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Perestroika For U.S. Highways: A Bold New Policy For Managing Roads for a Free Society

by Gabriel Roth

Reason Foundation

3415
S. Sepulveda Blvd.
Suite 400
Los Angeles
CA 90034
(310) 391-2245

Executive Summary

Highway officials reckon that over $300 billion are required to make good the deterioration of roads and bridges, and that further sums will be needed to increase capacity to reduce congestion, especially in expanding suburban areas (see. pg. 2). With the Highway Trust Fund Program due to expire in September 1991, Americans are understandably concerned about the future of their highway systems.

Although current discussion focuses on the sources for the required funding, more funding will not solve the "infrastructure crisis." As in Eastern Europe, there is a need to get away from the discredited "command economy" methods, and to use those of the market economy to improve and increase road capacity in the United States. Policymakers nationwide must be innovative and enable the private sector to apply to highways its ownership, pricing, and financing tools.

Problems with current system include:
--Highway Trust Fund (HTF), which funds major U.S. highways, discriminates against the private provision of roads and, because funds are filtered through government bureaucracy, inflates highway costs by 20-30 percent.
--The HTF enables states to implement low-priority projects at federal expense.
--Many states have laws prohibiting private provision of highways.

Recommendations for improved highway management:
--Assign ownership and responsibility of each highway segment to one clearly defined entity--federal, state, local, or private sector--to clarify accountability for maintenance and expansion needs (see pgs. 3-17, 36).
--Revise state laws to allow for private ownership and provision of roads. Private developers of roads and bridges have better access to financing mechanisms, can develop roads at a time and cost savings, and are not constrained by costly bureaucratic procedures (see pgs. 25-40).
--Allow the Highway Trust Fund to expire, along with the federal taxes that provide it with revenues, to free much-needed road funds from political battles in Washington; so highway funds can be put to use more readily and where demand is most urgent (see pgs. 6-17, 35).

Other recommendations include:
--Strengthening the link between prices paid and costs imposed by users (see pgs. 17-22).
--Use of axle load charges to assist in maintaining highways (see pgs. 22, 37).
--Use of pricing systems to free traffic flow in urban areas (see pgs. 17-22, 36).
--Use of financial profitability criteria for investment in highways (see pgs. 23-24).

These recommendations, if implemented, would enable public authorities to introduce to the highway sector business-oriented methods that are successfully used to manage commercial and industrial activities. But where political constraints prevent the public sector from using these methods, laws and funding methods should be changed to allow the private sector to proceed with projects, using these proven methods, at its own risk and expense.

I. INTRODUCTION

A. The Present System and Its Problems

While the 3.9 million miles of classified public roads in the United States comprise the world's finest highway system--the 44,629 mile National System of Interstate and Defense Highways alone is probably the greatest public works project ever built--the system is beset with major problems:

* Highway users face increasing congestion, which is particularly acute in urban and suburban areas. Average weekday peak-hour delays crossing the Hudson River into Manhattan roughly doubled between 1976 and 1986; speeds on many sections of Washington, D.C.'s Capital Beltway fell by 15 to 50 percent from 1982 to 1988; congestion delay in the San Francisco Bay Area grew more than 50 percent between 1986 and 1988; and total hours of traffic delay in the Los Angeles five-county area grew 30 percent between 1982 and 1984.(1)

* The system is suffering from a significant deterioration of pavements and bridges. The 1988 federal highway inventory showed that about 49.6 percent of the system's 1.06 million miles of heavily traveled road surfaces was in "fair" condition and 11.6 percent in "poor" or "very poor" condition. If these percentages apply to all paved roads in the United States--including local roads--there is a total of some 1.09 million miles of road surfaces in "fair" condition and 254,000 miles in "poor" and "very poor" condition. The total cost of repairing these road surfaces is estimated to be $286 billion in 1989 dollars. The 1989 federal bridge inventory rated as substandard 230,620 bridges (out of a total of 576,508 U.S. road bridges over 20 feet long) and estimated that their rehabilitation could cost $67 billion.(2)

As funds for highways are allocated by political processes, all the participants have strong incentives to exaggerate their "needs" in order to get bigger slices of the available funds. Therefore, the above figures may be on the high side. But there is indubitably a wide public perception, which readers may share in the light of their own experiences, that conditions on many U.S. highways are too poor to be acceptable.

B. Four Approaches to Improvement

Those who desire improvements typically follow one or more of the following approaches:

* Raise more money to keep the present system going--"we know what has to be done, just give us more funding";

* Improve management--change the organization and/or the staff;

* Improve charging systems and investment criteria--apply to highways the principles of pricing and investment that are used to allocate scarce resources in other sectors of the economy;

* Change the ownership structure--allow the private sector to provide highways.

This report will explore the last three approaches. It will follow a market-oriented approach to suggest changes in management, financing methods, and ownership structure to increase the productivity of the existing highway system and enable it to be expanded to meet future demands.

The first approach--finding new sources of public funds to keep the existing system going--will not be addressed because the highway problem is essentially institutional, and institutional problems cannot be solved by throwing money at them. Furthermore, in periods of federal financial deficits substantial new government funding sources are unlikely to materialize.

II. IMPROVING HIGHWAY MANAGEMENT

A. The Present Situation

The nation's 3.9 million miles of classified roads and streets can be divided both by jurisdiction--federal, state or local--and by function. The functional classification divides U.S. roads into arterials, collectors, and locals.

Arterials are the main highways that move traffic speedily from one area to the other; locals provide access to residences, farms and businesses; while collectors enable traffic to move between the locals and the arterials. The functional classification is further subdivided into "Principal Arterials," of which "Interstates" form an important component, and to "major" and "minor" arterials and collectors. Table 1 shows how the highways are divided by jurisdiction between state, local, and federal governments.

Table 1 shows that most of the highways--about 74 percent--are under local jurisdiction, while 23 percent come under the states. The federal government is formally responsible for less than 5 percent of the system; most of the federal roads are on federal property, for example, national parks, forests, and other federally owned areas. Does this mean that the federal involvement in U.S. highways is trivial? Not at all.

Table 1

Jurisdictional Control of U.S. Roads and Streets

Jurisdiction	Rural Mileage	%	Urban Mileage	%	Total Mileage	%
State	704,151	22.5	96,008	13.0	800,159	20.7
Local	2,244,155	71.7	642,493	86.9	2,886,648	74.5
Federal	183,363	5.8	973	0.1	184,336	4.8

Source: FWHA, Our Nation's Highways

B. The Federal Role

Although the federal government is technically responsible only for 4.8 percent of U.S. highways, most of which are on federal lands, it exercises enormous influence over the rest of the system. This can be seen from Alan Pisarski's data on the distribution of highway roles among different levels of government, which are reproduced below as Table 2.

Table 2 shows that the federal government provides 90 percent of the funds for the interstate system; 43 percent for other arterials; and 31 percent for collectors. To ensure that these funds are spent in accordance with federal requirements, federal inputs for system design and project planning are estimated to be 90 percent for the interstates and 20 percent for other arterials. This table shows the extent to which governmental roles at different levels are interwoven: for example, although the interstate highways are 100 percent owned by the states, they are financed, and often designed, by federal agencies.

The federal influence is exerted through the Federal-aid Highway Program, which permits federal funds to be spent on four federal-aid designated route systems (the interstate, primary, secondary, and urban systems), each of which has its share of arterials and collectors--there are no local roads in the federal-aid systems. The federal-aid systems comprise about 851,000 highway miles, about 22 percent of total U.S. road miles. But these 22 percent include the country's most important roads and streets, and carry about 79 percent of all U.S. highway travel. Federal-aid involvement in each functional class of road ranged in 1988 from 100 percent for the interstates through 0 percent for locals.

Table 2
Distribution of Governmental Responsibilities

	Interstate Fed/St/Loc	Arterials Fed/St/Loc	Collectors Fed/St/Loc
Sys. Des. & Project Plan	90/10/0	20/60/20	0/20/80
Finance	90/10/0	43/32/25	31/20/49
Constr., Ownership, Operation & Maint.	0/100/0	1/74/25	1/34/65

Source: Alan Pisarski, Report on Highways, States, Roads, and Bridges, 1987, p. 68

According to the Federal-Aid Road Act of 1916 and the Federal Highway Act of 1921, the federal/state relationship was as follows: the states' role was to select, plan, design, and construct highway improvements while the federal role was to review and approve work done with the assistance of federal funds. According to FHWA (America on the Move), these "partnership roles" remain in effect to this day. But readers should not take for granted that this "review and approval" process protects the interests of federal taxpayers or road users. It does not.

Anyone familiar with the workings of federal agencies knows that staff bend over backwards to avoid confrontation with states so that, in practice, federal funds are used to support whatever schemes the states decide upon. Cost/benefit analyses carried out by states are often used to ensure that the benefits from highway improvement exceed the costs payable by the states, which can be as low as 10 percent of total costs; thus federal funds are regarded as costless by those who select projects for implementation.

In the case of highway "Demonstration Projects" (157 of which were inserted into the 1989 highway authorization bill, at a cost of $1.4 billion) projects were shamelessly selected by a process of legislative logrolling.(3) The routing of federal funds to the districts represented by members of appropriation committees may be in accordance with congressional traditions, but it does little to further the federal interest in good communications.

How does the federal government exercise such wide powers over the major highways without being formally responsible for them? Its instrument is the financing mechanism, which is called the Highway Trust Fund.

C. The Highway Trust Fund

The Highway Trust Fund (HTF) was established by Title II of the Federal-Aid Highway Act of 1956 as a mechanism to finance the highway program, especially the Interstate program. Title II increased some of the existing taxes paid by road users, established some new ones, and provided that revenues from these taxes are credited to the HTF for the financing of the Federal-aid Highway Program. The 1956 Act required HTF revenues to be wholly dedicated to the financing of federal-aid highways.(4)

But the HTF is not a trust fund in the legal sense, and changes in the law since 1956 have allowed the dedication of part of the revenues to mass transit. Payments out of the HTF are also made to the Land and Water Conservation Fund and to the Aquatic Resources Trust Fund.

