9. Transportation Cost Implications

This chapter explores some implications of transportation economic evaluation with regard to optimal pricing, economic efficiency, land use, stakeholder perspectives, and travel patterns.

Economic Efficiency Impacts

A basic tenet of market theory is that economic efficiency is maximized when prices (defined as *perceived variable internal costs*) reflect total marginal costs, as described in Chapter 3. Mispricing prevents users from efficiently incorporating costs into their consumption decisions.

> "Price is the mechanism by which scarce resources are allocated efficiently between competing uses. For consumers, price encourages a purchase if the benefits of making the purchase exceed the benefits of alternatives. For producers, prices provide incentives for resources to move to those uses which people value most highly by informing firms how to produce, which products to produce, when and where to sell the products, and when, where and how to invest." [1]

Cost estimates in this study indicate that motor vehicle use is significantly underpriced. External costs range from 24% to 46% of total costs, as shown in Table 9-1. User costs (both market and non-market) would need to increase 31% to 86% to incorporate all costs. Other studies described in Chapter 2 reach similar conclusions.

Table 9-1 **Average Automobile Costs as a Percent of Total Costs**

	Total Costs	Internal Costs		External Costs	
Units	**per mile**	**per mile**	**% of Total**	**per mile**	**% of Total**
Urban Peak	$1.32	$0.71	54%	$0.61	46%
Urban Off-Peak	$1.05	$0.71	68%	$0.34	32%
Rural	$0.84	$0.64	76%	$0.20	24%
Weighted Average	*$0.99*	*$0.67*	*68%*	*$0.32*	*32%*

On average, about one-third of the costs of driving are external.

External costs are not eliminated, they simply show up elsewhere in the economy, for example as higher prices for commercial goods (for parking costs), increased local taxes (for road services), higher insurance premiums (from automobile accidents), illnesses (from pollution), and lower residential property values (from urban traffic). Another effect of underpriced driving is that non-automotive travel choices decline. Walking, bicycling, transit, and rail transport receive little capital investment, land use patterns and social habits develop which conflict with these travel options, and they are stigmatized.

[1] Halcrow Fox, *Land Transport Pricing for New Zealand*, Transit New Zealand (Wellington), 1993, p. 47.

Externalized costs are not the only cause of underpricing. Many costs are fixed, which further reduces the ratio between prices and total costs. Vehicle operating costs represent only 35% of total users' market costs, including fixed vehicle costs and residential parking. External costs equal 48% to 130% of user marginal costs (vehicle operating costs plus, user time and accident risk), and 181% to 381% of vehicle operating costs. For each dollar users spent operating a vehicle they incur an average of $2.61 worth of external costs related to congestion, crashes, parking and environmental degradation.

Although underpricing a common consumer good such as driving may appear to benefit users (and indeed benefits many individuals in the short term), mispricing reduces overall economic efficiency.[2] Underpriced automobile use increases purchases of transport over other consumer goods, and driving over other travel modes. As Johnson states, *"When a good as central to American life as the automobile remains underpriced for several decades, that good tends to be used more than it otherwise would be. Habits become ingrained and are hard to break. They are reinforced by the present urban infrastructure designed to exploit the full possibilities of private mobility."*[3] Low prices force other constraints, such as congestion, pollution, and resource depletion to limit growth. Underpricing makes these problems unavoidable. Under such circumstances, increasing road capacity is not only ineffective at reducing congestion, it may be counterproductive.[4]

Consumers pay fixed and external costs no matter how much or little they drive, which reduces the incentive to limit driving to trips with positive net value. Put another way, automobile owners receive only a small portion of the savings produced when they driving less. Shifting costs from being external or fixed to being internal and variable increases user choice. At worst consumers would simply shift the money saved in reduced fixed expenses to cover their higher variable expenses, resulting in no overall change in travel or cost. But they can achieve savings that are not currently possible by foregoing low value trips or shifting to more efficient modes. The driving that is eliminated represents existing travel with negative net benefit. Efficient pricing makes consumers better off and improves transportation system efficiency.

Underpriced Driving Reduces Transportation Diversity and Efficiency
Underpricing increases automobile dependency and reduces travel choices, which is unfair to non-drivers and reduces the transport system's overall efficiency. Using automobiles for relatively short urban trips is a sub-optimal use of technology that exacerbates urban problems. Underpricing encourages automobile use for trips when more efficient alternatives such as walking, cycling small low powered vehicles, and local buses are more appropriate.[5]

[2] Terry Moore and Paul Thorsnes, *The Transportation/Land Use Connection*, American Planning Association, Report #448/449 (www.planning.org), Washington DC, 1994.
[3] *Avoiding the Collision of Cities and Cars*, Academy of Arts and Sciences (Chicago), 1993, p.11.
[4] Kenneth Button, *Transport Economics*, Second Ed., Edward Elgar (Aldershot), 1993, p. 181, 191, 202.
[5] H. Dimitriou, *Urban Transport Planning: A Developmental Approach*, Routledge (NY), 1992, p. 245.

