

TESTIMONY

Financing Transportation Infrastructure in California

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Financing Transportation Infrastructure in California²

Before the Little Hoover Commission
State of California

March 26, 2009

Chairman and distinguished Members: Thank you for inviting me to speak on options for financing California's transportation infrastructure. I am a Senior Principal Researcher at the RAND Corporation, where I am Director of the Transportation, Space, and Technology Program. Until the end of 2005, I was Professor of Civil & Environmental Engineering and Professor of City & Regional Planning at the University of California, Berkeley, where I was also Director of the Institute of Transportation Studies. Earlier, I spent 25 years at UCLA, where I was Chairman of the Department of Urban Planning.

Following a summary of my main points below, I will briefly discuss the history of financing California's transportation infrastructure, including state highways and user fees and the erosion of such user fees, before turning to a discussion of the pluses and minuses of three possible policy directions for financing California's transportation infrastructure. I end with some conclusions.

Summary

For nearly a century, California has relied on its road system users to pay fees—fees that have been the major source for financing the construction and maintenance of the state's transportation infrastructure. But in the last decade, the state has failed to raise those fees to keep up with its needs; as a result, the state is gradually increasing its reliance on its strained sources of general revenue to finance the transportation system. In addition to heightening California's fiscal crisis, this shift away from user fees to a reliance on general revenues also worsens congestion because it does not use prices to appropriately regulate flows on the state's networks. Although the gasoline tax gradually is becoming obsolete as a user fee, new

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approaches are becoming available that employ electronic tolling and permit the state to charge users based on vehicle miles of travel. These approaches are both more efficient and more equitable than relying on sales taxes or other general fund approaches to financing the state's infrastructure.

A Brief History of Financing California's Transportation Infrastructure

State Highways and User Fees

A hundred years ago, the nation wanted to get farmers out of the mud and to connect them to regional markets. At the same time, rapid growth in automobile use created traffic jams on existing, mostly underdeveloped roads. Gradually, California took on the responsibility of augmenting its local roads by creating major routes designed for heavy longer-distance traffic. These state highways were expensive to build and maintain and quickly strained the state treasury. In the early 1920s, California devoted more than 40 percent of state revenues to maintaining roads and paying interest on bonds it had issued to build them. Despite these high levels of spending, congestion continued to worsen because appetites for automobiles, trucks, and highway travel were growing so rapidly.

The principal beneficiaries were seen to be the users of the system—motorists, truckers, shippers, and so on. So from this period of financial exigency came the revolutionary concept of financing transportation through “user fees.” Because the need for, and costs of, state roads varied roughly in proportion to traffic levels, it made sense to cover the costs of those roads by directly charging the users. While tolls were considered the fairest way to charge users at the time, they had a major drawback. The cost of collecting tolls (constructing toll booths, paying toll collectors, dealing with revenue losses from graft and pilfering, and dealing with delays imposed on travelers) absorbed a large proportion of toll revenues. Developing interconnected road networks required constructing and maintaining expensive-to-build links (over waterways or through mountain passes), as well as some lightly used links that could not be financed entirely by locally generated toll revenues.

The solution to this dilemma came when states, starting with Oregon in 1918, adopted an alternative form of user fee—motor fuel taxes. Although in using such taxes states charged for road use in rough proportion to motorists' travel and although heavier vehicles paid more because they used more fuel per mile of travel, fuel taxes did not quite match tolls for efficiency and equity because they did not levy charges at precisely the time and place of road use. Still, fuel taxes cost much less to collect and administer than tolls and soon became the principal

means of financing America's main roads. Because fuel taxes were user fees, most states reserved fuel taxes exclusively for transportation expenditures; this link between state fuel taxes and transportation expenditures has been mandated by federal law since the 1930s. When the federal government decided in 1956 to finance intercity highways on a national scale, it increased federal fuel taxes and created the Federal Highway Trust Fund, emulating the "user pays" principle that had been so successful in the states.

For more than eight decades, motor fuel taxes have paid most of the costs of building and operating major roads in the United States. As public policy gradually came to favor a transportation system that was somewhat balanced between private cars and public transit, highway user fees were also used to construct and operate transit systems. This change was objectionable to some who saw it as a "diversion" of road user fees to other purposes and thus a violation of the principle that user fees were to be reserved only for the benefit of those who paid them. But to keep together a coalition of highway, transit, construction, and environmental interests, and recognizing that some automobile users benefit by having good transit service, the funding of public transit partly with highway user fees has become institutionalized.

