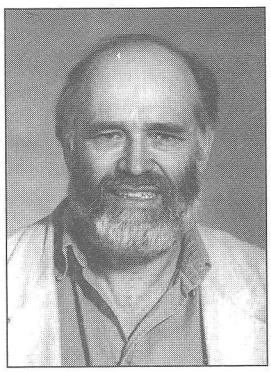
Optimal Level of Automobile Dependency

(A TQ Point/Counterpoint Exchange with Peter Samuel and Todd Litman)

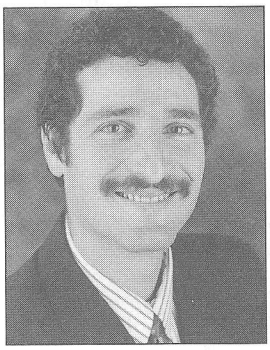
A strange book appeared in 1862 called *The Prophecies of Mother Shipton.* It set out a number of mysterious prophecies, including a vision of the automobile age, long before the first automobile had been invented. According to Mother Shipton:

"Carriages without horses shall go,
and accidents fill the world with woe."

While Mother Shipton turned out to be the invention of London bookseller Charles Hindley, the vision is nonetheless an extraordinary one, especially with benefit of hindsight. It does not focus on the independence, richness, and choice that the auto would bring, but on its social costs. We have adopted the automobile even though we pay a staggering price for it in lives, pollution, noise, and land and resources consumed. Automobility is a two-sided coin, and a mountain of social criticism, movies, literary works, and technical papers has attempted to address the miracle and its attendant horrors. There is probably no one, in any part of the world that has not been profoundly affected by the automobile and has an opinion about its proper role. How much automobility is enough? How much is too much? What should we do to get the right mix? These simple questions raise very difficult philosophical, social, and economic questions—more widely ranging than a conventional *Transportation Quarterly* article.



Peter Samuel



Todd Litman

To address these questions, we decided to try something new: we invited two thoughtful observers—Peter Samuel, publisher of *Toll Roads Newsletter* and Todd Litman of the Victoria Transport Policy Institute—to share their views in a Point/Counterpoint exchange. Both agreed to a series of questions and a process for interacting on them. The resulting exchange is reported here. We wish to thank both contributors for their cooperativeness and their insights.

We believe that this format is an effective way to give you valuable perspective on complex matters of this sort. What do you think of this approach? We invite your comments on this Point/Counterpoint feature and your suggestions on other issues where this approach might be useful.

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TQ: ***Is automobile use excessive in the U.S.? Are we too automobile dependent? If so, why?***

Litman: Considerable research indicates that a significant portion of automobile use results from market distortions rather than true consumer preference.[1] In a more optimal transportation market consumers would drive less than they do now and be better off overall as a result.[2] Our research suggests that personal automobile use could probably decline by 30% or even more if all transportation and land use market distortions were corrected.

A properly functioning market reflects consumer choice, competition, cost-based pricing, and economic neutrality. Current transportation markets violate these principles:[3] Consumers have few viable travel choices for many trips; many costs of driving are either fixed or external; and land use and transportation investment practices tend to favor automobile travel over other modes.

Individually these distortions may seem modest and justified. For example, free parking is convenient and tax exempt, so businesses consider it a cost-effective way to attract customers and reward employees. Local governments often require generous amounts of off-street parking to avoid parking spillover problems. But free parking underprices driving which "leverages" increased vehicle traffic. As a result, free parking not only increases parking costs, it also exacerbates traffic congestion, roadway expenses, crashes, and environmental impacts. Businesses and city officials often ignore these indirect impacts when making decisions about parking prices and regulations.

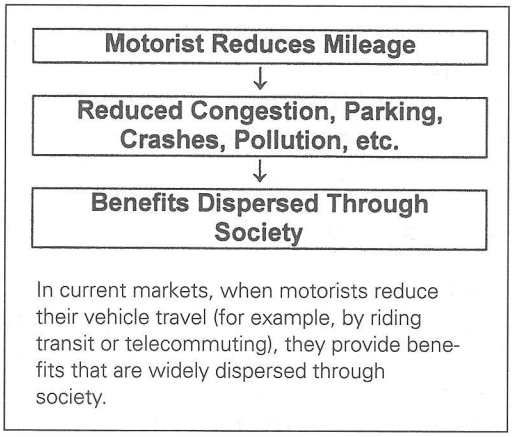
To put this another way, correcting market distortions provides multiple benefits. For example, charging motorists directly for the parking they use not only reduces parking costs, it also reduces traffic problems such as congestion, roadway costs, crashes, and environmental impacts. These benefits are often overlooked when parking decisions are made. Our current transportation market provides the equivalent of matching grants for driving. The reforms we are discussing reduce such grants or allow them to be applied to other modes.

Many market distortions represent older social objectives and technologies. Underpricing may have made sense during the early years of the automobile age to take advantage of economies of scale in vehicle and road production. In the 1920s and 1930s, your costs of owning and driving an automobile declined as your neighbors' mileage increased. Free roads and parking may also have been justified to minimize the costs and inconvenience of collecting fees. But these practices no longer make economic sense now that automobile markets are mature and electronic pricing greatly reduces transaction costs.

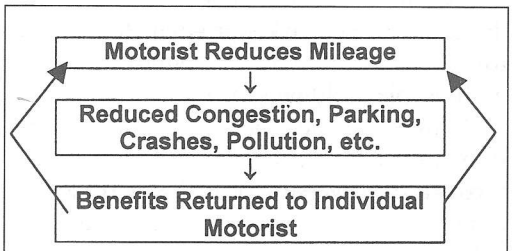
Some people are skeptical. They ask, "If driving provides benefits, how can reduced driving increase benefits?" The answer is that a more optimal market gives consumers more of the savings that result when they drive less. Consumers only reduce their driving when they are better off overall, that is, when they value the additional savings more than a particular mile of driving.

This is illustrated in Figure 1. When you make a transportation decision that reduces automobile use (for example, by riding transit, cycling, telecommuting, or simply using a closer destination), you reduce congestion, parking costs, crash risk, and environmental impacts. But such benefits are currently dispersed throughout the economy. Your neighbors benefit from your actions as much as you do. An optimal market returns more of these benefits directly to you, increasing your incentive to choose the most efficient travel option for each trip. You would not give up all driving, but you would probably reduce some car travel to take advantage of these additional savings, just as many consumers

FIGURE 1: Optimal Markets Return More Benefits of Reduced Driving to Individual Consumers



In current markets, when motorists reduce their vehicle travel (for example, by riding transit or telecommuting), they provide benefits that are widely dispersed through society.



In a more optimal market, benefits are returned to individual motorists. This gives consumers an incentive to use alternatives when they are more cost effective overall.

respond to retail store sales and discount coupons.

Market distortions tend to be unfair and harmful to people who are transportation disadvantaged. They result in cross-subsidies from households that drive less than average to those that drive more than average, and reduce travel choices for non-drivers. Market distortions also reduce economic productivity by increasing indirect and external cost burdens.[4] International studies indicate that regions with balanced transportation are more economically competitive.[5] If properly implemented, transportation market reforms can increase equity and stimulate economic development.

Samuel: Only by assigning a huge array of external costs to the use of the private automobile is it possible to conclude that there would be 30% less motoring in a better-arranged market for transportation. Those kinds of calculations have been shown to include:

(1) double-counting of crash costs that in fact fall on motorists already, albeit often in an imperfect fashion

(2) attribution of a large proportion of the U.S. defense budget to motoring, when in fact U.S. defense forces are maintained for a large array of reasons unrelated to the defense of imported oil—support of NATO, containment of North Korea and China, periodic peacekeeping interventions, and the capability to respond to unpredictable challenges that may arise more rapidly than the ability of the U.S. to reconstitute its forces

(3) very high-proposed levies on motorists for quite uncertain health damages from tailpipe emissions

In addition it makes no sense to propose loading onto market prices some theoretical estimate of external costs without making a corresponding calculation of social benefits. This kind of theory surely is seeking to adjust market prices with the net of social costs versus social benefits, and it is one-sided in the extreme to list and calculate only external costs of motoring and propose that they alone be loaded onto motoring via taxes or price controls. The road and car lobbies can produce corresponding external benefit accounts that are similarly arguable, and which run up equally large numbers to the external costs that Litman cites.

We can agree in principle that market distortions are bad, but we probably disagree about the nature of those distortions.

Litman: Samuel has clearly not read the material he is criticizing. He claims incor-

rectly that the reforms I propose consist primarily of internalizing non-market externalities. In fact, most travel reductions result from more mundane reforms: charging motorists directly for parking and local roadway expenditures, distance-based insurance and registration fees, congestion pricing, charging road users rent on roadway rights-of-way, and removing tax and investment policies that favor driving over other travel modes.