Because transport costs are diverse, no single mechanism can capture all externalities. *The Economist* argues, "*Cars must be made expensive to use rather than own, whether through taxation, road -pricing or parking fees.*"[6] Increased fuel taxes are often recommended to internalize automobile costs,[7] but this provides little incentive to reduce congestion, accidents, parking costs, or many environmental impacts. Others emphasize peak period road pricing.[8] This could reduce congestion but not other externalities such as pollution or parking subsidies. Efficient pricing requires several types of fees: weight-distance fees, fuel taxes, congestion pricing, smog fees, parking charges, marginalized insurance, and higher fines for traffic violators.[9]

Transaction costs can make optimal pricing inefficient, which could justify continued underpricing. Current parking charges and traditional road tolls require users to deliver money in the correct form, and impose administration costs. People may prefer to avoid transaction costs by paying lump sums or bundling transportation fees with other charges. New technologies can significantly reduce these transaction costs, lowering the threshold under which marginal pricing is justified. Although transaction costs prevent society from ever achieving pricing that perfectly reflects costs, this is not a barrier to significant progress in marginalizing transport costs.

Many costs associated with increasing transportation prices, such as unemployment and reduced profits in motor vehicle dependent industries are *transition* costs which decrease over a few years and eventually disappear. Transition costs are economic inefficiencies that result when durable factors such as location, equipment and training don't match current markets. Transition costs can be minimized by good planning and gradual implementation of changes. For example, the British government's plan to increase fuel taxes 5% annually above inflation for the next decade to internalize environmental costs is expected to have minimal transition costs because it is so predictable and gradual.

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[6] "Taming the Beast: A Survey on Living With the Car," *The Economist*, 22 June 1996.

[7] Steve Nadis and James MacKenzie, *Car Trouble*, WRI, Beacon Hill Press (Boston), 1993, p. 160.

[8] Anthony Downs, *Stuck In Traffic*, Brookings Institute (Washington DC), 1992.

[9] Per Kågeson, *Getting the Prices Right*, European Fed. for Transport & Environment (Bruxelles), 1993; Charles Komanoff, "Pollution Taxes for Roadway Transportation," *Pace University Law Review*, 1995; Todd Litman, *Socially Optimal Transport Prices and Markets*, VTPI (www.vtpi.org), 2001.

Economic Development Implications of Underpricing

Transport is necessary for most economic activities. Transport is itself a major economic sector, accounting for about 17% of GNP, 11% of household expenditures, and over 10% of U.S. employment.[10] As a result, there is a popular assumption that driving benefits the economy due to the sheer size of the automobile and petroleum sectors, and their historical role in industrial development and unionized employment.[11] Increased transport prices are claimed to have a "multiplier effect" that raises overall costs and reduces productivity.[12] These arguments are used to support underpricing.[13]

However, these arguments usually ignore total costs and distributional effects. Each dollar of subsidy to one company resulting from underpricing means a dollar lost elsewhere in the economy, and underpricing reduces the incentive for consumers to use resources efficiently. Since underpricing reduces overall economic and transport efficiency it reduces rather than stimulates overall economic development.

It is *production* and *exports* of goods that provide economic benefits, not *consumption*. The automobile industry is now significantly overcapitalized, reducing its profitability.[14] Petroleum is increasingly imported, and even domestically assembled vehicles incorporate a significant portion of imported components. There is no reason to believe that automobile expenditures provide more jobs or higher profits than expenditures on other consumer goods.

Automobile expenditures, particularly fuel purchases, provide minimal economic benefit at the regional level. One study found that only 15% of gasoline expenditures remained in the regional economy.[15] Even in Los Angeles County, where petroleum is produced and processed, only about 50% of petroleum expenditures stay in the local economy, resulting in an economic multiplier of 1.8, compared with 2.7 for general goods and services.[16] In British Columbia, $1 million spent on: petroleum = 4.5 jobs; general automobile expenditures = 7.5 jobs; public transit = 21.4 jobs.[17] This is probably representative of other non-petroleum producing regions.

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[10] *Facts and Figures 93*, American Automobile Manufacturers Association, p. 58; *Transportation In America, 11th Edition, Supplements*, ENO Foundation (Lansdowne). Sept. 1993, p. 4.

