



CENTER ON URBAN AND METROPOLITAN POLICY

Improving Efficiency and Equity in Transportation Finance

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A complex partnership between many governmental bodies, continually influenced by numerous private, corporate, and civic interests, finances our nation's transportation system. But the nature of the partnership is changing. Originally offset by a variety of user fees, such as tolls and fuel taxes, the burden of financing transportation programs is gradually being shifted to local governments and voter-approved initiatives. This shift to local transportation taxes raises interesting issues for public policy. This brief dissects the arcane and complicated system of transportation funding by describing the relationships that define the federal, state and local roles. It summarizes the most pressing problems facing the transportation network, and argues that expanded reliance on user fees remains the most promising way to promote equity and efficiency in transportation finance.

I. Introduction

Ever since the widespread adoption of automobiles, the American highway system has generally been financed with “user fees”—money collected from those who use the roads. Tolls and fuel taxes, which levy charges roughly proportionally to travelers’ use of roads, have been the most common.

However, tolls have traditionally been costly and difficult to collect because of the need to construct toll plazas and staff them with salaried workers. In addition, revenues from fuel taxes have for three decades been rising more slowly than program costs as legislators become ever more reluctant to raise them to meet inflation. As a result, the burden of raising the funds for transportation programs is gradually being shifted to local governments and voter-approved initiatives that are, in most instances, not based on user fees. As a result, new sources of revenue, especially local sales taxes have come to pay for transportation infrastructure.

In fact, seemingly modest local tax increases enacted as short-term solutions to immediate problems are setting a major national trend. Without any deliberate or conscious change in policy, transportation finance is gradually devolving to local governments and lessening its reliance on user fees. User fees are, however, more efficient and more equitable than local sales taxes for transportation projects. In the short run, increases in fuel taxes are viable and practical. In the longer term, tolls collected electronically promise the most appropriate and flexible method of user fee financing.

This policy brief outlines the complex series of relationships that define federal, state, and local roles in financing transportation systems. It summarizes some of the most pressing problems regions and the nation face in paying for the growth, management, and maintenance of the American transportation system. And it argues that continued or expanded reliance on user fees remains the most promising way to promote efficiency and equity in transportation finance.



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II. Roles and Responsibilities for America’s Roads

Although some depict the different governments involved as a “layer cake,” with local governments at the bottom and the federal government at the top, it is probably more realistic to view transportation governance as a “marble cake,” with local, regional, state, and federal interests mixed together through multiple programs in which different governments cooperate, compete, regulate, and represent their unique concerns. Federal policy is often shaped by state and local interests, and state funding commitments are often made to maximize the receipt of federal funds.

When measured in terms of lane miles or surface area, local roads compose the vast majority of the nation’s transportation system. Local roads are built, maintained, and operated mainly by counties, towns, and cities (see Table 1). However, beyond busy activity centers, local roads are often characterized by low traffic volumes and, as such, account for a minority of all travel. In 2001, urban and rural local roads together carried only 12.8 percent of all vehicle miles traveled (see Table 2).

Table 1. Ownership of American Roads, 2001

	Miles	Percent of National Total Miles	Percent of Category
Rural Roads			
Counties	1,637,616	41.32%	53.19%
Towns, Townships, Municipalities	600,957	15.16%	19.52%
States	665,093	16.78%	21.60%
Federal	119,296	3.01%	3.87%
Other Jurisdictions	56,115	1.42%	1.82%
Total Rural	3,079,077	77.69%	100.00%
Urban Roads			
Counties	144,065	3.64%	16.29%
Towns, Townships, Municipalities	614,696	15.51%	69.52%
States	110,481	2.79%	12.50%
Federal	2,234	0.06%	0.25%
Other Jurisdictions	12,709	0.32%	1.44%
Total Urban	884,185	22.31%	100.00%
	3,963,262	100.00%	

Source: Federal Highway Administration, “Highway Statistics Series, 2001,” Table HM-10 (2001). Note: The term “urban” is used by the U.S. Department of Transportation to include a U.S. Census-designated place with a population between 5,000 and 50,000 or a designated area with a population greater than 50,000.

These roads are critical because they provide the most direct access to homes, businesses, and institutions. Local roads and streets enable travelers to make the first and last part of every trip; they also support postal and parcel deliveries, emergency services by police, fire, and ambulance services, trash collection, and a wide range of similar services. Local streets also are the rights-of-way for telephone and electric power lines and pipes that provide gas, water, and sewer services to homes and businesses. Because access to property and services impart value to land, local governments typically require developers of land to build streets and cede them to the public.

Table 2. Highway System Travel, 2001 (in millions of miles)

	Miles Traveled	Percent of National Total Miles Traveled	Percent of Category
Rural Roads			
Interstate	275,402	9.84%	24.82%
Other Principal Arterial	253,517	9.06%	22.84%
Minor Arterial	174,798	6.24%	15.75%
Major Collector	212,246	7.58%	19.12%
Minor Collector	60,269	2.15%	5.43%
Local	133,576	4.77%	12.04%
Total Rural	1,109,808	39.65%	100.00%
Urban Roads			
Interstate	403,630	14.42%	23.89%
Other Freeway & Expressway	183,746	6.56%	10.88%
Other Principal Arterial	403,628	14.42%	23.89%
Minor Arterial	332,474	11.88%	19.68%
Collector	139,638	4.99%	8.27%
Local	226,334	8.09%	13.40%
Total Urban	1,689,450	60.35%	100.00%
	2,799,258	100.00%	

Source: Federal Highway Administration, "Highway Statistics Series, 2001," Table VM-2 (2001).

