

# **Evaluating Criticism of Transportation Costing**

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## **ABSTRACT**

Several recent studies have investigated the full costs of motor vehicle use. They indicate that motor vehicle use imposes significant external costs (costs not borne directly by users). Some critics have responded with reports that attempt to refute this research. The critics argue that various costs 1) do not exist at all; 2) may exist but are overstated and not significant; 3) are not externalities; 4) cannot be priced effectively; or 5) are offset by benefits. This paper examines the legitimacy of these arguments. It finds that some criticism of specific cost studies is valid, but that much of the criticism in these reports misrepresents issues. Critics often show little knowledge of subjects they analyze, and many present incorrect facts. Their arguments are often based on ideology rather than conventional economic principles. Their publications often lack citations or rely on references from ideologically oriented sources, and few have peer review, in contrast to transportation costing studies which tend to be fully referenced and peer reviewed.

## **Introduction**

Whether an individual consumer is purchasing a vehicle or travel ticket, or a government is making a transportation investment or policy decision, it is important to know the full costs that such a decision will impose. The World Bank,<sup>1</sup> OECD,<sup>2</sup> USDOT,<sup>3</sup> and business journals<sup>4</sup> emphasize the importance of incorporating full costs, including indirect and external impacts, into transportation investment, pricing and policy decisions.

Some transport costs have been widely researched. Vehicle user cost information is widely available.<sup>5</sup> “Cost allocation” studies identify the roadway costs of different vehicle classes.<sup>6</sup> Economists have estimated the value of travel time and traffic accident risk under various conditions.<sup>7</sup> However, each of these accounts for only a portion of total transportation costs. Several recent studies attempt to calculate all transportation costs, including external and non-market costs. Examples of which are listed in Table 1.

Although their perspectives, methods and estimates vary, all of these studies identify significant external and indirect costs of motor vehicle use, some of which are frequently overlooked in transportation decision making. The existence of external costs implies that society could benefit from price and planning reforms that more effectively account for the full costs of transportation activities.<sup>8</sup>

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<sup>1</sup> *Sustainable Transport: Priorities for Policy Reform*, World Bank ([www.worldbank.org](http://www.worldbank.org)), May 1996.

<sup>2</sup> European Conference of Ministers of Transport, *Urban Travel and Sustainable Development*, OECD (Paris; [www.oecd.org](http://www.oecd.org)), 1995.

<sup>3</sup> *Estimating the Impacts of Urban Transportation Alternatives*, National Highway Institute, USDOT (Washington DC; [www.fhwa.dot.gov](http://www.fhwa.dot.gov)), 1995.

<sup>4</sup> “Taming the Beast,” *The Economist*, 22 June 1996.

<sup>5</sup> Runzheimer International ([www.runzheimer.com](http://www.runzheimer.com)); Intellichoice ([www.intellichoice.com](http://www.intellichoice.com)); *Consumer Reports* and various automobile magazines.

<sup>6</sup> *1997 Federal Highway Cost Allocation Study*, USDOT ([www.fhwa.dot.gov](http://www.fhwa.dot.gov)), 1997.

<sup>7</sup> Kenneth Small, *Urban Transportation Economics*, Harwood (Chur), 1992.

<sup>8</sup> Todd Litman, *Socially Optimal Transport Prices and Markets*, VTPI ([www.vtpi.org](http://www.vtpi.org)), 1999.

**Table 1**      **Transportation Cost Studies<sup>9</sup>**

<p>Apogee Research, Inc., <i>The Costs of Transportation</i> Conservation Law Foundation (Boston; <a href="http://www.clf.org">www.clf.org</a>), March, 1994.</p> <p>Mark Delucchi, et al., <i>Annualized Social Cost of Motor Vehicle Use in the United States, Based on 1990-1991 Data</i>, Vol. 1-23, Institute of Transportation Studies (<a href="http://www.engr.ucdavis.edu/~its">www.engr.ucdavis.edu/~its</a> and <a href="http://www.ota.fhwa.dot.gov/scalds/DELUCCHI.pdf">www.ota.fhwa.dot.gov/scalds/DELUCCHI.pdf</a>) UCD-ITS-RR-96-3, 1996-97.</p> <p>John DeCicco and Hugh Morris, <i>The Costs of Transportation in Southeastern Wisconsin</i>, American Council for an Energy-Efficient Economy (Washington DC; <a href="http://aceee.org">http://aceee.org</a>), 1998.</p> <p>Per Kågeson, <i>Getting the Prices Right: A European Scheme for Making Transport Pay Its True Costs</i>, European Federation for Transport and Environment (Bruxelles), May, 1994.</p> <p>Theodore Keeler and Kenneth Small, <i>The Full Costs of Urban Transport; Part III, Intermodal Cost Comparisons</i>, Institute of Urban and Regional Development (Berkeley), #21, July 1975.</p> <p>KPMG (Van Seters, Levelton, Pammenter, Powell, Paul, Litman), <i>Cost of Transporting People in the British Columbia Lower Mainland</i>, Greater Vancouver Regional District (Burnaby), 1993.</p> <p>KPMG, <i>The Costs of Transporting People in the City of Edmonton</i>, City of Edmonton, 1996.</p> <p>Douglass Lee, <i>Full Cost Pricing of Highways</i>, National Transportation Systems Center (Cambridge; <a href="http://ohm.volpe.dot.gov">http://ohm.volpe.dot.gov</a>), January 1995.</p> <p>Todd Litman, <i>Transportation Cost Analysis; Techniques, Estimates and Implications</i>, Victoria Transport Policy Institute (<a href="http://www.vtpi.org">www.vtpi.org</a>), 1999.</p> <p>James MacKenzie, Roger Dower and Donald Chen, <i>The Going Rate</i>, World Resources Institute (Washington DC; <a href="http://www.wri.org">www.wri.org</a>), June 1992.</p> <p>David Maddison, David Pearce, Olof Johansson, Edward Calthrop, Todd Litman, Eric Verhoef, <i>The True Costs of Road Transport</i>, Earthscan (London), Blueprint #5, 1996.</p> <p>Peter Miller and John Moffet, <i>The Price of Mobility: Uncovering Hidden Costs of Transportation</i>, NRDC (Washington DC; <a href="http://www.crest.org/efficiency/nrdc/mobility">www.crest.org/efficiency/nrdc/mobility</a>), 1993.</p> <p>John Poorman, <i>Estimating Marginal Monetary Costs of Travel in the Capital District</i>, Capital District Transportation Committee (Albany), April 1995.</p> <p>PSRC, <i>The Costs of Transportation; Expenditures on Surface Transportation in the Central Puget Sound Region for 1995</i>, Puget Sound Regional Council (<a href="http://www.psrc.org/costs.pdf">www.psrc.org/costs.pdf</a>), 1996.</p> <p>Christopher Zegras with Todd Litman, <i>An Analysis of the Full Costs and Impacts of Transportation in Santiago de Chile</i>, IIEC (Washington DC, Santiago; <a href="http://www.iiec.org">www.iiec.org</a>), 1997.</p>
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<sup>9</sup> Summaries of these studies are available in David Greene, Donald Jones and Mark Delucchi, *The Full Costs and Benefits of Transportation*, Spinger (Berlin), 1997; James Murphy and Mark Delucchi, "A Review of the Literature on the Social Cost of Motor Vehicle Use in the United States," *Journal of Transportation And Statistics*, Vol. 1, No. 1, January 1998, pp. 15-42; and Todd Litman, *Transportation Cost Analysis*, VTPI ([www.vtpi.org](http://www.vtpi.org)), 1999.

Several individuals and organizations have responded with publications that criticize transportation costing analysis and these conclusions. Examples of these publications are listed in Table 2. This paper examines this criticism. The first section discusses common issues. The second section examines individual critics' publications.

**Table 2 Critics of Transportation Costing**

Eric Beshers, *External Costs of Automobile Travel and Appropriate Policy Responses*, Highway Users Federation (1776 Massachusetts Ave., NW, # 500, Washington DC 20036, 1994.

Roy E. Cordato, *The Central Planning of Lifestyles: Automobility and the Illusion of Full Cost Pricing*, Competitive Enterprise Institute ([www.cei.org](http://www.cei.org)), 1997.

Wendell Cox and Jean Love, "Drivers Pay Their Own Way—And Then Some", *Governing*, April 1994; Public Purpose ([www.publicpurpose.com](http://www.publicpurpose.com)).

Royola Dougher, *Estimates of the Annual U.S. Road User Payments Versus Annual Road Expenditures*, 1995; and *The Funding of Roads in the United States: How the Taxes and Fees Collected from Motorists are Spent*, American Petroleum Institute (Washington DC; [www.api.org](http://www.api.org)), 1997.

James Dunn, *Driving Forces; The Automobile, Its Enemies and the Politics of Mobility*, Brookings Institute (Washington DC; [www.brookings.org](http://www.brookings.org)), 1998.

Kenneth Green, *Defending Automobility: A Critical Examination of the Environmental and Social Costs of Auto Use*, Reason Foundation (Los Angeles; [www.reason.org](http://www.reason.org)), 1995.