[11] David Aschauer, "Is Public Expenditure Productive?" *Journal of Monetary Economics*, Vol. 23, pp. 177-200, 1989; Alicia Mannell, "How Does Public Infrastructure Affect Regional Economic Performance?" *New England Economic Review*, Sept./Oct. 1990, p.11-33; Theresa Smith, "The Impact of Highway Infrastructure on Economic Performance," *Public Roads*, Spring 1994.

[12] Hickling Lewis Brod, *Social Cost Pricing and the External Benefits of Trucking*, American Trucking Association (Washington DC), 1997.

[13] The Allen Consulting Group, *Land Transport Infrastructure: Maximizing the Contribution to Economic Growth*, Australian Automobile Association (Canberra), Nov. 1993.

[14] "The Coming Car Crash: Global Pile-up," *The Economist*, 10 May 1997, pp. 21-23.

[15] *Montgomery County Energy Study*, Montgomery Dept. of Env. Protection (Rockville), 1985.

[16] L.A. County Transportation Comm., *Transportation Energy Conservation in Los Angeles*, Nov. 1979.

[17] B.C. Treasury Board Input/Output Table (Victoria), 1996.

The Effects of Underpricing: Two Industry Example
Consider an economy with two industries: Heavy and Light. Transport is a relatively large portion of Heavy's production costs, and a small portion of Light's.

1. These industries initially face a transport price structure which underprices shipping by funding roadways through general taxes. Since both industries pay the same tax, Light is effectively subsidizing Heavy.
   Score: Heavy + Light - Economic Efficiency -

2. A $0.10 per mile road use fee is implemented to replace the property tax, called FairPrice. Heavy industry pays more taxes while Light pays less.
   Score: Heavy - Light + Economic Efficiency +

3. At worst, Heavy pays the full road charge. But, Heavy may change shipping practices to reduce costs, so its net cost increase is minimal.
   Score: Heavy = Light + Economic Efficiency ++

4. FairPrice also reduces traffic congestion and accidents. Assume that Heavy industry's shipping time is reduced by 1/2 hour for every 100 miles of trucking and its trucks cost $50 per hour to operate, this means the $10 per hundred mile road user charge saves $25 in operating expenses, for an overall saving to Heavy.
   Score: Heavy + Light + Economic Efficiency +++

Although this example is simplistic, it emphasizes two important points:

1. Underpricing does not eliminate costs it simply transfers them.
2. Full Cost pricing provides incentives for business to use resources more efficiently, which provides long term economic benefits, especially to transportation dependent industries.

Table 9-2 identifies the types of companies that are likely to be better or worse off from underpricing. Only if "Better Off" firms provide more profit or employment than those in "Worse Off" might underpricing provide overall economic benefit.

Table 9-2 **Commercial Impacts of Motor Vehicle Use Underpricing**

Better Off	Worse Off
Motor vehicle production, sales and service.	Alternative forms of transportation.
Bulk commodities.	High-value products.
Low-value manufacturing.	Communications and information industries.
Imports.	Domestic and local production.
Isolated companies.	Centrally located companies.
Isolated retail and recreation.	Local oriented retail and recreation.

Underpricing benefits some companies and harms others. Overall, reducing underpricing should benefit more companies than it harms due to increased economic efficiency.

The U.S. automobile industry's portion of national employment and industrial production has declined in recent years.[18] There is no evidence that bulk commodities, low value manufacturing, and isolated commercial centers provide more economic benefits than less transportation intensive. Underpricing congestion incurs tremendous costs to businesses in employee wages and reduced productivity.[19]

A World Bank study indicates that automobile dependency reduces regional economic development.[20] The researchers conclude that, "*there are no obvious gains in economic efficiency from developing car dependence in cities*," and, "*There are on the other hand significant losses in external costs due to car dependence...*" They find that beyond a certain point (about 7,500 kilometers of per capita annual motor vehicle travel), increased driving impose economic costs that outweigh marginal economic benefits. They suggest that expenditures on motor vehicles and their facilities divert large amounts of private and public capital from alternative uses that are more economically productive. This study finds that the portion of income devoted to commuting is highest in automobile dependent cities, and that transit service efficiency is lowest and vehicle accident rates per capita are highest in automobile dependent cities.

