

STRATEGIC ALTERNATIVES FOR FINANCING THE HIGHWAY SYSTEM

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The Federal Aid Highway Act of 1956 created the Highway Trust Fund, providing a stable funding source for the nation's highway system, one that was adequate for most national highway needs for about the next 15 years. The Trust Fund receives revenues from a variety of highway-related taxes, approximately 85 percent of which are taxes on motor fuel (gasoline and diesel). The original intent was to generate revenues that bore some relationship to highway use through a budget mechanism that was independent of near-term political forces.

Since the early 1970s, however, the Trust Fund approach to highway finance has encountered a series of structural problems that, over time, have necessitated finding new means of financing the ongoing maintenance and improvement of the nation's highway infrastructure. Starting in the 1970s, for example, the Congress and the Administration began to limit spending from the Trust Fund to help offset the growing federal deficit. This occurred at the same time that a combination of federal regulations and higher fuel prices was stimulating improvements in fuel economy. Over time, the federal highway finance program changed, and it now has many characteristics of a block grant program: funds are being distributed as broadly as possible, with little relationship to transportation demand or specific national objectives.

The recently passed Transportation Equity Act for the 21st Century (TEA-21) provides the highway system with a large increase in funding. This increase is the result of two policy decisions: to spend down part of the backlog of cash in the Trust Fund, and to spend all future highway-related tax revenues on transportation. Since there will be no opportunities in the future for such

"house cleaning," any future increases in federal funds for highway finance will require a significant increase in federal taxes.

What's Wrong with the Current Highway Finance System?

The current highway finance system has three fundamental structural problems:

- ◆ Political barriers to raising user taxes
- ◆ Unpredictable revenues
- ◆ Lack of linkage between user fees and highway system costs and benefits

Political Barriers to Raising User Taxes

As noted, the Highway Trust Fund was established in 1956 as a user-supported fund. Economists term such fees "benefit taxes." That is, receipts are related to highway use, which in turn is presumed to provide a rough measure of highway benefits. Elected officials and the general public, however, do not view fuel taxes as a direct proxy for the benefits derived from using the highway system. Rather, fuel taxes are regarded as just another tax, and politicians risk losing their jobs if they raise fuel taxes to meet the full costs of the highway system.

The difficulty associated with increasing the fuel tax rate has resulted in insufficient revenues to maintain, let alone improve, the existing highway system. While TEA-21 funds plus state and local funding should provide an annual capital outlay of about \$40 billion in highway finance from 1998 to 2003 (in 1995 dollars), the Federal Highway Administration estimates that \$53.5 billion a year is needed to maintain existing highway and bridge conditions. The cost to improve highway, bridge, and transit conditions is estimated to

average \$79.6 billion a year.^a And even at these high levels of funding, service quality would remain below what it was 20 years ago.

Despite the magnitude of this gap, increases in user fees have been few and far between. During the 1980s, states raised their own fees to match inflation on a regular basis; on average half the states did so each year. By the 1990s, the number of states increasing their gas tax had dropped to an average of fewer than 10 each year. Federal taxes dedicated to transportation had not been raised since the famous nickel increase in 1982 until the enactment of TEA-21, which transferred 4.3 cents per gallon in deficit-reduction taxes into the Trust Fund.

Unpredictable Revenues

In addition to political uncertainty, highway revenues are subject to economic uncertainty involving both demand and supply. The demand uncertainty comes about because fuel tax receipts are not linked to travel demand alone. Fuel economy varies widely according to the mix and technology of vehicles in the fleet and the presence or absence of regulations. For example, between 1975 and 1995, fuel economy for passenger cars in the United States increased from 13.5 to 22.6 mpg as a result of the regulation of Corporate Average Fuel Economy (CAFE) standards. Because of these increases in fuel economy, total annual U.S. vehicle gasoline use during the period increased from 99 to 117 million gallons (up 18 percent) while annual vehicle miles traveled (VMT) by automobiles and light trucks increased from 1.2 to 2.2 billion (up 83 percent).