José A. Gómez-Ibáñez, "Estimating Whether Transport Users Pay Their Way: The State of the Art," *The Full Costs and Benefits of Transportation*, Springer (Berlin), 1997.

Thomas Hogarty, "The Social Benefits of Personal Vehicle Travel," *Transportation Quarterly*, Vol. 52, No. 2, Spring 1998, pp. 5-9; *Benefits of Road Travel and Transport*, Research Study #089, American Petroleum Institute (Washington DC; [www.api.org](http://www.api.org)), 1998.

Jack Mallickrodt, *Highway Subsidies*, (<http://home.earthlink.net/~malli/hwysub.htm>), April 1998.

Z. A. Spindler, *Automobiles in Canada; A Reality Check*, Canadian Automobile Association (Ottawa; [www.caa.ca](http://www.caa.ca)), 1997.

James Q. Wilson, "Cars and Their Enemies," *Commentary*, July 1997, pp. 17-23.

Criticism need not consist simply of fault-finding. Helpful criticism provides new perspectives and ideas, identifies both faults and merits, and puts a particular work into a larger context. Some transportation costing criticism raises legitimate issues and makes a healthy contribution to the discussion of transportation costing methods and conclusions. Beshers and Gómez-Ibáñez in particular identify weaknesses in early costing publications, many of which have been addressed in more recent studies.

However, most critics appear intent on discrediting and dismissing transportation costing rather than improving it. Most critics are supported by the automobile, petroleum or

highway industries. Their work appears intended to deflect support for reforms that may reduce these industries' profits. A few critics are ideologically opposed to reforms within the existing economic system (for example, Cordato and Green advocate a "property rights" philosophy that denies the concept of economic efficiency). Such ideological analysis begins with a conclusion, and works back to find supporting data and analysis, sometimes with little regard for accuracy. Only two of these thirteen publications had peer review.

There is nothing wrong with industry-sponsored research or promotion of alternative ideologies. However, it is important that readers appreciate the differences between transportation costing research and the critics' arguments. For example, people who cite Dougher, Mallickrodt or Spindler as evidence that motorists pay their fair share of costs should understand that these studies violate highway cost allocation principles and only take into account direct highway expenses, ignoring other external costs. Similarly Green's claim that driving is overpriced is based on selective cost estimates and a "property rights" framework rather than conventional economic principles.

Because of these fundamental differences in perspective and philosophy, the results of the critics' analyses cannot be legitimately compared with transportation costing studies. Unfortunately, they frequently are. For example, the Canadian Automobile Association presents Spindler's study as proof that driving is not subsidized, as a counter-argument to transportation cost studies, although his analysis violates standard cost allocation methods and misrepresents many issues related to external costs. Much of the critics' work appears to be little more than propaganda to justify the status quo, presenting incorrect or misrepresented information, spurious arguments, and hostile comments.

Critics might respond that transportation cost studies are equally biased. Some are sponsored by environmental organizations that are accused of being anti-automobile. However, other transportation cost studies have been performed by academic and independent research organizations. For example, Delucchi's research is sponsored by the University of California and funded by the U.S. Federal Highway Administration. Lee's work was sponsored and funded by the USDOT Volpe Transportation Systems Center. Poorman and PSRC studies were funded by local transportation agencies. Studies by Apogee and KPMG were performed by major research corporations. Most of these studies had peer review and all are based on conventional economic principles.

This is not to say that there are not errors, issues of disagreement, and uncertainty in the transportation costing literature, or that costing study results have not been misused. Below are some legitimate criticisms of transportation costing:

- Many cost estimates have significant variation and uncertainty. Although this is often acknowledged in the studies (some of which provide cost ranges), cost values are often reported as simple point values with little discussion of their variability. Since there are often several estimates of a particular cost, researchers should indicate the range of alternative estimates and explain why a particular estimate was selected for analysis.

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- Some transportation costing studies provided insufficient details of assumptions and analysis to allow readers to understand how cost estimates were calculated.
- Published estimates usually reflect average costs, which can differ significantly from marginal costs. Marginal costs tend to vary significantly, depending on time, location and other factors, which can be difficult to measure.
- Many cost estimates are ultimately based on just a few original studies, some of which involved little research or are not appropriate for simple extrapolation to other situations. For example, most estimates of the number of parking spaces per automobile and the portion of urban land devoted to automobile facilities appear to be nothing more than guesses. Similarly, Hart's 1985 study of the municipal costs of motor vehicle services in Pasadena, California<sup>10</sup> has been widely used to calculate automobile subsidies in other communities where conditions may be quite different.
- Transportation costing must reflect the analysis context and objectives. For example, analysis of local equity impacts might exclude costs borne outside of the jurisdiction and focus on cost recovery at the household level (do households pay the costs imposed by their driving). Analysis of national economic efficiency implications of motor vehicle use could include virtually all costs, and focus on the relationship between prices and marginal costs for individual trips. Some studies fail to specify the context, or use inappropriate analysis methods (such as average rather than marginal cost values).
- It is inappropriate to add congestion externalities to motorists' costs when calculating total costs. Congestion externalities represent increased costs to other road users, so adding these costs together would double count some impacts.
- It is not appropriate to add up total external costs of vehicle use and convert this into an optimal fuel tax. A truly optimal price structure requires several price changes that target individual externalities.<sup>11</sup> Fuel taxes may actually decline under optimal pricing.
- Transportation costing is sometimes presented inappropriately as a moral rather than economic issue. The existence of external costs does not mean that driving is "bad," that people who drive are irresponsible, or that people who use alternative modes are morally superior.

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<sup>10</sup> Stanley Hart, "An Assessment of the Municipal Costs of Automobile Use," self published graduate studies report (Pasadena) 1985.

<sup>11</sup> Todd Litman, *Socially Optimal Transport Prices and Markets*, VTPI ([www.vtppi.org](http://www.vtppi.org)), 1999.

## **Common Issues of Criticisms**

*This section discusses major criticisms of transportation costing.*

### **1. Uncertainty – Burden of Proof**

Some transportation costs are difficult to measure, either due to limited research or because they are inherently difficult to quantify. For example, external parking costs are technically easy to calculate but until recently little effort had been made to measure them, while the land use impact costs of motor vehicle use are not only technically difficult to quantify, they are also difficult to attribute to a particular transport activity. As a result, transportation cost estimates involve various degrees of uncertainty.

But such uncertainty is not unique to transportation costing, nor is it an insurmountable problem. Many decisions involve uncertainty, but that does not stop consumers or communities from making choices based on the best available knowledge. Uncertainty can be addressed with several strategies, including expert consultations, surveys, sensitivity analysis, and targeted research. Critics legitimately concerned with cost uncertainty should support rigorous and independent research on these issues.

Critics of transportation costing often argue that uncertain costs should be excluded from analysis even if the existence of the cost can be demonstrated. They suggest that uncertain costs be treated as having zero value. This is analytically incorrect and skews results. It is more appropriate to use the best available estimates and apply sensitivity analysis. As stated by one expert, “*A crude approximation, made as exact as possible and changed over time to reflect new information, would be preferable to the manifestly unjust approximation caused by ignoring these costs, and thus valuing environmental damage as zero.*”<sup>12</sup>

Excluding or using only low estimates of uncertain costs is often defended as being “conservative,” implying caution. However, low cost estimates undervalue damages and risks, which may be less cautious and conservative than higher estimates. When a cost or risk is dismissed because of uncertainty, despite reasonable evidence of its existence, the results should be described as a *lower bound* of estimate, and decision makers should understand that the true costs are likely to be higher.

It may be unnecessary to incorporate monetized estimates of all costs in a particular situation. However, costs that are excluded from quantitative analysis because they are difficult to measure should be described qualitatively. For example, if analysis comparing alternative transport investments does not include a monetized estimate of sprawl costs, it could still discuss the likely land use impacts of the different alternatives, including information on economic, social and environmental costs of increased sprawl.

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<sup>12</sup> Richard Ottinger, “Incorporating Externalities - The Wave of the Future,” in *Expert Workshop on Lifecycle Analysis of Energy Systems*, OECD (Paris; [www.oecd.org](http://www.oecd.org)), 1993, p. 54.

## **2. Confusion About “Externalities” and “Subsidies”**

Some critics argue that congestion, crash and facility costs are not external since they are borne largely by motorists as a group. This argument reflects confusion about the concepts of external cost and subsidy. External costs are negative impacts not reflected in the price of a good. Subsidies are economic costs transferred from one individual or group to another.

These critics assume that sector level subsidy analysis (whether costs are shifted from one group to another) is the appropriate perspective for defining externalities. It usually is not. Sector level analysis is common in politics where decisions are based on group interests, but has little significance in economics, which focuses on decisions by individual consumers and firms. Both economic efficiency and equity require that external costs be defined at the individual level (i.e., the costs an individual consumer or household imposes and bears) as discussed below:

- *Economic efficiency* requires that prices reflect marginal costs. This gives consumers accurate price signals. If road user prices fail to reflect full marginal costs, consumers will drive more than is optimal, leading to problems such as excessive congestion, facility costs, taxes, accidents and pollution.

