HIGHWAY FINANCE IN THE UNITED STATES: AN EMPIRICAL MODEL

by

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ABSTRACT

This thesis seeks to construct an empirical model of highway finance in the United States, and in particular, to examine the relationship between highway-user revenues and highway spending. It provides a general overview of the current highway system, including the federal-aid highway program, and the flow of highway funds between different levels of government. It also examines issues relating to highway-user revenues. A review of the literature failed to provide any "standard" model of highway spending and no previous studies of spending across all levels of government. Using data from the 50 states and the District of Columbia over the three-year period 1998-2000, regressions were run on the dollars spent on highways in each state from all levels of government. The independent variables included highway-user revenues (as defined by the Federal Highway Administration) in each state from all levels of government, lane-miles, daily vehicle-miles of traffic, land area, percent of land area classified as urban, population, gross state product, annual average wage, percent of traffic consisting of trucks, and average winter temperature. OLS estimates using the classical linear regression model were found to be unreliable, and attempts at using a growth rate model provided poor overall fit. Opportunities for future research are identified, as this is an important issue that should be of interest in public policy decision-making.

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Introduction

Public highways in the United States are funded through a complex system of taxes and user fees across all levels of government. Most spending occurs at, and is reported at, the state level. Fuel taxes have traditionally been the staple of highway revenue, but highway users pay a number of additional taxes and fees, some of which are not spent on highways. And in most states, additional funds from non-highway sources (e.g., general tax appropriations, financing) are spent on highways. The question of whether highway users are paying for their fair share of highway expenses frequently arises. A conceptual difficulty in answering this question comes in defining "fair share," as highways provide a combination of private, business and public service at different levels, and there are varying opinions as to how their cost should be shared.

In order for public policy decision makers to evaluate the effectiveness of their decisions relating to highway cost allocation, they must have information on the impact of those decisions. This raises the question: What is the relationship between highway-user revenues and expenditures on highways under the current system of highway finance? This paper seeks to compare highway spending in the 50 states and the District of Columbia and estimate the qualitative and quantitative impact of taxes and fees paid by motorists on this spending. This paper does not seek to determine whether this relationship is "fair." Such judgments are left up to our elected policy makers and their constituents.

The primary data source for this paper is the *Highway Statistics* series published by the U.S. Department of Transportation (DOT), Federal Highway Administration (FHWA). Data is reported by the states and some units of local government, and is reviewed by FHWA for consistency. It should be noted that the reporting of local data, much of which is estimated by the FHWA, lags behind the reporting of federal and state data by about one year. Therefore, the combined financial data (across all levels of government) for year 2000 appears in the 2001 edition of *Highway Statistics*, etc. Also, the federal government reports data based on their fiscal year (October 1 – September 30), while state and local governments may report on a fiscal or calendar year. Therefore, the data reported for year 2000 represents a mix of calendar and fiscal year data ending in year 2000. *Highway Statistics* has been published annually since 1945, and it is consistently cited for information on highway characteristics, use, income and spending in the United States.

Overview of the U.S. Highway System and Highway Finance

In the year 2000, there were 3,936,232 miles of public roads in the United States. Approximately three percent of these roads were owned by the federal government, 20 percent by state governments, and 77 percent by local governments.[1] The total amount spent on roads in this year was $122,696,557,000.[2] Of this amount, approximately one percent of direct expenditures were made at the federal government level, 63 percent at the state government level, and 36 percent was spent by local governments. Of the revenues used for these highways, approximately 23 percent came from the federal government, 51 percent came from state governments, and 26 percent came from local governments.[3]

Highways are classified by the FHWA into functional systems, based on their role in the overall network of public highways. The functional systems are: 1) arterial highways, including interstates, which connect states, cities and towns (generally the long trips); 2) collector facilities, which collect and disperse traffic between arterials and lower level roads; and 3) local streets and roads, which provide access to homes, businesses, farms, etc. These systems are further broken down into 12 classes, which may impact the type of funding for which they are eligible. The 12 classes are:

Rural	Urban
Interstate	Interstate
Other Principal Arterials	Other Freeways and Expressways
Minor Arterial	Other Principal Arterial
Major Collector	Minor Arterial
Minor Collector	Collector
Local	Local[4]

In general, federal funds are used for arterials and collectors, local funds are used for local roads, and state funds contribute to roads in all functional systems and classes, but there are exceptions.

[1] U.S. DOT, FHWA, *Highway Statistics 2000*, Table HM-10 Updated March 2003
[2] U.S. DOT, FHWA, *Highway Statistics 2001*, Table HF-2
[3] U.S. DOT, FHWA, *Highway Statistics 2001*, Table HF-10A
[4] U.S. DOT, FHWA, *Highway Statistics 2000*, Sections IV and V

Highway expenditures are also broken down into categories. The major classifications used by FHWA are:

- Capital outlays – costs associated with highway improvements, including land acquisition and other right-of-way costs; preliminary and construction engineering; construction and reconstruction; resurfacing, rehabilitation, and restoration costs of roadway and structure; system preservation activities; and installation of traffic service facilities such as guard rails, fencing, signs, and signals.
- Maintenance costs – those required to keep highways in usable condition for their designed service life.
- Highway and traffic service costs – those associated with the operation and management of highways, including 1) traffic control operations (control and surveillance systems for monitoring and controlling traffic flow); 2) snow and ice removal; and 3) miscellaneous costs for highway beautification, litter control, vegetation management, erosion control, and air quality programs.
- Administration costs – general expenses of administering a state or local highway program, including general overhead, engineering, and research costs not assignable to specific projects. Also includes expenses associated with highway planning and research, highway litigation, and highway publications.
- Highway law enforcement and safety expenditures – traffic supervision activities of state highway patrols; programs for driver education and training and motorcycle safety; vehicle inspection programs; and enforcement of vehicle size and weight limitations.
- Debt service costs – expenses incurred from borrowing funds for highway projects, including expenditures incidental to the sale of bonds, bond administration expenses, interest and redemption payments.[5]

As with the different classifications of highway functional system, funding is often allocated or directed to specific expenditure categories.

Highway funding occurs through a combination of direct payments and intergovernmental transfers, the most prominent of which is the federal-aid highway program. The federal government has been providing assistance for highways since the late 1800's. Prior to this time, highways consisted of local roads built by local governments and toll-financed

[5] U.S. DOT, FHWA, *Highway Statistics 2000*, Section IV

turnpikes built by private companies, which eventually came under state control. The development of a federally-supported, state-administered, integrated network of highways began in the early 1900's, and it has steadily expanded since that time. Some of the highlights of this development include:

- 1916 – Federal aid to the states in the construction of an integrated system of highways began, on a dollar-for-dollar matching basis.
- 1921 – Federal aid was restricted to a limited connected system of principal roads that became the Federal-aid Primary Highway System.
- 1944 – Federal aid was expanded to include urban and secondary extensions of the Primary System; a Federal-aid Secondary System of principal farm-to-market and feeder roads was designated; designation of a national system of interstate and defense highways was authorized.
- 1956 – The Federal-aid Highway Act of 1956 established the Highway Trust Fund, to be built from taxes on motor vehicle fuels, vehicles, tires, and trucks and buses exceeding 26,000 pounds gross weight, provided funding on a 90-percent federal, 10-percent state matching basis for the Eisenhower System of Interstate and Defense Highways, and continued funding for primary, secondary and urban highways (the ABC program) on a 50-percent federal and 50-percent state basis.
- 1970 – A special funding programs for bridge rehabilitation and replacement began (bridges are one of the most costly components of the highway program).
- 1976 – A special category of funds was authorized for the resurfacing, restoration and rehabilitation of Interstate highways (3R).
- 1982 – The Mass Transit Account was established within the Highway Trust Fund.

Today, the federal government reviews and establishes highway authorization legislation every six years. The two most recent authorizations contained significant changes. The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) eliminated the historical designations of Primary, Secondary, and Urban and established the National Highway System (NHS). The NHS includes the previously designated Interstate Highway system, the Strategic Highway Network (designated for military and national defense purposes), most urban and rural principal arterials, and major connectors. In 2001, the NHS consisted of 161,417 miles of public roads, which have been identified as important to our national economy and defense, and

therefore receive priority for federal funding. ISTEA also created a new flexible funding program, the Surface Transportation Program (STP), which allows federal funds to be spent on all roads and streets except those functionally classified as local or rural minor collector, on bridges on any public road, and on transit capital projects.

The Transportation Equity Act for the 21st Century (TEA-21), enacted June 9, 1998, extended most of the spending programs from ISTEA. However, it made significant changes to the federal Highway Trust Fund, the primary funding source for federal contributions to highways. First, the balance and interest earned on the balance was transferred to the General Fund, for purposes of deficit reduction. Also, federal-aid highway funds were keyed to receipts of the highway account of the Highway Trust Fund, and states were guaranteed a minimum 90.5 percent return on payments attributable to their state. It should be noted that the provisions of TEA-21 expired in September, 2003. New surface transportation authorization legislation has been introduced and is under consideration as the Safe, Accountable, Flexible and Efficient Transportation Act of 2003 (SAFETEA).

While a small portion of federal funds are spent directly on highways, most are distributed to state and local governments for spending. The federal aid process is administered by the FHWA and occurs in a series of steps. The Highway Trust Fund receives money from excise taxes on fuel, tires, truck and trailer sales, and heavy vehicle use. Table 1 shows the various federal excise taxes that are currently in effect. These taxes are collected at various stages of the distribution chain (retail, wholesale, distributor, etc.) and paid to the government. In turn, the U.S. Treasury Department reports the amount collected to the FHWA. Because this income cannot be directly related to its source state(s), the FHWA estimates the receipts attributable to each state based on highway fuel consumption. Table 2 shows the attribution of federal Highway Trust Fund receipts to each state for fiscal year 2000. As shown, a portion of the fuel taxes goes to the Mass Transit Account. This is the FHWA's estimate of how much income comes from highway users in each state, which is used to determine, but does not equal, the amount paid to each state.

Annual appropriations of funds are apportioned to each state using formulas set out in TEA-21. Table 3 shows a summary of these formulas, including the different programs and factors used in determining apportionment. The primary determinants are lane miles by highway functional class, vehicle miles traveled on these lane miles, income attributable to commercial

vehicles, and diesel fuel used on highways. Table 4 shows the resulting apportionment of funds broken down by state and program for fiscal year 2001. For most programs, these funds are matched by state or local governments on a 80-percent federal, 20-percent state basis.

It should be noted that the FHWA administers a number of funding programs in addition to the Highway Trust Fund, some of which receive money from the general fund and other federal agencies. These programs include: High Priority Projects, Emergency Relief, Parkways and Park Roads, Public Lands, Forest Highways, ITS Standards, Research and Metropolitan Deployment, NHTSA/FHWA Highway Safety Programs, and Motor Carrier Safety Assistance Programs. These funds are also allocated among the states.[6]

Once funds are apportioned to a state, there is a grace period before the funds are obligated for payment. This allows the state time for planning, budgeting and execution of their highway programs. Payments to contractors are made by state and/or local governments, and then the federal funds are used for reimbursement. As a consequence, most highway expenditures reported by the federal government are payments for work that was planned and/or started in a previous year.

There has been much criticism of the federal-aid funding program in the past, and as a result, TEA-21 included provisions to bring federal apportionments and allocations more in line with the receipts attributable to each state. Table 5 shows a comparison of attributions and apportionments of funds to each state for fiscal year 2000 and cumulative since 1956. It is interesting that for fiscal year 2000, the ratio of apportionments to attributions ranges from a low of 0.85 (Arizona, Mississippi and Texas) to a high of 5.74 (Alaska). This indicates that some states are subsidizing others, which raises questions about the financial structure.

As discussed above, most highway programs are administered at the state and/or local level. There is great variation in the expenditure share of each level of government, i.e., in some states most spending occurs at the state level and in some states most spending occurs at the local level. Larger governments may benefit from economies of scale, but this benefit may be offset by bureaucracy and higher operating costs. A recent study by David Levinson and Bhanu Yerra (University of Minnesota) used a series of regression models to find the share of highway expenditures by state and local governments that results in minimum expenditures for capital and

[6] U.S. DOT, FHWA, *Highway Statistics 2000*, Table FA-4D

operations/maintenance. The study found that the minimum is not very far from typical state/local mixes found in many states today.[7]

States provide financial assistance to local governments for highway expenditures through the transfer of state highway-user revenue, transfer of other state revenues, and/or redistribution of federal funds. In some cases, local governments make payments to states for a share of the matching funds for federal-aid highway projects. Figure 1 shows the flow of money between different levels of government (intergovernmental payments) for highway expenditures.

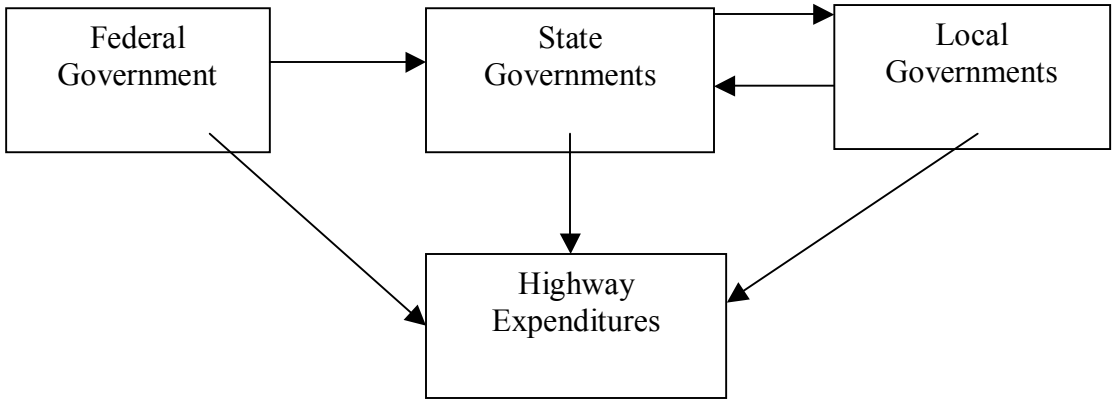

Figure 1

Flow of Highway Funds Between Governments

Like the federal government, the primary source of highway funding at the state level is highway-user fees, including fuel taxes, motor vehicle fees and taxes, and tolls, which vary greatly from state to state. For example, in the year 2000, the state excise tax on gasoline ranged from a low of 7.5 cents per gallon in Georgia to a high of 32 cents per gallon in Connecticut (see Table 6).[8] Some of these highway-user fees are diverted to mass transit and other purposes, while appropriations from general funds and other state imposts are used for highway spending. Some states also borrow money or issue bonds to finance highway projects. Table 7 shows revenues used by states for highways for the year 2000.

[7] Levinson, David, and Yerra, Bhanu, *Highway Costs and the Efficient Mix of State and Local Funds*, submitted for presentation to Transportation Research Board annual meeting, January, 2002.
[8] U.S. DOT, FHWA, *Highway Statistics 2000*, Table MF-121T

Local governments have typically funded local highways with local taxes and appropriations, but local option fuel taxes and other highway-user fees (e.g., tolls) appear to be on the increase. Revenues used by local governments for highways are shown in Table 8.

In summary, highway finance involves many levels of economic decision-making that are made in an intertemporal context. Individual consumers must decide on vehicle and highway use based on their budgetary constraints and personal utility. Manufacturers that need to transport goods and providers of highway transportation services make similar decisions that determine highway demand. Suppliers, the federal, state and local governments, must make income and spending decisions based on demand for highways and other public services, public policy decisions, budgetary constraints, and other factors, and must decide how much to spend at their own level, as well as how much to contribute to other levels.

Table 9 shows an overview of highway finance in the United States over the five-year period from 1997 to 2001. While there is variation from year to year and between the states, it shows that, overall, the percentage of income and spending categories has remained relatively stable over time. For example, of the revenues used for highways, 60-65% come from highway users (as defined by FHWA – further discussion follows), and less than five percent of this income comes from tolls.

A commonly cited statistic I have encountered compares the growth in our nation's infrastructure to the growth in demand for highways. Road lane-miles have grown by about three percent between 1980 and 1999, while the number of cars and light trucks registered in the same period has increased by 40 percent.[9] This, combined with the current federal highway reauthorization legislation and many state budgets in crisis, will make for challenging times ahead in the area of highway finance.

[9] U.S. DOT, Bureau of Transportation Statistics, *Transportation Statistics Annual Report 2000*

Highway-User Revenues

The FHWA defines highway-user revenues as taxes and fees imposed on the owners and operators of motor vehicles for their use of public highways. They include tolls, fuel, truck and tire taxes, and any other fees or taxes that can be identified as specific to motor vehicle ownership and/or use. Most highway-user revenues are used for highways, but some are used for mass transit and other non-highway purposes. The FHWA also reports on "highway receipts," a combination of that portion of highway-user revenue that was spent or specifically allocated for highways and money spent on highways from other sources.

Some have criticized the FHWA's definition of highway-user revenue as misleading because it does not include all taxes and fees paid by motorists, only those that are easily identified as specific to motor vehicles. For example, state sales taxes imposed on motor vehicle sales typically are not defined as highway-user revenues because they usually target all sales transactions. Only when motor vehicle sales are charged a separate tax rate from that imposed on general sales transactions is the motor-vehicle sales tax considered to be highway-user revenue.