Legally, the HTF is a separate account (with the name "Highway Trust Fund") maintained in the U.S. Treasury, from which the Federal Highway Administration (FHWA) can draw amounts determined annually by Congress. The FHWA uses these revenues to reimburse state governments for the federal share of expenditures previously made by the states.(5)

The main sources of funds, accounting for about 85 percent of receipts, are the taxes on motor fuels, which were fixed at 4 cents a gallon in 1956 and have since been raised to 9.1 cents a gallon, one cent of which is used to support mass transit. The current user fee structure is shown in Table 3.

How much was collected and what happened to the revenues? Because most federal highway funds are not spent directly, but granted to the states for highway purposes, and because the states, in their turn, make grants to local governments for highway purposes, it is not possible to relate income at a particular government level with specific expenditures.

As will be seen later, this makes it difficult to assess efficiency in the U.S. highway sector. However, the Federal Highway Administration (FHWA) does compile statistics of total receipts and total expenditures, and these are summarized in the Figure 1.

Table 3

SCHEDULE OF FEES PAID BY ROAD USERS INTO HIGHWAY TRUST FUND

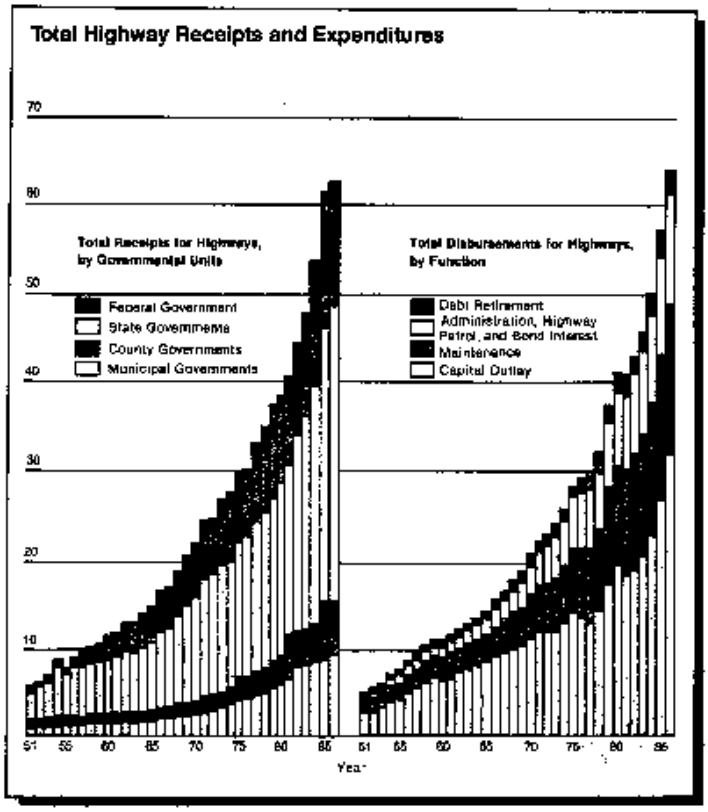
Federal Highway-User Fees

User Fee Type	Rate on January 1, 1990
Gasoline	$.09/gallon
Gasohol	$.03/gallon
Diesel Fuel	$.15/gallon
Other Special Fuels	$.09/gallon
Tires	0 - 40 lbs.: NO TAX 40 - 70 lbs.: $.15 For every lb. over 40 lbs. 70 - 90 lbs.: $4.50 + $.30 for every lbs. over 70 lbs. Over 90 lbs.: $10.50 + $.50 for every lb. over 90 lbs.
Truck and Trailer Sales	12% of retailer's sales price for trucks over 33,000 lbs. gross vehicle weight (gvw) and trailers over 26,000 lbs. gvw.
Heavy Vehicle Use (annual tax)	Trucks 55,000 lbs. gvw to 75,000 lbs. gvw: $100.00 plus $22.00 for each 1,000 lbs. (or fraction thereof) in excess of 55,000 lbs. Trucks over 75,000 lbs. gvw: $550.00

Source: FHWA, America on the Move.

Figure 1

TOTAL U.S. HIGHWAY RECEIPTS AND EXPENDITURES 1951-1986
U.S.$ billions



Source: FHWA, America on the Move.

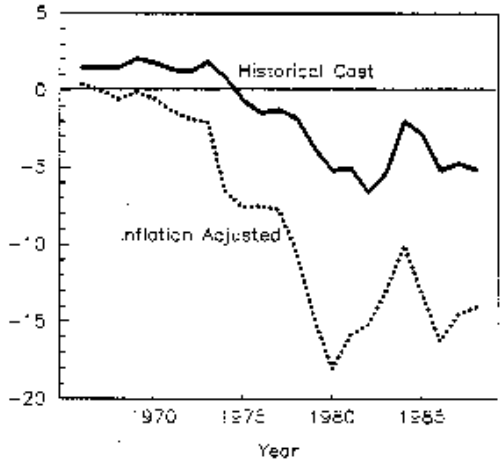
What do the data in Figure 1 tell us about the financial health of U.S. highways? They show that from 1951 to 1986 annual highway receipts and expenditures increased tenfold, from about $6 billion in 1951 to over $60 billion in 1986. They show the sources of receipts, by governmental units--note the preponderance of the states' contributions--and they show how the monies were spent--so much for capital outlays, so much for maintenance, so much for other functions. The data also indicate a rough balance between receipts and expenditures over the years.

But these data, typical of those produced for highways, do not show the profitability of the highway systems. This is because governmental agencies tend to show only that receipts are spent honestly, in accordance with the law, but not that they are spent efficiently, in a business-like manner. As government transportation planner John Semmens has pointed out, "Transportation agencies do not prepare profit and loss evaluations of their road operations. Accounts are generally kept on a cash flow basis, and no allowance is made for the progressive depreciation of such capital assets as bridges and roads.... Reserves are not established for the orderly maintenance of facilities. Consequently, as roadways near the end of their design life, there are rarely sufficient funds for replacement or restoration. Hence, the recurring crises in infrastructure finance."(6)

To show what highway accounts would look like if prepared in a more business-like format, Semmens took the FHWA's highway expenditure totals for all levels of government (as reported in the annual Highway Statistics) and amended them by adding an item for depreciation, assuming highway life to be 20 years.

Figure 2

NET "PROFIT" OR "LOSS" FOR U.S. ROADS (U.S.$ billions)



Source: Semmens, Liberty.

The results, illustrated in Figure 2 above, show that since the early 1970s revenues from highway users have failed to keep up with expenditures. This is consistent with the widespread view that the nation faces an "infrastructure crisis" and suggests that such sudden crises could be avoided by applying to the highway sector the accounting principles routinely used in the private sector.

The differences between private and public sector approaches to expenditures are also illustrated by public-sector acceptance of the extraordinary rise in the administrative costs of highway provision, which now use up over one-sixth of revenues. Semmens points out that "at the same time that the need to deal with the ultimate replacement costs of facilities has been disregarded, bureaucratic overhead in the highway agencies has soared. As a percentage of construction outlays, administrative costs have risen from under 7 percent in the 1950s to over 17 percent today. That is, while construction budgets were rising by a robust 400 percent, the costs of administering our public highways rose by an incredible 1200 percent."(7)

There may be good reasons for this rise, but it is not explained in the relevant tables. And why should it be? So long as expenditures are incurred in accordance with the law, officialdom tends to be satisfied. The private sector, on the other hand, with its emphasis on profitability, would want to know the reasons for such changes in administrative costs. Under current legislation (Public Law 100-17, Section 503) expenditures from the HTF, and the road-user taxes which finance it, are scheduled to terminate on September 30, 1993. As a time lag of up to two years is allowed between the authorization and disbursement of funds from the HTF (because these funds are used to reimburse state expenditures previously made), authorizations to spend HTF funds under current legislation cannot generally be made after September 30, 1991. If the present funding system is to continue without interruption, legislation to extend the HTF should be passed by September 30, 1991.

D. Strengths and Weaknesses of the Highway Trust Fund

The main strength of the Highway Trust Fund is that it has achieved its objective of greatly improving U.S. highways at a low fiscal cost to highway users. Despite its reliance on comparatively low user fees, over a period of 33 years it has succeeded in distributing some $213 billion to finance 43,600 miles of the Interstate Highway System and almost 840,000 miles of other highways covered by the federal aid system. In view of the inherent weaknesses of the HTF, its success has to be attributed to the skills of the people concerned with making it work. "Engineers and public officials have generally operated with care and good judgment within a process almost entirely dependent on those qualities."(8)

For the HTF these arrangements pose serious difficulties:

* Divided responsibilities. U.S. highways suffer from the divided responsibility that arises from the "partnerships" between different levels of government. This means that responsibility for all but local highways usually involves more than one level of government. For example, decisions in respect of federally financed state highways--for which federal contributions range from 75 percent to 90 percent-- require the involvement of both federal and state administrations. The states retain formal responsibility for their highways but do not have to foot more than a small percentage of the bills. This allows them to implement low-priority projects at federal expense.

* Imposition of costly federal regulations. Federal funds do not come free. As a condition for receiving them, states have to abide by burdensome regulations. Some, such as the Davis-Bacon Act wage provisions, the "Buy America" provisions, and requirements for "set-asides" in contracting, are mandatory for all federally financed programs and are reckoned to raise highway construction costs by 20 percent (11), or even by 30 percent in some states, for example, Tennessee. Others, such as the imposition of 55 mph speed limits, and mandatory drinking age laws, are specific to highways. This is not the place to argue the pros and cons of these matters: the point to be made here is that the HTF is being used to force states to abide by controversial regulations that the federal government is unable or unwilling to legislate directly. Additionally, the administrative costs of the program are on the order of 1.5 percent at the federal level and 5 to 7 percent at the state level so that, in total, highways financed through the HTF are likely to cost 25-28 percent more than if they were financed by the states directly.

* Mechanical allocation of revenues between states. HTF revenues are allocated between states in accordance with a complicated formula that attempts to take into account relevant factors of transportation, population, and geography. But even if the formula used to distribute the revenues among the states is the best that can be devised, it cannot replicate economic demand, that is, the willingness of users to pay for road space. The payments to the HTF from the states, and the amounts apportioned to them, are shown in Table 4. As can be seen, some states are shown to have received less than their payments, while others are shown to have received more. Alaska, the District of Columbia, and Hawaii are shown to have received eight times, almost four times, and three times, respectively, the amounts they paid into the fund since its establishment in 1956.