To describe this another way, internalizing costs gives consumers the savings that result when they drive less. Currently, if a motorist reduces mileage, the savings from reduced congestion, road and parking facility expenses, accidents and pollution are dispersed throughout society. By charging motorists directly for these costs they will individually capture the benefits that result when they drive less, which allows them to make efficient tradeoffs between the benefits and costs of each trip.

- *Horizontal equity* requires that individual consumers “pay for what they get and get what they pay for” unless a subsidy is specifically justified. External costs violate this principle, resulting in unfair cross-subsidies between individuals. Motorist’s impacts on other motorists might be equitable if each imposes and bears equal costs, but in practice these impacts differ significantly between motorists. For example, a careless driver imposes accident risks on more cautious motorists. As a result, there are often significant cross subsidies from low cost to high cost motorists.

Sector level analysis implies that society is not concerned with costs individuals impose on others in the same group. This is arbitrary and easily manipulated because it depends on how groups are defined. Should groups be defined by travel mode, geography, income class, or some combination of these attributes? For example, is traffic noise caused by motorists from one neighborhood an internal or external cost when they drive in another neighborhood? Are motorcyclists included in the same group as car drivers for evaluating noise costs? Are noise costs internal if imposed on a resident of an automobile owning household who travels mainly by bicycle? Defining externalities at the sector level makes no more sense than to suggest that stealing is acceptable if committed against somebody who shares a “group” attribute (a common ethnic, consumer or income status).



To describe this another way, external costs represent a subsidy of one *good* at the expense of other *goods*. For example, free commuter parking makes driving cheaper but increases employment and business costs. This price distortion makes driving relatively cheaper than other modes, such as ridesharing, public transit and non-motorized travel. Only if markets are undistorted can consumers choose the combination of goods and services that provide the greatest benefit. For example, when employees are given a choice of parking *or* the cash equivalent some choose to shift mode and are better off as a result (or they would not make the change).<sup>13</sup> Price distortions result in a cross-subsidy from households that drive less than average to households that drive more than average. For these reasons, economic efficiency and equity require that costs be internal at the individual level.

#### **External Costs Among Automobile Users**

Frances enjoys both bicycling and driving. Her neighbors, who also own automobiles, benefit when she shifts from driving to bicycling because it reduces local traffic noise and accident risk. When she drives, therefore, she imposes costs in terms of quiet and safety foregone. The fact that the cost is borne by other auto-owning households (who presumably impose comparable costs back on her and on each other), or that driving provides benefits, does not reduce the benefits to her neighbors (external benefits) when she bicycles rather than drives.

That all households in the neighborhood own automobiles does not mean that external costs offset each other. Some households impose greater traffic noise and accident risk than others. Households suffer inequitable impacts if the costs they impose total less than the costs they bear.

External costs are economically inefficient if Frances does not receive an incentive to bicycle equal to the benefits her neighbors would enjoy from reduced driving. With such an incentive everybody could be better off, because Frances would choose to bicycle whenever her neighbors' benefits was sufficient to induce a shift.

Whether this incentive is positive (neighbors reward Frances when she bicycles) or negative (Frances compensates the neighbors when she drives) depends on "property rights." If driving is a right, then the neighbors must reward bicycling. If having a quiet and safe neighborhood is a right, then Frances must pay to drive as compensation for the external cost she imposes. In practice, these property rights are unclear, so a combination of positive and negative incentives are applied to encourage individuals to shift to modes that impose fewer external costs.

Regardless of property rights, driving imposes costs to the degree that not driving provides a benefit. External costs and benefits have a mirror image relationship: an increase in benefits indicates a reduction in costs, and an increase in costs indicates a reduction in benefits.

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<sup>13</sup> Donald Shoup, "Congress Okays Cash Out," *Access*, No. 13, UCTC (<http://socrates.berkeley.edu/~uctc>), Fall 1998, pp. 2-8.

### **3. Transportation Benefits**

Critics argue that focusing on costs ignores transport benefits. This is untrue. Most cost studies acknowledge the tremendous benefits provided by transport in general and automobile use in particular. In addition, most transport benefits are measured in terms of reduced costs. For example, road improvements reduce travel time, crashes and vehicle costs. Cost analysis is therefore the basis for measuring benefits as well as costs.

However, the simple existence of benefits does not itself justify underpricing. Consumers pay for most goods they use regardless of how beneficial, including food, clothing and shelter, except when a subsidy is specifically justified. Broad subsidies for driving are only justified if *external marginal benefits* (people benefit overall if their neighbors drive more) are significantly greater than *external marginal costs*. Studies have found few external benefits from driving, and virtually no *external marginal benefits*.<sup>14</sup>

As an analogy, food provides tremendous benefits. However, this does not mean that increased eating is necessarily beneficial, that current diets are optimal, or that society should subsidize all food, including luxury meals. At the margin (i.e., relative to current consumption) many people are better off eating less, because overeating is unhealthy and reducing food expenditures leaves more resources for other beneficial goods. Similarly, that mobility provides benefits does not prove that *more* driving is better or that all driving should be subsidized. Direct user payments of transportation costs allows consumers to trade costs against benefits for each trip, just as a la carte restaurant pricing allows diners to choose just the amount and combination of foods they want.

Beyond an optimal level additional travel provides declining and eventually negative marginal benefits. No person would spend all their time and money on transport. Neither should a community devote excessive resources to transport facilities. Transportation cost analysis helps determine optimal transportation investments and prices. The true benefits of driving are revealed in a market that offers consumers viable travel alternatives and full-cost pricing. If driving is really superior it shouldn't need subsidies, either directly or by allowing uncompensated external costs. Conversely, high levels of motor vehicle travel do not necessarily reflect maximum consumer benefit if the market is distorted by underpriced driving and underinvestment in alternatives.

Just as critics claim that consumer benefits justify underpricing, they also claim that increased highway expenditures provide economic benefits. The highway industry argues that increased roadway investments increase economic productivity and growth,<sup>15</sup> but independent researchers find only marginal productivity benefits in regions that already have comprehensive road networks (i.e., paved roads to most destinations, even if they are

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<sup>14</sup> 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.

<sup>15</sup> *Transportation and the Economy*, AASHTO ([www.aashto.org](http://www.aashto.org)), 1998.

congested during peak periods).<sup>16</sup> Economic returns from highway expenditures have declined below that of private investments, a trend that can be expected as the most cost effective and beneficial projects have already been completed.<sup>17</sup>

Even if highway expenditures increase economic productivity, they are not necessarily the *best* investment, nor does it mean that underpricing and subsidizing motor vehicle *use* is good policy. Highway improvements can have harmful as well as beneficial impacts on a local economy.<sup>18</sup> Investments in alternative modes and management strategies that encourage more efficient use of existing road capacity tend to provide more economic benefit than expanding existing highways to reduce congestion.<sup>19</sup> One major study found that economic growth rates are higher in regions with more diverse, less automobile dependent transportation systems.<sup>20</sup>

#### **4. Affordability and Vertical Equity**

Critics claim that charging motorists for their external costs would harm the poor. They claim that higher user fees and investments in alternative modes creates an elitist transport system that benefits the rich (who would enjoy uncongested roads), while low income motorists are forced to use inferior travel options, such as public transit, walking and bicycling. But these arguments ignore important points:

- Underpricing automobile travel reduces travel choices (transit, walking and bicycling) and increases travel costs for non-drivers, which is vertically inequitable (i.e., it harms disadvantaged people). More optimal pricing and investments could improve travel options by increasing demand for alternative modes, benefiting economically, physically and socially disadvantaged non-drivers.
- Subsidies to driving increase housing costs, taxes, and other consumer costs. A price shift that increases automobile costs while reducing housing and tax cost would tend to benefit low-income households, who tend to drive less than average.
- Optimal pricing can be structured to address equity concerns. For example, fees can increase with annual mileage, residents could receive a limited number of free or discounted toll passes (providing a basic amount of affordable driving), and revenues can reduce regressive taxes or improve mobility services for non-drivers, providing overall equity benefits.

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<sup>16</sup> Amy Helling, "Transportation and Economic Development; A Review," *Public Works Management & Policy*, Vol. 2, No. 1, July 1997, pp. 79-93; Marlon Boarnet, "New Highways & Economic Productivity: Interpreting Recent Evidence," *Journal of Planning Literature*, Vol. 11, No. 4, May 1997, pp. 476-486.

<sup>17</sup> M. Ishaq Nadiri and Theofanis Mamuneas, *Contribution of Highway Capital to Output and Productivity Growth in the US Economy and Industries*, FHWA ([www.fhwa.dot.gov/aap/gro98cvr.htm](http://www.fhwa.dot.gov/aap/gro98cvr.htm)), 1998.

<sup>18</sup> Standing Committee on Trunk Road Assessment, *Transport Investment, Transport Intensity and Economic Growth*, DETR (London; [www.roads.detr.gov.uk/roadnetwork/heta/sactra98.htm](http://www.roads.detr.gov.uk/roadnetwork/heta/sactra98.htm)), 1997.