In response to criticism that highway users do not pay for their fair share of highway expenses, a research study by Rayola Dougher (American Petroleum Institute) found that in 1994 only 58 percent of the $141.8 billion paid by motorists in taxes on motor fuels, vehicle licenses and registration, tolls, vehicle sales taxes and vehicle property taxes was spent on roads and bridges. Of the $59.8 billion (42 percent) diverted to non-road uses, $9.5 billion went to federal budget deficit reduction, $6 billion was spent on mass transit, $2.9 billion was attributed to collection expenses, and $41.4 billion was spent on other government programs and services (unrelated to roads and bridges). When the data was broken down by state, it found that 47 of the 50 states were fully funding their roads and subsidizing non-road activities. [10]

The $141.8 billion paid by motorists in this study consists of $86.5 billion in "conventional" road user taxes (motor fuel taxes, vehicle license and registration fees, and tolls). The remaining $55.3 billion in "other taxes and fees" consists of sales and property taxes and miscellaneous fees, such as parking tickets, insurance premium taxes and federal gas guzzler

[10] Dougher, Rayola , *The Funding of Roads in the United States: How the Taxes and Fees Collected from Motorists are Spent*, American Petroleum Institute Research Study #088, May, 1997.

excise taxes, that were estimated to have come from motor vehicle owners and operators. The author acknowledges that FHWA reports an amount allocated to roads from these other taxes and fees, but criticizes FHWA for not keeping track of what portion of this amount comes from motorists (and not accounting for the total amount of "other taxes and fees" collected from motorists).

Table 10 shows a comparison of the information in the Dougher study and that provided by FHWA for the same year. FHWA data for year 2000 are also included. While the FHWA may not fully account for revenues that come from highway users, some of this money is likely included in the other taxes and fees used for highways. And the Dougher study does not include other taxes and fees (from non-motorist sources) that are used for highways. These are accounting issues, but states must ultimately decide how much to spend on highways, and where the money comes from is an important factor in that decision-making process.

As stated earlier, fuel taxes have traditionally been the staple of highway revenue. A recent report by the Surface Transportation Policy Project (STPP) suggests that this may be changing. In 2002, there were 44 transportation measures on ballots around the country, signifying a shift away from the traditional legislatively-approved user fees (e.g., gasoline taxes) and toward voter-approved general revenue taxes (e.g., sales taxes, general fund budget revenues, bonds, etc.). This move is found to be the product of two trends:

(1) the reluctance to increase traditional "user fee" revenues, especially state gasoline taxes that have failed to keep pace with inflation; and

(2) the demand for more public transit projects, which are difficult to finance from traditional user fees.[11]

In support of the first trend, the authors have compiled a table consisting of the motor fuel tax rate for each state in 1957, that rate adjusted for inflation to the year 2002, and a comparison to the actual rate in 2002. This table is reproduced as Table 11. It shows that, on average, state fuel tax rates should be about ten cents higher than their current level in order to have kept up with inflation.

[11] Ernst, Michelle, Corless, James, and McCarty, Kevin, *Measuring Up: The Trend Toward Voter-Approved Transportation Funding,* Surface Transportation Policy Project (STPP), www.transact.org, October, 2002

Of the 44 measures on the ballot in 2002, 55% were passed, with voters approving all four proposed bond measures. Of 30 measures that proposed new sales, property, or gas taxes, 13 were approved.[12]

[12] Surface Transportation Policy Project (STPP), *2002 Transportation Ballot Referenda Results*, www.transact.org, November, 2002

Literature Search

The issue of highway cost allocation has been studied and debated for many years. The 1997 Federal Highway Cost Allocation Study (HCAS) is the most recent government report on this subject. Directed by Congress and written by FHWA, the report sought to determine how changes in the federal-aid highway program had affected the equity of federal highway-user fees. The report was also designed to take advantage of research conducted in the concurrent U.S. Department of Transportation Comprehensive Truck Size and Weight Study (U.S. DOT TS&WS). Using a base period of 1993-1995, a three-year average of highway costs and revenues was constructed to reduce the effects of annual variations. This information was used to identify trends and forecasts of highway use, highway costs, highway-user revenues, highway cost responsibility, and equity and efficiency of highway-user fees for analysis year 2000.

The Summary of Key Findings in the 1997 Federal HCAS is shown below:

- Passenger vehicles (autos, pick-ups, vans) travel 93 percent of all VMT [vehicle miles of travel], account for 96 percent of all vehicles and will pay about 64 percent of all Federal highway user fees in 2000. Trucks on average pay almost 10 times more Federal highway user fees per mile of travel than passenger vehicles.
- Overall, the Federal user fee structure is more equitable today than it was in 1982. Changes in the composition of the Federal highway program and changes in Federal user fees account for most of the difference.
- Passenger vehicles are expected to overpay Federal user fees by about 10 percent, while single unit and combination trucks will underpay by about 10 percent in 2000. These averages, however, mask inequities among vehicles. For example, while automobiles pay their share of highway costs, pickups and vans overpay. In virtually all truck classes the lightest vehicles pay more than their share of highway costs and the heaviest vehicles pay considerably less than their share of costs.
- In general, the more axles under heavy vehicles, the lower their highway cost responsibility at any given weight and the more closely they come to paying their highway cost responsibility.
- State governments collect over two-thirds of total HURs [highway-user revenues] and the equity of their user fee structures strongly affects the overall equity of user fees collected by

all levels of government. Federal user fees are somewhat more equitable than average State user fees for lighter vehicles, but State user fees on average come somewhat closer to capturing the cost responsibility of the heaviest truck classes.

- Increasing the diesel differential or eliminating the $550 cap on the HVUT [heavy vehicle use tax] could result in incremental improvements to user fee equity. Modifications to the HVUT rate schedule or new taxes such as WDT [weight-distance taxes] or axle-WDT could result in larger gains in equity.
- Safety, congestion, environmental, and other social costs of highway use remain large despite significant progress in reducing those costs through regulatory and highway improvement programs. Imposing charges to reduce those costs holds promise, but many social costs are highly localized and are more amenable to local pricing rather than pricing at the Federal level.[13]

An Addendum to the 1997 HCAS was issued in May, 2000, to reflect changes from two pieces of legislation that impacted highway cost allocation. First, the Tax Payer Relief Act of 1997 redirected 4.3 cents per gallon of the federal motor fuel tax that had been dedicated for deficit reduction to the Federal Highway Trust Fund, which increased total highway-user revenues and changed the relative shares paid by different vehicle classes. Second, TEA-21 significantly increased surface transportation funding and made changes in authorization levels for different program areas, which affected the relative cost responsibility of different vehicle classes and the ratios of user fee payments to cost responsibility for these different vehicle classes. The Addendum also included estimates of air pollution-related costs attributable to motor vehicles based on research by the Environmental Protection Agency (EPA) that was not available when the report was published in 1997.

It should be noted that, while the HCAS addresses social costs, which include environmental, safety, and delay costs imposed on others by motor vehicles and their use, these costs are not included in the equity ratios presented. According to the report:

> "…highway agency costs are different from the economic costs associated with the operation of different vehicle classes. Analyses of economic costs occasioned by each vehicle class, which include environmental, safety, and delay costs imposed on others as well as pavement, bridge, and other infrastructure costs, are important in considering the economic efficiency of highway user fees. However, HCASs traditionally have focused primarily on the equity of highway user fees as measured by the extent to which each

[13] U.S. DOT, FHWA, *Executive Summary of 1997 Federal Highway Cost Allocation Study Final Report*, 1997

vehicle class pays the share of highway agency costs for which it is responsible. Agency costs considered in HCASs do not reflect what transportation agencies should spend in various areas, but are estimates of how obligations actually are being distributed."[14]

The reports contain two sets of equity ratios, measured as the share of revenues contributed by each vehicle class to the share of highway costs ("agency" costs, such as pavement, bridge, and other infrastructure costs) for that vehicle class. An equity ratio greater than 1.0 suggests that that class of vehicles is paying more than its costs, and a ratio less than 1.0 suggests vehicles are underpaying their costs. Table 12 shows a comparison of the equity ratios of federal user charges to allocated costs and the equity ratios of user fees to allocated costs across all levels of government; both are estimated for the year 2000. It should be noted that the ratios shown for the federal government are from the 2000 Addendum, which reflect the changes in TEA-21 and other 1997 legislation. The ratios shown across all levels of government are from the 1997 HCAS; these figures were not updated in the 2000 Addendum.

In general, the analysis at the federal level suggests that passenger vans and pick-up trucks and lighter single-unit and combination trucks are paying a higher share of revenues than costs, while buses and heavier single-unit and combination trucks are paying a lower share of revenues than costs. Passenger automobiles have an equity ratio of 1.0. The report notes that the difference between passenger automobiles (1.0) and passenger pickups/vans (1.5) is primarily attributable to better fuel economy, which means automobiles pay less in fuel taxes per mile than pickups/vans.

The figures shown in the second column of Table 12 are based on average revenues and expenditures for all state and local governments, and results for individual states may vary substantially from those shown in the table. The total revenues and costs for all vehicle classes in this column are not equal. At the state level, total user fee collections are approximately equal to total expenditures, but at the local level, user fees are only about 10 percent of expenditures. While the information across all levels of government was not updated in the 2000 Addendum, it is important in looking at the overall picture because state and local governments collect three-quarters of total highway-user revenues. While fuel taxes account for almost 90 percent of federal highway-user fees, they are only about half of state and one-third of the local highway-user revenues. Vehicle registration fees make up about one-third of state and over 40 percent of

[14] U.S. DOT, FHWA, *Addendum to the 1997 Federal Highway Cost Allocation Study Final Report*, May 2000

local highway-user revenues, compared to less than three percent for the federal heavy vehicle use tax.

Interestingly, in comparing the information across all levels of government with the information at the federal level, the equity ratios in most categories are lower. Passenger automobiles drop from 1.0 to 0.7, pickups/vans drop from 1.5 to 0.9, and all passenger vehicles drop from 1.1 to 0.8. Single-unit trucks drop from 0.9 to 0.8, combination trucks stay the same (0.8), and all vehicles considered together drop from 1.0 to 0.8.

As noted above, these equity ratios do not include the social costs associated with highway use. The 1997 report estimates that noise, congestion and crashes cost $406 billion in 2000, with 88 percent of these costs borne by highway users and 12 percent borne by non-users. The 2000 Addendum increased the social costs borne by non-users by adding estimates of costs related to air pollution, which ranged from $30.3 billion to $349.1 billion.[15] Using a mid-range estimate of $40.443 billion for air pollution, the report estimates the marginal costs of highway use, including incremental costs to the highway user, costs to public agencies, and external costs imposed on others, for different vehicle classes and highway classes, as shown in Table 13.

The report points out that marginal costs vary according to when and where a trip is made. For example, pavement costs for different vehicle classes depend on pavement design, condition, temperature and other local characteristics. Congestion costs associated with an additional mile of travel on rural highways are negligible when compared to costs on urban highways, but costs on urban highways are further dependent on time periods and traffic volume. In this regard, the report states: "To achieve the greatest degree of efficiency, fees reflecting the marginal costs of trips made in various locations at various times of the day should be charged."[16] While the report goes on to estimate the federal shares of these marginal costs using the proportion of total highway-user revenues generated at each level of government, and compares them to federal highway cost responsibility estimated in the equity analysis and to federal user fees paid by different vehicle classes, it clearly states that highway marginal costs cannot be assigned to one level of government or another.

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[15] Factors that contribute to this range include whether or not road dust is included (EPA does not include road dust as a pollutant attributable to motor vehicles, but others do) and differences in the value associated with a premature death (estimates from 26 studies dating back to the mid-1970's range from $0.6 million to $13.5 million).

[16] U.S. DOT, FHWA, *Addendum to the 1997 Federal Highway Cost Allocation Study Final Report*, May 2000

Because economists are interested in efficiency, many have advocated changes to the existing structure of highway finance in the United States, including the increased use of tolls and peak-period pricing. David Levinson (University of Minnesota), who has written extensively on this subject, states:

> "A reconsideration of the existing highway revenue mechanisms, in particular the gas tax, is in order. The original decision to utilize the gas tax for highway finance relied upon certain underlying fundamental conditions…Several key changes…challenge the assumptions that were in place when the decision to employ gas taxes was made. These changes include the increasing importance of social costs, the shift in the vehicle fleet toward alternative fuels or electric power, the rise of congestion, the scarcity of financial resources and resistance to general taxation, the emergence of new, intelligent transportation technologies and electronic toll collection, and changing priorities (from construction to maintenance) associated with a mature technology while America's highway finance system favors ribbon cutting to repairs…
> Road pricing ties revenue to need more closely and directly than a tax system can. It should result in more efficient, and less political, road financing decisions, with less waste due to the log rolling and pork-barrel politics which infests current infrastructure spending. It is easier to raise revenue for transportation from user fees, which directly result in better service, than general taxes. Just as gas taxes substitute more efficiently for general taxes, direct road pricing could substitute for gas taxes."[17]

On the other hand, the existing system is not likely to change overnight. A recent article by D.J. Kulash (Eno Transportation Foundation, Inc.) provides this perspective:

> "Highway user fees are particularly important and long-standing. The earliest road user fees were turnpike tolls, which were a response to the unprecedented long-distance through-traffic that accompanied the industrial revolution. Similarly, but much later, with the introduction of motorized traffic, counties and towns struggled to maintain roads in the face of the new traffic, much of which was from outside their immediate jurisdiction. User fees in the form of dedicated motor-fuel taxes became a popular solution. User fees offer a practical, simple way to finance transportation investment, and they can help boost efficiency. They are seen as fair, and they have produced the money needed to make necessary transportation investments. Transportation user fees are an imperfect solution to economists, budgetary interests, and transportation concerns, but they are a valuable, working compromise acceptable to many. They have been, and will likely remain, the cornerstone of U.S. transportation finance."[18]

[17] Levinson, David M., *Financing Transportation Networks*, pp. 202-3, Edward Elgar Publishing, Northampton, MA 2002

[18] Kulash, D.J., *Transportation User Fees in the United States*, Transportation Quarterly, Vol. 55, Issue 3, Eno Transportation Foundation, Inc., Washington, DC, Summer 2001

Executive Order 12893, "Principles for Federal Infrastructure Investments," requires that federal infrastructure investment and management plans be based upon a systematic analysis of expected benefits and costs. While the 1997 Federal HCAS did not address the issue of benefits, substantial research has been conducted to estimate both the user benefits of highway investment as well as the broader benefits of highways to economic productivity. A study by M. Williams (Northern Illinois University) and J.K. Mullen (Clarkson University) found that highway capital has a significant positive impact on regional output, measured as Gross State Product.[19]

I did not find any studies that look at the relationship between highway-user revenues and highway spending across all levels of government. In order to build a model, I reviewed a number of studies where highway spending was the dependent variable to identify pertinent independent variables. Some of these studies use cost functions as their basis, with independent variables for inputs (wage rates, cost of materials and land, cost of snow removal, interest rates), network (road length or lane miles), and output (vehicle miles of travel, number of bridges, accidents). Other studies make reference to "standard" determinants of highway demand, such as land area, personal income, number of motor vehicles registered, proportion of cars and trucks, population density/resident in urban areas, unemployment, and real debt-private income ratio. In some cases, highway expenditures and certain independent variables were measured per capita or per lane mile.

The FHWA is careful to caution users about comparing its data across states without taking into account the many state-to-state differences that may impact them. They even provide suggestions for making these comparisons, as well as some of the necessary data. The following are identified as "Selected Measures for Identifying Peer States":

- Net Land Area in Square Miles (Rural, Urban and Percent Urban)
- Population (Rural, Urban, Percent Urban, Total per Square Mile)
- Personal Income (Amount, Per Capita)
- Gross State Product (Amount, Per Capita)
- Annual Vehicle Miles of Travel (Rural, Urban, Percent Trucks, Total Per Capita)
- Lane Miles (Rural, Urban)[20]

[19] Williams, M. and Mullen, J.K., *The Contribution of Highway Infrastructure to States' Economies*, International Journal of Transport Economics, Vol. XIX, No. 2, June 1992

[20] U.S. DOT, FHWA, *Highway Statistics 2000*, Table PS-1

Methodology and the Classical Linear Regression Model

My hypothesis is: States with higher highway-user revenues have higher highway expenditures. To test this hypothesis, I first tried a classical linear regression model with cross-sectional, time-series data for the 50 states and the District of Columbia from the years 1998, 1999 and 2000 (153 observations). An ordinary least squares (OLS) estimator was generated to estimate the impact of highway-user revenue and other chosen independent variables on highway spending.

Most expenditure functions are dependent on the prices of the goods involved and a given target utility goal, subject to income constraints. In the case of highways, the federal, state and local governments must decide how much to spend on highways and how much to spend on other government services. There are a number of factors that influence these decisions, some of which may be anticipated or planned for (social priorities, highway demand or use, land and labor costs, etc.), and some which may be unexpected (extreme weather, terrorist attacks). These government suppliers must also make decisions about how to pay for their expenditures. They must decide how much will come from user fees and set fuel tax rates, registration fees, etc., accordingly. In most states, some highway money comes from general appropriations, which are based in part on sales, income and property tax rates. And in some cases states decide to engage in deficit spending to pay for highways, in which case interest rates will be a factor.

Perhaps one of the biggest but least obvious factors in this whole process is the role of politics. Virtually every state has a highway or transportation trust fund or line item in its budget, but some are more strictly controlled than others.[21] The proposed budgets for highway and other government spending are subject to legislative review and approval, and legislators generally vote based on input from their constituents and lobbying groups. It is difficult to measure the influence of politics in an economic model, although some have tried.[22] While

[21] A recent report by the Surface Transportation Policy Project (STPP) identified 30 states with constitutional or statutory requirements that state gasoline tax revenues be spent on highways. See *Measuring Up: The Trend Toward Voter-Approved Transportation Funding* by Michelle Ernst, James Corless, and Kevin McCarty, www.transact.org, October, 2002.

[22] See Congleton, Roger D. and Bennett, Randall W., *On the Political Economy of State Highway Expenditures: Some Evidence of the Relative Performance of Alternative Public Choice Models*, Public Choice, Vol. 84, No. 1-2, pp. 1-24, July 1995 and Knight, Brian, *Endogenous Federal Grants and Crowd-Out of State Government Spending: Theory and Evidence from the Federal Highway Aid Program*, American Economic Review, Vol. 92, No. 1, pp. 71-92, March 2002

difficult to measure, it is safe to assume that politics will influence both the spending and income sides of the equation.