Our analysis is carefully structured to minimize the problems Samuel describes. We avoid double-counting internal and external crash costs. Fuel taxes would increase little or not at all under our proposed optimal price structure, and do not include significant military costs. The pollution charges we assume are relatively modest, based on middle-range estimates published in peer-reviewed reports and articles, and represent a small portion of total price and travel changes.

Personal automobile use certainly provides user benefits, but there is no reason to expect significant external marginal benefits (i.e., you benefit if your neighbors increase their driving) to offset external costs, because rational participants in a market externalize benefits and internalize costs as much as possible. Objective research examining this question has found no significant external benefits from personal automobile use.[6]

TQ: ***Are there significant economic distortions in our transportation system? If so, what are they?***

Samuel: We have major distortions in U.S. transport, most being a product of over-involvement by governments, and misuse of tax powers to subsidize favored modes. We have arbitrary restrictions at the city level against provision of consumer responsive transit service in the form of competitive demand-responsive transit and ride sharing. Existing taxi services and municipally provided bus and rail transit are heavily protected from competition by entrepreneurial minivan, minibus jitney-style services. We therefore have artificially high cost public transport or transit, and stunted innovation. Taxi service is restricted by limits on license numbers, reflected in huge entry fees, black markets in self-supporting "gypsy" van services, and limited choices. Carpooling is limited by restrictions on drivers charging passengers.

Cities and other municipalities often distort mode choice in favor of the automobile by mandating the provision of minimum amounts of parking in new buildings. This often forces property owners to provide an uneconomic parking space, which is then dumped on the market at what they can get for it. They are forced to "bundle" parking with usable building space.

At the state and federal level, huge distortions in favor of urban passenger rail exist through the diversion of highway trust fund monies and toll profits to rail services. Whereas, by and large, motorists in the aggregate pay their way, rail transit users are subsidized in the range 50 to 95% of their costs. This results in inefficient and unproductive investment in rail, resources which would, in general, provide higher social yields if put into road pavement for the rich mix of rubber-tired vehicles that could use it. A "Lionel complex" or rail fetish seems to be part of the psychological makeup of key decision-makers in metropolitan planning organizations and legislatures. Their ability to skew money toward lightly utilized high-cost, custom-built rail constitutes a further distortion. (See José Gómez-Ibáñez, Tye and Winston, *Essays in Transportation Economics and Policy: a Handbook in Honor of John R. Meyer*, Brookings Institution Press 1999, and studies at www.publicpupose.com, www.rppi.org, www.ti.org for support of these propositions.)

On the roads, the heavy reliance on flat

per gallon fuel taxes as a highway funding mechanism is distortionary. It overprices travel by light vehicles on uncongested roads and underprices travel on congested roadways in peak hours. The government monopoly provision of road space introduces political distortions. Special interests with a concentrated interest in a particular road can often use the political process to swing government money toward their pet project at the expense of projects with more dispersed but greater total social payoffs. Colloquially this dysfunctional favor trading by politicians is called "pork."

In freight the FHWA's highway cost allocation studies have repeatedly shown that reliance on flat rate per gallon diesel tax and gross vehicle weight-distance charges is a serious distortion. It overcharges lighter, multi-axle trucks and undercharges high weight per axle vehicles. Well-designed toll charges by customer-oriented, bottom-line toll businesses would eliminate much of this distortion.

Truck weight and size limits and regulation of axle and trailer configuration by federal and state legislatures involves serious distortion, too. The legislatures are heavily influenced by waves of voter hysteria over large trucks. Governmental control of truck dimensions precludes pragmatic negotiations between trucker interests and road operators which could develop win-win arrangements for trucks and roads that are both more economic and productive for truckers and more pavement and bridge friendly for road owners.

Another major distortion is the "double taxation" of both tolls and highway user charges on toll roads. Highway user charges are levied for support of free roads and it is wrong that they should be collected on self-financing toll roads.

Litman: Peter Samuel and I agree on several points, including the distortionary effects of underpriced parking, the benefits of more accurate road use charges, and the potential benefits of public transit innovation. However, his pro-highway, anti-transit claims are unsupported by objective evidence.

It is not true that "by and large motorists in the aggregate pay their way." According to the 1997 Federal Highway Cost Allocation Study mentioned by Samuel, automobile users fees cover only 70% of roadway construction and maintenance costs, indicating that fees would need to increase about 43% for full cost recovery.

Critics point out that this study included several billion dollars in transit expenses as "highway cost," but on the other hand, many costs incurred by automobile use were excluded. For example, traffic services provided by the highway patrol were included, but the same services provided by local police were not. A major FHWA study of motor vehicle costs estimated these local traffic service expenses to total $18 to $27 billion in 1991, more than total public transit subsidies. This suggests that applying the user pay principle (motorists pay directly for the costs they impose) would significantly increase the price of driving, reducing vehicle use. Applying the user pay principle to parking, uncompensated crash costs and environmental damages further indicate that automobile use is underpriced.

Samuel's criticism of urban rail is exaggerated. Any transportation improvement is expensive in urban conditions. Although transit projects may appear costly, they are often cheaper than accommodating automobile trips on the same corridor when all costs are considered. The FHWA estimates that adding capacity for an urban-peak car trip costs about 62¢ per vehicle mile.[7] Highway travel involves significant additional costs that are reduced or avoided with public transit travel: vehicle expenses, parking, downstream traffic congestion, traffic services, crash risk, and environmental impacts.

I agree that government actions often subsidize a favored mode, but this is primarily

automobile use. Total U.S. transit subsidies average about $17 billion annually, most of which are bus service subsidies justified largely for equity sake (i.e., to provide basic mobility for non-drivers). Only about $5 billion is spent annually on rail capital expenditures. That is small compared with the $30 million of general taxes spent on local and state roads, more than $20 billion spent on local traffic services, and $100 million parking subsidies provided by local governments or mandated by zoning laws.[8]

It may be true, as some critics argue, that bus service improvements would be cheaper than rail projects, but rail offers additional benefits that should be considered. Rail produces less air and noise pollution, a significant benefit in large urban centers where many transit vehicles congregate. Rail transit stations can provide a catalyst for higher density land development, bus transit does not seem to have this effect.[9] These nodes of density provide economies of agglomeration reflected in high property values, and transportation benefits reflected in reduced per capita automobile use.[10] Some research suggests that rail transit provides significant transportation benefits by "leveraging" more accessible urban land use.[11] While rail transit is not appropriate everywhere, it may be a worthwhile investment on some corridors as part of a community's efforts to achieve long-term transportation and land use objectives.

Samuel: The federal highway cost allocation study finds that at the levels of federal and state government responsibility highway users pay their way in charges. Indeed if the questionable attribution of transit costs to motorists is taken out, they more than pay their way (see the Federal Highway Cost Allocation Study, U.S. Department of Transportation, August 1997, Table ES-5 pES-9).

It is at the local government level that roads are heavily paid for in other ways, especially with property taxes and developer levies. But such local streets serve more than just motorists driving through them. They provide right of way for utilities, sidewalks for walkers, access for deliveries, trash pick-up, and emergency services, and their width allows privacy space from opposite buildings and sunlight. Most new streets are financed initially by the housing or commercial developer and the costs passed on to the owners, and the owners pay for the upkeep, mostly in property tax assessments. Given the multiple purposes of such local streets beyond service to passing automobiles, it isn't clear that resource allocation, or equity, would be improved by attempting to move toward motorist charges for the upkeep of streets in thousands of cities and counties.

TQ: *Should public policies be changed to address these distortions? If so, in what ways?*

Litman: I believe that reducing transportation market distortions would provide significant economic, social and environmental benefits. This is not just my idea. Many other analysts reach the same conclusion.[12] In fact, some problems cannot be solved otherwise. For example, it is not economically feasible to build enough capacity to meet demand for free roads in urban areas, even with improved traffic management technologies, so traffic congestion is virtually unavoidable without pricing reforms.[13]

Some transportation market reforms are particularly appropriate because they provide a combination of economic, social and environmental benefits. We call these "Win-Win Transportation Solutions"[14] (examples are listed below). There is not enough space in this article to describe them in detail; interested readers can obtain more information about them at our website.

Distance-Based Vehicle Insurance and Registration Fees[15]—Prorating vehicle insurance and registration fees by mileage approx-

imately doubles the variable cost of driving without increasing total costs at all. This incentive is predicted to reduce vehicle travel and crashes by more than 12%, increase equity, and save consumers money. An average motorist is predicted to save $50-100 annually, representing the insurance and roadway cost savings that result from reduced driving.

Revenue-Neutral Tax Shifting[16]—Since governments must tax something, many economists recommend shifting taxes away from socially desirable activities to those that are harmful or risky. For example, shifting taxes from employment and business transactions to fuel consumption could reduce pollution while increasing employment and economic productivity.