In the long run, advances in technology—especially hybrid vehicles—should make it possible to achieve additional reductions in fuel consumed per VMT, and thus erode fuel taxes still further. Moreover, there is currently no tax linkage to the federal or state highway trust funds for alternative fuels such as electricity and natural gas. Thus, not only does the present system have inherently uncertain demand, but also there is a bias toward lower revenues.

On the other hand, the supply of gasoline in the United States depends in part on international petroleum reserves and production decisions. The

^a These estimates are derived from *1997 Status of the Nation's Surface Transportation System: Condition and Performance*, a report to Congress by the U.S. Department of Transportation (pp. 53–55). The estimated cost to maintain conditions is based on the Maintain User Costs estimate, adjusted upward by 16 percent. Dollars cited are adjusted to 1995.



Transportation Corridor Agencies' Eastern Toll Road ramp to SR 91. Electronic tolling will be compatible among all toll roads in Southern California.

supply is also dependent on demand elsewhere in the world. With the current faltering of the Asian economies, there is a global surplus of petroleum, and gas pump prices are the lowest in years. Lower gas prices, however, increase the demand for travel and gas, and raise revenues.

Lack of Linkage with Highway Costs and Benefits

The current set of highway user fees is not directly related to the costs and benefits of the highway system. Since the primary highway tax is included in the cost of every gallon of motor fuel, it does not have a visible link to use of the system. This lack of linkage encourages inefficient use of and investment in the system. It reinforces the impression that highways are a public good and dissociates the taxpayer from the actual system costs (both direct and indirect). The result is what economists call the “free rider” problem, with users unwilling to pay the full cost of highway use. The *1997 Federal Highway Cost Allocation Study* estimates that federal, state, and local user fees paid by all vehicles cover only 80 percent of costs occasioned by highway use (1,p.21). In contrast, consumers pay the full costs of production for most other goods and services.

It is also difficult to track the costs of the highway system since those costs cannot be distributed equitably among users according to how they are incurred. For example, all five-axle tractor semi-

trailers weighing between 50,000 and 100,000 lb pay approximately 6 cents/mile in user fees. Yet these trucks generate costs for highway wear and tear ranging from 3 cents/mile for the lightest truck to 14 cents/mile for the heaviest (1,p.14).

In addition, the current highway financing system makes it difficult to internalize external costs. Examples of external costs include the costs associated with pollution, safety, and congestion. Motor fuel taxes are average taxes and at best are set at levels required to recoup public expenditures. For ease of collection and understanding, the taxes are set at flat rates that at best mirror the average costs of providing the highway infrastructure. Motor fuel taxes do not encompass the incremental costs of pollution, reduced safety, or increased congestion imposed by highway users (and taxpayers) on the system. And while each additional user of the system imposes a greater cost, the increased user charges paid do not cover these higher costs (2).

Among these uncharged external costs, congestion is perhaps the largest in magnitude and the most important for the nation's economic well-being. Ironically, as adding capacity becomes increasingly difficult because of both funding constraints and limited political will to build new highways, congestion costs rise rapidly as well.

While the current highway finance system does not track direct and external costs very well, its failure to track benefits is perhaps more disturbing. The value of getting to a business meeting on time or of having a product arrive at the unloading dock when it is needed for a just-in-time shipment is many times the "price" paid through user fees. The lack of anything close to a market test for value received gives departments of transportation and others no incentive to provide better service.

What Can Be Done?

We present three options for addressing the above problems with the current highway finance system. One would work, but is painful and thus unlikely; one represents slight improvements to the existing unsatisfactory policy; and a third offers a long-term solution, but requires leadership and some imagination.

Large Increase in Federal-Aid Program

Until recently, a large increase in federal highway spending might occur in one of two ways:

- ◆ Spending the full resources in the Highway Trust Fund, or
- ◆ Increasing highway user taxes.

TEA-21 appears to have implemented the first option, yet there is still a shortfall in revenues. The agreement to increase spending to equal annual tax receipts, however, also calls for returning part of the cash balance to the Treasury, and future cash balances will no longer accrue interest. Therefore, an old-fashioned increase in federal highway taxes represents the only chance for a large increase in the federal program. Political realities make this option unlikely. Further, such increases would not correct the poor linkage between user fees and costs inherent in the current system.