<sup>19</sup> Phil Goodwin, *Solving Congestion*, Inaugural lecture for the Professorship of Transport Policy, University College London ([www.ucl.ac.uk/~ucetwww/pbginau.htm](http://www.ucl.ac.uk/~ucetwww/pbginau.htm)), 1997.

<sup>20</sup> Todd Litman and Felix Laube, *Automobile Dependency and Economic Development*, VTPI ([www.vtppi.org](http://www.vtppi.org)), 1998.

## **5. Roadway Cost Recovery – Conflicting Studies**

There are many highway cost allocation studies which investigate whether user fees cover the roadway costs of each vehicle class.<sup>21</sup> Some transportation costing critics attempt to demonstrate that motorists pay their fair share of costs.<sup>22</sup> However, the critics' analyses violate standard cost allocation principles.<sup>23</sup>

Highway cost allocation makes a distinction between general taxes and user fees. Taxes and fees applied broadly to other classes of taxpayers (e.g. sales taxes) are not considered highway user fees.<sup>24</sup> True user fees (special fuel taxes, vehicle registration fees and tolls) are charged *in addition to* general taxes. As an example, property taxes are a general tax, while municipal utility charges for water, sewage, and garbage collection are user fees for particular services. A homeowner cannot fairly claim that paying their utility fees satisfies property tax obligations, or vice versa. Similarly, roadway user fees are intended to reimburse governments for road use costs beyond general taxes.

Some critics violate this principle by treating all taxes as user fees, including general sales and property taxes on motor vehicles and vehicle fuels.<sup>25</sup> Suggesting that all taxes charged on automobiles and fuel are user fees is equivalent to suggesting that automobiles and vehicle fuel should be general tax exempt. If all taxes were treated as user fees no funds would be available for general government services, and user groups could make absurd demands: taxes on hats would be dedicated to public hatracks, and computer users could demand that taxes on software be dedicated to subsidize electricity or modems.

Critics challenged highway cost allocation methods, such as inclusion of \$5.7 billion in transit funding as a roadway cost in the *1997 Federal Highway Cost Allocation Study*.<sup>26</sup> On the other hand, they don't mention that a number of government expenditures for roadway and traffic services were excluded from this study. For example, highway patrol expenses are considered motor vehicle costs, but not the costs of local police and other municipal employees when they provide the same services. A number of studies indicate that the costs of such traffic services are significant. For example, Delucchi estimates motor vehicle costs borne by municipal governments include \$8.2-12.2 billion for police

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<sup>21</sup> Joseph Jones and Fred Nix, *Survey of the Use of Highway Cost Allocation in Road Pricing Decisions*, Transportation Association of Canada (Ottawa; [www.tac-atc.ca](http://www.tac-atc.ca)), August 1995; *1997 Federal Highway Cost Allocation Study*, USDOT ([www.fhwa.dot.gov](http://www.fhwa.dot.gov)), 1997.

<sup>22</sup> Dougher, 1993; Green, 1995; Mallickrodt, 1998; and Spindler, 1997. Beshers, 1993 cites Dougher.

<sup>23</sup> Hugh Morris and John DeCicco, "Revisiting the Extent to Which User Fees Cover Road Expenditures in the United States," *Transportation Research Record 1576*, 1997, pp. 56-63.

<sup>24</sup> Urban Institute, *Rationalization of Procedures for Highway Cost Allocation*, Trucking Research Institute (Washington DC), 1990, p. 53.

<sup>25</sup> Dougher, 1993; Green, 1995; Mallickrodt, 1998; and Spindler, 1997.

<sup>26</sup> Kenneth Green made this argument during personal communications, July 1999. Including transit expenditures can be justified for the sake of option value (to maintain a basic level of mobility for non-drivers, just as ship passengers pay for lifeboats), and because on some corridors, transit improvements are the most cost effective way to reduce roadway traffic congestion. See Daniel Brod and David Lewis, *The Congestion Management Role of Transit in Strategic Corridors*, Paper 971393, TRB Annual Meeting ([www.nes.edu/trb](http://www.nes.edu/trb)), January 1997.

services, \$0.7-2.8 billion for fire protection services, and \$8.7-12.4 billion in judicial and jail expenses.<sup>27</sup> Similarly, highway cost allocation studies usually ignore the opportunity costs of land, although many economists point out that such land is a valuable resource with significant opportunity costs that should be charged against road users.<sup>28</sup>

Highway advocates consider “diversions” of fuel taxes to non-highway accounts represents an overpayment by motorists. However, fuel is often exempt from general taxes, which is estimated to be equivalent to a 30% general tax discount.<sup>29</sup> Thus, a portion of “special” vehicle fuel taxes represent general taxes foregone. Using special fuel taxes for non-highway purposes can be considered to offset these general tax exemptions, or they can be considered an excise tax to fund government expenditures that support the petroleum industry.<sup>30</sup>

## **6. Anti-Automobile, Anti-American and Anti-Consumer**

Some critics claim transportation costing is unpatriotic and harmful to consumers.<sup>31</sup> They portray themselves as defending American’s freedoms and liberty against efforts to force consumers to “give up their cars” and be forced into undesirable travel modes. Cost-based pricing is described as “punitive,” as if intended to castigate motorists for bad behavior.

Such statements reflect a fundamental misunderstanding of transportation costing and the market principles on which it is based. Transport costing is not a debate about whether automobiles are “good” or “bad,” or a popularity contest between modes. It is a technical exercise to identify the full impacts of various transport options. Accurate costing information is the basis for making fair and rational transport decisions. Price reforms are not a punishment, they simply reflect direct user payment of costs, just as users are expected to pay for most goods they consume.

Transport costing and TDM programs are no more “anti-automobile” than a healthy diet is “anti-food.” An optimal diet requires an appropriate balance of foods. An optimal transport system requires an appropriate balance of travel choices. Market distortions that reduce consumer choice or underprice driving do not provide overall benefits. Market reforms associated with least-cost investments or full-cost pricing are not intended to force consumers to give up driving that they value. Under virtually any optimal transport system motor vehicles are likely to remain the most common form of transport overall. But some travel would probably shift to other modes because consumers consider themselves better off overall when given better choices and price signals.

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<sup>27</sup> Mark Delucchi, *Annualized Social Cost of Motor-Vehicle Use in the U.S., 1990-1991; Report #7*, Institute of Transportation Studies (Davis; [www.engr.ucdavis.edu/~its](http://www.engr.ucdavis.edu/~its)), 1998. Annual costs in 1991 dollars.

<sup>28</sup> Robert Poole, “Privatization: A New Transportation Paradigm,” *Annals*, AAPSS, 553, Sep. 1997, 94-105.

<sup>29</sup> Joe Loper, *State and Local Taxation: Energy Policy by Accident*, The Alliance to Save Energy (Washington DC; [www.ase.org](http://www.ase.org)), 1994.

<sup>30</sup> Roland Hwang, *Money Down the Pipeline: Uncovering the Hidden Subsidies to the Oil Industry*, Union of Concerned Scientists (Berkeley; [www.ucs.org](http://www.ucs.org)), 1995.

<sup>31</sup> In particular Beshers, Cardato, Cox & Love, Green, Spindler and Wilson.

Critics are wrong to claim that they are defending consumer choice. Underpricing motor vehicle use not only requires individuals to bear uncompensated costs (tax expenses, accident risk, air pollution, noise, etc.), but it also results in a less diverse transportation system, reducing consumer choices.

### **7. Focusing on Pricing Rather Than Costs**

Some critics assume that transportation costing is only relevant to vehicle pricing.<sup>32</sup> They then claim that transportation costing is irrelevant because price reforms are “punitive” and politically unacceptable. This overlooks other possible applications of costing research, including investment analysis, facility design (for example, making tradeoffs between mobility and safety for various types of road users), regulations (such as parking requirements in zoning codes), and equity analysis. It misrepresents the concept of “cost” as used by economists, with legal concepts and practical issues related to pricing.

For example, Green (p. 19) concludes that the barrier effect (reduced mobility to pedestrians and cyclists due caused by motor vehicle traffic on a road) is not really a cost because it is not a “billable” fee to motorists. But economists do not define costs in such legal terms, nor do they assume that all costs must be compensated. “Cost” means that a benefit is foregone. In the case of the barrier effect the question is simply, “Would pedestrians and cyclists experience benefits from increased mobility if they didn’t encounter roads with heavy vehicle traffic?” Studies show that they would. Whether it is fair or practical to charge motorists a fee for this cost is a separate issue. The concept of the barrier effect and estimates of its magnitude are relevant when evaluating the benefits and equity implications of pedestrian crossing improvements, urban street speed limits, traffic calming projects, TDM programs, traffic management plans, and land use alternatives (such as the benefits of locating public schools within neighborhoods where students have no busy streets to cross).

### **8. Access Benefits of Roads**

Some critics argue that because local roads provide basic access their costs should be charged to property owners rather than to motorists. This argument may apply to the first increment of capacity (i.e., a narrow, lightly paved road), but costs for additional roadway capacity and most maintenance and operating activities result from motor vehicle use. A special investigation in the 1988 Federal Highway Cost Allocation study concluded that the marginal increase in basic access provided by additional road capacity is small and declining, so the justification for charging land owners rather than users for roadway projects is weak and decreasing.<sup>33</sup> The justification would be even smaller now.