The dependent variable is defined as $Spent, consisting of highway expenditures on capital, maintenance, administration, law enforcement and safety across all levels of government, taken from Table HF-2 of *Highway Statistics*, for the 50 states and the District of Columbia. In keeping with other studies of highway spending, I did not include interest or bond retirement payments. In the year 2000, highway spending ranged from a low of $240 million in the District of Columbia to a high of $10 billion in California.

HUR is highway-user revenues available for distribution, as defined by FHWA, across all levels of government within each state, taken from Table HDF of *Highway Statistics*. This represents a portion of the income that is available for highway use and includes fuel taxes and other fees associated with highway use that are attributed to the state. Under my hypothesis, states with higher levels of highway-user revenues would choose to spend more on highways than states with lower highway-user revenues, so a positive coefficient is expected.

In the year 2000, DC also had the lowest highway-user revenues ($134 million) and California had the highest highway-user revenues ($11.48 billion). This supports my hypothesis that states with higher highway-user revenues have higher highway expenditures. But is this consistent across all the states, and what other factors contribute to this great variation in highway spending?

To complete my model, I had to identify and control for those variables independent from the general category of highway-user revenues that contribute to the great variation in highway spending from state to state. Some of these factors will impact highway expenditures for maintenance and upkeep of existing roads, some will impact the building of new roads, and some may impact both maintenance and new construction.

Based on my research and other studies of highway expenditures, I considered the following variables:

LM is the number of lane-miles in each state, indicating the size of the highway network that must be maintained and supervised (sometimes referred to as the primary measure of road "supply"). The number of lane-miles is estimated by multiplying the centerline length of the road by the number of through lanes. Through lanes are the prevailing number of lanes in both directions carrying through traffic in the off-peak period, and do not include lanes used for

parking, turning, collector-distributor operations, weaving, service ramps, bus pullouts, climbing lanes or vehicle run away lanes. The number of lane-miles is taken from Table HM-60 of *Highway Statistics*. It should be noted that there was a change in reporting lane-miles beginning in 1999, so differences between years may be inflated. It is expected that the estimated coefficient for lane-miles would be positive, as more lane miles requires more money for maintenance and supervision.

DVMT is daily vehicle-miles of travel in each state, the primary measure of road usage or demand. Travel estimates are compiled in different ways, depending on functional system and other factors. FHWA provides specific procedures for counting and estimating traffic on higher-class highways, including Interstates, the NHS and other principal arterials, and sectional counts for these roads are required to be updated at least every three years. Travel on rural minor collectors and rural/urban local roads may be estimated using fuel use or other methods. DVMT is taken from Table PS-1 of *Highway Statistics*. It is expected that the estimated coefficient for DVMT would be positive, because higher use of roads results in greater wear and tear, requiring more spending on maintenance and reconstruction. Higher DVMT is also expected to contribute to the demand for new highway construction to relieve crowding and traffic congestion.

Area refers to the number of square miles of land area, taken from Table PS-1 of *Highway Statistics*. It is expected that states with higher land areas would require more lane-miles of highways to serve their residents, and consequently these states would have higher highway expenditures. However, this is dependent on the population and its distribution within the state.

% Urban, also taken from Table PS-1 of *Highway Statistics*, is the percent of land area classified as urban, based on the federal-aid legislation definition of an area. Such areas include, at a minimum, a census place with an urban population of 5,000 to 49,999 or a designated urbanized area with a population of 50,000 or more. % Urban is expected to have a positive estimated coefficient, as urban areas are likely to have higher DVMT and consequently higher maintenance and capital highway expenditures.

POP is the mid-year estimate of population in each state, taken from the Bureau of the Census, as reported on the Bureau of Economic Analysis (BEA) web site. It is expected that states with higher populations will have higher demand for highways, so a positive coefficient is expected.

GSP is gross state product, a measure of output or value added in production by the labor and property located in a state. PI is personal income, including wages, interest, dividends and rental income, of people living in the state. Both of these measures are taken from the BEA web site, and they are highly correlated (0.99 across the three years). It is expected that states with higher GSP and PI will have higher tax bases. They are considered as measures of a state's wealth, or ability to afford more highway spending, so a positive coefficient is expected. After experimenting with both variables, separately and in combination, I chose to use GSP in my model, but not PI.

AvgWage is the average annual pay for all workers in each state covered by Unemployment Insurance (UI) and Compensation for Federal Employees (UCFE) programs. ConstWage is average annual pay for private construction workers covered by unemployment insurance in each state. Both of these figures are taken from the BEA web site. The U.S. Department of Labor has recently converted from the Standard Industrial Classification (SIC) system to the North American Industry Classification System (NAICS) for reporting wages, and wage information specific to highway construction workers is not available for most states for years 1998-2000. Many highway construction workers are government employees and are therefore not included in the ConstWage category. While AvgWage covers a broader range of workers and salaries, it generally provided more significant results than ConstWage in regression analysis. I chose AvgWage for my model, to reflect the cost of labor, a major cost factor in highway construction and maintenance. A positive coefficient is expected.

%Trucks is the percent of annual VMT (DVMT times the number of days in the year) composed of buses, single-unit trucks with at least two axles and six tires, and combination trucks. It was computed by taking a weighted average of rural and urban AVMT by truck, as shown in Table PS-1 of *Highway Statistics*. Engineering studies have consistently shown that trucks cause greater wear and tear on pavement and bridges than cars. The magnitude of the damage is dependent on a number of factors, including vehicle weight, tire width and axle load. The 1997 Federal Highway Cost Allocation Study (HCAS) found that, on average, the per-mile costs of combination trucks are almost double those of single-unit trucks and about ten times the costs per mile of passenger vehicles.[23] For this reason, a positive coefficient is expected.

[23] U.S. DOT, FHWA, *1997 Federal Highway Cost Allocation Study Final Report*, Part V, 1997

It should be noted that measuring the percent of truck traffic in each state is a difficult task. Paul Svercl of the Office of Highway Policy Information, FHWA, made the following statement on the *Highway Community Exchange*, an online discussion forum on the FHWA's web site:

> "Estimates of AVMT by State and major vehicle types normally are not prepared since the amount of information collected by individual States is very limited. Use of the VIUS data from Census provides survey answers expanded based on vehicle registrations, but generally the government vehicles, etc., are excluded and travel in-state vs. out-of-state needs to be considered. State estimates determined based on vehicle classification information (Table VM-4 percentages by major vehicle type published in the annual 'Highway Statistics' by FHWA) covers only the arterial systems and at best are rough estimates by vehicle type."[24]

In fact, Table VM-4 was dropped from the *Highway Statistics* publication in 2000.

Temp is average winter temperature, based on the months of December, January and February, for the 30-year period 1971-2000, as reported by the National Climatic Data Center of the National Oceanic and Atmospheric Administration (NOAA). Temp for the District of Columbia is included in the estimate for Maryland, and is repeated in the sample for both locations. Road pavement is susceptible to damage from freezing temperatures, especially when moisture has permeated the surface. The freezing, expanding and thawing process can cause potholes and general break-down of the pavement. In the state of Virginia, following a particularly cold and snowy winter in 2002-03, pothole repairs, budgeted at $11 million for the year, were expected to cost $22 million.[25] It is expected that states with lower average winter temperatures will spend more on highway maintenance and repair, so a negative coefficient is expected.[26]

[24] Svercl, Paul, *Highway Community Exchange*, www.fhwa.dot.gov, June 27, 2001
[25] Virginia DOT *Bulletin*, www.vadot.org, March-April, 2003
[26] A climate variable combining temperature and moisture may be more appropriate as a predictor of highway spending. Attempts to find representative average snowfall for each state were unsuccessful.

Using OLS, I ran several regressions of highway spending on highway-user revenues and different combinations of these variables. The model shown below seemed to provide the best results, based on overall fit and significance of variables. The descriptive statistics for these variables are shown in Table 14.

$$\$Spent_{it} = \beta_0 + \beta_1(HUR_{it}) + \beta_2(LM_{it}) + \beta_3(DVMT_{it}) + \beta_4(Area_{it}) + \beta_5(\%Urban_{it}) + \beta_6(Pop_{it}) + \beta_7(GSP_{it}) + \beta_8(AvgWage_{it}) + \beta_9(\%Trucks_{it}) + \beta_{10}(Temp_{it}) + \varepsilon_{it}$$

where i is the 50 states and the District of Columbia and t is the year 1998-2000.

Results Using the Classical Linear Regression Model

The results of the OLS regression analysis using the classical linear model are shown in Table 15. The coefficients for land area, percent of annual VMT by trucks, and average winter temperature are not significant. The coefficients for DVMT and percent of land area classified as urban are significant, but not positive as predicted. The remaining variables of highway-user revenues, lane miles, population, GSP and annual average wages are positive and significant.

The hypothesis that states with higher highway-user revenues have higher highway expenditures is supported. The coefficient of 0.23 suggests that for every dollar collected in highway-user revenues, 23 cents is spent on highways. This coefficient is significant at the five percent level, implying that you can reject the null hypothesis that highway-user revenues have no impact on highway spending with 95 percent confidence. However, these results are not reliable and should be interpreted with caution.

Using a classical linear regression model requires making certain assumptions about the data. The five basic assumptions are:

1. The dependent variable can be calculated as a linear function of a specific set of independent variables, plus a disturbance (error) term.
2. The expected value of the disturbance term is zero.
3. The disturbance terms all have the same variance and are not correlated with each other.
4. Observations on the independent variables can be considered fixed in repeated samples.
5. The number of observations is greater that the number of independent variables and there are no exact linear relationships between the independent variables.[27]

Given the complexities of highway finance described herein, it is obvious that highway spending is not a linear function of highway-user revenues and the other named variables. It is also likely that this model omits significant variables, such as the role of politics. These are violations of the first assumption.

[27] Kennedy, Peter, *A Guide to Econometrics*, 4th ed., pp. 43-44, The MIT Press, 1998

Figure 2 shows the actual figures for $Spent plotted against the fitted values of $Spent based on the linear OLS estimator, which provides a general illustration of the disturbance terms in the model. It is obvious that the variance of the disturbance terms is not constant, indicating heteroscedasticity, a violation of the third assumption. This is a reflection of the fact that highway spending is much greater in big states than it is in small states.

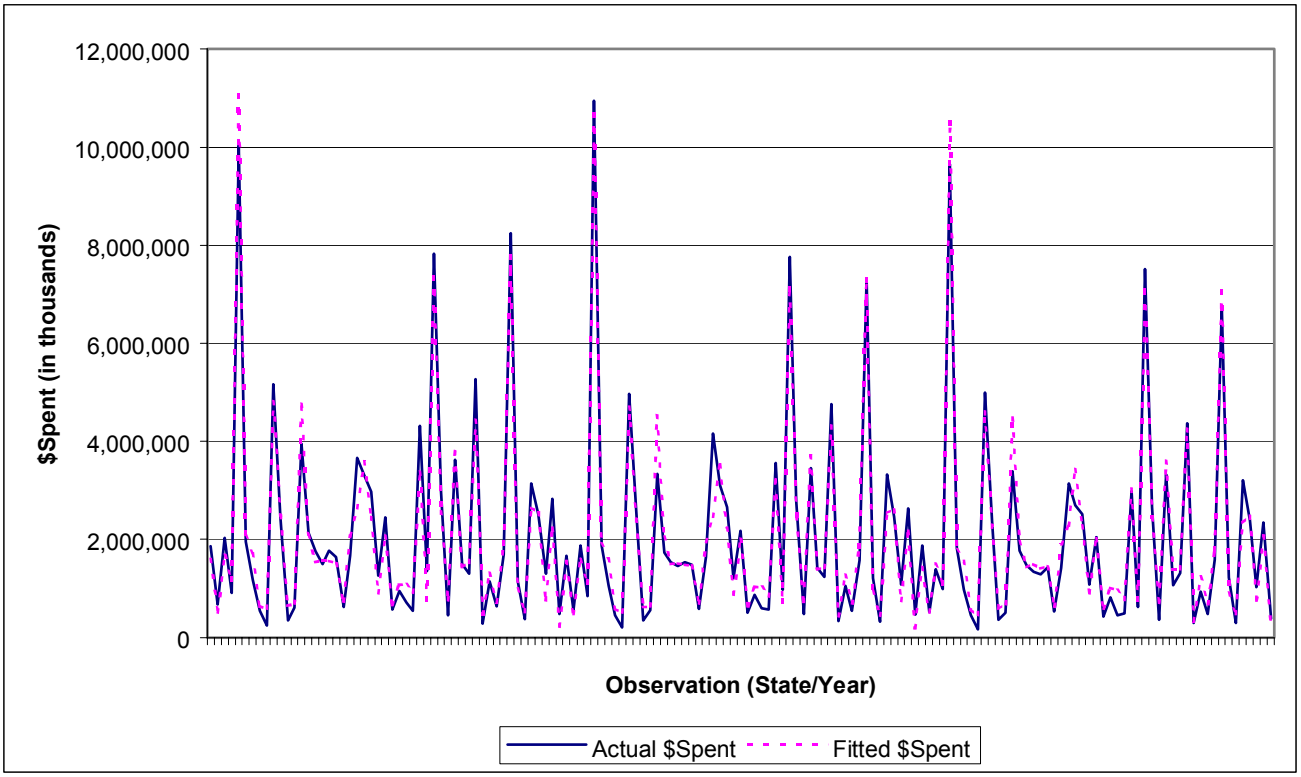

Figure 2

Linear OLS Estimates of $Spent on Highways

(Actual vs. Fitted)

A common problem in the use of time-series data is autocorrelation, in which the disturbances are correlated with those from the prior time period. This is also a violation of the third assumption. To test for autocorrelation, I ran a Durbin-Watson test. The Durbin-Watson test statistic was 0.3, which indicates positive autocorrelation of the disturbances. This is not surprising given the use of sequential yearly data. There are statistical procedures to correct for autocorrelation; however, it is recommended that the model be reviewed for completeness and correct specificity before using them. Given that my model likely has omitted variables and misspecified functional form, I did not attempt to correct for autocorrelation.

It is likely that this model contains measurement error, particularly in the areas of highway spending and revenues, DVMT and percent trucks. The Federal Highway Administration relies on state and local governments to provide this information, and the potential for inconsistencies and errors in reporting is great. Counting traffic is difficult, but pales in comparison to the current system for attributing and apportioning federal highway tax revenues to the states. Such measurement errors are a violation of the fourth assumption and may account for the incorrect signs on the coefficients for DVMT and %Urban.

The fifth assumption states that there are no exact linear relationships between the independent variables. A review of the data used in this model indicates that $Spent, HUR, DVMT, POP and GSP are all highly correlated (0.94 and higher). While there are no exact linear relationships, estimation problems can arise when two or more independent variables are highly correlated. This phenomenon is called multicollinearity. Because OLS is unable to distinguish variation that is common to these variables, it calculates the coefficients based on variation that is unique to each variable, resulting in artificially high variances for the parameter estimates. Unfortunately, there are no easy fixes for multicollinearity. One possibility is to drop one or more of the collinear variables. However, unless there is reason to believe that the true coefficient for the variable is zero (it has no impact on the dependent variable), dropping a variable would likely create a specification error. A more desirable fix is to obtain additional data, as increasing the sample size may reduce variances.

Growth Rate Models

One way of addressing some of the problems identified above is to look at the annual growth rate (rate of change) in dollars spent on highways instead of the actual level of spending. This should reduce the differences between big states and small states, and hopefully smooth out the variances of the error terms. Obviously, this will require converting highway-user revenues and some of the other independent variables to growth rates as well. It will also reduce the number of observations by one-third (based on three years of data), decreasing the degrees of freedom.

The descriptive statistics for the growth rates of the involved variables (except winter temperature, where a 30-year average is used for all years) are shown in Table 16. As expected, the average yearly change for some of the variables is very small (e.g., land area and lane miles). The largest average change is in the dependent variable, dollars spent on highways (average change 9.25 %). In order to determine the impact of the independent variables on the annual growth rate of dollars spent on highways, I tried different combinations of growth rates and actual levels of these independent variables. The results of three different models are shown in Table 17.

The first model uses the growth rates of all variables except winter temperature. The second model uses the growth rate of highway-user revenues, but actual levels for all other variables. The third model uses growth rates for highway-user revenues, DVMT, population, GSP and average wage, and actual levels for lane miles, land area, percent urban, percent trucks and winter temperature. This third model seemed to make the most sense in light of the nature and growth rates of the variables and to provide the best results.

Overall, none of the growth rate models provide particularly good fit, as evidenced by low R-squared and F statistics. Figure 3 shows the actual and fitted values of the growth rate in dollars spent on highways estimated by Model 3. There is less evidence of heteroscedasticity than the classical linear model, but it does still exist. The Durbin-Watson statistic for this model is 0.95, indicating that positive autocorrelation is still present. And the growth rate models do not address the problems of omitted variables and measurement errors in the data.