Road Pricing[17]—Road pricing can more accurately charge users the roadway costs they impose. Congestion pricing can maintain optimal roadway traffic volumes. This is more efficient and fair than current practices, which charge motorists according to fuel consumption.

Reform Motor Carrier Regulations[18]—Many jurisdictions limit transportation service competition. Private bus and jitney services are often restricted. These regulations can be changed to encourage competition and innovation while still supporting safety and comprehensive service objectives.

Local And Regional Transportation Demand Management (TDM) Programs[19]—TDM programs include a wide variety of services and policies, including rideshare matching, transit improvements, bicycle and pedestrian facility improvements and parking management. Policy reforms can insure that such programs are implemented when they are more cost effective than other solutions to transportation problems.

Efficient Land Use[20]—Current zoning and development practices tend to increase vehicle travel by separating land uses. More mixed-use and infill development can increase access and travel choices by locating activities closer together, such as having schools and small retail shops closer to residential areas.

Flexible Zoning Requirements[21]—Parking and road requirements are often inflexible and over-generous. There are many ways to reduce the amount of land devoted to roads and parking without constraining mobility. Parking requirements can be reduced where facilities can be shared and where transportation management programs are implemented.

Parking—"Cash Out"[22]—"Cashing out" offers commuters who receive free parking a cash alternative if they use other modes. This typically reduces driving by 10-30%, and is more equitable because it provides non-drivers with a benefit comparable in value to what drivers receive.

Transportation Management Associations[23]—Transportation management associations provide services such as rideshare matching, transit information, and parking coordination in a commercial district or employment center. This helps businesses save money and reduce local traffic and parking problems.

School and College Trip Management—School trip management supports the use of alternative modes for taking children to school.[24] These programs give families more choices, encourage exercise, and reduce school parking and congestion problems. Campus trip reduction programs are also effective.[25]

Samuel: Reducing road fatalities should be a major social goal. People are horrified by the absolute number of road deaths, but most of the difference between automobile and nonautomobile travel deaths is accounted for by the greater absolute amount of passenger miles traveled in autos—greater exposure. In fact the risks of automobile and nonautomobile travel are not all that much in favor of nonauto modes. In the U.S. there are about 10 deaths per billion vehicle-km (1.6

deaths per hundred million vehicle-miles) traveled on the roads. Bus and rail transit fatalities are about four times as high in terms of vehicle-distance traveled so only to the extent they achieve a passenger loading more than four times as great as an automobile (an average of about seven passengers/vehicle based on auto average occupancy of 1.7) do they offer a lower passenger-distance risk. The use of bicycles and motorbikes—and probably walking, though data on person-miles walked is sketchy—is far more dangerous than travel in automobiles, approximately an order of magnitude more dangerous (based on *National Transportation Statistics 1999*, Bureau of Transportation Statistics, U.S. Department of Transportation, pp. 231-247).

If any transport activity were to be taxed more heavily on the basis of risk and harm alone, it would be the use of bicycles and motorbikes, but of course to do that would be to overlook the benefits the users receive. Risks and harm in automobile use is not a secret. News and statistics on the road toll publicize the risks all the time. Drivers see crashes, and ambulances going to crashes, and they know about the risks.

People who drive their own cars have a certain level of personal control over the risk they take. By buckling up, by driving only when sober and alert, by keeping their car in good mechanical condition, and by their style of driving, they can reduce the risk in their own vehicle. On transit they take their chances over the skill and alertness of the drivers they happen upon and the level of maintenance of the vehicles they drive.

When exposure is taken into account, the use of motor vehicles should not be categorized as an activity that is especially harmful and risky and therefore deserving of higher taxation than other activities deemed beneficial. Just as automobile use involves risk and harm—but so do jobs, the use of electricity and natural gas in homes and workplaces, climbing stairs, use of airplanes, and many sports such as swimming—these activities produce injuries and death on a similar scale to driving. People engage in all these activities, including driving, because the odds of harm in any particular trip are very low compared to the benefits.

I see no basis for government to overrule the judgment individuals make in taking the risks in choosing transport modes by taxing one mode more heavily than another.

On some of Litman's specific proposals, vehicles suffer much risk that is unrelated to distance traveled—damage by theft and vandalism, for example. Another major insurance risk varies with the age and skill of the driver, which if anything is inversely related to miles traveled. Most insurance companies already monitor vehicle miles traveled on a periodic basis and assign the small weight it is actuarially worth. Forcing insurance companies to assign distance traveled a higher weighting than actuarially justified would be an unwarranted interference in their business and would create a new market distortion.

Distance-based registration and license fees could be an improvement on present flat rate fees, but it is not clear to me that they loom large enough to make any significant difference to the cost of driving. The suggestion that market-based changes could produce a 12% reduction in trips is implausible.

I agree with Litman in thinking there is an overwhelming case for deregulation of cabs and buses, and in favor of allowing a variety of competitive transit services to develop. Scheduled, fixed-route bus services do, however, need some specific protection from opportunistic entrepreneurs who would travel ahead of the scheduled vehicles and pick up passengers clustered at stops on account of the scheduled service. Klein, Moore and Reja in *Curb Rights* (Brookings Institution Press, 1997) outline a solution to this problem involving property rights at curb pick-up and set-down points. Otherwise free entry by different kinds of scheduled and demand-responsive service is essen-

tial to serving transit patrons better and providing some real alternative to ownership of a private vehicle. The restrictions that exist in most municipalities in the U.S. on cab numbers and rules that prevent competition with established bus service are, frankly, a protectionist racket allowing a favored few providers to incur costs and make profits they could never justify in a competitive marketplace. Federal anti-trust and civil rights laws should work to break up these racketeering relationships between politicians and special interests. These are criminal relationships, or if they are not, they should be criminalized.

Certainly it makes intuitive sense to say as Litman does that zonings, which limit heterogeneous land use, will increase trip lengths. If small stores are prevented from setting up in a "residential" area, then trips to another store will be longer and some walking trips will be converted to auto trips. Similarly when home-based jobs are prohibited in "residential" areas people may commute some miles to an office when they would prefer to work in an office just steps away. But we don't have much by way of studies that quantify the importance of this in generating extra trips.

Also there are trade-offs. Small stores often cost more to operate and have higher prices, just as schools within walking distance will offer fewer choices to pupils and make it difficult to hire specialist teachers. We often make trips to gain the benefits of agglomeration and specialization. Single-minded pursuit of trip reduction can end up increasing overall costs and depriving people of benefits they would have gotten from trips.

On land use restrictions, many of the same people who decry sprawl and protest at new transport infrastructure, such as a new motorway, are most vocal in opposing higher density living and the "intrusion'" of commercial activity into "residential" areas. Many don't want a store within walking distance of their home, and they wield great influence in local government.

TDM, TMAs and other schemes to promote alternatives to the automobile usually need subsidization, or involve arbitrary restriction on automobile use, and to that extent are a market distortion in their own right.

Litman: Again, Samuel's responses indicate that he is unfamiliar with the concepts he is criticizing. He suggests that market reforms are unjustified because some could increase crash risk. First, this implies that market reforms are intended only to reduce crashes, when in fact they are intended to provide several benefits including traffic congestion reduction, road and parking facility cost savings, increased consumer choice, consumer savings, and reduced environmental impacts. Second, his arguments are incorrect:

1. Suggesting that walking and cycling should be taxed more heavily on the basis of risk indicates a fundamental misunderstanding of economic concepts. Price reforms are needed to correct external costs. Additional crash risk borne by pedestrians and cyclists is an internal cost, so additional taxes or fees would not be charged to them.
2. While it's true that pedestrians and cyclists bear a higher risk of crash injuries, this is offset by the low risk they impose on others (reduced external risk). Walking and cycling also provide exercise benefits that some studies indicate more than offset increased crash risk to users. As a result, shifts from driving to walking and cycling provide overall public health benefits.
3. The relatively high crash risk for U.S. transit travel results from low load factors. Many TDM strategies would increase transit load factors, resulting in lower crash rates per passenger mile.

4. The evidence is very clear and consistent that regions with lower automobile use tend to have lower per capita roadway injuries and deaths. The transportation market reforms we propose could have substantial safety benefits. Distance-based insurance pricing in particular tends to produce substantial crash reductions because it gives higher risk motorists the greatest incentive to reduce their mileage.

Samuel's arguments against distance-based insurance are technically incorrect. He assumes that this reform requires a trade-off between mileage and other risk factors. The price strategy we propose prorates current premiums by annual mileage and so incorporates all existing risk factors. No trade-off is involved. With one exception (the Progressive Insurance Company is currently testing distance-based insurance pricing), no insurance rates apply anything near adequate weight to mileage. This is unfair and encourages excessive driving.

