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*"Efficiency - Equity - Clarity"*

# **Economic Development Impacts of Transportation Demand Management**

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## **ABSTRACT**

Transportation Demand Management (TDM) includes a variety of strategies that encourage more efficient use of transportation resources. This paper examines the economic development impacts of TDM. It investigates the optimal level of motor vehicle use, and the degree to which TDM strategies that reduce automobile travel are justified based on economic principles. This paper identifies various market distortions that result in economically excessive automobile travel. Many TDM strategies represent market reforms that correct these distortions by improving transportation options and competition, efficient pricing, and more neutral planning and tax policies. It summarizes research on the economic development impacts of various transportation investments and management policies. This analysis suggests that TDM strategies can increase economic productivity and development, and are often better investments than capacity expansion projects. However, TDM policies and programs must be well planned to provide maximum economic development benefits.

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## INTRODUCTION

Many people assume that increased mobility is good for the economy, and strategies that reduce mobility must be economically harmful. Investments and subsidies for parking structures, highway improvements, airports and port projects are often advocated as ways to support economic development. Automobile and petroleum producers are often seen as particularly desirable industries for regional economic development, and so are offered incentives and subsidies. Proposals to manage traffic demand through pricing reforms or other incentives to reduce driving, are often criticized on the grounds that reduced mobility and vehicle expenditures are harmful to the economy.

Is increased motor vehicle travel really good for the economy? What is the economically optimal level of automobile travel? Can automobile travel be reduced in ways that also support regional economic development? This paper examines these questions. In particular, it investigates how Transportation Demand Management policies and programs affect economic productivity and development.

*Transportation Demand Management* (TDM) includes more than three dozen strategies that result in more efficient transportation and land use patterns.<sup>1</sup> Some strategies improve consumer travel options. Others provide an incentive to reduce driving and rely more on alternative modes, or shift travel times. Some TDM strategies directly affect consumer behavior, others change planning and investment practices.

*Economic Development* refers to progress toward a community's economic goals, including increases in economic productivity, employment, business activity and investment. In recent years there has been growing discussion about how economic development should be evaluated.<sup>2</sup> *Economic development* can include nonmarket impacts related to human health, environmental quality, equity and quality-of-life, and so can differ from *economic growth*, which only reflects material wealth. For example, Gross Domestic Product (GDP), an indicator of economic growth, counts medical costs and environmental cleanup as positive economic activity and assigns no positive value to actions that prevent illness or environmental degradation. Economic development indicators attempt to take into account qualitative and non-market values.

People often assume that since automobile use tends to increase with economic development, efforts to reduce driving must be economically harmful. They assume there is a tradeoff between the economic benefits and environmental costs of increased mobility. However, there is an economically optimal level of mobility, beyond which increased driving is economically harmful. Appropriate strategies to reduce vehicle travel can therefore support both economic development and environmental objectives.

## **HISTORICAL EXAMPLE**

Although transportation investments (ports, canals, railroads, roads, etc.) often contribute to economic development, there are also many examples of excessive transportation investment. Most people are probably aware that rail transportation development made a key contribution to the industrial revolution and North America's westward expansion. Railroads greatly increased productivity and economic development during the nineteenth century, by increasing personal and freight mobility.

But the truth is somewhat more complicated. Although the railroad barons of that period amassed great wealth and employed vast armies of workers, their profits often resulted more from government funds and land grants than from rail service revenues. There were many examples of poorly planned rail lines that went bankrupt and impoverished investors. Because rail access was considered important to local development, every community wanted a railroad line, even if not economically justified. Countless towns cajoled, bribed and subsidized rail companies to attract a line, only to lose it a few years later due to inadequate revenues.

Government subsidies and favorable public policies intended to support railroad development exacerbated the economic waste resulting from uneconomic railroad investments. The railroad industry was not very profitable during the second half of the nineteenth century, leading to cutthroat competition and practices that many citizens considered unfair, resulting in "populist" political movements to regulate railroads and other corporations. A major depression during the 1890's was largely the result of excessive railroad investments and poor profits.

Just because railroad mobility could, in the right circumstances, increase productivity and economic development, does not mean that every rail line was a worthwhile investment, either for a profit-oriented business or for a community. An efficient economy uses each mode for what it does best. In many situations this meant relying on wagon transport to a rail station, rather than paying subsidies to build unprofitable rail lines.

