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16. Abstract

Most states collect the majority of transportation revenues from sources such as fuel taxes and vehicle registration fees, while relying on the federal government via the Federal Highway Trust Fund (HTF) for additional monies. More often than not, fuel taxes have proven the most resilient source of revenue, yet concerns over increasing fuel efficiency eroding this traditional source of revenue have magnified funding concerns. When examining total revenues adjusted for inflation, most states saw little or no growth in total revenues from 1995 through 2012. Additionally, the HTF has run a deficit in recent years and legislators have utilized general funds to replenish it, leaving future federal funding levels uncertain. Revenue alternatives examined in the literature included vehicle miles travelled fees (VMT fees), tolls, and public private partnerships. The feasibility of implementing an alternative revenue source is likely to depend upon public acceptance. Various surveys that were conducted are summarized on a number of alternative revenue options. Public opinion was often driven by a perception of benefits received, and many options, including tolling, received majority support. Current legislative initiatives are briefly discussed including fees for electric and hybrid vehicles, tolls, and an increased emphasis on local government involvement in transportation. Based on the public opinion surveys reviewed and the alternative revenue options, there are several steps that states may consider. Conducting public outreach to gauge various revenue options will assist in implementation and public understanding of new revenue regimes, should they be deemed necessary. Pilot projects to test various administrative methods for a chosen revenue alternative will also assist in determining an alternative's viability and potential administrative costs. At the very least, it would be prudent for states to consider potential revenue alternatives to fund the transportation infrastructure of the future.

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LTRC appreciates the dedication of the following Project Review Committee Members in guiding this research study to fruition.

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Southeast Transportation Consortium

The RAC Region II has initiated a collaborative research program consortium through the Transportation Pooled Fund (TPF) Program. The research program is called the Southeast Transportation Consortium (STC) and is intended to encourage coordination among member states, as well as provide resources and management of collaborative studies. The Consortium intends to address high priority transportation research topics of common interest to the southeastern and adjoining states. Louisiana serves as the lead agency in the STC.

STC Synthesis of Transportation Funding Sources and Alternatives in the Southeastern States Now and in the Future

by

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Southeast Transportation Consortium
Louisiana Department of Transportation and Development
Louisiana Transportation Research Center

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EXECUTIVE SUMMARY

In recent years, the demand for reliable transportation access has increased, but this has been accompanied by rising uncertainty over funding availability. The precarious fiscal situation facing many states has ratcheted up pressure on transportation funding regimes. Most states collect the majority of transportation revenues from sources such as fuel taxes and vehicle registration fees, while relying on the federal government via the Federal Highway Trust Fund (HTF) for additional monies. More often than not, fuel taxes have proven the most resilient source of revenue, yet concerns over increasing fuel efficiency eroding this traditional source of revenue have emerged. Additionally, the HTF has run a deficit in recent years and legislators have utilized general funds to replenish it, leaving future federal funding levels uncertain.

Due to these issues, there is an urgent need to examine current transportation funding sources to determine if they are sufficient to meet current and future transportation revenue needs. Proposals for alternative revenue and financing mechanisms must be pragmatic and balance a multitude of issues to ensure the recommended models can 1) be realistically implemented in current political environments and 2) remain sustainable in both the near- and intermediate-terms. This synthesis study examines these issues, presents potential alternative revenue sources, and gauges the prospects of implementation.

Current revenue structures for the southeastern states are comprised largely of fuel taxes, motor vehicle and motor carrier registration fees, and federal transfers, such as the HTF. Other current revenue sources include state imposts such as sales taxes, tolls, and general fund appropriations. Categories were drawn from the Federal Highway Administration (FHWA) for ease of comparison and consistent classification. States were compared for each category on a per capita basis, because revenues in Florida, for example, will be quite different from those in Kentucky. This facilitates comparisons between the southeastern states. When examining total revenues adjusted for inflation, most states saw little or no growth in total revenues from 1995 through 2012. In the face of increasing construction costs, this reduces the purchasing power of each dollar. Short term forecasts were also conducted, assuming no changes in revenue structures were made, and the results indicated the revenue shares derived from each source as well as total revenues were unlikely to change significantly in the next five years.

Literature that was reviewed indicated that current revenues were not sufficient to maintain or expand the transportation system. As a result, a number of alternative revenue options were examined. The most common revenue alternatives for transportation discussed in the literature were vehicle miles travelled fees (VMT fees) and tolls. VMT fees could be calculated a number of different ways, from onboard GPS devices to odometer readings. Drivers would then be charged a fee for each mile driven, and in the case of more advanced technology, could be charged based on the time of day and level of congestion. Such advanced technology could potentially reduce congestion by encouraging trips at off-peak times. Tolling could also be implemented in a similar way, with variable pricing options such as high occupancy toll lanes or congestion pricing, although enabling legislation may be required. Tolls can be collected electronically via prepaid transponders or traditional toll booths.

The feasibility of implementing an alternative revenue source is likely to depend upon public

acceptance. Various surveys that were conducted are summarized on a number of alternative revenue options. Public opinion was often driven by a perception of benefits received, and many options, including tolling received majority support. Current legislative initiatives are briefly discussed including fees for electric and hybrid vehicles, tolls, and an increased emphasis on local government involvement in transportation. Based on the public opinion surveys reviewed and the alternative revenue options, there are several steps that states may consider when determining the viability of alternative revenue sources. Conducting public outreach to gauge various revenue options will assist in implementation and public understanding of new revenue regimes, should they be deemed necessary. Pilot projects to test various administrative methods for a chosen revenue alternative will also assist in determining an alternative's viability and potential administrative costs. At the very least, it would be prudent for states to consider potential revenue alternatives to fund the transportation infrastructure of the future.

INTRODUCTION

Study Overview

While the demand for access to reliable transportation has increased in recent years, at the same time uncertainty over funding availability has mounted. The National Surface Transportation Policy and Revenue Study Commission of 2007 found that to reach an adequate level of funding to improve conditions and meet future demand, investments of up to $766 billion through 2055 would be required. The American Society of Civil Engineers' *Infrastructure Report Card of 2013* graded the condition of the United States' roads as a D and noted a funding shortfall of $80 billion annually; without closing this gap there were few prospects for correcting infrastructure deficiencies. This same report assigned bridges a grade of C+, with annual investment needs of over $20 billion. The American Society of Civil Engineers *Failure to Act Economic Impact Report* (2011) on surface transportation identified a funding gap estimated at $94 billion per year through 2020. Lacking additional investments, the report estimates that the U.S. would lose 877,000 jobs and increase transportation costs for businesses and individuals by over $430 billion. These impacts would result in economic losses through lower exports and reduced Gross Domestic Product. These reports highlight a shortfall in transportation funding in the United States and many states have dealt with fiscal issues that has ratcheted up pressure on numerous transportation funding regimes. Economic pressures, combined with increasing vehicle fuel efficiency, have thrown into question whether it is still viable to fund roadways through fuel tax revenues. Additional funding concerns center on the Federal Highway Trust Fund (HTF), which serves as funding source for various road construction projects and has run a deficit in recent years.

In light of these developments, it is important to comprehensively report on current transportation funding sources and examine alternative revenue and financing mechanisms to replace or supplement current funding sources that have become unsustainable. Proposals for alternative revenue and financing mechanisms must be pragmatic and balance a multitude of issues to ensure the recommended options are acceptable to taxpayers and feasible to implement. The purpose of this research synthesis is to report on current revenue sources and possible alternative funding mechanisms. This knowledge is critical for the planning and decision-making processes that will shape the future of the U.S. transportation system, and will provide the foundation upon which policymakers can develop innovative strategies to keep all critical transportation assets operational.

Research Objectives

The objectives of this synthesis study are to identify current funding sources for transportation systems; examine the effects of any pending or proposed changes in revenue structures; and to identify alternative funding mechanisms that would be most beneficial and successful once implemented in states located in the Southeast U.S. What follows is a list of the study's primary research tasks:

1. Identify and catalogue current funding sources used by the southeastern states for transportation purposes, including a matrix of transportation funding options that are used

in different states.

2. Develop forecasts of current revenue sources and discuss factors that will impact current revenue sources now and in the future.

3. Summarize research studies on alternative transportation revenue strategies including implementation of those options and benefits and concerns for each source identified.

4. Summarize public surveys about alternative revenue sources to determine if they are viable and report on legislative action regarding current and alternative revenue sources.

5. Discuss recommendations for consideration and implementation of alternative revenue sources.

Structure of the Report

This study begins with an analysis of the current transportation funding mechanisms used by southeastern states and forecasts of future revenues from those current sources. We also investigate proposed or pending shifts in funding strategies that have been developed in response to declining real revenues. This research synthesizes the current state of transportation funding in the Southeast U.S., discusses the most promising alternative funding structures, and summarizes public opinion on whether alternative methods are appropriate for widespread use throughout the region. It is important to emphasize the non-normative nature of our research. The end goal *is not* to prescribe solutions to resolve transportation funding deficits. Rather, it objectively reviews the current status of transportation funding in the Southeast U.S. and identifies *possible* alternative means of funding. The basic structure of the report is as follows: a review of federal transportation revenues, state transportation revenues and projections under current funding regimes, literature review of transportation needs and alternative revenue options, identification of any proposed or potential changes to funding sources, implementation potential based on public opinion, and a conclusion that outlines policy implications.