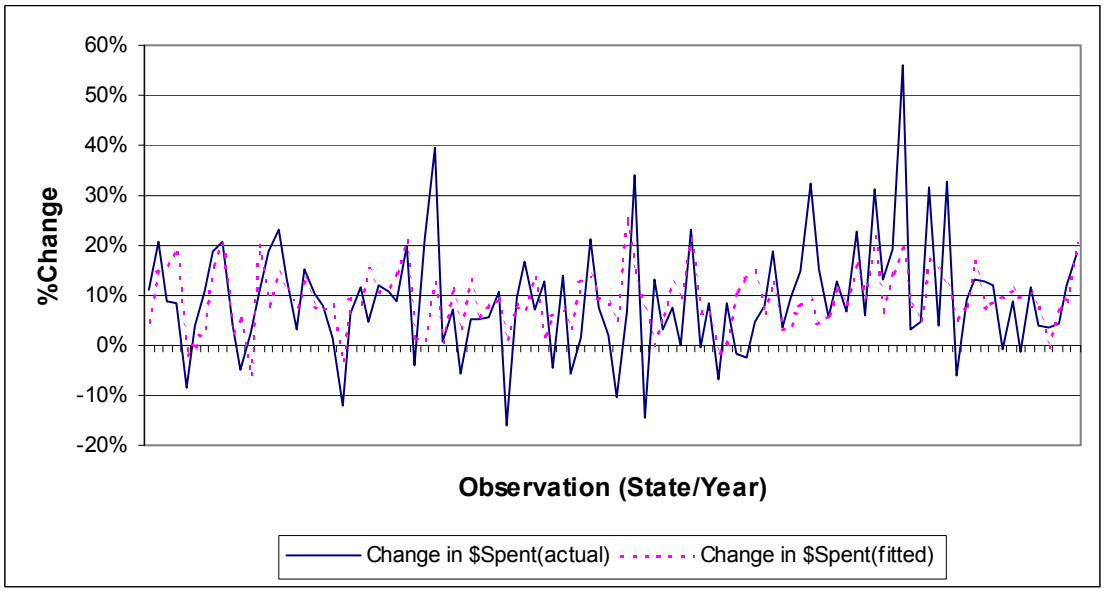

Figure 3

OLS Estimates of Growth Rates in $Spent on Highways

(Actual vs. Fitted)

Conclusions

In conclusion, the complexities of the highway finance system in the United States make it difficult to estimate the relationship between highway-user revenues and highway spending across all levels of government. There is no "standard" economic model for highway spending revealed in the literature.

The OLS estimate from the classical linear regression model presented suggests a positive relationship; however, this estimate is unreliable because the data collected violates many of the assumptions required for using this model. Attempts at using a growth rate model address some of these violations, but not all. The growth rate models do not provide overall good fit, and they suggest that highway-user revenue is not a significant variable in models of highway spending.

Opportunities for future research in this area include experimenting with different functional forms of the models presented herein, attempting to define a political variable, and adding additional years of data. In addition, the following information needs to be taken into consideration when working with these models:

- This study uses the FHWA definition of highway-user revenue. According to the Dougher study, when considering motor-vehicle-related sales and property taxes (which the FHWA counts as "other income"), highway users pay significantly more than what is reported by FHWA, and more than what is spent on highways.
- This study does not include the social costs of highways: congestion, crashes, noise and pollution.
- This study does not include the economic benefits associated with highways.

As the demand for highways continues to increase at a pace far greater than supply, lawmakers will continue to search for additional revenues, including those that come from highway users.

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APPENDIX

Tables 1-17

Table 1

Current Federal Highway-User Fees
Source: U.S. DOT, FHWA, *Highway Statistics 2002*, Table FE-21B, November 2003 1/

USER FEE		TAX RATE	DISTRIBUTION OF TAX				
			EFFECTIVE DATE	HIGHWAY TRUST FUND		LEAKING UNDER-GROUND STORAGE TANK TRUST FUND	GENERAL FUND
				HIGHWAY ACCOUNT	MASS TRANSIT ACCOUNT		
Fuel Taxes (Cents per Gallon)							
Gasoline		18.3	01/01/96	12	2	-	4.3
		18.4	10/01/97	15.44	2.86	0.1	-
Diesel and Kerosene fuel		24.3	01/01/96	18	2	-	4.3
		24.4	10/01/97	21.44	2.86	0.1	-
Special fuels 2/ 3/		18.3	01/01/96	12	2	-	4.3
Liquefied Petroleum Gas		13.6	10/01/97	11.47	2.13	-	-
Liquefied Natural Gas		11.9	10/01/97	10.04	1.86	-	-
Other Special Fuels		18.4	10/01/97	15.44	2.86	0.1	-
Neat alcohol (85% alcohol) 3/ 4/		9.25	10/01/97	7.72	1.43	0.1	-
Compressed natural gas 5/		4.3	10/01/93	-	-	-	4.3
		4.3	10/01/97	3.44	0.86	-	-
Gasohol 6/	**10 percent gasohol made with Ethanol**	13	10/01/97	6.94	2.86	0.1	3.1
		13.1	01/01/01	7.64	2.86	0.1	2.5
		13.2	01/01/03	7.74	2.86	0.1	2.5
	7.7 percent gasohol made with Ethanol	14.242	10/01/97	8.782	2.86	0.1	2.5
		14.319	01/01/01	8.859	2.86	0.1	2.5
		14.396	01/01/03	8.936	2.86	0.1	2.5
	5.7 percent gasohol made with Ethanol	15.322	10/01/97	9.862	2.86	0.1	2.5
		15.379	01/01/01	9.919	2.86	0.1	2.5
		15.436	01/01/03	9.976	2.86	0.1	2.5
Other Taxes – All Proceeds to Highway Account							
Tires		0-40 pounds, no tax					
		Over 40-70 pounds, 15 cents per pound in excess of 40					
		Over 70-90 pounds, $4.50 plus 30 cents per pound in excess of 70					
		Over 90 pounds, $10.50 plus 50 cents per pound in excess of 90					
Truck and trailer sales 7/		12 percent of retailer's sales price for tractors and trucks over 33,000 pounds GVW and trailers over 26,000 pounds GVW					
Heavy vehicle use		Annual tax:					
		Trucks 55,000-75,000 pounds GVW, $100 plus $22 for each 1,000 pounds (or fraction thereof) in excess of 55,000 pounds					
		Trucks over 75,000 pounds GVW, $550					

Footnotes to Table 1

1/ Source: Office of Highway Policy Information, Federal Highway Administration.

2/ Special fuels include benzol, benzene, naphtha, liquefied petroleum gas, casing head and natural gasoline, or other liquid used fuel in a motor vehicle except diesel, kerosene, gas oil, fuel oil, or a product taxable under the gasoline tax provisions. Prior to October 1, 1997, most special fuels were taxed at a single rate. Exceptions were LPG, which was not subject to the LUST tax, and neat alcohols, which are taxed at various rates depending on type and source of alcohol. Beginning October 1, 1997, LPG and LNG are taxed based on their energy content relative to gasoline. Other special fuels, with the exception of neat alcohols, are taxed at the basic special fuels rate.

3/ Neat alcohol made with alcohol derived from petroleum products (M85) is taxed as a special fuel.

4/ In 1996, only $166,000 was collected by Internal Revenue Service for taxes on neat alcohol and some other miscellaneous sources. There is no accurate way to distribute miscellaneous taxes to specific funds or accounts.

5/ Compressed natural gas is taxed 48.54 cents per thousand cubic feet (MCF), with the Mass Transit Account receiving 9.7 cents per MCF and the Highway Account receiving 38.83 cents per MCF. Roughly converting these amounts to cents per gallon results in the entries in the table above.

6/ Section 1920 of the Energy Policy Act of 1992 expanded the definition of gasohol effective January 1, 1993. Prior to the Act, gasohol was defined as a blend of gasoline and at least 10 percent fuel alcohol (by volume), and blends containing less than 10 percent alcohol were taxed as gasoline. Under the Act, the product now called 10 percent gasohol corresponds to the old definition. Two additional types of gasohol are also defined. The term 7.7 percent gasohol includes gasoline-alcohol blends where the alcohol content is at least 7.7 percent but less than 10 percent. The term 5.7 percent gasohol includes gasoline-alcohol blends where the alcohol content is at least 5.7 percent but less than 7.7 percent.

7/ Section 1401 of the Taxpayer Relief Act of 1997 replaced a mechanism by which the fair market value of tires exceeding 40 pounds was deducted from the fair market value of a truck and replaced it with a credit for the excise tax paid. This provision was effective January 1, 1998.

Table 2
Federal Highway Trust Fund Receipts Attributable to Highway Users in Each State
Fiscal Year 2000 (in thousands of dollars)
Source: U.S. DOT, FHWA, *Highway Statistics 2000*, Table FE-9 1/

STATE	HIGHWAY ACCOUNT								
	MOTOR FUEL					OTHER			TOTAL
	GASOLINE			SPECIAL FUELS	TOTAL	FEDERAL USE TAX	TRUCKS AND TRAILERS	TIRES	
	GASOLINE	GASOHOL	TOTAL						
Alabama	367,823	283	368,106	162,191	530,297	21,375	77,047	10,258	638,977
Alaska	36,655	1,898	38,553	16,399	54,952	2,161	7,790	1,037	65,940
Arizona	326,196	15,728	341,924	144,391	486,315	19,029	68,592	9,132	583,068
Arkansas	212,951	-	212,951	121,324	334,275	15,989	57,634	7,673	415,571
California	2,037,887	90,985	2,128,872	537,019	2,665,891	70,772	255,105	33,964	3,025,732
Colorado	215,924	44,609	260,533	97,738	358,271	12,881	46,429	6,182	423,763
Connecticut	208,408	2,645	211,053	60,748	271,801	8,006	28,858	3,842	312,507
Delaware	58,620	-	58,620	12,559	71,179	1,655	5,966	794	79,594
Dist. Of Col.	25,656	-	25,656	4,833	30,489	637	2,296	306	33,728
Florida	1,101,118	625	1,101,743	270,898	1,372,641	35,701	128,687	17,133	1,554,162
Georgia	706,244	-	706,244	289,382	995,626	38,137	137,468	18,302	1,189,533
Hawaii	57,341	-	57,341	7,191	64,532	948	3,416	455	69,351
Idaho	100,125	-	100,125	46,924	147,049	6,184	22,291	2,968	178,492
Illinois	380,845	201,538	582,383	282,239	864,622	37,196	134,075	17,850	1,053,743
Indiana	334,354	69,501	403,855	217,687	621,542	28,688	103,410	13,768	767,408
Iowa	122,913	49,395	172,308	108,363	280,671	14,281	51,476	6,853	353,281
Kansas	205,000	3,659	208,659	82,705	291,364	10,900	39,288	5,231	346,783
Kentucky	319,114	2,298	321,412	153,062	474,474	20,172	72,710	9,681	577,037
Louisiana	312,979	1,028	314,007	127,986	441,993	16,867	60,798	8,095	527,753
Maine	104,326	-	104,326	35,005	139,331	4,613	16,629	2,214	162,787
Maryland	362,775	1,611	364,386	106,300	470,686	14,009	50,497	6,723	541,915
Massachusetts	408,364	-	408,364	82,227	490,591	10,837	39,061	5,201	545,690
Michigan	718,189	25,010	743,199	198,207	941,406	26,121	94,156	12,536	1,074,219
Minnesota	-	194,612	194,612	125,233	319,845	16,504	59,491	7,920	403,760
Mississippi	242,101	-	242,101	111,718	353,819	14,723	53,071	7,066	428,679
Missouri	427,135	12,347	439,482	188,470	627,952	24,838	89,531	11,920	754,241
Montana	72,862	292	73,154	40,283	113,437	5,309	19,136	2,548	140,430
Nebraska	94,466	15,415	109,881	78,611	188,492	10,360	37,343	4,972	241,167
Nevada	95,799	23,065	118,864	57,836	176,700	7,622	27,475	3,658	215,455
New Hampshire	99,762	-	99,762	22,568	122,330	2,974	10,721	1,427	137,452
New Jersey	578,149	6,733	584,882	167,775	752,657	22,111	79,700	10,611	865,079
New Mexico	109,361	14,651	124,012	87,112	211,124	11,480	41,382	5,510	269,496
New York	839,142	11,103	850,245	239,336	1,089,581	31,542	113,694	15,137	1,249,954
North Carolina	575,890	21,885	597,775	192,125	789,900	25,320	91,267	12,151	918,638
North Dakota	46,345	3,226	49,571	31,020	80,591	4,088	14,736	1,962	101,377
Ohio	459,589	144,881	604,470	331,448	935,918	43,681	157,451	20,963	1,158,013
Oklahoma	276,975	-	276,975	134,125	411,100	17,676	63,715	8,483	500,974
Oregon	215,825	8,097	223,922	94,497	318,419	12,454	44,890	5,977	381,740
Pennsylvania	740,005	7,401	747,406	294,299	1,041,705	38,785	139,804	18,613	1,238,907
Rhode Island	61,844	-	61,844	12,126	73,970	1,598	5,760	767	82,095

South Carolina	338,387	-	338,387	129,329	467,716	17,044	61,436	8,180	554,376
South Dakota	34,732	13,324	48,056	31,818	79,874	4,193	15,115	2,012	101,194
Tennessee	446,905	-	446,905	187,366	634,271	24,693	89,006	11,850	759,820
Texas	1,547,616	36,132	1,583,748	592,484	2,176,232	78,082	281,453	37,472	2,573,239
Utah	131,799	8,403	140,202	65,574	205,776	8,642	31,150	4,147	249,715
Vermont	49,307	-	49,307	12,637	61,944	1,665	6,003	799	70,411
Virginia	499,597	20,594	520,191	207,819	728,010	27,388	98,722	13,144	867,264
Washington	361,887	19,056	380,943	124,229	505,172	16,372	59,014	7,857	588,415
West Virginia	124,856	3	124,859	57,213	182,072	7,540	27,178	3,618	220,408
Wisconsin	335,623	20,947	356,570	147,293	503,863	19,411	69,970	9,316	602,560
Wyoming	49,491	-	49,491	60,971	110,462	8,035	28,964	3,856	151,317
Total	17,579,257	1,092,980	18,672,237	6,990,693	25,662,930	921,289	3,320,857	442,134	30,347,210

STATE	MASS TRANSIT ACCOUNT					GRAND TOTAL	STATE
	GASOLINE			SPECIAL FUELS	TOTAL		
	GASOLINE	GASOHOL	TOTAL				
Alabama	67,442	147	67,589	20,564	88,153	727,130	Alabama
Alaska	6,721	984	7,705	2,079	9,784	75,724	Alaska
Arizona	59,809	6,444	66,253	18,307	84,560	667,628	Arizona
Arkansas	39,046	-	39,046	15,383	54,429	470,000	Arkansas
California	373,655	33,195	406,850	68,088	474,938	3,500,670	California
Colorado	39,591	20,011	59,602	12,392	71,994	495,757	Colorado
Connecticut	38,213	1,271	39,484	7,702	47,186	359,693	Connecticut
Delaware	10,748	-	10,748	1,592	12,340	91,934	Delaware
Dist. Of Col.	4,704	-	4,704	613	5,317	39,045	Dist. Of Col.
Florida	201,895	324	202,219	34,347	236,566	1,790,728	Florida
Georgia	129,493	-	129,493	36,690	166,183	1,355,716	Georgia
Hawaii	10,514	-	10,514	912	11,426	80,777	Hawaii
Idaho	18,358	-	18,358	5,949	24,307	202,799	Idaho
Illinois	69,829	90,224	160,053	35,785	195,838	1,249,581	Illinois
Indiana	61,305	35,167	96,472	27,600	124,072	891,480	Indiana
Iowa	22,537	25,609	48,146	13,739	61,885	415,166	Iowa
Kansas	37,588	1,897	39,485	10,486	49,971	396,754	Kansas
Kentucky	58,511	1,191	59,702	19,406	79,108	656,145	Kentucky
Louisiana	57,386	533	57,919	16,227	74,146	601,899	Louisiana
Maine	19,129	-	19,129	4,438	23,567	186,354	Maine
Maryland	66,516	835	67,351	13,478	80,829	622,744	Maryland
Massachusetts	74,875	-	74,875	10,425	85,300	630,990	Massachusetts
Michigan	131,683	12,966	144,649	25,130	169,779	1,243,998	Michigan
Minnesota	-	89,076	89,076	15,878	104,954	508,714	Minnesota
Mississippi	44,390	-	44,390	14,165	58,555	487,234	Mississippi
Missouri	78,317	5,924	84,241	23,896	108,137	862,378	Missouri
Montana	13,360	150	13,510	5,107	18,617	159,047	Montana
Nebraska	17,321	7,992	25,313	9,967	35,280	276,447	Nebraska
Nevada	17,565	10,173	27,738	7,333	35,071	250,526	Nevada
New Hampshire	18,292	-	18,292	2,861	21,153	158,605	New Hampshire
New Jersey	106,006	2,981	108,987	21,272	130,259	995,338	New Jersey
New Mexico	20,052	7,596	27,648	11,045	38,693	308,189	New Mexico
New York	153,860	5,149	159,009	30,345	189,354	1,439,308	New York
North Carolina	105,592	11,346	116,938	24,359	141,297	1,059,935	North Carolina

North Dakota	8,498	1,673	10,171	3,933	14,104	115,481	North Dakota
Ohio	84,268	75,114	159,382	42,024	201,406	1,359,419	Ohio
Oklahoma	50,785	-	50,785	17,005	67,790	568,764	Oklahoma
Oregon	39,572	4,124	43,696	11,981	55,677	437,417	Oregon
Pennsylvania	135,683	3,837	139,520	37,314	176,834	1,415,741	Pennsylvania
Rhode Island	11,339	-	11,339	1,537	12,876	94,971	Rhode Island
South Carolina	62,045	-	62,045	16,397	78,442	632,818	South Carolina
South Dakota	6,368	6,908	13,276	4,034	17,310	118,504	South Dakota
Tennessee	81,942	-	81,942	23,756	105,698	865,518	Tennessee
Texas	283,762	18,608	302,370	75,120	377,490	2,950,729	Texas
Utah	24,166	3,858	28,024	8,314	36,338	286,053	Utah
Vermont	9,041	-	9,041	1,602	10,643	81,054	Vermont
Virginia	91,603	10,677	102,280	26,349	128,629	995,893	Virginia
Washington	66,354	9,744	76,098	15,751	91,849	680,264	Washington
West Virginia	22,893	2	22,895	7,254	30,149	250,557	West Virginia
Wisconsin	61,538	10,104	71,642	18,675	90,317	692,877	Wisconsin
Wyoming	9,074	-	9,074	7,730	16,804	168,121	Wyoming
Total	3,223,234	515,834	3,739,068	886,336	4,625,404	34,972,614	Total

1/ Total Federal Highway Trust Fund receipts are reported by the U.S. Department of the Treasury. Payments into the Highway Trust Fund attributable to highway users in each State are estimated by the Federal Highway Administration.