Long-term negative economic effects of transport price increases are relatively small, and appear to be declining in most industrial sectors.[21] Freight transport has decreased as a percentage of GNP, industrial production, and national employment due to increased efficiency and more high-value, low-bulk products.[22] Transport accounts for only about 5-6% of most manufactured product prices.[23] Fuel taxes are only about 4% of trucking industry gross revenues, and 0.5% of railroad gross revenues,[24] so increased fuel taxes would only have a slight effect on final prices. North American fuel prices and user fees are among the lowest among developed nations (Figure 9-1). Increasing fuel taxes to internalize externalities and reduce demand, with revenues used to replace other taxes, could have would have overall positive impacts on the economy and employment.[25]

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[18] *Transportation In America, 11th Edition, Supplements*, ENO Foundation (Lansdowne), Sept. 1993, p. 4

[19] *Curbing Gridlock*, TRB, National Academy Press (Washington DC), 1994, pp. 48-49

[20] Jeff Kenworthy, Felix Laube, Peter Newman and Paul Barter, *Indicators of Transport Efficiency in 37 Global Cities*, Sustainable Transport Research Group, Murdoch University (Perth), for the World Bank (Washington DC), February 1997.

[21] Dr. Rainer Walz, Dr. Joachim Schleich, Regina Betz and Carsten Nathani, *A Review of Employment Effects of European Union Policies and Measures for CO2 Emission Reductions*, Fraunhofer Institute (www.isst.fhg.de), May 1999.

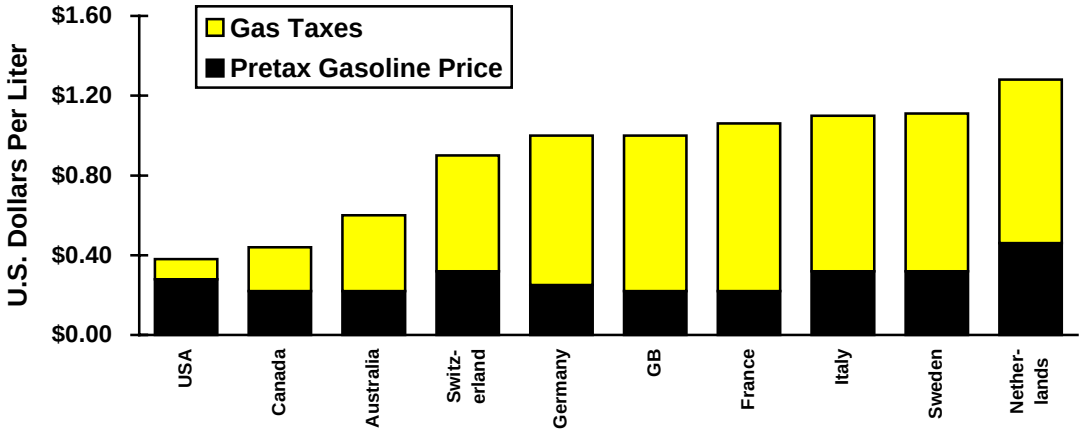
[22] *Transportation In America, 11th Edition*, ENO Foundation, 1993, p. 23, and *Supplement*, p. 4.

[23] Diamond and Spence, 1989, quoted in Piet Rietveld, "Spatial Economic Impacts of Transport Infrastructure Supply," *Transportation Research*, Vol. 28A, 1994, p. 337. National Transportation Agency, *An Integrated and Competitive Transportation System*, (Ottawa), March 1992, from *Transportation, Taxation and Competitiveness*, Transport Association of Canada (Ottawa), 1993, p. 56.

[24] *Transportation, Taxation and Competitiveness*, TAC (Ottawa), 1993, p. 25, 29.

[25] Douglas Norland and Kim Ninassi, *Price It Right; Energy Pricing and Fundamental Tax Reform*, Alliance to Save Energy (Washington DC) 1998.

Figure 9-1 **1997 Gasoline Taxes and Prices in Selected Countries**[26]



North America has the lowest fuel taxes and prices among the developed nations.

One recent study concludes, "*There is ample opportunity for using gasoline tax revenues, not only to soften the blow on low income groups, but to improve the efficiency of the tax system.*[27] The Office of Technology Assessment states, *"...if a gasoline tax were coupled with an equal-revenue increase in investment tax credits, short-run macroeconomic losses resulting from motor fuel tax increases could be more than offset by the short-run macroeconomic gains"*.[28] Because fuel is a small portion of total industrial costs Kågeson concludes that, *"The effects from internalizing the social costs of transport on the ability of European industry to compete on the world market will be almost negligible. The total impact will amount to less than 0.5% of the annual turnover of most industries."*[29]

A $43.50 per tonne CO_2 tax (increasing fuel prices 20-30%) on freight transport in Norway is estimated to reduce long-haul rail and truck shipping by 0.26% and 1.82% respectively, local for-hire truck transport would decline only 0.11%, fleet truck shipping 2.08%, and fleet van shipping by 0.36%.[30] These changes are considered insignificant over the long term compared with normal turnover in these industries.