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<sup>32</sup> In particular, Green, Cardato and Spindler.

<sup>33</sup> “An Analysis of Highway Revenues and Cost Responsibility for Non-Users,” Appendix F, *Final Report on the Federal Highway Cost Allocation Study*, USDOT, 1982.

Current roads are typically four lanes wide (two traffic lanes and two parking lanes) implying that 50-75% of road area is required to meet the needs of motor vehicles, rather than just basic access. Since most communities have well-developed roadway systems that easily satisfy basic access needs, the costs of increasing road capacity are generally for motor vehicle use. Most road wear results from motor vehicle use (particularly from heavy vehicles and cars with studded tires). Even pedestrian and bicycle facility costs could be charged to driving if automobile traffic is considered to degrade the bicycling and walking environment, creating the need for separate facilities. This implies that most current road expenditures can be considered motorists' responsibility.

### **9. Problems are Self Correcting**

Critics often argue that automobile costs are being solved through technological progress, frequently citing claims that air pollution has been reduced by 95% through emission controls over the last few decades. This is an exaggeration. Engine and fuel changes mandated by state and federal laws have significantly reduced regulated tailpipe emission rates under standard test conditions. However, actual emissions are greater than these tests indicate because vehicles often operate outside of design conditions (cold engines, ineffective emission controls, etc.) and because not all air pollutants are regulated tailpipe emissions (including CO<sub>2</sub>, mechanical particulates and toxins).<sup>34</sup>

Similarly, although automobile occupant crash protection has increased through technological improvements, much of this has been offset by increased vehicle speeds and mileage, resulting in little reduction in per capita crash risks.

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<sup>34</sup> *Mobility and Access, Transportation Statistics Annual Report 1997*, BTS ([www.bts.gov](http://www.bts.gov)), p. 109-110.

## **Bibliography of Transportation Costing Criticism**

*This section investigates specific arguments made by critics.*

### **1. Eric Beshers, *External Costs of Automobile Travel and Appropriate Policy Responses*, Highway Users Federation (Washington DC), 1994.**

The Highway Users Federation is a coalition of motor vehicle and highway development industries whose interests are road construction and minimizing the costs of road use. This paper responds to articles by Professor John Pucher arguing that motor vehicle taxes should increase to internalize externalities and encourage more efficient travel behavior.

Beshers agrees that there are significant external costs associated with automobile use, and that policy changes are justified, including congestion pricing, emission charges and measures to reduce the negative impacts of sprawl. His main point is that such policy corrections should not be excessive. He emphasizes that pricing should be closely tied to specific consumer choices (a point also made in much of the transport costing literature), not blunt instruments such as increased fuel taxes.

#### *Roadway Costs*

Beshers states incorrectly that drivers pay 99% or more of road costs (the *1999 Federal Highway Cost Allocation Study* found that automobile user fees cover only 70% of total roadway costs).<sup>35</sup> His argument is based on three mistakes. First, he includes general taxes among vehicle user charges, which is inconsistent with standard economic practice, as discussed earlier. Second, he excludes borrowing expenses as a cost because “*Whether or not a government has elected to finance a particular expenditure through debt issuance has no bearing on the level of real resources expended for highway purposes.*” This argument is wrong. Borrowing costs are real costs that represent the time value of resources and the opportunity costs of deferring consumption. Road users pay this cost to obtain roadway investments years earlier than would be possible under pay-as-you-go financing.

Third, Beshers excludes local road costs on the assumption that such roads are for “access.” But access for non-drivers requires a less expensive local road system than what is required for motor vehicle traffic. Most current local roads are much wider than required for a non-automotive transportation system.<sup>36</sup> Motor vehicles cause most road wear and create the need for most new construction costs, even at the local level. The incremental costs of an automobile oriented road system over a basic, non-automotive road system should be charged to drivers, which represent nearly all current roadway expenditures.

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<sup>35</sup> *1997 Federal Highway Cost Allocation Study*, USDOT ([www.ota.fhwa.dot.gov/hcas/final](http://www.ota.fhwa.dot.gov/hcas/final)).

<sup>36</sup> Harry Dimitriou, *Urban Transport Planning, A Developmental Approach*, Routledge (NY), 1992, p. 136; Herbert Levinson, *Transportation and Traffic Engineering Handbook*, Institute of Transportation Engineers/Prentice Hall (Englewood Cliffs, NJ), 1982, p. 256.



### *Parking*

Beshers acknowledges that much publicly supplied parking is underpriced, but argues that privately supplied parking is an internal cost because it is ultimately borne by the same group that uses the parking, and is efficient if provided in a free and competitive market. As discussed earlier, this sector level equity analysis is inappropriate for both economic efficiency analysis, since it underprices driving, and equity analysis, since it ignores cross subsidies from people who pay for free parking but seldom or never use it, to those who do use it. Beshers ignores the influence of market distortions such as zoning laws, tax exemptions, and municipally subsidized parking which increases parking supply, making it virtually impossible for individual firms to charge for parking.<sup>37</sup>

### *Depletion of Natural Resources*

Beshers ignores several external costs attributed to resource consumption, including environmental impacts and macroeconomic costs associated with importing petroleum,<sup>38</sup> and intergenerational equity.<sup>39</sup> The existence of these external costs can be demonstrated by the broad support (including public subsidies) for energy conservation, alternative energy development, the U.S. Strategic Petroleum Reserve, and recycling. If all costs were internalized such public concerns and market interventions would be unnecessary.

### *Accidents*

Studies identify several significant uncompensated external accident costs associated with driving.<sup>40</sup> Beshers argues that such costs are not externalities because they *could* be internalized through tort reform that increases damage compensation. However, as a public policy, accident costs cannot be fully compensated because to do so would create an incentive for individuals to be careless, or even to create accidents (a “moral hazard”). Under current laws and practices vehicle accidents impose external costs.

### *Sprawl*

Beshers discusses a limited number of external costs associated with sprawl: loss of open space, aesthetics and deterioration of social cohesion. He ignores other problems, such as increased impervious surfaces, higher infrastructure costs, ecological degradation and increased future travel costs.<sup>41</sup> He claims that sprawl provides benefits that compensate for costs, but most benefits he cites, such as business development, are economic transfers, not net benefits.

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<sup>37</sup> Richard Willson, “Suburban Parking Requirements,” *Journal of the American Planning Association*, Vol. 61, No. 1, Winter 1995, p. 34.

<sup>38</sup> See for example “The Real Cost Of Energy,” Harold M. Hubbard, *Scientific American*, 264/4, April 1991; Office of Technology Assessment, *Saving Energy in U.S. Transportation*, U.S. Congress, 1994; and other sources *Transportation Cost Analysis*, Chapter 3.12.

<sup>39</sup> Daly and Cobb, *For the Common Good*, Beacon Press (Boston), 1994; National Research Council, *Assigning Economic Value to Natural Resources*, National Academy Press (Washington DC), 1994.

<sup>40</sup> Rune Elvik, “The External Costs of Traffic Injury: Definition, Estimation, and Possibilities for Internalization,” *Accident Analysis and Prevention*, Vol. 26, No. 6, 1994, pp. 719-732.

<sup>41</sup> Todd Litman, *Land Use Impact Costs of Transportation*, VTPI ([www.vtppi.org](http://www.vtppi.org)), 1999

**2. Roy E. Cordato, *The Central Planning of Lifestyles: Automobility and the Illusion of Full Cost Pricing*, Competitive Enterprise Institute ([www.cei.org](http://www.cei.org)), 1997.**

This report argues against government action to address motor vehicle externalities on the grounds that government agencies are incapable of determining optimal prices. It supports privatization of roads, arguing that it is the only appropriate way to address social costs of automobile use. Cordato dismisses the concept of economic efficiency, arguing for “compensatory justice” as the way to address external costs such as pollution. For example, if roads are privately owned people harmed by automobile air pollution could demand compensation from the owner. He dismisses government management, such as congestion pricing on existing roads, as “market socialism.”

Cordato criticizes transportation costing studies (particularly MacKenzie, et al. 1993 and Lee, 1993). He cites Beshers (1994) and Green (1995) to conclude that cost estimates are exaggerated and the benefits of automobile use are ignored. However, he argues that debate over the magnitude of costs is misguided since the “*economically relevant costs cannot be measured and the net benefits associated with reallocation of resources are unknowable,*” so efforts to determine the full costs of transportation, and efforts to correct market failures through government policy, are “vacuous” exercises.

As an example, Cordato argues that global warming cannot be assigned a cost, due in part to uncertainty over the impacts on humans, and in part because it is impossible to know the preferences of the future humans who will be impacted.

