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Kentucky's Road Fund Tax Structure

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16. Abstract <p>In recent years, there has been a great deal of discussion of whether the incoming Road Fund revenue is sufficient to meet the needs of Kentucky's Highways System. Many have suggested a policy of raising the current tax rates on motor fuels as a way of enhancing the financial health of the Road Fund. This current study examines the sources of the Road Fund and evaluates the sources of revenue in terms of stability, equity, competitiveness, and adequacy. Finally, the study examines the impact various changes in motor fuel taxes would have on revenue.</p>			
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CHAPTER 1

Executive Summary

Recent economic growth has created greater demands on Kentucky's infrastructure, including the state's highway system. To finance its highway infrastructure needs, the state of Kentucky levies a series of taxes and fees which are maintained in the Road Fund, supplemented with federal funds, to finance the maintenance, operation, and development of the state's highway system. The financial viability of the Road Fund is critical to the maintenance of an efficient highway network and a growing state economy. An essential ingredient for a healthy Road Fund is a sound tax policy. The soundness of the tax policy can be evaluated on a number of grounds including adequacy, stability, equity, and competitiveness. This current study examines the state of Kentucky's Road Fund on these grounds. In addition, the study provides an overview of the tax policy and recent trends in the state's Road Fund as well as trends in Road Funds nationwide. Various motor fuel tax policies are examined and discussed in greater detail in the following chapters.

Why is the Road Fund Important to the State of Kentucky?

The Road Fund is a state accounting fund created to finance the development of a statewide transportation system that is integrated into a national transportation system. In Kentucky, the monies from the state Road Fund support more than 27,000 miles of state highways, representing 38% of the state's total roadway miles and 83% of the state's traffic (Wilbur Smith Associates, 1997).

State Road Funds were established as a means of earmarking money for the development and maintenance of the nation's highway system. Historically, in the United States, privately-financed toll roads provided the principal road networks. However, public policy makers realized that the private sector's provision of roads would be insufficient for an effective and integrated highway system. Private sector firms do not benefit directly from the positive spillovers (increased economic development and improved quality of life) fostered by an expansive system of highways and roads. Therefore, such firms only provided roads to the point at which their marginal benefit of toll revenues were equal to or exceeded the marginal cost of providing the roads. The highways and roads which met that criteria were insufficient to provide a transportation network required to support the economic growth and development desired for this nation.

To meet the need for a nationwide integrated highway system, the public sector began to construct and maintain roads. The public provision of roads was justified by the positive economic impacts (positive externalities) accruing to communities and businesses from better and more extensive highways systems. Today, the US has a vast network of interstates, state highways, and city and rural roads that are a major asset to the commerce and productivity of the nation.

Why Evaluate the Current Tax Policies that Support the Road Fund?

Over time, a state's Road Fund revenue and desired expenditure growth may not match. While the cost of building and maintaining roads changes due to inflation and other factors, Road Fund revenue sources may not, necessarily, change at the same rate. If Road Fund expense growth exceeds revenue growth, a state will have difficulties funding all viable projects. Therefore, it is essential that taxing policies can be periodically reevaluated in order to ensure the adequacy of the Road Fund.

How are Road Funds Supported?

Unlike state General Funds that are supported by a number of broad based taxes (income, sales, property, and the like), and expended for multiple state purposes, a Road Fund receives funds from specific taxes that are earmarked for transportation.¹ While there are unique characteristics of each state's Road Fund, taxes and fees generally include motor fuel taxes, driver license fees, and usage fees² and taxes. Other Road Fund revenue sources used by some states include toll revenues, weight-distance special taxes, and sales and property taxes.³ States also receive money from special state and federal appropriations and some states utilize debt financing to fund highway projects.

Motor vehicle usage fees and motor fuel taxes are the principal revenue sources for Kentucky's Road Fund. Motor vehicle usage fees and taxes represent 41 percent of the total Road Fund revenue, while motor fuel taxes and federal dollars represent 31 and 20 percent of the total highway infrastructure revenue available for the state. This is compared to 22, 35, 27 percent nationally for fees, motor fuel taxes, and federal dollars respectively. **Table 1-1** displays the revenue sources for Kentucky's highway construction and maintenance activity relative to national averages. The comparison of rates implies that Kentucky places relatively less emphasis on state's motor fuel taxes and federal support than the rest of the nation while the having relatively greater emphasis on fees.

Table 1-1
Revenue Source Comparison
1997 Data

	REVENUE SOURCES			
	Motor Vehicle Usage Fees & Taxes	Motor Fuel Taxes	Federal Dollars	Misc.
Kentucky	41%	31%	20%	8%
U.S.	22%	35%	27%	16%

¹ In most states, there are constitutional restrictions against using Road Fund revenue to support General Fund agencies.

² This includes motor vehicle registration fees and special title taxes of vehicles among other taxes and fees.

³ The majority of states have their revenue cabinets or departments administer the tax collection activities.

Are the Road Fund Taxes and Fees Effective Sources of Revenue?

State revenue sources are often analyzed for stability, equity, competitiveness, and adequacy. A stable revenue stream allows policy makers to make more effective long-term investment plans. To analyze whether Road Fund revenue sources are equitable, the distribution of taxes and fees for each class of vehicles using the road system may be compared to the highway system wear and tear they create. To have an equitable tax and fee structure, the highway usage cost that each class of vehicle creates should be equal to the revenue that each class of vehicle generates. To analyze the competitiveness of the Road Fund tax structure, the tax and fee rates of a state may be compared to benchmark states, border states, and national averages. Finally, adequacy may be measured by assessing whether the revenue stream generated from the tax and fee policy matches the needs of the state's highway system. Our analysis suggests:

- (1) the revenue generated by a variety of tax and fee sources for the Road fund has been relatively stable compared to the revenue of the states General Fund.
- (2) the allocation of taxes and fees to different classes of vehicles has not been completely equitable considering the usage costs associated with the different classes of vehicles. As of 1997, buses, cars, and heavy trucks were paying less than their "fair share" of the costs they create, while pickups and vans, light trucks, and medium trucks are paying more than their fair share of costs.
- (3) Kentucky's current tax and fee rates on motor fuel taxes, licenses and registrations have generally lagged behind the nation, benchmark states, and border states.
- (4) data raises concerns about the adequacy of the current Road Fund tax and fee policy and whether the state is taking in sufficient revenue to support the state's transportation system.

Is the Road Fund Revenue Responsive to Changes in the State's Income?

As indicated, economic growth and expansion increases the demand for transportation services and infrastructure. Therefore, the Road Fund's responsiveness to income changes signals whether the Road Fund will be sufficiently responsive to meet the needs of an expanding economy. **Table 1-2** provides the income elasticity of different revenue sources of the Road Fund. (The elasticity is based on 1980 through 1997 data.) Income elasticity is a measure of responsiveness of the tax revenue to changes in the state's income. An income elasticity of greater than one implies that the fund or the revenue source is very responsive to changes in income, while an income elasticity of less than one implies that the fund or the revenue source is not very responsive to income changes. The elasticities suggest that, overall, the Road Fund is neutral to changes in income and is less responsive to changes in income than the General Fund. The table also suggests that

motor fuel taxes and other revenue sources (which the Federal Highway funds is the major source of revenue) are not very responsive to changes in income.

**Table 1-2
Comparison of Income Elasticities of
Funds and Revenue Sources**

FUNDS		REVENUE SOURCES FOR THE ROAD FUND		
General Fund	Road Fund	Motor Vehicle Usage	Motor Fuel	All Other Road Fund Sources
1.22	1.00	1.36	0.85	.80

How Much Revenue Could Have Been Created in the Past with Different Tax Policies for Motor Fuels?

The motor fuel tax is an important source of revenue for Kentucky’s Road Fund. It represents nearly a third of the total revenue for the Road Fund. However, the motor fuel tax revenue growth, unlike other Road Fund revenue sources, has shown limited growth in recent decades due to:

- (1) a lack of a mechanism for adjusting motor fuel tax rates as changes in prices occur, including changes in the cost of constructing and maintaining the state’s highway system; and
- (2) the lack of systematic changes in tax and fee policies to match Road Fund revenue to the needs and demands of the highway system.

This lack of Road Fund revenue growth could foster a deterioration of funding for the state’s highway system. To enhance the effectiveness of the motor fuels tax as a source of Road Fund revenue, the current tax policy could be adjusted in a variety of ways. The most commonly suggested way of changing the motor fuel tax rate is to have a one-time change in the supplemental tax rate.⁴ However, other possibilities exist. For instance, the floor of the excise tax could be amended (which would change the excise portion of the motor fuel taxes). Alternatively, the supplemental tax rate could be changed incrementally as the demand for revenue changes. Such a policy could be implemented by adjusting the tax rate to equate to inflation in order to match the growth of the revenues to the cost of maintaining and building roads. This study examined ways that the motor fuel tax policy could be amended including:

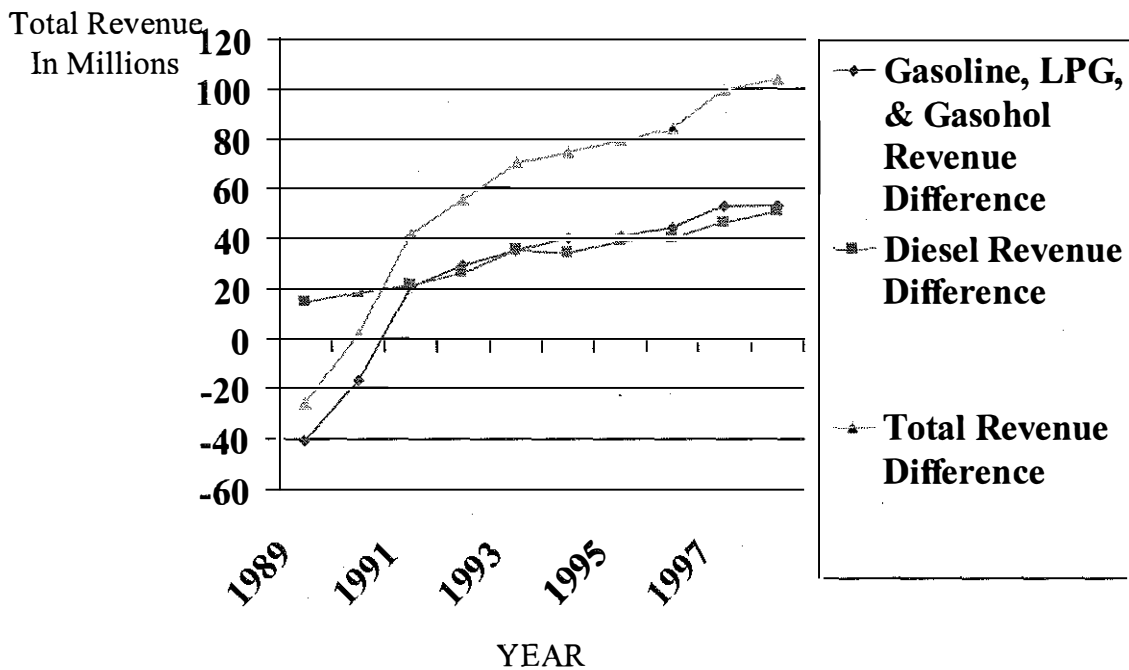
- (1) systematically changing tax policies to match the revenue stream to the needs of the state’s highway system, or

⁴ The current tax policy includes a variable excise tax rate and a supplemental tax. The excise portion of the tax is taxed quarterly at 9 percent of the average wholesale price of fuel with a floor price of \$1.11. Since the inception of the statute, the price has never exceeded a \$1.11, and therefore, the price has effectively become a flat tax rate of 10 cents per gallon (9 percent times \$1.11). In addition, there is a supplemental tax of 5 cents for gasoline and 2 cents for diesel fuel.

- (2) indexing the tax rate to the changes in cost of maintaining the state's highway system.

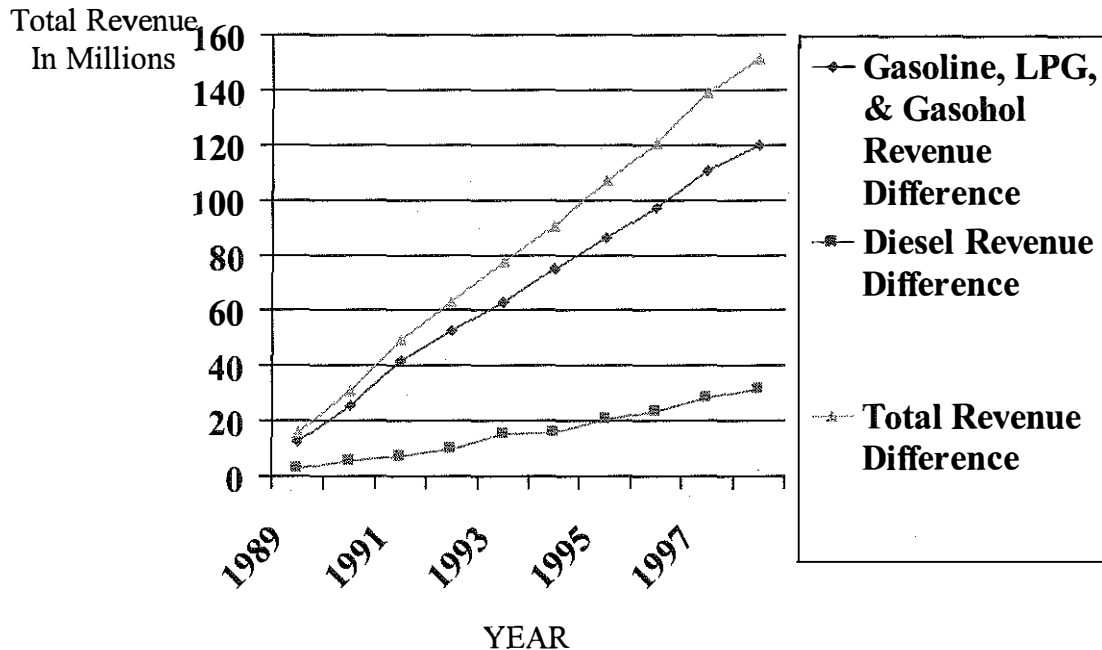
Analysis was also carried out to determine the revenue impact of a policy of systematically changing the motor fuel tax rates to mimic the national tax average from 1989 to 1998. This analysis indicates a substantial increase in revenue for the Road Fund could have been produced. For instance, by the year 1998, an additional \$97 million could have been generated for that year. In total, an additional \$524.682 million could have been produced for the Road Fund over the ten year period. The growth of revenue for individual years is displayed over time in **Figure 1-1**.

Figure 1-1
Motor Fuel Tax Revenue Created Using National Average Tax Rate



If a policy of tying the tax rate of motor fuels to the inflation rate was implemented in 1989, an additional \$155 million could have been created for the year 1998. In total, an additional \$864.320 million of revenue could have been created for the Road Fund over the ten year period. The growth of revenue is displayed in **Figure 1-2**.

Figure 1-2
Motor Fuel Tax Revenue Created Using A CPI Index Tax Rate



What is the Projected Revenue of the Road Fund?

While evaluating possible past tax policy changes may be useful to gain perspective, future revenue estimates can be equally informative regarding potential revenue policy changes. To gain such a perspective, three scenarios were evaluated:

- (1) A “Do-Nothing” Case Scenario. Under this scenario, it is projected that by year 2005, the Road Fund is projected to take in \$1,313.109 million. Of this \$1,313.109 million, \$436.144 million, or about 33%, is derived from motor fuel taxes.
- (2) A National Tax Rate Scenario. Under this scenario, the motor fuel tax rate would be systematically adjusted to the National Average Tax Rate. This tax policy would create an estimated additional \$232.336⁵ million in year 2005 and a total estimated additional revenue of \$1,070.941⁶ million for Road Fund

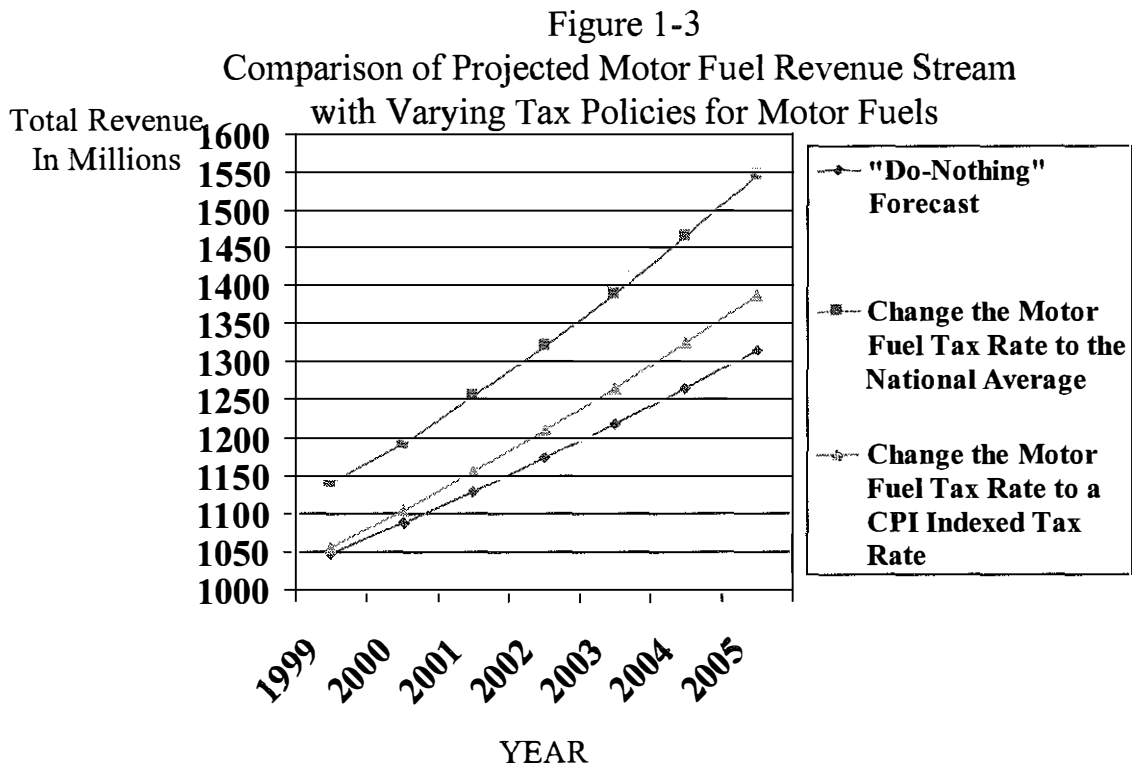
⁵ This value is the sum of the additional revenue from special fuels (diesel fuels) gasoline, LPG, and gasohol for the year 2005.