Muddling Through

Since the Intermodal Surface Transportation Efficiency Act was enacted in 1991, a number of positive events have occurred in highway finance. In dollar terms, TEA-21 is most important, but since 1991 many states have begun to experiment with innovative financing methods, including soft loans and various types of credit support, sometimes using state infrastructure banks (see article by Grote and Seltzer in this issue). In addition, there has been a modest but mixed history of experimentation with public-private partnerships (see article by Giglio and Anknor in this issue). Examples include the Southern Connector in South Carolina and the SR 91 Expressway in Orange County, California. Although such approaches are interesting, the pace of evolution is moderate, so that the absolute dollar values generated to date have been limited.

One scenario calls for continued reliance on state and federal gas taxes and other fees, complemented by continued growth in innovative finance. While such a scenario makes for interesting debate over the pace at which evolution might occur, it does not represent a fundamental change. Rather, capital investment is unlikely to make it possible to offset two decades of imbalance between demand and investment. As a result, highway congestion will grow over increasingly longer periods of the day, and there will be deterioration in both highway and economic performance as people and goods experience increasing delays and uncertainties in daily travel.

Paradigm Shifts

Neither higher federal taxes nor muddling through appears to offer a particularly attractive option. Three possible paradigm shifts, none of which are mutually exclusive, offer a better alternative:

- ◆ Decentralize to the states and local governments.
- ◆ Link payment with use of the system.
- ◆ Implement true public-private partnerships.

Decentralize. States and local governments already own most of the nation's highway system and carry out investment and maintenance activities. The federal government serves as tax collector and regulator. Recent years have seen debate over variations on decentralization (with a modest federal role maintained for projects of true national significance or perhaps for cases in which a banker of last resort is needed). Such a shift could encourage a host of new financing approaches by giving states more flexibility in the use of highway trust funds. For example, the funds could be used as a loan to secure debt financing, as was done successfully for the George Bush Turnpike in Dallas, Texas. With decentralization and greater flexibility, moreover, new management philosophies may evolve, such as increased use of debt financing and leverage, and introduction of public-private partnerships for all aspects of highway construction and maintenance. Indeed, decentralization offers a possible institutional pathway to the next two options.

Link Payment with Use of the System. Electronic toll collection (ETC) has passed from experimentation into standard practice in parts of North America as widespread as Southern California, Oklahoma, Ohio, Florida, and Toronto. The E-ZPass program, for example, will encompass a network of toll facilities in Delaware, New Jersey, New York, and Pennsylvania; as of September 1998, 2.3 million E-ZPass transponders were in use in metropolitan New York City (3).

Until now, transponders and related intelligent transportation systems techniques have been used primarily to improve traffic flow or to alleviate the difficulties associated with manual toll collection. For the first time, however, transponders are also making it possible to move from an average tax to true use-based fees. Fees can now be set at rates that vary according to the costs imposed by highway users on the system and provide a better measure of the true value received. The result will be fees that begin to act like those in other markets, providing more accurate market signals, as well as significant increases in revenues. Successful experimentation along these lines is already under way. Examples are the SR 91 variable toll system and the growing interest in high-occupancy toll (HOT) lanes around the country.

Full implementation of such a system would require collection of usage fees for all highway travel—not just tolled facilities. The introduction of transponders, together with the use of readily available global positioning systems, makes this feasible, and would allow variable pricing accord-

ing to congestion, facility type, vehicle type, and time of day. One way of collecting fees through this system would be to use the swipe-card technology that is currently in place at many gas stations. This approach might be called a "variable gas tax"; some drivers would pay a higher and some a lower tax, depending on their use of the highway system. Full implementation of such a system would require both political courage and some time, but this option offers the potential for a far more market-oriented provision of highway services.

Implement True Public-Private Partnerships. Building on the above two changes, the private sector could assume a much greater role in funding, building, and operating the system (under public-sector stewardship). Unlike current efforts, such partnering could be implemented on a systemwide or regional basis, rather than piecemeal. Such a partnership approach would recognize that highway services are a public good while enabling private-sector management to offer the most cost-effective provision of services, regardless of whether a road was highly profitable or merely important for social and economic reasons.