Cordato emphasizes the benefits of automobile use, particularly privacy and freedom. He criticizes transportation cost studies, and proponents of transportation demand management of ignoring these benefits. He considers any proposals to limit American’s use of cars to be “shackling” and “*contemptuous of the freedom that Americans have exercised to come and go as they please and live where they desire.*”

**3. Cox and Love, “Drivers Pay Their Own Way—And Then Some” *Governing Magazine*, April 1994, p. 67.**

This article responds to another article in the same magazine issue by James MacKenzie on the external costs of automobile use. Cox and Love state that “*Through fuel taxes, licenses and fees, American highway users contribute more than enough revenue to support the street and highway system.*” As discussed earlier, this is untrue according to conventional roadway cost allocation. They also state that “*the purported external costs of the personal transportation system are largely paid by the driving public, who constitute virtually all of the taxpayers. After all, 90 percent of American households have at least one car.*” As discussed earlier, such sector level analysis ignores the economic inefficiency of non-marginal pricing, and the inequities of cross-subsidies from households that drive less than average to those that drive more than average.

They claim, “*Nor are cars the polluters their critics contend. On a per-person basis, a single-occupant automobile emits less sulfur dioxide and nitrogen oxide than rail transit.*” This ignores other air pollutants that are considered to have the greatest social costs, including particulates, VOCs and CO, which are emitted by automobiles at a greater rate than other modes. The fact that other modes also pollute does not reduce the harmful effects of automobile pollution.

Cox and Love state that “*reliance on the automobile and the highway system is at the heart of our unequaled affluence.*” As previously discussed, although automobiles and highways may have contributed significantly to economic development in the past, objective studies indicate little economic benefit from increased highway capacity or vehicle use in regions with developed roadway systems.

**4. Rayola Dougher, *Estimates of Annual U.S. Road User Payments Versus Annual Road Expenditures*, American Petroleum Institute (Washington DC), March 1995;<sup>42</sup> and *The Funding of Roads in the United States: How the Taxes and Fees Collected From Motorists are Spent*, May 1997.**

These reports examine whether roadway user tax payments cover roadway costs. They include general taxes when calculating automobile revenues, which violates highway cost allocation principles, as described previously. Dougher justifies this with the argument that *all* sales taxes are excise taxes and can be considered user fees. This is a unique argument with profound implications. If this approach were legitimized, endless groups could argue for funds for their special projects, with unlimited multiple counting of the same tax payments. Taxes paid on wooden baseball bats would be claimed by the lumber industry, the sporting goods industry, the retail industry, and even the medical industry for to cover the costs of baseball game injuries. Of course, wealthier people would demand more public services than the poor. There would be no funds left for general government activities or services for the poor.

Dougher compares her estimates of roadway facility costs with transportation cost studies that include other external costs besides roadway expenses. Although she concludes, “*The view that road users are being subsidized by others is mistaken. Calls to increase motor fuel and motor vehicle taxes on this basis have no foundation.*” Dougher has not proven her point unless all other external costs are ignored.

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<sup>42</sup> For additional comments on this paper see Hugh Morris and John DeCicco, “Extent to Which User Fees Cover Road Expenditures in the United States,” *Transportation Research Record 1576*, 1997, pp. 56-62.

**5. James Dunn, *Driving Forces; The Automobile, Its Enemies and the Politics of Mobility*, Brookings Institute (Washington DC; [www.brookings.org](http://www.brookings.org)), 1998.**

Dunn discusses various problems associated with our current transportation system. He identifies three transportation policy paradigms for addressing these problems:

1. The Anti-Automobile Vanguard which represents special interest groups that propose radical transportation reform that is at odds with most citizens' preferences.
2. The Auto, Plus, which is a sensible and politically feasible set of reforms intended to reduce problems while satisfying citizens' preferences for automobile travel.
3. Entrenched Interests (mainly the automobile and highway industries) that support the status quo and oppose most reforms.

Dunn primarily attacks the Anti-Automobile Vanguard, highlighting excesses and failures, although his analysis indicates that the Entrenched Interests are an equal or greater barrier to transportation improvements. His critique is political with only superficial analysis of actual costs and benefits. None-the-less, he criticizes the anti-automobile vanguard for exaggerating costs and understating benefits of automobile use.

Dunn details the history of several transportation issues, including highway funding, fuel taxes, vehicle regulations, urban transit, intercity rail service, urban sprawl, and related transportation policies. Much of the analysis justifies policy reform, but finds that the Anti-Automobile Vanguard's approach is impractical. The "Auto, Plus" package of reforms he proposed include marginal changes in vehicle design, transportation choice, land use, and pricing policy (with modest increases in fuel taxes), which he considers politically possible. This represents what Dunn considers a safe and pragmatic political center in transport policy debates.

**6. José A. Gómez-Ibáñez, "Estimating Whether Transport Users Pay Their Way: The State of the Art," *The Full Costs and Benefits of Transportation*, Springer (Berlin), 1997.**

Gómez-Ibáñez evaluates five transportation costing studies.<sup>43</sup> He considers the studies biased upward because most were produced by environmental groups. He emphasizes that cost analysis must reflect a particular perspective and objectives, so a cost estimate developed for one type of analysis may be inappropriate for another. He compares the estimates of the five studies, which indicates a relatively wide range of cost categories and estimates which he argues indicate uncertainty and poor analysis. He uses Litman's Urban Peak rather than Weighted Average cost values, which explains part of the variation between studies, although why this is done is not explained. He identifies five common "pitfalls" of transportation costing:

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<sup>43</sup> MacKenzie, 1993; Kageson, 1993; Miller and Moffet, 1993; Apogee Research, 1994; Litman, 1994.

## *Evaluating Criticism of Transportation Costing*

- He considers parking supplied by businesses a bundled good, comparable to other employee benefits and customer services. He argues that this must be economically efficient overall due to market competition, and does explore how zoning laws and tax policies may distort the market. He agrees that free parking can be considered an externality if it affects traveler behavior, but concludes that this is only true for a small portion of trips (city center commutes). He does not discuss the cross subsidies from employees and customers who don't use free parking to those who do.
- He argues that accident costs are primarily internal to motorists as a group, and that transportation costing studies fail to incorporate empirical evidence about the relationships between traffic volumes and accident rates, and that it is incorrect to assign accident costs to the larger vehicle in a crash. This ignores other categories of accident externalities identified by researchers.<sup>44</sup>
- He criticizes the use of air pollution costs estimates based on control rather than damage costs. However, most current transportation cost studies rely largely on damage cost estimates. As scientists have developed a better understanding of air pollution impacts, estimated costs associated with motor vehicle use have increased in recent years. In particular, extensive research by Delucchi justifies a relatively high estimate of total vehicle air pollution.<sup>45</sup>
- The external costs of energy consumption are criticized for inconsistent perspectives. In particular, if economic impacts to the national economy from fuel imports are included (an economic transfer), then international impacts (such as global warming damages) should be excluded. Including expenditures on military actions in the Middle East is also criticized.
- He criticizes cost studies for using average rather than marginal costs when calculating the costs of various modes, particularly the costs of roadway and transit services. This overestimates costs where services provide economies of scale (such as rail transit) and underestimates the costs of providing highway and transit capacity under peak conditions.

Many of these points are legitimate, particularly for the older studies that were reviewed. More recent costing research has addressed most of these issues, either by adjusting cost estimates, or by providing more information to explain a particular analysis. Gómez-Ibáñez's claim that these studies are likely to overestimate costs has not been supported by more recent research indicating that at least some costs are probably greater, not less, than the earlier studies indicate.

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<sup>44</sup> Rune Elvik, "The External Costs of Traffic Injury: Definition, Estimation, and Possibilities for Internalization," *Accident Analysis and Prevention*, Vol. 26, No. 6, 1994, pp. 719-732.

<sup>45</sup> Donald McCubbin and Mark Delucchi, *Social Cost of the Health Effects of Motor-Vehicle Air Pollution*, Institute of Transport Studies ([www.engr.ucdavis.edu/~its](http://www.engr.ucdavis.edu/~its)), 1996, Table 11.7-6.

**7. Kenneth Green, *Defending Automobility: A Critical Examination of the Environmental and Social Costs of Auto Use*, Reason Foundation (Los Angeles; [www.reason.org](http://www.reason.org)), December 1995.**

Green argues that automobile external costs are small, and concludes that automobile users pay more in taxes than their external costs. However, his analysis is not based on conventional economic principles. He uses a “property rights” framework, in which external costs are limited to direct liabilities between property owners (human health is considered a property). To be considered an externality, Green requires that an impact be:

- Verifiable and quantifiable as a direct result of automobile use.
- Imposed by auto users (defined as the 88% of the population that lives in a household owning an automobile) on non-auto users (defined as the 12% of the population that lives in a household that does not own an automobile).
- Attributable to individual vehicle users.

He argues (footnote 27) that to quantify an externality, “...one should be able to evaluate the impacts through analysis of actual moneys spent or actual debt incurred rather than upon a chain of predicted financial losses that are predicated upon flawed environmental or social impact models.” Indirect and dispersed impacts, ecological damages, government costs, non-market losses and damages from one driver to another are not considered externalities. Injuries to wildlife and other environmental resources are only costs if an individual owns them.