⁶ This value is the sum of the additional revenue from special fuels (diesel fuels) gasoline, LPG, and gasohol over the years 1999-2005.

in the years 1999 through 2005. This substantial additional revenue is largely the result of the large dispersion between the national average tax rate and the existing tax rate for the state of Kentucky.

- (3) A CPI Indexed Scenario. Under this scenario, the motor fuel tax rate would be tied to the inflation rate. This tax policy would create an estimated additional \$74.292⁷ million of revenue for The Road Fund in the year 2005 and a total estimated additional revenue of \$268.317 million for Road Fund in the years 1999 through 2005.⁸

The total projected revenue stream of the Road Fund with the different tax policies for motor fuels is displayed in **Figure 1-3**.



⁷ This value is the sum of the additional revenue from special fuels (diesel fuels) gasoline, LPG, and gasohol for the year 2005.

⁸ This value is the sum of the additional revenue from special fuels (diesel fuels) gasoline, LPG, and gasohol over the years 1999-2005.

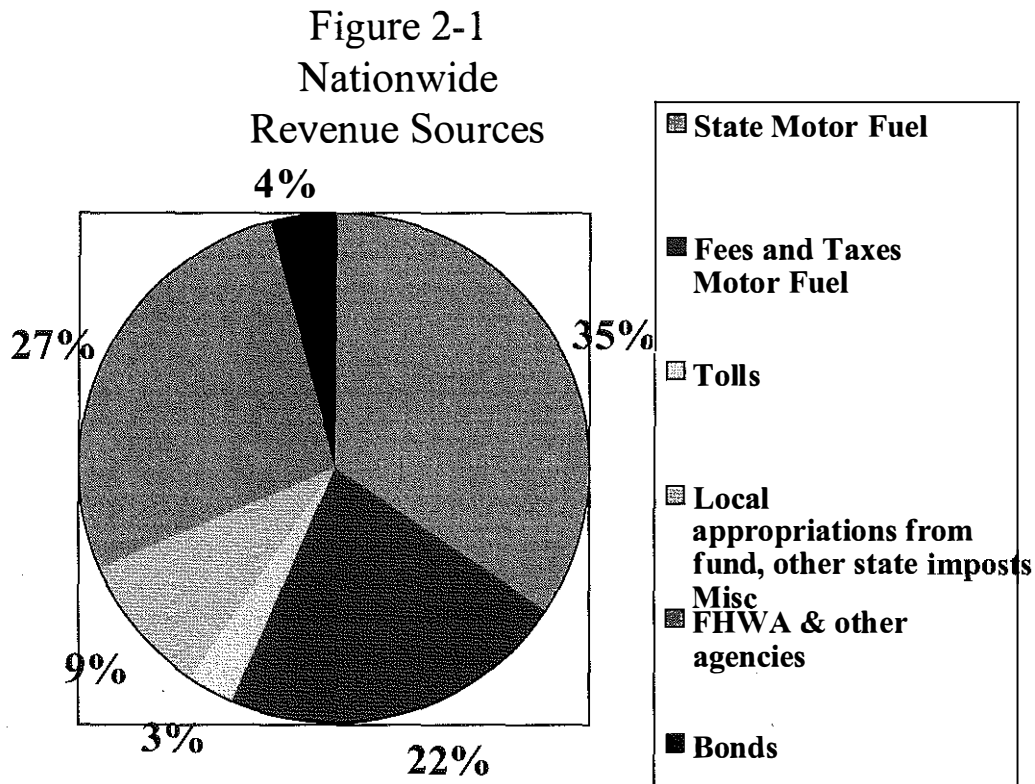
Summary

This study examined the state of Kentucky's Road Fund and its sources. In the following chapters, the revenue sources of the Road Fund will be described in detail. In addition, an analysis is included to evaluate the Road Fund on the basis of stability, equity, competitiveness, and adequacy.

CHAPTER 2 Road Fund Revenue

SOURCES OF REVENUE

As noted in the introduction, road funds are generally funded through “road user” taxes and fees including motor fuel taxes, vehicle registration fees, driver license fees, weight-distance taxes, tolls, and titling taxes. Additionally, special taxes and fees are assessed on a number of other revenue sources including property taxes on motor vehicles, boats, and other personal property taxes. Finally, part of the states’ funds used to finance road and highway infrastructure are obtained from the issuance of bonds and federal financial support. Revenue sources for state road construction and maintenance, nationwide, are summarized in percentage terms in **Figure 2-1**.



Source: *Federal Highway Statistics*

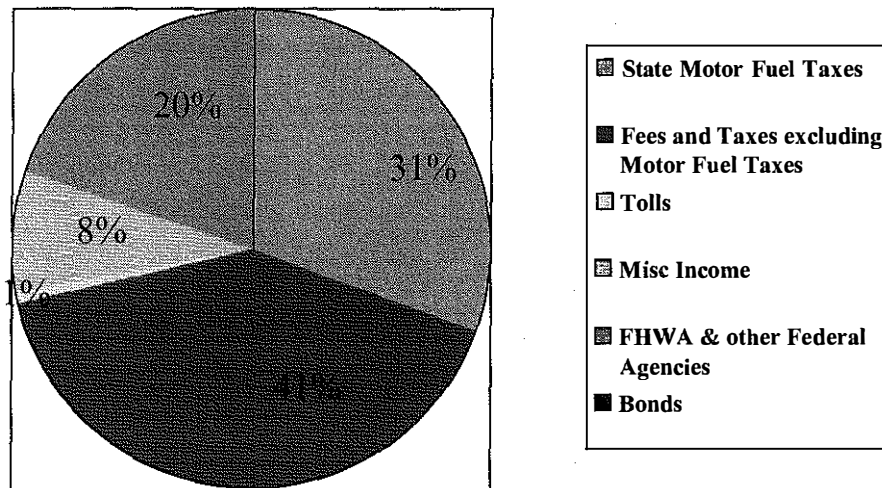
These six categories are: (1) state motor fuel taxes; (2) fees and taxes excluding motor fuel taxes,¹ (3) tolls; (4) Federal Highway Agencies FHWA and other federal agencies; (5) bonds; and (6) local government revenue, appropriations from general fund, other state imposts, and miscellaneous sources. Of these six categories, motor fuel taxes represent the largest revenue source (35%) for the road funds nationwide. FHWA and other federal agencies provide the second largest source of revenue (27%). Fees provide another significant source of revenue (22%), while toll fees (3%), bonds (4%), and

¹ This category includes the motor vehicle usage tax.

revenue sources from the local governments, appropriations from general funds, state imposts, and other miscellaneous sources provide a less significant source of revenue (9%).

Figure 2-2 displays the revenue sources for Kentucky's Road Fund. Comparing **Figure 2-2** to **Figure 2-1** highlights some of the major differences between the Kentucky's sources of funds and the rest of the nation. While Kentucky depends less on motor fuel taxes, federal sources, and toll revenues than the rest of the nation, it does depend more on fees. The following sections provide greater detail of the differences between the state of Kentucky and the nation as a whole for each of these revenue sources.

Figure 2-2
Kentucky's Road Fund Revenue Sources



Source: FHWA Highway Statistics Summary of 1997

Motor Fuel Taxes

When a consumer purchases motor fuels, a portion of the money paid for the fuel is motor fuel taxes. Motor fuel taxes are levied at the federal, state, and local levels. These taxes vary by fuel type (gasoline, diesel, gasohol, other), and by tax or fee type (i.e. excise, sales, motor carrier, and the like). As highlighted in **Figure 2-1**, motor fuel taxes represent a very important source of funds for the maintenance and construction of highway facilities nationwide. Currently, the state motor fuel tax represents 35% of the revenue generated to support the nation's highway system. The state of Kentucky derives a slightly lower portion (31%) from motor fuel taxes (Kentucky Transportation Cabinet, 1998).

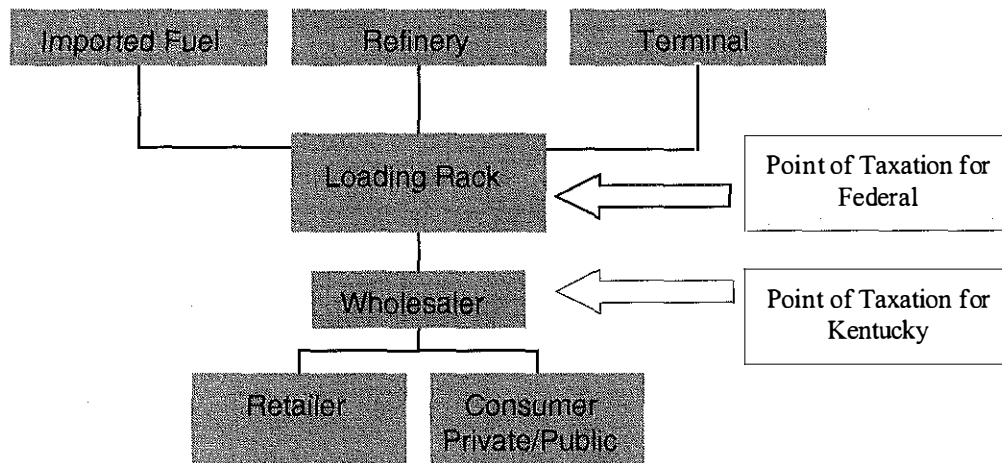
The point of taxation for motor fuels can differ between the federal level and the individual states and can also differ among the states. Federal fuel taxes are filed quarterly while most states require the state fuel taxes to be filed monthly (Council of

State Governments, *Road Fund Tax Evasion: A State Perspective*, 1996). The process of distributing fuels can occur through various means, but generally fuels are moved several times before the fuels are purchased by the consumer at the pump. Consequently, the point of taxation could occur at several possible points.

At the federal level, the point of taxation occurs as the fuel exits the terminal rack (Council of State Governments, *Road Fund Tax Evasion: A State Perspective*, 1996).² The tax is paid by the actual owner of the fuel at that time and this owner could be the terminal operator, producer, or wholesaler.³ As noted, states use various points of taxation including terminal, distributor (loading rack or wholesaler), or retailer. Several states do not, necessarily, specify the placement of the tax in terms of terminal, distributor, or retailer, rather, these states tax according to “first sale or receipt” basis. As of 1996, 6 states, used the first sale or receipts as the point of taxation for gasoline. A majority of states, 30, taxed at the distributor, while 7 states taxed at terminal, and 7 states taxed at the retailer level for gasoline. For diesel fuel, 8 states tax diesel fuel at the first sale or receipt, while 28 states tax at the distributor, 7 states tax at the terminal, and 7 states tax at the retail level. In Kentucky, motor fuels are taxed at the wholesaler. **Figure 2-3** displays the distribution process and highlights the point of taxation by the federal government and by the state of Kentucky.

Source: The Council of State Governments, *Road Fund Tax Evasion: A State Perspective* 1996

Figure 2 - 3
Point of Federal Taxation for Gasoline and Diesel Fuels



The revenue generated from the motor fuel tax rates is based both on the consumption of motor fuels and the tax rate assessed on the motor fuels. In many states, the state motor

² This is true for gasoline and diesel fuel. The point of taxation for motor fuel was modified by Omnibus Budget Reconciliation Act of 1993. This act moved the point of taxation from the wholesaler to the terminal rack and effectively reduced the number of taxpaying entities from over 28,000 to approximately 2,000 entities (Council of State Governments, *Road Fund Tax Evasion: A State Perspective*, 1996).

³ A reduced rate of taxation is applied to removals of gasohol and gasoline to be used for the production of gasohol (Council of State Governments, *Road Fund Tax Evasion: A State Perspective*, 1996).

fuel tax is assessed as a unit tax at a fixed rate per gallon. However, ten states have variable tax rates that are subject to periodic adjustment depending on current market conditions and state revenue needs. Four of these ten states, including Kentucky, impose a tax based upon the average wholesale price, with the gallonage rate adjusted periodically according to the average wholesale price.⁴ These ad valorem tax rates are 9% in Kentucky, 10% in Massachusetts, 13% in Rhode Island, and 17% plus 7% in North Carolina.⁵

Currently, Kentucky's tax rates are 16.4 cents per gallon for gasoline and 13.4 cents per gallon of diesel fuel. Of the tax on the motor fuels in the state of Kentucky, a portion (1.4 cents) is assessed as an environmental assurance tax. The remaining portion of each of the taxes is devoted to the state Road Fund. Therefore, 15 cents of the 16.4 cents of tax on gasoline and goes towards the Road Fund, while 12 cents of the 13.4 cents diesel fuel tax is allocated towards the Road Fund.

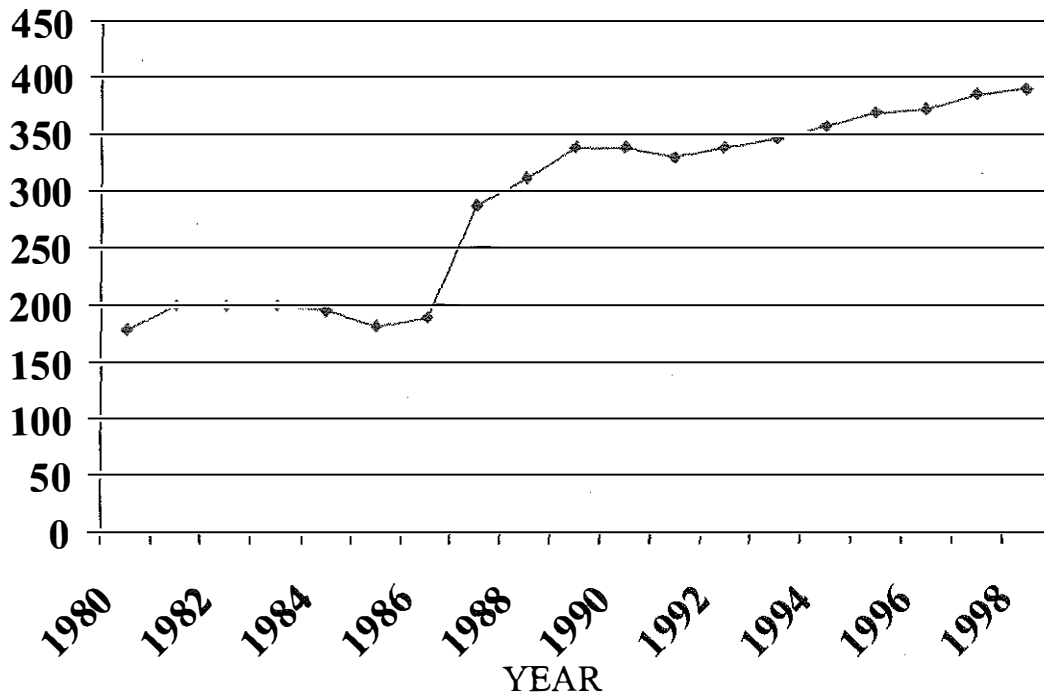
Figure 2-4 displays the recent trends in motor fuel tax revenue for the state of Kentucky. As highlighted in the figure, there was a large increase in motor fuel tax revenue between the years 1986 through 1988 due to tax policy changes. This change in revenue resulted from the implementation of a higher gasoline tax and special fuel tax by 5 cents and 2 cents per gallon respectively. These tax changes took effect on July 1, 1986. However, tax revenue has grown at a relatively consistent rate from 1992 to 1998 with revenues reaching nearly \$400 million by 1998.

⁴ Generally, these adjustments occur either quarterly or semi-annually.