The maintenance and operation of local streets is also supported with general funds of local governments using revenue from real estate taxes on residential, commercial, and industrial property. In recent years, many local governments have also used similar financial support to provide local public transit services, which can be viewed as a source of basic accessibility.

Although most transportation facilities are formally built, owned, and operated by local and state governments, the federal government's role in transportation grew significantly during the last century, and in many ways, actions undertaken by the states reflect national transportation and environmental policies. The federal government directly builds and owns few roads, most of which are on federal lands, but the U.S. Constitution enumerates a federal responsibility for "interstate commerce."

After World War II, the National System of Interstate and Defense Highways, consisting of more than 40,000 miles of high-quality highways, was made possible by a substantial increase in federal fuel taxes and excise taxes on vehicles and components, such as tires. Gradually, while the states were still ostensibly making the most important decisions, the federal government required them to fulfill certain requirements in order to receive coveted federal funds. States must now plan their highways and transit facilities in accordance with federal planning guidelines and must meet federal environmental protection requirements. Because the federal government oversees the health and well-being of its citizens, it also regulates the safety features, energy consumption, and pollution production of vehicles that are produced by private companies for private owners.

Under the Constitution, most government functions not specifically assigned to the federal government reside with the states, however. In the early part of the twentieth century, states' roles in transportation grew dramatically as automobile and truck travel expanded much faster than population, and the provision of intercity highway connections became necessary and expensive. Most heavily traveled, long-distance roads in the United States, and many transportation facilities serving other modes of travel, are owned and operated by

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state departments of transportation and overseen by commissions of citizens appointed by state governors or legislatures.

States differ greatly in their transportation practices. Nevertheless, many similarities run through their approaches. Fees for the use of the transportation system, in the form of transit fares, highway tolls, state fuel taxes, and vehicle registration fees, finance many transportation projects. Some states borrow money by issuing bonds to finance new transportation capacity. User fees are often used to repay this debt, but in some instances, bonds are backed by the general revenues of the states.

Other elements of the system are metropolitan planning organizations (MPOs) and other regional players. Most Americans are far more aware of local, state, and federal governments than they are of regional agencies, yet these entities are gradually becoming major players in transportation decisionmaking. Metropolitan areas contain many government jurisdictions, and many trips commonly cross local boundaries—as do the troublesome environmental and social impact of transportation. Although regional agencies rarely have the authority to levy taxes or raise their own funds, they have in some cases gained formal authority over state funds spent within their jurisdictions, and this gives them considerable financial power.²

For decades, regional MPOs decided how federal transportation funds would be spent within fairly tight limits as determined by federal and state laws and narrowly specified funding categories. These agencies gained substantial new influence with passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991.³ This law reduced federal limitations and increased the flexibility with which regional agencies could allocate funds among types of projects.⁴ States have also acted in recent years to increase the role of regional planning agencies. In California, for example, three-fourths of federal and state highway and transit funds are designated by state law to be spent in accordance with priorities set by the MPOs.

III. The Challenge Facing Transportation Revenues

For 80 years, federal and state 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 “balanced” transportation system, highway user fees also contributed increasingly to the construction and operation of public transit systems. But now there is a major change underway, and most citizens are not even aware that it is happening.

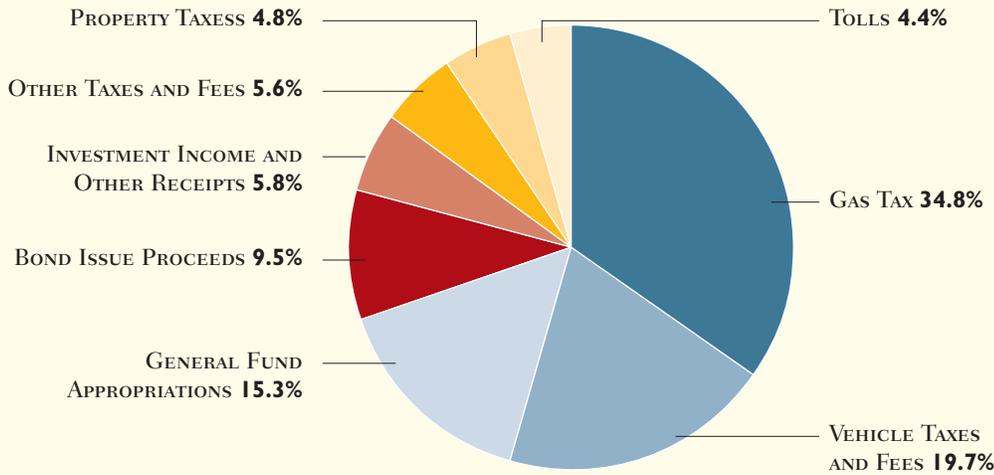
With federal and state fuel taxes rising much more slowly than travel volume and system costs, legislators are looking for new money to help build, operate, and maintain the transportation system. But instead of raising fuel taxes or introducing new forms of user fees to cover these needs, lawmakers are forcing local governments to raise nonuser funds locally and, in effect, are changing the basis of transportation finance to more resemble the situation that existed prior to the invention of user fees. Cities, counties, and transit districts are all increasingly turning to “local option transportation taxes” to fund new transportation investments. The most visible examples of these in recent years have been voter-approved sales taxes to fund particular roads and rail transit projects.⁵

State legislators and federal lawmakers have recently responded to the real decline in user fee revenue in several ways. They have encouraged local transportation tax measures. They have increased borrowing to support transportation programs. And they have promoted more vigorous competition among states for available federal funds. They have avoided, however, the most promising direction for improving transportation finance: expanding the use of user fees.

