these issues. They reflect urban population and vehicle traffic growth, which increases demand for land, road space and environmental quality. Economic theory suggests that this increased scarcity justifies changing land and transport practices to encourage more efficient use of such resources. Put another way, Smart Growth and TDM reflect growing concerns about various problems ("external costs") caused by urban growth and vehicle traffic. These include increased facility and public service costs, congestion and crashes, environmental and aesthetic degradation, reduced consumer choices, and other negative impacts.

These changes can be considered to reflect the diminishing marginal benefits of land consumption and mobility. Although a certain amount of land consumption and driving provide significant benefits to consumers and society, the incremental benefits to users from increased land consumption and vehicle use tend to decline.

Smart Growth and TDM also reflect increasing emphasis on sustainable development objectives, including long-term economic efficiency, resource conservation, global and intergenerational equity, and ecological integrity. These require expanding economic analysis and planning practices to account for indirect, non-market, long-term impacts.

Smart Growth and TDM represent fundamental changes in land use and transportation planning, so it is not surprizing that they are often face heated criticism. Some criticism concerns specific technical issues, such as the best way to implement a particular strategy, but other criticism is broader, attacking the fundamental assumption that society can benefit from reduced sprawl and driving. This is sometimes presented as a conflict between motorist and transit interests.[1] Critics describe Smart Growth and TDM as a well

intended but misguided effort, a cure that is worse then the disease, unrealistic utopian fantasies, a way for special interests to extract tax money, and even a conspiracy to increase government intrusion into citizens' personal affairs.

Sometimes this is presented as a debate between a right-wing political ideology that favors free markets and commerce, and a left-wing political ideology that places greater value on social and environmental objectives. A right-wing perspective tends to assume that households can best meet their needs by having freedom to purchase or build a home anywhere. From this perspective, unconstrained development (i.e., sprawl) and increased mobility (i.e., automobile dependency) benefit consumers. A left-wing perspective tends to assume that consumers are residents of a geographic community. From this perspective, protecting and improving conditions in existing neighborhoods is the best way to benefit consumers. Although this debate has some elements that actually divide along these lines, the real technical issues are much more complex.

As described in this paper, sprawl and automobile-dependency are caused in part by government interventions such as zoning codes, tax polices and transportation policies, and result in reduced consumer choice, fiscal waste, and community degradation. For these reasons, a right-wing ideology has many reasons to support Smart Growth and TDM, particularly strategies that reduce regulations, correct government failures and rely on market-based solutions to land use and transportation problems.

The intent of this paper is to get beyond the emotional and simplistic analysis that too often dominates this debate, and explore what consumers would choose in efficient and free land use and transportation markets, how well current markets satisfy this demand, and whether Smart Growth and TDM reforms would do a better job, and thereby increase social welfare and equity relative to current practices.

Definitions

This section defines Sprawl, Smart Growth, automobile dependency and TDM.

Sprawl

Some Smart Growth critics incorrectly define sprawl simply as suburbanization, meaning any development outside existing urban jurisdictions. However, suburban development itself does not constitute sprawl. Sprawl is a particular *type* of development: dispersed, low-density, single-use, automobile-dependent land use. Sprawl is sometimes called "unplanned" development, meaning there is little coordination among private development, public services and policy objectives such as greenspace preservation.

Several studies have examined the social costs of alternative land use patterns. Although these vary depending on conditions and perspective, there is general agreement that sprawl tends to increase per capita infrastructure costs and vehicle travel, that it reduces greenspace wildlife habitat and transportation choice, and tends to reduce investment in existing urban communities.

There are also benefits associated with sprawl, but most are direct user benefits. External costs are generally much larger than external benefits because rational producers and consumers try to internalize benefits and externalize costs. As a result, at the margin, external costs of sprawl tend to be greater than external benefits. Table 1 summarizes external impacts of sprawl identified in one major study.

Table 1 **Costs and Benefits of Sprawl** (based on Burchell, 1998 and others)

	Alleged Costs	Rating	Alleged Benefits	Rating
Public Services	Higher infrastructure costs	High	Lower public operating costs	Medium
	Higher public operating costs	Medium	Efficient long-term growth	Low
Transportation costs	Increased vehicle use	High	Shorter commute times	Low
	Increased travel times	Low	Less congestion	Uncertain
	Higher household transportation spending	Uncertain	Lower government transportation costs	Low
	Less efficient transit/ fewer travel choices	High		
	Higher transport social costs	Medium		
Environmental	Loss of agricultural land	High	Increased access to open space	Low
	Loss of greenspace, habitat	High		
	Increased energy use	Medium		
	Increased air pollution	Uncertain		
Quality of life	Aesthetically displeasing	Low	Lower crime rate	Low
	Reduced sense of community	Medium	Cheaper retail goods	Medium
	Less historic preservation	Medium	Fosters economic well-being	Medium
Social issues	Fosters segregation/exclusion	Uncertain	Fosters local land-use decisions	Medium
	Worsens inner-city deterioration	Medium	Enhances municipal diversity and choice.	Medium
	Fosters spatial mismatch	Medium		
Economic	Reduced agglomeration efficiencies.	High		

Ratings indicate whether there is agreement this condition exists and is linked to sprawl.

Smart Growth

Smart Growth is a general term for land use practices intended to create more resource efficient and "livable" communities (meaning communities designed to provide desirable environmental and social amenities, such as security, social cohesiveness and a pleasant environment). Smart Growth is a set of complementary strategies that vary depending on the needs of a specific situation. Smart Growth strategies are described in Table 2.

Table 2 **Smart Growth Strategies** (JHK Associates, 1995; Ewing, 1996)

Strategy	Description
Strategic planning.	Establish a comprehensive community vision that individual land use and transportation decisions should support.
Create more self-contained communities.	Locate a variety of compatible land uses within proximity of each other. For example, develop schools and shops close to residential areas.
Encourage quality, higher density development.	Eliminate unnecessary restrictions on density. Demand high quality designs that addresses problems associated with higher density.
Encourage cluster development.	Keep clusters small and well defined, such as "urban villages" with distinct names and characters. Coordinate development to facilitate accessibility.
Encourage infill development.	Encourage redevelopment of existing facilities and neighborhoods. Reform public policies that unintentionally favor greenfield development over infill.
Concentrate activities.	Concentrate commercial activities in "nodes" of high-density, mixed development linked by good transit service.
Flexible zoning.	Reduce excessive and inflexible parking and road capacity requirements.
Encourage Transit Oriented Development.	Increase development density around transit stations and high-capacity transit corridors. Provide good walking and cycling facilities in those areas.
Parking Management	Encourage shared parking, and other parking management strategies.
Create a network of interconnected streets.	Keep streets as narrow as possible, particularly in residential areas and commercial centers. Use traffic calming to reduce excess traffic speeds.
Site design and building orientation.	Encourage buildings to be oriented toward city streets, rather than set back behind large parking lots. Avoid large areas of parking or other unattractive land uses in commercial areas.
Improve nonmotorized travel conditions.	Encourage walking and cycling by improving sidewalks, paths, crosswalks, protection from fast vehicular traffic, and street amenities.
Implement TDM.	Use transportation demand management to reduce total vehicle traffic and encourage the use of efficient modes.
Preserve greenspace.	Preserve open space, particularly areas with high ecological and recreational value. Channel development into built-up areas.
Encourage a mix of housing types and prices.	Develop affordable housing near employment, commercial and transport centers. Develop second suites, apartments over shops, lofts, location-efficient mortgages, and other innovations that help create more affordable housing.
Stormwater management.	Encourage on-site stormwater drainage and water conservation

These strategies can be implemented at various geographic scales. *Smart Growth* usually refers to regional planning, while *New Urbanism* and *Transit Oriented Development* reflect similar planning principles at local and site levels. Exactly what strategies are implemented depends on community preferences and conditions. Smart Growth need not end suburban development, nor does it require high-rise housing or prohibitions on automobile use. It is particularly important in growing suburban areas.

Table 3 compares major differences between Smart Growth and Sprawl.

Table 3 **Comparing Smart Growth and Sprawl**

Feature	Smart Growth	Sprawl
Land use density	Higher-density, clustered.	Lower-density, dispersed.
Development location	Infill (brownfields).	Urban periphery (greenfields).
Land use mix	Well mixed.	Homogeneous, not mixed.
Transportation	Multi-modal. Supports walking, cycling and public transit.	Automobile-oriented. Poorly suited for walking, cycling and transit.
Streets	Designed to accommodate a variety of activities. Traffic calming.	Designed to maximize motor vehicle traffic volume and speed.
Planning process.	Planned. Coordinated between jurisdictions and stakeholders.	Unplanned. Little coordination between stakeholders.

Automobile Dependency

Automobile dependency consists of high levels of per capita automobile travel ("Automobile" includes cars, vans, light trucks and SUVs), automobile oriented land use, and reduced transport alternatives (Newman and Kenworthy, 1998). It tends to have poor pedestrian and cycling conditions, limited transit service, underpricing of automobile travel (such as abundant free parking, unpriced roads and low fuel taxes), and dispersed landuse patterns that require a high level of mobility for a given level of access.

TDM

TDM refers to various strategies intended to encourage more efficient and diverse transportation. Table 4 describes various types of TDM strategies.

Combined Effects

Smart Growth and TDM tend to have synergistic effects (the total is greater than the sum of their parts). For example, simply increasing travel options (e.g., transit improvements, ridesharing programs, or pedestrian and cycling facilities) may by themselves may do little to change travel behavior, but become quite effective when implemented with incentives to reduce driving (e.g., congestion pricing, Parking Cash Out, distance-based fees). Conversely, incentives to reduce driving may have modest effects if consumers lack adequate travel choices.

Smart Growth and TDM can provide economic development benefits. Land use density and clustering tend to provide agglomeration benefits, which consist of increased productivity due to improved access and network effects (Coffey and Shearmur, 1997; Haughwout, 2000). Automobile-dependency increases consumer expenditures on vehicles and fuel, which tends to provide less employment and economic activity than other consumer expenditures, particularly in regions that do not produce vehicles and fuel (Litman and Laube, 1999). This suggests that Smart Growth and TDM tend to increase productivity and regional economic development. Although these impacts are difficult to measure, they may be large.

Table 4 **TDM Strategies** (*Online TDM Encyclopedia*, 2000)

Strategy	Description
Pricing Reforms	Comprehensive tax and price reforms.
Least-Cost Planning	Transportation planning that allows demand management to be considered equally with capacity expansion projects.
Park & Ride	Parking at urban-fringe transit stops.
HOV Preference	Transit and rideshare priority measures.
Transit Improvements	Improved public transit service.
Ridesharing	Rideshare promotion and matching.
Bicycle Encouragement	Support and encouragement for cycling.
Nonmotorized Improvements	Improved bicycle and pedestrian planning, facilities and services.
Intermodal Bike	Bike lockers at stops, bikeracks on transit vehicles.
Tele-access	Telecommunications that substitute for physical travel, including telecommuting, teleshopping, distance learning, etc.
Alternative Work Hours	Flex time and alternative work weeks (such as four 10-hour days)
Guaranteed Ride Home	Provide a limited number of free rides home for commuters who do not drive.
Address Security	Address security concerns of non-drivers.
Full Cost Pricing	Pricing reforms to charge users directly for the costs they impose.
Increased Fuel Taxes	Increase federal and state fuel taxes.
Road Pricing	Road tolls and congestion pricing.
Vehicle Restrictions	Restrict vehicle use in specific areas or at certain times.
Parking Pricing	Charge users directly for parking. Avoid discounts for long-term leases.
Commuter Financial Incentives	Financial benefits to commuters who use alternative modes. Includes Parking Cash Out, transit and ridesharing benefits.
Parking Management	Encourage shared parking, and other parking management strategies.
Distance-based fees.	Mileage-based vehicle insurance and registration fees.
Carsharing	Convenient, short-term vehicle rentals that substitutes for vehicle ownership.
Neotraditional Planning	Develop neighborhoods that encourage walking, bicycling and transit use.
Traffic Calming	Street design features to reduce vehicle traffic speeds when appropriate.
Smart Growth	Land use policies that encourage more efficient land use.
Reduce Parking & Road Standards	Reduce excessive and inflexible parking and road capacity requirements. Manage parking for efficiency
Transport Management Associations (TMAs)	An organization of businesses that provides transportation management and parking management services in a particular area.
Regulatory Reforms	Reform motor-carrier regulations to encourage competition and innovation.
Location-Efficient Development	Encourage higher density, affordable housing near commercial centers, transit lines and parks.