⁵ Reeling from the rapid acceleration of gasoline prices in the 1970's, Kentucky's General Assembly modified the tax base to the average wholesale price per gallon and set the tax rate at 9%. Subsequently, the tax price would increase with the increase in wholesale price. Additionally, the a minimum wholesale price of \$1.11 was established in 1982 (Kentucky's Transportation Cabinet, 1998). In 1996, the average wholesale price of gasoline was \$0.71 per gallon. Therefore, there would have to be a 60% increase before their would be an adjustment to Kentucky's tax rate.

Figure 2-4
Kentucky Motor Fuel Tax Revenue

Tax Revenue in millions



Source: Kentucky's Transportation Cabinet

Finally, **Table 2-1** shows the last time there was a change in tax policy for each state. As indicated in the table, Kentucky's tax rate for gasoline and diesel tax rates were last changed in 1994. The tax change increased the LUST⁶ tax for the removal of underground storage tanks from .4 cents to 1.4 cents per gallon.

Section Summary

In summary, when a Kentucky consumer purchases gasoline, a portion of the amount paid will go to the gas station proprietor, and a portion will go to the Road Fund. These road funds help to finance the maintenance and construction of transportation facilities.

⁶ Leaking Underground Storage Tanks

**Table 2-1
Tax Rate Changes**

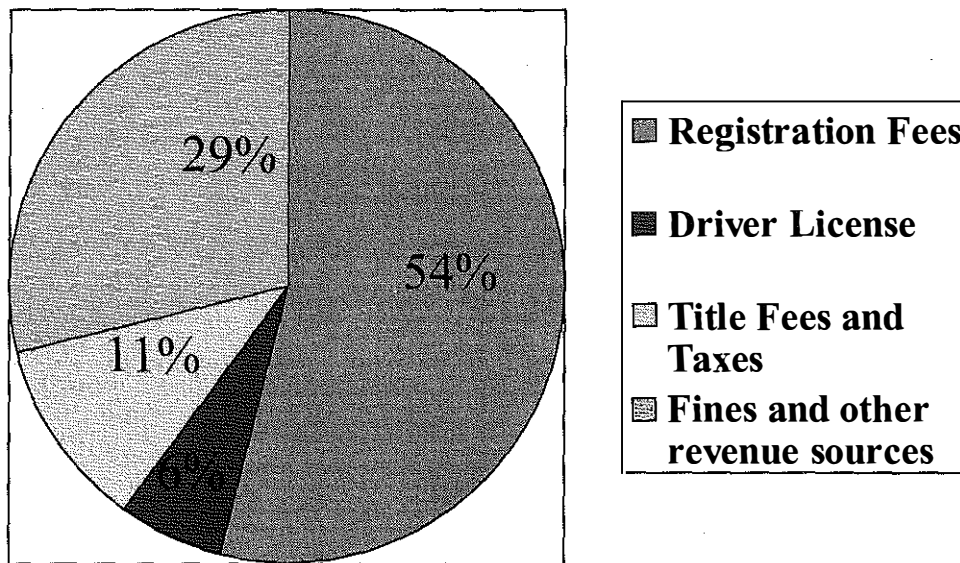
<i>STATE</i>	<i>LATEST CHANGE</i>	
	<i>GASOLINE</i>	<i>DIESEL</i>
Alabama	06/01/92	06/01/92
Alaska	07/01/61	07/01/61
Arkansas	07/01/90	07/01/96
California	01/01/94	01/01/94
Colorado	01/01/91	01/01/92
Connecticut	07/01/97	09/01/91
Delaware	01/01/95	01/01/95
District of Columbia	10/01/94	10/01/94
Florida	01/01/97	01/01/97
Georgia	07/01/71	07/01/71
Hawaii	01/01/91	07/01/91
Idaho	01/01/96	04/01/96
Illinois	01/01/90	01/01/90
Indiana	04/01/88	04/01/88
Iowa	01/01/89	01/01/89
Kansas	07/01/92	07/01/92
Kentucky	07/15/94	07/15/94
Louisiana	01/01/90	01/01/90
Maine	07/17/91	04/01/89
Maryland	05/01/92	07/01/93
Massachusetts	01/01/91	01/01/91
Michigan	08/01/97	01/01/84
Minnesota	05/01/88	05/01/88
Mississippi	07/01/93	07/01/93
Missouri	04/01/96	04/01/96
Montana	07/01/94	07/01/94
Nebraska	10/01/97	10/01/97
Nevada	01/01/97	01/01/97
New Hampshire	06/07/93	06/07/93
New Jersey	07/01/88	07/01/88
New York	04/01/97	04/01/97
North Carolina	01/01/97	01/01/97
North Dakota	01/01/96	01/01/96
Ohio	07/01/93	07/01/93
Oklahoma	07/01/89	07/01/89
Oregon	01/01/93	01/01/93
Pennsylvania	05/01/97	10/01/97
Rhode Island	07/08/94	07/08/94
South Carolina	01/01/89	01/01/89
South Dakota	05/01/97	05/01/97
Tennessee	04/01/89	04/01/89
Texas	10/01/91	10/01/91
Utah	08/01/97	07/01/97
Vermont	08/01/97	07/01/89
Virginia	07/01/92	07/01/92
Washington	04/01/91	04/01/91
West Virginia	05/01/93	05/01/93
Wisconsin	04/01/97	04/01/97
Wyoming	07/01/89	07/01/89

Source: FHWA Highway Statistics, 1998

Fees and Taxes Excluding Motor Fuel Taxes

All of the states and the District of Columbia assess fees for motor vehicle registration. Some, but not all states, also assess a titling tax for usage, fees for emission control, and fees according to the weight of the vehicle. In total, \$22.1 billion usage tax and fees were collected nationwide in calendar year 1996 (FHWA, 1996). Of this \$22.1 billion, nearly 60% of the motor vehicle registration fees and tax revenue nationwide is derived from registration fees while the remaining 40% is derived from fees for driver license, title fees and taxes, fines and penalties, and miscellaneous other sources. Special title and taxes totaled to only 11 % of the motor vehicle tax receipts nationwide.

Figure 2-5
Nationwide Motor Vehicle and
Motor Carrier Tax Revenue Sources



Source: FHWA Highway Statistic 1996 Table MV-2

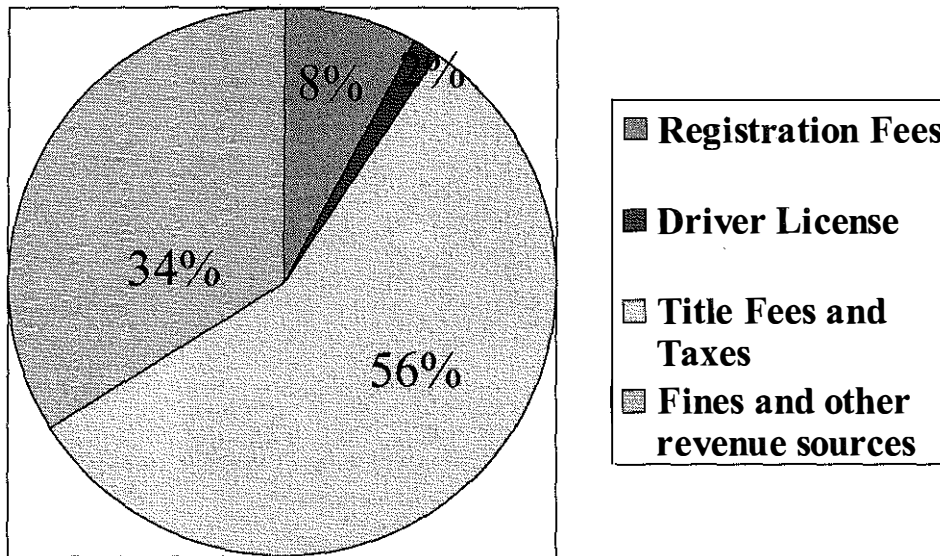
In the state of Kentucky, the Motor Vehicle Usage Tax and Fees are a very important source of revenue as they represent 41% of the total monies deposited into the State Road Fund (Kentucky Transportation Cabinet, 1998). However, relative to many other states, Kentucky derives a smaller portion of the Motor Vehicle Usage Tax revenue from motor vehicle registration. Instead, the state of Kentucky derives a substantial amount of revenue from a special title tax.

Kentucky's vehicle registration fees are among the lowest fees in the nation. Currently, the registration fees for a passenger car is \$15 annually. Of this \$15 fee, \$11.50 is

deposited into the Road Fund. Kentucky currently derives \$41 million, or nearly 8% of the total motor vehicle and motor carrier receipts, from motor vehicle registration fees.⁷

Unlike many states, Kentucky assesses a special titling tax to create revenue for the State Road Fund.⁸ For the state of Kentucky, the special titling tax generates the largest portion of the usage tax and fee revenue. This special title tax is calculated at 6% of 90% of the retail value on new and used vehicles and is assessed when a vehicle is transferred from owner to owner. For rental and lease vehicles, the tax is calculated based on the lease or rental contract. Because the tax is a percent of the sales value, the revenue stream of the tax increases as the sales price of vehicle increase. As indicated in **Figure 2-6**, special title and taxes amounted to \$298 million, or 56% of the total motor vehicle tax receipts and over 30% of total revenues collected for the state. Comparing **Figure 2-5** to **Figure 2-6** highlights the difference in revenue sources in Kentucky from the rest of the nation.

Figure 2-6
Kentucky Motor Vehicle and
Motor Carrier Tax Revenue Sources



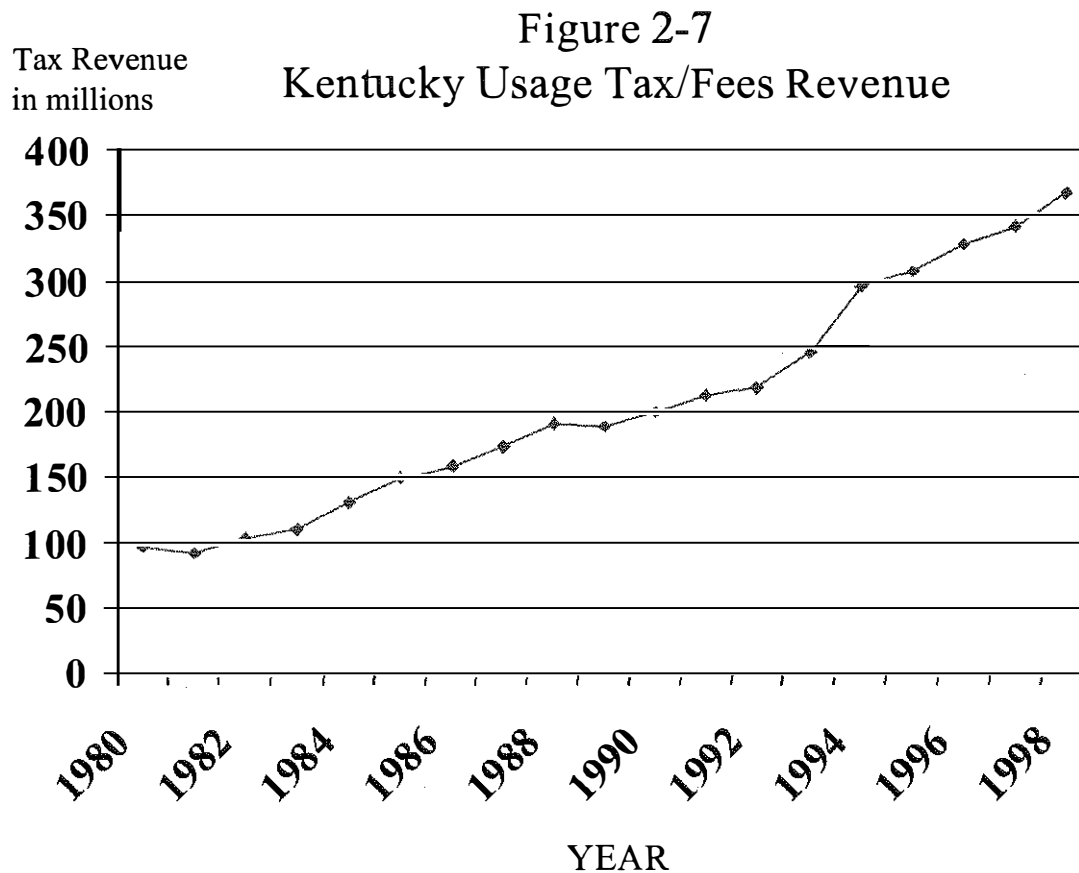
Source: FHWA Highway Statistics 1996 Table MV-2

Figure 2-7 displays the recent growth of usage taxes and fee revenue for the state of Kentucky. As highlighted in the figure, usage tax/fees revenue has generally experienced constant growth in recent years. This increase in revenue can be attributed to a larger tax base created through an increase in the volume and value of car sales. Therefore, the

⁷ Currently, the state of Kentucky registration fees are \$12 for each car or light truck registered and commercial trucks are assessed fee that ranges from \$24 to \$1,260 annually depending on the weight (Kentucky’s Transportation Cabinet, 1998).

⁸ In many states, a special titling tax is either not assessed, or is assessed and earmarked for a General Fund.

future revenue stream from Usage Tax and Fees is largely dependent on the price changes and volume of vehicles sold.



Source: Kentucky's Transportation Cabinet

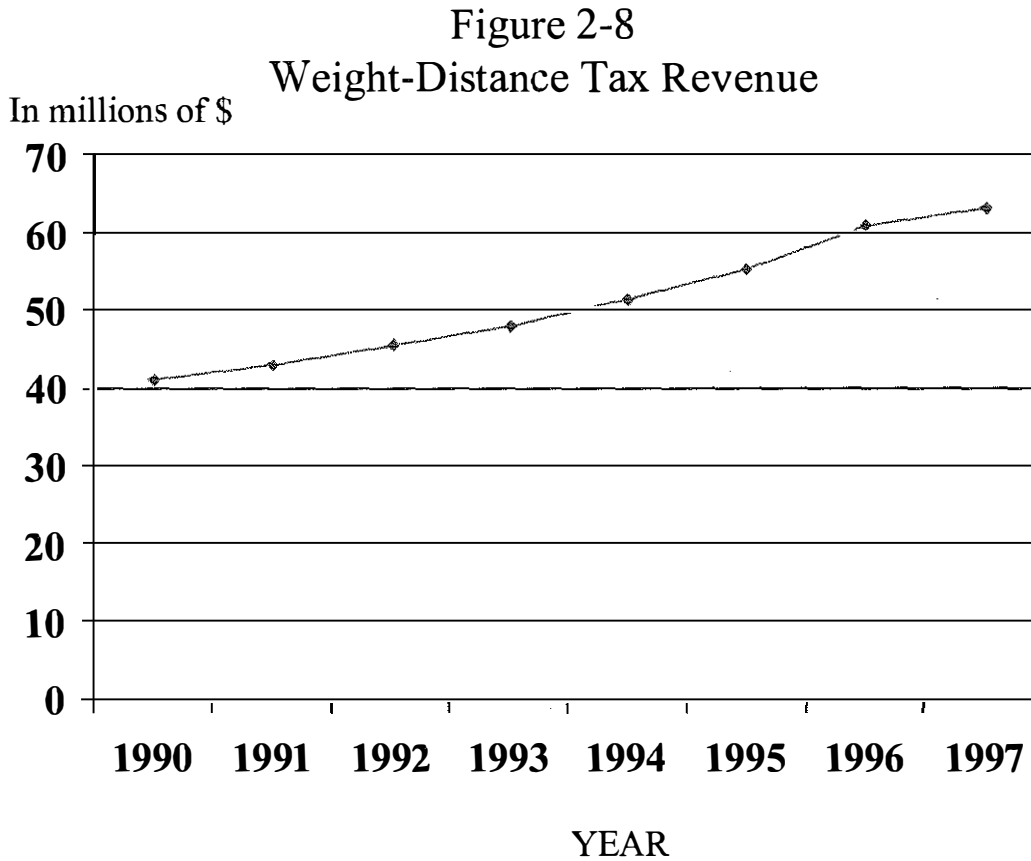
Other Revenue Sources

In addition to the previously mentioned motor vehicle usage tax and fee revenue sources, there are a number of other fees and taxes that create revenue for the State Road Fund. These revenue sources includes fines and penalties, estimated service charges, weight-distance tax, special license fees and franchise taxes, and the certificate of permit fees. Of these different fees and taxes, the weight-distance tax is the most significant. Currently, there are 5 states that have a weight-distance tax, including Kentucky. These states use a weight distance tax as a way of charging trucks for the wear and tear they create for roads.⁹ In 1997, the weight distance tax created over \$63 million of revenue

⁹ In recent research, (Kentucky Transportation Center, *1998 highway cost allocation update: Technical Report*) found that the collection of weight-distance tax is fairly inefficient with only 83% of the taxable revenue collected.

for the state Road Fund (Kentucky Transportation Center, 1998 highway cost allocation update: Technical Report).¹⁰

Figure 2-8 depicts the recent trend in the weight distance tax. As highlighted in the figure, revenue from the weight-distance tax has experienced relatively constant and strong growth in recent year (6.8% annually).