BACKGROUND AND CURRENT STATE FUNDING STRUCTURES

Currently, most states fund transportation infrastructure and assets through some or all of the following revenue means: (1) user fees, (2) fuel taxes, (3) miscellaneous income, (4) bonds, (5) federal government transfers, (6) local government revenues, and (7) general funds (Eger and Hackbart, 2001). More often than not, fuel taxes have proven to be the largest and most consistent source of revenue (Penner et al., 2006). Fuel taxes are easy to administer, protect privacy, and minimize evasion (Whitty, 2007). Still, the current system, which consists mostly of fuel taxes and registration fees, tolerates congestion costs imposed on drivers and infrastructure and does not charge users based on the costs they impose by using transportation infrastructure (Transportation Research Board, 2006). Burwell and Puentes (2009) identify several challenges facing fuel taxes moving forward – the loss of purchasing power from non-indexed fuel taxes, a lack of specific services being financed by users (funding for other transportation projects, etc.), and fuel taxes not charging equally based on miles travelled due to varying fuel efficiency. As fuel efficiency standards increase and alternative fuel vehicles such

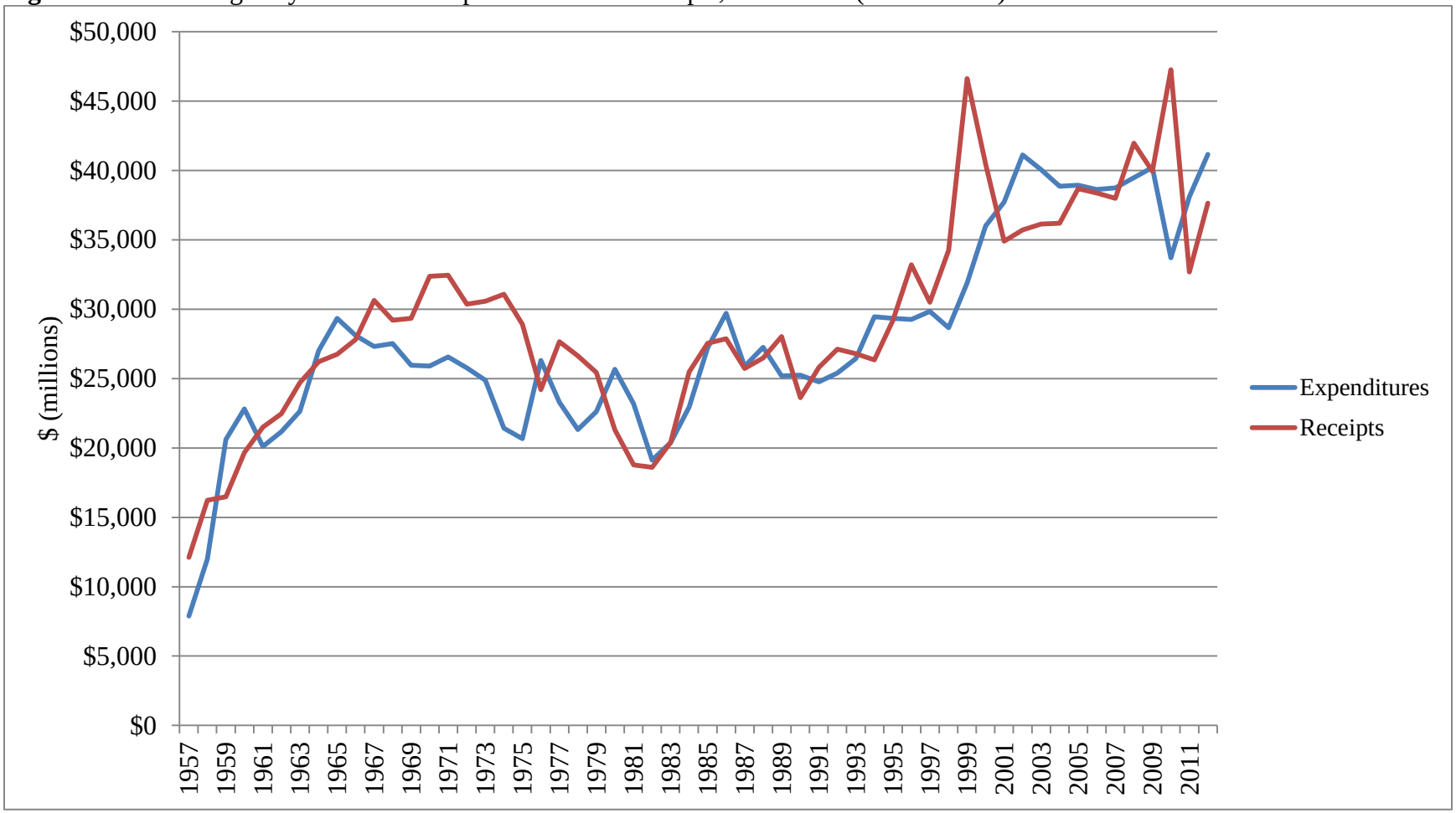
as electric and plug-in hybrids that require little or no fuel (and thus contribute less in taxes) become more popular, fuel tax collections will continue to suffer (Ang-Olson, Wachs, & Taylor, 2000). This is already apparent in tax revenue trends. Growth has slowed in recent years compared to other revenue sources such as registration fees, likely driven by increasing fuel efficiency, economic issues, and alternative fuel vehicles. Fuel tax revenue has been relatively stable over the last 50 years, with notable exceptions in the late 1970s and early 1980s. With the recent downturn in the economic fortunes of the U.S., many states have had to contend with declining revenues from sources traditionally dedicated to transportation (Vock, 2010). Most states have not responded by increasing fuel taxes; instead, they made up revenue shortfalls by utilizing federal stimulus money to fill gaps in transportation budgets or funded new projects by issuing bonds, which in turn raise the overall debt burden of states (Slone, 2010). While raising fuel taxes is one possible remedy, there is concern that a significant increase could reduce travel, thereby offsetting additional revenue collected on fuel that is sold (Penner et al., 2006). Many state leaders have found that voters politically disapprove of raising fuel taxes, although both Vermont and Wyoming raised their state fuel taxes in 2013 (Council of State Governments, 2013). Concerns surrounding the future reliability of the HTF have added another layer of funding uncertainty for states.

Federal Highway Trust Fund

The HTF serves as funding source for various road construction projects. The HTF is funded by a federal fuel tax of 18.3 cents per gallon on gasoline and 24.4 cents per gallon on diesel fuel, as well as taxes on tires, truck and trailer sales, and heavy vehicle use. It contains three accounts: the Highway Account for funding road construction, the Mass Transit Account, and the Leaking Underground Storage Tank Trust Fund. Since 2008, this fund has often run a deficit, requiring that general funds be used to replenish it (GAO, 2013). It is unclear whether this model of replenishment is sustainable over the long term, and lacking a secure source of federal funding, many states are looking at their own funding sources for sustainable ways forward (Council of State Governments, 2013)

The issues surrounding the HTF are examined first. Although, the HTF is not own-source revenue, as part of all states' revenue streams, it is still an important piece of transportation funding. In recent years, the fund has disbursed over $30 billion annually to states for highway and transportation spending (GAO, 2009-b). Figure 1 shows HFT expenditures and receipts from 1957 through 2012, in 2012 dollars.

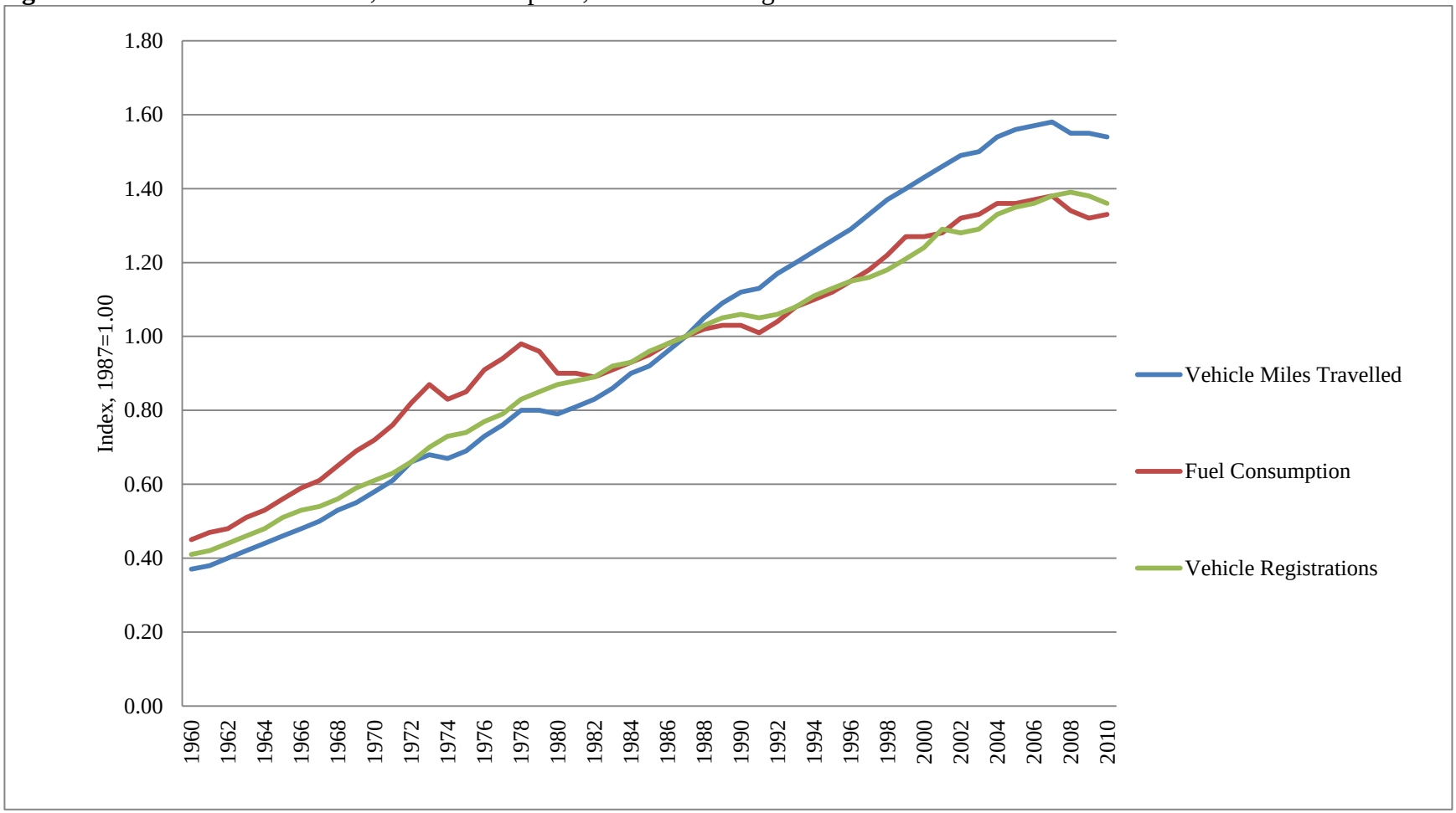
Figure 1: Federal Highway Trust Fund Expenditures and Receipts, 1957-2012 (2012 dollars)