Market Principles

This section discusses basic economic principles required for an efficient and equitable market.

1. Informed Consumer Choice

An efficient market allows consumers to make informed tradeoffs between quantity, quality and price, so they can choose the bundle of goods that best meets their needs. Only if consumers have a variety of choices, and accurate information about their choices, can individuals' consumption decisions represent their true preferences. For example, high levels of automobile travel can only be considered to represent consumer preferences if they have viable travel alternatives. Similarly, sprawl development patterns can only be considered efficient if consumers have viable alternatives to low-density suburban housing.

2. Efficient Pricing

Efficient pricing tests consumer demand to insure that resources are consumed in their most valuable application. Economic efficiency requires that prices (perceived variable user costs) equals marginal costs, unless a subsidy is specifically justified. Subsidies may be justified for equity reasons, due to economies of scale (i.e., marginal costs are less than average costs), or to stimulate a particular type of economic activity, such as growth in a particular industry, for strategic reasons.

What constitutes marginal cost can vary depending on perspective. In the short run, this means that vehicle users are charged for road damage, congestion, crash risk, and environmental damages they impose on others. Long run marginal costs include cost recovery for investments (i.e., that users as a group bear all facility costs, with individuals paying according to their share). Cost recovery is also justified on horizontal equity grounds (i.e., consumers should get what they pay for and pay for what they get, meaning that there should be minimal cross-subsidies among consumers), and on economic neutrality grounds (see below), since most other goods are priced based on cost recovery.

3. Economic Neutrality

Economic neutrality requires that public policies (e.g., government subsidies, taxes and regulations) treat comparable goods the same, unless there is a specific justification for special treatment. This tends to encourage consumer choice and efficient pricing. Because governments provide most transportation facilities and services (e.g., roads, ports, airports and public transit), control land use (e.g. zoning codes, development policies and property taxes), and regulate and tax travel activities, there are many ways that governments can favor one type of activity over others.

4. Producer Competition

An efficient market usually requires that producers face competition, which tends to encourage consumer choice, efficient pricing and innovation. This means that new companies are allowed to enter a market with minimal restrictions, and that government policies encourage competition.

Justifications for Market Distortions

It is not always easy or appropriate to follow market principles. An efficient market is something to work toward, but is unlikely to be perfectly achieved. Market distortions may be partly justified for reasons described below.

1. Transaction Costs

Cost-based user fees tend to have higher transaction costs than lump-sum payments. Both consumers and producers often find it more convenient to pay for facilities and services through less precise, existing charges. However, transaction costs are declining due to new management strategies and technologies, such as electronic pricing, allowing more cost-based pricing.

2. Equity

Subsidies and favorable policies may be justified to achieve equity objectives. For example, a significant portion of public transit subsidies are justified in order to provide basic mobility to people who are economically and physically disadvantaged. Vehicle user fees such as road tolls, parking fees and higher fuel taxes are often opposed on the grounds that they are regressive, although it is usually possible to make such charges to be neutral or progressive, based on how they are structured and how revenues are used.

3. Economies of Scale

Subsidies and favorable policies may be justified due to economies of scale (i.e., marginal costs are below average costs). For example, during the early years of the automobile era policies to encourage automobile use may have been justified to take advantage of economies of scale in vehicle and roadway production (you benefited if your neighbors increased their vehicle ownership and mileage through lower costs for vehicles and roads). However, now that the roadway system and automobile industries are mature, there is little evidence of significant economies of scale (there tend to be diseconomies of scale, due to increased traffic congestion).

4. Economic Development

Underpricing and subsidies can sometimes be justified to stimulate development of an industry or geographic area. However, this is usually only justified for short time periods, when the industry or area is undeveloped and experiences significant economies of scale or scope. Once an industry approaches maturity this justification disappears.

Conflicts Between Consumer Preferences and Efficiency

There are often conflicts between consumer preferences and market efficiency. All else being equal, consumers prefer lower prices. It may seem contradictory that consumers would benefit from policy reforms that increase their prices. But consumers also bear external costs. The question is not whether consumers should bear a cost, but rather, whether consumers should bear costs directly or indirectly. Paying directly for goods tends to be more efficient, because it allows consumers to choose just how much of that good they wish to consume, no more and no less.

For example, since most consumers are motorists, many people think it makes sense to provide "free" parking to residents, employees and customers. But such parking is not really free, consumers pay for it in their rents, as a substitute for other employment compensation, and in the prices of retail goods. Unbundling parking (i.e., having consumers pay directly rather than indirectly for parking) gives consumers more choice and encourages more efficient use of parking resources. For example, a renter who currently pays $750 per month for an apartment with two parking spaces may be better off paying $650 for the apartment and $50 per parking space because this allows them to more accurately match their parking needs with their vehicle ownership. With bundled parking, some households are forced to pay for parking they don't use. Unbundled parking offers households a new opportunity to save rent costs by reducing their vehicle ownership (and therefore their parking needs). To the degree that bundled parking encourages consumers to own more vehicles than if they paid directly for each parking space, it is economically inefficient and "leverages" increased driving (and therefore increased congestion, roadway costs, crashes, air pollution, etc.).

Current practices are comparable to a restaurant that only offers all-you-can-eat pricing. This is attractive to people who eat a lot, but it is not efficient for people who only want small meals. All-you-can-eat pricing encourages excessive and wasteful consumption of food, because consumers feel that they must eat as much as possible to get their money's worth. Direct payment of parking is comparable to al a carte restaurant pricing, which allows diners to choose just the amount of food they want.

Efficiency of Current and Alternative Policies

This section investigates the efficiency of current land use and transportation markets, and the potential for Smart Growth and TDM to improve market efficiencies.

A primary issue in this analysis is whether current transportation and land use markets reflect market principles. Critics of Smart Growth and TDM tend to assume that current markets are overall efficient and fair, so sprawl and automobile dependency reflect consumer preferences. Advocates argue that current markets are significantly distorted, resulting in more land consumption and more automobile travel than would occur under a socially-optimal market, and that Smart Growth and TDM can lead to more efficient and equitable markets, providing overall consumer benefits.

Consumer Choice

Current Consumer Choice

Do current land use and transportation markets provide consumers adequate choices? They do for some types of goods. For example, consumers who want to purchase a suburban single-family home, a motor vehicle, or luxury travel usually have many options. However, outside of those bounds the choices are often quite limited. In many communities there are few options for affordable housing in multi-modal neighborhoods. Zoning codes often restrict higher-density housing (multi-family, secondary suites and loft apartments) and land use mix (shops close to residential developments). Nondrivers often have inferior travel options and face high costs. In many areas it is difficult to walk or cycle for transportation, transit service is limited, and there is poor coordination between modes.

Anybody who doubts that non-automobile travel options are limited should spend a couple normal weeks without driving, as an experiment. This time period should include normal responsibilities such as commuting, running errands, socializing and family responsibilities. The difficulty that non-drivers encounter depends on various factors, including the type of community, travel responsibilities and physical ability. A non-driver who has few responsibilities and abundant time (such as a single, unemployed person) may find their travel limitations acceptable, while a non-driver with unlimited funds can afford to hire taxies to provide automobility. Some non-drivers can rely comfortably on cycling. But under many circumstances non-drivers experience difficulty meeting normal transportation needs for commuting, work, errands and social activities.

An interesting issue in this analysis is whether automobile-dependency necessarily reduces the quantity and quality of transportation alternatives. Automobile oriented transportation can reduce travel choice in the following ways:

- Roads, parking facilities and vehicle traffic create barriers to walking and cycling (and therefore transit use, since most transit trips involve walking or cycling links).
- Automobile travel tends to favor more dispersed land uses, both because it allows greater distances between destinations and because it requires more land devoted to roads and parking facilities. This makes walking and cycling less efficient.

- Reduced demand for travel alternatives reduces their efficiency, since these modes experience economies of scale and scope. As middle-class travelers shift to driving, the quality of transit and carpooling options declines.
- Increased automobile dependency means that common social and economic activities assume that participants can drive, and tends to place a social stigma on non-drivers.

For these reasons, automobile dependency does not simply have benign effects on transportation choice. It reduces the quantity and quality of travel options. The poor quality of travel options available to non-drivers can be explained, in part, by negative impacts of automobile use. Policies that favor automobile use over alternatives makes non-drivers worse off both relatively and absolutely.

Optimal Consumer Choice

It is difficult to define exactly what amount of land use and transportation choice is "adequate." There is little distortion if consumers lack options for which there is little demand.[2] For example, that few stores sell garlic-flavored ice cream probably does not reflect a significant market distortion. But options that would be self-financing or cost effective compared with existing subsidized services, but which is not provided due to legal or institutional barriers, can be considered a market distortion.

In many communities there seems to be unmet demand for housing alternatives, particularly low- and middle-priced housing in multi-modal neighborhoods (i.e., good walking, cycling and transit services) that have good schools, efficient public services and a high level of personal security. Homes in older, higher-density urban areas that are considered desirable (sometimes called "gentrified neighborhoods") often command a premium. Housing prices tend to increase with proximity to transit stations (Lewis and Williams, 1999; Hunt, McMillan and Abraham, 1994). Many consumers prefer homes that reflect New Urbanist features, such as medium-density, walkable, mixed-use neighborhoods (*Consumer Reports*, 1996; Nelessen, 1994; Kunstler, 1996). Similarly, in many circumstances there seems to be unmet demand for walking, cycling, ridesharing and public transit service, and that total automobile travel would decline if consumers had better travel choices ("Land Use Impacts," VTPI, 2000). For example, one major study predicted that multi-modal planning can reduce automobile commuting by 22.5%, and increase transit and nonmotorized travel by 27% (1000 Friends, 1997).

This is not to imply that society must subsidize all land use or transport options, or that given better alternatives all consumers would choose high-density, carfree lifestyles. It simply suggests that there is unmet demand for housing and travel alternatives, and the providing such alternatives benefits consumers and society. Unless viable alternatives are available it is impossible to conclude that current consumption patterns (suburban housing and vehicle travel) necessarily reflects consumer preferences. This analysis suggests that public policies which reduce land use and transportation choices can be quite harmful, and policy reforms that increase consumer choice can be quite beneficial.

Impacts of Smart Growth and TDM on Choice

Many Smart Growth and TDM strategies increase consumer choice, such as those listed in Table 5. Most rely on positive incentives: consumers who choose current land use and transportation options are no worse off, but they have new options that are not currently available. As a result, any trade-off they make, such as choosing smaller homes or less automobile travel in exchange for improved access or financial savings, reflects net consumer benefits compared with current options.

Table 5 **Strategies that Tend to Increase Consumer Choices**

Improved Land Use Choice	Improved Transport Choice
• Avoid overly-restrictive zoning. • Encourage Transit Oriented Development. • Encourage shared parking, and other parking management strategies. • Improve nonmotorized travel conditions. • Encourage a mix of housing types and prices. • Encourage cluster and infill development by improving the quality of design and public services in higher-density neighborhoods. • Traffic Calming.	• Alternative Work Schedules • Bicycle & Pedestrian Improvements • Carsharing/Vehicle Rentals • Guaranteed Ride Home • High Occupant Vehicle (HOV) Preference • Nonmotorized Improvements • Address Security Concerns • Park & Ride • Ridesharing • Transit Improvements • Tele-access

It is difficult to know how much consumers' land use choices and travel behavior would change if these strategies were implemented. Various studies indicate that some households would choose higher-density housing that has other desirable attributes such as efficient public services, good schools and security, and automobile use would decline if consumers had better travel choices. Reductions in residential land consumption and automobile travel of 5-20% appear feasible if consumers are offered suitable land use and transportation alternatives.