Kentucky Transportation Center, 1998

Despite its significant contribution to the State Road Fund, the use of a weight distance tax is losing popularity because it is not uniformly accepted and applied across all states, and it is believed to be an expensive tax to administer. However, a study prepared for the state of Oregon found that the weight-distance tax to be a relatively inexpensive tax to administer (Cambridge Systematics, SYDEC, Inc. and Pacific Rim Resources, Inc, *Oregon Weight-Mile Tax Study*, 1996). Despite this evidence, the future use of weight-distance tax is somewhat unclear.

¹⁰ Kentucky charges a rate of 2.85 cents per mile for trucks operating at declared weights of over 60,000 pounds.

Section Summary

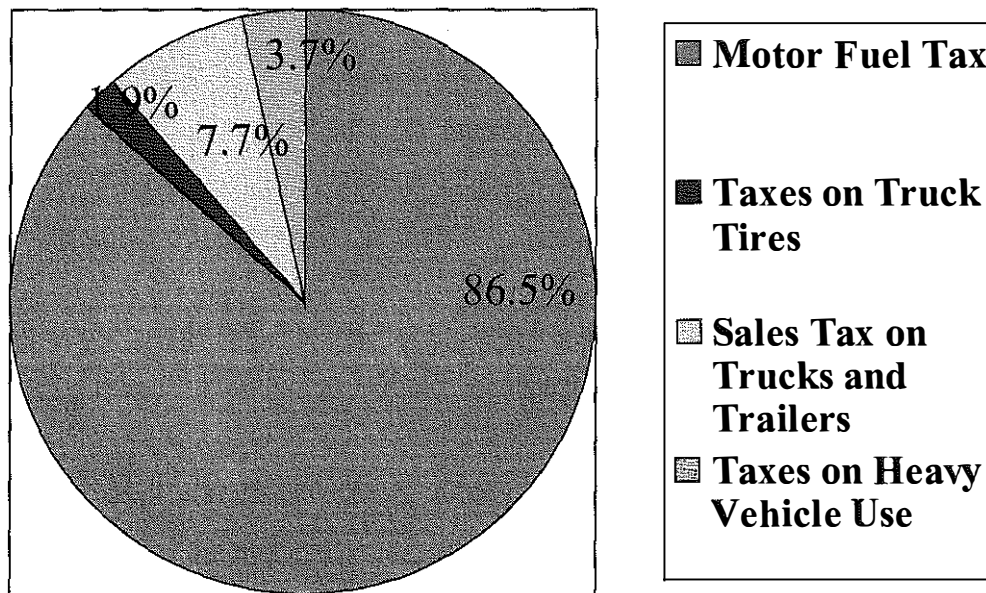
In summary, motor vehicle and motor vehicle usage fee and tax receipts are important sources of revenue for the state Road Funds. The motor vehicle registration fee is the most significant revenue source of the motor vehicle usage tax and fees in most states. However, special title taxes and fees are the most significant source of revenue in the state of Kentucky. Finally, the state of Kentucky relies on the weight-distance tax as a source of revenue, while most states do not.

Federal Funds

Currently, the federal Highway Trust Fund (HTF) is the second largest source of revenue for financing state highways and the third largest for the state of Kentucky. In 1995, HTF represented 26 % of states' road revenue (FHWA Highway Statistic, 1997). In comparison, federal sources comprise only 20 % of Kentucky's road system revenue.

Revenue to fund the HTF is derived from a number of sources, including motor fuel taxes, taxes on tires weighing more than 40 pounds, sales taxes on new trucks and trailers, and taxes of the use of trucks weighing more than 55,000 pounds. For the years 1985-1995, the breakdown of revenue sources for the HTF was as follows: 86.5% is derived from a motor fuel tax, 1.9% is derived from taxes on truck tires, 7.7% is derived from the sales of trucks and trailers, and 3.7% is derived from taxes of heavy vehicle use. This breakdown is displayed in **Figure 2-9** (Statistics calculated according to database provided by the Office of Highway Information Management, Federal Highway Administration. <http://www.fhwa.dot.gov/ohim/Summary95/>)

Figure 2-9
HTF Revenue Sources



Source: Office of Highway Information Management, Federal Highway Administration.
<http://www.fhwa.dot.gov/ohim/Sununary95/>

As **Figure 2-9** indicates, motor fuel tax revenue is by far largest source of revenue for HTF. Currently, the federal gasoline and diesel taxes are 18.3 cents and 24 cents per gallon respectively, which are in addition to the states tax rates. While the federal tax rate on motor fuels is uniform across all states, the amount of money sent to the HTF from each state will not necessarily be the amount of money allocated back to each state.¹¹

HTF taxes are periodically re-authorized by Congress. Currently, the taxes are authorized through 2005 as established by TEA-21 (FHWA: Office of Policy Development, 1998). Not all of the revenue generated from these taxes goes to the Highway Account within the HTF. For instance, 2.86 cents and 0.1 cent per gallon of gasoline tax goes toward Mass Transit Account and Leaking Underground Storage Tank Fund within the HTF. In addition, the General Fund receives 2.5 cents per gallon of the tax on gasohol plus an additional 0.6 cent per gallon for fuels that are at least 10 % ethanol. Recently, a portion of the tax revenue that was originally earmarked for deficit reduction has been reallocated to go into the HTF fund. This reallocation of tax revenue, along with a reduction in diesel fuel tax evasion, has created greater resources for the HTF fund (Federal Highway Administration, Office of Policy development, "Primer Highway Trust Fund", November 1998, <http://www.fhwa.dot.gov/aap/primer98.pdf>).

¹¹ Additionally, some states, including Kentucky, receive specific funds due to the economic characteristics of the state. As an Appalachian state, Kentucky receives money for road construction and improvement from the Appalachian Regional Commission to create economic development in the economically depressed Appalachian Region.

Table 2-2 displays the tax rates for different fuels and the portion of the taxes delegated to different functions.

Section Summary

Federal funds represent over a quarter of the revenue received by the states. An overwhelming majority of the federal revenue is raised from motor fuel taxes. While the assessment of federal taxation on motor fuels is constant across all states, the distribution of revenue may not be allocated proportionally to the amount received from each state, and therefore, can be subject to consider policy debate during periodic HTP re-authorizations.

Bonds and Tolls

Bonds and tolls represent a much smaller portion of revenue for states in general and for the state of Kentucky. States often borrow money to finance construction of transportation facilities. The use of bonds to finance roads and other transportation facilities is often justified based on the benefit principle of taxation. The benefit principle suggests the matching of the cost of using facilities to the benefits received by the user of facilities. Bonds allow states to amortize the cost of roads over a number of years and therefore, allow the states to better allocate the cost of facilities to those who are using the facilities.¹² Toll roads are also justified under this principle. However, both bonds and toll revenue represents a small portion of the state of Kentucky's revenue and will not be discussed in detail here.

Chapter Summary

This chapter provided an initial introduction to the funding sources for the nation and the state of Kentucky. While motor fuel taxes are an important revenue source for the state of Kentucky, it is less important relative to other states. Kentucky is more reliant on the usage tax of the special title tax. In the next chapter, recent changes in revenue sources are highlighted, a comparison of trends for revenue and expenditures is described, and a descriptive comparison of tax and fee rates among benchmark states is provided.

¹² In addition, the cost of building some facilities is extremely high and makes it very difficult for states to pay for the cost in one lump sum. Also, states can issue bonds with a tax-exempt status and therefore reducing the cost of borrowing money for capital projects.

**Table 2-2
Federal Highway User Taxes**

Fuel Type	Effective Date	Tax Rate (cents per gallon)	Distribution of Tax			
			Highway Trust Fund		Leaking Under-ground Storage Tank Trust Fund	General Fund
			Highway Account	Mass Transit Account		
Gasoline	10/01/1997	18.4	15.44	2.86	0.1	-
Diesel	10/01/1997	24.4	21.44	2.86	0.1	-
Gasohol (10% ethanol)*	10/01/1997	13	6.94	2.86	0.1	3.1
Special Fuels:						
General rate	10/01/1997	18.4	15.44	2.86	0.1	-
Liquefied petroleum gas	10/01/1997	13.6	11.47	2.13	-	-
Liquefied natural gas	10/01/1997	11.9	10.04	1.86	-	-
M85 (from natural gas)	10/01/1997	9.25	7.72	1.43	0.1	-
Compressed natural gas (cents per thousand cu. ft.)	10/01/1997	48.54	38.83	9.70	-	-
Truck Related Taxes – All Proceeds to Highway Account						
Tire Tax	0-40 pounds, no tax Over 40 pounds - 70 pounds, 15¢ per pound in excess of 40 Over 70 pounds - 90 pounds, \$4.50 plus 30¢ per pound in excess of 70 Over 90 pounds, \$10.50 plus 50¢ per pound in excess of 90					
Truck and Trailer Sales Tax	12 % of retailer's sales price for tractors and trucks over 33,000 pounds GVW and trailers over 26,000 pounds GVW					
Heavy Vehicle Use Tax	Annual tax: Trucks 55,000 pounds and over GVW, \$100 plus \$22 for each 1,000 pounds (or fraction thereof) in excess of 55,000 pounds (maximum tax of \$550)					

Source: Federal Highway Administration, Office of Policy development, "Primer Highway Trust Fund", November 1998, <http://www.fhwa.dot.gov/aap/primer98.pdf>

* Other rates apply to gasohol blends less than 10% ethanol or blends made with methanol.

CHAPTER 3

Tax Analysis

ROAD FUND

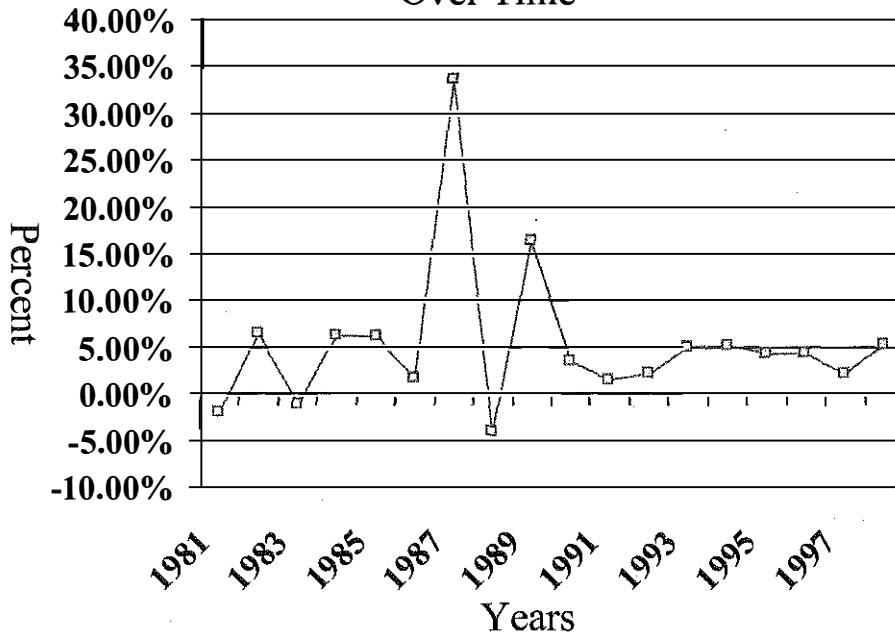
A state's Road Fund provides the financial resources to construct and maintain a network of roads and highways required for an efficient transportation system for goods, services, and people. Therefore, it is essential to have Road Fund tax and fee structure that provides the revenue for a well-maintained and efficient highway system. An effective tax structure provides a *stable* revenue stream, allocates the tax burden *equitably*, is *competitive* relative to surrounding states, benchmark states, and national averages, and is *adequate* for the infrastructure needs of the state. In this chapter, we focus on the stability, equity, competitiveness, and adequacy of Kentucky's Road Fund taxes.

Stability

Stability of revenue not only reduces the risk of shortfalls for budget makers, but it also reduces the uncertainty associated with long term investments and financing decisions. Like any other revenue fund, the stability of the Road Fund is a function of the stability of its revenue sources. Much of the fluctuation of the Road Fund revenue stream can be explained by changes in tax and fee policies. In addition, changes in the tax base, including the amount fuel consumed and the fluctuation in the number and prices of vehicles sold, can create instability of the Road Fund. Of these causes of instability, periodic changes in policies create the greatest level of instability.¹ This instability is highlighted in **Figure 3-1**.

¹ The large increase in 1987 was created from a tax increase of 5 cents per gallon for gasoline and 2 cents per gallon for special fuels (diesel fuels) that were enacted on July 1, 1986. The jump in 1990 was created by a change in the title tax from 5% to 6%.

**Figure 3-1
Percent Change in Road Fund
Over Time**



Source: Kentucky's Transportation Cabinet

Table 3-1 compares the average growth rates and standard deviation of the Road Fund relative to the average growth rate and standard deviation of the usage² of the facilities, inflation rate, and the General Fund over the last ten years.³ As the table highlights, the Road Fund has experienced greater variance (as measured by the standard deviation) than the usage of the facilities. The Road Fund has had nearly the same variance as the inflation rate, and has had much less variance than the General Fund.

**Table 3-1
Comparison of the Stability of the Growth Rates**

	Road Fund	Usage	Inflation	General Fund
Average Growth Rate	3.71%	3.95%	3.16%	6.62%
Standard Deviation	1.38	0.2	1.13	5.81

Source: Kentucky Transportation Cabinet

² Usage is represented by Vehicle Miles of Travel (VMT) of the state's roads.

³ The standard deviation is a measure of variance. The higher the standard deviation relative to the average, the greater the variation for a particular source or variable.

This relative instability of the Road Fund can create long term planning challenges for policy makers. Therefore, seeking ways to make the Road Fund revenue more stable and consistent could be a Road Fund tax policy objective.

Equitable

A reasonable measure of Road Fund tax equity involves comparing the revenue generated by different classes of road and highway users to the cost responsibility of the different classes of users.⁴ **Table 3-2** compares the revenue and costs generated by various types of vehicles for the year 1997.

Table 3-2
Contribution and Cost Responsibility of
Kentucky Highway Users

VEHICLE TYPE ⁵	Total annual cost responsibility		Total annual revenue contribution		Ratio of percent revenue contributed to percent cost responsibility
	Thousand \$	Percent of Total	Thousand \$	Percent of Total	
Cars	516,373	45.74	489,567	43.03	0.94
Buses	11,705	1.04	9,228	0.81	0.78
Pickups and vans	233,874	20.72	281,620	24.76	1.19
Light trucks	23,315	2.06	32,702	2.88	1.39
Medium trucks	47,709	4.23	51,913	4.56	1.08
Heavy trucks	295,991	26.22	272,620	23.96	0.91
Total	1,128,967	100.00	1,137,650	100.00	1.0

Source: Kentucky Transportation Center, *1998 Highway Cost Allocation Update: Technical Report*

⁴ Details of calculating the cost per mile and revenue per mile for different classes of vehicles is provided in *1998 Highway Cost Allocation Update: Technical Report* by the Kentucky Transportation Center. Sources of revenue attributed to different classes of vehicles include fuel taxes, registration or license fees, usage taxes, road tolls, other motor carrier taxes, other federal taxes, and miscellaneous taxes and fees. Costs include construction, maintenance and traffic, administration, and enforcement.

⁵ Many of these classifications may not be entirely clear. *Pickups and vans* includes sports utilities, *light trucks* includes trucks such a coke or beer truck; medium trucks includes dump trucks and UPS trucks, while heavy trucks are the traditional semi-trucks.

The most relevant statistic in the table is the ratio of percent revenue to percent cost for the different classes of vehicles. A ratio of one implies equity among cost responsibility and revenue contribution. A ratio of less than one implies that the class of vehicle is providing less revenue relative to costs while a ratio of greater than one implies that the class of vehicle is providing more revenue than costs.

As highlighted in the ratio column, the costs generated by cars, buses, and heavy trucks exceed the revenue generated by the users of these vehicles. In contrast, the revenues created by the users of pickups and vans, light trucks, and medium trucks exceed the costs associated with these vehicles.

Table 3-3 displays the equity ratio over time. As the table highlights, buses, light trucks, medium trucks, and pickups and vans have experienced growth in the ratio of revenue contributed to the cost responsibility. Of these vehicles, buses (0.33 to 0.78), light trucks (1.00 to 1.39), and medium trucks (0.66 to 1.08) have experienced the greatest growth in the ratio of revenue contributed to the cost responsibility. Cars and heavy trucks have both experienced a slight decrease in the ratio of revenue contributed to the cost responsibility over time.