Automobile underpricing may have been justified when the automobile industry was first developing, since vehicle and road production experienced economies of scale.[31] This unique historical event does not apply to mature markets. Vehicle use now experiences diseconomies of scale now due to increasing congestion, crash risk and other

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[26] *The Economist*, 26 July 1997, p. 88.
[27] Center for Transportation Research, *Texas Transportation Energy Savings: Assessment of Control Measures, Technologies and Policies*, Texas Sustainable Energy Dev. Council (Austin), 1995, p. 131.
[28] *Saving Energy in U.S. Transportation*, Office of Technology Assessment, US Congress, 1994, p.225.
[29] Per Kageson, *Getting the Prices Right*, European Fed. for Transport & Env. (Bruxelles), 1993, p. 183.
[30] Trond Jensen and Knut Eriksen, "A General Equilibrium Model for Freight Transport in Norway," published in *European Transport Forum Conference Proceedings*, PTRC, Sept. 1994.
[31] Clay McShane, *Down the Asphalt Path*, Columbia University Press, 1994, p. 105. Also see Stephen Goddard, *Getting There*, Basic Books, (NY), 1994.

externalities. Each driver benefits if others drive less, reducing conflicts over road and parking space. There are probably few, if any, further economies of scale in automobile, petroleum and roadway industries.

A recent review of economic impact research concludes that transportation improvements may provide negative as well as positive economic impacts in a community.[32] Most highway improvements in developed countries provide only marginal productivity benefits.[33] Nijkamp and Blaas argue that transport facility investments only contribute to development if other conditions are ripe and transport costs are a significant economic constraint.[34] Kessides concludes that infrastructure investments can provide high returns in developing countries but only normal returns in North America and Western Europe.[35] Public transit expenditures provide twice the rate of return in productivity as highway improvements, indicating that increased transport diversity and efficiency provide greater macroeconomic benefits than overall increases in motor vehicle use.[36]

Piet Rietveld calls economic arguments for transport subsidies "*scientific mythification*." He states that "*...the direct contribution of infrastructure improvement to a reduction in transport costs is in general small in industrialized countries.*"[37] Harry Dimitriou argues that inter-community transport improvements support economic development, but intra-community transport improvements (such as urban roadway widening) provide little economic benefit in developed regions.[38]

Recent macroeconomic research indicates that transportation infrastructure investments may have high economic returns.[39] However, this does not prove that increased *driving* provides economic benefits. Rather, it implies that increased *transport efficiency* provides benefits. Public transit expenditures provide twice the return on investment as highway improvements,[40] indicating that it is the general benefits of mobility rather than the specific benefits of driving that provides economic benefits.

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[32] Standing Committee on Trunk Road Assessment, *Transport Investment, Transport Intensity and Economic Growth: Interim Report*, Dept. of Environment, Transport and Regions (London; www.roads.detr.gov.uk/roadnetwork/heta/sactra98.htm), 1997.

[33] Marlon Boarnet, "New Highways & Economic Productivity: Interpreting Recent Evidence," *Journal of Planning Literature*, Vol. 11, No. 4, May 1997, pp. 476-486; Amy Helling, "Transportation and Economic Development; A Review," *Public Works Management & Policy*, Vol. 2, No. 1, July 1997, pp. 79-93.

[34] Kenneth Button, *Transport Economics*, Second Edition, Edward Elgar (Aldershot), 1993, Chapter 10; Nijkamp and Blaas, *Impact Assessment and Evaluation in Transport Planning*, Kluwer, 1993, p. 45-49.

[35] Christine Kessides, *The Contributions of Infrastructure to Economic Development*, World Bank Discussion Paper #213 (Washington DC), 1993.

[36] David Aschauer, *Transportation Spending and Economic Growth*, American Public Transit Association (Washington DC), 1991.

[37] Piet Rietveld, "Spatial Economic Impacts of Transport Infrastructure Supply," *Transportation Research*, Vol. 28A, No.4, p. 339.

[38] Harry Dimitriou, *Urban Transport Planning: A Developmental Approach*, Routledge, 1992, p. 144.

[39] Alicia Munnell, "How does public infrastructure affect regional economic performance?" *New England Economic Review*, Nov. 1990.

[40] David Aschauer, *Transportation Spending and Economic Growth: The Effects of Transit and Highway Expenditures*, American Public Transit Association (Washington DC), Sept. 1991.

External Benefits of Transportation

Transportation underpricing and subsidies would be justified if there are significant *external marginal benefits* from automobile use. The Highway Users Federation,[41] the International Road Union, the Deutsche Strassenliga (a German freight organization), and the German Club of Automobilists have each published reports arguing that driving provides significant external benefits.[42] Supposed benefits include improved personal mobility, improved economic productivity, and general regional economic development.