Samuel dismisses our estimates of vehicle travel reductions without showing evidence. Since the average motorist spends about as much on combined vehicle insurance and registration fees than on fuel each year, converting these to variable costs is equivalent to doubling the price of fuel. Using standard estimates of price effects on vehicle travel, a 12% total mileage reduction is a lower-end estimate.

The land use policy reforms we propose do not force people to choose undesirable housing locations, or forego travel that they value. It allows consumers to make their own trade-offs. Current land use policies favor lower-density, single-use development. These distortions reduce consumer choice, increase automobile use, and are harmful to the environment. There is abundant research indicating that per capita vehicle trip generation rates are lower in communities with more mixed land use.

Transportation Management Associations and TDM programs have proven successful and cost effective in many situations. Although such programs do require funding, their costs tend to be lower than the cost of providing additional road and parking capacity. The problem we recommend correcting is that funds available to expand parking and road capacity usually cannot be used for demand management solutions, even if they are more cost effective and beneficial. We simply suggest that a least-cost approach be used for selecting transportation improvements, whether that is more asphalt or a TDM program.

TQ: *What justification exists for public policies that influence people's transportation choices?*

Samuel: At the micro-urban or neighborhood level, homeowners and business people are justified in banding together to make collective decisions about the role of different transport modes within their small community of say 200 to 2,000 people. A homeowners' association may decide to regulate auto access and limit parking to the outside of a development, to make the inner area auto-free. In historic districts, laid out for horsepower and walking, traffic calming and other limits on auto speeds and truck access may be decided upon. Businesses may similarly try and concentrate car parking and provide shuttles, or decide that a pedestrian mall built in the 1970s was a mistake and that motorists should be welcomed again. Homeowners' associations and local block or neighborhood groups, and businesses adjacent to a pedestrian mall have every right to make these kinds of decisions to preserve, or enhance, the economy and character of their area. After all, they will have to live with the consequences of such decisions.

But at the municipal, metropolitan or state levels of government, efforts to dictate

people's choices in transport mode become oppressive and authoritarian. Far from being an acceptance of a chosen lifestyle by a discrete group, they become the imposition of one's own set of values on others. Instead of being an affirmation of choice, they become at the macro-urban level, a denial of choice. A person's mode choice is an exceedingly personal affair. Whether a person uses a car, bus, SUV, cab, minivan, commuter rail, or bike, will depend in large measure on person-by-person considerations, such as their sense of security at transit stops, health and strength, errands that may be combined or "chained" with the work trip, trade-offs between housing costs and location convenience, the extent to which they have a vehicle for noncommute purposes, their spouse's and children's needs, etc. No planners or bureaucrats can second-guess the individual on whether their mode choice is optimal or suboptimal, warranted or unwarranted. They simply don't know the details of their lives sufficiently well. Further—and here we assert an article of philosophical or political faith—no planner or legislator has the moral right to overrule people's individual choices in such matters. Governments have no more right to set a limit on car usage or vehicle miles traveled than they have a right to set a ceiling on per capita electricity consumption, to limit the number of telephone calls made, dictate how much people will eat, spend on vacations, or dictate the maximum size of houses. At issue are freedom and individual rights.

So, at higher levels of government than the small neighborhood from which people can opt out, any government policy on mode choice is quite unjustified.

Litman: The reforms we are discussing are no threat to freedom or rights. They do not involve bureaucrats dictating an individual's travel decisions. They increase consumer choice. Some require users to pay directly to use roads and parking, rather than paying indirectly, just as we expect from electricity and telephone service, but travel choices are still left to consumers.

Public policy already influences a person's travel decisions in many ways. For example, public investments in paths, roads, public transit, and airports determine what travel options are available. The design of such facilities and the rules that govern their use influence the relative advantages of different modes. Funding, taxing and pricing practices impact travel choices. Zoning laws and development policies have major effects on land use patterns, which affect our travel choices.

Until recently, transportation planning consisted primarily of choosing the best way to make driving convenient. Such practices are so common that some motorists respond to even modest efforts for balance as a threat to their "right" to drive. Motorists accustomed to subsidies may truly believe that being required to pay directly to drive and park reduces their freedom, but they actually bear those costs already, indirectly, through taxes, higher consumer costs, and lower wages. Paying directly rather than indirectly allows consumers to choose when an automobile trip is really worth its full cost. At worse, motorists simply continue to drive as much as they do now and bear the same overall costs, but they have a new opportunity to save money by driving less. Any travel foregone represents trips that consumers value less than their full costs.

Governments have a responsibility to insure that transportation and land use markets are fair and efficient, which means providing reasonable choices based on full cost pricing. When that is done, most other interventions would be unnecessary. Until then, communities may choose to establish trip reduction objectives and programs to address traffic congestion, environmental problems and inequities resulting from existing market distortions. But not even the most aggressive programs have bureaucrats mak-

ing travel decisions for individuals. Even "mandatory" commute trip reduction programs implemented in some large urban areas only require employers to develop management plans. The components of the plan are flexible. They may include measures such as Parking Cash Out, transit and rideshare information, and bicycle parking, which increase commuter choices and reduce automobile subsidies. No employee is forced to give up driving. Such programs typically affect only 10-20% of trips, so most commutes are unaffected. A few cities are experimenting with "car free" transportation, but these are generally limited to downtown areas or are only implemented a few days each year.

Most Transportation Demand Management (TDM) and "Smart Growth" strategies reduce government interventions or simply change existing practices. For example, TDM and Smart Growth often eliminate parking requirements and make development standards more flexible. Distance-based pricing simply requires a change in existing insurance regulations. Even mandatory Commute Trip Reduction programs are no more burdensome than existing requirements: the most comprehensive programs typically cost less than $100 annually per employee, about one-tenth of what employers spend on a parking space.

Samuel's suggestion that transportation management is only appropriate by small homeowner and business associations is arbitrary and restrictive. Some TDM strategies can be applied by such groups, but others must be implemented at other geographic levels. For example, rideshare matching is most effective at the regional level, and transit improvements require coordination across jurisdictional boundaries. Distance-based insurance requires changes by state or provincial regulators. The changes we propose are simply modest corrections to a currently unbalanced system. Samuel's criticisms seem exaggerated and ideological.

Samuel: Where TDM programs are one-tenth the cost to employers of providing parking spaces then they are liable to be implemented without the need for government programs or mandates. No doubt a great deal of voluntary TDM does occur, where as Litman suggests, it saves the employer money.

Voluntary TDMs are quite uncontroversial. No one proposes to prevent employers implementing TDMs. At issue have been federal and state mandates requiring TDMs such as employee commute plans in cases where businesses find them ineffectual, onerous, and costly. Such programs have arbitrary targets, arbitrary thresholds for eligibility, and they have often been arbitrarily administered. They provoked great opposition and have been largely abandoned.

There is a distinction of substance between a discrete neighborhood of some hundreds of people choosing to be car-friendly or a "walkable," transit-oriented community and a whole metro area, state, or country deciding this. In the first case, there will be a diversity of development patterns and people will retain choices of lifestyle, whereas in the second, there will be a one-size-fits-all (and a small size at that) development pattern, and choice will disappear.

If that argument is "ideological," then the U.S. is a country founded by "ideologues" and still teeming with them.

TQ: *Should it be a public policy objective to reduce vehicle-miles traveled?*

Litman: It should be public policy to correct market distortions that cause excessive automobile use. The result would almost certainly be a significant reduction in vehicle mileage.

This is not to suggest that automobiles are "bad" or that driving should be arbitrarily prohibited. It simply recognizes that individual consumers and society overall would

benefit from a more balanced and diverse transportation system. Under an optimal transportation market, consumers would continue to drive when they want, but would have more opportunities and incentives to use alternatives when they are a better choice overall, taking into account all benefits and costs.

Truly beneficial automobile travel can face the discipline of the market. It does not require underpricing, arbitrary tax exemptions or other favorable treatments that our current transportation system provides. The additional driving that results from these market distortions is harmful to consumers and the economy overall.

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. Current transportation pricing is akin to all-you-can-eat restaurant pricing, which encourages excessive eating. Direct user payments of transportation costs allow 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.

Until comprehensive reforms are implemented, there will continue to be significant external costs associated with automobile use, and so vehicle travel reduction objectives are justified on "second best" principles. For example, the best solution to congestion problems is to price road space, but until this occurs, it may make sense to use more blunt, nonpricing TDM strategies to discourage urban-peak driving and encourage alternatives, such as HOV lanes and employer Commute Trip Reduction programs. The justification for such programs would decline in a more optimal transportation market.

Samuel: The United States Environmental Protection Agency, the U.K. government and many European governments have explicitly embraced policies to reduce vehicle miles traveled by automobiles. I'm delighted that Litman isn't keeping that company.