This legalistic approach is very different from conventional economics, which is concerned with the efficient use of resources. An economist asks, does motor vehicle use impact a resource? What is the value of that resource? Questions of who should bear the costs of providing the resource are important, but not the starting point for economic analysis. Green’s analysis starts with asking, Can somebody be legally forced to pay for this resource?, and then uses that to determine whether the resource exists and its value. This backward approach overlooks the fact that not all valuable resources fit conveniently into the existing legal framework of property ownership.<sup>46</sup>

Green assumes that transportation costing is only useful to establish optimal prices to affect vehicle selection and short-term driving behaviors, ignoring applications in transport planning, policy and investment analysis. Although he claims to evaluate automobile use externalities, his analysis only considers sector level subsidies between auto-owning and non-auto-owning households. As previously discussed, this ignores economic efficiency and most equity issues.

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<sup>46</sup> A point emphasized by Ronald Coase in his famous article, “The Problem of Social Cost,” *The Journal of Law and Economics*, Vol. 3, October 1960.

Green's external cost estimates are far lower than other cost studies, because he argues:

- Global air pollution impacts are not verifiable and cannot be attributed to driving.
- Although water pollution and wetlands loss are caused by automobile use and road construction, these are unavoidable and cannot be easily monetized, and therefore need not be considered a cost to individual users.
- Parking externalities consist only of \$156 million in employee parking tax exemptions, stating, "...tax deductions are viewed by some as a societal subsidy of automobile parking." The cost studies he cites actually include the *full cost* of parking subsidies as externalities, with estimates ranging from \$53- to more than \$200-billion per year. He provides no explanation for excluding the full cost of subsidized parking.
- Traffic noise costs cannot be scientifically verified, and in most cases property owners cannot claim any losses since road traffic existed first.
- External accident costs are limited only to injuries to members of non-car-owning households, and accident costs are often overstated, claiming that total accident costs are actually less than claims paid.
- Pedestrians and bicyclists have no right to travel across busy streets, traffic barriers are more psychic than real, and any disadvantages experienced by non-drivers in an auto dependent transportation system must be offset by economic benefits so they can be ignored. He provides no references supporting these arguments.
- Water pollution, noise and barrier effect costs by automobiles can be ignored because the same impacts are imposed by other modes. He states incorrectly (page 19) that "*the extent to which it is auto-users, as distinct from other transportation system users, are responsible for this proposed effect [the barrier effect] is not specified.*" Several cost studies provide specific estimates of costs for each mode. *Transportation Cost Analysis* provides this information for the barrier effect.
- Land used for roads cannot be considered a cost, since their value has never been calculated, and government has no inherent property rights; despite the fact that land has significant opportunity value, and the Reason Foundation itself often argues that governments should minimize land holding for more efficient use of resources.<sup>47</sup>

Green misinterprets the literature on congestion costs. He argues that "*In an infinite series of such interactions, such user-on-user impositions [from congestion] should cancel one another out, distributing the cost of increasing congestion equally among auto users.*" This is simply not true. First, congestion is economically inefficient because the congestion price each driver bears (from vehicles on the road ahead) does not represent the total congestion cost they individually impose on others vehicles.<sup>48</sup> Second, bus and rideshare passengers *impose* less congestion per person, but *bear* the same delays as single occupant automobile drivers (except on HOV lanes).

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<sup>47</sup> Robert Poole, "Privatization: A New Transportation Paradigm," *Annals, AAPSS* 553, Sept. 1997, p. 98.

<sup>48</sup> Anthony Downs, *Stuck in Traffic*, Brookings Institute (Washington DC; [www.brookings.edu](http://www.brookings.edu)), 1992.

Green states, “*Another flaw in the congestion cost estimates found in the auto-cost literature is that such estimates depict all time as time that could be spent working.*” This is also untrue. Travel cost values have been widely studied by observing individuals’ willingness to pay for travel time savings. Wage rates are often used as a reference for estimating the value consumers place on their personal travel time, but this is not to imply employment is the alternative use of travel time.

Green argues that resource consumption imposes no external costs (to put this another way, there is no social benefit to resource conservation) but offers only ideologically-based references in support. He ignores social and ecological costs of resource extraction, processing and distribution; macroeconomic and national security costs of importing resources; and any moral obligation to provide resources to future generations.

Although Green acknowledges the possibility of land use impact costs, he dismissed these because the relationships between transport and land use are “complex,” and that if such costs exist they are offset by benefits (although nothing he says or quotes indicates *external benefits* from automobile-oriented land use which offset *external costs*).

Green dismisses the possibility of external disposal costs from automobile use because, he argues, properly treated waste does not produce external impacts. This is untrue on two points. First, regulations are often violated. It is illegal to pour used crankcase oil down the drain or into the ground, but this rule is virtually unenforceable. Second, even legally treated waste often produces *residual* external costs, such as environmental damages from landfills and industrial sludge disposal.

Green only acknowledges three externalities: local air pollution, accident expenses to members of households that don’t own an automobile, and a portion of employee parking tax revenue foregone. He selects an outdated estimate of air pollution costs (\$7 billion) and claims incorrectly that this estimate is representative of the literature.

Green argues that charging automobile users more for the external costs they impose “*would clearly result in a decline in the living standard for the 87 percent of American households that depend on the automobile for their mobility. There is little evidence to support the contention that even the remaining 13 percent of American households would enjoy any benefits in the overall loss of economic power that American society would endure in the face of severe overpricing of personal transportation.*” This treats automobile user charges as costs (resources lost) rather than as transfer payments (resources shifted). He ignores potential benefits from reduced congestion, roadway, parking, traffic accident or pollution damage costs, or from increased consumer choice.

As a result of this approach Green estimates that automobile externalities totals about \$8 billion annually in the United States. Citing Dougher’s estimate of automobile user revenue, he concludes that driving is overpriced.



**8. Thomas Hogarty, “The Social Benefits of Personal Vehicle Travel,”**  
*Transportation Quarterly*, Vol. 52, No. 2, Spring 1998, pp. 5-9; *Benefits of Road Travel and Transport, Research Study #089, American Petroleum Institute (Washington DC), 1998.*

Hogarty argues (incorrectly, as mentioned earlier) that transportation cost studies ignore the benefits of automobile transportation. He attempts to quantify these benefits to argue that because “the social benefits of personal vehicle travel vastly exceed the associated social costs, the article concludes that increased funding for the Interstate and National Highway Systems is socially desirable.” He cites Dougher, 1997 (see critique above) as evidence that public funding for highways should increase, stating, “Inasmuch as total spending on roads by all levels of government is considerably less than total taxes on highway users by all level of government, federal/state/local fiscal constraints should not limit socially desirable investments in highways.”

The analysis fails to support these conclusions because it does not consider marginal impacts, as discussed earlier. It fails to demonstrate that increasing road capacity and vehicle use provides net benefits (marginal benefits that exceed marginal costs), or that increasing road capacity provides greater benefits than other management or investment options. It is comparable to arguing that because people need to eat, restaurants should be subsidized.

There are a number of other technical errors in the analysis. To calculate total consumer surplus from private automobile travel Hogarty estimates what such travel would cost if performed by taxi. Using an estimated generalized user cost of \$0.90 per mile for driving compared with \$4.31 per mile for the same trips made by taxi, he concludes that consumer surplus averages \$1.71 per mile, or \$3.8 trillion for all automobile travel.

Using taxi travel as the substitute for driving is rather arbitrary (comparable to calculating the benefits of canned food based on savings over having the same meals served at a restaurant), yet he does not discuss the basis for his approach or show how the results might vary using other assumptions.

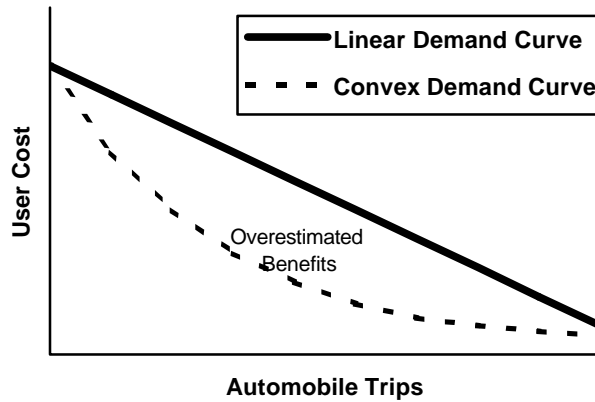
He appears to significantly overestimate the cost of taxi service. Even in relatively expensive taxi markets such as Washington DC and New York fares average less than \$2.00 per mile for a typical 5 mile trip.<sup>49</sup> Per-mile costs in suburban and rural areas tends to be lower, and if all automobile travel were converted to taxi trips average costs would almost certainly decline due to economies of scale and scope. Using \$2.00 per mile reduces the estimated consumer surplus to less than a third of what Hogarty estimates.

Hogarty assumes a linear demand curve, which is a reasonable assumption for relatively small changes in consumption, but not for a total demand curve, which tends to be convex with respect to the origin (see Figure 1). Using a convex demand curve would further reduce estimated net benefits.