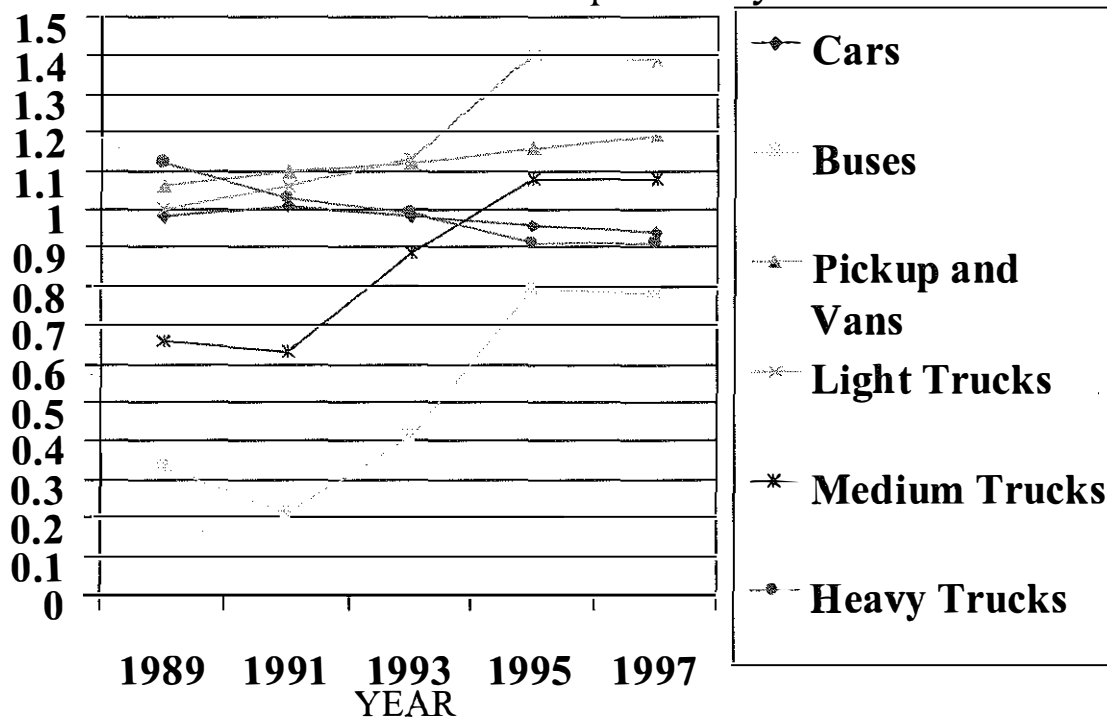
Table 3-3
Ratio of Contribution and Cost Responsibility
Of Kentucky Highway Users Over Time

VEHICLE TYPE	RATIO OF PERCENT REVENUE CONTRIBUTED TO PERCENT COST RESPONSIBILITY				
	1989	1991	1993	1995	1997
Cars	0.98	1.01	0.98	0.96	0.94
Buses	0.33	0.21	0.41	0.79	0.78
Pickups and vans	1.06	1.10	1.12	1.16	1.19
Light trucks	1.00	1.06	1.13	1.40	1.39
Medium trucks	0.66	0.63	0.89	1.08	1.08
Heavy trucks	1.12	1.03	0.99	0.91	0.91
Total	1.00	1.00	1.00	1.00	1.0

Source: Kentucky Transportation Center, *1998 Highway Cost Allocation Update: Technical Report*

Figure 3-2 visually displays the ratio of percent revenue to percent cost responsibility over time. If there were complete equity among the different classes of vehicles, all ratios would be one over time. As the figure displays, the ratio for light trucks, buses, and medium trucks are significantly different one for at least part of the time. By 1997, owners of light trucks are paying a disproportionate share of the revenue relative to costs, while buses are paying the lowest share.

Figure 3-2
Ratio of Percent Revenue to
Percent Cost Responsibility



Source: Kentucky Transportation Cabinet

Table 3-4 provides a further explanation for the growth of the revenue versus the growth of costs for each class of vehicles. Examining the classes of pickup and vans, light trucks, and the medium trucks revenue and cost breakdowns over time, it is apparent that the percentage of cost responsibility for both categories has gone up over time while the percentage of revenue contributions have gone down. These trends have created an upward movement in the ratio for each of these class of vehicles over time. In contrast, heavy trucks' cost responsibility has gone up while the revenue contribution has gone down over time leading to a lower ratio over time. Finally, there has been both upward and downward movements in both the cost responsibility and revenue contribution over time for cars creating a higher and lower ratio over time for cars.

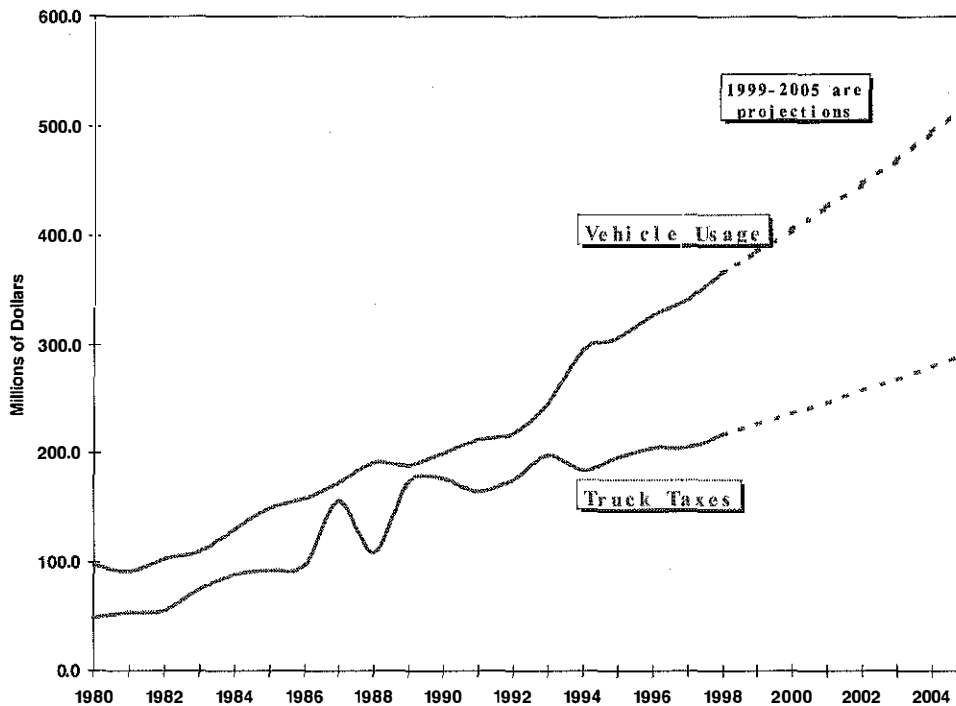
**Table 3-4
Cost Responsibility of
Kentucky Highway Users Over Time**

VEHICLE TYPE	TOTAL ANNUAL COST RESPONSIBILITY (in percent)					TOTAL ANNUAL REVENUE CONTRIBUTION (in percent)				
	1989	1991	1993	1995	1997	1989	1991	1993	1995	1997
Cars	44.76	44.69	44.15	44.17	45.74	45.69	44.16	45.22	45.93	43.03
Buses	0.37	0.28	0.53	0.90	1.04	1.11	1.34	1.29	1.14	0.81
Pickups and vans	21.44	22.49	22.13	23.28	20.72	20.23	20.40	19.80	19.99	24.76
Light trucks	3.05	2.69	2.76	2.72	2.06	3.04	2.53	2.44	1.95	2.88
Medium trucks	4.43	4.39	4.43	4.60	4.23	6.76	6.93	4.97	4.26	4.56
Heavy trucks	25.96	25.46	26.00	24.33	26.22	23.17	24.64	26.28	26.73	23.96
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	26.73	100.0	100.0

Source: Kentucky Transportation Center, 1998 Highway Cost Allocation Update: Technical Report

In general, these vehicles can be lumped into two categories. 1) passenger vehicles, and 2) trucks. Examining the tax structures and recent trends of these two types of vehicles can allow future projections of revenue from the two sources of revenue. **Figure 3-3**

**Figure 3-3
Comparison of Motor Vehicle Usage Revenue
and Truck Taxes**



Source: Kentucky Transportation Cabinet

suggests that in the future, passenger vehicles will generate a higher proportion of Road Fund revenue and adjustments to tax and fee policies may be appropriate to create equity among the different classes of vehicles.⁶⁷

In summary, Kentucky's Road Fund tax policy has not effectively matched the costs and revenues associated with each type of vehicle. Vehicles such as light trucks, pick-ups and vans are paying a disproportional amount of their costs, while vehicles such as cars, heavy trucks, and buses are not paying their proportional share.

Competitiveness

A state's tax policy can also be evaluated based upon its relative competitiveness to benchmark states. Recently, there has been greater and greater concern over the appropriate level of motor fuel taxation and states are comparing their relative rates to neighboring states. There are two primary sources for this concern:

- (1) in recent decades, states have become increasingly aware of the public's reaction to a state's relative tax burden. For example, excessive tax rates, compared to competitive states, might encourage the re-location of business and industry to states with a lower tax burden, and
- (2) relative tax competitiveness can also be a factor in encouraging tax avoidance. Individuals who are travelling, or live on the border of two states, may choose to purchase their gasoline in one state versus another state based upon the relative tax rates, which implicitly affects the price of fuel. The problem may be magnified when there is a major metropolitan area on a border. For example, in the state of Kentucky, there are two major metropolitan areas on the state borders: Cincinnati and Louisville. Individuals in these cities may choose to purchase their gasoline in one state rather than their home state based on differences in gasoline prices caused by tax rate differences.

As suggested, of the border states, Ohio (Cincinnati) and Indiana (Cincinnati, Louisville, Owensboro, and Evansville) have the greatest concentration of Kentuckians living near there border. As highlighted in **Table 3-5**, both Indiana and Ohio also have higher gasoline and diesel taxes. Indiana has gasoline and diesel fuel taxes of 19.41 cents and 27.0 cents, respectively, while Ohio has gasoline and diesel taxes of 22.0 cents and 25.0 cents, respectively. Consequently, compared to these states, Kentucky has a competitive advantage.

⁶ These projections are based upon linear trends.

⁷ The instability of the revenue stream of truck taxes was created through the enactment of the Supplemental Highway Usage (SHU) tax in 1986 that was found unconstitutional later that year and created a drop in revenue the following year. Legislators then relied on a weight-distance tax to replace the revenue of the SHU tax.

Similarly, the bordering states of Tennessee, which has a higher tax rate of 21 cents for gasoline and 18 cents for diesel fuel, and West Virginia which has a substantially higher tax rate of 25.35 cents for both fuel types, do not currently pose competitiveness concerns for Kentucky.

Due to the relative small populations that live near the Kentucky borders with Illinois, Virginia, and Missouri, tax competitiveness may be a minor concern relative to these states. However, compared to each of these states, and for each of the fuel types, Kentucky has a lower rate of taxation.

Table 3-5
Border States Tax Rate Comparison
(All Values In Cents)

STATE	MOTOR FUEL TAX RATES			
	Gasoline		Diesel	
	Rate	Difference	Rate	Difference
<i>Kentucky</i>	16.4	NA	13.4	NA
Illinois	24.6	+8.2	27.4	+14.0
Indiana	19.41	+3.01	27.0	+13.6
Missouri	17.5	+1.1	17.0	+0.6
Ohio	22.0	+5.6	25.0	+11.6
Tennessee	21.0	+4.6	18.0	+1.6
West Virginia	25.35	+8.95	25.35	11.95
Virginia	17.5	+1.1	19.5	+6.1
Average	20.47	+4.07	21.58	+8.18

Source: *Nebraska Transportation Cabinet, 1999*

On average, Kentucky's gasoline tax rate and diesel tax rate is 4.07 cents and 8.18 cents per gallon less than their border states and has a lower tax rate than every state that borders the state of Kentucky. Therefore, Kentucky may be a benefactor of motorists crossing the border to purchase fuels in most areas.

While **Table 3-5** provides a perspective of the relative tax burden Kentuckians face compared to border state citizens, **Table 3-6** compares the tax burden of Kentucky motorists relative to other Southeastern states. As the figure displays, 10 of 12 states have a higher gasoline tax rate, and 11 out of 12 states have a higher diesel. In total, the 12 benchmark states has an average gasoline tax rate that is 2.18 cents greater and average diesel tax rate that is 5.43 cents greater than Kentucky.

Table 3-6
Tax Rate Comparison to Benchmark States
 (All Values in Cents)

STATE	MOTOR FUEL TAX RATES			
	Gasoline		Diesel	
	Rate	Difference	Rate	Difference
<i>Kentucky</i>	16.4	NA	13.4	NA
Arkansas	18.7	+2.3	18.5	+5.1
Alabama	16.0	-0.4	19.0	+5.6
Georgia	7.5	-8.9	11.79	-1.61
Louisiana	20.0	+3.6	20.0	+6.6
Maryland	23.5	+7.1	24.25	+10.85
Mississippi	18.0	+1.6	18.0	+1.6
North Carolina	21.6	+5.2	21.95	+8.55
South Carolina	16.0	-0.4	16.0	+2.6
Tennessee	21.0	+4.6	17.0	+3.6
Texas	20.0	+3.6	20.0	+6.6
Virginia	17.5	+1.1	19.5	+6.1
West Virginia	25.35	+8.95	25.35	+11.95
Average	18.58	+2.18	18.83	5.43

Source: *Nebraska Transportation Cabinet, 1999*

Table 3-7 provides the tax rate of all states and the average tax rate for the nation.⁸ The data suggest that Kentucky has below average tax rates relative to border states, benchmark states, and national averages for both gasoline and diesel fuel. More specifically, Kentucky currently has a tax rate below the national average with a tax rate of 16.4, and 13.4 cents per gallon of gasoline and diesel fuel respectively compared to the national averages of 20.62 and 21.08 for gasoline and diesel fuel.⁹ Of all states, Connecticut has the highest gasoline tax rate of 32 cents per gallon while New York has the largest diesel fuel tax rate of 30.24 cents per gallon. Georgia has the lowest tax rate for gasoline tax rate with a rate 7.5 cents per gallon while Alaska has the lowest diesel tax rate of 8 cents per gallon.

Figures 3-4 provides a national comparison of tax rates over time. As the figures indicate, Kentucky is below the national average for both diesel fuels and gasoline. However, Kentucky's tax rate on diesel fuel lags further behind than the gasoline tax rate and has been below the national average since 1985, while the gasoline tax rate has been below the national average since 1989.

⁸ The table is ordered by the states with the highest tax rate to lowest tax rate for gasoline.

⁹ In addition, trucking firms outside that purchase fuel outside of the state, but consume the fuel on Kentucky Roads are assessed a tax. (Kentucky Transportation Cabinet, 1999).

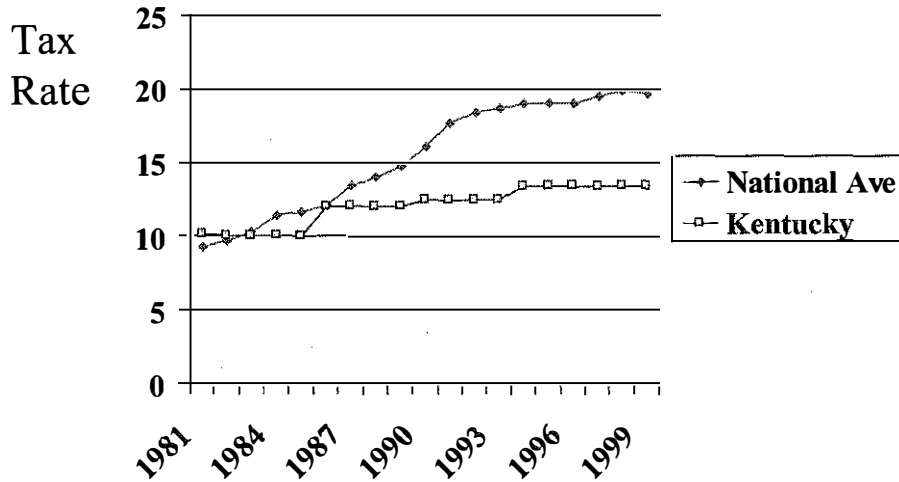
**Table 3-7
Motor Fuel Tax Rates**

State	Base Gasoline		Base Diesel	
	Rate	Tax Rate	Tax Rate	Rate*
Connecticut	32.00	32.00	18.00	18.00
New York	8.00	29.30	8.00	30.24
Rhode Island	28.00	29.00	28.00	28.00
Montana	27.00	27.00	27.75	27.75
Idaho	25.00	26.00	25.00	25.00
Pennsylvania	25.90	25.90	22.35	28.35
California	18.00	25.42	18.00	27.30
Wisconsin	25.40	25.40	25.40	26.70
West Virginia	20.50	25.35	20.50	25.35
Illinois	24.60	24.60	27.40	27.40
Utah	24.50	24.50	19.00	19.00
Hawaii	16.00	24.00	16.00	16.00
Nevada	24.00	24.00	27.00	27.00
Oregon	24.00	24.00	24.00	24.00
Nebraska	22.80	23.70	22.80	25.30
Maryland	23.50	23.50	24.25	24.25
Delaware	23.00	23.00	22.00	22.00
Washington	23.00	23.00	23.00	23.00
Colorado	22.00	22.00	20.50	20.50
Ohio	22.00	22.00	22.00	25.00
North Carolina	17.00	21.60	17.00	21.95
Massachusetts	21.00	21.00	21.00	21.00
South Dakota	21.00	21.00	18.00	18.00
Tennessee	20.00	21.00	17.00	18.00
Iowa	20.00	20.00	22.50	22.50
Louisiana	20.00	20.00	20.00	20.00
Minnesota	20.00	20.00	20.00	20.00
North Dakota	20.00	20.00	20.00	20.00
Texas	20.00	20.00	20.00	20.00
Vermont	19.00	20.00	16.00	26.00
Indiana	15.00	19.41	16.00	27.00
Maine	19.00	19.00	20.00	20.00
Michigan	19.00	19.00	15.00	16.70
Arkansas	18.50	18.70	18.50	18.50
New Hampshire	18.00	18.70	18.00	18.00
Mississippi	18.00	18.00	18.00	18.00
Alabama	16.00	16.00	17.00	19.00
Arizona	18.00	18.00	18.00	26.00
Kansas	18.00	18.00	20.00	20.00
New Mexico	17.00	18.00	18.00	18.00
Missouri	17.00	17.50	17.00	17.00
Virginia	17.50	17.50	16.00	19.50
Oklahoma	16.00	17.08	13.00	13.00
Kentucky	15.00	16.40	12.00	17.20
South Carolina	16.00	16.00	16.00	16.00
Wyoming	13.00	14.00	9.00	9.00
Florida	12.80	12.80	24.60	26.27
New Jersey	10.50	10.50	13.50	17.50
Alaska	8.00	8.00	8.00	8.00
Georgia	7.50	7.50	7.50	11.79
U.S Ave	19.34	20.62	19.37	21.08