Figure 1 summarizes the diversity of revenue sources for highways. Although state user fees and the return to the states of federal user fees continue to provide a majority of revenues, this share has decreased over time, and other sources are becoming increasingly significant. Table 3, using data assembled by the Surface Transportation Policy Project,

Figure 1: Revenue Sources for Highways, 2001

Total = \$132,874,555,000



Source: Robert Puentes and Ryan Prince, "Fueling Transportation Finance: A Primer on the Gas Tax" (Washington: Brookings Institution, 2003). Includes federal, state and local sources.

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Table 3: Changes in State and Local Transportation Revenue, 1995–1999 (in \$ millions)

Type of Revenue	1995	1999	Change	Percent Change
State Borrowing	\$4,316	\$8,298	\$3,982	92.26%
Other Local Taxes, Incl. Sales Taxes	\$4,487	\$7,079	\$2,592	57.77%
Other State Taxes	\$6,565	\$8,560	\$1,995	30.39%
Local General Funds	\$12,326	\$15,857	\$3,531	28.65%
Local Property Taxes	\$5,220	\$6,384	\$1,164	22.30%
State User Fees	\$36,200	\$42,730	\$6,530	18.04%

Source: Surface Transportation Policy Project, "Measuring Up: The Trend Toward Voter Approved Transportation Funding" (2002).

shows how dramatic the change has been in just five years. While revenue from user fees increased by 18 percent between 1995 and 1999 and remains the largest single source of revenue, local transportation taxes grew three times as fast during this period.

In short, America's system of transportation finance is quietly but steadily being restructured.

A. Declining Reliance on the Gas Tax

The first major influence on the nation's changing transportation finance system is its declining reliance on the gas tax.

Fuel taxes are usually levied as a charge per gallon of fuel sold. Generally, they do not increase automatically when the cost of living rises, as do sales and income taxes. Instead, they must be increased by legislative action. Although these taxes were in the past enormously popular—because many constituencies believed the benefits of transportation investments to be worth their costs—this is no longer true, and legislators appear to be willing to do almost anything but raise motor fuel taxes. Indeed, while 28 states have raised their gas taxes since 1992, only three raised them enough to keep pace with inflation, and in real terms, the average gas tax rate declined by about 14 percent in one decade.⁶

California provides a vivid example of what is happening in most states. Between 1947 and 1963, the California fuel tax increased three times (as did the federal fuel tax); after that, however, neither was raised for more than 20 years. Since 1982, the California gas tax has been raised only once by the legislature and once again by vote of the people because the governor refused to endorse an increase without a referendum. In 1957, the California fuel tax stood at 6 cents per gallon. If it had risen at the same rate as inflation in the cost of all goods and services, the state fuel tax would today be 32.5 cents per gallon, rather than its current 18 cents per gallon, which lags its 1957 buying power by 14.5 cents. California is not unique. On average, fuel taxes in the 50 states would have to rise about 11 cents per gallon just to recoup their 1957 buying power.⁷

Although these figures are stark, the financial situation is actually even worse. Overall, new vehicle fuel economy was about 14 miles per gallon in 1974, and today it stands at about 28 miles per gallon.⁸ The result is that, as less tax revenue per gallon is generated, Americans drive about twice as many miles per gallon; therefore, fuel tax revenues have plummeted when measured per mile of driving. What is more, congestion is worsening throughout the nation as revenues from user fees level off in current dollars and decline in buying power, and decline even more per vehicle mile traveled.⁹

Another problem is that the cost of roads and other transportation facilities has risen dramatically even as the revenue to support them has declined. Building and maintaining roads and transit facilities require spending on land, labor, capital equipment, and materials, all of which cost more than in the past. The *Engineering News-Record* construction cost index, for example, tracks the average cost in 20 cities of a mix of major ingredients in the cost of transportation facilities: common labor, steel, lumber, and concrete. Between 1957 and the end of 2002, the index rose by 817 percent.¹⁰ Although there was undoubtedly a gain in the productivity of construction expenditures during this time, it is nonetheless clear that revenues have declined dramatically in relation to costs.

Finally, according to the Federal Highway Administration (FHWA), road delays—defined as travel times in excess of those at free-flow conditions—increased by 8.5 percent between 1993 and 1997.¹¹ Growing congestion not only slows traffic down, it also pollutes the air and consumes precious fuel.¹² The Federal Highway Administration expects vehicle miles of travel to increase by another 42 percent between 2003 and 2020, with the growth rate for heavy trucks increasing faster than that for lighter vehicles.¹³ Congestion will surely worsen at some locations, and funding is also needed to address safety needs and the deterioration of older pavements and bridges.¹⁴

Faced with these escalating costs, the steady erosion of revenue from the motor fuels tax as a source of transportation finance is troubling.