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<sup>49</sup> [www.washingtonpost.com/cgi-bin/taxicalc.cgi](http://www.washingtonpost.com/cgi-bin/taxicalc.cgi) and [www.ci.nyc.ny.us/html/tlc/html/taxirate.html](http://www.ci.nyc.ny.us/html/tlc/html/taxirate.html).

**Figure 1** Travel Demand Curves



*Most demand curves are convex and so have less consumer surplus than Hogarty assumes with a linear demand curve.*

Hogarty identifies a number of “intangible” benefits from roadways, such as access for various types of public services, but does not demonstrate that increasing roadway capacity is the most cost effective way to increase such benefits. Most benefits he identifies are direct internal benefits to road users or property owners, or economic transfers that benefit one group at the expense of another. He fails to identify significant external benefits that would justify public subsidies of roadway capacity expansion.

**9. Jack Mallickrodt, *Highway Subsidies*,  
(<http://home.earthlink.net/~malli/hwysub.htm>), April 1998.**

Mallickrodt's goal is to prove that roadways are not subsidized. He argues that roads produce a "profit" when total costs are compared with total user payments, and so are a worthwhile investment. His analysis includes all taxes on motor vehicles, vehicle parts and fuel as "user fees," which violates roadway cost allocation principles, as previously discussed. He implies that this analysis counters the conclusions of transportation cost studies by Delucchi, Komanoff and MacKenzie, although it is limited to just government roadway expenditures and ignores other external costs considered by those authors.

**10. Z. A. Spindler, *Automobiles in Canada; A Reality Check*, Canadian Automobile Association (Ottawa; [www.caa.ca](http://www.caa.ca)), 1997.**

Although this publication claims to respond to transportation cost studies, it includes no references or citations (a technical report of this length would normally have 50-100 citations and notes). Spindler presents transportation cost studies as simply ideological attacks on driving. He challenges arguments supposedly made by "some academic studies," "auto critics," and anti-auto special interest groups without citing specific studies. He claims that such groups are seriously proposing eliminating all cars. Spindler implies that transportation cost studies assume that automobiles are "bad," and therefore presents arguments to indicate that automobiles are "good," or, at least not *too* bad.

The report argues that automobile users pay more in "user fees" than what is spent on roadways, but makes no reference to existing highway cost allocation literature. A chart on page 4 suggests that road user taxes total \$14.3 billion per year, while roadway expenditures totaled less than \$6 billion. However, this includes general sales taxes. As described previously, standard cost allocation requires that only special taxes be considered "user fee." Assuming that GST and PST combined average 14% throughout Canada, true user charges total only \$11.6 billion, not the \$14.3 billion claimed.

Spindler also ignores local road expenditures, which represent an annual expenditure approximately equal to provincial highway expenditures.<sup>50</sup> Yet, the report implies that provincial expenditures represent total roadway funding. It states, "*This means that in 1995-96, governments taxed the motor vehicle owners of Canada a total of \$14.27 billion. But they spent just \$5.795 billion on roads and related works.*" Apparently Spindler:

1. Is unfamiliar with standard transportation economic practices and therefore failed to exclude general taxes and include local road expenditures.
2. Understands these concepts but chose to ignore these factors to make his point.
3. Has an argument for including general taxes and excluding local expenditures, but doesn't bother to state them, in which case his position poorly presented.

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<sup>50</sup> *Transportation in Canada 1996*, Transport Canada (Ottawa; [www.tac-atc.ca](http://www.tac-atc.ca)), p. 21

Spindler argues that congestion, accidents and pollution impose no external costs, or if such costs exist they cannot be measured, although they are frequently measured by transportation economists. He concludes that congestion pricing is unfair (“*They propose to charge users a fee for imposing the added delay cost on themselves! Of course, such a solution does nothing to reduce the costs of congestion. On the contrary, it only adds to the costs we already pay through fuel taxes.*”) and ineffective (“*In theory, the added user fee is supposed to force the ‘marginal’ road user off the road, thus relieving congestion. However, very few of us see ourselves as marginal.*”) in contrast to extensive literature which indicates that congestion pricing could be an effective way to benefit road users and increase equity.

Spindler similarly misrepresents the debate over parking subsidies, arguing that it only concerns tax write-offs of parking for businesses. He makes no references to the economic inefficiency and cross subsidies that result when drivers receive free parking but non-drivers receive no comparable benefit.

The report is particularly opposed to carbon taxes and congestion pricing, arguing that the first would not reduce CO<sub>2</sub> emissions and the second would not reduce congestion, because cars are a necessity. It argues that carbon taxes are a “fallacy,” asking, “*Why tax emissions when the money collected will not be used to correct the problem?*” Although there is extensive literature on carbon taxes and congestion pricing, the report makes no references to them, relying simply on the author’s opinions.

The report claims that automobiles account for “only” about 10% of total carbon emissions in Canada, and so are not a significant cause of the problem. Yet, virtually any sector could make a similar claim. Regardless of the portion of emissions a sector produces, it is both equitable and efficient that the automobile sector help to achieve its share of emission reduction goals.

The report argues that automobile use is essential to individuals. What is not explored is whether this automobile dependency (i.e., lack of alternatives) might result from policies that favor automobiles over other modes, preventing the development of a more diverse transportation system that benefits consumers. Instead, the report demands even more expenditures on automobile infrastructure, and more subsidies to driving.

It argues that “*Cars are such an advantage that almost everybody has at least one*”, but includes data showing that only about 2/3 of Canadians are licensed to drive. Ironically, the report includes a quote from C.D. Buchanan’s report *Traffic in Towns*, which argued that automobile traffic should be discouraged in urban areas. It acknowledges urban sprawl as a problem, yet argues without evidence that this is unrelated to automobile use or automobile facilities.

Spindler argues that automobile production is important to the Canadian economy, with the implication that automobile use helps to create jobs and economic development. But this is not true, particularly in British Columbia. Domestic vehicle use provides relatively

little employment compared with alternative consumer expenditures, since vehicle manufacturing and petroleum production are highly capital intensive. Transit expenditures provide about 3 times the jobs as automobile expenditures in general, and about 5 times the jobs as petroleum expenditures.<sup>51</sup>

**11. James Q. Wilson, “Cars and Their Enemies,” *Commentary*, July 1997, pp. 17-23.**

This article is a response to Jane Holtz Kay’s book *Asphalt Nation; How the Automobile Took Over America and How We can Get It Back* (Crown, 1997). It argues that problems of automobile use have been exaggerated by anti-automobile critics, and that driving is so beneficial compared with alternatives (higher density residential development and public transit) that it would be foolish to restrict it more. The article acknowledges significant external costs of automobile use, including congestion, accident risk to pedestrians and cyclists, and air pollution, and recommends pricing strategies to address these problems, including congestion tolls, emission fees and increased fuel taxes.

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<sup>51</sup> Input/Output Table, BC Treasury Board (Victoria), 1997.

## **Conclusions**

Many objective researchers have found significant costs resulting from motor vehicle use, including many external costs. Although there is still uncertainty about their exact magnitude, it is possible to develop reliable lower-bound estimates of these impacts.

Critics of transportation costing make a number of arguments, many of which misrepresent, misinterpret or abandon altogether conventional economic theory and practices. Some critics show little knowledge of subjects they analyze, and many of their facts are incorrect. Their arguments often lack citations or rely on references from ideologically oriented sources outside of mainstream thought. Common errors include:

1. Claiming that any cost which is difficult to measure can be ignored.
2. Defining externalities and subsidies at the sector level.
3. Claiming that external costs are offset by external benefits
4. Claiming that underpriced driving benefit the poor.
5. Treating general taxes as user fees.
6. Accusing transportation costing of being anti-automobile and anti-American.
7. Claiming that problems such as pollution and accident externalities are being corrected through vehicle design improvements.

No transportation cost study is perfect, and early studies in particular contained errors worth correcting. More recent costing analysis have addressed most of these problems. It is wrong to argue, as do the critics, that existing knowledge is inadequate to apply cost estimates to transportation policy decisions. A precautionary and conservative approach would be to incorporate at least the lower range of current estimates in planning and pricing. Otherwise we encourage inefficient transport habits, waste public and private resources and impose inequitable costs.

Many of the critics' have a strong ideological bias. They assemble arguments and data to support a foregone conclusion rather than engage in open-minded inquiry. Much of this analysis appears intended to dismiss transportation costing rather than to improve it. Most critics are supported by the automobile, petroleum or highway industries. Their work appears intended to deflect interest in reforms that may reduce these industries' profits. Some critics abandon neoclassical economics altogether, and yet compare their results with transportation cost studies that are based on conventional economic theory.

Automobile use provides enormous benefits, but this does not mean that more driving is better, or even that existing levels of automobile use are optimal. Incorporating full cost analysis into transportation policies, planning and pricing could make consumers better off overall by increasing transportation choices and allowing individuals to make their own tradeoffs between their incremental costs and benefits for each trip.

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- Concepts that were not well explained.
- Analysis that is inappropriate or incorrect.
- Additional information, ideas or references that could be added to improve the report.

*Thank you very much for your help.*

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