TQ: *Are present levels of expenditure on transit and roads appropriate?*

Samuel: Expenditures on transit, especially passenger rail, are far too high in the U.S. There is no justification for taxpayers—mostly motorists—being required by governments to underwrite most of the costs of building and operating these costly systems. In general they provide more inferior service than automobiles—slower travel times, more intermodal transfers, less privacy and security, and a greatly reduced carrying capacity for goods. And they cost more–rail's 37¢ per passenger-mile and the bus, 44¢ versus 21¢ by automobile (Clifford Winston and Chad Shirley, *Alternate Route,* Brookings Institution, 1998, p. 26). These researchers found net disbenefits (aggregate benefits exceeded by aggregate costs) from transit in the U.S. presently, so any rational policy would set about an orderly phaseout of public subsidies to rail. Rail is used disproportionately by the wealthy, so there should be no hesitation in cutting off taxpayer support. Many rail operations might continue since demand in major markets such as New York City may be rather price inelastic—users would pay much higher fares than currently prevail.

Bus transit on the other hand is used more by the poor, so there are equity and welfare arguments for subsidy. In addition, unlike most rail service, buses can share the right-of-way with other vehicles. It may have the ability to take over at lower cost from abandoned rail service, and pay its way.

In the absence of functioning road space markets, it is difficult to know if aggregate levels of road expenditure are appropriate. It is likely that far too much is being spent on roads in sparsely settled rural areas (the work of Doug Lee, Volpe Center, and John Semmens, Arizona Department of Transportation, suggests this). On major interurban routes it seems likely that proper life cycle costing and negotiated arrangements between truckers and road operators would see larger spending on capital (heavier pavement and bridge loadings) but there would be reduced repaving and less frequent reconstruction. Performance warranties might have the same effect of substituting capital for maintenance spending.

In congested urban areas, new policies and higher road expenditures are clearly needed. Annual U.S. congestion costs probably run around $96 billion per year (assuming the 68 cities' congestion measured by the Texas Transportation Institute's "Annual Mobility Report" calculations account for three-quarters of the national total), so substantial extra spending is probably warranted to reduce congestion. Of course, demand is artificially enlarged by the lack of peak hour pricing of road use within the cities. But offsetting that, it is depressed by the very aggravations of driving in congested conditions; in turn, there is a substantial latent demand to be satisfied.

The Winston and Shirley modeling (cited above) suggests that efficient urban transport in the U.S. requires a substantial decrease in transit and an increase in the auto road share—for an auto/transit split of 97.6%/2.4% versus the existing 93.4%/6.6% split (p. 58). This would require a once-and-for-all increase of auto usage of some 4 to 5%, plus growth in line with population after that. Road toll variations according to congestion levels would enable us to use the existing roadway more efficiently and also provide objective market signals as to where future investment is justified.

Modern lifestyles with two-worker households, flexible work hours, and the emerging decentralized and dispersed shape of the American built environment, overwhelmingly favor the door-to-door, nonstop networked service of the personal auto and single goods vehicle/roadway system. The line-haul characteristics of transit are only suited now to a tiny niche market of work trips from points close to a transit line to central business areas. These are now just one of many employment and business districts within any metro area.

Expenditure on transit with dedicated trackage, elaborate stations and custom-built vehicles is generally money wasted on an obsolete, high-cost mode that caters to slight social need.

Litman: I believe that there are justifications for society to provide a basic level of access. What constitutes "basic access" is a mater of discussion and may vary from one community to another, but it usually means that people have mobility options needed to obtain education, employment, medical services, and some shopping and recreation activities. This often requires society to subsidize rural roads and transit services, to insure that people can participate in economic and social activities.

Anything beyond basic access should be funded directly by users, based on the costs they impose. It is therefore an empirical question based on consumer demand whether particular roads and transit systems would expand or contract. As previously mentioned, our analysis indicates that overall vehicle travel would decline significantly in a more optimal transportation market, reducing the need for road capacity. There may be some corridors where vehicle travel demand is high enough that increased road capacity is still justified, but I suspect they are few.

Public transit could be far more productive if market distortions favoring driving

and automobile-oriented development were corrected. In a more optimal market, there may still be justifications for some transit subsidies to maintain basic mobility for non-drivers, but per trip subsidies should decline due to economies of scale and scope in transit service. International studies indicate that public transit is much more cost effective in cities with more balanced transportation.[26] Put another way, transit subsidies are needed, in part, due to automobile dependency.

Samuel implies that motorist and transit user interests' conflict, but least-cost investment principles suggest that highway funds should be spent on transit improvements when they are the most cost-effective solution to traffic problems. Transit improvements benefit motorists by providing additional choices (even people who don't currently use transit may value knowing that it is there in case they ever need it, just like a spare tire or lifeboat have value even if they are not actually used) and by reducing traffic congestion and parking problems. Some research suggests that these benefits are substantial in congested urban corridors.[27]

As stated earlier, I think that there are significant additional benefits to transit in general and rail transit in particular that are overlooked by Samuel and in the analysis by Winston and Shirley. These include vehicle and parking cost savings, more efficient land use, increased consumer choice, and equity. A more comprehensive analysis tends to justify more Transportation Demand Management and public transit improvements.

Samuel: Certainly where objective analysis shows a transit investment as a more cost-effective way of satisfying demand for transportation than a highway investment, then it is preferable. In the real world of developing urban areas in advanced countries, this rarely occurs. Ridership on fixed route transit normally falls way below projections and net costs per passenger mile end up much higher than road costs. Repeatedly it is calculated that transit trips for which riders pay $1 or $2 costs $5 to $20 to provide. And usually relatively expensive rail ridership draws much patronage from prior bus ridership. Few new rail riders are extracted from cars.

No conceivable rail network in any developing U.S. metro area can provide stations within walkable distance of more than a few percent of trip origins and destinations, so expensive, time-consuming, and polluting shuttle services and/or parking are required to support rail. After-the-event studies have shown insignificant rail impacts on road congestion and slight land use impacts. Fixed route passenger transit serves a niche market of central city commuters, but central cities are declining in importance as job centers and commuting is declining relative to noncommute trips. Rubber-tired vehicles have the enormous advantage of operating on a hierarchical system of infrastructure from motorways at the top end down to alleyways, driveways, parking structures and loading docks at the bottom end. By contrast most rail journeys require an expensive and time-consuming mode shift at each end.

TQ: ***A major political issue in the U.S. is suburban sprawl. In what ways should transportation policy be shaped to address land use objectives?***

Litman: Transportation and land use policies are two sides of the same coin: Excessive driving encourages low-density, urban periphery development ("sprawl") which leads to automobile dependent land use patterns that encourage excessive driving. This results in inefficient transport and land use patterns.

Most comments I have made regarding transportation policy apply equally to land use. Several land policy reforms, which reduce sprawl, are justified for economic,

social, and environmental benefits. For example:[28]

Zoning Laws—Current zoning laws often require excessive parking supply and single-use development patterns. This discourages infill development, unnecessarily limits density and reduces access, favors automobile-dependent land use patterns, and results in underpriced driving.

Transportation Planning and Investment Practices—Current planning tends to favor highway improvements over alternatives (such as congestion pricing and other TDM strategies), in part because dedicated highway funds are an incentive for local governments to define their transportation problems in terms of highway solutions when other solutions may actually be more cost effective overall. This leads to more automobile-dependent land use patterns.

Utility Pricing and Tax Rates—Although public service costs tend to increase for lower-density, urban fringe development, this is not usually reflected in taxes and fees. Households in older urban neighborhoods tend to overpay for public services, while those in newer, lower-density suburban locations tend to underpay.[29] This underpricing encourages sprawl.

Urban Disinvestment—Older, multimodal urban neighborhoods have become degraded, in part because they tend to receive less infrastructure investment per capita than suburban areas. Households that want amenities such as good public schools often have no alternative to automobile-dependency, suburban locations. This leverages more automobile-dependent lifestyles than would occur if the housing market offered more consumer choices.

Samuel: Peripheral development is not necessarily low-density, though sometimes municipal zonings make it lower density than a developer would choose. But low density development may also simply be a reflection of householders wanting the space to throw a ball with the kids, store a boat and have some buffer space between themselves and their neighbors. Lower density warehousing and big-box stores are needed to deploy loading docks, forklifts, and pallets in place of the much less efficient handling of goods and use of two-wheeled handtrucks involved in cross-sidewalk or alleyway deliveries of old cities.

It is simply untrue, in the U.S. anyway, that current planning practices favor highway improvements over alternatives. As specified in federal regulations, all alternatives must be compared. When the highway alternative comes out of the comparative process as the most cost-effective, transit enthusiasts will often charge that the process was biased, but they seldom go beyond assertion on the basis of the result.