B. Increased Reliance on Local Transportation Taxes

As gas tax yields sag reliance on local transportation taxes surges. Numerous local government ballot measures have been taking up the slack left by the stagnation of fuel tax revenues at the state and federal levels. Before 1980, few states permitted or encouraged towns or counties to levy their own special-purpose transportation fees, except for the property taxes traditionally used for neighborhood streets and county roads. In the 1970s, major metropolitan areas adopted permanent sales taxes to support new transit systems, and in the 1980s, several states authorized local jurisdictions to hold elections to enact measures to raise revenues for transportation purposes. The pace accelerated during the 1990s with 21 states either adopting new laws authorizing local option transportation taxes or witnessing dramatic expansion in their use.¹⁵

During 2002, American voters considered 41 separate ballot measures to raise money for transportation, of which only nine were statewide elections and of which only a handful involved user fees such as fuel taxes.¹⁶ Some local governments have enacted vehicle registration fees (arguably a user fee, but more accurately a form of property taxation), taxes on real estate sales, local income or payroll taxes earmarked for transportation, and taxes on new real estate developments.

Despite these variations, the most common approaches taken (used in about half of the measures) were local sales taxes.¹⁷ Sales taxes have a broad base and because they apply to the purchase of many goods, the rate of increase can be relatively low. This tends to make sales taxes more popular than increases in user fees, which are more concentrated because they fall on fewer people. One county in California, for example, estimated that a 1 percent countywide sales tax increase would produce as much added revenue for transportation as would a motor fuel tax increase of 16 cents per gallon.¹⁸

Local sales taxes weaken the role of the states and are in several ways less equitable and less efficient than user fees. User fees, after all, directly impose on travelers and system users the costs of building and maintaining the facilities from which they benefit and the indirect costs of resource depletion, air pollution, and other transportation “externalities.” Moreover, user fees induce more efficient behavior, unlike sales and property taxes. If bridge tolls are increased, for example, some travelers decide to carpool or shift to public transit for the journey to work.¹⁹

Higher fuel taxes also encourage the purchase of more fuel-efficient vehicles. Sales and property taxes, on the other hand, do nothing to encourage more efficient or socially responsible use of the transportation system. Furthermore, our cities and towns need local sales and property taxes to provide essential services for which user charges are unavailable or undesirable, such as for schools and libraries. Revenues from sales taxes, in particular, also tend to drop dramatically in periods of recession, just when government needs increased revenues the most.

So, although more local governments are turning to them, and reliance on them is increasing, local transportation taxes present challenges for public policy.

C. An Explosion in Borrowing

Borrowing is also on the upswing. As Table 3 indicates, state borrowing was the fastest growing source of revenue for transportation projects and programs in recent years. Proponents of a variety of forms of borrowing prefer to call this approach “innovative financing,” usually through loans or issuing bonds.

A few states have created “infrastructure banks” that provide low-interest loans and other forms of credit enhancement for transportation projects.²⁰ Others have developed financial instruments that enable them to borrow against anticipated future federal appropriations and future revenues from a variety of taxes earmarked for transportation.²¹ Borrowed money, however, is not really revenue at all given that it must later be repaid using revenues from either taxes or user fees. And, of course, the state must also bear the cost of interest, which, if funds are held for 20 or 30 years, often exceeds the value of the principal.

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Borrowing is sometimes worth undertaking, for example, when early construction of a project saves construction costs and revenues later in the life of the project are likely to exceed the interest payments. It is appropriate to fund some capital projects with borrowed funds, and systematic analysis can show when the benefits of doing so exceed the costs. But borrowing is not always justified, and it is troubling that elected officials operating under term limits increasingly prefer borrowing simply because it defers the implied tax increases to a future date, presumably after they have left office.

In the current fiscal climate, the issue of state indebtedness for transportation projects will come under more scrutiny and may not be sustainable in the long term.

D. The Politics of Spending Highway User Fees

Spending issues also enter into the finance picture.

If funds collected from tolls and motor fuel taxes are actually “user fees,” they are akin to a price charged in exchange for the benefits received from the roads. If this is so, complex philosophical and political questions arise about how the funds should appropriately be spent. Many believe that funds collected in these ways should be strictly reserved to pay costs associated with the construction, maintenance, and operation of highways. The use of such funds to cover state expenditures for health care or education would seem to many observers to be an inappropriate use of these revenues.²² Others believe that public funds should be used for any public purpose deemed appropriate by elected officials. Some also argue that expenditures on transit and bicycle paths improve the overall efficiency of highways and should be permitted for highway user fees. Many environmentalists contend that highways impose “unpriced” externalities, such as air pollution on entire communities, and therefore the funds should be broadly available for any public purpose.²³

Clearly, this debate varies from state to state. Some states have primarily urban populations, while others are largely rural. Levels of congestion differ greatly from place to place. Some states host much more through traffic by nonresidents than others. Some states experience mainly automobile travel while others see more goods movement. Some make extensive use of toll roads while others rely entirely on motor fuel taxes. Some states directly fund mass transportation systems and operations, while others finance mass transit entirely through local governments and special districts. It is not surprising, therefore, that states take different positions on the issue of eligible uses of fuel tax revenues. Thirty states restrict the use of motor fuel tax receipts to the planning, development, building, operation, maintenance, and administration of highways.²⁴

Research is needed to clarify relations between transportation patterns and conditions in states and their stance on how user fee revenue is spent. It is likely, however, that there are large differences of opinion within states, reflecting different philosophical positions and competing priorities of interest groups, even more than the unique history of each state. Regardless of the current status of state spending policies, this question is certain to be central in policy debates on transportation finance in every state as well as at the national level.

E. Increasing Competition for Federal Funds

Finally, because it is becoming increasingly difficult for states to raise their motor fuel taxes, competition among the states for federal dollars is becoming ever more intense. The proceeds of the federal gas tax, presently set at 18.4 cents per gallon, are distributed to states based on “allocation formulas,” which differ somewhat from one federal program to another.