Erosion of User Fees

Amidst this elaborate system of federal and state user-fee finance, a huge change in how we finance transportation systems is now under way. Although federal and state fuel taxes are still the largest single source of revenue for transportation, such taxes are rising far more slowly than either traffic volumes or transportation system costs and no longer come close to covering the costs of building, operating, and maintaining the transportation system. At the same time, there is clearly widespread opposition to raising fuel taxes sufficiently to fund California's infrastructure needs, estimated to be \$500 billion by the California Business, Transportation and Housing Agency.

California has an excise tax, expressed as "cents per gallon" on motor fuels. In addition, since the late 1970s, the state has also charged a sales tax, expressed as a percentage of the sales price, on motor fuels intended to be used mostly to support public transit. Because the excise tax on fuel is levied per gallon, and not per dollar or per mile, inflation and improved vehicle fuel efficiency combine to erode the excise tax's buying power. To keep pace with rising costs and increasing travel, the per-gallon fuel tax levy needs to be increased regularly—a significant political liability to an otherwise simple and elegant finance mechanism. The state's per-gallon excise tax has not risen from 18 cents per gallon since 1994, and the federal excise tax has been at 18.4 cents per gallon since 1993. Just to keep the buying power of the two combined excise

taxes as they were in 1994, when the last increase occurred, the combination of these two taxes would need to be raised by another 16 cents per gallon. Moreover, the cost of road maintenance and construction has steadily risen by more than the general consumer price index, further reducing the effectiveness of the revenue yielded by the tax.³

The fuel tax's eroding purchasing power from inflation has been compounded by increasing vehicle fuel efficiency. The average passenger car traveled 13.5 miles per gallon in 1970, rising to about 22 miles per gallon by the year 2000, and is moving toward 30 miles per gallon very soon under recent revisions to federal law. While this improvement is, of course, highly desirable, improved fuel economy nevertheless directly reduces per-mile revenues from motor fuel taxes without reducing the need for new roads or wear and tear on existing ones, even as we drive many more miles per penny of revenue.

As the transportation system grows in extent and ages, an ever increasing share of expenditures is needed to operate, maintain, and renew the existing system, meaning that even less money is available for system growth. In some locations, it has also become necessary to strengthen existing facilities as new information has come to light about the impacts of earthquakes on roads and bridges.

Traffic congestion is also clearly worsening in many places, with the major metropolitan areas of California worsening the most. Los Angeles leads the nation in total annual hours of delay for all travelers, total annual gallons of fuel wasted because of delay, and total economic costs as a result of congestion delays.⁴ Surely, declining real revenues combined with rising costs for maintenance, operations, and system expansion are among many factors that explain rising traffic delays. New projects are on hold because the state is unable to fund system expansion, and major maintenance projects are being delayed as well. Since traffic has steadily grown much faster than population growth, the state's inability to fund system expansion is clearly one of several reasons traffic congestion and its associated delays have worsened. While the recent ramp-up in fuel prices slowed some of the projected growth in travel in the short term, history suggests that drivers are more likely to respond by shifting to more fuel-efficient vehicles than by curtailing driving; so, unless fuel prices were to climb much higher, vehicle travel is likely to continue growing in the years ahead.

³ The sales tax on motor fuel is expressed as a percentage of the sale price, so the recent surge in fuel prices has dramatically increased the revenue produced. While that might have been used to benefit transportation programs, the overall state deficit has caused a great deal of this money to be diverted to cover general state costs; thus, transportation programs remain under fiscal stress.

⁴ Paul Sorensen, Martin Wachs, Endy Y. Min, Aaron Kofner, Liisa Ecola, Mark Hanson, Allison Yoh, Thomas Light and James Griffin, *Moving Los Angeles: Short-Term Policy Options for Improving Transportation* (Santa Monica, CA: RAND Corporation, 2008), 10.