Often the project selection process is in the hands of an agency dedicated to transit and road-based solutions are given short shrift. Road pricing or toll lane projects, which would often improve a road solution, are rarely among the alternatives considered. That is a major source of anti-highway bias in the planning process.

Another anti-highway bias lies in the way contemporary transport planning focuses analysis on major corridors rather than on analysis of an area network. This stacks the odds in favor of choosing high investment, fixed guideway, line-haul systems, and against solutions that enhance the overall network. The strength of road transport is its ubiquitous infrastructure, from driveways, alleyways and local streets, through collectors, distributors and arterials, all the way up to motorways. It usually offers alternative routes. It involves door to door, or loading dock to loading dock, travel in the one vehicle. That minimizes the need for costly and time-consuming intermodal transfers. When analysis focuses on a corridor, usually a radial corridor, it tends to minimize consideration of the network strengths of road-based vehicles.

Litman: Samuel approaches this as an ideological debate between highway and public transit, which I think blinds him to the real issues. The reforms we have proposed are not based on choosing between highways and public transit; they concern choosing between capacity expansion and demand management. This is not "anti-highway" any more than a healthy diet is "anti-food." I am not suggesting that highway construction and automobile use should stop, but simply that it should be subjected to the same economic discipline that regulates most economic activities.

I don't think the evidence supports Samuel's assertion that current planning and investment practices favor transit over highways. I believe that an objective review would show that highway investments are consistently favored over demand management. This results from planning practices that define goals and objectives in terms of vehicle traffic flow. So, for example, improvements in electronic communications or more efficient land use patterns that reduce the need to travel are not usually recognized as transportation improvements, and not considered as options in planning and funding processes. Dedicated highway funds reward jurisdictions with money if they choose roadway projects, but provide no comparable levels of funding for TDM solutions. There is little opportunity or incentive to use economic incentives, such as congestion or parking pricing to address transportation problems. Samuel and I agree that congestion pricing should be used more to address congestion problems. However, I certainly don't blame opposition from transit interests for a lack of road pricing (road pricing increases transit demand), and I see it as just one of several pricing reforms that should be implemented.

Public transit receives a share of federal and state funds, and new federal transportation policies allow some funds to be used for either highway or transit, depending on regional planning objectives, but there are still many policies that tip the scales toward highway capacity expansion solutions to our transportation problems.

Samuel: America and Canada, too, continue to draw strength from immigration. Silicon Valley and associated high-tech industry draw on the whole world's talent pool and on venture capital and entrepreneurship that U.S. institutions seem to spawn. So our metropolitan areas continue to grow even though the natural birthrate is low. We continue to be a mobile people, relocating to warmer parts of the country, and beautiful settings of mountains, lakes, deserts and the sea. At the same time, we want improved amenities in traditional and historic settings. It is not ideological but simply practical, and in service of people, to say that we should accommodate the reasonable needs of our fellow citizens for personal transportation where they are prepared to pay the costs of improved infrastructure in the form of newer, safer and more efficient roads, bridges and tunnels.

TQ: ***What are the prospects for implementing significant policy changes to achieve transportation and land use objectives? Who is likely to support and who is likely to oppose such changes?***

Samuel: Those who decry suburban "sprawl" may, unfortunately, have some success in limiting construction of needed new roads and in blocking development on the fringes of our built areas. Many influential Americans seem to have bought the wrong idea that capacity enhancement won't produce congestion relief, and hence is pointless. And those who will benefit from new development aren't politically organized to compete with those who want to block development. Settled property owners will often be

wary of, or flat out oppose, new development. They see it as bringing unwelcome change—for example, conversion of verdant farmland fields to suburbs that are inevitably stark until softening vegetation has matured, extra traffic, new and different people, new demands on public services such as schools, and possible increases in local taxes. Those who resist change are in place and find it easier to organize and elect "slow-growth" officials. Those who would benefit from new development would come from all over, and the poor would benefit by moving into their vacated houses. The dispersed beneficiaries are only protected by the old American notion that it's only fair to provide opportunity for others to buy their way into homeownership and that the suburbs are the best place for them to raise families.

Those who want to harness transport policy to their vision of a so-called "New Urbanism" will not have it all their way, however. Their promises of a lower cost, higher quality, less congested way of life in planned, higher density inner areas are doomed to failure. Higher density is more, not less, expensive. Congestion is certain to increase, not decrease with greater density, because the absolute number of trips mode shifted will be less than the absolute increase in trip numbers. Most serious for the would-be sprawl-busters, the overwhelming majority of Americans prefers the present moderate densities of the suburbs and will fiercely resist densification.

The sprawl-busters have a totally unrealistic notion of the power of planners to anticipate future needs and to "plan" spatial arrangements that reduce the demand for mobility. Hopefully the smug Smart Growth program will prove a short-lived political fad, and it will be recognized as a political scam full of hyperbole and impossible promises.

Inner city administrations and property-owners, together with transit suppliers and agencies have a strong self-interest in the "anti-sprawl" movement, as well as conservative and fearful groups in the suburbs. Arrayed against them will be new entrepreneurial businesses wanting low cost facilities for themselves and their workers, tract homebuilders, immigrants and, of course, the road gang.

Neither camp is likely to win a clear political victory and have its vision prevail. People of my persuasion who believe transport facilities should be shaped to respond to demonstrated public need, and expanded to overcome congestion, are likely to remain very frustrated by strong opposition to every road enhancement proposal. That will mean Americans continue to suffer unnecessary congestion and aggravation on the roads. But in cars equipped with automatic transmission and soon intelligent cruise control, mobile phones, sound systems and perhaps in-vehicle Internet access, congestion time will be less aggravating and unproductive. So people will not be "congested out of their cars" as some transit enthusiasts hope. The anti-sprawl crowd will only succeed with the negative part of their agenda—that which blocks some roads and delays some development. They will find the public heavily resistant to densification and see development leapfrogging to areas beyond their "green belts."

Litman: I don't think Samuel's approach is helpful for evaluating reforms. I believe that there can be significant economic, social and environmental benefits to applying Smart Growth principles, such as better coordination between transportation and land use, and incentives for more clustered development to reduce infrastructure costs and preserve greenspace.[30] I see a growing portion of North Americans who appreciate these benefits for a variety of reasons: some want to live in a more pedestrian-friendly community, some value having wildlife habitat, while others simply want to reduce tax burdens. Increasingly, developers see the value of "New Urbanist" design to meet market demand, and businesses see better planning

as a way to support more regional economic development, as indicated by a 1995 study by the Bank of America on the benefits of Smart Growth in California. This suggests that it is possible to organize a broad coalition of interests to support innovations and reforms, including residents, taxpayers, public officials, business leaders, health professionals, and environmentalists.

Of course, such changes must overcome considerable inertia, including developers and public officials accustomed to existing planning practices, local officials who prefer the administrative simplicity of inflexible zoning laws, industries that profit from market inefficiencies, and citizens who resist the short-term costs required to achieve long-term benefits. Although most residents could benefit overall from these reforms, they tend to be skeptical and easily influenced to oppose innovation.

Critics try to portray TDM and Smart Growth as anti-consumer. They often focus on just one or two strategies, such as parking fees or urban growth boundaries. But TDM and Smart Growth involve a balance of strategies that increase consumer choice, remove market distortions, and reward consumers for choices that reduce problems created by excessive vehicle traffic and sprawl.

I think that there is considerable potential for changing public policy, because the solutions used in the past are no longer effective. Although automobile use provides benefits, these benefits experience diminishing returns. Most people don't want to be more automobile dependent than they are now, and many welcome alternatives that allow them to be less automobile dependent. Over the long term there will be opportunities for reform as problems continue to increase and conventional solutions continue to fail.

For example, developers are finding that many households will pay a premium for housing in well-designed urban neighborhoods with balanced transportation. They can make money selling city lofts, infill in older urban neighborhoods, and suburban neotraditional neighborhoods. Given good choices, many consumers prefer being less automobile dependent.

As a personal example, when our family was shopping for a home many friends encouraged us to locate in an outer suburb to have better schools for our children. This is a common sentiment. It indicates that many families choose suburban homes for amenities such as school quality, not because they want an automobile-dependent lifestyle. It is often more cost effective to improve urban services and environmental conditions, thereby attracting middle-class households back to multimodal neighborhoods, than to continue increasing road capacity and extending services at the urban fringe.

Samuel: Automobiles and other rubber-tired motor vehicles are as central a part of our way of life as electricity, telephones and now, computers. For several decades now city planning and government budgets have been heavily devoted to reducing the role of automobiles and providing "alternatives." More has been spent in government grants and subsidies to urban transit systems than on building the whole U.S. interstate highway system. Government monopoly control of toll bridges and tunnels is used to restrict supply and generate vast profits, which disappear into the bottomless pit of subsidized transit. The result: 2% of trips are catered to.