For example, federal funds to maintain interstate highways are divided among the states based on a formula that equally weighs their miles of interstate highways, vehicle miles of travel on interstate highways, and annual contributions to the federal highway account attributable to commercial vehicles. Federal funds available for the Congestion Mitigation and Air Quality (CMAQ) program are distributed to states based on the populations living where federal air quality standards have not been attained or in maintenance areas (a maintenance area is one that has only recently attained federal air quality standards).²⁵

Table 4: Federal Highway Trust Fund Account Receipts and Apportionments Attributable to the States, 1998–2002 (in \$ thousands).²⁶

State	Payments	Apportionments & Allocations	Percent of Apportionments to Payments 1998–2002	Cumulated Percent Since July 1956
Alaska	285,028	1,984,420	696.22%	667.83%
District of Columbia	161,428	601,273	372.47%	407.26%
South Dakota	470,193	1,132,065	240.77%	205.36%
Hawaii	348,636	819,681	235.11%	343.19%
Montana	646,463	1,515,257	234.39%	235.25%
Rhode Island	386,812	885,713	228.98%	221.75%
North Dakota	464,532	1,062,331	228.69%	202.07%
Vermont	354,860	686,606	193.49%	206.04%
West Virginia	1,048,373	1,864,971	177.89%	192.36%
Delaware	383,835	647,459	168.68%	153.43%
Idaho	813,380	1,251,898	153.91%	165.79%
Connecticut	1,478,885	2,199,252	148.71%	171.01%
Wyoming	732,239	1,082,179	147.79%	177.52%
New York	5,821,622	7,445,030	127.89%	122.52%
Pennsylvania	5,790,087	7,145,528	123.41%	115.93%
New Mexico	1,253,078	1,484,531	118.47%	129.19%
New Hampshire	662,759	756,744	114.18%	131.77%
Nevada	1,007,444	1,143,491	113.50%	139.31%
Minnesota	1,960,411	2,216,240	113.05%	123.60%
Utah	1,193,121	1,341,148	112.41%	145.56%
Wisconsin	2,709,206	2,989,219	110.34%	93.52%
Iowa	1,615,921	1,757,601	108.77%	111.96%
Alabama	2,930,546	3,154,444	107.64%	108.69%
Arkansas	1,955,089	2,095,425	107.18%	100.38%
Kansas	1,580,832	1,687,300	106.73%	107.86%
Oregon	1,784,524	1,899,445	106.44%	116.64%
Maine	748,896	788,291	105.26%	110.76%
Washington	2,726,857	2,851,538	104.57%	140.74%
Mississippi	1,946,524	2,006,705	103.09%	98.84%
Nebraska	1,098,364	1,126,704	102.58%	110.24%
Illinois	4,808,583	4,865,999	101.19%	108.00%
Maryland	2,554,138	2,570,888	100.66%	132.87%
Massachusetts	2,650,526	2,655,463	100.19%	154.47%
Virginia	4,038,400	4,033,919	99.89%	108.70%
Colorado	1,912,462	1,879,113	98.26%	121.71%
Missouri	3,642,282	3,520,212	96.65%	94.38%
California	14,502,081	13,956,333	96.24%	95.47%
Kentucky	2,757,062	2,643,284	95.87%	102.27%
Tennessee	3,531,372	3,351,597	94.91%	96.60%
North Carolina	4,377,032	4,148,098	94.77%	87.58%
Indiana	3,658,617	3,445,112	94.16%	87.91%
Louisiana	2,491,503	2,340,699	93.95%	114.86%
Ohio	5,370,037	5,026,540	93.60%	91.62%
Arizona	2,669,687	2,490,982	93.31%	109.01%
Oklahoma	2,367,160	2,206,443	93.21%	87.08%
Michigan	4,974,711	4,633,949	93.15%	89.66%
South Carolina	2,596,613	2,417,680	93.11%	88.69%
New Jersey	4,123,792	3,770,152	91.42%	98.64%
Florida	7,448,080	6,772,458	90.93%	88.93%
Georgia	5,569,352	5,060,722	90.87%	91.06%
Texas	12,060,258	10,919,014	90.54%	85.29%
Total	142,463,693	150,331,144	105.52%	108.05%

Source: Federal Highway Administration, "Highway Statistics Series, 2001," Tables FE221 and FE221b (2001).

“Competition among the states for federal dollars is becoming ever more intense.”

“Research indicates that an optimal system of road user charges, coupled with appropriate construction standards, could save money for everyone.”

As shown in Table 4, some states receive far more in federal highway funds than they contribute to the federal Highway Trust Fund (HTF), while others receive less than they have contributed. According to figures from the U.S. Department of Transportation, between 1956 and 1997, Alaska received more than 6.5 times the federal highway funds it contributed to the HTF in motor fuel and other user fees, while Texas received only 85 percent of the funds paid within its borders.

The political debates that shape new transportation legislation are often dominated by the efforts of “donor” states, such as Michigan and North Carolina, to revise allocation formulas to capture larger shares of their federal contributions, while recipient, or “donee,” states such as Montana and Hawaii argue that the most fair allocation formulas are those that maintain their large shares. Of course, a reasonable observer might expect some redistribution to be appropriate and might ask whether a federal transportation financing program that returns all money to the states in which it was collected is, in the end, likely to produce a result little different from 50 separate state funding programs.