* Concealment of HTF costs. Careful readers of Table 4 will notice that, in total, the amounts paid out to the states exceed by 16 percent the amounts paid in. This is due to interest being earned on the balances being held by the U.S. Treasury. To the extent that interest not received by road users on HTF balances is ignored, the benefits from this financing system are exaggerated. But they are exaggerated in other ways also. As the federal costs of running the HTF are at least 1 percent of revenues, the real total appropriated to the states cannot exceed 99 percent of the total paid in, therefore the ratios of apportionments to payments shown in Table 4 should, on average, be reduced by 17 percent to show the true picture. Furthermore, as federally financed projects are reported to cost at least 24 percent more than projects without federal financing, the ratios should be reduced by a further 24 percent. Thus, to get a truer picture of the financial impact of the HTF, the apportionments and ratios in Table 4 should be reduced by 37 percent (100 percent minus 76 percent of 83 percent), as shown in table 5. This shows that--other things being equal--the only states that gain financially from the HTF are those with Table 4 ratios of apportionments to payments that exceed 1.59. These are Alaska, Connecticut, District of Columbia, Hawaii, Idaho, Maryland, Montana, Nevada, North Dakota, Rhode Island, South Dakota, Utah, Vermont, Washington, West Virginia, and Wyoming. All other states are probably net losers as a result of the financial operations of the HTF. To arrive at an exact determination for any state, it would be necessary to analyze the dates of its HTF payments and receipts, the interest forgone, and to compare the costs of its federally financed projects with what they would have been if implemented without federal funds.

* Leakage of funds. In recent years the integrity of the HTF (which is not a "Trust Fund" in the legal sense) has been eroded by the allocation of its revenues to non-road use. The most important leak is the dedication of the proceeds of one cent of fuel tax revenue (totaling about $1.4 billion a year) to mass transit. The reduced tax on gasohol (which provides a 60-cent subsidy per gallon of ethanol used in the manufacture of gasohol) also represents a leak of funds, amounting in 1988 to $482 million.(9)

* Overemphasis on capital expenditure at the expense of maintenance. The HTF was originally designed to finance only capital expenditure, for example, new construction. Under the 1976 "3R Program," which was extended in 1981 to become the "4R Program," the HTF has also financed the resurfacing, restoration, rehabilitation, and reconstruction of highways in the Federal-Aid system. Nevertheless, a program that emphasizes cheap funds for new construction is bound to tempt state governments to tilt the balance against maintenance, and this may have contributed to the deterioration of the system. It has already been pointed out

TABLE 4

HIGHWAY TRUST FUND PAYMENTS AND APPORTIONMENTS BY STATE

– $ THOUSANDS –

STATE	PAYMENTS INTO THE FUND	APPORTIONMENTS FROM THE FUND	RATIO: APPORTIONMENT/PAYMENTS
	CUMULATED SINCE 7-1-56	CUMULATED SINCE 7-1-56	CUMULATED SINCE 7-1-56
ALABAMA	3,522,529	4,613,144	1.31
ALASKA	342,902	2,748,974	8.01
ARIZONA	2,380,553	3,548,284	1.49
ARKANSAS	2,362,484	2,370,719	1.00
CALIFORNIA	19,228,099	17,444,305	0.91
COLORADO	2,475,740	3,402,945	1.37
CONNECTICUT	2,329,218	3,841,136	1.65
DELAWARE	567,852	850,932	1.53
DIST. OF COL.	390,216	1,524,271	3.91
FLORIDA	7,717,341	7,267,171	0.94
GEORGIA	5,490,926	5,642,806	1.03
HAWAII	479,522	1,448,344	3.02
IDAHO	[illegible]	1,671,330	1.86
ILLINOIS	8,468,721	9,712,858	1.15
INDIANA	5,248,848	4,597,048	0.88
IOWA	2,798,097	3,250,157	1.17
KANSAS	2,464,752	2,858,760	1.16
KENTUCKY	3,090,010	3,862,740	1.25
LOUISIANA	3,574,823	5,199,735	1.45
MAINE	1,007,133	1,165,574	1.16
MARYLAND	3,296,878	5,324,322	1.62
MASSACHUSETTS	4,012,264	4,411,553	1.10
MICHIGAN	7,443,649	6,776,548	0.91
MINNESOTA	3,570,865	4,805,515	1.35
MISSISSIPPI	2,345,375	2,502,359	1.07
MISSOURI	4,906,430	4,960,565	1.01
MONTANA	938,965	2,466,529	2.63
NEBRASKA	1,635,008	1,802,749	1.10
NEVADA	813,630	1,630,651	2.00
NEW HAMPSHIRE	718,718	1,124,754	1.56
NEW JERSEY	5,791,547	5,298,959	0.91
NEW MEXICO	1,457,391	2,181,814	1.50
NEW YORK	9,942,250	11,924,118	1.20
NORTH CAROLINA	5,349,380	4,476,724	0.84
NORTH DAKOTA	721,510	1,420,593	1.97
OHIO	9,040,880	8,343,541	0.92
OKLAHOMA	3,344,266	2,861,238	0.85
OREGON	2,483,958	3,288,794	1.34
PENNSYLVANIA	9,044,652	10,409,207	1.16
RHODE ISLAND	631,674	1,309,108	2.07
SOUTH CAROLINA	2,783,482	2,620,918	0.95
SOUTH DAKOTA	775,779	1,461,132	1.89
TENNESSEE	4,295,722	4,582,368	1.05
TEXAS	14,671,920	12,462,797	0.85
UTAH	1,258,346	2,647,237	2.10
VERMONT	445,920	1,110,681	2.49
VIRGINIA	4,485,910	6,218,773	1.39
WASHINGTON	3,355,026	5,697,889	1.70
WEST VIRGINIA	1,556,613	3,771,788	2.42
WISCONSIN	3,832,873	3,276,825	0.85
WYOMING	739,849	1,650,013	2.24
TOTAL	190,531,075	220,364,925	1.16

Source: FHWA. Highway Statistics 1988, Page 46, Table FE-221.

TABLE 5

HIGHWAY TRUST FUND PAYMENTS AND ESTIMATED ADJUSTED APPORTIONMENTS

– $ THOUSANDS –

STATE		PAYMENTS INTO THE FUND	ADJUSTED APPORTIONMENTS	RATIO: APPORTIONMENT/ PAYMENTS
		CUMULATED SINCE 7-1-56	CUMULATED SINCE 7-1-56	CUMULATED SINCE 7-1-56
WINNERS	ALASKA	342,002	1,730,594	5.06
	DIST. OF COL.	366,315	880,281	2.40
	IDAHO	801,360	1,052,851	1.30
	HAWAII	479,522	812,457	1.69
	MARYLAND	3,286,379	3,364,323	1.03
	MONTANA	936,885	1,553,913	1.70
	NEVADA	812,690	1,027,328	1.26
	NORTH DAKOTA	721,510	894,974	1.24
	RHODE ISLAND	651,474	860,865	1.31
	SOUTH DAKOTA	776,773	970,918	1.24
	VERMONT	446,920	690,855	1.58
	UTAH	1,258,345	1,667,791	1.32
	WASHINGTON	3,353,028	3,586,870	1.06
	WEST VIRGINIA	1,556,813	2,376,227	1.50
	WYOMING	726,846	1,028,798	1.37
LIKELY LOSERS	ALABAMA	3,522,858	2,996,390	0.85
	ARIZONA	2,340,883	2,235,418	0.95
	ARKANSAS	2,362,454	1,489,863	0.63
	CALIFORNIA	19,229,084	10,969,912	0.57
	COLORADO	2,475,740	2,140,695	0.86
	CONNECTICUT	2,524,216	2,419,916	0.96
	DELAWARE	867,882	554,857	0.64
	FLORIDA	7,717,341	4,346,414	0.56
	GEORGIA	5,460,625	3,654,779	0.64
	ILLINOIS	8,489,721	6,119,067	0.70
	INDIANA	6,249,848	2,895,163	0.47
	IOWA	2,789,007	2,047,599	0.71
	KANSAS	2,498,752	1,802,540	0.72
	KENTUCKY	3,080,310	2,487,228	0.77
	LOUISIANA	3,874,823	3,275,833	0.81
	MAINE	1,032,183	734,912	0.73
	MASSACHUSETTS	4,012,264	2,778,278	0.70
	MICHIGAN	7,443,649	4,269,225	0.58
	MINNESOTA	3,570,895	3,027,474	0.85
	MISSISSIPPI	2,243,373	1,579,488	0.70
	MISSOURI	4,808,430	3,157,832	0.66
	NEBRASKA	1,835,004	1,411,941	0.76
	NEW HAMPSHIRE	719,716	704,585	0.98
	NEW JERSEY	5,761,517	3,401,350	0.59
	NEW MEXICO	1,457,391	1,214,549	0.83
	NEW YORK	9,942,259	7,814,714	0.79
	NORTH CAROLINA	4,348,356	2,819,706	0.65
	OHIO	9,040,680	6,256,491	0.69
	OKLAHOMA	3,244,365	1,783,881	0.55
	OREGON	2,483,958	2,074,202	0.84
	PENNSYLVANIA	7,946,619	5,864,020	0.74
	SOUTH CAROLINA	2,763,482	1,651,178	0.60
	TENNESSEE	4,205,732	2,946,192	0.70
	TEXAS	14,671,820	7,551,241	0.51
	VIRGINIA	4,585,910	3,914,877	0.85
	WISCONSIN	3,762,073	2,069,400	0.55
TOTAL		180,551,076	135,789,000	0.75

Sources: PAYMENTS INTO THE FUND: FHWA, Highway statistics 1988, Table FE-221.

ADJUSTED APPORTIONMENTS: Apportionment figures from the above FHWA Table were reduced by 37 (100 - 83 x 0.76) percent to take into account:

- interest foregone by the states on funds paid in (average 16 percent);
- federal administrative costs (average 1 percent);
- excess costs imposed on states by federal regulations (assume 24 percent).

To ascertain exact gains or losses for any state, it would be necessary to calculate interest foregone (having regard to the dates of actual HTF payments and receipts), and to compare the costs of its federally financed projects with what they would have been without federal funding.

that neither federal nor state highway authorities have any obligation to publish accounts showing liabilities for maintenance following new construction.

This tendency of rulers to prefer new construction over maintenance was noted by Adam Smith in 1776.