This is just one example of how transportation investments can overshoot their mark. Although transportation improvements can provide significant economic benefits, once a particular type of transport becomes associated with economic growth, communities and individuals will tend to overinvest in them, particularly if external funding is available through federal or state grants, or gullible investors. When the first bridge, canal, rail line, highway or airport is constructed in an area, it can have a high rate of economic return, significantly increasing regional productivity, but this success will spur other communities to want one too, to stay competitive and for the sake of prestige, although each additional facility provides less net benefits. This is particularly harmful if such facilities "leverage" increases in transport activities that have significant external costs. The full cost of overinvestments in railroads or highways is not just the economic resources devoted to these facilities, it also includes any incremental crash risk and pollution associated with their use. As a result, once a particular transportation technology matures, overinvestment and inefficiency become a major economic risk.

## **ECONOMIC DEVELOPMENT IMPACTS OF TRANSPORTATION**

Transportation affects economic development in three major ways:

### **As a Factor of Production**

Transportation is an important factor in most production activities. It delivers raw materials and employees to factories and worksites, and allows goods and customers to reach markets. Even information-based businesses that distribute final products by the Internet require physical mobility for critical resources including employees, equipment, office materials and espresso. All else being equal, a reduction in transport costs increases economic productivity and competitiveness.

### **As a Consumer Good**

Transportation is a major consumer good, representing the second largest category of consumer expenditures, after housing. A typical household spends 15-20% of net income directly on transportation, and bears various indirect transportation costs, such as expenditures on residential parking and taxes spent on transportation facilities.

### **As Public Expenditures**

Transportation facilities (roads and parking facilities, ports and airports) and services (transit, traffic policing and air traffic control) are major public expenditures. As a result, they affect taxation, and the distribution of government resources.

### **As a Source of Externalities**

Transportation activities impose external costs including congestion, facility costs, land requirements, crash damages and pollution. These external costs can reduce economic productivity and development. For example, traffic congestion increases business overhead costs, road and parking subsidies increase tax costs, and pollution can reduce farming tourist industry productivity. Transportation improvements that reduce these external costs increase productivity and economic development.

**ECONOMICALLY OPTIMAL LEVEL OF MOBILITY**

It is possible to have too much of a good thing. Economic inputs often exhibit diminishing marginal utility: unit benefits decline with increased consumption. For example, if you only eat one meal a day, a second daily meal provides significant benefits, and a third daily meal is also worthwhile, but a fourth meal may provide little additional benefit, and a fifth or sixth daily meal would be harmful overall. Although food is essential for life and health, this does not mean that more eating is necessarily better or that society should subsidize all food. At the margin (that is, relative to current levels of consumption), many people would be better off eating somewhat less.

Similarly, although a certain amount of mobility provides significant economic benefits, this does not mean that more mobility is always better. There is an economically optimal level of motor vehicle use beyond which increased travel is harmful overall.

The best way to determine optimal consumption levels is to let consumers decide in an efficient market. Such a market must reflect certain principles, including consumer choice, competition, optimal pricing and economic neutrality. A transport market that reflects these principles maximizes economic efficiency, productivity and development.

Current transport and land use markets violate market principles, as indicated in Table 1. Although individual distortions often appear modest and justified (for example, businesses consider it reasonable to provide unpriced parking, and public officials consider it reasonable to provide unpriced roads), their impacts are cumulative and synergistic. Underpriced roads not only cause excessive congestion and road wear, it also increases parking, crash and environmental costs. Underpriced parking not only causes inefficient use of parking facilities, it also increases congestion, crashes and pollution.

**Table 1      Transportation Market Distortions<sup>1</sup>**

<b>Market Requirements</b>	<b>Common Transport Market Distortion</b>
<i>Choice.</i> Consumers need viable choices, and information about those choices.	Consumers often have few viable alternatives to owning and driving an automobile, and living in automobile dependent communities.
<i>Competition.</i> Producers must face competition to encourage innovation and efficient pricing.	Most roads and public transit services are provided as public monopolies. There is often little competition or incentive for innovation.
<i>Pricing.</i> Consumers' prices reflect marginal costs. There should be no significant external costs unless specifically justified.	Automobiles use is underpriced: most costs are either fixed or external. Lower-density, automobile dependent land use patterns are also underpriced.
<i>Economic neutrality.</i> Public policies (laws, taxes, subsidies, and investment policies) must not favor one economic activity over others, unless specifically justified.	Many public policies favor automobile use including dedicated road funding, automobile-oriented planning and investment practices, and zoning laws that require generous parking.