Similarly, by capping spending, the federal government for some years allowed the balance in the federal highway account to grow by billions of dollars annually, claiming that by spending less on highways in a given year than it collected, it was contributing to deficit reduction. The states worked tirelessly to end this practice, and succeeded in incorporating into TEA-21 the Revenue Aligned Budgetary Authority. RABA, as it is known, requires “spending down” the balance in the Highway Trust Fund by tying federal funding to the level of the HTF, thereby liberating more federal money for the states.

This tactic seems to have backfired to some extent, however. As the national recession proceeds, and gas tax revenues decrease, income to the HTF has fallen, creating a “negative RABA” effect—meaning that since spending must reflect income into the highway account it now has to decrease rather than increase. This threatens to further intensify competition among the states for larger slices of the federal pie during the current reauthorization debate.²⁷

IV. Strategies for Renewing Transportation Revenues

Considering these issues, alternative strategies for supporting transportation revenues are garnering more and more attention. This section describes two such strategies.

A. Aligning Transportation Charges with Costs Imposed by Different Users

Transportation programs at the state and federal levels that rely to a considerable extent on user fees continue to face long-term, complex, and politically charged problems. User fees, including vehicle registration and license charges, fuel taxes, truck weight and distance charges, and tolls should, in principle, be structured such that the fees recovered from different classes of vehicles reflect the costs borne by governments to provide those vehicles with the opportunity to travel.

For example, heavy trucks impose costs on the highway system that significantly exceed those of light duty vehicles, such as family automobiles. Heavy vehicles increase construction costs by requiring more gentle grades and curves and substantially thicker pavements than lighter vehicles.²⁸ Maintenance costs are also high on highway segments that carry large volumes of heavy vehicles. In recognition of these higher costs, states demand that heavy trucks pay higher vehicle registration fees and, where tolls exist, pay higher tolls. Most heavy trucks are powered by diesel engines, with fuel economy rates well below those of cars. Trucks thus pay taxes on diesel fuel that are higher per mile of driving than light vehicles.

Many studies demonstrate that the current system of user fees involves numerous “cross subsidies” of some groups of vehicles by others.²⁹ Table 5 summarizes data recently pub-

Table 5: Ratio of 2000 User Fee Payments to Allocated Costs for All Levels of Government

Vehicle Class/ Registered Weight	Federal	State	Federal and State	Local	All Levels of Govt.
Autos	0.9	1.0	1.0	0.1	0.7
Pickups/Vans	1.2	1.2	1.2	0.1	0.9
Buses	0.1	0.8	0.5	0.0	0.4
All Passenger Vehicles	1.0	1.0	1.0	0.1	0.8
Single-Unit Trucks					
≤25,000 pounds	1.4	2.2	1.9	0.1	1.5
25,001 – 50,000 pounds	0.6	1.0	0.8	0.0	0.6
>50,000 pounds	0.5	0.5	0.5	0.0	0.4
All Single Units	0.8	1.2	1.1	0.1	0.8
Combination Trucks					
≤50,000 pounds	1.4	1.7	1.6	0.1	1.3
50,001 – 70,000 pounds	1.0	1.3	1.1	0.1	0.9
70,001 – 75,000 pounds	0.9	1.1	1.0	0.1	0.8
75,001 – 80,000 pounds	0.9	0.9	0.9	0.1	0.8
>80,001	0.6	1.0	0.9	0.0	0.7
All Combinations	0.9	1.0	0.9	0.1	0.8
All Trucks	0.9	1.1	1.0	0.1	0.8
All Vehicles	0.9	1.0	1.0	0.1	0.8

Source: Federal Highway Administration, "Federal Highway Cost Allocation Study: Final Report" (1997).

lished by the federal government resulting from its latest “Highway Cost Allocation Study.” The table shows that when user fees paid to all levels of government are estimated, different types of vehicles pay dramatically different proportions of the costs they impose on the highway system. In the aggregate, single-unit trucks weighing more than 50,000 pounds contribute in user fees only 40 percent of the estimated costs of their use. Autos contribute 70 percent of their costs; pickup trucks and vans, 90 percent; and single-unit trucks weighing less than 25,000 pounds contribute 150 percent of their costs through the taxes and fees that they pay.³⁰

The mispricing of highway use is of enormous consequence. Small, Winston, and Evans have shown that an optimal system of road user charges, coupled with appropriate construction standards, could save money for everyone. If charges were levied fairly in proportion to the costs imposed by vehicles type, and those charges vigorously enforced, and if roads were constructed to more demanding standards, savings in road maintenance and replacement costs over time would be great enough to permit lower user fees for all classes of vehicles.³¹ The transition period would span several decades, however, because it would take time to rebuild all the roads to the necessary standards.

Of course, this issue is politically explosive, and it is difficult to achieve even marginal changes in the direction of full cost recovery from user charges on each class of vehicle. The trucking industry is intensely competitive, and many trucking companies are small family businesses. Increases in charges for heavy trucks increase business risk, especially if charges are much higher in some states than in others. Although trucking interests point out that higher costs would necessarily be passed on to consumers of the goods that are moved by truck, others cite the efficiency, environmental, and congestion benefits of higher trucking costs. The latter would constitute incentives to shift a larger share of long-distance freight movements to the rail system.

Of course, it remains difficult to convince any state to change its user fees to any significant extent. Because interstate truckers travel very long distances and their vehicles have large fuel tanks, if one state were to raise motor fuel taxes more than its neighbors, trucks would likely buy fuel in neighboring states. In the past, political compromises that involved higher user charges for trucks also resulted in approval for using even larger and heavier trucks, which, to a certain extent, lessened the effectiveness of the new policies.