> The proud minister of an ostentatious court may frequently take pleasure in executing a work of splendor and magnificence, such as a great highway, which is frequently seen by the principal nobility, whose applauses not only flatter his vanity, but also contribute to support his interest at court. But to execute a great number of little works, in which nothing that can be done can make any great appearance, or excite the smallest degree of admiration in any traveller, and which, in short, have nothing to recommend them but their extreme utility, is a business which appears in every respect too mean and paultry to merit the attention of so great a magistrate. Under such an administration, therefore, such works are almost always entirely neglected.(10)

* Backlash from nonhighway federal issues. The HTF can be affected by federal issues--such as the budget deficit--that are not specifically highway related. This enables Congress to keep HTF balances unobligated in order to reduce the magnitude of the budget deficit. The General Accounting Office estimated, in a report issued in May 1989, that at the end of the financial year 1988 there were at least $7.7 billion in the HTF that could be spent on new projects. Criticism of this practice is not meant to suggest that highways should escape cuts in times of crisis. The point is that federal "macromanagement" of the HTF makes nonsense of the "Trust Fund" concept and also freezes the federally aided highway program in a way that does nothing to ensure that the cuts fall on the least urgent projects.

* Discrimination against toll highways and privately provided highways. HTF monies can only be used to support highways operated by public authorities and, with very limited exceptions, cannot be used for toll roads. This is clearly unjust, as journeys on toll roads and on privately provided roads (which need not necessarily be toll roads) are not exempted from contributions to the Fund--users of these roads pay the same fuel and tire taxes as users of publicly provided "freeways."

* Politicization of highway provision. The severance of the link between highway use and finance has led to the politicization of the highway process. Those who want additional telephone facilities can rent or buy additional lines (if they are fortunate enough to be in the United States or in a few other "Western" countries), but road users held up in traffic cannot rent or buy additional road space. Their only remedy is to lobby for more roads through the political process. As a result, John Semmens notes, "there is considerable incentive for all involved to pursue free-ride lobbying strategies, that is, to increase the demand for and consumption of road services, while shifting the costs onto others. States struggle with each other over shares of federal spending. Cities and counties struggle over shares of state taxes. User lobbies push for nonuser taxes. Truckers seek to shift more of the burden to auto drivers. Meanwhile, highway agencies get little credit for keeping roads in their jurisdiction in good shape. On the contrary, efficient maintenance makes an agency a more vulnerable target for cuts in the struggle over allocations. A deteriorated road system serves the politically potent purposes of demonstrating a need for more money."(12)

None of the points made above weakens the case for dedicated highway trust funds fed from road user charges. There can be many advantages in state highway trust funds that do not discriminate against private road providers and that possess adequate legal safeguards to protect the funds from leakage to nonhighway use. But it is difficult to make the case for continuing to run the HTF in the manner in which it has been operated hitherto.

E. Possibilities for Improvement

For any facility to be operated in an orderly and efficient manner, its ownership has to be assigned unequivocally to a clearly defined entity, be it public or private. The owner of a facility has an obligation to maintain it to relevant standards, and a right to charge for its use, possibly in accordance with an agreed scale. Ownership also carries with it the right to sell or lease the facility or, if there are no buyers, the right to close it down or abandon it.

In the case of highways, the important objective is to ensure that each highway, or segment of highway, has one owner, and one only, responsible for its maintenance and operation, and clear funding sources, such as axle-weight charges, congestion charges, an agreed share of highway trust fund revenues, or property taxes (see section III below).

One can envisage the federal government remaining the owner of some highways (for example, those serving federal lands), the

states of others, local authorities of others, and turnpike authorities of others. Urban roads could be municipally owned. Some highways could be privately owned. But whatever the starting arrangement might be, the ability to transfer ownership--and funding sources--would tend to change highway ownership, with less suitable owners being replaced by more suitable ones.

III. CHARGING FOR HIGHWAY USE AND INVESTING FOR IMPROVEMENT

A. The Present Situation

* Average pricing. An efficient system of highway charging would require users to pay the costs that they themselves cause. But present systems of paying for U.S. roads are far from efficient. Instead of individuals paying the costs arising out of their own use of highways, total costs are divided among groups of road users, with individuals paying through road taxes an average of the total costs incurred. In this way, there is only a weak link between those who impose heavy costs and those who have to pay the resulting bills. The point was put as follows by Thomas B. Deen, currently Executive Director of the Transportation Research Board:

> When all users of both high-cost and low-cost facilities pay the same tax, the result is equivalent to the situation of an electric company which decided to eliminate individual electric meters and to bill customers not on the basis of individual consumption, but by measuring total power usage and charging each consumer an equal part of the total bill. Not only is this inequitable; more importantly, it will eliminate incentive for conserving electricity. Many new houses would be heated with electricity, since an individual's cost would not be increased by a decision to install electric heating. Demand for power would soar, and new investment would be needed for new generating facilities. There would be no real basis for determining the proportion of total resources which should be devoted to power generation.(13)

Under the present system there are of course some differences between payments made by individuals; owners of trucks pay more than owners of automobiles, and those who consume large amounts of fuel pay more than those who use little. But these differences are too small to substantially influence the behavior of those who impose particularly heavy costs on the highways, especially in the categories of: (a) owners of heavy-axle trucks, and (b) users of congested roads.

Proposals to require these groups to pay amounts that approximate more closely to the direct costs that they cause are discussed below.

* Profitless investment. The application of "average pricing," whereby the total costs of highways are decided politically and then divided "fairly" among users, logically leads to the result that highways should make neither profits nor losses. How then are investment decisions made? In the absence of market criteria of profit and loss, investment decisions are made by elected officials in the light of advice on highway "needs" received from professional staff. The assessment of highway "needs"--not only in the United States but in all countries--is based on mechanistic planning processes that are essentially the same as those used with disastrous results in the Soviet Union and "Third World" countries. Decisions on where to invest highway monies are not taken in response to the needs of road users as expressed by willingness to pay, but as a result of administrative allocations often governed by political priorities. The mechanistic allocation of HTF revenues among states has already been mentioned, but this is only the tip of the iceberg. State and local authorities can have their own arbitrary allocation systems. For example, the allocation of highway funding in California is subject to a 60/40 percent split between southern and northern California.

Even when there is no question of impropriety, investment decisions made on the basis of official assessments of "needs" cannot adequately reflect the preferences of customers--the road users. "While absolutely legitimate in its methods," writes Alan Pisarski, "the central weakness [of the 'Needs Process'] is that the process of investment in the road system can become independent of demand....In a process not governed by economic criteria, the roles of financial aid from other levels of government can be very seductive and deleterious, reducing the effective costs of money and, thereby, distorting investment decisions."(14)

A proposal for a better way of assessing the merits of alternative investments in highways is made below.

B. Possibilities for Improvement

In their recent book, Road Work: A New Highway Pricing and Investment Policy, authors Kenneth Small, Clifford Winston, and Carol Evans reexamine the costs imposed on U.S. roads by heavy axle loads and by users of congested roads.(15) They conclude that the recovery of these costs from the individuals in those groups would raise sufficient funds not only to

maintain all heavily used roads in good condition but also to finance the costs of expansion to the extent desired by the users.

Vehicles with heavy axles. It is well known that the damage caused by vehicles to highway pavements is a function of axle weight. The American Association of State Highway Officials (AASHO--the predecessor of the present American Association of State Highway and Transportation Officials-- AASHTO) evaluated the effects of axle loadings on pavement life in the 1940s and 1950s. While the precise relationship between damage and axle weight varies with circumstances, the research indicates that damage increases approximately in proportion to the fourth power of axle weight. This "fourth power rule" means that a doubling of a vehicle's axle weight can increase the damage it inflicts on the highway by 2 x 2 x 2 x 2 = 16 times. Thus, an 80,000-lb. truck with its weight equally distributed over five axles does as much damage to a highway pavement as about 10,000 automobiles with two 2,000-lb. axle loads (Note: 5/2 x 8 x 8 x 8 x 8 = 10,240).

A rational charging system for heavy trucks would take account of this, to encourage operators to reduce highway damage by equipping their vehicles with more axles. For example, a two-axle vehicle weighing 24 tons would, if each axle carried twelve tons, cause over three times as much damage as a similar vehicle equipped with three axles each carrying 8 tons. New Zealand does in fact tax its heavy vehicles in a manner that encourages truckers to minimize axle weights (rather than vehicle weights) but in the United States only Oregon does so.

The authors of Road Work have calculated that a policy of taxing heavy vehicles in rough proportion to damage caused, coupled with a pavement strengthening program, would produce substantial benefits to the U.S. economy (over $7 billion a year in 1982 conditions) without imposing corresponding costs on most truckers, who could benefit from reduced fuel taxes and registration fees. Some truckers (e.g., those using two-axle vehicles) could become worse off, but even their loss could be mitigated by giving them time to replace their equipment or by aiding them financially to do so.

Vehicles causing congestion. The direct costs imposed by users of congested roads are perceived to be the slowing down of other users. The sole user of a freeway can safely travel on it at a high speed, but congested conditions can bring all traffic to a stop. This congestion can only occur because the "freeway" is, literally, almost "free" to users to crowd on it and degrade the quality of its service. In this sense congestion can be seen as arising out of the absence of

pricing which, in a market economy, serves the purpose of reducing demand and increasing supply. The absence of market pricing arises, of course, from the absence of property rights in road space, a matter discussed in Section IV of this paper.

The levels of tolls required to maximize the output of a road system can be found only by trial and error, but payments in the range of $2 to $5 a day would be likely. Calculations made for the San Francisco Bay area suggested that, under the conditions prevailing in 1972, "optimal tolls charged to expressway users...would range from below 1 cent per vehicle-mile for off-peak periods up to rush-hour tolls of 1 - 7 cents on rural roads, 2 - 9 cents on suburban roads, and 6 - 35 cents on downtown roads."(16) In Singapore a fee equivalent to $1.75 has abolished city-center congestion in the morning and evening peak periods. It is levied by requiring those who drive automobiles into the central area in the morning and afternoon peaks to purchase in advance daily or monthly windshield stickers, which are observed by police at the entrances to the restricted zone.

To be efficient and effective, charges for the use of congested roads should be applied selectively, with the prices charged reflecting congestion levels on different road links and at different times of the day, as is done in the case of telephone charges. For this reason alone, collection at conventional toll booths would be impracticable. It would also be impracticable because an efficient charging system should enable charges to be levied without vehicles having to stop. Electronic charging systems can perform these tasks, and one, utilizing automatic vehicle identification, is already in successful operation in the United States.