Pricing

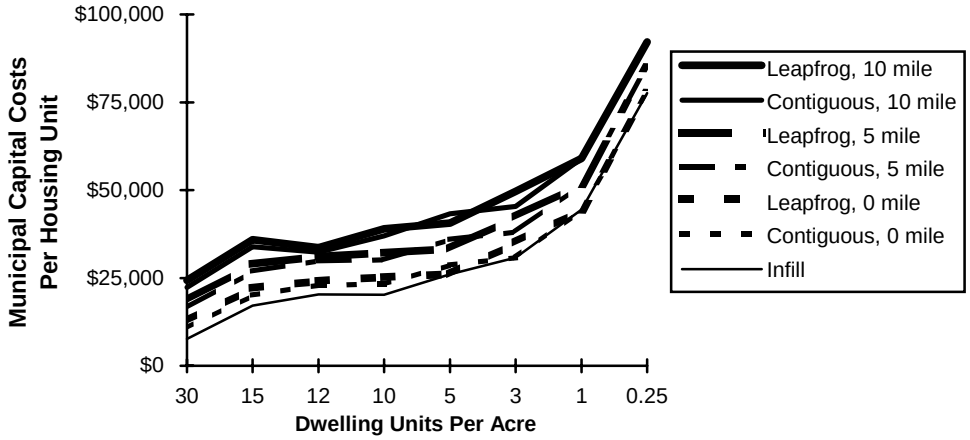
Current Pricing

As discussed earlier, optimal pricing requires that prices (perceived, variable user costs) reflect marginal costs (the total incremental costs imposed by consuming a good or service). The efficiency of current land use and transport pricing is discussed below.

Land Use

Optimal land use pricing requires that prices reflect location-related costs. The costs of providing public services such as utilities, roads, policing, and schools tends to be higher in sprawl than in more clustered or infill development (Ewing, 1997; Sorensen and Esseks, 1998). Figure 1 and Table 6 illustrate two estimates of these costs. These estimates often understate the full incremental costs of sprawl development because most studies consider only a portion of total costs. For example, many studies consider differences in infrastructure costs, such as additional capacity for roads, utilities and schools, but not differences in on-going operating costs, such as the additional cost of school busing for lower-density development outside the urban boundary.

Figure 1 **Residential Service Costs** (Frank, 1989)



This illustrates increased capital costs for lower density, non-contiguous development.

Table 6 **Per Household Annual Municipal Costs by Density** (Smythe, 1986)

Costs	Rural Sprawl	Rural Cluster	Medium Density	High Density
Units/Acre	1:5	1:1	2.67:1	4.5:1
Schools	$4,526	$4,478	$3,252	$3,204
Roads	$154	$77	$53	$36
Utilities	$992	$497	$364	$336
Total Costs	*$5,672*	*$5,052*	*$3,669*	*$3,576*
Savings Over Sprawl	*$0*	*$620*	*$2,003*	*$2,096*

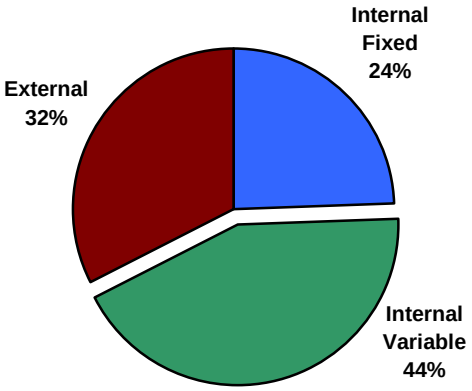
Sprawl can increase public service costs by hundreds of dollars a year.

Current development fees, utility charges and taxes seldom reflect the full magnitude of these cost differences. Buyers of low-density, exurban homes are not usually charged a premium for extra infrastructure and school busing expenses required for such a location compared with homes that are closer in. As a result, homebuyers lack adequate incentives to choose housing that is more cost effective to communities, and they do not have the opportunity to save money by choosing a more efficient location. The studies cited above indicate that efficient prices (including rents or mortgages, utility fees and taxes) for high-density, infill homes would be several hundred dollars a year less than what they currently are, while prices for low-density, exurban homes would be several hundred dollars a year higher.

Transportation

Although automobiles are expensive to own, they are cheap to drive. About a third of the costs are external and a quarter are internal but fixed, as illustrated in Figure 2. This indicates that driving is "underpriced," meaning that prices do not reflect full marginal costs.[3] A rich vocabulary describes overpricing, which is said to "gouge" or "rip-off" consumers, but there is no comparable terms for underpricing. Yet underpricing is equally harmful since the costs are borne elsewhere in the economy.

Figure 3 **Automobile Cost Distribution** (Litman, 2000)



Less than half of the total costs of automobile use (including vehicle expenses, travel time, accident risk, facility costs, and environmental impacts) are internal-variable.

Efficient transportation pricing requires that user pay directly for use of roads and parking facilities, rent and property taxes on roadway land, traffic services, congestion, crash risk, and pollution. The table below shows estimates of the magnitude of these additional charges. This indicates that efficient pricing would more than double the variable cost of driving (offset by reductions in fixed vehicle charges such as insurance and registration fees, and indirect charges such as taxes and costs incorporated into retail prices), reducing automobile travel by one-third or more.

Table 7 **Optimal Vehicle Pricing** (Delucchi, 1996; Litman, 1999c)

Pricing Instrument	Average Fee	Travel Reduction
Weight-distance charges (payment for roadway costs, including rent on rights-of-way)	7-12¢	14-24%
Parking charges	6-12¢	12-24%
Comprehensive, distance-based insurance	6-8¢	12-16%
Pollution fees	2-4¢	4-8%
Congestion pricing	2-3¢	4-6%

Some critics of transportation price reform claim that these estimates are based on highly uncertain and exaggerated estimates of the external costs of driving. They focus on uncertainties associated with non-market costs, particularly ecological risks such as climate change. However, non-market externalities are only a minor portion of underpricing. For example, pollution fees are only about 10% of the additional vehicle charges in Table 7. Direct payment for parking and roads, rent and property taxes on rights-of-way, and distance-based insurance represent much larger external costs corrections. The *1997 Federal Highway Cost Allocation Study* found that user fees cover only 70% of current roadway expenditures, indicating that fuel taxes would need to increase 43% just to internalize these costs. For more discussion of vehicle costs see Delucchi (1996), FHWA (1997) and Litman (2000).

This analysis indicates that land consumption and vehicle travel are currently underpriced, which encourages sprawl and automobile dependency. Put another way, current pricing fails to return to individual consumers the savings that result when they choose a more location-efficient home or they drive less. For example, shifting from driving to transit can reduce traffic congestion, parking costs, crash risk (and therefore insurance costs) and environmental impacts, but these savings are not returned directly to the person who shifts mode. As a result, consumers lack the incentive to use the most economically efficient housing or transportation option, and they lack the opportunity to save money by choosing more efficient alternatives.

Impacts of Smart Growth and TDM on Pricing

Smart Growth and TDM include many strategies that improve land use and transportation pricing, as summarized in Table 8.

Table 8 **Strategies that Tend to Price More Efficiently**

More Efficient Land Use Pricing	More Efficient Transport Pricing
• Development and utility pricing that reflects location-related costs. • Reduce unjustified cross-subsidies from high-density to low-density neighborhoods. • Increase the availability of higher-density, more affordable housing options.	• Congestion Pricing • Distance-Based Fees • Commuter Financial Incentives • Fuel Tax Increases to Internalize Costs • Parking Pricing • Road Pricing

These strategies could have significant impacts on consumer behavior, although they are difficult to predict, and depend on other factors. One market survey found that Calgary households would pay an average of CA$130 (US$90) per month extra for a single-family suburban home rather than an urban townhouse (Hunt, 2000; Hunt, McMillan and Abraham, 1994). This premium is comparable in magnitude to the increased public costs of lower-density development. This suggests that if housing prices reflected location-related costs, a significant portion of residents would choose higher-density homes in exchange for financial savings. For example, if consumers can choose between an $1,000 per month in housing costs (mortgage, utilities and taxes) for a single-family suburban home, or $900 per month for a townhouse, most would choose the single-family option. But if the single-family home cost $1,100 and a townhouse only $800, to more accurately reflect location-related costs, more households would choose townhouses. To the degree that current prices fail to reflect these costs (and therefore fail to reflect the savings of more resource-efficient housing) consumers have fewer choices and reduced benefits.

Charging motorists directly for their road and parking costs, congestion impacts, crash damages and pollution is predicted to reduce automobile use by 1/3 or more (Litman, Komanoff and Howell, 1998; Litman, 1999c). International comparisons also indicate that automobile travel declines significantly in regions with more efficient pricing, even if residents have high incomes (Schipper and Eriksson, 1995).

Economic Neutrality

Current Practices

Many current government and business practices tend to favor lower-density development and automobile travel (Litman, 1999b). Some are described below.

Zoning, Development And Development Practices
Current zoning laws require generous amounts of parking, setbacks, minimum lot sizes, and single-use development. This increases sprawl and automobile dependency.

Mortgages Practices.
For many years federal housing policy explicitly favored development of new, suburban housing over the renovation of existing urban housing (Lewyn, 1999).[4] Current mortgage lending practices generally overlook the higher transportation costs associated with urban fringe housing (Hare, 1995). As a result, homes in automobile-dependent areas are considered by banks to be more affordable, although housing costs savings are consumed by increased vehicle costs (Hoeveler, 1997). This encourages homebuyers to choose more automobile-dependent housing than they would otherwise choose.

Measuring Transport Activity
Current planning practices tend to favor automobile oriented improvement at the expense of alternatives (Ewing, 1993; Litman, 1999b). Traffic engineers have well-developed techniques for evaluating motor vehicle traffic quality (e.g., Level of Service, congestion delay, parking demand studies, etc.) but lack comparable tools for other modes. Since traffic flow improvements are measured but disbenefits to other forms of access are not, planning and investment decisions are skewed to favor automobile travel at the expense of other modes. For example, transportation professionals traditionally consider any increase in parking and roadway vehicle capacity to be an "improvement," even if wider roads, larger parking lots and higher traffic speeds reduce the mobility and safety of non-motorized modes, and therefore of transit.

Transport Planning and Investment Practices
A major portion of transportation funding is dedicated to highway projects. Alternative modes and transportation improvement strategies that reduce the need for travel (e.g., more mixed land use, improving urban schools, establishing delivery services) lack dedicated funding. As a result, if a community defines its transportation problems as insufficient road capacity it can obtain funding that would not be available for other solutions to the problem. This encourages government agencies to favor automobile-oriented solutions to transport problems when other solutions may be more cost effective overall (Boarnet and Haughwout, 2000). As a result, transportation planning and funding tend to favor motorists and suburban areas over non-drivers and less automobile-dependent areas (STPP, 1996; Lewyn, 1999; Haughwout, 2000).[5]

For example, travel surveys typically find that only about 5% of trips are made by walking and cycling. However, such surveys tend to under-record nonmotorized trips: many exclude walking trips altogether, and they often undercount short trips, non-work trips, travel by children, and recreational trips. Automatic traffic counters may not record nonmotorized travelers, and manual counters are usually located on arterial streets that are less heavily used by cyclists than adjacent lower traffic streets. In fact, most trips involve nonmotorized links. For example, trips that are classified as "auto" or "transit" trips are often actually "walk-auto-walk," or "bike-bus-walk" trips, yet the nonmotorized components are often ignored, even if they take place on a roadway. One study finds that the actual number of nonmotorized trips is six times greater than what conventional surveys indicate (Rietveld, 2000). This suggests that 20-30% of all trips are non-motorized, yet a much smaller portion of transport funds are spent on facilities and safety programs for non-motorized modes.[6]

Impacts of Smart Growth and TDM

A number of Smart Growth and TDM strategies help correct current practices that favor sprawl and automobile dependency, as indicated in Table 9. These reforms tend to result in increased consumer choice and more efficient pricing. It is difficult to know how much land use and travel would change in response to these changes, but the results could be significant.