B. Widespread Adoption of Electronic Toll Collection Systems

It seems safe to say, then, that the nation will likely be unable to rely on fuel taxes to finance roads or transit systems in the long term. The current development of hybrid engines that dramatically improve fuel economy is only a hint of changes likely to come. The world's supply of petroleum is finite, and we are already developing a variety of biofuels and other synthetic fuels. Fuel cells are also seen by many as a likely source of power for the future, and they may not, in the longer term, use petroleum-based fuels. At the very least, a changing and uncertain relation between travel and the consumption of petroleum-based fuels lies ahead.

We could, of course, tax hydrogen or biofuels as we do gasoline, but doing so would likely conflict with other policy goals, such as reducing pollution and achieving energy independence. In the long term, we will undoubtedly charge on the basis of road use rather than fuel use. Every reasonable projection of technological change indicates that gasoline and diesel fuel will dominate the market for surface transportation fuel for at least two decades, and probably three. However, traffic will continue to grow and funds will be needed for transportation infrastructure construction, operation, and maintenance.

To meet those needs, many predict a greater role for tolls (which now make up about 7.8 percent of all user fee revenues for highways, and 4.4 percent of total revenue sources). Electronic toll collection (ETC) is expanding dramatically and is likely the way we will charge users of transportation facilities in the future. Travelers will eventually pay electronically for each use of the system, with charges reflecting the cost of using particular facilities at particular times of day by vehicles with particular characteristics. Almost 95 percent of all toll collection lanes in U.S. major metropolitan areas already have ETC capability, and the Federal Highway Administration expects 100 percent coverage by 2005.³²

Economists have long argued that the only way to completely solve the congestion problem is through congestion-related pricing made possible by ETC systems. Economic theory says that the price of traveling should be higher at the places and during the times of day when demand for highways (and benefit from using them) is greatest. If a bridge toll, for example, cost three times more during periods of highest congestion than in the middle of the night, some travelers would surely be more likely to use public transit, form car pools, use less crowded alternate routes, or delay less essential trips to off-peak hours.³³ And in fact, several dozen travel corridors throughout the world currently use variable pricing for travel, including a small handful in the United States. Congestion pricing has been successfully used in Singapore for more than 25 years, and London implemented congestion pricing in 2003.³⁴

Although transportation experts have discussed congestion pricing for decades, one of the major obstacles to its implementation has long been the technical difficulty of collecting tolls. Building toll plazas and varying the charges with time of day and class of vehicle is complex, expensive, and politically problematic. Recent advances in information technology, however, now make such pricing much more technically feasible. Small, inexpensive transponders enable each motorist to be charged a different fee to use each segment of road at a particular time of day. The charges can appear on monthly credit card bills.³⁵

The technical capacity now exists to integrate into one system the mechanisms for financing our highway system and managing congestion. Charging more than we now do for the use of the busiest roads at the busiest times of day, and quite a bit less than we now do at other times and places, would be the fairest and most efficient way to raise the funds needed for operating and expanding the capacity of the transportation system. At the same

time, we could use the charges to meter the use of the system to dramatically control congestion.

Some argue that the accounting system needed for congestion pricing will be an invasion of privacy, but it is possible to prevent this by using numbered accounts. Others argue that congestion pricing discriminates against the poor. Yet the current system of transportation finance is not at all neutral with respect to income, and a system of direct charges for actual benefits gained from using the system is inherently fairer than a complex system of cross-subsidies. For many trips, the proposed approach would lower trip costs compared with the current means of pricing travel. It would also surely be possible to offer lifeline rates to the poor.

V. Conclusions and Policy Recommendations

Choosing the best financing mechanisms for transportation is a difficult balancing act. Today, citizens demand not only that the finance system raise needed revenue, but that it also include incentives to promote economic activity, provide improved access for people of all ages and income groups, and discourage environmentally damaging behavior. It is essential that charges and fees for the use of transportation systems produce needed revenues, but it is also important that they incorporate incentives and price signals to attain other program and policy objectives, including efficiency and equity. In view of that, here are four recommendations for improving the equity and efficiency of our nation's system of surface transportation finance.

A. States should assume responsibility for increasing transportation revenues, rather than devolving the obligation to local governments.

User fees continue to be among the most effective, efficient, and equitable approach to transportation finance. In the short term, fuel taxes are the most readily available user fees, and states should raise fuel taxes to support transportation programs rather than devolve funding responsibility to local governments through local tax measures.

However, state legislators and members of Congress seem intent on avoiding any action that could be interpreted as a tax increase. They find it difficult to agree on an optimal allocation of user fees among classes of vehicles, and they find it painful to confront controversy over the allocation of highway user fees to public transit systems. All of this has increased lawmakers' reluctance to raise state and federal motor fuel taxes, despite the fact that these, for decades, were viewed not as taxes at all, but as charges appropriately levied against those who benefit from the system and whose travel imposes costs on it. To a certain extent, this trend in the states is exacerbated by the influence of term limits. Legislators seem unwilling to raise motor fuel taxes because they know they will soon be out of office, and they do not wish to leave higher fuel taxes as their legacy.³⁶

In short, transportation finance is increasingly dominated by a politics of expediency, as state legislators continue to shift burdens onto local option transportation taxes and borrowing. More and more the choice between one type of revenue-raising mechanism and another is based entirely on revenue production and short-term acceptability to the voters. Overlooked as the responsibility for revenue production devolves back to local government is the fact that the revenue mechanisms are becoming simultaneously more inefficient and inequitable. States need to reassume responsibility for ensuring the adequacy and fairness of transportation funding.