Automatic Vehicle Identification (AVI). AVI methods depend on vehicles being equipped with electronic identifiers, known as transponders, which reflect unique identification signals when passing through radio beams emitted by "readers." This equipment is routinely used to identify aircraft, railcars, and containers, and has been tested on vehicles for more than twenty years. In the 1970s, for example, Southern California Rapid Transit District equipped its Los Angeles buses with transponders for management control purposes. In the same period the New York Port Authority was testing transponders with a view to using them for nonstop toll collection. In the 1980s, 3,000 vehicles in Hong Kong were equipped with transponders. In all these systems the transponders were fixed securely to the underside of the vehicles, and the readers were located under the surface of the highway.

Since 1989, 14,000 users of the Crescent City Connection 12-lane bridge in New Orleans have had the option of paying

their tolls without having to stop, thanks to AVI equipment designed, manufactured and operated by the Amtech Corporation of Dallas, Texas. Unlike the systems tested earlier, the Amtech transponders, which are called TOLLTAGs, are credit-card sized portable units displayed on the windshields of users' vehicles. The readers are on overhead gantries. TOLLTAG holders make deposits to their Amtech accounts--$40 being a typical payment--and their accounts are drawn down as the TOLLTAGs signal the vehicles' passage along the tolled facility. When the amounts deposited are almost drawn down, TOLLTAG holders are invited to deposit the next installment. As TOLLTAGs reduce toll collection costs, New Orleans offers users a 30 percent discount on the regular toll rate.

Following the successful introduction of their system in New Orleans, Amtech took on a more ambitious assignment in their hometown of Dallas: Offering TOLLTAGs to users of the 62 toll-collection points of the 17-mile Dallas North Tollway. As the Tollway Authority does not provide TOLLTAGs without charge, the 21,000 or so TOLLTAG users in Dallas have to pay $2 a month rental, and a five-cent toll surcharge, to cover the costs of the equipment. Despite this, over 24,000 TOLLTAGs were issued in Dallas in the first ten months of the system's operation, and over 36,000 transactions a day are recorded there. Eighty percent of users arrange for the transfer to the toll authority's account to be made automatically by credit card, so that once their accounts are set up, TOLLTAG holders need do nothing to keep them open, except to pay their credit card bills. The Amtech TOLLTAGs have performed well, with zero misreadings reported.

An AVI system named FASTOLL is to be introduced in the Washington, D.C. area, on the Dulles Toll Road, in 1991. As in the case of the Dallas North Tollway, use of the system will be voluntary, but a high response will be encouraged because the Virginia Department of Transportation, which operates the Dulles Toll Road, expects to make substantial savings in operating costs from automated nonstop toll collection. Therefore, FASTOLL users will be offered dedicated lanes to maximize time savings and are not to be charged for the use of transponders.

Other electronic systems have been proposed, including a system that would work like modern subway tickets, which lose value as they are used up, without being linked to particular individuals or automobiles. This is not the place to go further into technical details of automatic toll collection. Suffice it to say that both theory and practice indicate that the collection of payment for road use without toll plazas is today as technically feasible as paying for telephone use without coin-operated call-boxes.

Some cities outside the United States charge for the use of congested roads, even without AVI. Singapore's area licensing system has already been mentioned. It was introduced in 1975 and was almost identical to one proposed for Caracas in 1972 in a World Bank financed study. Caracas did not accept the proposal; Singapore did and has been operating it without a hitch ever since, and is now planning to upgrade to electronic AVI. Since 1986 the Norwegian city of Bergen has been levying a charge of 5 Kronas (equivalent to $0.65) for automobiles entering the business district; the revenues are used for highway improvement. Oslo has implemented an 18-gate "toll ring" around the central core of the city. Each toll booth has one or two AVI lanes. Congestion pricing is also being considered by the Ministry of Transport of the Netherlands. The United Kingdom Chartered Institute of Transport recommended in 1990 the early introduction of AVI in London.

According to estimates quoted by the authors of Road Work, net benefits from congestion pricing to U.S. road users in urban areas would have been of the order of $6 billion a year under the conditions prevailing in 1981. Benefits in the 1990s would be substantially higher, because of increased congestion and higher valuations of saved time.

Dedicated state highway funds. The authors of Road Work suggest that correctly assessed axle-load and congestion taxes could completely cover the costs of building and maintaining highways and replace other road user charges such as fuel taxes and annual license fees. Some states may not be ready to adopt these radical proposals despite dissatisfaction with the HTF. A suitable solution for them, and an improvement over present methods, might be dedicated state highway funds, which could have the advantages of the federal HTF without its disadvantages.

Thirty-one states already have dedicated highway funds. However, both fairness and efficiency require that such funds do not discriminate against the private sector, so that privately provided public highways would get their fair share of revenues generated by their traffic. The idea of paying private road providers in proportion to the traffic generated on their roads was discussed in Britain in the 1980s; these payments were dubbed "shadow tolls," as the road providers were to receive funds without the traffic having to make additional payments. "Shadow tolls" are still being discussed in Britain but have not yet been introduced.

Even if congestion and axle-load taxes were introduced, other revenue sources would still be necessary to cover the costs of highway management--for example, policing, sign-

posting and administration. These costs could conveniently be covered by a modest fuel tax. A fuel tax might also be used to cover the costs of maintaining underutilized rural roads. Dedicated state or regional highway funds that do not discriminate against privately provided roads might provide the best mechanisms for funneling payments from road users to road providers--public or private--in areas in which congestion and heavy axle loadings do not pose significant problems.

Payments by property owners. In the case of lightly used roads, such as are to be found in many rural areas, there may not be enough traffic to generate the funds required for maintenance. A study comparing highway costs and revenues in Arizona in 1983 showed, for example, that while total costs were well-covered by total revenues, the costs of maintaining 46 percent of the highway mileage was not covered by the revenues generated on those sections.(17) In some cases, payments by property owners, either through voluntary associations or through property taxes, could be the best way to keep such roads open. In others, specific subsidies would be appropriate.

Vehicles causing pollution. This paper cannot deal with the problems caused by pollution-emitting vehicles because so little is known about the magnitude of the costs involved. But it is clear that pollution charges, equal to the costs caused by pollutants, would be a much more efficient solution to this problem than countrywide regulations of the kind being discussed in the U.S. Congress. To the extent that pollution problems are serious in certain places at certain times, policies should be designed to discourage the use of polluting vehicles in those specific areas, rather than to prohibit them in rural and urban areas alike.(18)

Additional investment would increase highway capacity, and hence reduce congestion and the appropriate congestion charges. If highways were supplied by competitive markets, the equilibrium prices on different road links would be those which generated the funds required to operate the highway system and increase its capacity to the point at which congestion was reduced to levels acceptable to users.

Investment criterion. If road use was charged for on a market basis--that is, users being required to pay for costs imposed, including congestion costs--the investment criterion of profitability could be used as a yardstick for investment decisions. This would have two obvious advantages: (a) investments made on this basis could be compared with other revenue-earning ones, including especially railways, and (b) such investments could be carried out by both the public and private sectors. By definition, use of the profitability

criterion would result in a self-financing highway system, independant of general revenues. Self-financing is taken for granted in the electricity, gas and telephone services.

Under conditions of congestion, the price of road use would be determined by congestion levels, in the same way that office rents are determined by occupancy levels. Additional investment would increase highway capacity, and hence reduce congestion and the appropriate congestion charges. If highways were supplied by competitive markets, the equilibrium prices on different road links would be those that generated the funds required to operate the highway system and increase its capacity to the point at which congestion was reduced to levels acceptable to users.

The road not taken. The idea of charging for the use of congested roads is not new. Sir Alan Walters's first paper on the subject was published in England in 1954,(19) while Milton Friedman and Daniel Boorstin were working on a similar proposal at the same time, apparently without knowledge of the work being done in England.(20) In 1959 William Vickrey of Columbia University proposed electronic road pricing in evidence to a committee of Congress.(21) The subject was studied intensively in the 1960s and 1970s, with the U.K.'s Road Research Laboratory investigating technical devices and modeling their effects on traffic demand. Hong Kong tested out the equipment in the early 1980s and concluded that there were no technical problems in identifying road users in congested areas and in billing them at their homes on a regular basis.

Proposals for market-based solutions to the urban transportation crisis have recently been developed for the San Francisco Bay Area by the Bay Area Economic Forum (BAEF), a partnership of the Association of Bay Area Governments and the Bay Area Council. Taking as their starting point the need to reduce traffic levels in order to improve air quality, the BAEF has published a two-part report (Market-Based Solutions to the Transportation Crisis) which examines some of the economic, technical, and public policy ramifications of (a) requiring road users to pay the costs they impose and (b) linking the payments to specific corridor improvements.(22) The report concludes that "Estimates of fair user costs must be made. A technology for collecting the fees must be selected. The process of funding improvements must be modified and linked to the fee revenues. These...tasks, once accomplished, will provide the Bay Area with a simple and effective way of managing and financing transportation."

But--outside the Bay Area and except in Norway and Singapore--the idea of charging for the use of congested roads has had minimal public discussion, and politicians avoid the

subject like the plague. One reason for this might be that many advocates of "road pricing" discuss the notion only as a way of restricting demand. The other effect of price--that of stimulating the supply--is ignored. Road users in Berkeley, Madison, and Hong Kong who studied the proposals can hardly be blamed for seeing themselves as net losers from such a process. And indeed, charging a high price for a scarce resource without allowing other suppliers to offer competitive bids can rightly be regarded as monopoly exploitation.

If the public resists the charging of economic road prices by a public monopoly, would it accept such a system if operated by competitive private suppliers? This question cannot even be considered without exploring the possibilities of the private provision of highways.

IV. PRIVATE PROVISION OF HIGHWAYS

In the first half of the 19th century, hundreds of turnpike companies operated in the United States. In the eastern states alone they built and maintained over 10,000 miles of road. These companies were financed almost entirely by private capital and received tolls from road users. Relative to the size of the economy at that time, these investments in highways exceeded the post-World War II public sector investments in the Interstate Highway System.(22)

In New York 272 turnpike companies were chartered between 1797 and 1820.(24) The American companies were following the example of Great Britain where, in 1830, there were 1,116 turnpike trusts maintaining 22,000 miles of turnpikes, which accounted for about a fifth of the total road system.(25) The first private toll road authorized in the United States is reported to have been the 34-mile Little River Turnpike (currently part of route U.S. 50) in Virginia, which was authorized in 1785 but not completed until about twenty years later.(26) The first turnpike road to actually operate in the United States connected Philadelphia and Lancaster. It was opened in 1794 by a company chartered in 1792.