Table 9 **Strategies for Economic Neutrality**

Improved Land Use Neutrality	Improved Transport Neutrality
• Reform overly-restrictive zoning. • Reflect location-related costs in utility prices and taxes. • Allow a mix of housing types and prices.	• Pricing reforms • Least-cost planning • Full cost pricing • Cash out parking • Zoning reform • Reform excessive parking and road standards

As previously described, increased housing choices, and housing prices that reflect location-related costs, would encourage more efficient land use. Least-Cost Planning could result in significant changes in transportation planning and investments, shifting resources from highway capacity expansion toward transit and TDM solutions (Johnston and Rodier, 1999). More efficient transportation pricing could reduce a significant amount of driving and encourage use of alternative modes. This could improve the quantity and quality of travel alternatives due to economies of scale and scope, and increased public support.

Competition

Current Competition

Markets for conventional housing and automobile transportation tend to be highly competitive. However, there appear to be unjustified constraints that make markets for alternative housing and transportation options less competitive.

Zoning codes and development policies tend to limit multi-family housing, secondary suits, apartments over shops, and loft apartments, reducing competition in affordable housing markets. Some jurisdictions discourage affordable housing in order to minimize fiscal burdens (lower income housing is considered to impose more municipal costs than the local tax revenue it generates) and as a form of class and racial segregation.

Motor-carrier regulations limit transportation service competition. Firms that want to introduce a new type of transportation service, such as commuter express buses, urban jitney or shared taxi, are often prohibited altogether, or face excessive regulation, due to outdated laws and rules. Although there are reasons to regulate transportation services to maintain quality, predictability and safety, unnecessary regulations be reduced, and regulation objectives can be changed to address specific problems while encouraging competition, consumer choice and innovation (Klein, Moore and Reja, 1996).

Impacts of Smart Growth and TDM

Some Smart Growth and TDM strategies encourage increased competition in housing and transportation markets. This tends to increase consumer choice and efficient pricing. As discussed earlier, improved consumer choice and efficient pricing is likely to reduce urban sprawl and automobile dependency. It is difficult to predict the exact effects Smart Growth and TDM strategies that increase competition would have on consumer behavior.

Table 10 **Strategies that Increase Competition**

Improved Land Use Neutrality	Improved Transport Neutrality
• More flexible zoning codes. • Increased land use choices (described above).	• Reform motor-carrier regulations to encourage competition. • Increased transport choices (described above).

Conclusions about Market Efficiency

Table 11 summarizes some current market distortions and appropriate corrections. These corrections are Smart Growth and TDM strategies.

Table 11 **Correcting Market Distortions** (Braid, 1995; Lee, 1999; Litman, 1999c)

Distortion	Correction	Land Use/Travel Impacts
Underpriced road and parking facilities.	Direct user charges for all roadway costs, would increase vehicle fees about 1¢ per mile. Direct fees for all parking would average $1-5 per trip.	A 1¢ per mile additional charge would reduce VMT about 2%. Direct parking charges would reduce VMT 15-25%.
Unpriced roadway land. In an optimal market road users pay "rent" on land used for roads.	Rent and taxes on roadway land would require fees averaging 1-4¢ per vehicle mile.	Additional fees averaging 1-4¢ per vehicle mile would reduce automobile travel by 6-8%.
Fixed vehicle fees costs that increase with mileage (i.e., crashes and road use).	Distance-based vehicle insurance and registration fees would increase average vehicle fees 5-6¢ per mile (offset by reductions in fixed fees).	Fees averaging 5-6¢ per vehicle mile would reduce automobile travel by 10-12%.
Unpriced congestion and road capacity expansion.	Use congestion pricing, and user tolls to allocate road space and fund highway capacity expansion.	Congestion and demand for additional highway capacity could decline significantly.
Unpriced air, noise and water pollution.	Emission fees, estimated to average 2-4¢ per vehicle mile, with higher rates in urban areas.	2-4¢ fees would reduce vehicle travel by 4-8%, with greater reductions in urban areas.
Current tax laws and business practices favor driving over alternatives, including generous parking and company car and mileage benefits.	Neutral treatment of transportation would involve Parking Cash Out, no free personal use of company cars, and mileage reimbursements closer to vehicle operating costs.	Parking Cashing Out typically reduces automobile commuting by 15-25%. Reduced company car and mileage reimbursement rates would probably have small impacts on total vehicle travel.
Planning and funding tends to favor automobile-oriented solutions to transportation problems.	Apply least-cost principles to transport planning, meaning that alternative solutions can compete equally against roadway capacity expansion for funding.	It is uncertain how much this would change planning practices and travel behavior, but some changes would occur, particularly over the long term.
Excessive regulation and lack of competition in transportation markets.	Change motor carrier regulations to encourage competition and innovation.	At least some increase in transportation choice is likely to occur.
Zoning laws and development practices favor low-density development and automobile use by requiring generous amounts of parking, minimum lot size and building setbacks.	Development policies should encourage a wide range of housing options, including transit-oriented development, urban infill, secondary suites, and lofts. Restrictive zoning laws should be reduced.	It is difficult to predict how much this would affect land use, but at least some changes are likely to occur, particularly over the long run.
Prices do not usually reflect location-related costs, which overcharges clustered development and undercharges dispersed development.	Development, utilities fees, and taxes reflect density-related costs, increasing costs for more dispersed suburban locations.	It is difficult to predict how much these would affect land use, but at least some changes are likely to occur.
Mortgage lenders ignore the higher transportation cost associated with automobile-dependent housing.	Lenders would recognize potential household transportation cost savings from location-efficient housing.	It is difficult to predict how location efficient lending would affect housing decisions but at least some changes are likely.

This is not the first analysis to conclude that land use and transportation market distortions increase sprawl and automobile use, that significant reforms are justified, or that consumer behavior would shift significantly in more efficient land use and transportation markets. Other studies reach a similar conclusion, although most consider only one or two distortions.[7] Virtually every comprehensive, objective economic analysis has identified significant market distortions favoring sprawl and automobile dependency.

A certain amount of market inefficiencies is inevitable due to transaction costs and to help achieve equity and economic development objectives, but these do not appear to justify current market distortions. Many current distortions result from older social objectives (i.e., to stimulate vehicle production) and technologies (i.e., mechanical toll collection) that are no longer relevant.

Critics argue that distortions favoring sprawl and driving are offset by other market distortions favoring urban infill and travel alternatives (Gordon and Richardson cite subsidized city center stadia and rail transit), but these are relatively small in magnitude. For example, total U.S. transit subsidies are more than an order of magnitude smaller than total automobile subsidies,[8] and are justified in part to maintain a basic level of mobility for non-drivers, rather than to reduce automobile travel. (Litman, 1999d).

Although individually most of these market distortions only increase automobile use and sprawl by a few percent, but their effects are cumulative and synergetic. For example, underpriced parking not only causes inefficient use of parking facilities, it also exacerbates traffic congestion, roadway costs, crashes and pollution problems. Conversely, underpriced traffic congestion, roadway, crash and pollution costs increase parking expenses. Over the long term these market distortions create more automobile-oriented transportation and land use patterns that reduce transportation choices, further increasing these problems.

This analysis suggests that consumption patterns would be quite different under more economically efficient land use and transportation markets. Although it is not possible to predict exactly how much land use and travel behavior would change under more neutral and efficient practices, the changes would probably be large, particularly over the long-run. Driving would probably decline by one-third to one-half if conventional market distortions were corrected (such as road and parking pricing, distance-based vehicle insurance and registration fees), and perhaps even more if sustainability objectives were also incorporated into pricing (such as pricing to reduce climate change emissions). In other words, more than a third of current motor vehicle use can be explained by market distortions that reduce consumer choice and underprice driving.

Many of these reforms reflect positive incentives: consumers benefit directly from improved choices or new opportunities to save money, but those who choose sprawl or automobile travel are no worse off. Even strategies that increase direct user charges may benefit consumers indirectly if the revenue substitutes for other taxes or is returned in some beneficial way. This indicates that in a more efficient market, consumers could consume significantly less land and vehicle travel, but be better off overall as a result.

Are Second-Best Options Are Justified?

This analysis indicates that current land use and transportation markets are significantly distorted in favor of sprawl and automobile dependency. Even critics of Smart Growth and TDM concede the existence of at least some of these market distortions, and acknowledge the theoretical desirability of reforms such as road and parking pricing, emission fees, and more diverse housing options (Mills, 1999; Dunn, 1998).

However, such reforms tend to be difficult to implement. The most effective strategies (e.g., pricing reforms) tend to be least politically palatable because they make consumers feel worse off (Downs, 1992). This raises the question of whether second-best strategies are justified, or whether it is best to leave distortions as they are. Given imperfect land use and transportation markets, it is better to accommodate or restrict economically excessive demand? For example, if development and utility fees do not reflect location-related costs, are blunt regulations such as urban growth boundaries justified to reduce sprawl? If congestion pricing is politically infeasible, is the next-best alternative to continue to build as much free highway capacity as financially possible, to increase transit subsidies, require Commute Trip Reduction programs, or to restrict vehicle use?

These questions are difficult to answer since we lack the information needed to model current and alternative policies. However, the following points should be considered:

- These market distortions tend to be cumulative and synergetic. Many distortions skew consumption decisions in the same direction: toward excessive land and driving. This suggests that there are likely to be multiple benefits from correcting individual distortions. For example, charging for parking not only results in more efficient use of parking resources, it also reduces traffic congestion, traffic crashes and environmental impacts. Even relatively blunt instruments, such as transit subsidies and restrictions on automobile use and urban expansion, may be justified to correct the cumulative effects of multiple market distortions that favor sprawl and automobile dependency.
- Strategies considered "second best" when evaluated only in terms of transportation objectives may be justified if evaluated from a broader perspective. Many Smart Growth and TDM strategies provide multiple economic, equity and environmental benefits, and can be considered "Win-Win" or "No Regrets" strategies (VTPI, 1999).
- Some pricing strategies are revenue-neutral "tax shifting," (Durning and Bauman, 1998) which provides benefits by reducing the tax burden on desirable activities such as employment and investment.
- Land use and transportation system changes are often slow and difficult to reverse, and many resources (land, fuel, environmental quality) are likely to become increasingly scarce. Current policies should therefore be evaluated in terms of future impacts and needs.

This is not to suggest that all Smart Growth and TDM strategies are always justified. But it does suggest that they can provide large economic, social and environmental benefits, particularly strategies based on economic principles (consumer choice, efficient pricing and economic neutrality). Blunter strategies (such as transit subsidies, traffic calming and urban growth boundaries) can also provide net social benefits if implemented as part of an overall Smart Growth and TDM program.