Further Erosion of User Fees Likely

There is every reason to believe that the trends described above are likely to continue. The political climate is one of wariness for any kind of tax increase—even increases in transportation user fees. During the debate leading up to the reauthorization of the federal surface transportation program in the form of the bill known as SAFETEA-LU, in 2005, there was a strong consensus among legislators that motor fuel taxes should not be increased to expand the federal transportation program. To reach consensus on the recently passed statewide budget, the Governor's proposed motor fuel tax increase had to be dropped from the package.

Possible Future Policy Directions

If motor fuel tax revenues will become increasingly inadequate to support the operation, maintenance, and expansion of the state's transportation system in coming decades, the state obviously has been considering alternative ways of establishing a strong and stable financial base for that system. Included in consideration of the alternatives must be attention to the transition from the current system to any future system. Below, I discuss the plusses and minuses of three options.

Option One: Increase Reliance on Borrowing

One response to the decreasing revenue from motor fuel taxes has been increased borrowing. Often referred to as "innovative finance," debt financing of capital facilities for transportation has increased over the last decade. Federal and state programs can make it easier to borrow public funds. For example, "grant anticipation revenue vehicles" (GARVEEs) and "grant anticipation notes" (GANs) are short-term loans of federal funds to transportation agencies that commit future federal and state trust fund distributions in advance of when they would normally be received to complete funding packages needed to build projects today. State infrastructure banks can also provide "revolving funds" that enable projects to be built through borrowing and funds to accumulate in the banks through the repayment of the principal plus interest. Also, efforts to interest international sources of private capital—from banks, retirement funds, and the like—to invest in highways and bridges are growing. In most cases, these projects commit to repaying the borrowed capital over two to five decades from the proceeds of tolls or other fees charged to users.

Borrowing is good way to finance large public capital investments with high up-front costs that provide benefits to users for generations, especially for projects that produce major streams of revenue from tolls. Debt financing especially makes sense when the annual stream of expected benefits from a project (discounted to the present) exceeds the annual principal and interest payments for the project (also discounted to the present). Borrowing money by issuing low-interest, tax-exempt bonds spreads the cost of a new public facility over time in rough proportion to the flow of actual benefits from that facility. Paying off the loans floated to build transportation projects is, of course, a long-term financial obligation that requires agencies to acquire revenue throughout the life of the project to repay the capital and to meet interest obligations.

While borrowing to pay for transportation projects can be a good idea (such as when the debt can be retired directly from facility tolls or other user fees), it can also simply be a way to put off for a few years the politically difficult task of restructuring transportation finance. Unfortunately, in California, some recent decisions to use debt financing for transportation projects have been motivated by a desire to get needed projects off of the ground as traditional revenue sources have run dry rather than by dispassionate calculations of expected benefits and costs.

Option Two: Increase Reliance on Local Option Transportation Taxes

California has also gradually been shifting the financial burden for transportation away from user fees and toward general taxes and fees that do not rely on charges for the use of the transportation system. More than any other state, California has relied on special county sales taxes for transportation, often called “self help” taxes. In the last fiscal year, California benefited by about \$5 billion in critical sales tax revenue, approved by voters—at different times—in over 20 individual counties. The revenue has been absolutely necessary to highway and transit infrastructure programs; for the first time in decades, California is spending more non-user or general revenue on transportation than user fees. While these measures are critical at the present time, they may not represent a long-term solution to the state’s infrastructure finance problem.⁵

Sales taxes are lucrative because they have a broad base. While fuel taxes are paid only by motorists on fuel purchases, sales taxes are paid by many more people purchasing a much wider range of goods. Thus, even small sales tax increases can generate significant sums of money. One county, for example, estimated that a 1 percent increase in the general transportation sales tax produces as much revenue as a motor fuel tax increase of 16 cents per gallon. While the

⁵ The shift to general revenue is occurring at the federal and the state level. When the Federal Highway Trust Fund recently approached a zero balance, Congress allocated about \$8 billion in general revenue to at least temporarily replenish the balance.

annual tax paid by households might be the same between these taxes, small increases to a frequently paid tax have proven to be much more palatable politically. Then again, the burden of such taxes falls on all citizens regardless of how much they use the transportation system. In contrast to the “drive less, pay less” fuel tax user fee, sales taxes charge light or occasional users of the transportation system far more per mile traveled, while frequent heavy users of the transportation system tend to pay far less for each mile of travel.