However, road development was interrupted in the nineteenth century by the rise of the railroads, which put most turnpike companies out of business. There was some development of private toll roads in the twentieth century, but they, in their turn, were superseded by the public sector "freeways," though even as late as 1933 there were in the United States over 200 private companies operating toll bridges.(27) The demise of the turnpikes is often used to illustrate the weakness of the private provision of public services, but the contrary is the case: unlike public sector operations, private operations cease when demand becomes inadequate.(28)

Until recently, U.S. development of private sector roads was confined to suburban areas, in conjunction with property development, and to private commercial estates. The suburban roads are generally taken over by local authorities upon completion but many of them, including facilities owned and operated by shopping and commercial centers, are privately managed and maintained. In the area of St. Louis (Missouri), over 400 streets are owned and operated by associations of local property owners.(29)

In 20th-century Europe, governments were more eager than in the United States to rely on toll highways, many of which had significant private-sector inputs. In **Italy**, the toll expressway network was established in 1924 with the commissioning of the 30-mile Milan-Lake route, probably the first toll expressway in the world. By 1990 the Italian toll expressway network was more than 3,600 miles long. These toll highways are operated by 22 concessionares, the largest of which is the Autostrade Company, in which the state has a holding, and which is responsible for the management of over 1,600 miles of toll expressways. The Italian concession companies work closely with the government; they benefit from government guarantees and, in return, are obligated to give the highways to the state at the end of the concession periods.

Similarly, post-World War II **France** has relied on a system of private concessionaires to provide over 4,000 miles of toll expressways. In 1982, the government "harmonized" the toll rates in an organization designed to combine uniform toll rates with cross-subsidies to ensure that the financially stronger concessions supported the weaker ones.

Public/private partnerships for the provision of toll roads are also to be found in **Spain**, where over 1,200 miles of expressway were built by private concessionaires. The government decides on the routes and specifications of the expressways and invites private companies to construct and operate them for periods not exceeding fifty years. The government gave certain guarantees to the private investors, and had to take over three of the eleven concessions when revenues failed to cover costs.(30)

Britain announced in 1989 its intention to involve the private sector in the provision of toll highways, and the government has invited proposals from consortia to finance, construct, and operate the Birmingham Northern Relief Road. This 30-mile urban expressway, which is expected to relieve congestion in one of Britain's busiest urban areas, is to be operated as a toll road for a period to be determined as part of the bidding process, after which it is to be transferred to

the government free of debt. The contract price is likely to be about $350 million. The government has also invited consortia to prequalify for a further toll highway--from Birmingham to Manchester--a distance of about 100 miles. No guarantees are contemplated.

In 1986 the British government awarded a contract to Dartford River Crossing Ltd. (a company jointly owned by Trafalgar House PLC and three financial institutions) to construct a $320 million toll river crossing across the Thames at Dartford. The 1.7-mile crossing will include a 1,476-foot cable-stayed center span bridge, the longest in Europe. The crossing is to be transferred to the government free of debt as soon as sufficient tolls are collected.

In **Sweden**, parliament has already passes a bill enabling new privately owned toll roads and bridges to be built, and consideration is being given to a proposal by the private sector to replace the existing Svindersund bridge between Sweden and Norway. A consortium including road builders had offered to complete Stockholm's orbital expressway with a privately funded link (which would include six miles in tunnel) to connect Stockholm to the island of Nacka, and thus reduce congestion in the capital city.

To relieve congestion on the existing airport road, a private-sector group is to begin construction in **Bangkok** of an expressway over the existing highway, which is already often operating at full capacity. The overhead highway is to be toll-financed, and the existing one to remain toll-free.

Private projects also are underway in **Malaysia**, where a consortium is building a major north-south tollway for $770 million. The Malaysian government also requested proposals for a second highway/bridge link to Singapore.

In Latin America, the Salinas government in **Mexico** announced plans in 1989 for at least 2,500 miles of private tollways, with the first two projects already under way. In September 1989, a private consortium began constructing a 164-mile tollway from Cuernavaca to Acapulco, and the first private toll bridge is under construction linking Juarez with El Paso, Texas, across the Rio Grande.

Improved highway connections to the Texas border are also being built between Monterey and Laredo, to enable traffic from Monterey to by-pass the delays at Nuevo Laredo. A consortium of five Monterey companies has raised $200 million for the project, and they received a franchise to operate the roads for eight years--or longer if needed--to earn a 15 percent annual return.

In the United States a number of new toll projects are also under way, marking the rebirth of private tollways here.

A highway in Arizona. In the vicinity of Phoenix, Arizona, landowners wishing to enhance the value of their property had a 28-mile public highway built at their own expense to local authority specification. The construction was financed by loans taken out on the security of the land adjacent to the highway. As the landowners expected to be repaid by the increase in the value of their land, this privately provided highway is toll-free.

A toll-bridge in Fargo, North Dakota. In 1988 The Bridge Company, a private partnership, completed construction of a private toll-bridge between Fargo (North Dakota) and Moorhead (Minnesota) after voters rejected a proposal for public funding. Ownership of the bridge, which cost $1.9 million, will revert to the two cities after the bonds are paid off.

A toll road in Virginia. In July 1989, Virginia's State Corporation Commission gave final state approval for a 15-mile highway, which the Toll Road Corporation of Virginia is planning to build, own, and operate in the vicinity of Washington D.C., from Dulles Airport to the town of Leesburg. The highway is to be privately financed, all the costs being recovered from tolls. It is to meet expected demand in a rapidly developing area and has the backing of the local authorities and of the State governor. The state approval process took almost four years, but construction is now expected to start in 1991 with completion due in 1993.

Highway franchises in California. In the summer of 1989 the California legislature passed a bill (AB 680) that enabled the California Department of Transportation (Caltrans) to develop partnerships with private entities to design, build, and operate toll highways under 35-year leases on state-owned rights-of-way. Caltrans promptly established a Department of Privatization charged with the task of arranging four demonstration projects, of which one has to be in northern California and one in the south. Ten consortia submitted proposals, and the four winning teams were selected in September 1990, with a view to negotiating exclusive development agreements before 1991.

Transportation Corridor in Colorado. The Front Range Toll Road Company is proposing to build a 210-mile transportation corridor between Pueblo and Fort Collins, east of Denver. It is to accommodate up to eight lanes of traffic, a high-speed rail line, a 72-inch water main, and other utility and communication facilities. Preliminary feasibility studies have been carried out, with project costs estimated to be $1.5 billion.

Chicago to Kansas City Toll Road. In Illinois and Missouri, private investors are proposing to finance, build, and operate a $2.5 billion 425-mile toll road between Chicago and Kansas City. A $400,000 engineering and financial feasibility study, prepared by Price Waterhouse and others, concluded that the project would be feasible if certain conditions were met. In anticipation of this project going forward, the Illinois legislature enacted the Toll Road Utility Act of 1989, which adds highways to the existing set of utilities permitted in the state.(31)

Proposals for private toll roads in Puerto Rico & Florida. In December 1989 the Puerto Rico Highway Authority invited proposals to develop 24 miles of private toll road and one toll bridge in the northeast region of the island. At the same time a Florida entrepreneur offered to develop up to 97 miles of a planned toll road round Orlando for which state funds were not available.

Possible Private Sector Roles in Highway Provision

The private sector is flexible and can serve in a variety of ways to improve highway services, for example:

1. **Unencumbered ownership:** In this role the private sector takes full responsibility for the project and all financial risks and is entitled to all the rewards. While common in the competitive sectors of the economy, unencumbered ownership is rare in the provision of highways because of the public-sector interest in regulating tolls and other aspects of highway projects.

2. **Franchises.** In this role the public sector contracts with a private entity to provide and operate a highway. Under "Build-Operate-Transfer" agreements, private investors raise the money and build highways at their own risk, operate them for an agreed period, and then transfer ownership of the highway to the public sector. California has decided to use the B-T-O ("Build-Transfer-Operate") variant on this theme and will take formal title to privately built highways before leasing them out for private operation, in order to relieve private operators of the need to insure against public liability claims.

3. **Management Contracts.** In these cases the public sector undertakes the initial investment and contracts with the private sector to manage its operation. It is common in the United States for highway maintenance to be contracted out in this way in urban areas.

C. Obstacles to Private Provision

In view of the failure of governments the world over to meet the needs of road users--road conditions in most countries are far worse than in the United States--why are not more highways provided by the private sector? Roads are not "public goods" in the sense that those who do not pay for their use cannot be excluded. On the contrary, payments for road use can be heavy and difficult to avoid. Five obstacles to the private provision of roads are often cited:

1) Difficulty of getting necessary rights-of-way;
2) Difficulty of road providers getting paid;
3) Competition from public-sector "free" roads; and
4) Uncertainty about legal liability (A point fashionable in the United States);
5) Concern about equity--will the poor be denied the right to travel?

Getting the right-of-way. The private provision of roads is often dismissed as a serious possibility on the ground that only by the use of the powers of "eminent domain"--the power of government to appropriate private property for public use--can the required rights-of-way be assembled. This problem, though serious, can be addressed in at least three ways:

1) There are numerous cases in which rights-of-way suitable for highways are readily available in existing transportation corridors. The Dulles Toll Road in the Washington, D.C. area, for example, was built alongside the existing Dulles Airport Access Road. Underutilized railroads can also provide opportunities for new highways, as in the proposed Consolidated Transportation Corridor from the Ports of Los Angeles and Long Beach.

2) The options available to the private sector to purchase land are often underestimated. For one thing, the private sector--unlike many governments--can carry out quick deals with landowners without having to go through time-consuming statutory procedures which, inter alia, limit the amounts payable. Furthermore, private entrepreneurs often have the choice of more than one route. Pipeline builders, for example, routinely consider alternative routes, negotiate with different groups of owners, and settle with the first group that comes up with an acceptable arrangement.

3) Finally, there is the possibility of government using its powers of compulsory acquisition to obtain land for the private enterprise. This was frequently done in the railway age without the private sector giving up the rewards of successful investment nor the risks of unsuccessful ones.