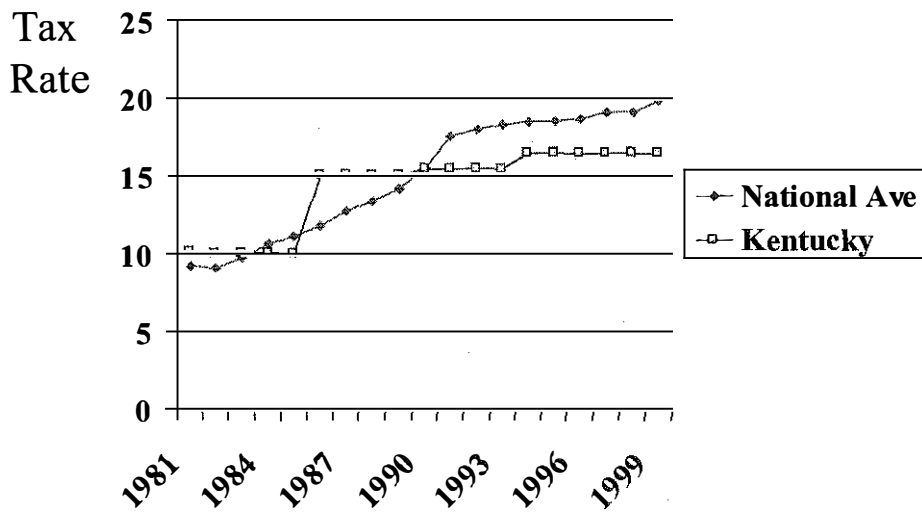
Source: Nebraska Transportation Cabinet, 1999

Both the Diesel fuel and the Gasoline tax includes the base rate plus additional surcharges and miscellaneous taxes

Figure 3-4
Motor Fuel Tax Rate Comparison
Diesel



Gasoline



In addition to the motor fuel taxes, Kentucky assesses more than 50 different fees for licenses and permits for the operation and use of vehicles. Of these, vehicle registration fee is the most common fee across all states and our analysis compare the fees across border states. **Table 3-8** shows that Kentucky is below the average fees charged for both cars and trucks.

**Table 3-8
Registration Fees Comparison**

State	Auto Registration	Truck Registration		
		Single Unit	Three axle 45,000 lb tractor trailer	Five axle 80,000 lb tractor/trailer
Kentucky	\$15.00	\$53.50	\$568.00	\$1,282.00
Illinois	\$48.00	\$390.00	\$1,110.00	\$2,200.00
Indiana	\$12.75	\$175.75	\$691.50	\$1,381.50
Missouri	\$24.00	\$63.00	\$558.00	\$1,727.00
Ohio	\$21.75	\$126.50	\$628.00	\$1,368.00
Tennessee	\$22.00	\$193.75	\$820.25	\$1,384.25
Virginia	\$26.50	\$87.50	\$371.50	\$1,003.00
West Virginia	\$31.50	\$90.00	\$370.00	\$1,132.75
Average of Neighboring States	\$26.64	\$149.36	\$649.89	\$1,456.64

Source: Wilbur Smith Associates, 1997

In summary, the state of Kentucky has a relative low tax burden for owning and operating trucks and motor vehicles relative to border states, benchmark states, and national averages.

Adequacy

Adequacy considers a state's ability to meet the infrastructure investment needs of a state. This section examines the adequacy of the state of Kentucky's Road Fund based upon historical trends of revenues relative to the usage of the state highways and the growth of the General Fund. Here, we provide only an overview of the adequacy of the Road Fund revenue sources and we refer the reader to a 1997 report by Wilbur Smith Associates called "Kentucky Road Fund Adequacy" for a more in-depth analysis.¹⁰

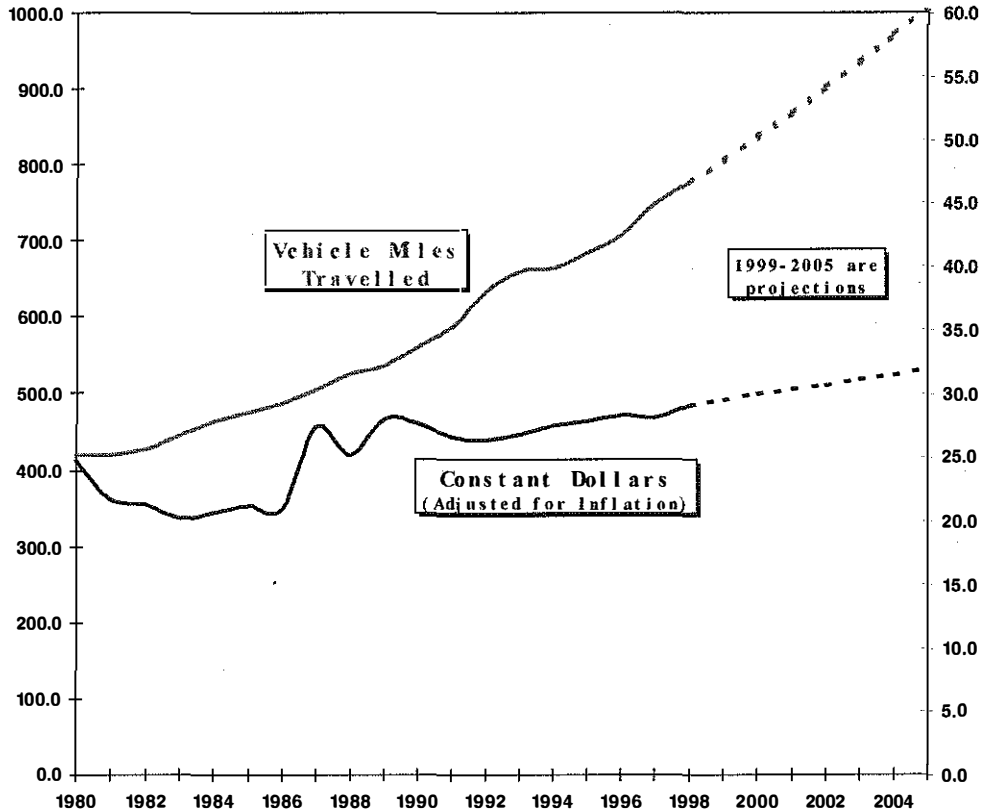
An indication of the adequacy of the Road Fund involves an assessment of its growth rate relative to the growth rate of the use of roads and highways within the state of Kentucky. Currently, the Kentucky Transportation Cabinet draws upon the revenue of the Road Fund to meet the maintenance needs of 27,485 miles of state highways and roads. Of these miles of roads, more than 3,000 miles (or nearly 11 percent of the miles of road) need repair due to deterioration, and wear and tear. In addition, nearly 58 percent of Kentucky rural arterials (as compared to 14 percent for the nation) have lane widths of less than 11 feet and need improvements. These problems may get worse, rather than better in the future. In a study conducted by Wilbur Smith Associates, it was suggested that road conditions will deteriorate, accident rates and congestion will increase due to a lack of funding to meet the needs of the state's highway system (Wilbur Smith Associates, 1997).

The usage of these highways and roads within the state of Kentucky can be proxied by the Vehicle Miles of Travel (VMT). Historical and future estimates of the state's VMT's

¹⁰ Wilbur Smith Associates, Kentucky Road Fund Adequacy Report, 1997.

and Road Fund revenue are provided in **Figure 3-5**. As highlighted in the figure, the usage of the highways has grown at significantly higher rates than the Road Fund revenue stream. (The dotted lines are future projections). This may suggest that it may be difficult to meet the funding needs of the state's highway system with the current road Fund tax structure

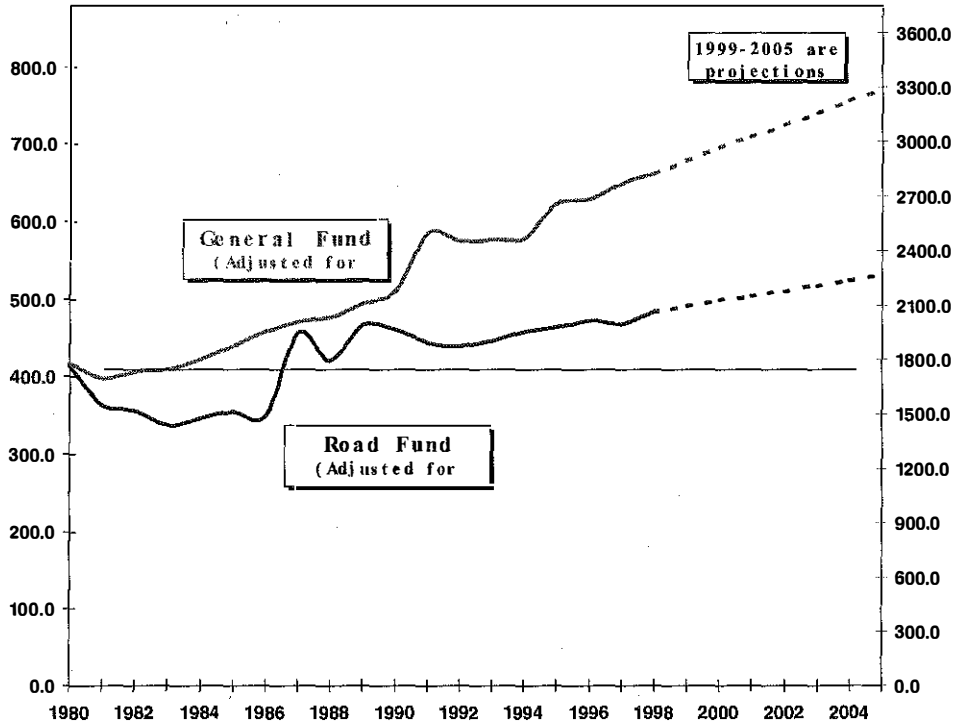
Figure 3-5
Comparison of VMT and Road Fund Growth



Source: Kentucky Transportation Cabinet

To assess the relative Road Fund growth rate compared to the state's General Fund, **Figure 3-6** provides a year by year perspective of the growth of the two funds. Over the last 10 years, the General Fund has grown at an annual rate of 6.63 percent, which exceeds the growth rate of the Road Fund of 3.71 percent. This suggests that the taxes and fees of the Road Fund are not producing the revenue growth that the taxes and fees of other state funds have realized.

Figure 3-6
Comparison of the Growth Rate of the
Road Fund and the General Fund



Source: Kentucky Transportation Cabinet

Summary

This chapter has examined the tax and fee policy that supports Kentucky's Road Fund. The analysis can be summarized as follows:

- (1) the revenue sources for the Road Fund has been relatively stable compared to other funds (General Fund), but less stable than inflation rate.
- (2) the allocation of taxes and fees to different classes of vehicles has not been completely equitable. As of 1997, buses, cars, and heavy trucks were paying less than their "fair share" of the costs they create, while pickups and vans, light trucks, and medium trucks appear to be paying more than there fair share of costs.
- (3) Kentucky's current tax and fee rates on motor fuel taxes and license and registration have generally lagged behind the nation, benchmark states, and border states.

- (4) the analysis suggests that there may be some concern about the adequacy of the current tax and fee policy. Without any adjustments to the state's tax and fee policies, the state may not be able to maintain a high quality highway and public road system in the future.

CHAPTER 4 REVENUE ANALYSIS

As indicated in Chapter 3, Kentucky's Road Fund revenue growth has not kept pace with highway usage or the cost of building and maintaining a high quality system of public highways. This mismatch of Road Fund revenue growth and highway system needs may, ultimately, lead to a deterioration of highway quality, insufficient capacity and other affects such as increased travel time and constrained economic development. This chapter provides an assessment of the relative growth of the Road Fund by major tax category. Included in the analysis is an evaluation of the income elasticity of Kentucky's major Road Fund revenues, Kentucky relative tax rates and revenue growth implications of adjustments to Kentucky's current methods of raising revenue for the Road Fund.

Road Fund Growth Rates of Revenue Sources

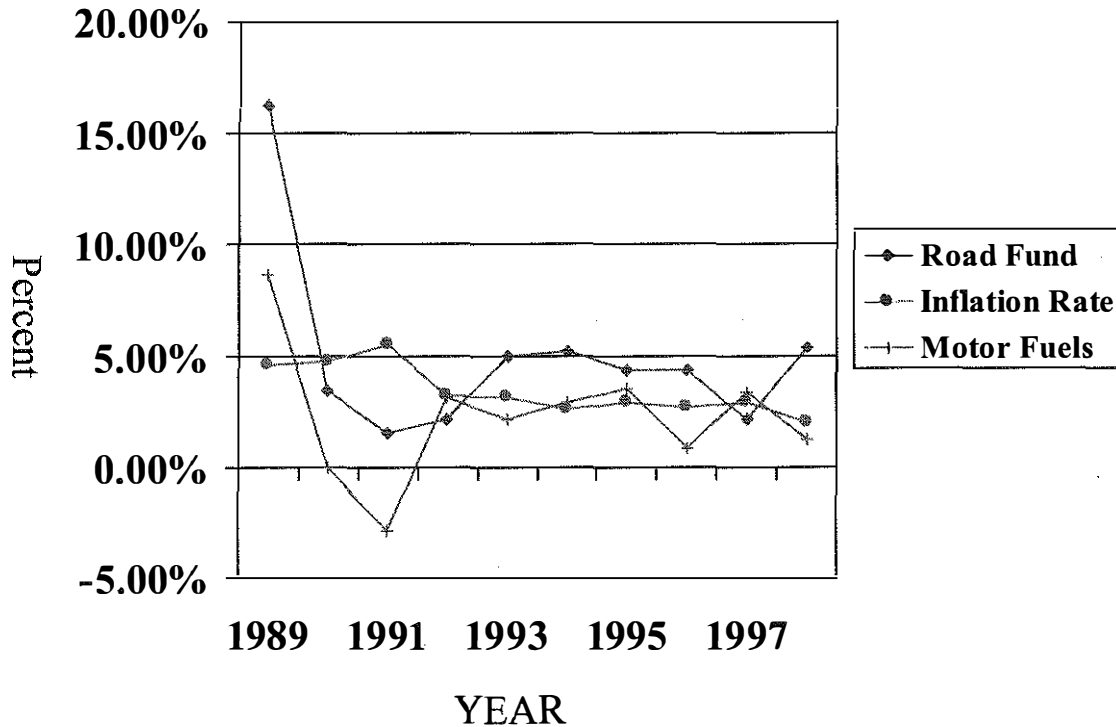
As indicated, the two major state sources of revenue for Kentucky's Road Fund are motor fuel taxes, motor vehicle usage taxes and fees. Motor vehicle usage taxes and fees have shown consistent growth over time, while the revenue from the motor fuel tax has not. **Table 4-1** and **Figure 4-1** both display the growth rate of motor fuel tax revenue relative to inflation and the growth rate of the Road Fund. The table and the figure both highlight that in, general, the motor fuel tax revenue has grown at a slower rate than inflation and the Road Fund.¹

**Table 4-1
Comparison of Growth Rates**

YEAR	Road Fund	Motor Fuels	Inflation Rate
1989	16.26%	8.62%	4.59%
1990	3.43%	-0.03%	4.76%
1991	1.51%	-2.82%	5.52%
1992	2.12%	3.12%	3.17%
1993	4.94%	2.17%	3.11%
1994	5.17%	2.89%	2.63%
1995	4.38%	3.51%	2.90%
1996	4.36%	0.84%	2.70%
1997	2.16%	3.39%	2.90%
1998	5.37%	1.21%	2.00%
<i>Average</i>	4.97%	2.29%	3.43%

¹ The table displays a higher average rate of growth in motor fuel revenue relative to inflation. However, the rate of growth for motor fuel revenue is largely influenced by the large increase in revenue in 1989 as the result of a policy change in the tax rate between 1988 and 1989. Therefore, the averages are somewhat misleading.