*A fair and efficient market must reflect the principles in the left column. Transportation and land use markets often violate these principles, as described in the right column.*

These market distortions result in economically excessive vehicle ownership and use (“excessive” meaning more than would occur in an efficient market), which increases total transport costs and creates more automobile-oriented land use patterns.<sup>3</sup> These additional costs are equivalent to a tax on businesses and consumers. Policies that correct these distortions can increase economic efficiency and productivity. Many TDM strategies help correct market distortions, as indicated in Table 2. Virtually all market-based transportation reforms are considered TDM strategies.

**Table 2 TDM and Market Principles<sup>1</sup>**

<b>More Consumer Choice</b>	<b>More Efficient Pricing</b>	<b>More Neutral Planning</b>
Flextime	Parking Cash Out	Transportation Market Reforms
Carsharing	Congestion/Road Pricing	Regulatory Reform
Guaranteed Ride Home	Distance-Based Fees	Institutional Reforms
Location Efficient Development	Fuel Tax Increases	Least Cost Planning
Nonmotorized Improvements	Parking Management	Access Management
Ridesharing	Parking Pricing	TDM Programs
Telework	Smart Growth	Transportation Management
Transit Improvements	Transportation Market Reforms	Associations (TMA)

*This table shows how various TDM strategies support can support market principles.*

Some TDM strategies require subsidies or regulations that themselves violate market principles. However, these may be justified on equity grounds (to benefit people who are transportation disadvantaged), and on second-best grounds, to offset existing market distortions. Until vehicle use is efficiently priced, subsidies for alternative modes and regulations restricting automobile use may be justified, if they reduce external costs overall. For example, public transit subsidies may be justified because transit service provides basic mobility to people who are transportation disadvantaged, because such subsidies tend to be progressive with respect to income, and because when all impacts are considered, transit travel often has smaller marginal external costs than the same trip made by automobile, even taking into account financial subsidies.<sup>4</sup>

### **Economic Impacts of Automobile Use**

Automobile ownership and use tend to increase with economic development, up to a point. This occurs because increased wealth allows more consumer expenditures on driving. It does not indicate that increased driving *leads to* wealth. Excessive consumer expenditures on automobiles can reduce economic development.<sup>3</sup> Many countries experience their greatest economic growth when per capita automobile use is relatively low, and economic growth rates decline as they become more economically developed and vehicle ownership is greater.

Some wealthy regions have relatively low levels of automobile ownership and use, while some impoverished regions are relatively automobile dependent, with traffic congestion, poor walking and cycling conditions, and inefficient public transit services.<sup>5</sup> A major study for the World Bank that compared transportation and economic development patterns in various cities throughout the world indicates that excessive automobile use tends to reduce regional economic development.<sup>6</sup> This research indicates that beyond an optimal level (about 7,500 kilometers of per capita annual motor vehicle travel overall, although this varies depending on geographic and economic factors), the economic costs of increased vehicle travel outweigh the marginal benefits. Regions with balanced transportation systems appear to be most economically productive and competitive.

High levels of per capita automobile use increase the portion of regional wealth devoted to roads and vehicle use, increase per capita accidents, and reduce the efficiency of transit service. These increased costs reduce economic competitiveness and development, particularly since such expenditures tend to divert capital from more economically productive uses and increase consumption of imported goods (vehicles and fuel).

## **Impacts of Roadway Investments**

Automobiles are the dominant transport mode in most areas, but this does not mean that roadway projects are the best way to improve transport. Automobile travel is already convenient and inexpensive to most destinations, and fast provided that you do not try to travel under urban-peak conditions. The major transportation problems facing society consist of urban-peak congestion, motor vehicle crash risk and pollution, and inadequate mobility for non-drivers, all of which can be addressed by demand management.