Table 3
Apportionment Formulas for the Federal-Aid Highway Program
Source: U.S. DOT, FHWA, *Highway Statistics 2001*, Table FA-4A

FUND	FACTORS	WEIGHT	STATUTE 1/	MINIMUM APPORTIONMENT
Interstate Maintenance (IM)	Interstate System lane miles	33 1/3%	104(b)(4)	1/2 percent of Interstate Maintenance and National Highway System apportionments combined
	Vehicle miles traveled on the Interstate System	33 1/3%		
	Annual contributions to the Highway Account of the Highway Trust Fund attributable to commercial vehicles	33 1/3%		
National Highway System (NHS)	Remainder apportioned as follows:		104(b)(1)	1/2 percent of Interstate Maintenance and National Highway System apportionments combined
	Lane miles on principal arterial routes (excluding the Interstate System)	25%		
	Vehicle miles traveled on principal arterial routes (excluding the Interstate System)	35%		
	Diesel fuel used on highways	30%		
	Total lane miles on principal arterials divided by the State's total population	10%		
Surface Transportation Program (STP)	Total lane miles of Federal-aid highways	25%	104(b)(3)	1/2 percent
	Total vehicle miles traveled on Federal-aid highways	40%		
	Estimated tax payments attributable to highway users paid into the Highway Account of the Highway Trust Fund	35%		
Bridge Replacement and Rehabilitation Program (BRR)	Relative share of total cost to repair or replace deficient bridges	100%	144(e)	1/4 percent (10 percent maximum)
Congestion Mitigation and Air Quality Improvement Program (CMAQ)	Weighted nonattainment and maintenance area population	100%	104(b)(2)	1/2 percent
Recreational Trails Program (RT)	Equal shares to each eligible State	50%	104(h)	None
	Nonhighway recreational fuel use during the preceding year	50%		
Metropolitan Planning (MP)	Urbanized area population 2/	100%	104(f)(2)	1/2 percent

Minimum Guarantee	Specific share specified in law of the aggregate apportionments for Interstate Maintenance, National Highway System, Bridge, Congestion Mitigation, Surface Transportation Program, Metropolitan Planning, Recreational Trails, Appalachian Development Highway System, and Minimum Guarantee and allocations for High Priority Projects adjusted to ensure that each State's share of apportionments for the specified programs is at least 90.5 percent of its percentage contributions to the Highway Account of the Highway Trust Fund. The shares specified in law are increased for States falling below the 90.5 level and the shares of the remaining States are decreased so that the shares continue to total 100 percent.	100%	105	$1 million
State and Community Highway Safety Grants	Total population	75%	402©	1/2 percent, 1/4 percent for American Samoa, Guam, Virgin Islands, and the Commonwealth of the Northern Mariana Islands, 3/4 percent for Secretary of the Interior (Bureau of Indian Affairs)
	Public road mileage	25%		

1/ Denotes appropriate section in title 23 U.S. Code.

2/ Usually places of 50,000 or more persons. Definition contained in 23 U.S.C. 101(a).

Table 4

Apportionment of Federal Funds Administered by the FHWA for Fiscal Year 2001 1/

(in thousands of dollars)

Source: U.S. DOT, FHWA, *Highway Statistics 2000*, Table FA-4

STATE	INTERSTATE MAINTENANCE	NATIONAL HIGHWAY SYSTEM	SURFACE TRANS-PORTATION PROGRAM	BRIDGE	CONGESTION MITIGATION AND AIR QUALITY IMPROVEMENT	APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM	RECREATION TRAILS	METRO-POLITAN PLANNING	MINIMUM GUARANTEE	REVENUE ALIGNED BUDGET AUTHORITY	TOTAL 2/
Alabama	77,704	87,673	113,709	66,152	6,753	48,805	992	2,137	110,918	58,617	573,459
Alaska	20,466	25,308	27,676	10,118	6,753	0	694	963	218,402	34,458	344,838
Arizona	78,203	83,353	93,800	10,244	27,520	0	922	3,085	156,728	49,615	503,471
Arkansas	50,637	69,954	78,841	41,513	6,753	0	901	963	84,420	38,215	372,195
California	342,528	437,644	536,184	245,409	310,431	0	2,959	29,583	443,530	267,044	2,615,313
Colorado	61,703	76,881	82,063	20,151	20,516	0	1,012	2,762	43,801	34,188	343,077
Connecticut	40,465	37,643	52,910	68,117	29,687	0	587	2,853	156,081	43,917	432,261
Delaware	7,042	35,875	27,676	13,535	6,753	0	525	963	25,882	12,794	131,045
Dist. Of Col.	2,306	40,611	27,676	21,789	6,753	0	483	963	1,000	11,441	113,021
Florida	151,736	215,395	249,759	56,110	35,155	0	1,439	11,823	519,152	137,872	1,378,441
Georgia	147,389	140,914	195,132	60,189	27,714	19,504	1,323	3,788	325,953	103,871	1,025,777
Hawaii	6,947	35,970	27,676	19,272	6,753	0	533	963	32,974	14,972	146,060
Idaho	29,564	39,233	34,099	10,581	6,753	0	865	963	66,820	22,320	211,197
Illinois	164,189	141,518	196,875	111,325	72,912	0	1,347	9,849	151,307	97,804	947,126
Indiana	105,456	110,924	138,693	38,149	14,230	0	880	3,128	221,035	71,571	704,065
Iowa	53,773	75,702	80,497	52,714	6,753	0	846	1,095	34,578	34,762	340,719
Kansas	51,522	70,303	88,462	48,429	6,753	0	805	1,183	29,937	33,885	331,278
Kentucky	75,147	83,094	94,031	50,196	10,168	44,771	872	1,483	101,454	52,172	513,389
Louisiana	67,641	65,725	89,471	91,893	6,753	0	1,124	2,588	83,762	47,059	456,015
Maine	20,427	24,204	29,018	20,738	6,753	0	697	963	33,117	15,220	151,136
Maryland	65,903	71,873	88,769	54,106	42,340	7,632	698	4,160	80,598	46,937	463,016
Massachusetts	65,799	66,183	93,848	104,388	20,839	0	752	5,495	112,347	53,901	523,552
Michigan	117,295	140,741	196,159	98,606	30,047	0	1,559	6,752	230,793	93,662	915,614
Minnesota	71,069	85,621	108,816	24,609	15,135	0	1,201	2,754	64,865	43,359	417,429
Mississippi	50,081	68,322	80,343	47,227	6,753	5,473	1,085	963	68,444	37,304	365,995
Missouri	105,724	109,548	141,590	120,678	18,815	0	1,118	3,233	110,048	69,938	680,691
Montana	41,847	56,756	35,624	13,045	6,753	0	768	963	109,640	28,714	294,110

Nebraska	34,919	60,217	56,592	26,484	6,753	0	630	963	19,104	22,465	228,125
Nevada	32,233	37,436	36,535	8,271	10,265	0	632	1,058	62,714	20,961	210,105
New Hampshire	15,712	27,205	27,676	17,952	6,753	0	614	963	31,680	14,931	143,485
New Jersey	73,092	107,471	124,788	155,033	78,794	0	926	7,701	125,169	77,416	750,389
New Mexico	55,120	60,514	48,554	10,823	6,753	0	754	963	69,924	28,584	281,989
New York	131,219	166,404	214,421	330,825	123,725	10,519	1,203	16,398	296,677	149,307	1,440,698
North Carolina	100,541	119,165	152,258	86,886	14,394	28,735	1,123	2,919	220,349	81,837	808,207
North Dakota	23,526	63,849	35,382	8,271	6,753	0	589	963	34,477	18,951	192,758
Ohio	164,394	152,504	194,453	115,173	44,627	22,008	1,357	7,733	165,323	99,070	966,642
Oklahoma	66,398	81,951	107,260	76,514	6,753	0	951	1,573	55,714	44,591	441,706
Oregon	53,463	69,005	74,874	43,720	10,214	0	954	1,650	50,371	35,233	339,483
Pennsylvania	144,979	160,752	199,577	330,825	58,058	119,334	1,062	8,373	202,301	144,272	1,369,533
Rhode Island	8,604	34,313	27,676	38,108	6,753	0	526	963	40,179	17,230	174,351
South Carolina	68,775	69,913	97,141	40,830	6,753	2,391	801	1,657	153,298	48,801	490,360
South Dakota	27,611	53,727	38,571	13,677	6,753	0	583	963	41,105	20,675	203,663
Tennessee	100,089	102,773	124,662	66,789	12,685	54,716	972	2,577	120,995	66,715	652,972
Texas	297,009	369,741	447,521	120,897	83,037	0	2,415	13,211	658,233	221,875	2,213,939
Utah	53,154	38,806	45,482	20,458	9,378	0	753	1,533	28,054	22,647	220,264
Vermont	14,427	28,490	27,676	18,254	6,753	0	575	963	22,936	13,225	133,298
Virginia	114,411	111,608	146,946	78,311	28,368	11,501	1,123	4,449	170,562	75,009	742,288
Washington	73,166	82,560	106,037	95,763	22,053	0	1,177	3,734	64,009	51,694	500,194
West Virginia	36,146	36,552	44,755	49,622	6,753	67,861	693	963	30,397	32,734	306,475
Wisconsin	68,480	107,373	119,279	27,210	17,346	0	1,120	2,863	166,485	57,597	567,753
Wyoming	42,070	72,022	27,676	8,271	6,753	0	731	963	25,511	20,102	204,098
U.S. Total	3,872,100	4,711,320	5,535,190	3,308,251	1,350,514	443,250	49,250	192,508	6,473,150	2,941,534	28,877,066

1/ Apportioned pursuant to the Transportation Efficiency Act of 1998 (TEA-21) as amended by the TEA-21 Restoration Act. Does not include funds from the Mass Transit Account of the Highway Trust Fund.

2/ Does not include funds from the following programs: emergency relief, Federal lands highway programs, Commonwealth of Puerto Rico highway programs, high priority projects, Woodrow Wilson Bridge, National Byways, construction of ferry boats and ferry terminal facilities, and intelligent vehicle-system, among others. These funds are allocated from the Highway Trust Fund.

Table 5

Comparison of Federal Highway Trust Fund Highway Account Receipts Attributable to the States and Federal-Aid Apportionments and Allocations from the Highway Account 1/

Fiscal Years 1957-2000 (in thousands of dollars)

Source: U.S. DOT, FHWA, *Highway Statistics 2000*, Table FE-221

STATE	PAYMENTS INTO THE FUND 2/				APPORTIONMENTS AND ALLOCATIONS FROM THE FUND 3/				RATIO OF APPORTIONMENTS AND ALLOCATIONS TO PAYMENTS	
	FISCAL YEAR 2000	PERCENT OF TOTAL	CUMULATED SINCE 7-1-56	PERCENT OF TOTAL	FISCAL YEAR 2000	PERCENT OF TOTAL	CUMULATED SINCE 7-1-56	PERCENT OF TOTAL	FISCAL YEAR 2000	CUMULATED SINCE 7-1-56
Alabama	638,977	2.106	8,573,526	2.001	589,698	1.965	9,070,618	1.949	0.92	1.06
Alaska	65,940	0.217	868,606	0.203	378,674	1.262	5,640,198	1.212	5.74	6.49
Arizona	583,068	1.921	6,527,695	1.523	494,747	1.649	7,069,388	1.519	0.85	1.08
Arkansas	415,571	1.369	5,708,693	1.332	397,312	1.324	5,508,172	1.184	0.96	0.96
California	3,025,732	9.970	43,866,079	10.237	2,795,250	9.315	41,214,543	8.858	0.92	0.94
Colorado	423,763	1.396	5,472,490	1.277	367,548	1.225	6,699,381	1.440	0.87	1.22
Connecticut	312,507	1.030	4,845,481	1.131	439,532	1.465	8,245,856	1.772	1.41	1.70
Delaware	79,594	0.262	1,242,443	0.290	128,749	0.429	1,867,517	0.401	1.62	1.50
Dist. Of Col.	33,728	0.111	693,383	0.162	117,381	0.391	2,801,978	0.602	3.48	4.04
Florida	1,554,162	5.121	19,794,868	4.619	1,390,224	4.633	17,286,697	3.715	0.89	0.87
Georgia	1,189,533	3.920	14,511,143	3.386	1,023,963	3.412	13,043,855	2.803	0.86	0.90
Hawaii	69,351	0.229	1,085,227	0.253	154,425	0.515	3,714,733	0.798	2.23	3.42
Idaho	178,492	0.588	2,176,513	0.508	253,889	0.846	3,555,977	0.764	1.42	1.63
Illinois	1,053,743	3.472	16,950,308	3.956	986,434	3.287	18,237,613	3.920	0.94	1.08
Indiana	767,408	2.529	11,488,236	2.681	688,839	2.296	9,902,919	2.128	0.90	0.86
Iowa	353,281	1.164	5,598,659	1.307	345,026	1.150	6,181,461	1.329	0.98	1.10
Kansas	346,783	1.143	5,269,344	1.230	338,426	1.128	5,603,337	1.204	0.98	1.06
Kentucky	577,037	1.901	7,566,378	1.766	525,325	1.751	7,649,119	1.644	0.91	1.01
Louisiana	527,753	1.739	7,733,289	1.805	464,400	1.548	8,896,053	1.912	0.88	1.15
Maine	162,787	0.536	2,311,745	0.539	153,306	0.511	2,547,003	0.547	0.94	1.10
Maryland	541,915	1.786	7,479,644	1.745	476,674	1.589	9,833,544	2.113	0.88	1.31
Massachusetts	545,690	1.798	8,420,683	1.965	536,063	1.786	13,194,986	2.836	0.98	1.57
Michigan	1,074,219	3.540	15,629,539	3.647	961,800	3.205	13,770,526	2.960	0.90	0.88
Minnesota	403,760	1.330	7,033,692	1.641	439,011	1.463	8,672,154	1.864	1.09	1.23
Mississippi	428,679	1.413	5,536,171	1.292	365,747	1.219	5,271,017	1.133	0.85	0.95

Missouri	754,241	2.485	11,098,186	2.590	719,347	2.397	10,303,648	2.214	0.95	0.93
Montana	140,430	0.463	2,046,646	0.478	301,755	1.006	4,738,036	1.018	2.15	2.32
Nebraska	241,167	0.795	3,456,696	0.807	224,419	0.748	3,766,259	0.809	0.93	1.09
Nevada	215,455	0.710	2,379,636	0.555	228,039	0.760	3,305,540	0.710	1.06	1.39
New Hampshire	137,452	0.453	1,731,544	0.404	148,580	0.495	2,265,516	0.487	1.08	1.31
New Jersey	865,079	2.851	12,426,201	2.900	781,862	2.606	12,151,373	2.612	0.90	0.98
New Mexico	269,496	0.888	3,489,429	0.814	307,801	1.026	4,473,823	0.962	1.14	1.28
New York	1,249,954	4.119	20,381,137	4.756	1,485,648	4.951	24,613,551	5.290	1.19	1.21
North Carolina	918,638	3.027	12,608,712	2.942	825,844	2.752	10,792,863	2.320	0.90	0.86
North Dakota	101,377	0.334	1,537,190	0.359	194,296	0.647	2,998,654	0.644	1.92	1.95
Ohio	1,158,013	3.816	18,294,343	4.269	1,006,181	3.353	16,585,819	3.565	0.87	0.91
Oklahoma	500,974	1.651	7,292,104	1.702	446,540	1.488	6,245,356	1.342	0.89	0.86
Oregon	381,740	1.258	5,596,090	1.306	384,990	1.283	6,446,452	1.385	1.01	1.15
Pennsylvania	1,238,907	4.082	18,964,682	4.426	1,449,850	4.832	21,630,906	4.649	1.17	1.14
Rhode Island	82,095	0.271	1,317,368	0.307	180,896	0.603	2,878,081	0.619	2.20	2.18
South Carolina	554,376	1.827	6,945,142	1.621	483,066	1.610	6,014,911	1.293	0.87	0.87
South Dakota	101,194	0.333	1,611,000	0.376	211,222	0.704	3,187,571	0.685	2.09	1.98
Tennessee	759,820	2.504	10,134,723	2.365	685,545	2.285	9,650,222	2.074	0.90	0.95
Texas	2,573,239	8.479	33,669,649	7.857	2,199,108	7.328	28,210,931	6.063	0.85	0.84
Utah	249,715	0.823	3,161,665	0.738	283,695	0.945	4,631,680	0.995	1.14	1.46
Vermont	70,411	0.232	1,071,964	0.250	133,812	0.446	2,181,469	0.469	1.90	2.04
Virginia	867,264	2.858	11,214,344	2.617	775,292	2.584	11,928,899	2.564	0.89	1.06
Washington	588,415	1.939	7,904,012	1.845	544,878	1.816	11,156,787	2.398	0.93	1.41
West Virginia	220,408	0.726	3,412,079	0.796	329,354	1.098	6,377,486	1.371	1.49	1.87
Wisconsin	602,560	1.986	8,508,123	1.985	572,783	1.909	7,682,091	1.651	0.95	0.90
Wyoming	151,317	0.499	1,880,817	0.439	228,408	0.761	3,324,360	0.714	1.51	1.77
Total	30,347,210	100.000	428,517,317	100.000	29,945,654	99.793	463,020,929	99.511	0.99	1.08
American Samoa	0	0	0	0	3,794	0.013	71,136	0.015	0	0
Guam	0	0	0	0	13,193	0.044	208,186	0.045	0	0
N. Marianas	0	0	0	0	3,815	0.013	53,247	0.011	0	0
Puerto Rico	0	0	0	0	27,519	0.092	1,735,028	0.373	0	0
Virgin Islands	0	0	0	0	13,716	0.046	206,118	0.044	0	0
Grand Total	30,347,210	100.000	428,517,317	100.000	30,007,691	100.000	465,294,644	100.000	0.99	1.09

Notes to Table 5

1/ Payments into the Fund include only the net tax receipts deposited in the Highway Account of the Federal Highway Trust Fund. Excluded are motor fuel taxes transferred to the Mass Transit Account of the Highway Trust Fund (1 cent per gallon from April 1, 1983 through November 30, 1990, 1.5 cents per gallon until September 30, 1995, and 2.0 cents per gallon thereafter); the 0.1 cent per gallon dedicated to the Leaking Underground Storage Tank Trust Fund beginning January 1, 1987 and ending December 31, 1995; and the tax designated for deficit reduction (2.5 cents per gallon from December 1, 1990 through September 30, 1993, 6.8 cents until September 30, 1995, and 4.3 cents until October 1, 1997, when 4.3 cents will be deposited into the Highway Trust fund, including 3.45 cents for the Highway Account); and the tax from motor- boat use of gasoline transferred to the Aquatic Resources Trust Fund and the Land and Water Conservation fund.