Figure 4-1:
A Comparison of the Growth Rates Of the
Road Fund, Motor Fuel Tax Revenue, and Inflation



Additionally, the motor fuel tax revenue is not responsive to changes in income levels. The responsiveness of the different taxes to changes in income can be measured by an income elasticity. An income elasticity, in this particular case, measures the percent change in revenue of the tax source relative to the percent change in income.

$$\text{Income Elasticity} = \frac{\text{Percent Change in Tax Revenue}}{\text{Percent Change in Income}}$$

In **Table 4-2**, the income elasticities are provided for the General Fund, the Road Fund, and different revenue sources for the Road Fund. (The elasticity is based on 1980 through 1997 Kentucky data.²) An income elasticity of greater than one implies that the fund or the revenue source is very responsive to changes in income, while an income elasticity of less than one implies that the fund or the revenue source is not very responsive to changes in income.

² Because the motor fuel tax is a unit tax, the income elasticity was calculated based on changes in real income and gallons consumed. The income elasticity for the other revenues are based on changes in income and revenue.

Table 4-2
Comparison of Income Elasticities of
Funds and Revenue Sources

FUNDS		REVENUE SOURCES FOR THE ROAD FUND		
General Fund	Road Fund	Motor Vehicle Usage	Motor Fuel	All Other Road Fund Sources
1.22	1.00	1.36	0.85	.80

The table suggests that while the Road Fund is neutral to changes in income, it is much less responsive to changes in income than the General Fund. The table also suggests that motor fuel revenue sources and other revenue sources (which the Federal Highway funds is the major source of revenue) are not very responsive to changes in income.

The slow growth of the motor fuel tax revenue can be explained by the structure of the tax. While other tax bases, such as the motor vehicle usage tax, change with the rate of inflation, the tax base of the motor fuel tax is not tied to inflation.³ Therefore, the growth of the motor fuel revenue has remained below the growth rate of the Road Fund in general and the growth rate of highway usage.

To address the issue of slow growth in revenue for the Road Fund, policymakers could consider a number of policy changes. This study examines two policies: 1) a periodic adjustment to the state's motor fuel tax rates; and 2) indexing the motor fuel tax rate to the CPI. The rest of the chapter examines these issues in greater detail.

Estimate of Past Revenue

In the following sections, the study examines both what could have happened if policy changes had been made in the past and if policy changes are made in the future. Critical to the estimated effect is the *price elasticity of demand* for motor fuels. Price elasticity of demand is the percent change in consumption over a percent change in price, while holding income constant.

$$\text{Price Elasticity} = \frac{\text{Percent Change in Quantity of Motor Fuels Consumed}}{\text{Percent Change in Price}}$$

If the price elasticity of demand is greater than the absolute value of 1.0, then the good is considered to be sensitive to price changes and an elastic good. If the percent change in quantity of fuel consumed is greater than the percent change of price change, then the good has a price elasticity of less than absolute value of 1.0 and is not sensitive to price changes and are considered inelastic goods.

³ Explicitly, the motor fuel tax is suppose to be a variable tax tied to the price of fuels. However, it is effectively a fixed tax rate. The motor fuel tax is set at a percentage of the wholesale price of fuel with bottom floor price of \$1.11. Currently, the wholesale price of motor fuels is well below this floor price and has been for the duration of the tax system. Therefore, the tax has effectively become a fixed tax rate.

It is generally accepted that the price elasticity of motor fuels is inelastic and that the consumption of motor fuels is not very sensitive to price changes. If the price elasticity of demand is inelastic, the price elasticity has to be between the absolute value of 1.0 and 0. An absolute value of 1.0 implies that with a percent change in price, there would be an equal and opposite change in the percent change in consumption of fuels. A price elasticity of 0 implies that with a percent price change of motor fuels, there would be no change in the quantity of fuel consumed.⁴ In other words, people would not change their consuming behavior with a change in price.

In a regression analysis, we found that people and businesses do not change their fuel consumption behavior for either gasoline and diesel fuel in the very short run⁵ (in other words, the price elasticity of demand is 0 in the short-run). However, we found that people and businesses begin to change consumption behavior in the long-run. For gasoline, the absolute value for the price elasticity of demand for gasoline, LPG, and gasohol is .1572 while the absolute value for the price elasticity of demand for special fuel (diesel fuel) is .6982.⁶ These estimates imply that motor fuels do indeed have an inelastic demand curve.⁷ The analysis uses these price elasticities for the motor fuels to create historical estimates of revenue using different tax rates.

Table 4-3 displays the Kentucky tax rates for motor fuels relative to the national average over time.⁸

⁴ The maximum amount of revenue that could have been created with a given change in tax rate would be when the price elasticity of demand is equal to 0 because there is no change in quantity of consumption with a change in the price of fuels. The closer the value approaches -1.0 , the less revenue that could be created.

⁵ Short-run is defined as less than a year and the long-run is defined as a year or more.

⁶ The differences between the short-run and the long-run elasticities is that individuals and businesses need time to adjust their behavior. Over the long-run, individuals will begin to buy more fuel efficient cars, move closer to work, etc to reduce their fuel consumption. Furthermore, businesses have explicit contracts that may make it impossible to change how goods are shipped in the short-run and can only change in the long-run.

⁷ A more detailed explanation of the empirical estimates of the elasticities is provided in Appendix B.

⁸ The source of the average tax rate over time is the annual *FHWA Highway Statistics* reports.

Table 4-3
Comparison of Kentucky and the National Averages
of Tax Rates Over Time

YEAR	Gasoline, LPG, And Gasohol		Special Fuels (Diesel)	
	Kentucky	National Ave	Kentucky	National Ave
1989	.154	0.142	.124	0.148
1990	.154	0.155	.124	0.160
1991	.154	0.176	.124	0.177
1992	.154	0.180	.124	0.183
1993	.154	0.183	.124	0.186
1994	.164	0.185	.134	0.189
1995	.164	0.185	.134	0.190
1996	.164	0.187	.134	0.190
1997	.164	0.191	.134	0.195
1998	.164	0.191	.134	0.199

Table 4-4 displays the revenue values for the Road Fund using the national average tax rates.⁹ This estimated tax revenue is compared relative to the revenue created from the actual tax rates over the time period of 1989 to 1998. The table suggests that using the national average tax rates, and assuming an elasticity of -0.1572 for gasoline, LPG, and gasohol, and an elasticity of -0.6982 for special fuels (diesel fuel),¹⁰ a total of \$258.865 million of additional revenue would have been created from gasoline, LPG, and gasohol tax while a total of \$324.685 million of additional revenue is created from special fuels (diesel fuel) tax over the last 10 years (1989-1998). This additional revenue from gasoline, LPG, and gasohol along with special fuels (diesel fuel) represents just over 6.8% of the total revenue of the Road Fund in the same time frame.

⁹The revenue generated for the Road Fund is calculated by using the national average tax rate minus .4 cents for Kentucky's LUST tax from 1989 to 1994 and 1.4 cents thereafter. Therefore, the values that appear in the table are only after the LUST tax is taken out.

¹⁰ The estimates also assume that the supply of fuel is perfectly elastic and that the whole tax is passed onto the consumer. This assumption is a conservative estimate because if the whole tax is passed on then people will buy less gas and less fuel would be taxable.

**Table 4-4
Historical Estimated Revenue Difference
With The National Average Tax Rate**

YEAR	Gasoline, LPG, And Gasohol			Special Fuels (Diesel)		
	Actual Revenue	Calculated Revenue National Tax Rate	Difference Between Calculated and Actual	Actual Revenue	Calculated Revenue National Tax Rate	Difference Between Calculated and Actual
	In Millions of Dollars			In Millions of Dollars		
1989	\$273.981	\$233.614	-\$40.367	\$63.630	\$78.264	\$14.635
1990	\$276.094	\$259.388	-\$16.707	\$60.341	\$78.481	\$18.140
1991	\$276.691	\$297.502	\$20.812	\$50.777	\$71.908	\$21.131
1992	\$281.939	\$311.053	\$29.114	\$56.579	\$82.742	\$26.163
1993	\$279.836	\$315.195	\$35.359	\$72.183	\$107.067	\$34.884
1994	\$292.882	\$333.090	\$40.208	\$67.185	\$101.113	\$33.928
1995	\$297.214	\$337.790	\$40.576	\$76.103	\$114.862	\$38.759
1996	\$299.325	\$343.467	\$44.142	\$78.818	\$118.920	\$40.102
1997	\$305.836	\$358.492	\$52.656	\$84.852	\$131.161	\$46.308
1998	\$307.902	\$360.972	\$53.070	\$88.222	\$138.856	\$50.635
Total	2891.699	3,150.564	258.865	698.689	1,023.374	324.685

The second policy scenario has the motor fuel tax rates tied to the inflation rate. Part of the problem of the current system of taxing motor fuels is that the tax price of fuels does not fluctuate with the cost of maintaining and developing the current highway network. As a way of hedging against potential rising cost of maintaining and developing facilities, the actual tax rate could be indexed to the CPI rather than a fixed tax rate.

To evaluate the impact of a CPI indexed tax rate, we assume that the tax price¹¹ for all motor fuels was indexed to the CPI starting in 1989.¹² **Table 4-5** displays the actual historical tax prices and the tax price if the motor fuel tax had been tied to the CPI. The first column under each fuel type exhibits the historical tax rates for money earmarked towards the Road Fund from 1989 to 1998. The second column under each fuel type is what the Road Fund tax rates would have been if they had been tied to the national CPI. By 1998, the tax rate for gasoline, LPG, gasohol, and special fuels (diesel fuel) would have been 21.0 cents and 16.8 cents respectively as compared to the current rates of 15 cents and 12 cents respectively. This would represent a 40% increase in tax price for each fuel type without any new legislation.

¹¹ The tax price of the motor fuel taxes is the tax rate that is contributed to the Road Fund. For gasoline, LPG, and gasohol, the base tax rate is \$.15 per gallon while the special fuels (diesel fuel) is \$.12 per gallon.

¹² 1989 was chosen to give a ten year perspective.

Table 4-5
Historical Revised Tax Rates Earmarked for the Road Fund
 (New Tax Rates Are Tied To The CPI)¹³

YEAR	CPI INFLATION RATE	BASE TAX RATES			
		GASOLINE, GASOHOL & LPG		SPECIAL FUELS	
		Current	Revised	Current	Revised
1989	4.59%	.150	0.157	.120	0.126
1990	4.76%	.150	0.164	.120	0.131
1991	5.52%	.150	0.173	.120	0.139
1992	3.17%	.150	0.179	.120	0.143
1993	3.11%	.150	0.184	.120	0.148
1994	2.63%	.150	0.189	.120	0.151
1995	2.90%	.150	0.195	.120	0.156
1996	2.70%	.150	0.200	.120	0.160
1997	2.90%	.150	0.206	.120	0.165
1998	2.00%	.150	0.210	.120	0.168

Table 4-6 provides estimates of revenue created from a tax rate that was indexed to the CPI.¹⁴ A total of \$683.949 million of additional revenue would have been created from gasoline, LPG, and gasohol tax while a total of \$159.874 million of additional revenue would have been created from special fuels (diesel fuel) tax over the last 10 years (1989-1998).¹⁵ This additional revenue from gasoline, LPG, and gasohol along with special fuels (diesel fuel) represents just over 9.9% of the total revenue of the Road Fund from 1989 through 1998.

¹³ These tax rates do not include the LUST tax that do not go to the Road.

¹⁴ Once again, a long-run price elasticity of demand of $-.1572$ is assumed for the gasoline, LPG, and gasohol and a price elasticity of $-.6982$ for special fuels (diesel fuel) and a perfectly elastic supply curve is assumed.

¹⁵ Once again, the revenue estimates do not include the 1.4 cents per gallon tax rate devoted for the LUST tax.

Table 4-6
Historical Estimated Revenue Difference
With A CPI Based Tax Rate

YEAR	Gasoline, LPG, And Gasohol			Special Fuels (Diesel)		
	Actual Revenue	Calculated Revenue CPI Tax Rate	Difference	Actual Revenue	Calculated Revenue CPI Tax Rate	Difference
	Millions of Dollars			Millions of Dollars		
1989	\$273.981	\$286.554	\$12.573	\$63.631	\$66.549	\$2.920
1990	\$276.094	\$301.764	\$25.670	\$60.341	\$65.647	\$5.307
1991	\$276.691	\$318.621	\$41.930	\$50.777	\$57.990	\$7.213
1992	\$281.939	\$334.781	\$52.842	\$56.579	\$66.447	\$9.868
1993	\$279.836	\$342.552	\$62.716	\$72.183	\$87.146	\$14.963
1994	\$292.882	\$367.640	\$74.757	\$67.185	\$83.033	\$15.848
1995	\$297.214	\$383.517	\$86.303	\$76.103	\$96.522	\$20.419
1996	\$299.325	\$396.316	\$96.991	\$78.818	\$102.329	\$23.511
1997	\$305.836	\$416.404	\$110.568	\$84.852	\$113.081	\$28.229
1998	\$307.902	\$427.501	\$119.599	\$88.222	\$119.819	\$31.597
Total	\$2891.699	\$3,575.649	\$683.949	\$698.689	\$858.563	\$159.874

Future Projections

While creating changes and estimates of additional revenue created with policy changes in the past is insightful, policy makers obviously are more concerned about the future. In this section, the study provides future projections of revenue under the current and revised policies.

Table 4-7 displays the projected revenue of the Road Fund and its subcategories along with the projected revenue of the General Fund when no policy changes occur. This “base-line estimate” is based strictly on historical percent changes projected into the future and does not incorporate possible changes in the economy, driving habits, and the like.

As highlighted by the table, the estimates suggest that by year 2005, the Road Fund will have \$1,313 million of total revenue with motor fuel taxes and motor vehicle usage taxes providing \$436 million and \$519 million respectively. The table also suggests that the motor fuel tax revenue as a proportion of the total Road Fund revenue will decrease, while the motor vehicle usage tax will continue to increase as a proportion of the total Road Fund revenue.

Table 4-7
Future Revenue Estimates
With Existing Polices

YEAR	GENERAL FUND	ROAD FUND	Road Fund Subcategories			
			Motor Fuel		Motor Vehicle Usage	
	Millions of \$	Millions of \$	Millions of \$	Percent of Road Fund	Millions of \$	Percent of Road Fund
1999	\$6169.100	\$1049.251	\$395.499	37.69%	\$385.461	36.74%
2000	\$6469.700	\$1088.470	\$401.967	36.93%	\$405.116	37.62%
2001	\$6770.086	\$1129.470	\$408.553	36.17%	\$425.773	37.69%
2002	\$7084.418	\$1172.340	\$415.262	35.43%	\$447.484	38.17%
2003	\$7413.345	\$1217.170	\$422.095	34.67%	\$470.301	38.64%
2004	\$7757.544	\$1264.060	\$429.055	33.95%	\$494.282	39.10%
2005	\$8117.724	\$1313.109	\$436.144	33.21%	\$519.486	39.56%

The second set of estimates assumes a policy of systematically changing the tax rates of motor fuels to match the national average tax rate. To do this, we use the national average tax rate of 1998 and project out into the future the changes in the national average tax rates based on trends in tax rate changes over the last ten years.¹⁶ Therefore, this second set of estimates is based upon changing the tax rate to the national average tax rate on a yearly basis.¹⁷ **Table 4-8** displays these estimates.¹⁸

As the table suggests, systematically increasing the tax rate to the national average would over the years 1999-2005 create an additional \$448.547 million from the gasoline, LPG, and gasohol tax while an additional \$622.394 million from special fuels (diesel). A primary reason for this significant additional revenue is that there would be an initial increase in Kentucky's tax rate (to match the current national average) for motor fuels that would continue to grow.¹⁹

¹⁶ The revenue generated for the Road Fund is calculated by using the national average tax rate minus 1.4 cents for Kentucky's LUST tax. Therefore, the values that appear in the table are only after the LUST tax is taken out.

¹⁷ This would be impossible to do without a special session each year.

¹⁸ These estimates use a long-run price elasticity of demand of -0.1572 for gasoline and -0.6982 for diesel fuel and a perfectly elastic supply curve. The estimates also incorporate future price changes in motor fuels. Therefore, price changes were also estimated. To estimate the motor fuel price changes, the study assumes that price changes will continue to change at historical rates. Thus, the price changes are based upon trend analysis.

¹⁹ The existing tax rate of 16.4 cents (of which, 1.4 cents is a LUST tax) per gallon for gasoline, LPG, and gasohol would jump to the national average of a 19.1 cents per gallon. The existing tax rate of 13.4 cents (of which, 1.4 cents is a LUST tax) per gallon for special fuels' (diesel fuels) would jump to the national average of 19.9 cents per gallon.