The popularity of local sales taxes for transportation can be attributed to four important characteristics:

1. *Direct local voter approval:* These measures typically result in projects and services near voters' homes and work places, so voters personally can appreciate them and anticipate their benefits. In an era of growing distrust of politicians, these measures provide tangible direct local benefits.
2. *The taxes have finite lives:* Voters enact transportation taxes that will persist typically for 15 or 20 years, unless specifically reauthorized by another popular vote. Voters thus have a sense of control over their money. If projects do not live up to their expectations or if the completed projects fully accommodate growth and reduce congestion, then the taxes could end.
3. *Specific lists of transportation projects:* The taxes may be used only to build certain projects or fund specific programs named in the ballot measures, which means that politicians' discretion to spend the money is severely limited.
4. *Local control over revenues:* The money raised locally is spent locally for local benefit, under the control of a local transportation authority, ensuring citizens that the money will not leak into other jurisdictions. Surveys of voters and interviews of local politicians about these measures find that local control is the single most politically attractive aspect of local option transportation taxes.

Transportation tax referenda around the nation are often argued to be a new and politically expedient way of raising needed revenue—of filling the gap in revenue created by slowing increases in motor fuel taxes coupled with improved vehicle fuel efficiency. But local option transportation taxes may be doing much more than that. In addition to raising money, such taxes are gradually but inexorably changing how we plan and finance transportation systems in several fundamental ways:

1. The growing popularity of sales taxes is steadily shifting the financial base of the transportation system from user fees to general taxes paid by all citizens, regardless of their direct reliance on the transportation system. User fees have at least some tendency to induce more efficient use of the transportation system; higher fuel taxes, for example, encourage motorists to acquire more fuel-efficient vehicles. In contrast, general taxes provide no incentive for greater transportation efficiency. And while sales taxes and fuel taxes are both income-regressive (meaning that people with lower incomes pay a higher proportion of their incomes in each of these taxes than do people with higher incomes), the effects of user fees on the poor are tempered by the fact that those who pay them always benefit from them, while sales taxes burden non-users as well as users.
2. The rising use of county transportation sales taxes and the growing role of metropolitan transportation planning are consistent with a national trend toward the devolution of transportation decisionmaking authority, but federal policy and the rise of county tax measures are in fundamental conflict. While Congress and many states are devolving transportation decisionmaking to the regional level by enhancing the powers of metropolitan planning organizations, county sales taxes can actually undermine the influence and authority of those regional or multi-county organizations by focusing resources and decisionmaking on counties and other smaller units of government.
3. Local transportation taxes are increasingly limiting the transportation policymaking authority of elected officials by requiring that transportation funds be spent strictly in accord with the language of the ballot measures over fairly long periods of time. One implication of this is that project lists are gradually eliminating the flexibility necessary to adapt to changing needs.
4. Transportation planners and engineers often apply analytical procedures like benefit-cost analysis to determine which investments should be selected, while ballot measures proposing local transportation taxes substitute election campaigns—sometimes derisively called “beauty contests”—for such systematic analysis. Many believe that greater reliance should be placed on analyzing project cost-effectiveness, but listing popular projects in the sales tax measures limits the relevance of systematic analysis in project selection. While local control and direct democracy are American ideals, it is probably not appropriate for voters to preempt the application of technical expertise in designing and managing transportation systems.

5. Raising transportation revenues through local tax measures creates clear incentives to support projects that produce local benefits while giving lower priority to projects within local jurisdictions from which benefits accrue largely to long-distance travelers. Roads like I-5, Highway 99, and Route 101, for example, benefit many through-travelers, and improvements to such roads should not be financed primarily by the local communities through which they pass.

Option Three: Renew User Fees Using Electronic Toll Collection

Tolls—direct charges levied at the time and place roads are used—were considered at the dawn of the automobile era to be ideal user fees, but they had to be rejected, as noted above, because of the high costs of administering them. Nearly a century later, rapid and dramatic advances in technology have revived the potential and promise of tolls. A new breed of information technologies—including on-board computers, global positioning systems (GPS), digital maps, and wireless communications—now makes it relatively easier and cheaper to measure and record vehicle travel by road segment and time of day across different jurisdictions. Such technologies effectively open the door to numerous tolling options long proposed by transportation economists. Today, there are over 90 projects under way around the world in which innovative electronic tolling applications are already in place or in advanced stages of development. These projects incorporate a variety of pricing schemes, ranging from facility congestion tolls to area congestion tolls to weight- and distance-based user fees and insurance charges levied on a per-mile basis. Of these, by far the most technically advanced plans with the greatest revenue potential are proposals to replace the fuel tax with a network-wide, distance-based user fee for automobiles and trucks.