Source: Federal Highway Administration, Table FE-210

As noted in Figure 1, HTF outlays have exceeded revenues in recent years, partly as a result of a nationwide trend of lower fuel tax revenues due to more fuel efficient vehicles, alternative-fuel vehicles, changing driving habits, and a weak economy. Moreover, the tax has not been adjusted for inflation since 1993, reducing tax dollars' purchasing power (Burwell & Puentes, 2009). If simply adjusted by the Consumer Price Index, the tax today would be approximately 30 cents per gallon. As forecasts of motor fuel consumption in the Energy Information Administration's *Annual Energy Outlook* (Table A2) indicate declines through 2040, concerns have emerged about the impacts the HTF will suffer (Transportation Research Board, 2003). Increases in fuel prices have been shown to drive increases in fuel economy as well (Allcott & Wozny, 2010; Busse et al., 2009; Klier & Linn, 2010). These increases in fuel economy could result from the use of more fuel-efficient vehicles, federal standards such as Corporate Average Fuel Economy (CAFE) and/or from a reduction in the number of trips. Underlying the level of fuel tax receipts is the level of fuel consumption and the tax rate. The number of vehicles on the road and number of miles travelled drive the amount of fuel consumed. Thus it is prudent to, at a minimum, examine national trends as these measures may illuminate future revenue trends both nationally and at the state level. Statistics are compared on an aggregate basis (measured as indices, base year=1987) across the U.S. from 1960 through 2010 in Figure 2.

Figure 2: Vehicle Miles Travelled, Fuel Consumption, and Vehicle Registrations in U.S.



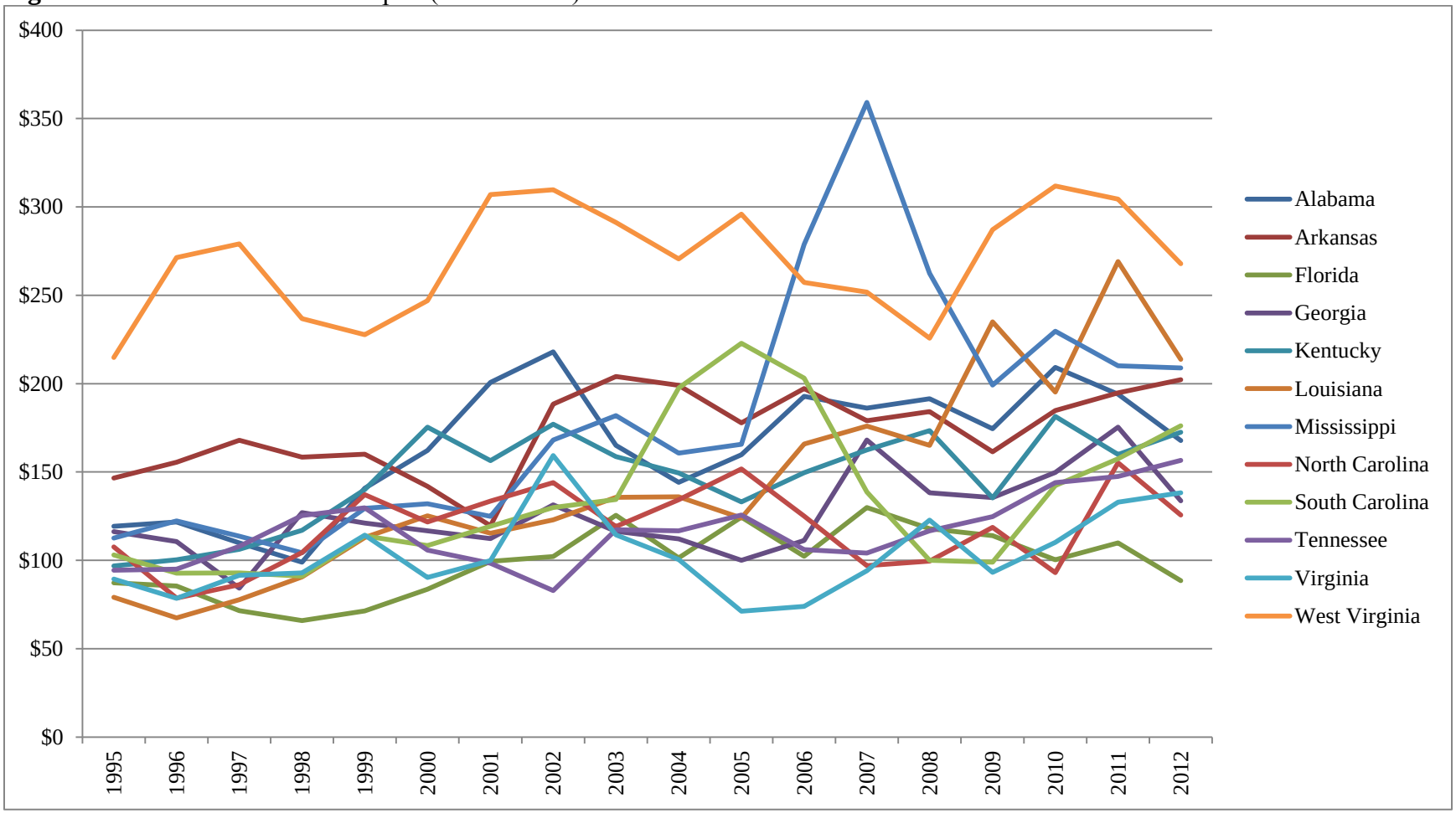
Source: FHWA, Office of Highway Policy Information, *Highway Statistics Series*, Chart RC-1C

Until 2008, each of these categories showed a steady upward climb; since then all three have leveled off or slightly declined. These changes have led to lower fuel consumption, which in turn reduces fuel tax receipts. Fuel tax rates can be modified to compensate for these changes, but it is unclear if these adjustments will preserve the fuel taxes' long-term viability. Additional pressures on funding, both for the HTF and state funds, stem from inflation in construction and asphalt costs (Slone, 2009). In many ways, these issues mirror the problems facing the states, as reliance on motor fuel taxes is likely to become more precarious in the future.

Figure 3 presents federal transfers per capita by state as reported by the FHWA[1]. Since 1995, there has been a general upward trend in transfers. However, the issues facing the HTF make a continued reliance on federal funding uncertain. Mississippi and Louisiana saw increases in the years after Hurricane Katrina in the form of FHWA Hurricane Katrina Emergency Relief Funds. From September of 2005 through July of 2009 Mississippi received over $1 billion in funds. From September of 2005 through January of 2012, Louisiana had been allocated over $1.3 billion in relief funds (Kirk, 2012). Most states also saw increases from 2009 to 2010/2011, due to stimulus funds from the American Recovery and Reinvestment Act. Still, the majority of federal transfers to the states come via the HTF, although the totals reported are cumulative from the federal government. Additional federal transfers may be attributed to the Federal Transit Administration, National Highway Traffic Safety Administration, and Army Corps of Engineers. Across all states, these other federal transfers comprise around five percent of the federal transfer total.

[1] A discussion of FHWA data is included in the State Revenues section.

Figure 3: Federal Transfers Per Capita (2012 dollars)



Source: FHWA, Office of Highway Policy Information, *Highway Statistics Series*, Table SF-1; Census Bureau's Annual Estimates of the Population of the United States

State Revenue Sources

FHWA's *Highway Statistics Series* provides centralized data useful for examining national and state revenue sources. The FHWA reporting requirements give states leeway to report data for either the calendar year or the state's fiscal year. This may create some discrepancies depending on the reporting methods used, particularly since the FHWA does not list states' reporting year choices. However, the data are reported in a consistent format, and with a longer time frame, compared to the amount of detail that is in the state level budget data. In addition, states also vary in reporting department-wide revenue versus highway revenue. These variations leave FHWA-reported data as our preferred source for reporting historical revenues. However, due to a number of factors we will identify, some modifications are made in order to forecast future revenues from the identified sources. The revenue sources examined here are categorized by the FHWA on an annual basis in the *Highway Statistics Series* Table SF-1 as "Revenues used by States for Highways." This includes highway-user revenue and other revenues dedicated for highways and mass transit purposes. In some cases, categories were aggregated – federal transfers represent one instance of this. The categories reviewed here include motor fuel taxes, motor vehicle and motor carrier taxes, tolls, general fund appropriations, other state imposts, miscellaneous, bond proceeds, federal transfers (from FHWA and other agencies), and local transfers. Each category is reviewed, and revenues are compared across southeastern states on a per capita basis to gauge revenue levels in recent years. All dollar amounts are reported on an inflation adjusted basis in 2012 dollars. After reviewing each revenue classification, we finish by reporting total revenues per capita.

State funding structures rely on many of the same revenue sources, such as fuel taxes and vehicle registration fees, yet the overall composition of transportation funding varies across states. Beginning with fuel taxes, we examine the main revenue sources and compare them across the southeastern states. First, we provide a broad overview of revenue sources in Table 1, we then report a more detailed data breakdown. A regression model assists with estimating future revenues from these sources. These projections shed light on the continued reliance on current funding regimes and provide some indication as to the necessity of proposed funding changes.

Table 1, compiled by the National Conference of State Legislators, lists current funding sources and indicates which states have opted into each. This matrix provides a summary of the revenue sources that the southeastern states rely on to fund transportation. Revenues that do not fall into one of the defined columns are listed individually in the "Other" column. All southeastern states use a fuel excise tax, with several also having sales taxes on fuel. Vehicle registration, license, or title fees are also a popular revenue source for southeastern states. With the exception of Mississippi, Florida, and North Carolina, every state relies on general fund appropriations as a funding source for transportation. However, this alone does not indicate funding levels are insufficient, as states may choose to allocate additional funds to transportation during the budgeting process.