Getting paid. If simple institutional arrangements were in place, there is no reason why payments made by road users cannot be routed to private road providers as easily as to public providers. Indeed, private providers are more likely to ensure that monies payable are actually paid. (Note, for example, that for many years the U.S. state and federal authorities failed to collect substantial amounts of fuel tax payable into the HTF). Section III of this paper described alternative ways in which private road providers can be paid in situations where the levying of tolls in the traditional way may be inappropriate. Highway trust funds that do not discriminate against privately provided roads can be made to allocate to any road owner the amounts due on the basis of traffic counts. Furthermore, the development of AVI and other modern methods of payment enables highway providers to levy appropriate charges where costs are particularly high, as on congested roads.

Competition from "free" highways. Even a brief review of the history of toll roads indicates that competition from "free" roads (literally "freeways") is a major obstacle to the private provision of roads. To expect private investors to risk their funds on a road that requires payments from users, when alternative routes do not require additional payments, is to expect a great deal. However, this difficulty could be mitigated to a considerable extent by the use of dedicated highway funds that do not discriminate against the private sector. In some situations the funds generated in this way on a privately provided road might be sufficient to cover all its costs; but even where they were not, the existence of earnings from a highway fund would enable a lower toll to be charged by the private provider than would be the case if he were deprived of the revenues from road user charges "earned" on his road. A lower toll-- or zero toll--would also reduce the amount of traffic diverted from the privately provided road to the "free" publicly provided one.

Uncertainty about legal liability. This is regarded as a serious problem in the current U.S. legal climate and, for this reason, as mentioned above, the private firms that are to receive franchises in California will lease, rather than own, the highways they are to operate under the privatization arrangements of Caltrans. However, some insurance experts do not see this as a serious problem. Private owners of local roads associated with shopping centers have lived with this issue for years and have no difficulty in obtaining insurance. Toll highways, such as the New Jersey Turnpike, obtain insurance without difficulty and the claims experience is wide enough to enable the insurance industry to set rates. However, the need to insure against claims would certainly raise toll rates, possibly by as much as five percent.

Equity. One of the standard objections to the private provision of any public service is that it would be "unfair," especially to the poor. As "equity" is usually not defined by those who raise the issue, this is not an easy objection to refute. Because some Cadillac owners are inevitably poorer than others, a tax on Cadillacs can be attacked as being "inequitable." However, in the case of highways, the present system discriminates against low-income people, and the revisions proposed would help many of them.

* First, as road space is currently not used economically, an important class of gainers would be those who do economize in its use, namely, the users of public transport, in which the poor, the very old, the very young, and the disabled are heavily represented.

* Second, there would be important gains to those who live in urban centers, who tend to be heavily disadvantaged. One of the main reasons for the distress in city centers is the poor accessibility that prevents low-income people from traveling for work, shopping, and other important activities. All these would benefit from increased economic activity that would arise from the more efficient use of congested city-center roads.

* Third, to the extent that low-income workers live in city centers, they are less likely to be affected by congestion charges imposed on traffic traveling in peak directions.

* Fourth, to the extent that the measures would reduce air pollution in central areas, the main beneficiaries would be the poor. Asthma and emphysema rates nationwide are currently four times higher for blacks than for whites.(32)

In general, there could be substantial gains to local authorities that allowed their congested roads to be operated at a profit: rents and taxes payable for profitable road space would allow them to reduce taxes and/or increase services to low-income people. It is difficult to see how, on balance, the provision of highways in accordance with market criteria can be considered "inequitable" when compared to the present situation.

D. Advantages of Private Provision

In the same way that most telephone users in countries such as India and the Soviet Union have great difficulty in appreciating the advantages of private telephone companies, so most road users in the United States have difficulty in envisioning the advantages of private road provision. These could be:

1) Depoliticization. Privately provided highways are more likely to be provided in response to users' needs than governmental programs that respond to political priorities.

2) Pricing and investment. Highways that have to cover their costs are more likely to be built where they are most needed and to standards for which users are prepared to pay; and to charge fees that correspond to costs imposed. For example, if the private sector were allowed to provide the "Outer Beltway" now being canvassed for Washington, D.C., the chances of wasted investment would be reduced. The profitability criterion used by the private sector may not be perfect, but it is likely to be preferable to the nonprofit investment methodologies currently used for highway planning.

3) Speed of response. If allowed by the local planning processes, private providers can get highways financed and built more quickly than governmental institutions.

4) Benefits to local authorities. As private commercial projects pay rents and property taxes, privately provided highways can convert local authority roads--especially congested ones--from money losers to money makers.

5) Revelation of costs. The accounting requirements governing the private sector would ensure that privately provided highways would be properly depreciated and would provide information on total highway costs, which is currently difficult to get. Furthermore, the competitive pressure on private providers would exert a constant downward pressure on costs and, for example, force highway operators to take serious measures to protect their roads from damage by overloading.

E. The Monopoly Problem

The most serious objection to the private provision of public roads is that road owners would be monopolists and thus in a position to exploit their customers. Before dealing with this issue a preliminary point should be made. Monopolies are not new to road users. We confront them almost everywhere: When we have to wait 40 minutes to enter New York through the Lincoln Tunnel, or when our shock-absorbers are broken by potholes in Chicago, we do not have the option of choosing another road supplier.

And the situation outside the United States is worse. In countries as diverse as Britain and India, road users are forced to pay high road-use charges that serve to augment the general revenues of their governments--in most countries none

of the highway taxes collected are dedicated to road improvement. So the issue is not monopoly versus competition but whether private highway suppliers can improve the workings of existing systems dominated by government monopolies.

In the case of local roads, we have some relevant experience by which to assess the monopoly question. Private ownership of streets is common in St. Louis (Missouri) and in commercial and residential new developments. While dissatisfaction with maintenance on privately owned streets occurs from time to time, no cases have been reported of homeowners or businesses being denied access to their premises by street owners.

In any event, the remedy against monopoly is obvious: so long as private investors are permitted to add competitive links to the urban network and to charge competitive prices, road users would be protected from exploitation from monopolists. Highway privatization would be the best method of protecting road users against monopoly. The same argument applies in the case of the arterial roads that connect centers of activity with one another. In general, users could be protected from excessive charges by competition or even by the threat of competition.

In cases where the private highway is built as a result of voluntary transactions, for example, where no governmental powers are used to force landowners to sell their land for the highway, and where the highway provider is given no guarantee of protection against competition, it is difficult to see good reasons for any governmental interference in the rights of the owners to set fees as they please, subject to general laws against discrimination, and so on. Private owners would presumably attempt to set fees that maximize their revenues. They may in some cases miscalculate and set them so high that the highway would be very little used. But the "remedy" of price-setting by the state would probably be worse than the "disease" of human greed, as it would in all probability lead to prices being governed by political objectives and would discourage further private provision.

The situation is not so clear-cut in cases where governmental powers are used at the behest of the entrepreneur, for example, to protect the enterprise from competition from other privately provided highways, or to obtain land. In such cases an arrangement to limit the profits of the enterprise could be both inevitable and reasonable. As the prices charged should depend on traffic conditions, a possible arrangement would be for the private owners to earn an agreed rate of return on their investment, with the balance of the revenues going to a public authority.

V. RECOMMENDED ACTION PROGRAM

Despite a tenfold increase in highway receipts from 1951 to 1986, the United States faces an infrastructure crisis in which expenditures have failed to keep pace with maintenance and construction needs. Political considerations have guided decision making on infrastructure expenditures, with the result that basic maintenance has often been neglected. Furthermore, administrative costs have escalated as a percentage of highway infrastructure outlays from 7 percent in the '50s to over 17 percent currently, leaving a smaller proportion of revenues for actual maintenance and construction work.

With politics, not economics, driving HTF decision making, it is not surprising that the current system has resulted in an infrastructure crisis. The current system suffers from divided responsibilities in which the states own highways and bridges, yet the federal government foots most of the bill. Moreover, politics determine fund allocation, with a complex formula used to divide funds among the various states regardless of infrastructure revenues generated in each state. And some highway revenues have been diverted away from direct expenditures on infrastructure and reallocated for political reasons to other purposes such as mass transit.

In this context, the principles of ownership, pricing and investment used in successful market economies offer valuable policy tools both for improving the efficiency of existing highway operations and maintenance as well as for providing resources to expand infrastructure capacity. This program of reform contains several key elements:

Nonrenewal of the Highway Trust Fund. Despite the past achievements of the HTF, it is difficult to see good reasons for its continuation. While the advantages of federal financing of state highways are dubious at most, the disadvantages enumerated earlier are all too clear.

The abolition of the HTF would not, of course, prevent the federal government from financing, constructing and operating federal highways on its own, should it see reason to do so, as it already does on federal lands. This paper takes no position on this point. The purpose of this recommendation is not to prevent federal involvement in highways, but to prevent the inefficiencies that arise from the federal financing of state highways.

In abolishing the HTF, existing, uncommitted funds--estimated by John W. Hill, Jr. of the General Accounting Office to be about $6.4 billion upon expiration of the Fund's authorization--would have to be distributed. This could be done by allocating the funds to the states based on existing formulas. In addition, upon expiration of the HTF, federal taxes that support the system should also be abolished.

At first, the abolition of the HTF is unlikely to reduce the tax burden of road users, because most states would impose their own taxes to replace federal highway funds. But, over time, state road user taxes will change to correspond with the preferences of state voters; taxes for road use may rise in some states and decline in others.

Assign ownership of each highway to one entity. Pass the necessary legislation to ensure that all highways have owners with full powers to privatize them. A major problem here is OMB circular A.102 which stipulates that highways built or maintained with federal funds may not be disposed of without onerous requirements being met. These can involve repayment of federal grants or even payment to the federal government of the market value of the asset being disposed of. Furthermore, in the case of grants made by the HTF there is a prohibition of tolling (except in nine "test states"), which might make it illegal to impose economically efficient congestion charges.

Establish dedicated state highway funds which do not discriminate against private highway providers. While it is difficult to justify the continuation of the federal HTF, which receives revenues from road users and returns most of them to the states, there are good reasons for having dedicated state highway trust funds to enable road users to pay for highway use by means of fuel and tire taxes, and annual license fees. Fuel and tire taxes are relatively cheap and easy to collect and (as was seen in section III above) are suitable for meeting certain highway costs. These funds should also receive the revenues collected from owners of heavy vehicles to compensate for the pavement damage they cause. Receipts from state highway funds should be distributed to all entities, private as well as public, which provide or maintain public roads.