Under some circumstances, highway investments provide significant economic productivity benefits by reducing transportation costs. But this only occurs if other conditions are ripe and transport costs are a significant economic constraint. Once a region has a basic paved road system, additional roadway capacity provides relatively small economic development benefits. Most impacts that do occur are economic transfers, economic activity shifted from one location to another without overall gain.<sup>7</sup>

Increasing roadway capacity provides declining marginal economic benefits.<sup>8</sup> Although US highway construction projects showed high annual return on investment during the 1960s (0.54), this declined significantly by 1991 (0.09) and is likely to continue declining since the most cost effective projects have been implemented.<sup>9</sup> Other types of transport improvements, such as public transit investments and TDM programs often provide greater economic benefits.<sup>10</sup> Regions that invest heavily in highway expansion fare little better in reducing traffic congestion than those that invested much less.<sup>11</sup> Thousands of dollars would need to be spent annually per household to increase roadway capacity enough to simply maintain current congestion levels. TDM strategies that reduce congestion and improve access at lower total costs can increase economic development.

Transportation funding practices often make highway expenditures appear economically attractive from an individual jurisdiction's perspective. Federal, state or provincial grants appear to be "free" money that provide local jobs and business stimulation during the construction period, and are therefore attractive regardless of their long-term transportation impacts. This tends to distort investments toward highways and away from other solutions that may be more optimal overall.

Although some industrial trends, such as increased use of just-in-time deliveries, increase the importance of road capacity in production, other trends, such as telecommunications that substitute for physical travel, reduce its importance. There is no evidence that given suitable economic incentives, businesses couldn't develop cost effective ways to reduce their dependency on road transport and continue to be productive.<sup>8</sup>



### **Economic Impacts of Vehicle Expenditures**

The motor vehicle industry is a major economic sector, so many people assume that vehicle expenditures support economic development. However, it is production and export of goods that supports economic development, not consumption. Although vehicle use benefits some economic sectors, it burdens others. Each dollar spent on motor vehicles means one less dollar to spend on other goods. Expenditures on automobiles, fuel and roadway facilities provide relatively little regional economic activity because they are capital intensive and are mostly imported for other areas.

**Table 3 Regional Economic Impacts of \$1 Million Expenditure<sup>12</sup>**

<b>Expenditure Category</b>	<b>Regional Income</b>	<b>Regional Jobs</b>
Automobile Expenditures	\$307,000	8.4
Non-automotive Consumer Expenditures	\$526,000	17.0
Transit Expenditures	\$1,200,000	62.2

*This table shows economic impacts of consumer expenditures in Texas.*

A study in San Antonio, Texas found that each 1% of regional travel (53 million vehicle miles) shifted from automobile to transit increases regional income by \$2.9 million (about 5¢ per mile shifted), resulting in 226 additional regional jobs (Table 3).

It might be argued that regional economic losses are offset by national economic gains if vehicles and petroleum are produced in other parts of a country. Even if cars are assembled in the country where they are consumed, many of their parts and much of the fuel is imported. Although economic losses may be smaller in a country that produces vehicles and fuel, expenditures on these goods provide less regional and national economic development than most alternative consumer expenditures.

From a Keynesian perspective, it might be argued that consumer expenditures on motor vehicle travel provide important economic stimulation that absorbs excess production, maintains employment and helps avoid economic depressions. From this perspective, the high costs and inefficiencies of an automobile-oriented transportation system are desirable. But if it is true that an economy must rely on inefficiencies to maintain stability and employment (and not all economists agree with this assumption), it makes little sense to use a type of consumption that extracts such a large toll on human lives and the environment. Expenditures on health care, education and social programs, and investments in other forms of transportation that are safer, accessible by non-drivers and more environmentally benign, could provide the same economic function while also supporting other societal goals.

Vehicle and road production may have had economies of scale during the early periods of vehicle production and road development. But once the vehicle industry and a basic road network developed, these external benefits disappeared. The motor vehicle industry is now mature and overcapitalized. World production capacity significantly exceeds demand. As a result, vehicle manufacturing is less profitable than many other industries.

**Impacts of Policy Reforms**

An efficient transport market requires a number of reforms, including cost-based pricing and more neutral tax and investment policies. Table 4 summarizes an estimate of additional vehicle fees required for efficient pricing, indicating that the optimal level of vehicle use is at least 1/3 lower than current levels (probably more, since cost-based pricing is just one of the reforms required for an efficient market). Of course, it is difficult to predict the exact effects of such large total price changes, but the implications are clear, in a more efficient market, consumers would choose to drive significantly less.