Table 1: Use of State Revenue Sources for Surface Transportation

	Fuel Taxes	Fuel Sales Tax	Motor Vehicle/Rental Car Sales Tax	Vehicle Registration, License or Title Fees	Vehicle or Truck Weight Fees	Traffic Camera Fees	Tolls	General Funds	Interest Income	Other
Alabama	x			x	x			x	x	Vehicle inspection fees; advertising revenues; impact fees
Arkansas	x		x	x	x			x	x	Ad valorem tax; impact fees
Florida	x		x	x		x	x		x	Documentary stamp revenue; congestion pricing; impact fees
Georgia	x	x			x	x	x	x	x	Impact fees
Kentucky	x		x	x	x			x	x	Licenses, permits, or fees; weight-distance tax
Louisiana	x			x	x	x	x	x	x	Licenses, permits, or fees
Mississippi	x			x	x				x	Contractor's tax; lubricating oil tax; locomotive fuel tax
North Carolina	x		x	x	x	x	x		x	
South Carolina	x			x			x	x		Impact fees
Tennessee	x	x		x	x					
Virginia		x	x	x	x	x	x	x	x	Sales tax; congestion pricing; impact fees
West Virginia	x	x	x	x			x	x		Highway litter control fund; impact fees

Source: National Conference of State Legislators (2011), Table 6, p. 28

Fuel Taxes

Given that fuel taxes[2] are the most widely used source amongst the southeastern states, our analysis first focuses on this revenue source. Fuel taxes have served as a primary funding source for state transportation departments for many years, in part because they have proven a stable, reliable funding source. However, the issues facing the HTF noted in the previous section are also applicable to state fuel taxes.

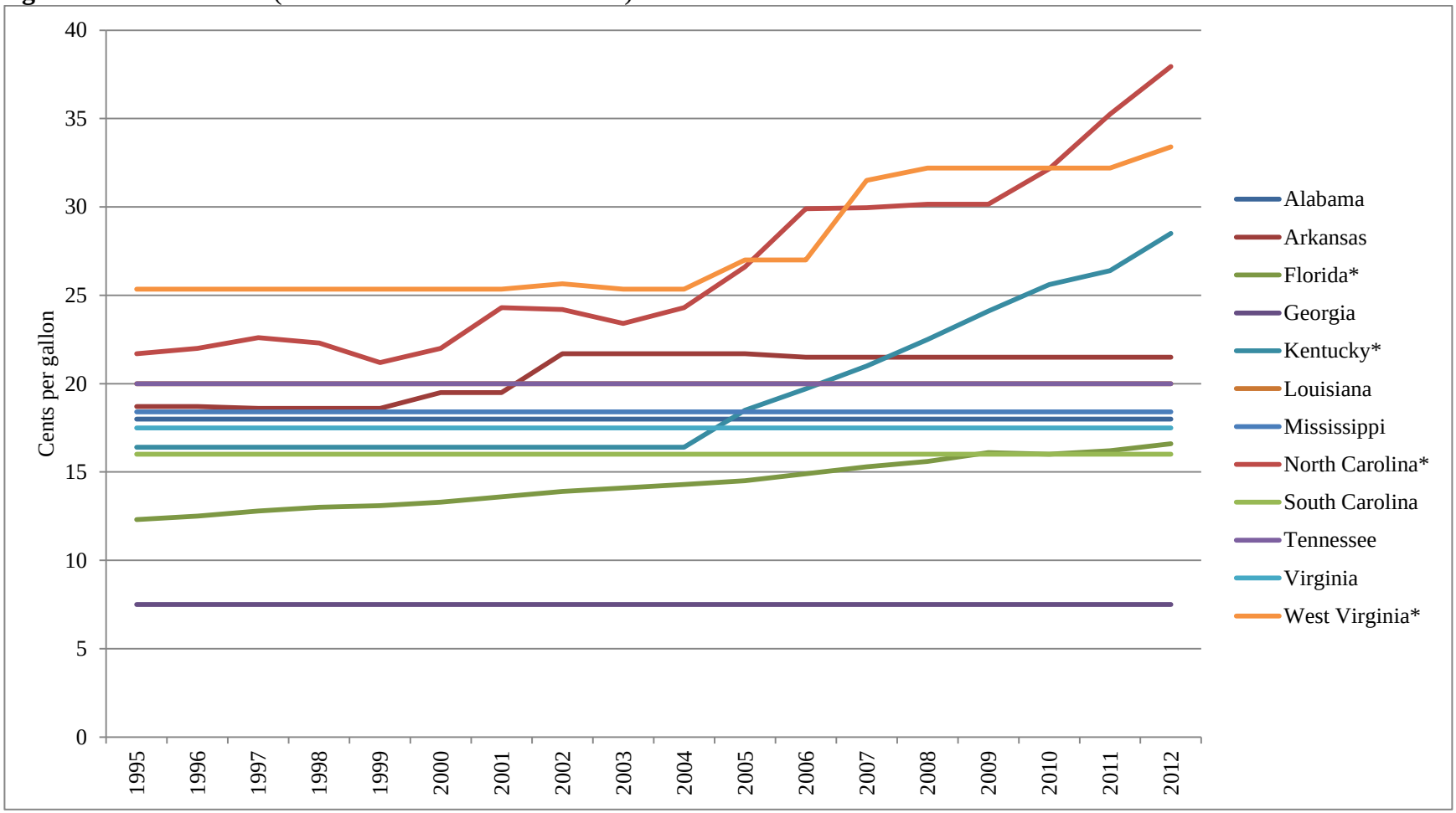
Tax rates modestly vary between states. Gas tax rates are shown in Figure 4[3] from 1995 through 2012. The FHWA only reports excise taxes, so any additional taxes on the sale of motor fuels are not included in these measures. Excise taxes are a tax levied on a gallon of fuel, while sales taxes are levied as a percentage of the purchase price. As of 2012, North Carolina has the highest gas excise tax rate at 37.95 cents per gallon, while Georgia has a region-low rate of 7.5 cents per gallon. The average excise fuel tax rate for all 50 states is 21.63 cents per gallon.

The difference in Georgia's rate is due to its use of sales taxes to complement its gas excise tax. Georgia's taxes include an additional three percent gas tax and one cent sales tax that is imposed by Georgia on a weighted average indexed retail sales price. According to Clarke, Brown, and Hauer (2010), the effective rate in Georgia in 2008 was approximately 21.2 cents. In 2013, Virginia replaced its 17.5 cent per gallon excise tax with a 3.5 percent wholesale tax on gas and six percent on diesel.

[2] Fuel taxes include both gasoline and diesel. We report gas tax rates as they constitute the majority of fuel tax revenues, although the revenue reported is inclusive of both.

[3] Louisiana and Tennessee had the same rate at 20 cents, so it appears as though Louisiana is not included.

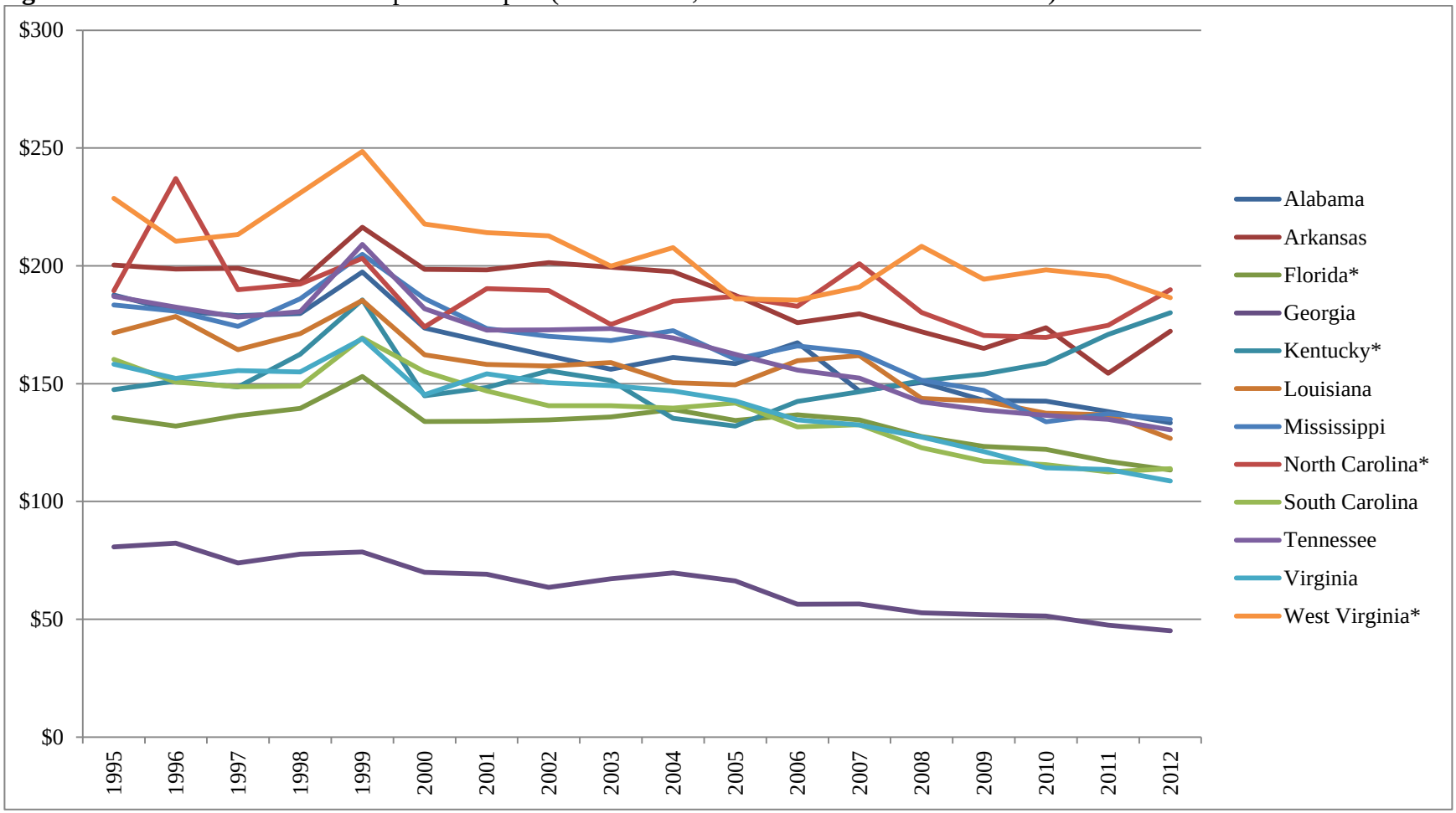
Figure 4: Gas Tax Rates (* indicates indexed for inflation)