Although implementation details for distance-based user fees vary, the technical strategy, in its simplest form, works as follows. To determine and record travel information, each vehicle is equipped with an on-board unit that integrates these components: a GPS receiver, a set of digital maps showing jurisdictional boundaries, an odometer feed, a rate table for computing distance charges, and some form of wireless communication technology for reporting billing data. During each trip, the computer repeatedly checks the GPS receiver to determine geographic location and then compares this information with digital maps to establish the current jurisdiction. Each mile traveled (based on the odometer feed) is then sorted and stored by jurisdiction, and the computer uses this information, along with the rate table, to keep a running total of fees owed to different authorities.

Periodically, this information is transmitted to a billing agency so that charges can be levied and fees paid. This can occur, for example, through dedicated short-range communications when the driver refuels, in which case the fees could be added to the fuel bill. Alternatively, data could be uploaded to a billing agency such as a credit card company on a monthly basis, and the vehicle owner could be billed electronically. To prevent toll evasion, on-board equipment must be tamper-resistant; some units are programmed to perform regular checks against the odometers to ensure that the units have not been turned off during any period of operation. Jurisdictions may also choose to mount roadside devices that can communicate with passing cars to verify that on-board units are installed and operational.

Distance-based fee proposals are without question ambitious, yet several states have already been evaluating the feasibility of per-mile electronic tolling. In 2001, the Oregon legislature commissioned the state's Department of Transportation to develop a long-term vision for road finance, which resulted in a detailed proposal for a mileage-based road fee, which was tested by motorists in and around Eugene. The Minnesota Department of Transportation pooled resources with 14 other states (California, Connecticut, Iowa, Kansas, Michigan, Missouri, North Carolina, Ohio, Oregon, South Carolina, Texas, Utah, Washington, and Wisconsin) and the Federal Highway Administration to fund a proposal, developed by researchers at the University of Iowa, for a multi-jurisdictional (state-to-state) mileage fee.

Electronic tolling has already gained considerable traction in other parts of the world, most notably Europe. Austria, Switzerland, and Germany have all recently launched automated weight-distance truck tolls across their national highway networks. More recently, the cities of Copenhagen, Gothenburg, and Helsinki have experimented with distance-based user fees, while the European Space Agency has begun to lay out specifications for a pan-European distance-based road tolling system. Many of these European experiments have cited fiscal shortfalls as a central motivation, but they have also explicitly focused on other important objectives, such as varying charges to better manage congestion, encourage shifts away from reliance on single-occupant autos, track burgeoning truck travel, and provide incentives for buying cleaner-emission vehicles.

The move toward electronic tolling continues to be met with considerable skepticism, and in some cases outright hostility, among some transportation interest groups, voters, and elected officials. The most common objections are related to privacy and environmental issues. For those concerned with privacy, the prospect of on-board equipment that might allow governments to monitor drivers without their consent or knowledge is chilling indeed. Environmental advocates worry that distance-based pricing schemes would take the form of flat mileage fees, thus

accounting for neither fuel economy nor emissions differences among vehicles. Replacing the existing fuel tax with such a flat fee would effectively eliminate one of the few tax-related policy incentives for purchasing more fuel-efficient vehicles. But the emerging technology promises to allow us to vary the fee for driving based on time of day, congestion levels, vehicle characteristics, the cost of providing the particular facility, and many other factors. That kind of flexibility is among the most promising aspects of the concept of electronic charging.