2/ Total Federal Highway Trust Fund receipts are reported by the U.S. Department of the Treasury (for apportionment purposes only and reflect "delayed deposit"). Refer to table FE-10A. Payments into the Highway Trust Fund attributable to highway users in each State are estimated by the Federal Highway Administration. Includes revenues from highway-user taxes only.

3/ Includes all funds apportioned or allocated from the Highway Trust Fund except for the following programs: Indian reservation roads, highway safety information, and local transportation assistance. These programs are either administered by other Federal agencies or are treated as administrative funds and cannot be easily attributed to individual States. Obligations are used to represent allocations for alcohol safety incentive grants and the Woodrow Wilson Bridge.

Table 6
State Tax Rates on Motor Fuel – Year 2000 1/
(in cents per gallon)
Source: U.S. DOT, FHWA, *Highway Statistics 2000*, Table MF-121T

STATE	GASOLINE		DIESEL		LIQUEFIED PETROLEUM GAS		GASOHOL 2/		
	RATE	EFFECTIVE DATE	RATE	EFFECTIVE DATE	RATE	EFFECTIVE DATE	RATE	EFFECTIVE DATE	EXEMPTION
Alabama *	18	06/01/92	19	06/01/92	17	06/01/92	18	06/01/92	-
Alaska	8	07/01/61	8	07/01/61	-	-	-	-	8
Arizona *	18	07/01/90	27	07/01/90	18	07/01/90	18	07/01/90	-
Arkansas *	18.6	07/01/96	18.6	07/01/96	16.5	04/01/91	18.6	07/01/96	-
	19.5	07/01/99	20.5	04/01/99					
California *	18	01/01/94	18	01/01/94	6	01/01/76	18	01/01/94	-
Colorado *	22	01/01/91	20.5	01/01/92	20.5	01/01/92	22	01/01/91	-
Connecticut *	32	07/01/98	18	09/01/91	-	07/01/96	31	07/01/98	1
Delaware *	23	01/01/95	22	01/01/95	22	01/01/95	23	01/01/95	-
Dist. of Col.	20	10/01/94	20	10/01/94	20	10/01/94	20	10/01/94	-
Florida *	13.1	01/01/99	25.1	01/01/99	16.0	01/01/98	13.1	01/01/99	-
Georgia	7.5	07/01/71	7.5	07/01/71	7.5	07/01/71	7.5	07/01/71	-
Hawaii	16	07/01/91	16	07/01/91	11	07/01/91	16	07/01/91	-
Idaho *	25	04/01/96	25	04/01/96	18.1	04/01/96	22.5	07/01/94	2.5
Illinois *	19	01/01/90	21.5	01/01/90	19	01/01/90	19	01/01/90	-
Indiana *	15	04/01/88	16	04/01/88	-	-	15	04/01/88	-
Iowa	20	01/01/89	22.5	01/01/89	20	01/01/89	19	01/01/89	1
Kansas *	18	07/01/92	20	07/01/92	17	07/01/92	18	07/01/92	-
	20	07/01/99	22	07/01/99	19	07/01/99	20	07/01/99	
Kentucky *	16.4	07/15/94	13.4	07/15/94	15	07/01/86	16.4	07/15/94	-
Louisiana *	20	01/01/90	20	01/01/90	16	07/01/93	20	01/01/90	-
Maine	19	07/17/91	20	04/01/89	18	07/17/91	19	07/17/91	-
Maryland	23.5	05/01/92	24.25	07/01/93	23.5	07/01/93	23.5	05/01/92	-
Massachusetts *	21	01/01/91	21	01/01/91	8.1	10/01/98	21	01/01/91	-
Michigan *	19	08/01/97	15	01/01/84	15	01/01/84	19	08/01/97	-
Minnesota *	20	05/01/88	20	05/01/88	15	07/01/95	20	05/01/88	-
Mississippi *	18.4	07/01/93	18.4	07/01/93	17	01/01/89	18.4	07/01/93	-
Missouri *	17	04/01/96	17	04/01/96	17	04/01/96	17	04/01/96	-
Montana *	27	07/01/94	27.75	07/01/94	-	-	27	07/01/94	-
Nebraska *	22.8	01/01/99	22.8	01/01/99	22.8	01/01/99	22.8	01/01/99	-
Nevada	24.75	01/01/97	27.75	01/01/97	22.00	07/01/97	24.75	01/01/97	-
New Hampshire *	19.5	07/01/95	19.5	07/01/95	18	06/16/91	19.5	07/01/95	-
New Jersey *	10.5	07/01/88	13.5	07/01/88	5.25	07/01/88	10.5	01/01/92	-
New Mexico *	18.5	10/01/98	19.5	10/01/98	-	-	18.5	10/01/98	-
New York *	22.05	01/01/99	21.20	01/01/99	8	10/01/90	22.05	01/01/99	-
	28.9	07/01/99	27.65	07/01/99			28.9	07/01/99	
	29.3	10/01/99	27.95	10/01/99			29.3	10/01/99	
North Carolina *	21.2	01/01/99	21.2	01/01/99	21.2	01/01/99	21.2	01/01/99	-
North Dakota *	20	01/01/98	20	01/01/98	20	01/01/98	20	01/01/98	-
	21	07/01/99	21	07/01/99	21	07/01/99	21	07/01/99	
Ohio *	22	07/01/93	22	07/01/93	22	07/01/93	22	07/01/93	-

Oklahoma *	17	07/01/89	14	07/01/89	17	07/01/89	17	07/01/89	-
Oregon *	24	01/01/93	24	01/01/93	24	01/01/93	24	09/01/93	-
Pennsylvania *	25.9	05/01/97	30.8	10/01/97	18.9	10/01/97	25.9	10/01/97	-
Rhode Island *	29	07/08/94	29	07/08/94	29	07/08/94	29	07/08/94	-
South Carolina	16	01/01/89	16	01/01/89	16	01/01/89	16	01/01/91	-
South Dakota *	18	10/01/98	18	10/01/98	16	10/01/98	16	10/01/98	2
	22	04/01/99	22	04/01/99	20	04/01/99	20	04/01/99	
Tennessee *	20	04/01/89	17	04/01/90	14	04/01/89	20	04/01/89	-
Texas *	20	10/01/91	20	10/01/91	15	01/01/87	20	10/01/91	-
Utah *	24.5	07/01/97	24.5	07/01/97	24.5	07/01/97	24.5	07/01/97	-
Vermont *	20	08/01/97	17	07/01/89	-	-	20	08/01/97	-
Virginia *	17.5	07/01/92	16	07/01/92	10	01/01/94	17.5	07/01/92	-
Washington *	23	04/01/91	23	04/01/91	-	-	^23	05/01/94	-
West Virginia *	25.35	05/01/93	25.35	05/01/93	25.35	05/01/93	25.35	05/01/93	-
Wisconsin *	25.4	04/01/98	25.4	04/01/98	25.4	04/01/98	25.4	04/01/98	-
Wyoming *	14	07/01/98	14	07/01/98	-	-	14	07/01/98	-
Mean	20.17		20.37		14.80		19.87		
Weighted Avg.	19.29		19.96		14.28		20.40		
Federal Tax	18.4	10/01/97	24.4	10/01/97	13.6	10/01/97	13.0	10/01/97	5.4

STATE	PERCENT	SALES TAX
		REMARKS
Alabama	4	Applies to fuel not taxable under volume tax laws.
Arizona	5	Applies to fuel not taxed under the motor-fuel or use-fuel taxes. Liquefied petroleum gas sold, used or stored in State is exempt.
Arkansas	4.5	Special fuel for municipal buses and gasoline are exempt.
California	6	Applies to sales price including Federal and State motor-fuel taxes.
Colorado	3	Applies to fuel not taxable under volume tax laws.
Connecticut	^5	A Petroleum Products Gross Earnings tax is applied to many petroleum products, in addition to the per gallon taxes shown on Sheet 1.
Dist. of Col.	5.75	Applies to fuel not taxable under volume tax laws.
Georgia	4	A 3-percent "second motor-fuel tax" and a 1-percent sales tax apply to sales price including Federal motor-fuel tax.
Hawaii	4	Applies to sales price excluding Federal and State motor-fuel taxes. Alcohol fuels are exempt.
Idaho	5	Fuels subject to the motor fuel volume tax are exempt.
Illinois	6.25	Applies to sales price excluding Federal and State motor-fuel taxes. For gasohol, only 70 percent of the price is subject to sales tax.
Indiana	5	Applies to sales price excluding Federal and State motor-fuel taxes.
Iowa	5	Applies to fuel not taxable under fuel tax laws, including those fuels taxable, then subject to refund.
Kansas	4.9	Applies to fuels not taxable under the volume tax laws.
Kentucky	6	Applies to sales price, exclusive of Federal tax, of fuels not taxable under the volume tax laws.
Louisiana	4	Fuels subject to volume tax are exempt. Gasohol is exempt if alcohol produced in State.
Maine	6	Applies to motor fuel not taxed at the maximum rate for highway use under the volume tax laws.
Maryland	5	Applies to motor fuel not taxed under other Maryland laws.
Massachusetts	5	Applies to fuels not taxable under the volume tax laws.
Michigan	6	Applies to sales price including Federal volume tax except when used in a passenger vehicle with capacity of 10 or more for hire over regularly scheduled routes in State.
Minnesota	6	Applies to fuels not taxable under the volume tax laws.
Nebraska	5	Gasoline is exempt. Diesel and alternative fuels subject to the volume tax are exempt.

New Mexico	5	Applies to fuels not taxable under the volume tax laws. Ethanol blends deductible under the gasoline tax laws are exempt.
New York	4	Applies to sales price including Federal motor-fuel tax.
North Dakota	5	Applies to fuels not taxable under the volume tax laws.
Ohio	5	Applies to fuels not taxable under the volume tax laws.
Oklahoma	4.5	Applies to fuels not taxable under the volume tax laws.
Pennsylvania	6	Applies to fuels not taxable under the volume tax laws.
South Carolina	5	Applies to sales price of aviation gasoline only.
South Dakota	4	Applies to fuels not taxable under the volume tax laws.
Tennessee *	6	Gasoline on which the volume tax has been paid and not refunded and motor fuel subject to the use fuel tax are exempt.
Texas	6.25	Applies to fuels not taxed or exempted under other laws.
Utah	4.875	Applies to fuels not taxable under the volume tax laws.
Washington	6.5	Applies fuels not taxable under the volume tax laws. Certain providers of public transportation of handicapped persons are exempt.
Wisconsin	5	Applies to fuels not taxable under the volume tax laws.
Wyoming	4	Applies to sales price of LPG. Gasoline and diesel subject to volume tax are exempt.

1/ This table shows motor-fuel tax rates in effect as of January 1, and any subsequent changes that have occurred through the date shown in the title. Only taxes that are levied as a dollar amount per volume of motor fuel are included on sheet 1. Taxes that apply to all petroleum products without distinguishing motor fuel are omitted. Local option taxes are included only when they have been adopted uniformly Statewide. For States marked with an asterisk, see the notes below:

Alabama - The gasoline, gasohol, and diesel rates include a 2¢ per gallon inspection fee. Alabama-registered LPG vehicles pay an annual fee based on vehicle type in lieu of the volume tax.
Arizona-The fuel tax on diesel remains at 18 cents per gallon for light and exempt vehicles, but is set at 27 cents per gallon if used to propel a truck with more than two axles or with a declared gross vehicle weight over 26,000 pounds.
Arkansas - The gasoline, gasohol, and diesel rates include 0.2 ¢ per gallon Environmental Assurance Fee. Applicants for LPG user permits must pay a fee in lieu of the volume tax.
California - LPG users may pay an annual fee in lieu of the volume tax.
Colorado - Owners of LPG vehicles registered in the State must pay an annual fee in lieu of the volume tax.
Connecticut - The tax is computed at 5% of the gross earnings from the first sale of a petroleum product in the State.
Delaware - Rates are variable, adjusted annually.
Florida - Tax rates are variable, adjusted annually. For gasoline and gasohol, in addition to the rates shown, there is a State-imposed State Comprehensive Enhanced Transportation System (SCETS) tax that varies by county from 0-5.0¢ per gallon. All counties levy the SCETS tax on gasoline, but a few levy less than the maximum rate. LPG vehicles registered in the State pay an annual fee in lieu of the tax on alternative fuels and the SCETS tax.
Idaho - LPG users may pay an annual fee based on vehicle weight in lieu of volume tax.
Illinois - Motor carriers pay an additional 6.3¢ per gallon on gasoline, 6.5¢ on diesel, and 5.9¢ on LPG.
Indiana - Motor carriers pay an additional 11¢ per gallon. LPG vehicles pay an annual fee.
Kansas - LPG users may pay an annual fee based on mileage and gross vehicle weight in lieu of the volume tax.
Kentucky - Tax rates are variable, adjusted quarterly. A 2% surtax is imposed on gasoline and 4.7% on special fuels for any vehicle with 3 or more axles. The gasoline, gasohol, and diesel rates include 1.4¢ per gallon Petroleum Environmental Assurance Fee.
Louisiana - Owners of LPG vehicles of 10,000 pounds or less gross vehicle weight pay an annual fee based on mileage.
Massachusetts - Tax rates are variable, adjusted quarterly.
Michigan - For vehicles defined under the Motor Carrier Fuel Tax Act, diesel fuel is discounted 6 cents per gallon at the pump; and is assessed a 12 cents per gallons surcharge on a quarterly return, with a provision for a 6 cent per gallon refund on fuel purchased in Michigan.
Minnesota - There is a credit to the wholesaler of 15¢ per gallon of alcohol used to make gasohol.
Mississippi - The gasoline, gasohol, and diesel rates include 0.4¢ per gallon dedicated to the Groundwater Protection Trust Fund.
Missouri - LPG vehicles 18,000 pounds or less gross vehicle weight registered in the State pay an annual fee in lieu of the volume tax.
Montana - LPG vehicles registered in the State pay an annual fee based on gross weight in lieu of the volume tax. Out-of-State vehicles purchase trip permits. There is an alcohol distiller credit of 30¢ per gallon of alcohol produced in the State with State agricultural products and used to make gasohol.

Nebraska - Rates are variable, adjusted quarterly. The gasoline and gasohol include 0.6¢ per gallon and diesel rate includes 0.2¢ per gallon Petroleum Release Remedial Action Fee.
New Hampshire - The gasoline, gasohol, and diesel rates include 0.7¢ per gallon Oil Discharge and Disposal Cleanup Fee. Alternative fuel vehicles pay twice the usual registration fee in lieu of the volume tax.
New Jersey - In addition to the rates shown, there is a Petroleum Products Gross Receipts Tax. The tax is computed on a cents-per-gallon basis and is applicable to a wide variety of petroleum products.
New Mexico - The gasoline, gasohol, and diesel rates include the Petroleum Products Loading Fee of $150 per 8,000 gallons (1.875¢ per gallon). Rate was $80 per 8,000 gallons (1¢ per gallon) prior to 7/1/96. Owners of LPG-powered vehicles up to 54,000 pounds gross vehicle weight may pay an annual fee in lieu of the volume tax.
New York - Rates are variable, adjusted annually. There is an additional tax on motor carriers of 8.5¢ per gallon of gasoline and 9.6¢ on diesel. Rates include the Petroleum Business Tax of 14¢ per gallon. The gasoline rate includes a 0.5 mill (0.05¢) per gallon Petroleum Testing Fee.
North Carolina - Rates are variable, adjusted semiannually.
North Dakota - A special excise tax of 2% is imposed on all sales of special fuel (diesel or LPG) that are exempted from the volume tax if the fuel is sold for use in the State. There is a producer credit of 40¢ per gallon of agriculturally derived alcohol produced in the State and used to make gasohol.
Ohio - Commercial vehicles formerly subject to the highway use tax pay an additional 3¢ per gallon. Dealers are refunded 10¢ per gallon of each qualified fuel (ethanol or methanol) blended with unleaded gasoline.
Oklahoma - Rates shown include 1¢ per gallon tax dedicated to the Petroleum Underground Tank Release Environmental Cleanup Indemnity Fund. When the Fund reaches specified balance, future tax revenues will be deposited in a highway fund. The gasoline, gasohol, and LPG rates include 0.08¢ for fuel inspection. LPG users may pay an annual fee in lieu of the volume tax.
Oregon - The diesel and LPG rates shown are paid by users for vehicles not under the jurisdiction of Public Utility Commissioner. Vehicles under the jurisdiction of the Public Utilities Commissioner and paying motor-carrier fees are exempt from payment of the motor-fuel tax.
Pennsylvania - The rates include the Oil Franchise Tax for Maintenance and Construction, a variable rate tax adjusted annually. LPG rate based on gasoline gallon equivalent.
Rhode Island - Rates are variable, adjusted quarterly. Rates includes 1¢ per gallon tax for the Underground Storage Tank Financial Responsibility Fund.
South Dakota - There is a credit at the rate of the gasoline tax to distributors blending gasoline with ethanol to produce gasohol. There is also a producer incentive payment of 20¢ per gallon.
Tennessee - LPG users without permits must pay in advance at the beginning of the fiscal year; others pay quarterly. Fee is based on vehicle weight and fuel efficiency. Sales tax rate on aviation fuel is 4.5 percent.
Texas - Owners of LPG vehicles registered in the State must pay an annual fee in lieu of the volume tax.
Utah - LPG is tax exempt if user purchases annual exemption certificate.
Vermont - Diesel vehicles 10,000 pounds and over pay 26¢ per gallon. LPG vehicles are subject to a registration fee 1.75 times the usual fee. The gasoline, gasohol, and diesel rates include 1¢ per gallon for the Petroleum Cleanup Fund.
Virginia - Vehicles weighting 26,000 pounds or more or having 3 or more axles pay an additional 3.5¢ per gallon.
Washington - Owners of LPG vehicles pay an annual fee.
West Virginia - Rates are variable, adjusted annually.
Wisconsin - Rates are variable, adjusted annually.
Wyoming - LPG is subject to sales tax. The gasoline, gasohol, and diesel rates include 1¢ for the Underground Storage Tank Corrective Action Account.