Source: FHWA, Office of Highway Policy Information, *Highway Statistics Series*, Table MF-205

Figure 5 shows motor fuel tax receipts per capita by state from 1995 through 2012 on an adjusted net basis, as reported by the FHWA. Using per capita amounts allows for a more accurate comparison across states by accounting for differences in revenues due to population. Receipts include all forms of fuel tax, including gas and diesel. However, the majority of receipts come from gas taxes. As a result, receipts correspond fairly closely to the tax rates in Figure 3. States where tax rates have increased, such as West Virginia and North Carolina, remained among the highest grossing states over the time period. Several states have raised gas taxes during this period, and indexing has become an option that automatically adjusts rates to account for inflation. Many of these rate changes occur annually, as rates are indexed to inflation or the wholesale price of fuel. Florida's gas tax is tied to the Consumer Price Index. Kentucky, North Carolina, and West Virginia's tax rates are linked to the wholesale price of fuel. Figures 4 and 5 indicate that these states index their tax rates. Indexing is a measure that can provide short term revenue stability (Costa, Plotnikov, & Collura, 2013). As of 2012, North Carolina and West Virginia were the top states in fuel tax revenues per capita. Since the FHWA classifies fuel sales taxes outside of motor fuel tax receipts, Georgia obviously remains at the low end of tax receipts. Fuel sales taxes are included in the category "Other State Imposts," discussed in a subsequent section.

Figure 5: Net Motor Fuel Tax Receipts Per Capita (2012 dollars, * indicates indexed for inflation)

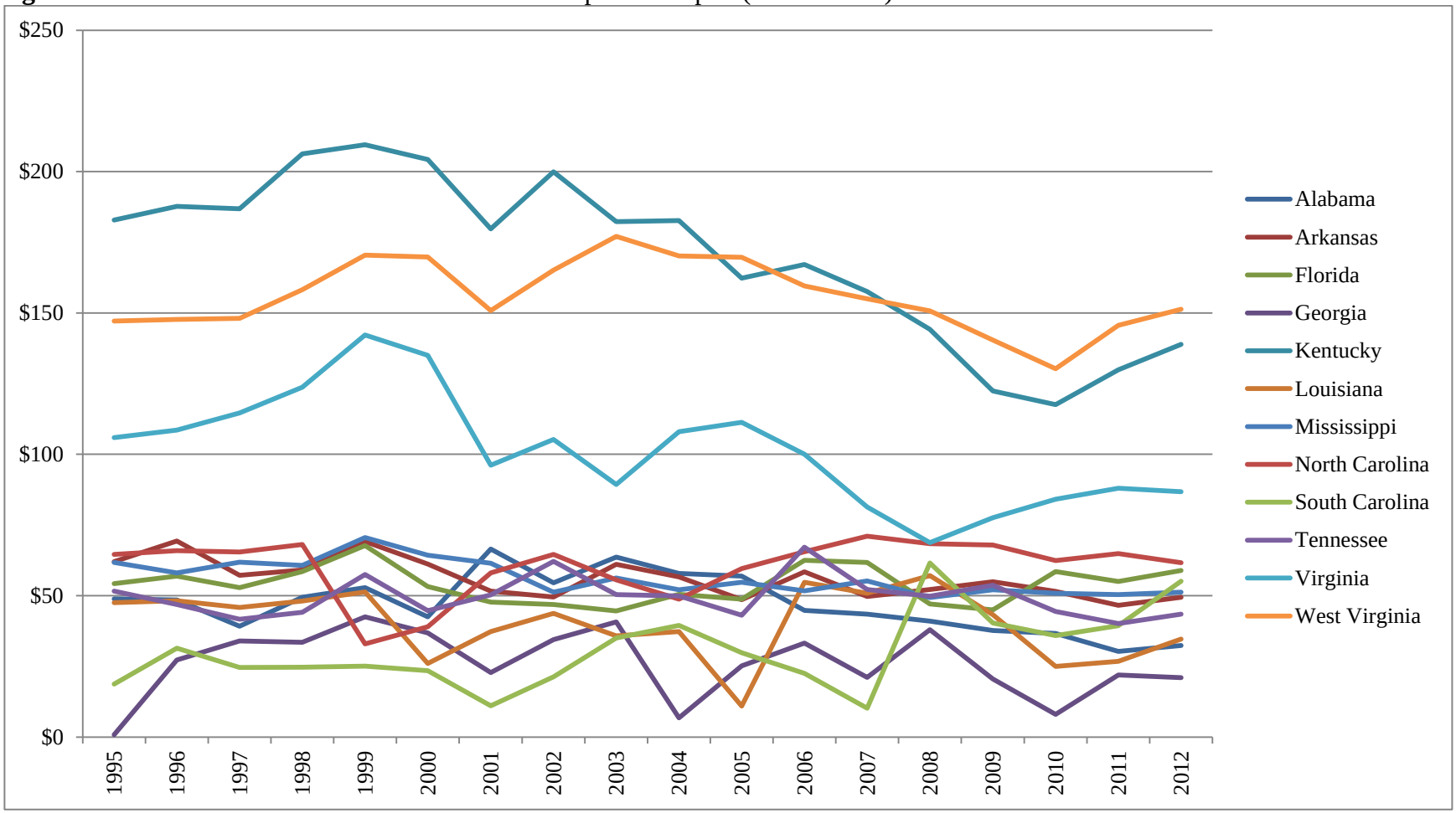


Source: FHWA, Office of Highway Policy Information, *Highway Statistics Series*, Table MF-1; Census Bureau's Annual Estimates of the Population of the United States

Motor Vehicle and Motor Carrier Taxes

A second major category of user fees recognized by the FHWA is motor vehicle and motor carrier taxes. These generally consist of various registration and licensing fees, such as drivers' licenses, title fees, and standard vehicle registrations. Figure 6 shows the per capita totals in this category from 1995-2012. They also include other sources such as Kentucky's weight-distance tax and special title taxes; with these additional sources Kentucky was one of the highest grossing states in this category. Kentucky's "special title tax" is a motor vehicle usage tax, which is levied the first time a vehicle is registered in Kentucky and when there is a transfer of ownership. The Motor Vehicle Usage Tax is assessed at a rate of six percent of the retail price of vehicles, with credits allowed for similar taxes paid to another state. For new vehicle purchases, a notarized affidavit of the purchase price is submitted for calculation of the tax. If an affidavit is not available, 90 percent of Manufacturer's Suggested Retail Price (MSRP) is used. For used vehicle purchases, the total consideration paid (trade-in credits are allowed) is used if a notarized affidavit is present. If a notarized affidavit is not available, the price comes from a reference guide as prescribed by the Department of Revenue. A minimum fee for used vehicles is collected, which is the six percent rate assessed at no less than 50 percent of the price as listed in the reference guide. Kentucky's weight distance tax is defined by Martin, Bell, and Walton (2013): "In addition to the fuel consumption taxes paid, companies with vehicles licensed for 60,000 lbs. or more file a separate tax return (KYU or weight-distance tax), which assesses 2.85 cents for each mile operated on Kentucky public highways by those specific vehicles" (p.1). In Louisiana, the sales tax on vehicle sales is currently diverted to the general fund, but may be dedicated to transportation around 2021. Generally, the revenues derived from motor fuel taxes exceed those from motor vehicle and motor carriers.

Figure 6: Motor Vehicle and Motor Carrier Tax Receipts Per Capita (2012 dollars)



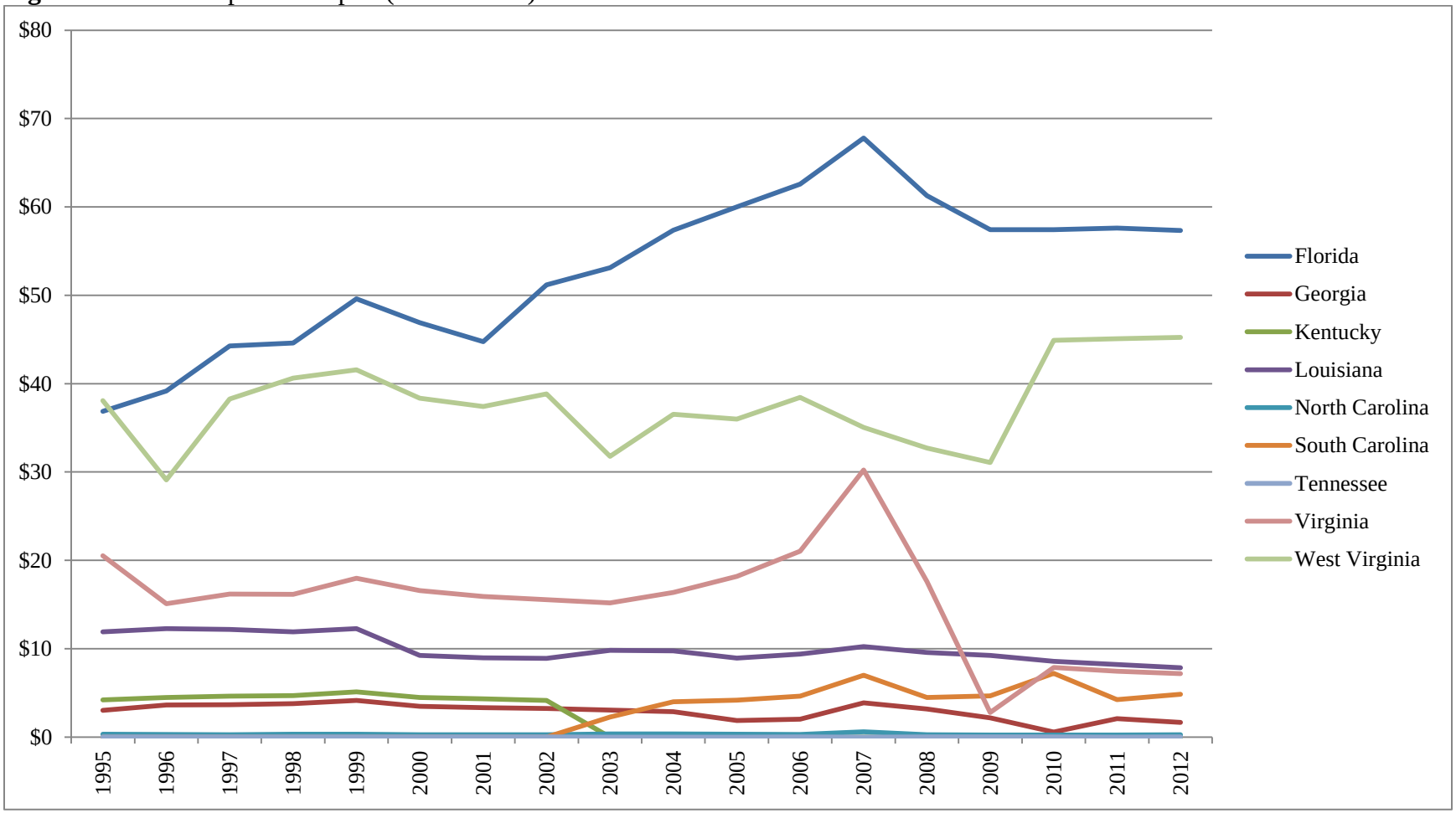
Source: FHWA, Office of Highway Policy Information, *Highway Statistics Series*, Table SF-1; Census Bureau's Annual Estimates of the Population of the United States