These studies have been criticized for failing to distinguish between internal and external benefits, counting economic transfers as benefits, and non-marginal analysis.[43] That transport provides benefits does not mean that these are external, that *more* travel is necessarily good for society (marginal benefits), that more driving is the best way to provide access, or that driving should be underpriced. A 1982 USDOT study concluded, "*the preponderance of expert opinion probably lies on the side of saying that there are no external benefits of highway consumption beyond the benefits to the users.*"[44] Two recent studies also conclude that transport benefits are mostly internal.[45] A European Investment Bank study recommends against assuming that transport investments necessarily provide large indirect economic benefits.[46] An Office of Technology Assessment report also concludes that there are no significant marginal external benefits of transportation.[47] Although transportation benefits society, the benefits to not justify underpricing.

External benefits are usually captured in through competition.[48] For example, communities often subsidize roads and parking to attract development.[49] This benefits the first communities to use this approach, but other communities are then forced to provide comparable subsidies until most benefits are captured by developers or new residents.

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[41] Eric Beshers, *External Costs of Automobile Travel and Appropriate Policy Responses*, Highway Users Federation (Washington DC), March 1993.

[42] Cited in Werner Rothengatter, "Do External Benefits Compensate for External Costs of Transport?", *Transportation Research*, Vol. 28A, 1991, p.325.

[43] Per Kageson, *Getting the Prices Right*, European Fed. for Transport & Env. (Bruxelles), 1993, p. 37. Also see Werner Rothengatter, "Obstacles to the Use of Economic Instruments in Transport Policy," in *Internalising the Social Costs of Transport*, OECD, 1994.

[44] *Final Report on the Federal Highway Cost Allocation Study*, USDOT, FHWA, 1982, p. E-9.

[45] Werner Rothengatter, "Do External Benefits Compensate for External Costs of Transport?", *Transportation Research*, Vol. 28A, 1991, p.321-328; Dr. Heini Sommer, Felix Walter, Rene Neuenschwander, *External Benefits of Transport?*, ECOPLAN (Bern), March 1993.

[46] Jacques Girard and Christopher Hurst, *Investment and Growth: Qualty versus Quantity*, European Investment Bank Nr. 23, July 1994.

[47] *Saving Energy in U.S. Transportation*, Office of Technology Assessment, 1994, p. 97.

[48] Kenneth Button, *Internalising the Social Costs of Transport*, OECD, 1994, p.12.

[49] Samuel Nunn, "Role of Local Infrastructure Policies and Economic Development Incentives in Interjurisdictional Cooperation," *Journal of Urban Planning and Development*, Vol. 121, No. 2, June 1995, pp. 41-56.

Land Use Impacts of Underpricing

Transportation has direct and indirect impacts on land values and use.[50] Overinvestment in transportation facilities and underpricing of vehicle use increases the amount of land used for transportation and encourages low-density, urban fringe development.[51] If highways improve access between urban and rural areas, rural property values increase as urban home buyers compete with other rural land uses. This profits current rural land owners and allows individuals to purchase more land, privacy, and private environmental amenities than otherwise possible. It also allows exurban residents to compete for urban jobs, and access urban services, benefiting exurban residents and urban businesses. At one time this was considered unquestionably good for society.[52] Webber states,

> "Today [1985] people are moving into outlying areas because technological improvements in transportation and communications have reduced the real cost of traveling and communicating...current transportation and communication systems are generating new forms of urbanization that are highly efficient, yet spread over thousands of square miles. I suggest that this calls for celebration, not commiseration. It promises unprecedently amiable living and working arrangements in pleasant surroundings and increasingly intimate contact with friends and associates, many of whom may be located miles away. When combined with high automobility, the exurbs promise spacious residential sites, temporal proximity to numerous employment sites, and relatively easy access to recreational resources and culturally rich activities."[53]

Webber is only half correct. While increased driving allows individuals access to land that is less impacted by urban problems, it expands the range and scale of the impacts that individuals are trying to avoid, which call into question his claim of "efficiency." Competition for exurban locations creates a self-perpetuating cycle of increased costs since increased motor vehicle traffic degrades the urban environment, thereby increasing urban sprawl and automobile use.

The amount of time people spend on transport varies little, regardless of travel mode or speed.[54] One geographer writes, "*Those who use technology to travel at greater speeds still have to make the same amount of contacts--still work, eat, sleep and play in the same*

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[50] Terry Moore and Paul Thorsnes, *The Transportation/Land Use Connection*, American Planning Association, Report #448/449 (Chicago), 1994; Kelley, "The Transportation Land-Use Link," *Journal of Planning Literature*, Vol. 9, No. 2, Nov. 1994, p. 128-145.