At Baltimore-Washington International Airport, a $1 million trolley looks splendid but rarely delivers more than the number of passengers who could fit into a $30,000 van, because "light rail" is all the political rage. No one thought to ask how many air travelers would be attracted to a mode which has an average speed of about 20 mph and whose stops are within walking distance of less than 2% of Baltimore's population. This attempt to overcome "auto-dependence" is craziness at the level of King Canute

ordering back the tides.

There are no realistic alternatives to rubber-tired transportation, any more than there are realistic alternatives to electricity, or the use of computers. We have been devoting enormous resources to the search for alternatives. They aren't there. Surely it will be more constructive to focus our energies on refining, reforming and accommodating the automobile, rather than continuing to pursue nostalgic notions and chimeras of alternatives.

TQ: ***Throughout the world, where are these policy changes currently being implemented?***

Litman: Many market reforms are being implemented:

- Many cities have parking management and TDM programs.[31]
- The U.K. has implemented comprehensive traffic reduction plans and programs.[32]
- U.S. federal tax policy now allows parking Cash Out (although it is still taxable and therefore worth less to employees than the same money spent on a parking space).[33]
- The Progressive Insurance Company offers Autograph vehicle insurance coverage, which employs GPS technology to charge motorists based on vehicle use.[34]
- The U.K. and Scandinavian countries are implementing tax shifts to encourage energy conservation and reduce driving.[35]
- The cities of Singapore and three Norwegian cities have implemented downtown road access fees using electronic tolls, and congestion pricing is being considered elsewhere.[36]

Despite these isolated successes, there is still far to go. Few governments are implementing comprehensive transportation market reforms based on economic principles. This is expected, since any reform faces inertia and resistance from interests that benefit from the existing distortions. Although society benefits overall from more efficient pricing, the benefits are dispersed, while those who perceive that they would be worse off are quick to organize opposition.

I believe, however, that much of this resistance is actually misplaced. For example, the trucking industry has consistently opposed congestion pricing, although truckers would be among the greatest beneficiaries due to their higher operating costs. Similarly, many business organizations oppose fuel tax increases on the grounds that it would be economically harmful, although there is good evidence that tax shifting would increase overall business activity and employment. There is a great need to educate people about the potential benefits they could gain from economic reforms, and to organize coalitions to support these changes.

Samuel: Many policies claim to be market reforms but many lack essential elements of the free market. Good parking policies will involve minimal government "management," and maximum competition among different self-financing parking providers, and maximum flexibility for businesses and property owners to provide and sell parking, or buy it from others as they see fit. In many cases, anti-market policies masquerade under the name of "parking management reform" and TDM.

U.K. governments likewise have talked a great deal about traffic reduction and pricing but have deferred action, or left initiatives to local government. Norwegian cordon tolls were sold to the communities of Trondheim, Oslo, and Bergen as the means to fund a package of road and transit improvements, rather than as demand management schemes, though they have been moderately successful in that regard.

Singapore's road pricing system seems to have major benefits in assisting free flow of traffic, but such a comprehensive approach is

politically impossible in most of the U.S. and difficult in the European and Australasian democracies as well. Singapore is unique in being a city/state having a single level of government and an executive branch that derives its power from a majority of the legislature. It can force through comprehensive schemes that most other countries could not, as demonstrated by the recent defeat of the ambitious "Rekeningrijden" cordon tolling in the four major Dutch metro areas. Rather than pushing for comprehensive schemes of road pricing and demand management, we need successful demonstration projects, like I-15 HOT lanes in San Diego, Houston's HOV-two pricing, the 91-Express Lanes in Los Angeles, shoulder discounts on Lee County, Florida's bridges, and the three-tier pricing of the 407 toll road in Toronto.

I am thinking of genuine "demonstration projects" hoping that term is not contaminated by association with U.S. "pork" projects. We need limited projects that can be sold as trials only, rather than as schemes of broad social engineering, that will demonstrate the benefits of pricing to motorists. It will be fatal to pricing if it is seen as a way of trying to get motorists out of their cars and otherwise extract more money from them for transit or other purposes. These projects must offer motorists the choice of using the priced facility, and getting a better level of service, or sticking with the present unpriced facility. Only such unthreatening-to-motorist projects will fly politically.

Truckers and their customers must stand to benefit from priced lanes and variably tolled crossings. When these schemes are advocated by groups that vilify trucks and want to pour taxpayer or motorist resources into rail lines, it is not surprising that trucking groups are suspicious and resistant. Pricing has to be developed as attractive to truckers by offering tangible benefits to truck operators in excess of their costs for them to be expected to buy in to the idea.

Litman: I think that Samuel oversimplifies these issues, and bases his arguments on ideology rather than thoughtful, objective analysis. He opposes TDM programs because they are government funded, yet so are most existing roadway programs. Similarly, he opposes parking management that involves government regulations, but so do current parking policies. I agree with Samuel that it is preferable to let decisions be made by consumers in a free and efficient market. However, after decades of tax and zoning policies causing excessive parking supply and automobile use, correcting distortions often requires active intervention. In may cases it may make sense for a community to establish parking and transportation demand management objectives to more quickly achieve an efficient transportation and land use system.

TQ: *What trends and new technologies are occurring that will alter the effectiveness or feasibility of these policy changes?*

Samuel: We may be about to see some major breakthroughs in new automotive propulsion technologies. Much more fuel-efficient and cleaner diesels and gasoline engines are being developed. Hybrid internal combustion/electric battery vehicles may find a significant niche market for shorter-distance trips. At last fuel cells look to have more than theoretical promise. This technology will allow per-mile emissions to be reduced much faster than vehicle-miles traveled is likely to grow, so total vehicular emissions will drop. Motor vehicles, though more numerous, will become a smaller environmental burden.

Most importantly for policy, the flat rate per gallon fuel tax will become a diminishing source of revenue for roads and tolling will grow.

Intelligent transport systems (ITS) have been an area abounding in "hucksterish" hyperbole, of solutions in search of prob-

lems, attracting swarms of animals reared to feed at government troughs. But in the right institutional setting, ITS can deliver the goods in spectacular fashion. Electronic tolling has transformed the public acceptability and the economics of toll roads and road pricing. Tolling can now be practically implemented on individual lanes of an otherwise tax-financed and traditional road, and tolls can be registered at full highway speed and collected remotely like a utility bill. Toll rates can be varied independently of coinage sizes and fine-tuned by the minute to manage traffic flow and to prevent breakdown into inefficient stop-and-go—as brilliantly demonstrated by the San Diego Association of Governments on I-15. Motorists have proven far more receptive to variable pricing, where it has actually been implemented, than its strongest advocates dared to predict. It has proven difficult, however, to get pricing projects through the political minefields to the stage where the public can try it and see its benefits. Hopefully as working examples succeed, they will capture the public imagination and be widely implemented. In the American system of dispersed government, implementation is likely to be piecemeal and uncoordinated. Pricing policies will be a matter of trial and error pragmatics, of what is locally acceptable in the circumstances, with little chance for grand theoretical notions of optimal prices that incorporate planner-designated social costs. That kind of stuff may fly in a few more centrally governed nations, but not in America.

Congestion-related road pricing remains the only serious hope for combating congestion and generating the funds and support for needed roadway enhancements. It now has robust enabling technology in the electronic toll transponder, and in digital photography and optical character recognition systems for identifying license plates. Nearly ubiquitous mobile wireless phones and cheap geographic positioning systems (GPS) offer other ways of pricing roads directly, bypassing the labyrinth of federal and state tax collections and politicized disbursement strings and allocation channels.

Communications, location tracking and computing technologies now make it possible to run far more efficient demand responsive transport services. Customer needs can be logged and priorities established at a central dispatching or fleet management center, and vehicles directed, en route, to pick up and deliver people or goods door to door while maintaining minimum wait times and maximum load factors. This will enable us to increasingly dispense with traditional line-haul and train systems, which have heavy shuttle and transfer costs at their ends, and which impose unnecessary waits before departures, and stops and circuitous routings along the way.

In an age of dispersed development, multiple activity centers, and diverse origins, destinations, and timings of trips, centralized transport systems will be as much an anachronism as a computing world dominated by mainframe computers. The road system with its hierarchy of road types from driveways and loading docks, through local streets, and arterials right up to highways, is simply without serious competition for the overwhelming majority of trips today and will be even more dominant in the foreseeable future. Just-in-time delivery practices, the new logistics revolution, and increasing international specialization in manufacturing favor air for really long distance, plus road for most of the rest of the transport task. Rail and water have inherent advantages for homogenous, heavy products going from one point of concentration to another. But products are being constantly lightened and produced to more heterogeneous specifications and locations, favoring continuing mode shift to air and truck.