Tolls

The FHWA (2013) details a history of toll roads in the U.S. including current toll roads and policies. It notes that starting in the 1980s, there was an increased interest in tolling as Interstates began to age and more citizens owned vehicles. The confluence of aging infrastructure and increased demand remains a pertinent issue as tolls continue to be utilized by some states. In recent years, improvements in electronic toll collection have reduced administrative costs. They have also made toll roads more palatable by eliminating stop and go toll booths in order to maintain traffic flow. Because not all southeastern states have significant tolling operations, revenue from this source is limited. However, considering the possibilities for future tolling and its potential use as an alternative revenue source, it is instructive to examine those states that already have imposed tolls and the amount of revenues currently being derived from them. Figure 7 reports southeastern state tolling receipts from 1995 through 2012. The statistics reported do not include any local or privately operated toll facilities.

Florida and West Virginia led the Southeast in toll revenue per capita. Florida's turnpike system encompasses several roadways throughout the state and is the most comprehensive of any southeastern state. The system includes over 450 miles of tolled roads. According the Turnpike Enterprise's website (2005), it was developed to use bonding backed by tolls to develop new infrastructure. West Virginia's system consists of a portion of Interstate 77, the West Virginia Turnpike, which includes 88 miles between Princeton and Charleston. Alabama, Arkansas, and Mississippi did not report any toll revenue during the time period and are not included in Figure 7. Kentucky collected toll revenues until 2003 and South Carolina began collecting toll revenues in 2003. Table 2 lists toll roads and bridges in the southeastern states. The table does not include private or local facilities.

Figure 7: Toll Receipts Per Capita (2012 dollars)



Source: FHWA, Office of Highway Policy Information, *Highway Statistics Series*, Table MF-1; Census Bureau's Annual Estimates of the Population of the United States

Table 2: State Toll Roads and Bridges

Interstate System Toll Bridges	
Florida	Sunshine Skyway
Non-Interstate System Toll Bridges	
Florida	Mid-Bay
Florida	Pinellas Bayway System
Florida	Garcon Point
Virginia	George P. Coleman (US 17)
Interstate System Toll Roads	
Florida	Alligator Alley (Everglades Parkway)
Florida	I-95 Express
West Virginia	West Virginia Turnpike
Non-Interstate System Toll Roads	
Florida	Beachline East (Central Florida Expressway)
Florida	Beachline Expressway
Florida	Beachline West
Florida	Homestead Extension of Florida Turnpike (HEFT)
Florida	Holland East-West Expressway
Florida	Sawgrass Expressway (SR 869)
Florida	Polk Parkway (SR 570)
Florida	Florida Turnpike - Mainline
Florida	Lee Roy Selmon Crosstown Expressway
Florida	Veterans Expressway (SR 589)
Florida	Seminole Expressway
Florida	Southern Connector Extension
Florida	Suncoast Parkway (SR 589)
Florida	Goldenrod Road Extension
Georgia	Georgia 400 Extension
Louisiana	Louisiana 1 Expressway
North Carolina	Triangle Expressway
South Carolina	Cross Island Parkway (US 278)
Virginia	Powhite Parkway Extension (SR 76)
Virginia	Washington-Dulles Access and Toll Road/Route 267 (Hirst-Brault Expressway)

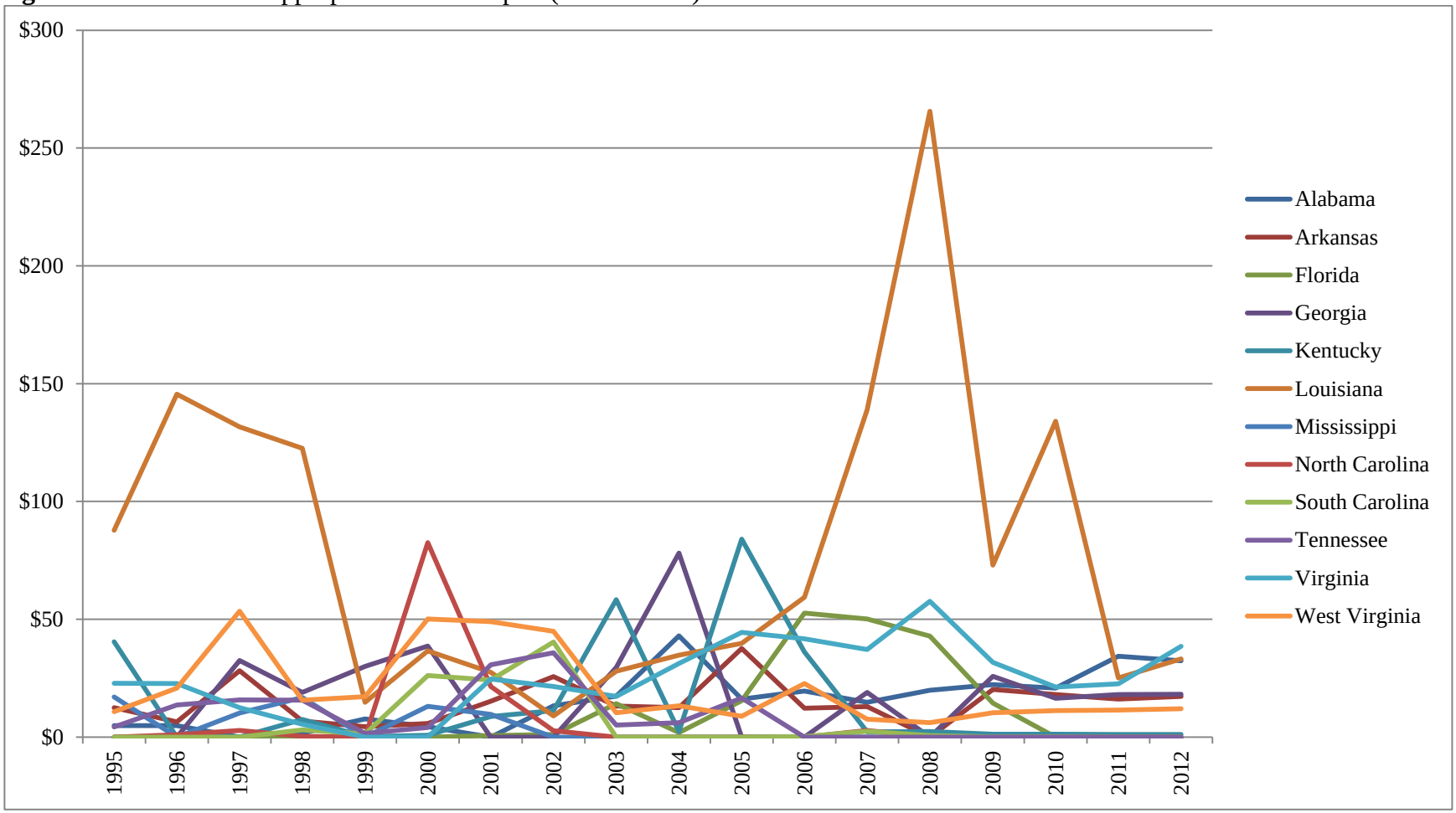
Source: FHWA, Office of Highway Policy Information, *Toll Facilities in the United States,* Publication FHWA-PL-13-037

General Funds and Other State Imposts

Outside of traditional revenue sources such as fuel and motor vehicle taxes, a number of states also rely on general fund appropriations and/or dedicated sales and use taxes and severance taxes (categorized as other state imposts). Several states collect fuel sales taxes in addition to the more common excise taxes as listed in Table 1. With the exception of Mississippi, Florida, and North Carolina, every state relies on general funds, which may be an indication that traditional transportation revenue sources have been insufficient to meet demand and have required general funds to supplement them. However, this alone does not indicate funding levels are insufficient,