2/ The gasohol rates shown are for gasoline blended with 10 percent ethanol.

Table 7
Revenues Used by States for Highways – Year 2000 1/
(in thousands of dollars)
Source: U.S. DOT, FHWA, *Highway Statistics 2000*, Table SF-1

STATE	BALANCE BEGINNING OF YEAR 2/			HIGHWAY-USER REVENUES 3/				APPROPRI-ATIONS FROM GENERAL FUNDS 4/	OTHER STATE IMPOSTS	MISCEL-LANEOUS
	RESERVES FOR CURRENT HIGHWAY WORK	RESERVES FOR DEBT SERVICE	TOTAL	MOTOR-FUEL TAXES	MOTOR-VEHICLE AND MOTOR-CARRIER TAXES	ROAD AND CROSSING TOLLS	TOTAL			
Alabama	289,213	-	289,213	540,842	142,116	-	682,958	14,721	6,949	1,747
Alaska	-	-	-	27,518	23,788	15,900	67,206	102,060	-	22,500
Arizona	350,402	14,974	365,376	560,082	202,705	-	762,787	115,346	236,547	56,676
Arkansas	147,391	-	147,391	394,484	122,926	-	517,410	11,466	1,488	26,456
California	3,275,581	-	3,275,581	2,885,636	1,601,798	286,449	4,773,883	146,453	3,362	231,754
Colorado	395,966	-	395,966	505,966	283,209	-	789,175	41,171	199,546	34,247
Connecticut	178,777	528,034	706,811	353,767	156,855	136	510,758	49,829	-	146,217
Delaware	161,346	88,311	249,657	107,531	92,737	144,856	345,124	4,105	-	41,477
Dist. of Col.	-	-	-	31,655	56,096	-	87,751	25,000	-	8,353
Florida	1,396,482	373,016	1,769,498	1,322,851	640,501	564,494	2,527,846	-	99,912	127,847
Georgia	1,117,968	156,755	1,274,723	389,279	227,573	21,497	638,349	238,285	172,358	79,789
Hawaii	348,928	-	348,928	59,845	61,111	-	120,956	2,841	-	19,673
Idaho	170,373	-	170,373	195,900	118,216	-	314,116	-	-	-
Illinois	1,205,808	185,431	1,391,239	1,182,692	954,742	345,356	2,482,790	184,052	72,874	62,318
Indiana	746,980	35,708	782,688	739,531	218,694	85,325	1,043,550	-	-	18,037
Iowa	138,885	-	138,885	391,679	349,497	-	741,176	56,584	247,237	13,883
Kansas	904,500	46,020	950,520	357,870	124,946	61,198	544,014	16,133	144,001	61,747
Kentucky	1,065,656	46,900	1,112,556	439,250	620,381	13,572	1,073,203	2,370	-	62,404
Louisiana	597,376	43,831	641,207	543,656	87,434	30,966	662,056	122,723	27,039	30,059
Maine	420,331	6,998	427,329	173,209	59,292	56,156	288,657	312,380	-	3,273
Maryland	204,003	74,886	278,889	534,742	450,839	140,979	1,126,560	-	79,803	45,485
Massachusetts	534,458	470,148	1,004,606	643,104	260,524	196,480	1,100,108	679,919	-	271,026
Michigan	496,201	1,071	497,272	917,521	694,133	31,557	1,643,211	266,873	53,962	73,288
Minnesota	756,702	9,880	766,582	591,718	627,511	-	1,219,229	2,954	-	79,132
Mississippi	395,372	316	395,688	378,638	137,465	-	516,103	27,881	72,236	13,711
Missouri	97,240	-	97,240	625,837	214,080	-	839,917	15,972	205,372	20,418

Montana	62,524	-	62,524	194,826	38,558	-	233,384	-	-	2,256
Nebraska	175,035	-	175,035	262,100	62,586	-	324,686	17,202	127,771	6,578
Nevada	255,896	-	255,896	284,039	73,920	-	357,959	-	-	15,053
New Hampshire	174,144	-	174,144	106,452	63,666	60,213	230,331	8,434	-	19,895
New Jersey	1,114,376	247,870	1,362,246	520,001	562,366	679,529	1,761,896	437,991	-	186,413
New Mexico	181,779	-	181,779	215,048	233,666	-	448,714	20,065	11,754	24,754
New York	4,597	105,549	110,146	957,153	540,767	883,108	2,381,028	79,086	-	92,171
North Carolina	989,983	-	989,983	1,006,456	236,716	1,590	1,244,762	500,515	54,400	82,202
North Dakota	32,026	-	32,026	98,031	59,061	-	157,092	52,811	5,659	1,697
Ohio	1,657,472	-	1,657,472	1,369,687	531,984	177,310	2,078,981	6,766	-	101,263
Oklahoma	729,678	198,220	927,898	357,933	306,634	132,344	796,911	115,427	44,053	42,980
Oregon	26,946	-	26,946	369,219	255,548	-	624,767	33,191	4,338	24,145
Pennsylvania	2,031,889	194,487	2,226,376	1,685,538	752,218	467,988	2,905,744	29,396	-	173,035
Rhode Island	28,042	4,535	32,577	53,418	25,847	11,385	90,650	4,078	-	8,996
South Carolina	424,520	-	424,520	370,999	70,911	-	441,910	78,756	-	22,826
South Dakota	79,291	-	79,291	113,949	38,018	-	151,967	-	49,098	5,825
Tennessee	1,109,137	-	1,109,137	724,716	191,384	26	916,126	17,558	10,937	15,563
Texas	909,825	78,932	988,757	2,253,931	1,183,686	97,059	3,534,676	-	27,573	140,376
Utah	241,729	-	241,729	311,386	68,678	197	380,261	230,935	36,991	37,226
Vermont	9,990	-	9,990	69,674	82,597	-	152,271	-	98	10,366
Virginia	789,111	31,733	820,844	739,826	719,652	88,315	1,547,793	-	402,362	56,150
Washington	501,160	71,056	572,216	673,446	330,475	95,877	1,099,798	-	-	47,666
West Virginia	334,883	8,363	343,246	291,517	230,162	51,983	573,662	67,917	-	22,004
Wisconsin	372,679	-	372,679	698,872	301,364	-	1,000,236	1,191	-	35,787
Wyoming	82,568	-	82,568	91,072	40,291	-	131,363	-	7,097	6,217
Total	27,715,219	3,023,024	30,738,243	28,714,092	15,529,924	4,741,845	48,985,861	4,140,437	2,404,817	2,732,961

Table 7 (continued)

STATE	BOND PROCEEDS		PAYMENTS FROM OTHER GOVERNMENTS			TOTAL RECEIPTS
	ORIGINAL ISSUES	REFUNDING ISSUES	FEDERAL FUNDS		FROM LOCAL GOVERN-MENTS	
			FEDERAL HIGHWAY ADMINIS-TRATION	OTHER AGENCIES		
Alabama	-	-	537,797	3,651	14,416	1,262,239
Alaska	-	-	308,349	1,244	-	501,359
Arizona	255,894	25,115	424,998	6,892	254,680	2,138,935
Arkansas	178,909	-	280,716	4,433	16,369	1,037,247
California	-	-	1,668,003	56,061	472,152	7,351,668
Colorado	554,265	-	295,973	6,388	37,708	1,958,473
Connecticut	150,680	-	405,145	1,714	5,120	1,269,463
Delaware	212,968	-	116,366	3,138	-	723,178
Dist. of Col.	-	-	121,347	1,765	-	244,216
Florida	273,948	-	994,165	12,534	45,168	4,081,420
Georgia	3,000	-	716,843	3,546	-	1,852,170
Hawaii	-	-	81,375	1,293	-	226,138
Idaho	-	-	181,473	5,379	3,662	504,630
Illinois	177,328	-	841,273	12,139	27,700	3,860,474
Indiana	245,731	18,921	624,482	4,869	22,566	1,978,156
Iowa	-	-	349,395	1,935	-	1,410,210
Kansas	356,229	-	298,792	3,559	15,999	1,440,473
Kentucky	-	-	530,304	2,147	-	1,670,428
Louisiana	-	-	408,725	11,389	51	1,262,042
Maine	-	-	146,278	983	-	751,571
Maryland	75,494	-	336,543	3,475	1,987	1,669,347
Massachusetts	927,242	-	486,990	2,749	4	3,468,038
Michigan	-	-	734,974	10,353	32,611	2,815,272
Minnesota	35,707	-	368,912	5,716	19,376	1,731,026
Mississippi	-	-	278,090	4,062	14,823	926,906
Missouri	255,250	-	669,237	6,436	25,637	2,038,239
Montana	-	-	240,513	5,319	2,776	484,248
Nebraska	-	-	212,638	1,685	28,044	718,604
Nevada	-	-	160,599	1,728	-	535,339
New Hampshire	-	-	126,726	2,419	8,475	396,279

New Jersey	2,124,716	867,760	571,818	19,525	-	5,970,119
New Mexico	307,185	-	277,103	19,280	-	1,108,855
New York	1,403,742	-	1,133,791	9,525	18,359	5,117,702
North Carolina	-	-	729,184	8,109	-	2,619,172
North Dakota	-	-	159,200	1,669	17,357	395,485
Ohio	249,431	-	651,561	7,169	30,828	3,125,999
Oklahoma	-	-	302,453	3,735	11,627	1,317,186
Oregon	-	-	273,466	63,725	-	1,023,632
Pennsylvania	1,928	-	887,643	10,921	17,856	4,026,523
Rhode Island	30,850	-	131,454	1,325	-	267,353
South Carolina	-	-	324,464	2,565	1,539	872,060
South Dakota	-	-	196,243	2,383	6,252	411,768
Tennessee	-	-	449,429	2,930	27,268	1,439,811
Texas	-	-	1,766,133	25,929	157,564	5,652,251
Utah	-	-	209,798	18,992	8,566	922,769
Vermont	-	-	108,127	-	1,226	272,088
Virginia	219,540	-	470,753	10,314	44,673	2,751,585
Washington	27,682	18,110	449,664	28,620	26,718	1,698,258
West Virginia	110,000	-	329,649	4,999	59	1,108,290
Wisconsin	-	-	500,670	6,162	67,972	1,612,018
Wyoming	-	-	176,582	63,335	764	385,358
Total	8,177,719	929,906	23,046,206	500,213	1,487,952	92,406,070

1/ Tables SF-1 and SF-2 show the receipts and disbursements State for highways. See Table SF-21 for general note on SF series. This table is compiled from reports of State authorities.

2/ Any differences between beginning balances and the closing balances on last year's Table SF-2 are the result of accounting adjustments, inclusion of funds not previously reported, etc.

3/ Amounts shown represent only those highway-user revenues that were expended on State or local roads. See Table SDF for the full amount of and disposition of highway-user revenues.

4/ Amounts shown represent gross general fund appropriations for highways reduced by the amount of highway-user revenues placed in the State General Fund. See the "Offset by General Funds Spent for Highways" column on Table DF.

Table 8
Revenues Used by Local Governments for Highways – Year 2000 1/
($ thousands)
Source: U.S. DOT, FHWA, *Highway Statistics 2001*, Table LGF-1

STATE	MOTOR-FUEL AND MOTOR-VEHICLE TAX REVENUES 3/	ROAD AND CROSSING TOLLS 3/	APPROPRI-ATIONS FROM GENERAL FUNDS	PROPERTY TAXES AND SPECIAL ASSESS-MENTS	OTHER LOCAL IMPOSTS	MISCEL-LANEOUS	BOND PROCEEDS 2/		PAYMENTS FROM OTHER GOVERNMENTS				TOTAL RECEIPTS
									STATE		FEDERAL		
							ORIGINAL ISSUES	REFUNDING ISSUES	HIGHWAY-USER IMPOSTS 3/	OTHER	FHWA	OTHER	
Alabama 4/	23,989	-	223,418	214,763	320	147,826	43	-	202,088	18,522	-	10,296	841,265
Alaska 4/	2,318	-	29,051	49,476	7,943	1,453	83,500	-	2,649	7,171	-	3,916	187,477
Arizona 4/	8,520	-	146,351	17,252	262,015	62,891	88,740	-	377,952	137,117	-	3,508	1,104,346
Arkansas 4/	-	-	28,437	42,720	56,181	34,470	16,000	-	148,587	1,928	-	2,607	330,930
California	-	133,553	1,894,607	161,619	132,189	1,617,944	6,108	1,587,827	1,311,089	1,621	370,566	46,587	7,263,710
Colorado 4/	-	27,119	139,272	88,338	189,421	148,198	362,595	-	274,841	26,753	-	10,884	1,267,421
Connecticut 4/	15,966	-	289,927	-	-	11,666	-	-	39,709	158	-	-	357,426
Delaware 4/ 5/	-	-	16,209	1,539	188	1,137	3,452	-	-	8,970	-	-	31,495
Florida 4/	595,964	48,283	189,974	162,645	429,144	123,448	70,864	-	269,414	41,709	-	15,749	1,947,194
Georgia 4/	-	-	328,516	1,951	664,065	62,469	5,807	-	-	817	-	338	1,063,963
Hawaii	33,493	-	27,988	-	30,242	4,757	25,855	-	2,408	360	11,408	2,868	139,379
Idaho	3,556	-	7,550	56,785	9,890	19,747	1,992	-	115,533	13,607	-	7,108	235,768
Illinois 4/	24,498	44,574	199,640	477,172	-	39,216	156,299	-	542,981	139,325	-	2,083	1,625,788
Indiana 4/	224,525	-	131,637	-	-	-	26,043	-	379,942	843	-	1	762,991
Iowa 4/	-	-	31,435	259,054	44,370	23,085	87,611	-	480,794	25,606	25,892	13,930	991,777
Kansas 4/	-	-	441,224	90,216	16,506	9,603	36,616	-	148,813	25,422	-	5	768,405
Kentucky 4/	76,437	-	117,540	-	1,905	14,662	-	-	9,707	68,483	-	442	289,176
Louisiana 4/	203	-	70,401	94,600	200,688	26,315	146,626	-	20,862	27,039	-	467	587,201
Maine 4/	-	2,340	190,251	-	-	778	3,649	-	19,587	51	-	1,408	218,064
Maryland 4/	-	-	60,936	19,031	15,455	20,185	120,222	-	378,710	39,890	-	370	654,799
Massachusetts 4/	-	32,787	-	567,786	3,105	28,847	28,340	-	197,913	6,858	-	3,987	869,623
Michigan 4/	-	1,089	328,950	16,120	50	286,492	75,292	-	936,140	983	-	-	1,645,116

Minnesota	-	-	625,994	423,353	-	86,790	188,270	-	458,580	197,818	-	4,183	1,984,988
Mississippi 4/	6,002	-	104,315	87,898	46,695	12,029	52,977	-	90,819	42,065	-	4,586	447,386
Missouri 4/	21,016	827	192,981	112,252	347,801	41,982	22,406	-	207,494	39,093	-	1,580	987,432
Montana 4/	12,240	-	35,031	37,703	-	2,268	5,410	-	25,434	4,052	-	2,762	124,900
Nebraska	15,274	1,470	85,910	131,333	12,328	18,511	40,096	-	221,730	61,108	-	10,655	598,415
Nevada 4/	104,664	-	-	2,783	-	180	28,358	-	57,101	-	-	90	193,176
New Hampshire 4/	166,011	-	-	38,641	-	-	-	-	23,584	-	-	-	228,236
New Jersey 4/	-	29,745	1,415,171	-	-	3,121	7,690	-	117,000	-	-	-	1,572,727
New Mexico	-	-	31,983	26,771	29,617	18,817	111,081	3,530	57,186	34,479	-	9,106	322,570
New York 4/	70,292	358,246	2,275,962	674,950	169,424	290,680	254,110	-	229,192	11,560	-	3	4,334,419
North Carolina 4/ 5/	16,018	-	339,059	6,607	6,581	20,338	101,366	-	210,206	919	-	6,039	707,133
North Dakota 4/	-	-	15,422	58,123	1,707	2,981	11,152	-	58,537	-	-	-	147,922
Ohio 4/	-	-	219,470	196,925	30,965	94,941	15,490	-	855,117	1,177	-	-	1,414,085
Oklahoma	-	-	127,017	15,989	37,104	16,906	4,500	-	174,053	42,354	-	1,824	419,747
Oregon 4/	9,783	3,469	95,364	39,050	26,620	120,765	42,062	-	214,672	19,565	-	66,475	637,825
Pennsylvania 4/	31,757	20	462,196	283,982	-	307,964	12,604	-	199,961	-	-	1,005	1,299,489
Rhode Island 4/	34,958	-	21,589	13,872	7,372	81	18,641	-	-	-	-	1,322	97,835
South Carolina	-	-	123,420	58,980	30,355	-	-	-	52,443	5,030	-	2,544	272,772
South Dakota 4/	5,717	-	132,974	19,915	-	927	1,293	-	38,762	6,444	-	796	206,828
Tennessee	27,070	6	147,355	4,491	774	-	24,475	-	217,860	1,549	-	8,673	432,253
Texas	154,867	279,254	1,139,165	730,642	-	654,902	426,243	-	403,795	10,934	-	91,200	3,891,002
Utah 4/	-	-	119,154	-	1,178	2,203	-	-	138,893	-	-	886	262,314
Vermont 4/	-	-	13,874	66,304	-	-	3,406	-	22,629	-	-	2,592	108,805
Virginia 5/	118,508	24,180	379,489	-	7,970	43,003	107,742	18,197	210,195	31,779	-	8,141	949,204
Washington	30,262	2,037	98,205	369,099	152,422	141,795	40,857	-	369,267	36,360	125,321	21,337	1,386,962
West Virginia 4/ 5/	-	1,115	127,792	36,515	92	10,150	-	-	-	18,971	-	13,243	207,878
Wisconsin 4/	624	54	752,589	358,209	195,600	19,189	257,471	-	353,745	-	-	1,640	1,939,121
Wyoming 4/	-	-	60,447	-	-	-	-	-	18,275	-	-	1,923	80,645
Total	**1,834,532**	**990,168**	**14,035,242**	**6,115,454**	**3,168,282**	**4,595,712**	**3,123,354**	**1,609,554**	**10,886,249**	**1,158,490**	**533,187**	**389,159**	**48,439,383**

Notes to Table 8

1/ Tables LGF-1 and LGF-2 summarize the receipts and disbursements for highways by local governments, including toll facilities. See Table LGF-21 for general note on local series. Local government reporting is on a biennial basis with even-numbered years optional. This table is compiled from the reports of State and local governments.