Safety is an important area where the auto/road system lags. The carnage on the roads is terrible. Rail, though imperfect, is safer as a guideway than the human driver

at the steering wheel, and its switching systems are safer at junctions than traffic signals and "stop" signs for human drivers. The automated highway system (AHS), while off to a false start in attempting to dramatically increase highway lane throughput, has much promise for improving road safety. Vision enhancement in fog and rain so vehicles ahead can be "seen," creation of virtual lane markings and in-vehicle display of warning and directional signs, collision warning radars, driver monitoring systems that can take over an undriven vehicle and bring it to a safe halt, all seem to have potential for reducing crashes. It may gradually take over routine lane keeping (steering) and the boring driving chores of maintaining suitable headways from the vehicle in front with "intelligent cruise control."

Litman: I certainly welcome vehicle efficiency, emission reduction, and safety technologies, but I don't believe that they eliminate the environmental and social problems associated with excessive automobile use. Improved engine technologies significantly reduced tailpipe emissions under design conditions, but reductions under actual driving conditions are smaller, and nontailpipe emissions are not controlled at all.

Although manufacturers have incentives to sell low-emitting and alternative-fueled vehicles in some markets, there is little incentive for people to maximize their use. Without significantly higher fuel prices or mileage-based emission changes, a typical multicar household will continue driving its larger, gasoline vehicles for most trips, and use a hybrid or electric vehicle for a relatively small portion of total travel. As a result, the emission reduction impacts will be smaller than their percentage of the vehicle fleet. This suggests that pricing reforms and TDM are critical for addressing air pollution in the short and medium term.

Even if cars had no air emissions at all, our transportation system would still impose significant environmental and social impacts, including the barrier that roads and traffic create to pedestrians and animals, crash damages, water and noise pollution, loss of green space and wildlife habitat, and the hydrologic impacts of pavement.[37] Most technological innovations only solve one or two problems, and may exacerbate others. For example, by reducing the cost of driving, improved fuel efficiency tends to increase vehicle travel (what economists call a "take back" effect), exacerbating traffic congestion, and crash and urban sprawl problems. Similarly, automobile safety features (seat belts, air bags, etc.) can encourage risky behavior that offsets much of the safety gain and significantly increases pedestrian and bicycle crashes.[38] I believe that society would benefit from market incentives that encourage less polluting technologies and more efficient travel behavior.

New electronic pricing technologies are cost effective and convenient, and can overcome many objections to direct pricing. For example, motorists would not need to stop to pay road tolls or feed parking meters with coins. However, not all market reforms require new technologies. Some can be implemented using off-the-shelf hardware. For example, per-mile insurance and road use fees only require an odometer audit, which can be performed during scheduled maintenance, such as an oil change. Shared parking and zoning reforms simply require changes in institutions and management practices.

Samuel: Road use in our cities is both overencouraged by the lack of flexible price management of scarce roadspace and over-discouraged by the congestion and lack of choice in roadway level of service. Winston and Shirley's modeling suggests that in a world free of the distortions of government intervention and selective subsidies, there may be more personal transport, not less. Of course all such modeling has its limitations, but it is not clear that we have "excessive"

automobile use overall. It is just as arguable that we have excessive transit. Sweeping changes are unlikely to be achievable at the national level, so we are most likely to progress by demonstrating the value of innovation piecemeal, relying on the pragmatic political tradition of picking up on what works.

Let the environmental impacts of the automobile be directly tackled with good science and pragmatically tailored policies, targeted to reduce only those aspects of auto use which generate identifiable problems. Adoption of sweeping general policies for reducing vehicle-miles traveled is unwarranted. Vehicle-miles traveled in clean vehicles in uncongested managed roadway conditions impose very low if any social costs. So we need to push for cleaner technologies, safety, and better management of roadspace, especially pricing it.

Summary

Litman: I believe that automobile travel can be highly beneficial to society. But this does not mean that all driving is beneficial, when all costs and benefits are considered. Like other goods, automobile use experiences diminishing marginal benefits and after a certain point, increased driving makes society worse off overall. To achieve the greatest net benefits, automobile use must be subject to market discipline. Our research indicates that various distortions in transportation and land use markets cause excessive driving, that is, levels of automobile use beyond what would occur in an optimal market. This conclusion is not fundamentally new. Many economists and policy analysts have identified significant distortions in our transportation land use markets. However, most consider just one or two. For example, many economists recognize traffic congestion as a market failure and propose congestion pricing as a solution. Others point to inefficiencies in road funding and parking management, and recommend better practices. Some analyses focus on pollution externalities and propose financial incentives to reduce emissions. Others are particularly aware of problems automobile dependency creates for non-drivers, and propose strategies to improve mobility choices.

Our research takes a comprehensive look at these market distortions and solutions. Although individual transportation market distortions may appear modest and reasonable, combined they cause significant inefficiencies. In a more optional market, with better travel choices and pricing, consumers would choose to drive significantly less, and be better off overall as a result. This research also suggests a number of practical ways to reduce a host of transportation problems by correcting market distortions. When appropriately implemented, I believe these "Win-Win Solutions" would be cost effective and benefit consumers, the economy, and the environment. This research has been described briefly here, and in greater detail in other articles and papers. I believe that the conclusions withstand objective technical scrutiny.

Unfortunately, many transportation professionals are quick to oppose these solutions because they represent a fundamental change in the way we define problems and implement solutions. Rather than measuring transportation primarily in terms of vehicle movement, Win-Win Solutions focus on "access." Rather than relying largely on major construction projects, they rely on management strategies, economic incentives, and small programs. Rather than considering just one or two problems at a time, they are most justified by considering a wide range of benefits and costs.

In this exchange, Samuel demonstrates this reluctance to consider innovative solutions. He approaches this exchange as an ideological debate between "pro-highway" and "anti-highway" interests. He betrays a tendency to oppose innovations without understanding them. Many of his criticisms

are technically inaccurate. I hope that *Transportation Quarterly* readers will keep an open mind as they investigate potential transportation demand management solutions to the problems we face.

Samuel: Litman, here, is reasonable and pragmatic, but the Smart Growth movement with which he is often allied, smacks of highly ideological thinking—passionately vilifying the suburban lifestyle and the automobile, ignoring progress that has been made in safety and tailpipe emissions, using simpleminded theories of causation (highways cause sprawl), conspiracy-minded history (GM killed the trolleys), doctrinaire in its assertions about the solution (denser development), arrogantly contemptuous of past practice ("smart" growth implies all else is... dumb?), blithe in its disregard for life's tradeoffs (big box stores' lack of charm), utopian in its faith in planning and controls administered by the enlightened, and intolerant of different choices and diversity.

A large dose of skepticism is in order about the ability of a public policy elite to foresee the future implicit in assertions that land use and transportation can be "coordinated." For some decades now, our present city, county, and metropolitan level planners and our existing institutions have been attempting exactly this. They have had to work with the constraints of imperfect forecasts, conflicting local interests, due process procedures, dispersed government, officials elected for two- to six-year-terms, and private property rights. Those are not suddenly going to be swept away—one hopes.

Of course we need to innovate. We especially need to innovate in pricing roadspace and letting the incentives and price signals of markets shape our investments. We need to innovate in letting investors take risks (and earn rewards) from providing infrastructure, rather than simply continue to have future generations of taxpayers bear the costs of planning fads and fashions. Innovation is needed in how we cater to trucks, and in how we reach size and weight standards, and in devising separate lanes and facilities for trucks versus light vehicles. It should be possible to go beyond the bureaucratic and politicized setting and to have road operators and trucker groups negotiate win-win arrangements in which they perhaps pay higher user charges or tolls but employ much more profitable and safer consists. We need far more innovative thinking about the possibilities of taking roads underground where right-of-way acquisition and wider surface highways are unacceptable. We need innovation based on a hardheaded assessment of the changing nature of work, family life and the value of our time. This surely makes unrealistic any major return to hub-and-spoke, centrally oriented, corridor transit. More in tune with our needs is flexible networked demand-responsive personal transportation, probably deploying near door-to-door service vehicles carrying single digit loads of people.

It seems to me to be ideological, and indeed authoritarian, to insist that we build few new highways when these are the essential infrastructure for the dominant mode, the transportation choice of the modern masses.

The last great ideological movement in city planning was "comprehensive redevelopment" or "slum clearance." With great passion, and federal funding, it was promoted by idealists, and also a few opportunists, as the city's panacea. Its major constructs were public housing high-rises now being demolished in spectacular "implosions." The clouds of dust and piles of rubble of the 1950's public-housing towers are an apt metaphor for the results of excessive zeal in city planning. Unintended consequences and great waste are just as likely to follow in the train of ideological "smartgrowthism."

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