Establish a national vehicle identification standard to facilitate nonstop toll collection. As AVI gets more widely used, it would clearly be advantageous if transponders could be recognized on any part of the highway network, in any state, in the same way that mobile telephones can be. Appropriate national standards could be prepared by an industry group (which might need protection from antitrust

laws), or by a body such as the American Association of Motor Vehicle Administrators, which is doing excellent work to ease the procedures for truck licensing.

Finance highway maintenance by means of fees related to axle loads. While their novelty might excuse delay in introducing charges for the use of congested highways, one can see no justification for allowing heavy axles to destroy the nation's highway pavements without the users being required to pay the appropriate compensation. The charges could be levied by means of annual license fees, based on expected mileage, with truckers being given the option of having their vehicles fitted with metering devices to enable charges to be assessed on the basis of actual loaded miles traveled. As discussed in section III above, such charges would: (a) encourage truckers to spread heavy loads over more axles and (b) raise the requisite amounts for pavement reconstruction from those who cause the damage.

Revise state laws, as necessary, to permit the private provision of roads. It is surprising, but nevertheless true, that in many states it is illegal for citizens to provide public roads. Even where permission is given, the statutory conditions are so difficult to meet that freedom to build is in practice denied. California, for example, passed legislation in 1989 allowing the private sector to provide four toll highways, and Caltrans is now engaged in selecting the best proposals. But if there is a shortage of road capacity, why restrict the private sector to four highways? Why not forty or four hundred? What is the point of allowing the private sector to provide vehicles but not road space? (The late Will Rogers is reported to have suggested that the way to end traffic congestion would be to have the roads provided by the private sector and the vehicles by the public sector.) Where they are available to publicly financed roads, tax exemption privileges should be equally available to privately financed ones.

In the case of Virginia, it took the authorities from November 1986 until July 1990 to give permission for the Dulles Toll Road Extension to be built and operated by the private sector. The relevant state law (Chapter 20 of the Virginia Highway Corporation Act of 1988) prohibits a highway being built without the State Corporation Commission satisfying itself that approval of the highway would be "in the public interest," a term that is not defined. This kind of requirement enables opponents to block or delay implementation of any highway project. (State agencies wishing to provide highways in Virginia do not have to meet this requirement, the assumption presumably being that projects provided with taxpayer funds are more likely to be "in the public interest" than projects provided with private funds.)

State laws need to be clarified, so that prospective highway providers know clearly, in advance, what is, and what is not, permitted, with no discrimination against the private sector.

Encourage the private provision of roads, starting with links that relieve urban and suburban bottlenecks. Once the HTF is abolished, ownership of highways is clarified, and financing mechanisms established that do not discriminate against the private sector, the way would be open for the private provision of highways. A start could be made with the construction of private "for-profit" highways to relieve existing urban or suburban bottlenecks. These give highway users immediate choices of getting, for extra payment, better facilities.(33) Additional facilities could be provided alongside existing highways, as in the case of the Dulles Toll Road (near Washington, D.C.) or above them, as over Bangkok's airport road.

Where the private sector shows that it can build and operate new highways satisfactorily, some authorities are likely to find it to their advantage to transfer existing highways to private owners or operators. There are a number of reasons for this. First, a private operator would relieve the public authority of the costs involved in highway operation; indeed, the public authority would receive rent for the use of its land, and property tax, thus turning a financial liability into an asset. Second, if private operators were allowed to impose economic charges to reduce congestion, the area would become attractive to individuals who place high values on their time, and these individuals are likely to increase the prosperity of the area.

Encourage the privatization of bridges, especially those in need of repair. More than 230,000 U.S. highway bridges need repair or replacement. Currently available funds are inadequate to cover the cost of this work, which could exceed $60 billion. Privatization could provide an alternative means of rehabilitating or replacing high-volume bridges, with costs being recovered through tolls or other means.

VI. THE ROLE OF GOVERNMENT

All levels of government have a legitimate interest in the existence of safe highways, built to standards responsive to the economic demands of users. But it does not follow from this that government has to provide the roads, or even

determine their standards. Government has a legitimate interest in a well-fed population, but many would argue that it does not have to tell people what to eat, and most would agree that it does not have to operate food shops.

The federal role in highways arose in the 19th century at a time when states were incapable of building interstate highways, but this period is over. The federal government has vital interests in defending its people and in encouraging interstate commerce, but it is not necessary for it to finance all major highways for these reasons. Other than providing highways on federally owned land (a task that could be contracted out to the private sector), the only obvious federal roles are to intervene in cases where highways are inadequate for defense needs or for interstate commerce. If, for example, federal defense experts find that certain bridges are too weak to carry tanks, there should be nothing to stop the federal authorities putting the necessary work in hand, preferably with funds appropriated to the Defense Department.

Certainly the present system, whereby road users pay taxes to the federal government which, in its turn, remits funds to support low-priority state investments at inflated costs, cannot be justified. It can be compared to a party game at which parents give money to an entertainer who, in his turn, remits 75 percent or less of the funds to the children to spend as they please, while keeping at least 25 percent to cover the expenses of the game. Why not let the parents decide on how to spend their funds?

State roles in highways are more substantial, as states are concerned with safety, a legitimate government role. Safety concerns can require intervention both in the design of roads (for example, to ensure that the geometry, surfacing, and signing of roads minimize accident risks) and in their management (for example, to ensure that motor vehicles are not driven in a manner that poses danger to others). States also have the responsibility of devising suitable financing systems for roads, and this can include the organization of dedicated highway funds that do not discriminate against privately provided public roads. A further state role, discussed above, is to provide appropriate economic regulation to ensure that private highway owners do not take advantage of any monopoly situations they may have.

Local government roles are particularly important in dealing with the extreme conditions of congestion and (at the other extreme) underutilization of highway facilities. Congestion can be addressed by the pricing methods discussed in Section III above, the same principles being applied whether the roads are privately or publicly owned. Congestion

pricing, if the prices are of the right order, would not only relieve congestion but also earn substantial revenues to hard-pressed municipalities and enable them to reduce income and other taxes. Underutilized roads pose much more difficult problems, as they cannot generally be financed by economic user charges. Unless such roads can be financed by property owners (either through local taxes or through owners' associations), they would have to be subsidized or, in extreme cases, abandoned.

VII. CONCLUDING OBSERVATIONS

While the United States has the biggest and best-developed market economy in the world, it also has a substantial "command economy" in which scarce resources are allocated not by the wishes of consumers and producers interacting through markets but by the decisions of politicians and administrators motivated by what they consider to be the common good. Most U.S. highways are fairly and squarely in the command economy, in which prices play minor roles and in which investments do not have to pass the market tests of profit or loss. The results are the same as those produced by command economies in Eastern Europe, Africa, and elsewhere: overcrowding and queuing in some parts of the system; underutilization of others; and physical deterioration.

The transfer of U.S. highways from the command economy to the market economy would result in more economic use of the existing system and in its expansion in response to the wishes of its users. Significant economic gains can be expected, some of which have been quantified, for example by the authors of Road Work referred to earlier.(34)

Those of us who have learned in recent years that taxes discourage economic growth might have difficulty in understanding why increases in charges for the use of congested roads can produce benefits. The essential point is that the pricing system provides the best method known to us to allocate scarce resources to urgent and important uses. "Free" or underpriced highways (like metered parking charges that are too low to equate supply and demand for onstreet parking) lead to waste in the use of an important resource, and it is the elimination of this waste that is the basis for the gains from market pricing. Furthermore, the application of market pricing to highways need not result in road users paying more in total; reductions in fuel and other road use taxes could result in lower charges for the use of uncongested roads.

But it is inevitable that, as in any transformation, there would be losers as well as gainers. These would include motorists who would be induced by congestion pricing to car pool, to travel outside peak hours, or to transfer their travel to less-congested roads. There could be losses to those who operate trucks with heavy axle loads, and who would be forced by higher charges to switch to vehicles with more axles. If the change were to be spread over a number of years, the costs to truckers could be minimal, but the railroads may make some gains at their expense. Other losers could be those, especially in rural areas, who depend on underused roads. They could have to find additional funding sources (property taxes, state grants) to maintain their accessibility. As a practical matter, existing roads would generally be "grandfathered" for a period to facilitate reform, as the savings made in public highway budgets would, in most cases, be more than sufficient to compensate the losers.

Of all the activities undertaken by government, few are worse managed than highways. Traffic congestion in cities, the most glaring and ubiquitous example of waste, is so taken for granted that it is regarded by many as some kind of "disease of civilization." However, underused roads outside cities also involve substantial waste, as does the tendency of politicians to prefer new projects over the maintenance of existing ones. This criticism is not directed at U.S. highway departments or officials, but at the criteria and methods governing their operations.

This paper contends that some improvement can be obtained by unraveling overlapping responsibilities for highway management and by introducing business-oriented procedures to highway financing, but that major improvements cannot be expected until highway pricing relates to costs imposed, and investment criteria to profits and losses. Provision by the private sector should be allowed where the public sector is unlikely to undertake the necessary reforms in the near future.

The 1,500 or so local and the 200 long-distance private companies that comprise the U.S. telecommunication system provide a useful model of how a well-managed, competitive, and self-financing highway system could operate, with intervention from federal and other governmental agencies being confined to the promotion of safety and the protection of users against monopoly exploitation. An immediate transformation is not suggested, only that the private sector be allowed to provide highways, on equal terms with the public sector.

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ABOUT THE AUTHOR

Gabriel Roth is a consulting civil engineer and transportation economist who has specialized in the economics of highways since 1956 when, as Rees Jeffreys Fellow, he studied the economic benefits of highway improvement at the UK Road Research Laboratory. In 1962-3 he served on the UK's Ministry of Transport Panel on Road Pricing, and in 1967 came to Washington D.C. to serve in the World Bank, which he left in 1986 on the publication of his World Bank book The Private Provision of Public Services in Developing Countries. His earlier publications include A Self-Financing Road System, 1966, Paying for Roads: The Economics of Traffic Congestion, 1967, and (with George Wynn) Free Enterprise Urban Transportation, 1982.

NOTES

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