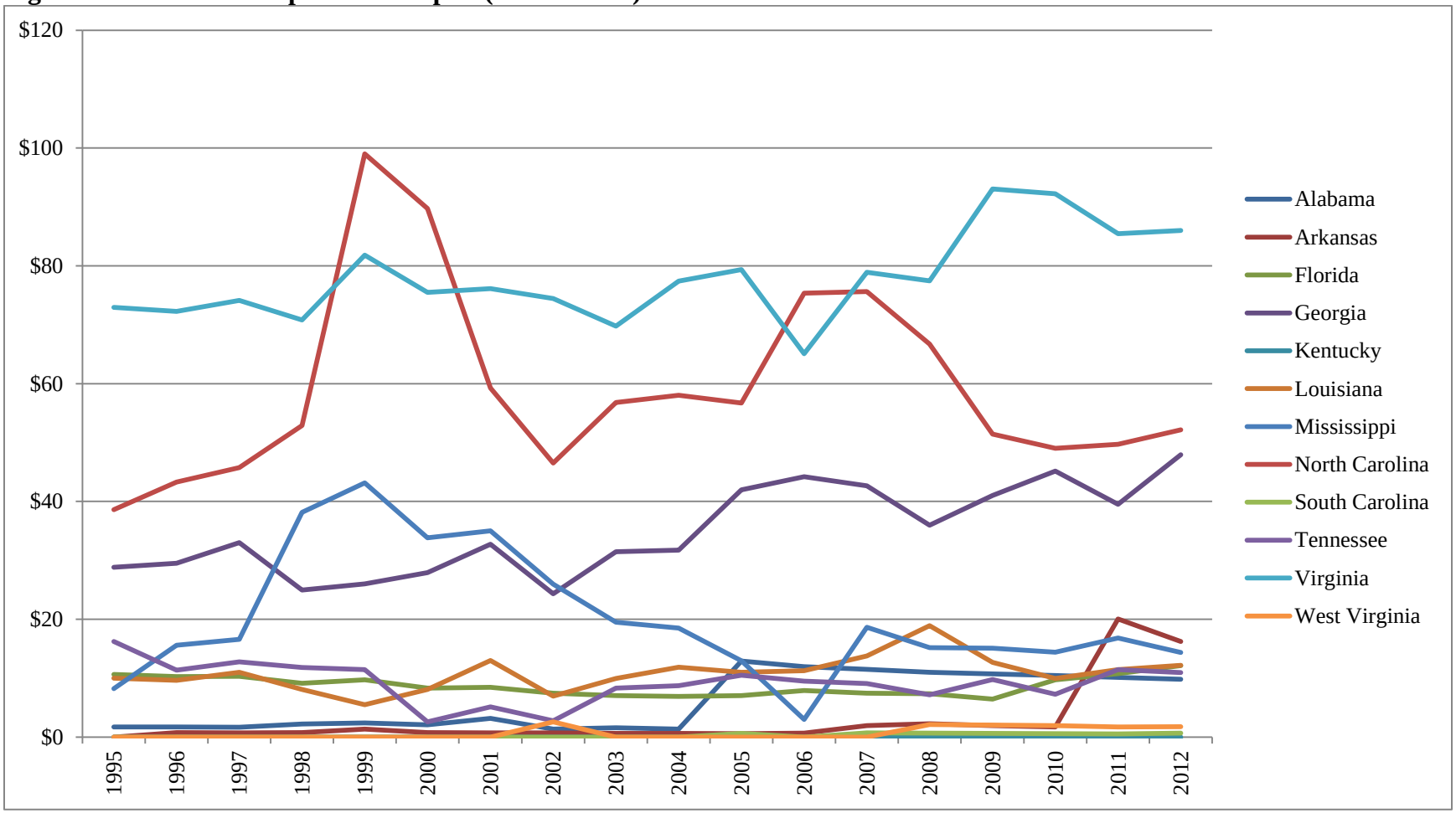
as states may choose to allocate additional funds to transportation during the budgeting process. Figure 8 and 9 illustrate revenues from general fund appropriations and the FHWA-denoted category "other state imposts" from 1995 through 2012, which includes sales and use taxes and severance taxes. Severance taxes include taxes that are levied for the extraction of natural resources and are designated for transportation purposes. While Table 1 indicates that several states do not use general funds, the reported amounts in the FHWA *Highway Statistics Series* include non-surface transportation related funding such as public safety, local aid, etc. Therefore, states may show general fund appropriations in the data for transportation-related purposes, but they are not necessarily solely dedicated to transportation construction or maintenance. General fund appropriations per capita in Figure 8 indicate that most states are under $50. Louisiana, particularly from 2007 to 2010, greatly exceeded this figure due to a general fund surplus after Hurricanes Katrina and Rita. Figure 9, illustrative of state imposts per capita, demonstrates that Virginia, North Carolina, and Georgia have traditionally been the three highest grossing states in this category. Georgia's inclusion is expected, due to the unique nature of its fuel tax, which combines an excise tax of 7.5 cents per gallon with an additional three percent fuel tax and one cent sales tax.

Figure 8: General Fund Appropriations Per Capita (2012 dollars)



Source: FHWA, Office of Highway Policy Information, *Highway Statistics Series,* Table SF-1; Census Bureau's Annual Estimates of the Population of the United States

Figure 9: Other State Imposts Per Capita (2012 dollars)

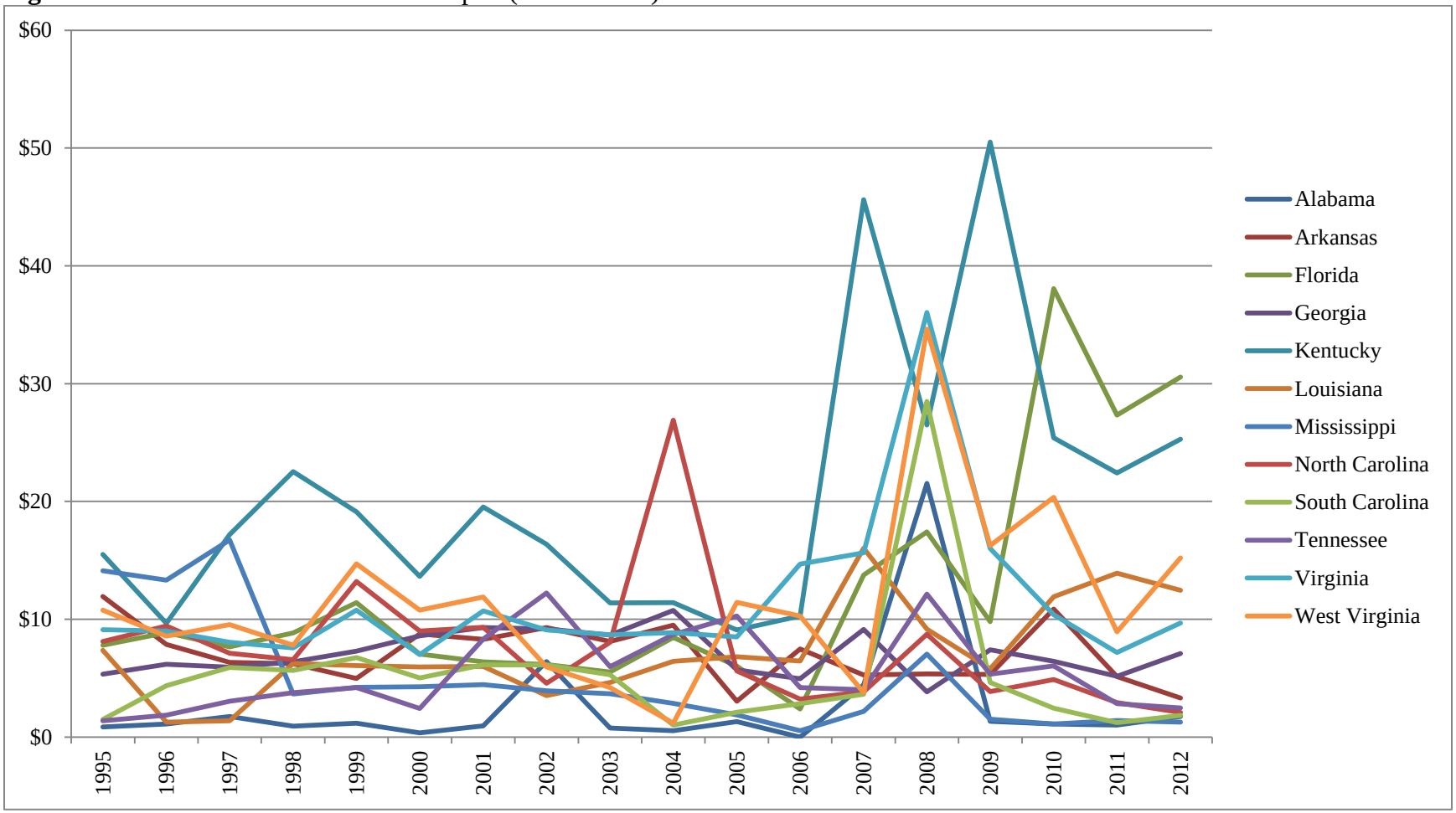


Source: FHWA, Office of Highway Policy Information, *Highway Statistics Series*, Table SF-1; Census Bureau's Annual Estimates of the Population of the United States

Miscellaneous Revenue

Figure 10 displays miscellaneous revenues on a per capita basis. Included in this category is any interest or investment income earned, advertising, and lottery proceeds dedicated to transportation. Like the category of other state imposts, miscellaneous revenue may include specific revenue sources that do not fall into any other main revenue source categories. There is considerable variability in this category, perhaps reflecting the volatility in financial markets in recent years. Since 2010, Florida and Kentucky have been the top two states in collecting miscellaneous revenues for transportation.