As an example consider the Oklahoma turnpike model, whereby some revenue winners support revenue losers, but the system as a whole makes money. The Oklahoma Turnpike Authority built and operates 10 turnpikes to supplement the limited money appropriated for highway construction and maintenance. Turnpike revenues pay all turnpike operating and maintenance costs and pay off the bonds issued to finance turnpike construction. Also, state-maintained roads receive motor fuel tax money generated by those driving on the turnpikes; the Oklahoma turnpike system generates more than \$60 million in state and federal motor fuel tax revenues that is contributed to state-maintained roads. Roughly half of the toll revenues collected on Oklahoma turnpikes comes from out-of-state motorists. If tolls were eliminated, the state would have to spend at least \$37 to \$57 million per year from gasoline taxes to maintain the existing turnpikes, necessitating a tax increase (4).

A related model is being explored by Argentina as part of an ambitious plan to build a 10,000 km Interstate Highway System. This plan, called Proyecto 10, would combine a national network with private-sector concessionaires to build, finance, toll, and operate the system. Up to 300 private concessions would be put out for bid, with competition keeping costs down and service up. The Argentine

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government would back the plan with energy tax receipts (10 centavos per liter), payable only after each concession had opened to traffic. In a sense this is a 1990s version of the U.S. Highway Trust Fund. The only missing element is use of technology to link fees with the value of service provided.

Conclusion

The U.S. highway system is supported by federal and state gas taxes and other related fees. This set of indirect user fees has paid for the extensive highway network that is the mainstay of the nation's commerce and recreation. One does not lightly change practices that have served well for many years. Yet the Highway Trust Fund approach serves less and less well. It does not directly link fees for use of the system with costs occasioned by users. And it is subject to unpredictable vacillations in revenue that have little relation to highway use. It does not provide enough money to maintain the system.

Despite this erosion, there is no discernible radical imperative to change the current ways of financing the highway system. Yet change in highway finance is going to occur. Change will occur because:

- ◆ The rapid introduction of electronic technologies, such as electronic tolling and automatic vehicle identification, facilitates an efficient, direct means of paying for highway use, and is already being adopted by toll authorities across the nation.

- ◆ States must find new financing mechanisms to support the highway infrastructure essential to their economic growth needs.

- ◆ The introduction of alternative-fuel vehicles requires new and better means of assessing payments for highway use.

These same issues confront governments of all developed and developing nations. The question is not whether there will be change in the way the U.S. highway system is financed. The question is whether we will be positioned to take best advantage of the change when it occurs and to provide a framework that will best suit our local and national interests. Now is the time to develop and implement a strategic plan for reforming the way we finance the nation's highway system.

References

1. *1997 Federal Highway Cost Allocation Study*. U.S. Department of Transportation, Washington, D.C., 1997.
2. *Transportation Research Board Special Report 246, Paying Our Way: Estimating Marginal Social Costs of Freight Transportation*. National Research Council, Washington, D.C., 1996.
3. Interview with Frank Pascual, spokesman for the Metropolitan Transportation Authority, Bridges and Tunnels, September 15, 1998.
4. Interview with Neal McCaleb, Director, Oklahoma Turnpike Authority.

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has been completed, this system is expected to be a valuable safety improvement to hazardous intersections at which installation of traffic signals is not justified.

A handbook to help states design urban TMCs and improve the performance of TMC staff is also being prepared. Typically, TMCs have developed incrementally without incorporating a human operations perspective. This new handbook will provide much-needed guidance to TMC designers and operators.

Throughout his career, Tignor has been active in professional societies. He served 12 years on the TRB Travelers Services Committee, 6 of these as committee chair, and 3 years on the TRB Operation, Safety, and Maintenance of Transportation Facilities Group. In May 1998 he led an Innovative Traffic Controls group to Sweden, Germany, France, and Great Britain to determine which new technologies and traffic controls would be adaptable for implementation in the United States. The 10-person group included representatives from TRB, the U.S. Department of Transportation, state DOTs, and local governments.

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