Impacts of Current and Alternative Policies on Consumers

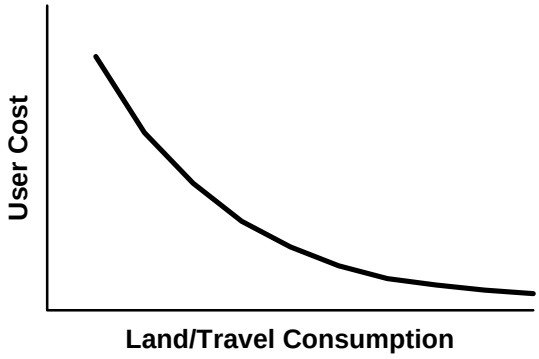
This section explores how Smart Growth and TDM effect consumers

Smart Growth and TDM critics argue that current land use and transportation patterns reflect consumer preferences, and so efforts to reduce sprawl and automobile use will harm consumers (Gordon and Richardson, 1999; Mills, 1999; Orski, 1999).[9] But it is wrong to assume that current consumption patterns reflect true consumer preferences due to land use and transport market distortions described earlier. Exactly how much market reforms would change land use and transport choices is an empirical question that is difficult to predict, but it appears to be large. There are many indications of latent demand for more resource efficient housing and travel. Such changes would reflect an overall *increase* in direct consumer benefits, in addition to indirect economic, social and environmental benefits.

Marginal Consumer Benefits

This analysis does not deny that suburban locations and automobile travel provide direct consumer benefits. Some of these benefits are large. But at the margin the benefits may be quite small, and many consumers would be happy to trade off some land consumption and vehicle travel for other benefits. For example, some households that would choose a one-acre housing lot in the current market might prefer a ½-acre lot with suitable design features or financial incentives. Similarly, that consumers currently drive a lot, and some automobile trips have high value does not mean that consumers could not reduce their vehicle trips if given better choice and appropriate incentives. Many Smart Growth and TDM strategies rely on positive incentives, meaning that consumers are no worse off if they continue their current consumption patterns, but they have new opportunities and savings for choosing efficient land use and transport.

Figure 3 **Convex Demand Curve**



A convex demand curve means that low prices greatly increases consumption.

The demand curves for land and transportation tend to be convex with respect to the origin (it curves downward, as illustrated in Figure 3). This means that there are some very high value land uses and trips, but as the price of land and travel declines,

consumers will continue to use more, although their benefits from each additional increment of consumption becomes smaller. Demand is virtually never saturated and becomes highly elastic at low prices, because an increasing portion of consumption consists of land use and travel with low marginal benefits.

This insatiable demand for low-priced land and transport occurs at two levels. Individual consumers find ways to use more land and transport, and over the long run markets and society reorganize to be more land and transport intensive. For example, although a household might be satisfied with a home on a modest parcel of land, there is virtually no limit to how much land it could use for more garden space, outbuildings, sporting fields and even wilderness, as long as they bear no additional cost. If land is cheap, over the long run, architects will tend to design buildings with larger footprints (e.g., one-story "ranch houses" rather than multi-story houses), and homebuyers will expect larger gardens and lawns.

Similarly, consumers can always find countless ways to increase their travel, provided that their price is low enough. There is evidence that the average amount of time devoted to travel tends to remain constant overall, which suggests that as transport speeds increase people will take more discretionary trips (Levinson and Kumar, 1995). When travel is fast, cheap and comfortable consumers make more and longer errands, accept longer commutes, vacation farther from home, and use more imported goods. If transporters (as in the Starship Enterprise) become as common as telephones, children will have birthday parties in the Amazon jungle, and bartenders will collect fresh cocktail ice in the Antarctic. Cheap mobility reduces access (e.g., the number of local shops and public services within residential neighborhoods), and makes longer-distance vacations and business meetings common.

This additional travel provides consumer benefits, but these may be small, and much of the benefit may be absorbed in competition. For example, if transportation is inexpensive, businesses will send sales staff on more client visits because their competitors are doing the same thing. Similarly, if travel is cheap, vacationers must travel farther to reach a destination that is considered unspoiled and unique. To the degree that people travel to have unique experiences or impress their friends, low transport costs lead to more travel with little net gain.

This underscores the importance of developing efficient land use and transportation markets that test consumer demand through the discipline of efficient prices, to insure that land and transportation consumption decisions result in net benefits. Although some land and transportation consumption provides very large benefits, the virtually unlimited demand for low-priced land and transport means that an increasing portion of land use and transportation activity consists of non-essential, discretionary consumption that provides little benefit. At the same time, the marginal costs of this additional travel tends to increase due to congestion.

Housing Preferences

Smart Growth need not *force* households to choose higher density. By improving land use choices, and passing on the financial savings that result from more efficient land use (such as reduced parking and utility costs) it allows households to *choose* higher density when they benefit overall as a result. Hunt (2000; also see Hunt, McMillan and Abraham, 1994) found that the average premium consumers are willing to pay for lower-density housing is comparable to the incremental costs of providing such housing. This suggests that more efficient pricing, in which housing charges more accurately reflected location-related costs would cause some consumers to choose more resource efficient housing.

Many families already choose higher-density housing, but lack multi-modal accessibility due to poor design. For example Moudon and Hess (2000) found that 40% of residents in suburban areas of Puget Sound live in multi-family housing, and about half of those live in multi-family clusters with more than one thousand residents. Yet, these developments often lack pedestrian access to nearby retail and public services, forcing residents to drive rather than walk for errands. Better integration between land use and transportation can significantly reduce automobile use without changing housing type or size (Cambridge Systematics, 1992). This suggests that Smart Growth principles applied to suburban development could provide consumer and social benefits.

Much of the apparent demand for suburban housing is not a preference for the physical attributes of low-density development, but rather reflects social attributes that could exist in urban neighborhoods. A National Home Builders Association survey (NHBA, 1999) found that 83% of consumers prefer suburban housing, but the features respondents value most are neighborhood security, quality schools and neighborhood quality. This suggests that some households would choose higher density, multi-modal locations that have such amenities. Demand for New Urbanist communities, loft apartments and urban infill is strong, provided that they offer personal security, school quality and prestige comparable to suburbs (*Consumer Reports*, 1996; Nelessen, 1994; Kunstler, 1996).

Critics also argue that lower-density development is necessary to meet consumers' desire for spacious homes. But larger homes can fit on small lots; the main amenity provided by larger housing lots is more lawn and garden space. Some households may value large lawns, but others may be happy to trade off lawn size for other amenities (such as better access), or for public greenspace (such as nearby parks or shared yards).

Critics argue that families with young children demand large-lot homes, and that parents must chauffeur children by automobile. Even if such claims are true, only a minority of households contain young children. Put another way, during a typical lifecycle there are times when higher-density housing and alternative travel options are more feasible and important, including young adult years when money is limited and people are physically fit, and late in life when a smaller home is preferable and driving becomes difficult. These periods are increasing due to later marriage and child rearing, and longer lifespans.

Travel Preferences

Critics of TDM argue that demand for mobility increases with income, so ever-increasing traffic must be accommodated as consumers become wealthier. As evidence they cite trends toward increased automobile ownership and use in developing countries (Roth, 1996). But more detailed analysis indicates that vehicle use tends to saturate, and is highly variable depending on public policies, particularly at the regional level (Newman and Kenworthy, 1998, p. 111). The portion of trips made by automobile varies significantly from one city to another, depending on land use and transportation practices, not just wealth, as indicated in Table 12.

Table 12 **Mode Split in Urban Areas** (Pucher and Lefevre, 1996, p. 16)

	Car	Transit	Cycling	Walking	Other
Austria	39%	13%	9%	31%	8%
Canada	74%	14%	1%	10%	1%
Denmark	42%	14%	20%	21%	3%
France	54%	12%	4%	30%	0%
Germany	52%	11%	10%	27%	0%
Netherlands	44%	8%	27%	19%	1%
Sweden	36%	11%	10%	39%	4%
Switzerland	38%	20%	10%	29%	3%
UK	62%	14%	8%	12%	4%
USA	84%	3%	1%	9%	2%

Travel patterns vary significantly due to differences in land use and transport policies.

There are many indications that even relatively wealthy motorists will reduce their vehicle travel and use travel alternatives if given suitable choices and incentives. For example, Parking Cash Out typically reduces automobile commuting by 15-25%, and many higher-income residents rely on walking and cycling for some trips.

This suggests that it is possible to reduce per capita land use and vehicle travel by satisfying consumer preferences for choice, accessibility, affordability, and community amenities. Only if market distortions favoring sprawl and automobile dependency are corrected can true consumer preferences be determined. To the degree that TDM and Smart Growth increase consumer choices, provide consumer savings and help create more livable communities, they can help meet consumer preferences.

Equity Analysis

This section explores equity impacts of Smart Growth and TDM.

Critics such as Green (1995) and Pisarski (1999) argue that current land use and transportation patterns benefit disadvantaged populations (e.g., women, minorities, people with low incomes), and that Smart Growth and TDM harm these groups by reducing their housing and mobility options. However, these critics assume that Smart Growth and TDM consist only of negative strategies that reduce consumer choice and increase their costs without providing significant offsetting benefits to disadvantaged groups. None evaluates the equity impacts of specific strategies or considers ways that Smart Growth and TDM can help achieve equity objectives.

This is a significant omission since Smart Growth and TDM strategies have a wide range of equity impacts. Many strategies support equity objectives by improving travel choices or affordability to disadvantaged groups. Others support some equity objectives but contradict others, such as HOV facilities that seem unfair to motorists but benefits disadvantaged groups. The overall equity impacts of pricing strategies depend on how prices are structured, how revenues are used, and the quality of travel alternatives.

For example, parking pricing can benefit lower-income people if there are good travel alternatives, revenues are used progressively, and if it helps reduce their traffic problems (Kain, 1994). Nearly all TDM strategies benefit people who are transportation disadvantaged indirectly by increasing travel alternatives. Virtually any Smart Growth or TDM program can be designed to achieve equity objectives. Some strategies require subsidies, which can be considered horizontally inequitable. However, such subsidies are often less per capita than current subsidies for driving (road and parking facility expenses, and other external costs). If so, subsidies for programs that benefit non-drivers increase horizontal equity.

Table 13 summarizes the equity impacts of 37 Smart Growth and TDM strategies, using the following criteria:

- *Horizontal Equity* Treats every person and group equally. Prices reflect costs unless a subsidy is specifically justified.
- *Income.* Is progressive with respect to income (lower-income people benefit more than those with higher incomes).
- *Need.* Benefits mobility-disadvantaged people (non-drivers, people with disabilities, etc.).

Many of these strategies increase horizontal equity by making user charges better reflect costs. Many benefit low-income people by providing financial savings or more affordable housing and travel options. Most benefit transportation disadvantaged people by improving transportation alternatives. This analysis shows that most Smart Growth and TDM strategies provide net equity benefits. Although these impacts vary depending on circumstances and perspectives, this analysis suggests that it is wrong to assume that Smart Growth and TDM necessarily reduce equity or harm disadvantaged groups overall.

Table 13 **Equity Summary** (1=Positive, 0=Mixed, -1=Negative) (VTPI, 2000)

Type	Horizontal	Income	Need	Comments
Pricing Reforms	1	-1	1	Increases vehicle charges to better reflect costs.
Park & Ride	0	1	1	Favors transit. Usually requires subsidies.
HOV Preference	1	1	1	Favors transit and ridesharing.
Transit Improvements	0	1	1	Favors transit. Usually requires subsidies.
Ridesharing	0	1	1	Increases affordable travel options.
Nonmotorized Improvements	0	1	1	Increases affordable travel options.
Intermodal Bike	0	1	1	Increases affordable travel options.
Tele-access	1	0	1	Increases travel options.
Alternative Work Hours	1	1	1	Tends to be highly valued by users.
Guaranteed Ride Home	0	1	1	Tends to be highly valued by users.
Address Security	1	1	1	Tends to be highly valued by non-drivers.
Full Cost Pricing	1	-1	1	Increases vehicle charges to better reflect costs.
Increased Fuel Taxes	1	-1	1	Internalizes vehicle costs.
Road Pricing	1	-1	1	Internalizes vehicle costs.
Vehicle Restrictions	0	0	1	Tends to improve alternative travel options.
Parking Pricing	1	-1	1	Internalizes vehicle costs.
Cash Out Parking	1	1	1	Provides benefits to non-drivers comparable to the value of free parking offered drivers.
Reform Parking Requirements	1	1	1	Reduces subsidies for driving.
Preferential Parking	1	1	1	Tends to improve alternative travel options.
Distance-based fees.	1	1	1	Makes charges better reflect crash costs.
Carsharing	1	1	1	Improves affordable transportation.
Neotraditional Planning	1	1	1	Improves housing and travel choices.
Traffic Calming	1	0	1	Reduces traffic impacts.
Location-Efficient Housing	1	1	1	Improves housing choice.
Zoning Reform	1	1	1	Allows more mixed use, higher-density development.
Parking Management	1	1	1	Reduces subsidies for driving and travel choice.
Preserve Open Space	0	-1	0	May increase housing costs.
Location-efficient Development	1	1	1	Improves housing and travel choices.
Affordable Housing	0	1	1	Improves housing choice and affordability.
Totals	*20*	*14*	*28*	

Criticisms

This section examines some specific criticisms of Smart Growth and TDM.