[51] VTPI, "Land Use Evaluation," *Online TDM Encyclopedia*, VTPI (www.vtpi.org/tdm/tdm104.htm), 2002.

[52] James Kunstler, *The Geography of Nowhere*, Simon & Schuster, 1993, p. 39; Peter Muller, "Transportation and Urban Form," in *Geography of Urban Transportation*, Guilford Press (NY), 1986.

[53] Melvin Webber, "The Emerging Metropolis: Trends and Trepidations." In: *Metropolitan Growth Centers: A New Challenge for Public-Private Cooperation*, UMTA-CA-06-0196-1, Nov. 1985, p.9, quoted in Homberger, Kell and Perkins, *Fundamentals of Traffic Engineering, 13th Edition*, Institute of Transportation Studies, UCB (Berkeley), 1992, p. 2-12.

[54] Gordon Stokes, "Travel Time Budgets and Their Relevance for Forecasting the Future Amount of Travel, in *Proceedings of European Transport Forum*, PTRC, Sept. 1994, p. 25-36.

proportions as always. They simply do these further apart from each other."[55] As a result, it is possible that little net benefit is derived from a substantial increase in driving.

As discussed in Chapter 5.14, urban sprawl has significant environmental and social costs, including environmental and aesthetic degradation, reduced community cohesion, increased municipal service costs, and reduced mobility for non-drivers. Sprawled land use tends to be highly automobile dependent, increasing per capita driving and external costs. Many urban planners now argue that land uses have become unnecessarily separated.[56] Lee concludes that an efficient transportation/land use system based on full-cost pricing would increase economic efficiency, reduce total transport expenses, reduce subsidies and tax burdens on non-users, improve urban environmental quality, reduce urban sprawl, and increase the use of efficient travel modes.[57]

Stakeholder Perspectives of Transportation Underpricing

From society's perspective, all costs and benefits must be considered in each decision, but the perspective of individual decision makers is often more limited. People tend to have different, often conflicting perspectives of transport costs and benefits, depending on their role (Table 9-3). These differing perspectives and definitions create conflicts over goals, objectives and strategies, and can result in economically inefficient decisions.

Table 9-3 **Stakeholder Perspectives of Transport Benefits and Cost**

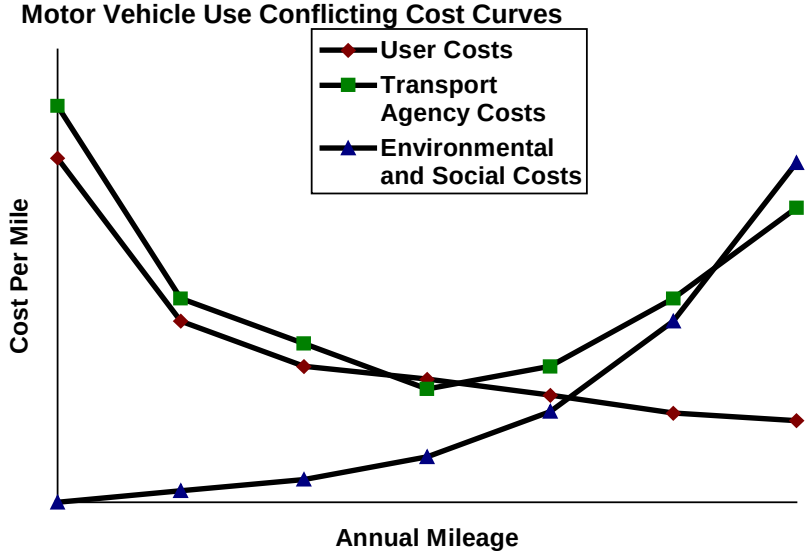
Perspective	Costs	Benefits
Society	All costs	All benefits
Driver	Time, vehicle costs, risk	Mileage
Non-Driver	Time, fares, discomfort, risk	Access
Politician	Political jurisdiction costs	Political jurisdiction benefits
Highway Planner	Roadway and drivers' costs	Vehicle mileage, road capacity
Urban Planner	Facility costs, traffic impacts	Mobility/Access
Energy Planner	Fuel consumption	Mobility/Access
Environmentalist	Environmental impacts	Mobility/Access

Definitions of transport costs and benefits varies depending on stakeholder's perspective.