B. While continuing to rely on motor fuel taxes as the principal source of user financing, states should explore and plan for widespread deployment of electronic toll collection systems.

Although motor fuel taxes have been the primary means of raising transportation revenues for more than 80 years, and will remain viable for some time to come, their days may be

numbered for practical reasons that reach beyond the political. Increasing concerns about global climate change and experimentation with alternative fuels suggest that over time we can expect dramatically improved vehicle energy efficiency. It is also increasingly likely that in the foreseeable future vehicles will be powered by a much wider variety of fuels. Although we cannot say so with certainty, many are betting that hydrogen will, before long, be the basis of automotive power.

In view of this, Congress and state legislatures should be urged to consider increases in fuel taxes during the reauthorization debate and in coming years, even though in all likelihood this type of user charge will gradually become obsolete. Legislators, in this respect, should keep one eye on the short term, during which fuel taxes should be given more attention than they have lately, and focus the other eye on the longer term, when fuel taxes are likely to become far less useful.

Tolls were originally understood to be a direct and appropriate form of user charge, but tolls were expensive and annoying to collect.³⁷ But now we have finally perfected electronic toll collection, a technology that makes it feasible to collect tolls unobtrusively and inexpensively. Motorists by the millions are using “EZ Pass” on the East Coast, “Fastrak” on the West Coast, and a variety of electronic toll devices in between. The success of this approach is a clear glimpse of the future. In fact, a recent study concluded that electronic toll collection is feasible on a much larger scale than it has been thus far deployed. Its authors believe that issues that, at first glance, appear to present insurmountable political hurdles, such as personal privacy, can be overcome without undue difficulty.³⁸

Eventually, electronic toll collection could possibly supplant fuel taxes as the principal means by which states finance the construction, maintenance, and operation of highways. As recognized in the 1920s, directly charging users at the time and place of use is the fairest and most efficient way of financing transportation systems. Electronic toll collection could also reduce the complexity of different charges for different classes of vehicles. Similarly, a change over time to electronic user fees could correct other inequities in the current system of user charges. For example, fuel taxes tend to overcharge urban travelers relative to rural drivers, and those who travel off-peak relative to those who drive at rush hour.³⁹

C. Pricing strategies should promote more efficient use of the transportation system.

Financial strategies must always be considered in light of their potential to produce revenue, but consideration should also be given to the opportunity to use prices and charges to increase the efficient use of the existing transportation system. State and federal transportation funding programs can promote electronic toll collection as a means of increasing capacity by improving the efficiency with which the existing transportation system is used. Efficiency gains from toll collection come not only from the simple flat fees applied for the use of a facility. Rather, the real gains from greater reliance on tolling will flow from the opportunity to use price differentials to promote more efficient use of the system.

One example would be using higher tolls on existing toll bridges and highways at the most congested hours and lower tolls when demand for travel is lowest. Another example is “High Occupancy Toll (HOT) lanes,” a variety of High Occupancy Vehicle (HOV) lanes. Where HOV lanes have unutilized capacity, they can be made available to single-occupant vehicles for a fee using electronic toll collection. This enhances state highway system revenue and reduces congestion on the parallel, mixed-flow lanes without requiring much construction. A similar application of tolling that has the potential to increase efficiency is that of allowing heavy trucks to pay fees for the privilege of bypassing ramp meters at freeway entrances.⁴⁰

D. Pricing strategies should reflect the costs to provide different transportation services.

In keeping with the principle that pricing can be used to induce behavior that makes more efficient use of the transportation system, it follows that, in many instances, the most appropriate way of achieving this is to set charges that reflect the social marginal cost of

the use of the facility. Heavy trucks should eventually be charged more to travel on a toll road than light duty vehicles because they impose heavier costs on those facilities; peak-hour users of roadways should be charged more than off-peak users because they impose higher marginal costs on society by traveling at the most crowded hours. Off-peak travelers, on the other hand, should receive a price break because they impose lower costs on transportation facilities.

VI. Conclusion

The transportation system is the ultimate public-private partnership. Cars and trucks are almost all privately owned, while the roadways are almost all public property. Americans fund highways and public transit systems through a complex partnership between many government bodies, continually influenced by numerous private, corporate, and civic interests. Governments at many levels interact with one another to build and manage the transportation system.

Given this complex arrangement, coupled with bureaucratic inertia, it will certainly be a challenge to fully achieve the ideals suggested here of a revenue system that also helps manage the transportation system. It is reasonable, however, to hold as an ideal the development of a system of user fees that produces adequate revenue to build and manage the transportation system while simultaneously promoting efficiency and equity. There will always be a need to balance these goals against the political process that, after all, epitomizes the art of the possible. On the other hand, the rapid development of technology to levy transportation charges means that the process of charging is no longer a barrier preventing progress toward this ideal. Building public understanding of the many possibilities for better service at lower cost through a system of transportation fees is the first step on what will undoubtedly be a long journey.

“It is essential that charges and fees for the use of transportation systems produce needed revenues, but it is also important that they incorporate incentives and price signals to attain other program and policy objectives, including efficiency and equity.”

Endnotes

- 1 Martin Wachs directs the Institute of Transportation Studies at the University of California, Berkeley, where he is also professor of city and regional planning and Carlson Distinguished Professor of Civil and Environmental Engineering. He is currently a visiting fellow at Resources for the Future in Washington, D.C.
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