Density-Related Costs and Benefits

Some critics argue that Smart Growth is harmful because it significantly increases land use densities, which imposes various social costs. But many Smart Growth programs involve little or no increase in density, particularly at the regional level. Critics tend to overstate the costs and understate the benefits of clustering and density, as discussed below.

Increased Local Traffic Congestion and Environmental Impacts

Smart Growth critics argue that increased density increases traffic congestion and air pollution (Cox, 1999; Gordon & Richardson, 1999), because reductions in per capita automobile travel tend to be smaller than increased population. All else being equal, doubling population density reduces vehicle mileage by only about 10%, resulting in a 40% net increase in trips within a local area. This criticism would be appropriate if Smart Growth consisted *only* of increasing density. But Smart Growth includes many other strategies that also reduce per capita driving: land use mixing, improved travel choices, and incentives to reduce mileage. Smart Growth can affect development location and design without increasing overall density. Even if higher density development increases *local* traffic congestion and pollution, it reduces overall congestion and pollution, since fewer vehicle trips are generated to other parts of the region.

Empirical evidence indicates that higher-density development does not necessarily increase congestion. Suburban areas such as San Bernardino County tend to have greater congestion problems than dense cities such as New York and Chicago (STPP, 1999). This analysis depends on how congestion is measured: high density areas tend to have the slowest traffic speeds, but suburban areas have the greatest per capita traffic delay because residents must drive more miles. This occurs because increased land use density and mix improves *access* by reducing the distances between destinations and increasing travel choice (particularly if there is grade-separated transit, such as subways or elevated rail systems). As a result, travel distances are shorter and travelers have options that bypass traffic congestion. Overall, U.S. automobile commute travel times are minimized at 7,000-10,000 persons per sq. mile, while transit commute times decrease with density (Levinson and Kumar, 1997).

Increased density concentrates but reduces per capita impervious surfaces (buildings and pavement) and human disturbance of the landscape. Such impacts can impose significant economic and ecological impacts, including increased stormwater management, hydrologic disruption, heat island effects and loss of habitat (Arnold and Gibbons, 1996; USEPA, 1999). Density increases local environmental impacts (urban neighborhoods tend to have smaller lawns, fewer trees, etc.), but protects regional greenspace (parks, farmland and wilderness), and is particularly important for environmental features that require large areas of undisturbed land.

Public Service Costs

Some critics argue that higher density development actually increases public costs (Cox, 1997; Gordon and Richardson, 1999). They cite research by Ladd (1992) indicating that per capita public service expenditures increase in higher-density regions (more than 250 people per square mile) U.S. counties. But aggregate analysis indicates nothing about the cost effectiveness of Smart Growth, which is intended to affect development patterns and design, not regional population density. For a given regional population density, Smart Growth objectives such as clustered and mixed land use, infill, reduced vehicle traffic and parking, can reduce public costs.

Ewing (1997) concludes that density-related costs can be graphed as a ~ (a tilde), with low costs in rural areas where households accept less public services (e.g., provide their own water, sewage and garbage collection), and increased costs in suburban areas where more services are demanded. Costs decline with clustering, and as densities increase from low to moderate, and increase again at very high densities.[10] Urban infill often has low public costs if infrastructure (schools, sewage, power, etc.) has capacity, but can have high costs if more capacity is required. This indicates that clustering, moderate densities and infill usually reduces public service costs, but some high-density development can increase some public costs. The higher public service costs of sprawl can result in cross-subsidies from older to newer neighborhoods. One study found that suburban residents in Phoenix receive 77% more government infrastructure investment per household than residents of older urban neighborhood, but pay less in taxes (Guhathakurta, 1998).

Productivity Benefits of Density

Critics of Smart Growth and TDM generally ignore economic benefits of more efficient land use. Density and clustering can provide agglomeration benefits, which consist of increased productivity resulting from improved access and network effects (Cervero, 1997; Coffey and Shearmur, 1997). Although such benefits are difficult to measure, they appear to be large. They are the reason that cities and commercial centers develop despite density-related costs such as congestion and concentrated pollution.[11] One published study found that doubling a county-level density index is associated with a 6% increase in state-level productivity (Haughwout, 2000).

Density and Social Problems

Density is often associated with social problems such as poverty and crime, but this does not mean that increased density *causes* such problems.[12] On the contrary, Smart Growth design features that encourage social interaction, improve access for non-drivers, increase social and economic opportunities for disadvantaged people, and increase demographic mix can reduce social problems overall.

To understand this issue it is important to make a distinction between density (people per acre) and crowding (people per room). As an example, high-priced high-rise apartments have density but not crowding, while small rural homes may have crowding but not density. Although crowding is associated with poverty and social problems, density is not (Baum and Epstein, 1978; Newman and Kenworthy, 1999; 1000 Friends, 1999). There is no evidence that shifting residents from conventional low-density housing to alternative, higher-density housing would cause social problems.[13]

Sprawl often creates a self-fulfilling prophecy: middle-class flight to suburbs leads to concentrated social problems in less desirable urban neighborhoods, reduces mobility options for disadvantaged groups, or increases social stratification (and therefore isolation of disadvantaged groups). Public education is a good example. Many inner-city public schools are considered inferior, so parents in urban areas face three options: accept mediocre education, pay for private school, or move to suburbs. This creates a cycle of decline, as families with resources abandon inner-city public schools and urban neighborhoods. The problems facing inner-city schools result from social factors rather than density itself. There is no physical reason that schools in higher-density urban neighborhoods cannot be equal to suburban schools in terms of quality and safety.

Many of the disadvantages of density, including traffic congestion, parking problems and pollution, are caused by motor vehicle density, not population density. To the degree that comprehensive Smart Growth and TDM programs can reduce per capita automobile travel, these problems can be minimized. Another important conclusion is that many of the problems associated with urban neighborhoods are social, not physical. That many urban neighborhoods are considered unsafe and their public services (such as schools) inferior is a significant challenge, but is not evidence that urban redevelopment is socially harmful or contradicts consumer preferences. On the contrary, it indicates that some, perhaps many, households would prefer more urban living if such barriers are corrected.

Although low-density development and automobile use provide benefits, most of these are "internal" benefits. There appears to be little justification for society to subsidize or favor lower-density development or automobile travel. On the contrary, although they benefit some consumer directly by increasing the amount of land and vehicle travel they can afford, the net benefits to users are small and largely capitalized into housing and transportation prices, and the increased consumption imposes significant external economic, social and environmental costs.

Reduced Affordability and Opportunity

Critics argue that Smart Growth and TDM reduce housing and transport affordability. Some emphasize that urban growth boundaries reduce the supply of land available for development in urban areas (Mills, 1999; Gordon and Richardson, 2000).[14] Others claim that TDM reduces economic opportunities for disadvantaged groups (women, minorities, low-income people) by restricting their ability to drive (Green, 1995; Pisarski, 1999). But Smart Growth consists of much more than urban growth boundaries, and TDM consists of much more than restrictions on driving. Many strategies improve affordability and economic opportunities by increasing choices and providing financial savings.

Clustered development with reduced road and parking requirements can reduce housing costs by allowing more units on a given parcel of land, and by reducing public service costs. Even modest increases in average densities can offset the land supply reductions from urban growth boundaries. Smart Growth also encourages development of multi-family housing, secondary suits, apartments over shops, and loft apartments, which represent a major share of affordable housing supply but are prohibited by current zoning

in many communities. Inflexible parking regulations tend to reduce urban housing affordability by increasing land requirements and construction costs (Jia and Wach, 1998). Requiring two parking spaces per housing unit represents just 10% of the cost of a $250,000 housing unit, but 25% of the cost of a more affordable $100,000 unit, and is excessive for lower-income households, which tend to own fewer vehicles than average.

Critics of Smart Growth often cite increased housing prices in the city of Portland, which has Smart Growth development policies. But a comparison between Portland and the city of Atlanta (which is considered to have sprawl oriented development policies) shows that the average portion of household income devoted to housing is the same (20% in both cases), while Portland residents rate housing and neighborhood quality much higher (Nelson, 2000). This suggests that population and income growth, rather than Smart Growth policies, are the cause of increased housing prices, and that Smart Growth can result in better quality housing and neighborhoods.

Table 14 **Comparing Portland and Atlanta** (Nelson, 2000)

	Portland	**Atlanta**
Growth Style	Urban Containment	Business As Usual
Population Growth	+26%	+32%
Job Growth	+43%	+37%
Income	+72%	+60%
Government Revenue	+34%	+56%
Property Tax	-29%	+22%
Vehicle Miles Traveled	+2%	+17%
Single Occupant Vehicle	-13%	_15%
Commute Time	-9%	+1%
Air Quality in Ozone Days	-86%	+5%
Energy Consumption Per Capita	-8%	+11%
Neighborhood Quality*	+19%	-11%
Change in opinion or house quality (all households)	+2.2%	+1.3%

Even if Smart Growth increases rents, this can be offset by other household savings. Smart Growth and TDM can reduce transportation costs, utility charges and taxes. As discussed in the section on equity, even TDM strategies that increase vehicle user charges can increase overall affordability if revenues are used to improve travel alternatives or returned to lower-income households (for example, through property tax reductions). A Smart Growth strategy called Location-Efficient Mortgages recognizes these potential savings when assessing a household's borrowing ability, increasing housing affordability (Hare, 1994; Hoeveler, 1997).

Tables 15 and 16 show the impacts of Smart Growth and TDM on housing and transportation affordability. This suggests that an appropriate combination of Smart Growth and TDM strategies can increase the affordable and quality of housing and transportation options, provide economic benefits and increased opportunities and choices that are particularly valuable to disadvantaged groups.

Table 15 **Smart Growth Housing Affordability Impacts**

Reduces Housing Affordability	Increases Housing Affordability
• Urban growth boundaries (reduce developable land supply). • Increased building design requirements (curbs, sidewalks, sound barriers, etc.).	• More accessible housing reduces total transportation costs (leaves more money for housing expenses). • Reduced parking and setback requirements (reduces land requirements per housing unit). • Higher density development and (reduces land requirements, increases land supply for housing.) • More diverse, affordable housing options (secondary suites, apartments over shops, loft apartments). • Reduced property taxes and utility fees for clustered and infill housing.

Many Smart Growth strategies increase housing affordability.

Table 16 **TDM Transportation Affordability Impacts**

Reduces Transport Affordability	Increases Transport Affordability
• Increased direct user fees (road tolls, parking fees). • Reduced highway capacity expansion. • Vehicle use restrictions.	• Improved travel options (pedestrian, cycling, ridesharing, transit). • More accessible land use (e.g., more shops and services close to residential areas). • Reduced transit fares. • Special mobility services (e.g., "welfare to work" van services). • Parking Cash Out and commuter transit benefits. • Distance-based vehicle insurance and registration fees. • Carsharing (short-term vehicle rentals located in neighborhoods). • School and campus transport management programs (increases student's transport choices).