**Table 4      Examples of Price Reforms<sup>13</sup>**

Strategy	Average Fee	Travel Reduction
<a href="#">Cost Recovery Road Price</a>	3¢	-6%
<a href="#">Pay-As-You-Drive Insurance</a>	6¢	-12%
<a href="#">Pollution Fee</a>	3¢	-6%
<a href="#">Congestion Pricing</a>	4¢	-8%
<a href="#">Parking Fees</a>	6¢	-12%
<b>Totals</b>	<b>22¢</b>	<b>-37%</b>

*This table summarizes an estimate of efficient vehicle user fee. It indicates that the optimal level of automobile use is more than a third lower than current levels.*

Until comprehensive market reforms are implemented, blunter TDM strategies may be justified on second-best grounds. For example, if road and parking pricing cannot be implemented for technical or political reasons, there is a case for subsidizing public transit and implementing HOV priority measures, requiring employers to implement commute trip reduction programs, discouraging sprawl, and even restricting automobile use in some situations. Although an individual external cost may justify only modest TDM reforms, greater implementation can be justified when all impacts are considered. For example, TDM programs are not considered a very cost effective air pollution reduction strategy,<sup>14</sup> but may be when congestion reduction, road and parking facility savings, traffic safety and consumer savings benefits are also considered.

Some TDM strategies are particularly appropriate for supporting economic development. “Win-Win Transportation Solutions” consist of cost effective market reforms to help solve transportation problems by removing distortions, increasing consumer choice, and encouraging more efficient travel behavior.<sup>1</sup> If fully implemented they are predicted to reduce vehicle use by 15-30%, or more if coordinated with other TDM policies.

The economic productivity benefits of these reforms are clearest when transportation is evaluated based on *access* (the ability to reach goods, services and destinations) rather than *mobility* (physical movement). Many market distortions increase mobility but reduce access by creating more dispersed and segregated land use patterns, and reducing the efficiency of alternative modes. This increases the amount of automobile travel required to accomplish activities, increasing resource consumption and reducing productivity. Households in more automobile dependent communities devote more than 20% of household expenditures to vehicle use (more than \$8,500 annually), while those in communities with more diverse transportation systems spend less than 17% (less than

\$5,500 annually), representing savings of hundreds of dollars a year.<sup>15</sup> International studies find similar results.<sup>3</sup> These cost savings are equivalent to an increase in personal wealth and industrial efficiency, yet they are not measured as GDP.

TDM strategies that increase transportation choice or rely on positive incentives provide direct economic benefits to consumers. Although some transportation price reforms increase variable vehicle charges, they can be revenue neutral (higher fees are offset by reductions in other consumer costs and taxes), so motorists who continue their current driving patterns pay no more overall, and those who reduce their annual mileage save.

**Potential Savings and Efficiency Gains From TDM**

An automobile dependent transportation system requires nearly every adult to own an automobile and use it for nearly all local trips, resulting in about 15,000 annual per capita vehicle miles. This requires generous road and parking capacity, and tends to increase traffic congestion, crash costs and environmental impacts. In a more balanced transport system, household typically own one automobile, and relies on walking, cycling and transit for a significant portion of trips, resulting in 8,000-10,000 annual per capita vehicle miles. This more balanced transportation system typically provides \$3,000-6,000 in net savings per household from reduced vehicle and residential parking costs,<sup>15</sup> representing about 10% of an average household’s annual net income, plus community savings from reduced parking and roadway facility costs, and reductions in damages from crashes and pollution.

Consider another perspective. Table 5 compares the typical annual costs of a 10-mile urban-peak commute by different modes. It assumes that vanpool operating costs average 24¢ per mile, transit operating costs average \$6.00 per bus-mile, and transit vehicles impose twice the roadway capacity and four times the external costs of an average automobile. Many people may be surprised at the high unit costs of highway capacity (most consumers have few opportunities to purchase a highway lane). Adding urban highway capacity typically costs \$4-8 million per lane-mile, including land acquisition and necessary intersection improvements, a \$200,000-500,000 annualized cost. Divided by 2,000 to 4,000 additional peak-period vehicles for 250 annual commute days indicates \$0.20-1.00 per additional vehicle-mile of travel, plus 5-10¢ per vehicle-mile for road maintenance and traffic services.