2/ Excludes proceeds from the sale of short term issues (notes). See Table LGB-2 for additional information on local government debt for roads and streets.

3/ See Table LDF for gross receipts and distributions of highway-user revenues, including local toll receipts.

4/ Estimated by FHWA.

5/ Although most local roads and streets are under State control, local governments may raise and expend money on these roads and streets. State expenditures on these roads and streets are included in State Highway Finance Table series.

Table 9
Five-Year Overview of Highway Finance in the United States
Compiled from Table HF-10A of *Highway Statistics 2001*, U.S. DOT, FHWA

		Percent		Percent		Percent		Percent		Percent
	2001 (prelim)	of Total	2000	of Total	1999	of Total	1998	of Total	1997	of Total
Revenues Used for Highways	$ million	Disbursed	$ million	Disbursed	$ million	Disbursed	$ million	Disbursed	$ million	Disbursed
Fuel/MV Taxes and Fees designated for Highways	71,934	55.38	75,604	61.62	69,090	59.55	64,253	59.51	61,598	60.24
Tolls	5,785	4.45	5,732	4.67	5,132	4.42	4,698	4.35	4,668	4.58
Total Highway-User Rev.	77,719	59.83	81,336	66.29	74,222	63.98	68,951	63.86	66,266	65.00
Other Taxes and Fees, including General Fund App.	34,190	26.32	31,137	25.38	29,380	25.33	25,395	23.52	25,424	24.94
Investment Income and Other Receipts	7,749	5.97	7,342	5.98	6,774	5.84	8,187	7.58	6,977	6.84
Total Income w/o Bonds	119,659	92.12	119,815	97.65	110,376	95.14	102,533	94.96	98,667	96.78
Bond Issue Proceeds	112,665	9.75	11,301	9.21	11,274	9.72	9,048	8.38	8,754	8.59
Total Receipts w/Bonds	132,324	101.87	131,115	106.86	121,650	104.86	111,581	103.34	107,421	105.36
Funds Placed in Reserves	2,423	1.87	8,418	6.86	5,639	4.86	3,606	3.34	5,468	5.36
Total Funds Available	129,900	100.00	122,697	100.00	116,011	100.00	107,975	100.00	101,953	100.00
Disbursements										
Capital	65,968	50.78	61,323	49.98	57,227	49.33	52,308	48.44	48,360	47.43
Maintenance	31,677	24.39	30,636	24.97	29,997	25.86	28,173	26.09	26,777	26.26
Administration & Research	10,423	8.08	10,020	8.17	9,130	7.87	8,523	7.89	8,256	8.10
Law Enforcement & Safety	11,977	9.22	11,031	8.99	10,393	8.96	9,445	8.75	9,761	9.57
Total w/o Interest or Bonds	120,045	92.41	113,010	92.10	106,747	92.01	98,449	91.18	93,154	91.37
Interest on Debt	4,770	3.67	4,583	3.73	4,350	3.75	4,379	4.06	4,166	4.09
Bond Retirements	5,086	3.92	5,105	4.16	4,914	4.24	5,147	4.77	4,633	4.54
Total Disbursements	129,900	100.00	122,697	100.00	116,011	100.00	107,975	100.00	101,953	100.00

Table 10
Comparison of Dougher Study and FHWA Data on Highway-User Revenues and Expenditures

Source	Highway Expenditures*	Highway-User Revenues	Highway-User Revenues Diverted to Non-Highway Uses	Other Taxes and Fees Used for Highways
Dougher (1994)	$82 billion	$141.8 billion	$59.8 billion	Not Reported
FHWA (1994)	$82 billion	$ 82.1 billion	$26.7 billion	$26.6 billion
FHWA (2000)	$113 billion	$ 99.9 billion	$18.5 billion	$31.7 billion

*Includes spending on capital, maintenance, administration, safety and law enforcement. Does not include interest or bond retirement.

Table 11
1957 State Motor Fuel Taxes Adjusted for Inflation to 2002
(in cents)
Source: Surface Transportation Policy Project (STPP), October 2002

	1957 State Motor Fuel Tax	1957 State Motor Fuel Tax Adjusted for Inflation to 2002	2002 Actual State Motor Fuel Tax	Difference Between Actual and Inflation Adjusted 1957 State Motor Fuel Tax
Alabama	7.0	37.9	18.0	-19.9
Alaska*	5.0	25.5	8.0	8.0
Arizona	5.0	27.1	18.0	-9.1
Arkansas	6.5	35.2	21.7	-13.5
California	6.0	32.5	18.0	-14.5
Colorado	6.0	32.5	22.0	-10.5
Connecticut	6.0	32.5	25.0	-7.5
Delaware	5.0	27.1	23.0	-4.1
District of Columbia	6.0	32.5	20.0	-12.5
Florida	7.0	37.9	13.9	-24.0
Georgia	6.5	35.2	7.5	-27.7
Hawaii*	5.0	25.5	16.0	16.0
Idaho	6.0	32.5	26.0	-6.5
Illinois	5.0	27.1	19.3	-7.8
Indiana	4.0	21.7	15.0	-6.7
Iowa	6.0	32.5	20.0	-12.5
Kansas	5.0	27.1	21.0	-6.1
Kentucky	7.0	37.9	16.4	-21.5
Louisiana	7.0	37.9	20.0	-17.9
Maine	7.0	37.9	22.0	-15.9
Maryland	6.0	32.5	23.5	-9.0
Massachusetts	5.0	27.1	21.0	-6.1
Michigan	6.0	32.5	19.0	-13.5
Minnesota	5.0	27.1	20.0	-7.1
Mississippi	7.0	37.9	18.4	-19.5
Missouri	3.0	16.3	17.1	0.8

Montana	7.0	37.9	27.0	-10.9
Nebraska	6.0	32.5	25.4	-7.1
Nevada	6.0	32.5	24.0	-8.5
New Hampshire	5.0	27.1	19.0	-8.1
New Jersey	4.0	21.7	14.5	-7.2
New Mexico	6.0	32.5	18.0	-14.5
New York	4.0	21.7	22.6	0.9
North Carolina	7.0	37.9	24.5	-13.5
North Dakota	6.0	32.5	21.0	-11.5
Ohio	5.0	27.1	22.0	-5.1
Oklahoma	6.5	35.2	17.0	-18.2
Oregon	6.0	32.5	24.0	-8.5
Pennsylvania	6.0	32.5	26.6	-5.9
Rhode Island	4.0	21.7	29.0	7.3
South Carolina	7.0	37.9	16.0	-21.9
South Dakota	5.0	27.1	22.0	-5.1
Tennessee	7.0	37.9	21.4	-16.5
Texas	5.0	27.1	20.0	-7.1
Utah	5.0	27.1	24.8	-2.3
Vermont	5.5	29.8	20.0	-9.8
Virginia	6.0	32.5	17.5	-15.0
Washington	6.5	35.2	23.0	-12.2
West Virginia	6.0	32.5	25.4	-7.2
Wisconsin	6.0	32.5	27.3	-5.2
Wyoming	5.0	27.1	14.0	-13.1
				0.0
Average	5.7	31.0	20.3	-9.7
*Alaska and Hawaii became states after 1957. The state gas taxes shown are for 1959				

Table 12
Comparison of Estimated Equity Ratios (User Fee Revenue to Allocated Costs) for Year 2000
Federal vs. All Levels of Government
Compiled from Table ES-5 of *Executive Summary of the 1997 Federal HCAS Final Report* and Table 7 of *Addendum to the 1997 Federal HCAS Final Report* (May 2000), FHWA

Vehicle Class/Registered Weight	Federal	All Levels of Govt.
Autos	1.0	0.7
Pickups/Vans	1.5	0.9
Buses	0.2	0.4
All Passenger Vehicles	1.1	0.8
Single Unit Trucks:		
≤25,000 pounds	1.5	1.5
25,001 - 50,000 pounds	0.7	0.6
> 50,001 pounds	0.4	0.4
Total Single Unit Trucks	0.9	0.8
Combination Trucks:		
≤50,000 pounds	1.4	1.3
50,001 - 70,000 pounds	1.0	0.9
70,001 - 75,000 pounds	0.9	0.8
75,001 - 80,000 pounds	0.8	0.8
>80,000 pounds	N/A	0.7
80,001 - 100,000 pounds	0.5	N/A
>100,001 pounds	0.4	N/A
Total Combination Trucks	0.8	0.8
All Trucks	N/A	0.8
All Vehicles	1.0	0.8

Table 13
Estimated Marginal Costs of Pavement, Congestion, Crashes, Air Pollution, and Noise for Illustrative Vehicles Under Specific Conditions – Year 2000
Source: Table 13 of *Addendum to the 1997 Federal HCAS Final Report* (May 2000), FHWA

Vehicle Class/Highway Class	Cents per Mile					
	Pavement	Congestion	Crashes	Air Pollution	Noise	Total
Autos/Rural Interstate	0	0.78	0.98	1.14	0.01	2.91
Autos/Urban Interstate	0.1	7.70	1.19	1.33	0.09	10.41
40 kip 4-axle S.U. Truck/Rural Interstate	1.0	2.45	0.47	3.85	0.09	7.86
40 kip 4-axle S.U. Truck/Urban Interstate	3.1	24.48	0.86	4.49	1.50	34.43
60 kip 4-axle S.U. Truck/Rural Interstate	5.6	3.27	0.47	3.85	0.11	13.3
60 kip 4-axle S.U. Truck/Urban Interstate	18.1	32.64	0.86	4.49	1.68	57.77
60 kip 5-axle Comb/Rural Interstate	3.3	1.88	0.88	3.85	0.17	10.08
60 kip 5-axle Comb/Urban Interstate	10.5	18.39	1.15	4.49	2.75	37.28
80 kip 5-axle Comb/Rural Interstate	12.7	2.23	0.88	3.85	0.19	19.85
80 kip 5-axle Comb/Urban Interstate	40.9	20.06	1.15	4.49	3.04	69.64
NOTE: S.U. = Single Unit, Comb. = Combination; Air pollution costs are averages of costs of travel on all rural and urban highway classes, not just Interstate. Available data do not allow differences in air pollution costs for heavy truck classes to be distinguished.						

Table 14
Descriptive Statistics of the Variables

	Mean	Median	Standard Deviation	Minimum	Maximum
$ Spent ($ thousands)	2,058,745	1,447,886	2,015,851	161,333 (DC 1998)	10,939,868 (CA 1999)
HUR ($ thousands)	1,910,433	1,206,131	2,179,564	125,702 (DC 1998)	11,991,119 (CA 1998)
Lane Miles	160,543	153,819	110,692	3,450 (DC 1998)	639,853 (TX 2000)
DVMT	144,239,014	112,736,986	147,844,159	9,060,274 (DC 1998)	837,838,798 (CA 2000)
Land Area (square miles)	69,373	53,983	84,934	61 (DC)	570,374 (AK)
% Urban	8.92	3.34	16.46	0.16 (AK 1998)	100.00 (DC-all 3 yrs)
Population	5,471,364	3,974,682	6,062,455	490,787 (WY 1998)	34,010,375 (CA 2000)
GSP ($ millions)	182,307	112,396	218,245	16,294 (VT 1998)	1,330,025 (CA 2000)
AvgWage ($ annual)	31,183	30,156	5,705	22,648 (MT 1998)	52,965 (DC 2000)
% Trucks	10.10	10.22	4.07	0.70 (RI 1998)	25.04 (WY 2000)
Winter Temp (30-yr avg in degrees F)	32.28	32.20	12.14	2.60 (AK)	67.40 (HI)

Table 15
Results of OLS Regression Analysis Using the Classical Linear Model

Variable	Coefficient (t-statistic)
HUR	0.2317** (2.5369)
Lane Miles	2.6368*** (4.4524)
DVMT	-0.0060*** (-3.5801)
Land Area	-0.5434 (-1.1905)
% Urban	-7025.0554** (-2.0482)
Population	0.2390*** (3.1788)
GSP	2.9673* (1.9564)
AvgWage	26.7127** (2.1786)
% Trucks	-15,179.0139 (-1.4739)
Winter Temp	-3275.7808 (-0.9236)

Regression Statistics

F	350.42
R^2	0.9610
Adjusted R^2	0.9583
Standard Err	411584.92
Observations	153
D-W Test	0.2981

* Results are significant at the 10% level.
* * Results are significant at the 5% level.
*** Results are significant at the 1% level.

Table 16
Descriptive Statistics of Annual Growth Rates in the Variables
(percent change)

	Mean	Median	Standard Deviation	Minimum	Maximum
$ Spent	9.25	8.35	11.38	-15.87	55.91
HUR	3.58	3.09	5.22	-15.87	26.02
Lane Miles	0.48	0.18	1.49	-5.68	9.30
DVMT	1.72	1.72	1.78	-3.42	6.02
Land Area	0.00	0.00	0.67	-3.18	3.55
% Urban	-0.12	0.00	10.89	-38.51	76.12
Population	1.02	0.80	0.82	-0.51	4.40
GSP	6.04	5.80	2.44	0.23	13.14
AvgWage	4.38	3.92	1.56	0.55	9.66
% Trucks	6.94	3.45	28.85	-84.92	133.62

Table 17
Results of OLS Regression Analysis Using Growth Rate Models
(Gr = annual percent change in variable)

Growth Rate Model 1		Growth Rate Model 2		Growth Rate Model 3	
Variable	Coefficient (t-statistic)	Variable	Coefficient (t-statistic)	Variable	Coefficient (t-statistic)
GrHUR	0.0742 (0.3404)	GrHUR	0.0472 (0.2064)	GrHUR	-0.0962 (-0.4655)
GrLM	0.7011 (0.9348)	LM	0.0000 (-0.1290)	LM	0.0000 (-0.8457)
GrDVMT	-1.2543* (-1.9558)	DVMT	0.0000 (-3478)	GrDVMT	-1.1109* (-1.7656)
GrArea	-0.0762 (0.0435)	Area	0.0000 (1.5388)	Area	0.0000* (1.7127)
Gr%Urban	0.1948* (1.7688)	%Urban	0.0017 (1.4316)	%Urban	0.0025*** (3.1713)
GrPOP	3.3499** (2.1421)	POP	0.0000 (0.2651)	GrPOP	4.5941*** (3.0094)
GrGSP	-0.8346 (-1.5001)	GSP	0.0000 (-0.2223)	GrGSP	-1.6015*** (-2.8424)
GrAvgWage	-1.4918* (-1.8196)	AvgWage	0.0000 (0.1063)	GrAvgWage	-0.9670 (-1.1365)
Gr%Trucks	-0.0647* (-1.7113)	%Trucks	0.0085** (2.3415)	%Trucks	0.0083*** (2.6687)
Winter Temp	-0.0013 (-1.3781)	Winter Temp	-0.0005 (-0.4093)	Winter Temp	-0.0011 (-1.1573)
Regression Statistics					
F	2.6898		1.2308		3.4966
R^2	0.2281		0.1191		0.2776
Adjusted R^2	0.1433		0.0223		0.1982
Standard Err	9.1053		0.1125		0.1019
Observations	102		102		102
D-W Test					0.9503

* Results are significant at the 10% level.
* * Results are significant at the 5% level.
*** Results are significant at the 1% level.

VITA

Joanna G. Knoll was raised and attended public schools in Dover, New Hampshire. She received her B.S. in Consumer Economics from the University of Massachusetts at Amherst in 1978. During her junior year, she interned with the Center for Auto Safety in Washington, DC. After graduation she worked for National Evaluation Systems, Inc., in Amherst, in various positions related to educational research and testing. From 1985 until 2000, she worked as a research analyst and freight classification specialist for the National Motor Freight Traffic Association in Alexandria, Virginia. During this time she also served as an advisor to the National Motor Common Carrier Weighing and Research Association. Since the fall of 2000, she has been working part-time at Northern Virginia Community College while pursuing her M.A. in Economics at Virginia Tech. She expects to graduate in the spring of 2004. She resides in Springfield, Virginia with her husband John C. (Jack) Knoll and son Andrew.