Another way to view the conflicts in transportation decision making is to consider the perceived relationships between average costs and quantity of driving from three perspectives: of *users* (who decide how much to travel), *transportation professionals* (who plan transport facilities) and *society* (which bears environmental and social costs and provides facility funding). These relationships are illustrated in Figure 9-2.

[55] John Whitelegg, "Time Pollution," *The Ecologist*, Vol. 23, No. 4, July/Aug. 1993, p. 131-134.
[56] For example see *The Land Use-Air Quality Linkage*, California Air Resources Board, 1994, p. 9.
[57] Douglass Lee, "A Market-Oriented Transportation and Land Use System: How Different Would it Be?" in *Privatization and Deregulation in Passenger Transport: Selected Proceedings of the 2nd International Conference*, Espoo, Finland, Viatek, Ltd., June 1992, pp. 219-238.

Figure 9-2 **Motor Vehicle Use Conflicting Cost Curves**



Since most motor vehicle costs are fixed, automobile owners face incentives to maximize driving. Facility development has a downward sloping cost curve (economies of scale) when traffic is low, since increased driving allows costs to be divided among more miles of use, but once the system is congested average costs increase. Environmental, and social costs of driving are minimal when use is low, but slope upward.

Individuals face incentives to maximize driving, "to get their money's worth" from large fixed automobiles costs. The transport agency's U-shaped average cost curve implies economies of scale when roadway development is a goal.[58] Only after congestion becomes a problem are transport agencies likely to perceive benefits from reducing traffic demand. Even then they frequently experience incentives to encourage driving, such as fuel taxes dedicated to road building. The upward sloping cost curves associated with congestion and other social and environmental costs means that society benefits from reduced driving. As a result of these different price signals the perspectives of individual drivers and automobile oriented transport planners conflict with society in general, and transport professionals who take a broader view of transport costs and choices.

The emphasis on increasing automobile capacity, rather than broader community development and environmental goals is ingrained in transport planning and financing. The existence of dedicated roadway agencies and funding skews planning decisions toward roadway development. As described by Harry Dimitriou, *"...the conventional bias in traditional* [planning] *methodologies with their concern for transport systems efficiency above all else, exists because those most intimately involved in such approaches are well equipped with tools and techniques to design and plan 'operational efficient' networks, whereas the equivalent expertise in the planning and management of more 'developmentally effective' transport systems is much less advanced."*[59]

[58] Stephen Goddard, *Getting There*, Basic Books (New York) 1994.
[59] Harry Dimitriou, *Urban Transport Planning*, Routledge (NY), 1992, p. 220.

Implications of Underpricing on Consumers

You may be wondering, *"What does this mean to me?"* Underpriced driving is an economic transfer that allows some households to own more cars, travel more and live in more suburban locations than if prices were higher. But this additional consumption of mobility may provide little net consumer benefit. Underpricing imposes costs that show up elsewhere in household budgets, such as higher consumer prices to pay for "free" parking, higher taxes to pay for roads and traffic services, and increased health costs. At one time underpricing may have provided external benefits due to economies of scale in roadway and industrial development, but there is no evidence that such benefits still exist.

Automobile advocates often claim that underpricing increases personal choices and freedom, as discussed in Chapter 8. The truth is just the opposite. Individuals have no choice but to bear the financial, crash risk and environmental costs of automobile use. Non-drivers have fewer mobility choices. Negative effects of underpriced driving include:

- *Increased overall transport costs.* Low marginal prices for driving encourage individuals to spend more on driving, leaving less funding for other goods.
- *Reduced transportation diversity*. Fewer people use alternative modes, so they receive less investment than they otherwise would.
- *More externalities*. Pollution, congestion, and motor vehicle accidents are surely greater than they would be if user costs were higher.
- *Increased land devoted to roads and parking facilities*. This means less land available for other uses, higher taxes, or reductions in other government services, and higher consumer costs to pay for "free" parking.
- *Automobile oriented land use, economic and social patterns*. Increased centralization and scale of services and activities, and less emphasis on neighborhood activities, services and relationships. The use and usefulness of streets for non-driving purposes, including walking, playing and other socializing has declined.

How these affect any specific individual depends on many factors including driving ability and automobile ownership, income, residence and job location, and future goals. The impacts of transport underpricing are also affected by how much an individual values environmental protection and social equity, and how much they value nonmotorized transport and community interaction. The benefits of underpriced driving are skewed toward people who drive the most, including those who are relatively wealthy, exurban and rural residents, and long distance commuters. Children and teenagers, the elderly, the very poor and the handicapped tend to use automobiles relatively little, receive the least benefits of underpricing and suffer significant disbenefits. The effects of price increases depend on how new prices are structured, how quickly and predictably changes occur, whether alternative modes are improved, and how revenues are distributed.