**Table 5      Costs of Urban Commute<sup>16</sup>**

<b>Mode</b>	<b>Auto Costs</b>	<b>Automobile</b>	<b>Carpool</b>	<b>Vanpool</b>	<b>Transit</b>
	<i>Passengers</i>	<i>1</i>	<i>3</i>	<i>10</i>	<i>30</i>
Vehicle Ownership	\$3,000/year	\$3,000	\$1,000	\$300	\$0
Vehicle Operation	12¢/vehicle-mile	\$600	\$200	\$120	\$1,000
Highway Capacity	50¢/vehicle-mile	\$2,500	\$833	\$250	\$167
Parking	\$1,000/year	\$1,000	\$333	\$33	\$0.00
Externalities (congestion, crashes, pollution)	10¢/vehicle-mile	\$500	\$167	\$50	\$67
<b>Totals</b>		<b>\$7,600</b>	<b>\$2,533</b>	<b>\$753</b>	<b>\$1,233</b>
<b>Savings Over Auto Trip</b>		<b>\$0</b>	<b>\$5,067</b>	<b>\$6,847</b>	<b>\$6,367</b>

*Alternative modes can provide significant savings over SOV commutes.*

An average employee earns about \$33,000 annually. Assuming that about half of urban automobile commutes could shift to more efficient alternative modes if given suitable incentives, the additional \$6,000 in annual commuting costs associated with automobile-dependency described above, represents about a 10% surcharge on wages. Put another way, TDM programs can reduce urban employment costs by about 10% by providing commute cost savings. This has the potential of significantly increasing productivity and increasing employment.

### **Examples of Efficient Options**

This paper does not deny that transportation is critical for economic development, or that a new parking facility, bridge or highway lane can provide economic development benefits. However, this paper points out that Transportation Demand Management can also provide transportation improvement benefits, often at less cost, and so can do more to increase economic development. Some examples are described below.

#### *Highway Congestion*<sup>17</sup>

Highways traffic congestion is increasing in many regions, adding costs to freight delivery and other commercial activities. Major highway investments are justified on the grounds that they reduce congestion, and therefore increase regional productivity. Such projects may be economically justified (benefit/cost ratio greater than 1.0), but TDM strategies such as road pricing can provide greater benefits (a higher benefit/cost ratio), by addressing congestion problems at a much lower cost. Shippers that are truly concerned about truck delay should be the first to support road pricing on existing roadways because it allows higher-value vehicles to gain priority over lower value vehicles, with faster implementation and lower cost than highway capacity expansion.

Local officials and the trucking industry have generally opposed road pricing on existing roadways because they hope to solve their congestion problems by obtaining state or federal funding for highway capacity expansion. This is an artifact of current highway funding practices which have dedicated funds for highway capacity expansion, but no comparable financial reward to communities which implement demand management strategies.<sup>10</sup> The result is a preference for economically inefficient projects that rely primarily on economic transfers (traffic congestion is reduced by projects funded by tax revenue from other jurisdictions) rather than economic efficiency gains (traffic congestion is reduced by projects that increase transportation system efficiency).

#### *Parking Problems*<sup>18</sup>

Business customers and employees tend to be sensitive to parking convenience. Inadequate or expensive parking is often considered a deterrent to business activity. For this reason, developers and businesses often demand that local governments subsidize parking supply in commercial centers.

Even if such projects are economically justified, there are often more cost effective ways to address parking problems by more efficient management. For example, shared parking, better information on available parking, regulations that make the most convenient

parking available to customers, parking pricing, and incentives for commuters to use alternative modes can all help solve local parking problems. Because they are generally more cost effective than increasing parking supply, and so avoid additional tax costs, these strategies tend to do more to support economic development.

*Zoning Codes*<sup>19</sup>

Current zoning codes tend to require generous amounts of parking in order to avoid parking spillover problems. However, this increases the costs of development, particularly for affordable urban infill (higher priced developments generally include generous amounts of parking regardless of zoning requirements, and the incremental cost of providing parking is relatively small in suburban and rural areas where land costs are low) and encourages sprawl.