Most TDM strategies can increase transport affordability.

Consumer Impacts of Urban Growth Boundaries

Some critics argue that urban growth controls and greenspace preservation harm consumers by reducing the supply of land available for residential development (Mills, 1999). But this is not necessarily the case. Greenspace preservation tends to reduces public costs (Fausold and Lilieholm, 1996), and increase the value of nearly land that is developed for housing and some other uses. Greenspace preservation is efficient and rational if these savings and increased value on developed properties exceed the value of development foregone. That private developers often preserve greenspace suggests that it can be efficient. Government growth controls are simply a variation of these practices.

Growth controls may be necessary because farms and wilderness require minimal parcel sizes. A thousand one-acre parcels, each with one building, driveways, parking and gardens and associated human activity cannot provide the same wildlife habitat or farm productivity as 900 acres of preserved forests or farms, plus 200 acres developed at 10

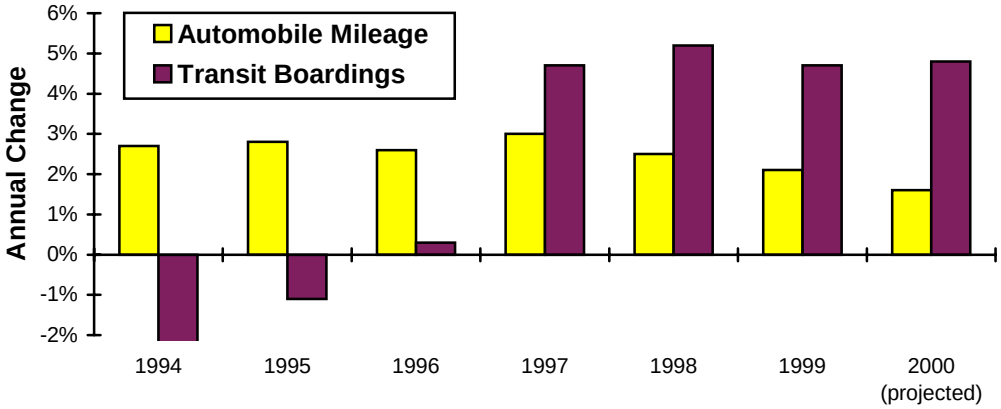
units to the acre. Which development pattern maximizes residents' welfare depends on their preferences: If large-lot homes are popular because they provide attractive views and proximity to nature, clustered development with large parcels of preserved greenspace can maximize consumer benefit. If residents choose low-density development in order to have large yards for sports activities, medium-density housing designed around neighborhood parks may provide the greatest overall consumer benefit. If consumers choose low-density development for the sake of privacy, they may prefer higher-density communities that incorporate visual and noise control features (such as fences, hedges and sound-dampening walls). Only if residents actually use their full parcel of land (for gardens, private play yards or structures), does low-density development maximize consumer benefits.

Excessive and Wasteful Transit Expenditures

Smart Growth and TDM opponents often criticize transit subsidies, particularly rail transit, arguing that they are ineffective and wasteful (Gordon and Richardson, 1999; Moretti, 1999; Orski, 2000). These arguments tend to overlook a number of important factors (Weyrich and Lind, 1999; Lewis and Williams, 1999).

Public transit is justified for two different goals: mobility (for people who are transportation disadvantaged) and efficiency (reduced congestion, facility costs and pollution). When evaluating transit for one objective it is inappropriate to include subsidies justified for the other. For example, subsidies for special mobility services or for transit service at times and in areas with low demand should not be included when evaluating the cost effectiveness of transit services intended to reduce congestion and pollution. Conversely, it is inappropriate to evaluate commuter bus or rail transit service intended primarily to reduce traffic congestion and pollution in terms of equity.

Figure 4 **Annual Growth in Automobile and Transit** (APTA & FHWA Data)



Between 1997 and 2000, transit use has grown faster than automobile use.

Critics argue that transit has failed to attract travelers away from cars despite "massive" public subsidies. But transit use has increased faster than automobile travel in recent years (Figure 4).[15] Transit subsidies are small compared with total automobile subsidies,

and are justified in part for equity (to provide a basic level of mobility for non-drivers and to accommodate travelers with special needs). In 1998 U.S. public transit subsidies totaled $15.4 billion, about half of which are justified for equity objectives, indicating an efficiency-justified subsidy of less than $8 billion. Public roadway subsidies (the portion of public roadway costs not paid by vehicle user fees) totaled $38 billion a year (FHWA, 2000),[16] while parking subsidies average more than $130 billion, and other external costs of automobile travel (uncompensated crash and environmental costs) are estimated to exceed $200 billion (Delucchi, 1996; Litman, 2000). This indicates that automobile subsidies are 20 to 50 times greater than efficiency-justified transit subsidies.

Critics point out that transit only serves a small portion of total personal travel. However, on many busy urban corridors, transit represents a much greater portion of travel. These are generally the corridors with the greatest transport problems. Although providing transit service on such corridors is expensive, it is usually cheaper than the full costs of accommodating the same trips by car (including roads, parking, user costs, crashes and environmental impacts). When such corridors have high-quality transit and financial incentives they experience ridership growth (Weyrich and Lind, 1999; Oram, 1995).

Critics tend to undervalue transit by considering only one or two benefits. For example, transit programs are often criticized as being more expensive than other options for reducing traffic congestion or air pollution, without considering additional benefits such as parking cost savings, consumer savings and choice, safety benefits, and long term benefits from more efficient land use. Grade separated transit can reduce congestion and traffic delays on parallel highways (Lewis and Williams, 1999). Rail transit stations can provide a catalyst for more efficient land use that can result in additional reductions in traffic (a mile of rail transit travel tends to "leverage" 4-7 miles in reduced automobile use, according to Newman and Kenworthy, 1998, p. 87). Conventional traffic models tend to overlook these benefits. As a result, transit investments can often provide much greater total benefits than critics acknowledge.

Transit service experiences economies of scale: the more passengers on a route the lower the cost per rider (Hunt and Abraham, 2000). As a result, marginal costs are usually much lower than average costs (there is minimal cost to carrying an additional rider if transit vehicles have excess capacity). Transit becomes more effective and cost effective if implemented with other Smart Growth and TDM strategies such as clustered, mixed development, improved pedestrian and cycling facilities, and financial incentives. Thus, transit investments that do not seem cost effective by themselves may become worthwhile as part of a Smart Growth and TDM program.

Critics often cite research indicating that rail transit benefits has been overestimated by local planners in order to obtain federal and state funds (Pickrell, 1992). Boarnet and Haughwout (2000) point out that this criticism applies equally to roadway projects, the benefits of which are often overstated, while more economically efficient alternatives are overlooked, due to dedicated highway funds. Least Cost Planning (a TDM strategy) eliminates such funding bias. It allows the most effective solution to transportation problems to be selected regardless of whether it is a highway improvement, transit capital

project, transit operation improvement, or a TDM program. Smart Growth and TDM can also increase the efficiency of transit service by improving performance and increasing ridership. Thus, Smart Growth and TDM can address legitimate criticism of public transit investments.

This is not to suggest that public transit is always the best solution to transport problems, or that current transit systems are optimal. However, it indicates the importance of using a comprehensive analysis when evaluating transit and comparing it with alternatives. Because critics overlook these factors, they fail to prove their arguments.[17]

Increased Regulatory and Tax Burdens

Critics argue that Smart Growth and TDM increase government regulations and expenditures, citing urban growth boundaries, mandatory Commute Trip Reduction, and TDM administrative programs. But many Smart Growth and TDM strategies *reduce* rather than *increase* regulations and government expenditures, or shift objectives without increasing regulations and funding overall. For example, Smart Growth and TDM tend to reduce regulations on parking, building design, density, and motor carriers. Similarly, although Smart Growth and TDM may increase public funding for alternative transport modes, these represent a shift from current expenditures, not necessarily an increase in public spending.

It is worth noting that private developers often impose much stricter regulations than Smart Growth policies. For example, it is common for master planned communities and retail malls to control all aspects of building design, maintenance and use. These regulations are justified to improve accessibility, convenience, safety, aesthetics, business activity and property values and environmental quality. Smart Growth allows efficiencies and amenities associated with master planning to be achieved in existing communities, and where there are multiple developers. This is more economically neutral than only allowing such amenities to be implemented as part of new, large-scale development.

Economic Development Impacts

Critics of Smart Growth and TDM sometimes suggest that Smart Growth and TDM policies will reduce economic development and employment, because the automobile industry is such an important economic sector. This claim is generally incorrect. The automobile industry is mature and not particularly profitable, and other industries provide much greater employment for a given investment. Expenditures on automobiles and fuel usually provide less economic development or employment than expenditures on most other consumer goods (Litman and Laube, 1999). One case study compared the economic activity and employment generated by expenditures on automobile use, transit use, and general consumer expenditures in San Antonio, Texas (Miller, Robison & Lahr, 1999). It found that each 1% of regional travel shifted from automobile to public transit increases regional income by about $2.9 million (about 5¢ per mile shifted), resulting in 226 additional regional jobs. Even greater benefits are likely in states that do not produce petroleum.

Aesthetic and Social Impacts

Suburbs are sometimes criticized as boring, unattractive, uncreative, conformist and materialist. Suburban developments often reflect uniform designs. Although bland buildings and conformist attitudes may be more common in suburbs, they are symptoms of larger forces, not necessarily caused by sprawl. Urban buildings can be equally boring, and ethnic enclaves can develop in suburbs.

However, current land use and transportation practices do have physical attributes that can have negative aesthetic and social impacts. Sprawl development minimizes the public realm (public spaces where residents casually meet and interact), because driving replaces walking on public streets, residents rely less on local services (i.e., neighborhood shop and schools), and private yards replace public parks. This reduces neighborhood interaction and community cohesion (Cochrun, 1994). Automobile-oriented commercial strips have large parking lots and oversized signs to attract motorists' attention, which many people consider unattractive. Although people may differ in the value they place on community cohesion and landscape aesthetics, there are reasons to believe that they are reduced by sprawl. By creating more balanced transport systems, pedestrian-oriented streets, mixed land use, flexible parking requirements, and reduced traffic speeds, Smart Growth and TDM can help produce stronger and more attractive communities.

Ineffective

Critics argue that Smart Growth and TDM are ineffective. For example, Orski (1999) concludes that TDM does little to solve transport problems, but he only considers a few strategies (commute trip reduction programs, carpool lanes, mass transit, and land use management) while ignoring others with proven effectiveness, such as road and parking pricing.[18] Nor does he consider the combined impacts of a comprehensive TDM program. Smart Growth and TDM have not solved North American transportation problems because they have never been implemented in a significant and comprehensive manner.

Critics argue that driving is insensitive to price, citing growing per capita vehicle travel in countries with high fuel taxes. Yet, many studies show that vehicle use is quite price sensitive ("Price Elasticities," VTPI, 2000). Fuel taxes are simply not an effective way to reduce driving because fuel represents only about 20% of total vehicle expenses, and motorists respond to high fuel prices by purchasing more fuel-efficient vehicles, resulting in modest mileage reductions. Driving is quite sensitive to overall vehicle costs, indicated by relatively large travel reductions caused by modest road tolls and parking fees.

Hypocrisy

Some critics imply that advocates of Smart Growth and TDM are hypocritical and unfair because they want to change *other people's* housing and travel habits, rather than their own. This criticism assumes that Smart Growth and TDM consist of personal sacrifices. But this paper shows thatsome Smart Growth and TDM strategies benefit both people who change their consumption patterns and those who do not. From that perspective there is nothing hypocritical or unfair about supporting Smart Growth and TDM to change other consumers' habits, provided that positive incentives are used.