Table 4-8
Future Revenue Estimates
With a National Average Tax Rate

YEAR	Gasoline, LPG, And Gasohol			Special Fuels (Diesel)		
	Trend Line Estimate of Revenue	Calculated Estimated Revenue National Tax Rate	Difference	Trend Line Estimate of Revenue	Calculated Estimated Revenue National Tax Rate	Difference
	Millions of Dollars			Millions of Dollars		
1999	\$312.004	\$349.445	\$37.441	\$91.989	\$146.160	\$54.171
2000	\$316.161	\$361.491	\$45.330	\$103.027	\$160.904	\$57.877
2001	\$320.374	\$374.665	\$54.291	\$115.391	\$185.022	\$69.632
2002	\$324.642	\$388.127	\$63.484	\$129.237	\$212.611	\$83.374
2003	\$328.968	\$401.882	\$72.914	\$144.746	\$244.157	\$99.411
2004	\$333.351	\$415.936	\$82.585	\$162.115	\$280.212	\$118.096
2005	\$337.792	\$430.294	\$92.502	\$181.569	\$321.403	\$139.834
Total	\$2273.292	\$2,721.839	\$448.547	\$928.075	\$1,550.469	\$622.394

The third set of estimates assumes a one time policy change that ties the motor fuel tax rate to the CPI starting in 1999.²⁰ To do this, we assume that the tax rate is changed at the current rate of inflation (2.0%). These estimates are displayed in **Table 4-9**.²¹ As the table indicates, over the years 1999-2005, the increase in tax rate would create an additional \$188.203 million from the gasoline, LPG, and gasohol tax while an additional \$80.144 million from special fuels (diesel fuel) would also be produced.

²⁰ These estimates assume a price elasticity of demand of -0.1572 for gasoline and -0.6982 for diesel fuel and a perfectly elastic supply curve. The estimates also incorporate future price changes in motor fuels. Therefore, price changes were also estimated. To estimate the motor fuel price changes, the study assumes that price changes will continue to change at historical rates. Thus, the price changes are based upon trend analysis.

²¹ Once again, the revenue estimates do not include the 1.4 cents per gallon LUST tax.

**Table 4-9
Future Revenue Estimates
With a CPI Based Tax Rate**

YEAR	Gasoline, LPG, And Gasohol			Special Fuels (Diesel)		
	Trend Line Estimate of Revenue	Calculated Estimated Revenue National Tax Rate	Difference	Trend Line Estimate of Revenue	Calculated Estimated Revenue National Tax Rate	Difference
	Millions of Dollars			Millions of Dollars		
1999	\$312.004	\$318.244	\$6.240	\$91.989	\$93.828	\$1.840
2000	\$316.161	\$328.674	\$12.513	\$103.027	\$106.880	\$3.853
2001	\$320.374	\$339.587	\$19.213	\$115.391	\$121.933	\$6.542
2002	\$324.642	\$350.866	\$26.224	\$129.237	\$139.112	\$9.874
2003	\$328.968	\$362.524	\$33.556	\$144.746	\$158.717	\$13.971
2004	\$333.351	\$374.573	\$41.222	\$162.115	\$181.092	\$18.976
2005	\$337.792	\$387.026	\$49.234	\$181.569	\$206.628	\$25.058
Total	\$2273.292	\$2,461.495	\$188.203	\$928.075	\$1,008.189	\$80.114

Summary

The motor fuel tax is an important source of revenue for Kentucky's Road Fund. It represents nearly a third of the total revenue for the Road Fund. However, the motor fuel tax revenue growth, unlike other revenue sources, has been stagnant in recent decades due to:

- (1) a lack of a mechanism for tying the revenue stream to the changes in the overall prices of the economy, including changes in costs of maintaining the state's highway system, and
- (2) the lack of systematic changes in tax and fee policies to match the revenue stream to the needs and demand of the highway system.

This lack of growth could create a deterioration of the state's highway system. To address the issue of a stagnant growth of the motor fuel revenue stream, legislators have a number of policy possibilities. We highlighted two in this study:

- (1) systematically changing tax policies to match the revenue stream to the needs of the state's highway system, or
- (2) indexing the tax rates to the changes in the cost of maintaining the state's highway system by using the CPI.

Our analysis suggests that if a policy of systematically changing the tax rates to mimic the national average had been employed from 1989 to 1988, an additional \$583.550

million could have been created for the Road Fund over the ten year period. If a policy of tying the tax rate of motor fuels to the inflation rate had been implemented in 1989, an additional \$843.823 million of revenue could have been created for the Road Fund.

Revenue estimates were also projected for the future under three different scenarios:

- (1) A “Do-Nothing” Case Scenario. Under this scenario, it is projected that by year 2005, the Road Fund is projected to have \$1313.109 million of revenue. Of this \$1313.109 million, \$436.144 million, or about 33%, is derived from motor fuel taxes.
- (2) A National Tax Rate Scenario. Under this scenario, the motor fuel tax rate would be systematically adjusted to the National Average Tax Rate. This tax policy would create an estimated additional \$232.336 million of revenue for the Road Fund in year 2005 and a total estimated additional revenue of \$1,070.941 million for Road Fund in the years 1999 through 2005. This substantial additional revenue is largely the result of the large dispersion between the national average tax rate and the existing tax rate for the state of Kentucky.
- (3) A CPI Indexed Scenario. Under this scenario, the motor fuel tax rate would be tied to the inflation rate. This tax policy would create an estimated additional \$74.292 million of revenue for The Road Fund in the year 2005 and a total estimated additional revenue of \$268.317 million for Road Fund in the years 1999 through 2005.²²

²² This value is the sum of the additional revenue from special fuels (diesel fuels) gasoline, LPG, and gasohol over the years 1999-2005.

APPENDIX A

I. A BRIEF DESCRIPTION OF KENTUCKY'S MAJOR CURRENT ROAD FUND REVENUE SOURCES

Motor Vehicle Usage Tax: A usage tax is currently imposed on the sale or transfer of new or used motor vehicles at the rate of 6% of the vehicle's taxable value. The taxable value of a new car is 90% of the manufacturer's suggested retail price. The taxable value for used trucks and cars is the actual selling price.

Also, the "U-Drive-It" usage tax is an optional method for the payment of motor vehicles usage tax on rental or lease vehicles. To qualify for this optional tax payment method, a permit must be obtained from the Transportation Cabinet. This tax is 6% of gross rental or lease charges.

Motor Vehicle Usage Taxes make up the largest portion of the Road Fund, representing more than 45% of the total money deposited into the Road Fund.

Motor Fuel Taxes: These taxes are levied on gasoline, liquefied petroleum gas (LPG) and special fuels (predominately diesel fuel) sold for use in motor vehicles operated on public highways. These taxes make up approximately 27% of the Road Fund.

The current effective tax rate on gasoline and LPG is 16.4¢ /gal . The current effective tax rate on special fuels is 13.4¢. These rates are broken down as follows:

i) A 9% tax on the whole sale price of gasoline, LPG, and special fuels. However, for tax purposes, a minimum wholesale price of \$1.11 per gallon was established. Currently, wholesale prices are below \$1.11, thus creating an effective tax rate of 10¢ per gallon ($10¢ = 9\% \times \$1.11$). If wholesale price goes above \$1.11, then 9% is applied to the price to determine the tax per gallon.

ii) A supplemental tax of 5¢/gal. on gasoline and LPG and a supplemental tax of 2¢/gal. on special fuels. These taxes were enacted in 1986.

iii) A 1.4¢/gal. Petroleum Storage Tank Environmental Assurance Fee (or Lust Fee) for all three types of fuel. These monies are used to remove fuel storage tanks from motor fuel stations that are being converted to other uses.

Motor fuel dealers must pay these taxes on all fuel they receive.

Commercial motor carriers pay these motor fuel taxes on all fuel used in Kentucky regardless of where purchased. A cash refund may be obtained by a carrier who

purchases **more** motor fuel in Kentucky than uses when driving on roads in Kentucky. A carrier who purchases **less** motor fuel than the carrier uses in Kentucky must pay the above motor fuel taxes on the difference between the amount consumed and amount purchased in Kentucky.

In addition, commercial motor carriers pay a **gasoline** surtax of 2% of the average wholesale price, but not less than 2.2¢ per gal. They also pay a **special fuel** surtax of 4.7% of average wholesale price, with the minimum tax of 5.2¢ per gallon. This tax is again on the amount of fuel **used** in Kentucky.

Licenses, Fees and Permits: Registration fees for cars and light trucks are levied at the rate of \$12.00 annually. Commercial trucks are assessed a per vehicle registration fee based on the gross weight of the vehicles. These truck registration fees range from \$24 (on trucks weighing less than 6,000 lbs.) to \$1,260 annually (on trucks weighing more than 73,281 lbs.). A vehicle operator's license currently costs \$8.00 for a four-year basic license.

Weight-Distance Tax: The weight distance tax is assessed on trucks operating on Kentucky roads at declared weights of 60,000 pounds or more at a rate of 2.85¢ per mile.

Toll Road Receipts and Miscellaneous Revenues: Tolls are collected on four parkways in which the Commonwealth currently operates. Miscellaneous receipts for the Road Fund include investment income, sales of surplus property, fines and penalties, and various fees and rentals.

II. AN HISTORICAL TIMELINE OF KENTUCKY'S MOST NOTABLE TAX MODIFICATIONS THAT AFFECTED ROAD FUND RECEIPTS

1920: A 1¢/gal. gasoline tax was established. The 5th state to adopt a gasoline tax.

1926: The gasoline tax reached 5¢/gal.

1936: A \$4.50 state registration fee (plus 50¢ for the County Clerks) for passenger cars was enacted.

1938: A \$4.50 registration fee for farm trucks was enacted.

1944: A \$4.50 fee for church buses, water-well drillers, and certain wreckers was provided.

1948: The motor fuel tax was raised to 7¢/gal. The 2¢ increase went to rural and secondary roads.

1960: Kentucky became the 34th state to adopt a sales and use tax. The sale or transfer of new or used motor vehicles were included under this tax. The tax was 3% of the motor vehicles value determined by an automotive reference manual.

1962: The administration of the motor fuel tax was transferred from the Department of Revenue to the Department of Motor Transportation

1964: The General Assembly changed the truck registrations to a “gross weight” basis. Trucks with a gross weight of less than 18,000 lbs. had a basic registration fee only. Trucks with a gross weight exceeding 18,000 lbs. were required to pay an additional weight fee.

1968: Registration fees for passenger cars, farm trucks and the lightest trucks were raised to \$11.50.

Kentucky’s sales and use tax, including the motor vehicle usage tax, was increased from 3% to 5%.

1972: Motor fuel tax was increased to 9¢/gal.

1980: The motor fuel tax was changed from a unit tax per gallon to an excise tax on the average wholesale price per gallon at a rate of 9%.

1982: A minimum wholesale price of \$1.11 per gallon was established, thus creating a minimum effective tax rate of 10¢ per gallon (10¢ = 9% x \$1.11). If wholesale prices went above \$1.11, then 9% was applied to the price to determine the tax per gallon.

1983: The current motor vehicle registration fees were established (see above for more details). Also, the requirement that all operator vehicle licenses be renewed every 4 years was established.

A 3.5¢/gal. tax credit for gasohol was instituted.

1985: The General Assembly placed a 5% tax on motor vehicle leases and rentals.

1986: A supplemental tax of 5¢ per gallon on gasoline and LPG was enacted. This brought the effective total tax on gasoline and LPG to 15¢ per gallon because the wholesale prices never went above \$1.11. Also, a supplemental tax on special fuels (diesel) of 2¢ per gallon was enacted, and thus the effective total tax on special fuels became 12¢ per gallon.

A motor fuels surtax was imposed on commercial motor carriers. Motor carriers were required to pay a **gasoline** surtax of 2% of the average wholesale price, but not less than 2.2¢ per gal. Motor carriers were also required to pay a **special fuel** surtax of 4.7% of average wholesale price, with the minimum tax of 5.2¢per gallon.

The weight-distance tax on heavy trucks (60,000 lbs. or more) was replaced by a Supplemental Highway User Tax on heavy trucks.

1987: The Supplemental Highway User Tax was declared unconstitutional.

1988: The 3.5¢/gal tax credit for gasohol was allowed to sunset.

The point of taxation for special fuels was changed from the retail to the distribution level.

Also, in order to replace revenue lost when the Supplemental Highway User Tax was declared unconstitutional 1987, the General Assembly re-imposed the weight-distance tax. The Assembly also increased various licenses, fees and permits paid by heavy trucks (60,000 lbs. or more). These included a heavy vehicle fuel surtax of 2.0¢ per gallon on fuels consumed on Kentucky highways. This tax and fee package was coupled with a program of enhanced enforcement and auditing efforts designed to more effectively monitor travel and assure tax compliance.

1990: A 0.4¢/gal Lust fee was instituted. These monies are used to remove fuel storage tanks from motor fuel stations that are being converted to other uses. Thus, the effective tax rate increased to 15.4¢/gal for gasoline and 12.4¢/gal for diesel.

The rate for the motor vehicle usage tax was increased from 5% to 6%.

1994: The Lust tax was increased to 1.4¢. Thus, the effective tax rate increased to 16.4¢/gal for gasoline and 13.4¢/gal for diesel.

1996: The 2.0¢/gal. heavy vehicle surtax that was imposed in 1988 was allowed to sunset to comply with a federal mandate. The Intermodal Surface Transportation Efficiency Agreement of 1991 (ISTEA) required that all states become participants in the International Fuel Tax Agreement (IFTA) by September 30, 1996. The conditions for membership in IFTA prevented Kentucky from continuing to impose the heavy vehicle fuel surtax. The General Assembly partially replaced the revenue from this tax by changing the definition of vehicles subject to the motor fuels surtax first instituted in 1986 on commercial motor carriers to include two axle-trucks.

1998: General Assembly enacted the current Motor Vehicle Usage Tax System (see above for details). Prior to this change, a motor vehicle's taxable value was determined by an automotive reference manual.

Sources: **Tax Facts: A Digest of Kentucky Tax Laws**, Commonwealth of Kentucky, REVENUE CABINET, 1998

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APPENDIX B: Methodology for Estimating Price Elasticities

The estimation of the price elasticities for gasoline, LPG, and gasohol and special fuels (diesel fuel) is based on a continuous dynamic model of demand presented in “Consumer Demand in the United States: Analysis and Projections,” H.S. Houthakker and Lester D. Taylor. In this book the authors derive demand equations for 82 different commodities.

Houthakker and Taylor’s model expresses and postulates a particular type of relationship between past and present demand behavior. The idea is that the effect of past behavior on current decisions is assumed to be represented entirely by the current values of certain “state variables.” The basic demand equation for a good using this dynamic continuous model is¹:

$$q_t = \alpha + \beta s_t + \gamma x_t + \eta p_t + \mu_t,$$

where q_t is an individual’s demand for the good during a very short time interval around t ; s_t represents the state variable at time t ; x_t is the person’s income during that interval; and p_t is the price of the good. The state variable, s_t , could either be the inventory of the good at time t if the good is durable or it could represent habit formation or inertia if the good is a nondurable.

In order to estimate the parameters of the above equation from annual data, the continuous model must be approximated by a model involving a discrete interval of time. Houthakker and Taylor show that the continuous model can be approximated by the following finite discrete model²:

$$q_t = A_0 + A_1 q_{t-1} + A_2 \Delta x_t + A_3 x_{t-1} + A_4 \Delta p_t + A_5 p_{t-1} + v_t$$

where $\Delta x_t = x_t - x_{t-1}$ and $\Delta p_t = p_t - p_{t-1}$. The above equation is estimated by Ordinary Least Squares (OLS).

They also show (apart from estimating errors)

$$\alpha = (2A_0(A_2 - (1/2)A_3))/A_3(A_1 + 1)$$

$$\beta = (2(A_1 - 1))/(A_1 + 1) + A_3/(A_2 - (1/2)A_3) + A_5/(A_4 - (1/2)A_5)$$

$$\gamma = 2(A_2 - (1/2)A_3)/(A_1 + 1)$$

¹ Different mathematical forms for the demand equation besides this linear one could be used. Houthakker and Taylor (1970) suggested semi-logarithmic, double logarithmic and inverse semi-logarithmic functions. However, as they mention, their dynamic continuous model is compatible only with a linear demand function, and that is why it is used here.

² Houthakker, H.S. and Taylor, pgs 3-23

$$\eta = 2(A_4 - (1/2)A_5)/(A_1 + 1).$$

Based on these estimates, three price elasticities for different time periods can be derived; 1) instantaneous, 2) one-year, and 3) long-term elasticities. The equations for these elasticity estimates, calculated at the means of the respective variables, are as follows.

$$\text{Instantaneous} = (2(A_4 - (1/2)A_5)/(A_1 + 1)) * (\bar{p}/\bar{q})$$

$$\text{One-Year} = A_4 * (\bar{p}/\bar{q})$$

$$\text{Long-Term} = (A_5/(1-A_1)) * (\bar{p}/\bar{q})$$

where \bar{p} and \bar{q} are mean price and quantity, respectively.

Only the one-year elasticity estimate was statistically significant for gas and only the long-term elasticity estimate was significant for diesel. Therefore, in the body of the paper when we derived the historical estimates for revenue using different tax rates, we used the one-year elasticity for gas and the long-term elasticity for diesel.

A potentially major problem associated with this approach is when estimating the finite discrete equation above we regress quantity on price, and thus there may be a simultaneity problem. In order to test if a simultaneity problem exists, we applied the Hausman Specification Test to the model.³ We found that there is no significant simultaneity problem.

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