Location Efficient Development is an alternative approach that incorporates more flexible zoning codes and other development practices (clustered, mixed use development, good pedestrian and transit accessibility, financial incentives that provide savings to residents and commuters that reduce their vehicle use). This can support regional economic development because it is more resource efficient and more sensitive to consumer demand. It allows more land use development to occur within a particular area; reduces costs for parking facilities, roadways and public services; encourages more efficient land use patterns, and gives consumers more housing choices.

In general, transportation facility capacity expansion should only be implemented after comprehensive TDM programs have been implemented and prove inadequate to address transportation problems, and as much as possible, demand for increased capacity should be tested by directly charging project costs to the users who benefit. This approach will tend to increase economic efficiency and productivity.

### **Economically Harmful TDM**

The potential economic benefits from TDM described above do not mean that every TDM strategy increases productivity and development in every situation. Any policy or program can be economically harmful if implemented inappropriately. Inefficient TDM programs are described below.

#### *Inefficient Programs*

A TDM program with high overhead costs and minimal travel impacts may not be worthwhile. Examples include a commute trip reduction program with high administrative costs that delivers few services, transit service that attracts few riders, and marketing campaigns that provide inaccurate information. TDM programs that are considered burdensome to participants (employees or residents) may create resentment, particularly if stakeholders do not feel that they can influence decisions.

#### *Inefficient Pricing*

Pricing can be economically harmful if price changes are sudden and unpredictable, if pricing methods have high transaction costs, if there are large price differentials in adjacent jurisdictions, if price are significantly higher than costs, or if prices are applied unfairly.

#### *Inefficient Planning*

TDM planning can be inefficient if it focuses on just one or two strategies, if it fails to provide a balance of transportation service improvements and incentives to reduce driving (for example, by increasing parking prices without providing adequate improvements for transit, ridesharing, nonmotorized transportation and telework), if it applies mobility services that are not appropriately matched to demographic and geographic conditions (such as bicycle promotion in areas unsuited to cycling).

## **CONCLUSIONS**

Motor vehicle use can provide significant economic benefits, but marginal benefits decline with increased use. Vehicle travel also imposes many costs. There is an optimal level of automobile use, beyond which marginal costs exceed marginal benefits. Current market distortions result in economically excessive vehicle use; a significant amount of driving imposes total costs that exceeds total benefits. Although some industries benefit (those associated with vehicle and fuel production, or with repairing crash damages), it is harmful to the economy overall. Excessive driving increases overhead costs to businesses and governments, reducing economic productivity and competitiveness.

Empirical evidence supports the conclusion that excessive motorization reduces economic development. Economic growth rates tend to decline in automobile dependent regions. Expenditures on motor vehicles and roads provide less employment and business activity than alternative expenditures. Public policies that increase automobile dependency and use, for example, by underpricing automobile travel or favoring roadway facility investments over more cost-effective alternatives, tend to be economically harmful. Public policies that result in more efficient use of transportation resources (roads, parking and transit services) and encourage consumers to reduce their expenditures on vehicles and fuel, tend to increase regional economic development. To the degree that TDM strategies support these objectives they can increase economic development.

Regions that already have adequate paved highways are unlikely to see major economic development benefits from increased road capacity. Many benefits associated with roadway capacity expansion are economic transfers rather than true productivity gains. Alternative investments and management strategies that lead to more efficient use of existing transport systems are likely to provide greater economic benefits. Although transportation facility capacity expansion investments may sometimes be justified for the sake of economic development, TDM strategies often provide greater economic development benefits because they improve transport with lower costs. Facility capacity expansion should only be implemented after comprehensive TDM programs have been implemented and prove inadequate to address transport problems, and as much as possible, demand for increased capacity should be tested by charging project costs directly to users.

Many TDM strategies reflect efficient market principles. TDM can help create a more efficient transport system that increases productivity and economic development, and makes consumers better off overall. The total economic benefits of TDM can be large. Efficient market reforms can reduce per capita vehicle use by a third or more, providing thousands of dollars in annual per capita economic savings and productivity gains. This can make consumers wealthier, increases investment and supports economic development. However, TDM policies and programs must be well planned to provide maximum economic development benefits.

## Endnotes

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