Motorists have every reason to support transportation alternatives that reduce the traffic congestion, crash risk and pollution they face, and improve travel options for non-drivers (which they may become in the future). Even negative incentives, such as congestion tolls and parking fees that price lower-income people off the roadways, is not necessarily unfair or regressive if there are good transport alternatives and revenues are used to benefit lower-income people overall.

Smart Growth and TDM critics often try to divide people into just two categories: motorists and non-motorists, with the implication that their interests conflict (Spindler, 1997). This ignores the great range of actual travel habits and interests. An individual may travel primarily by automobile, yet still value being able to walk to a store, rideshare when their car is in the shop, or have transit service available for occasional use.

Put another way, over a typical lifecycle most people can make use of alternative housing and transportation options created by Smart Growth and TDM. It is both rational and moral for citizens to support the development of such options so they will be available in the future, and to encourage their use to help improve mobility, economic savings and environmental protection for everybody. There is no reason that support for Smart Growth and TDM should be limited to people who have already changed their housing and travel patterns.

Conclusions

This study evaluates land use and transportation policies in terms of economic welfare and equity. The question then is not whether sprawl and automobile dependency is "good" or "bad," but rather, what levels of land use and vehicle travel are optimal. The study identifies several market distortions that result in economically excessive sprawl and vehicle travel. Although individually these distortions may appear modest and justified, their impacts are cumulative and synergistic. Because of these distortions, current land use and travel patterns cannot be considered optimal. In a more efficient market, consumers would choose more efficient land use and transport options, and be better off overall as a result.

A rough estimate is that one-third to one-half of automobile travel can be explained by "conventional" distortions, such as inefficient vehicle and facility charges, and biased planning practices. Sustainable economics, which places additional value on ecologic, equity and social impacts, could justify even greater vehicle travel reductions. The effects of these distortions on land use are probably similar, significantly increasing land consumption (measured as land devoted to transport facilities and buildings per capita). This increases consumer costs and external costs, reduces choices, and it aggravates urban degradation and inequity. The total costs are large and harm just about everybody overall, even those who directly benefit from sprawl and automobile dependency. Many problems facing society (traffic congestion, high taxes, excessive consumer costs, lack of travel choices for non-drivers, and loss of wildlife habitat and pollution) are virtually unsolvable without market reforms.

Smart Growth and TDM include more than 40 strategies to encourage more efficient use of land and transportation resources. Most reflect market principles of consumer choice, cost-based pricing and economic neutrality. They give consumers incentives to choose more accessible homes and reduce driving. Consumers can benefit directly from financial savings, improved choice, reduced congestion and safety; and indirectly through public savings and environmental improvements. These reforms tend to increase consumer welfare and equity. Even strategies that increase user fees can increase vertical equity if revenues are used in ways that benefit disadvantaged people. Blunt strategies, such as restrictions on development and vehicle use, may be justified as second-base solutions until more efficient market reforms are implemented.

Critics tend make the following, generally incorrect, assumptions:

- Current land use and transport markets are efficient, fair, and reflect consumer preferences.
- Sprawl and automobile-dependency have minimal negative impacts.
- Smart Growth and TDM consist primarily of regulatory-based strategies.
- Increased user charges, and incentives for more efficient land use and transport, are unfair and regressive.
- Consumers will not accept or benefit from housing and transportation alternatives.
- Smart Growth and TDM reduce housing and transport affordability.

Like any new practice, TDM and Smart Growth can be implemented ineffectively and have unexpected consequences. It is therefore important that they be carefully planned. The analysis in this paper does not prove that all Smart Growth and TDM strategies are always appropriate, but it suggests that in many situations they are justified and can provide significant direct and indirect benefits to individuals and society.

There are many issues of uncertainty. In order to evaluate alternative housing and transportation policies it is important to determine how much consumers value particular attributes. For example, it would be helpful to determine how much current preferences for suburban housing reflect a desire for single-family homes and how much it reflects a preference for security, quality schools and prestige associated with suburbs. Similarly, it would be helpful to determine how much consumers would willingly shift from driving to alternative modes if they had better quality public transit, pedestrian and cycling conditions. Smart Growth and TDM strategies are often evaluated individually, but they tend to have synergetic impacts, and so can be much more effective if implemented as a coordinated package. It would be helpful to develop models that can predict the combined effects of such strategies.

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Endnotes

[1] Development- and automobile-industry lobbyists often try to collapse this issue down into a simplistic debate over whether suburbs and cars are "good" or "bad," and between current practices or a total ban on urban growth and driving, since they know that, if forced to choose between just two options, most citizens, who live in automobile-oriented communities and drive, can be counted on to support the status quo (see for example Spindler, 1997). Dunn (1998) and his publicists makes much of what he calls the "Anti-Auto Vanguard," but his analysis actually identifies more political distortions by pro-automobile interests than by anti-automobile interests, and most policy changes he advocates are Smart Growth and TDM strategies (as a political scientist he simply selects the strategies he considers most politically feasible). Although a few "anti-car" organizations exist, they are small and have little influence. Most Smart Growth and TDM advocates have relatively modest objectives of reducing, but not eliminating, urban growth and driving.

[2] Although consumers may value having goods and services available that they don't actually use, such as ship passengers who value having lifeboats, and residents who value having transit services that they don't currently use. This is called "option value."

[3] Of course, other transport modes are also subsidized, particularly public transit. As described later in this paper, and in Litman, 1999b, transit subsidies tend to be high per passenger-mile, in part because transit tends to be common in urban areas where all forms of transport are expensive to provide, and because transit is subsidized to provide basic mobility for non-drivers (i.e., on equity grounds). Annual subsidies *per user* tend to be low, since transit-dependent people tend to travel much less than motorists.

[4] For example, the Federal Housing Administration policy favored loans in newer, lower-density areas because, as stated in an agency manual, "crowded neighborhoods lessen desirability" and "older properties in a neighborhood have a tendency to accelerate the transition to lower-class occupancy." Government agencies "redlined" neighborhoods considered high-risk, which prohibited affordable loans in those areas. The federal government also provided funding for urban renewal and public housing projects in cities. These policies forced middle-class families to leave cities and poor families to stay. The unsurprising result is class and racial segregation, and extreme social problems concentrated in urban neighborhoods. Although some people argue that they have been corrected (GAO, 1999), the distorted land use practices they created still exist.

[5] Smart Growth critics argue that deurbanization is a natural effect of increased income. For example, Gordon and Richardson (1999) argue that U.S. suburbanization started prior to development of the Interstate Highway System. However, Lewyn points out that the 17 largest U.S. American cities all gained population between 1930 and 1950, during the 1950s 13 lost population, and during the 1960's 14 lost population, and during the 1970s 15 lost population (Lewyn, 1999). The greatest period of urban population loss coincides with the period of Interstate system development.

[6] Critics might point out that nonmotorized travel represents a small portion of all mileage, as opposed to trips. However, this implies that society should favor longer-distance trips, for example, that more public resources should be devoted to a cross-town shopping trip than for a walking trip to a local store to make the same purchase. To the degree that all costs of driving are internalized this is justified. But to the degree that there are externalities, society should favor shorter and non-motorized trips. Devoting additional public resources for non-motorized transport is also justified for the sake of equity, since disadvantaged populations tend to rely more on walking and cycling than more advantaged groups.

[7] Transport economists have long argued that congestion is virtually unsolvable without pricing (Goodwin, 1997). Urban economists have argued that failing to price road space efficiently results in excessive urban expansion (Braid, 1995). Vickrey (1968) pointed out that crash costs are underpriced. Some urban economists have pointed out that parking is inefficiently priced (Shoup 1999). Environmental economists have argued that pollution emissions and resource consumption are underpriced (Repetto, et al, 1992.). Lee (1999) concludes that in an efficient market, the portion of land devoted to roads, and the amount of automobile travel would decline significantly. Litman, Komanoff and Howell (1998) and Litman (1999b) indicate that in a more efficient transportation market, automobile use is likely to decline by 35% or more. Even critics of Smart Growth and TDM concede that markets are significantly distorted. For example, Mills (1999) suggests that vehicle user fees must increase about 10¢ per mile to internalize roadway costs, resulting in a 15-25% reduction in urban travel, although he does not explore other market distortions. Dunn (1998) also acknowledges many market distortions.

[8] Total U.S. public transit subsidies average about $17 billion annually. Estimates of the total subsidy for automobile use, including road and parking facility costs not borne by users, congestion, accident risk and environmental impacts are several hundred billion dollars (Delucchi, 1996; Litman, 2000).

[9] Gordon and Richardson argue that public policies and subsidies have not contributed significantly to sprawl, citing William Fischel, *The Economics of Zoning*, 1985. However, this assertion misconstrues its source. Fischel only asserts that sprawl takes up a relatively small portion of cropland and that low gasoline prices have a minor effect on sprawl. The citation does not address pro-sprawl government policies related

to zoning, housing, transportation or education. In fact, Fischel asserts that `much sprawl is caused by local zoning practices," (p. 268), hardly the statement who believes sprawl is the natural result of the free market.

[10] Low density typically mean less than 2 housing units per acre, medium means 2 to 15 units per acre, and high means more than 15 units per acre.

[11] Many planners expected agglomeration benefits to decline due to increased mobility and improved transportation substitutes, such as electronic communications and improved delivery services, which allow many work activities to be performed almost anywhere, particularly for businesses that produce "intellectual" products such as design, software, and art. However, the empirical evidence suggests that the importance of proximity and agglomeration economies is increasing rather than decreasing, as indicated by the extreme centralization of high-level computer and software design in Silicon Valley, and film production in Hollywood. Although many specific planning and design tasks could be preformed in the wilds of Montana as efficiently as in a corporate office building, physical human interaction appears to be an important component of creative innovation and project development.

[12] Rational discussion of housing preferences is made difficult by the long tradition of anti-urbanism in the U.S., ranging from Thomas Jefferson, to various artists, philosophers and back-to-the-land movements which idealized rural life and residents. Anti-urbanism sometimes reflects anti-immigrant and anti-minority sentiment. For discussion see Fishman, 1987.

[13] For example, Lakewood, an inner suburb of Cleveland with 10,700 people per square mile, has 117 violent crimes per 100,000 pop., while Euclid (5,07 per./sq. mi), has 275 and Shaker Heights (4,900 per./sq. mi.) has 227, which is explained by their proximity to low-income neighborhoods. New York City (20,000 per./sq. mi.) has about 9 murders per 100,000 pop. while Atlanta (3,000 per./sq. mi.) has 35.

[14] To support his arguments Mills (1999) cites the effects of land policy on housing prices in Seoul, Bombay and Bangkok, examples that have little relevance to North American Smart Growth indicatives.

[15] This period of accelerated growth in transit ridership coincided with a growing economy and declining real fuel costs, both of which should favor automobile travel over transit. The best explanations for this growth appear to be the additional investments in transit service resulting from ISTEA, and changing consumer preferences. It appears that consumers perceive declining marginal benefits from increased driving, and relatively greater marginal benefits from increased transit use.

[16] This estimate excludes the portion of fuel taxes devoted for non-highway uses, based on the assumption that general taxes should be applied to vehicle fuel. If all fuel taxes are considered a user fee (i.e., if fuel is considered general tax exempt) the roadway subsidy declines to $18 billion.

[17] Mills (1999) argues that no studies show that transit to be cost effective. Using a more comprehensive analysis Lewis and Williams (1999) estimate that U.S. transit provides $26 to $40 billion net benefits.

[18] This reluctance to include pricing strategies might be justified with the claim that they are politically unacceptable in North America, but this is not entirely true. Parking Cash Out is widely accepted, and road pricing is being implemented in some pilot projects. This represents a self-fulfilling prophecy: If experts exclude any strategy they consider currently politically infeasible, true innovations will never be considered by decision makers.