Privacy concerns are understandable and will be critically important to the future of electronic road charges. But there is no inherent reason that such a system must compromise the privacy of travel data. A GPS receiver in the vehicle uses signals from satellites to determine its own location. Each of the systems in operation ensures that users' privacy can be protected, and several ingenious strategies seek to achieve this aim. In the University of Iowa proposal, for example, drivers would periodically download billing data from the on-board unit onto a smart card and then upload the data to the billing agency through a card reader at a filling station or on a home computer. The transfer process would be divided into two transactions. The first would upload user identification and total amount owed. Then, a second, anonymous connection would report the division of the bill to different jurisdictions. Jurisdictions would thus receive the appropriate revenues, but the government would never know *where* or *when* any individual had traveled, only the total amount owed.

Another common objection to tolling—electronic or otherwise—is that motorists already pay for the roads through user fees, mostly in the form of motor fuel taxes. Asking drivers to then pay electronic tolls to drive on some facilities thus constitutes “double taxation.” Concerns over double taxation from tolls can be allayed when electronic tolls are placed exclusively on new or added highway capacity rather than on existing highways, since the electronic charges can clearly be aligned with the incremental costs of those new roads (although fuel taxes for other roads are also paid while using new toll roads). This has been the case in California on SR-91, I-5, and SR-125. Perhaps more significantly, when electronic tolls are used to *replace* existing motor fuel taxes rather than charged *in addition* to fuel taxes, this issue of double payment is moot. For example, travelers can be billed at lower rates to cover maintenance and operating costs when traveling on roads whose capital costs were borne by fuel taxes in the past, while paying higher rates per mile to drive on roads for which debt is currently being repaid.

Switching to a distance-based user fee system would require a major investment in new technology, as well as developing new administrative capabilities within government, or through private contractors, to manage the program. Should the transition to electronic tolling be revenue-neutral, or should fees be set to fund the backlog of existing maintenance and construction

needs? Should fees vary by vehicle weight and/or emissions class? Should heavy trucks be charged more to travel on secondary roads—where they do the most damage—than on more heavily-engineered highways? Should urban areas be allowed to layer congestion tolls on top of base fees? Which of these ideas is the public prepared to accept? In London, Stockholm, and Southern California, less sophisticated congestion pricing programs have successfully increased vehicle flows and reduced delays with little or no public outcry. But whether network-wide schemes would be received as calmly is far from clear.

Finally, depending on how these policy questions are answered, tolls could be structured to increase transportation system efficiency, effectiveness, and equity—or they could be set to disproportionately benefit powerful entrenched interests. Indeed, while some are promoting the potential to improve efficiency, effectiveness, and equity, others oppose electronic tolling precisely because it opens the door to variable fees.

In short, while distance-based pricing offers the *potential* to price for a variety of indirect costs like vehicle weight, emissions, or delays imposed on other drivers, whether such strategies would survive the political bargaining process is very much in doubt. Reopening long-settled questions of who should pay for roads and how they should pay entails considerable risk and uncertainty for nearly everyone. If raising the motor-fuel and other established transportation taxes had not become so difficult politically, it is likely that the development of electronic tolling systems would be moving along much more slowly.

Conclusions

Motor vehicle travel continues to grow faster than the population. But even as the demand for roads continues to increase, the road system has expanded little in recent decades. The buying power of the principal source of revenues to operate, repair, and expand the road system—the motor fuels tax—continues to wane. Despite sometimes strong political support for increased spending on transportation, the fuel tax is unlikely to make a major comeback anytime soon. This is especially true as the nation addresses greenhouse gases and gradually shifts toward vehicles that continue to use highways while relying less on petroleum-based fuel.

In the short run, the nation can rely on non-user based fees, like the California “self help” sales taxes, but in the longer run, it seems likely that we will prefer direct user fees because they are fairer and encourage changes in travel behavior that help optimize the efficiency of our capital investment by encouraging shifts in routes, the times at which we travel, and increased reliance on public transit where it is available. Forging consensus on who should pay for transportation

systems, and how they should pay, will require a complex and at times vigorous debate, careful research, and many trials. Yet in the end, progress is being made and a shift is necessary to avoid a prolonged period of instability and crisis in American infrastructure finance.

California should today be funding research into applying and implementing direct electronic tolling and fees per mile of charging. The state should include the transition to modern user fees in its strategic transportation planning agenda and should be relying increasingly on user fees both for congestion management and for revenue production.

I would like to thank you again for the opportunity to address the Commission today on this important topic and look forward to answering any questions you might have.