Figure 10: Miscellaneous Revenue Per Capita (2012 dollars)



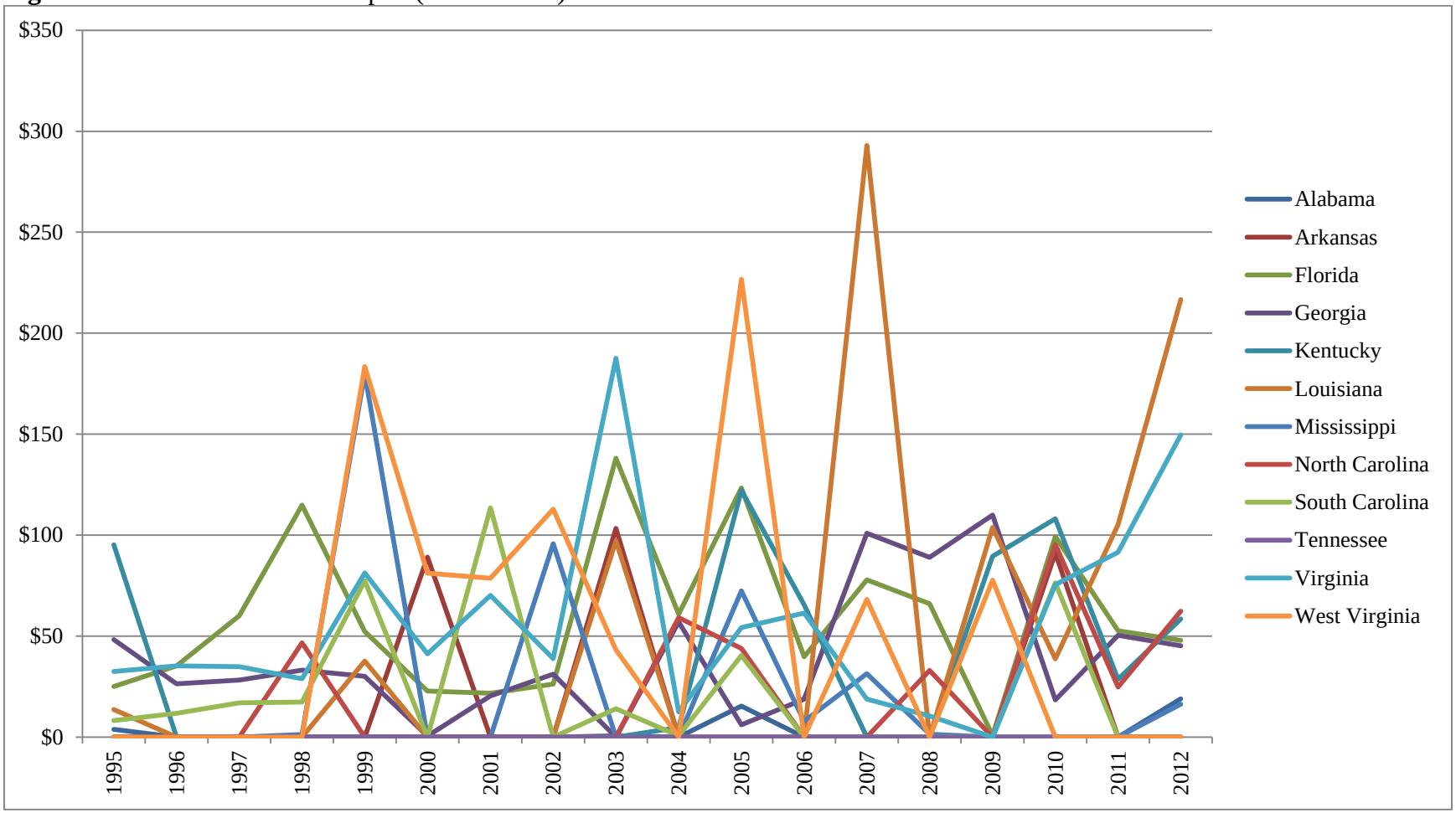
Source: FHWA, Office of Highway Policy Information, *Highway Statistics Series*, Table SF-1; Census Bureau's Annual Estimates of the Population of the United States

Bond Issues

When bonds are issued or refinanced, the FHWA counts the proceeds as revenue. While bonds do not provide a steady stream of revenue, issues that are used to finance large infrastructure projects can significantly impact transportation funding in a given year. Debt issuance to fund transportation projects has become a popular tool of policymakers, but concerns linger over the elasticity of debt limits and the level of debt state transportation agencies can stand to absorb. Borrowing money to meet a short-term need rather than a long-term capital project creates debt that must be paid off. These projects do not create additional revenue, and therefore do not provide a long-term funding solution. Determining what levels of debt service can be sustained by revenues from highway funds is critical for balancing appropriate levels of investment using debt financing without hampering a state's ability to meet other needs that may arise.

There have been advances in the types of debt instruments issued in recent years enabling states to utilize different sources of financing to develop transportation infrastructure. The FHWA's website on Innovative Program Delivery provides details on each of these financing options, which we briefly summarize here. Grant Anticipation Revenue Vehicles (GARVEEs) are debt issues with a payback source of future Title 23 Federal-aid funding. Transportation Infrastructure Finance and Innovation Act (TIFIA) program loans provide credit assistance from the Federal government in order to finance transportation projects. "The TIFIA credit program is designed to fill market gaps and leverage substantial private co-investment by providing supplemental and subordinate capital. Each dollar of Federal funds can provide up to $10 in TIFIA credit assistance and support up to $30 in transportation infrastructure investment" (FHWA, 2014). Build America Bonds (BABs) are tax credit bonds that were part of the American Recovery and Reinvestment Act. BABs are bonds issued before January 1, 2011, and the issuer (state or local governments) chose to have taxable bond interest versus a traditional tax-exempt bond. In return the federal government provides an interest subsidy. Private Activity Bonds (PABs) are another type of bond issue with differing treatment of interest. As a result of the Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU), private bonds can be issued to fund highway and freight facilities but are treated as tax-exempt issues. State Infrastructure Banks (SIBs) are investment funds that function like a bank; issuing loans and credit assistance for transportation projects. They are capitalized with Federal funds and matching state funds. Repayments are made with Federal funds. Southeastern states that have utilized SIB pilot programs are: Arkansas, Florida, North Carolina, South Carolina, Tennessee, and Virginia. Figure 11 shows bond earnings, including both new and refinanced issues. As expected, the revenue obtained from bonds showed significant variability from 1995 through 2012.

Figure 11: Bond Proceeds Per Capita (2012 dollars)

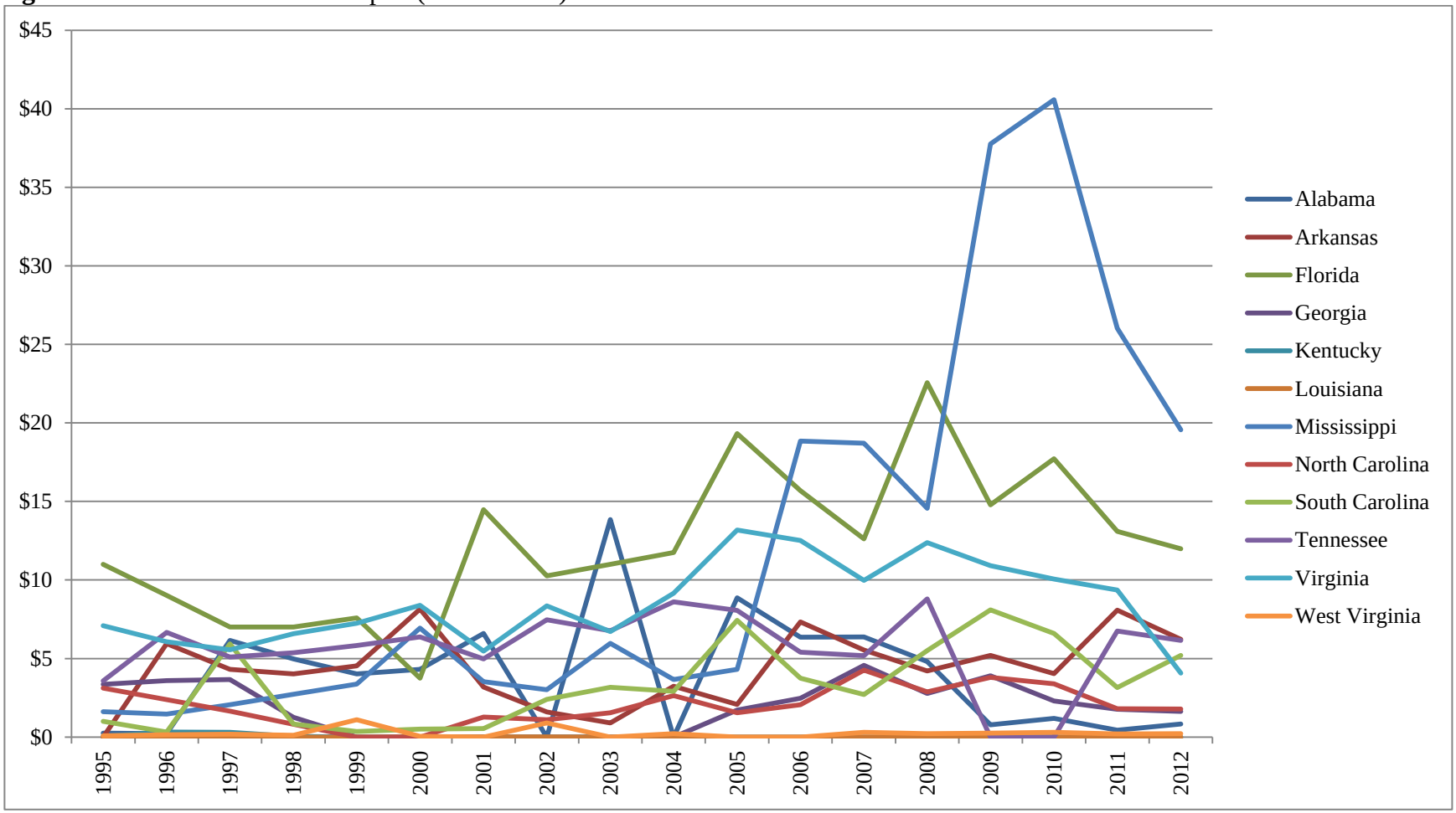


Source: FHWA, Office of Highway Policy Information, *Highway Statistics Series,* Table SF-1; Census Bureau's Annual Estimates of the Population of the United States

Local Transfers

The final FHWA revenue category is local transfers or payments to states. In most cases, the reported amounts in this category are small, because states generally transfer funds to local governments for expenditure. Those amounts that do fall into this category may include property taxes and/or local option sales/fuel taxes that are collected locally and remitted to the state. These revenues may then be allocated back to local government in the form of road aid or other programs. Local transfers per capita are shown in Figure 12. Mississippi saw large increases in this category in recent years. This is likely attributable to Mississippi's Highway Enhancements Through Local Partnerships Program (HELP). This program was established in 2000 and allows the state to enter agreements with local governments to finance and construct large highway projects. The local government entity issues bonds to finance the project, with the proceeds being transferred to the state to complete the project.

Figure 12: Local Transfers Per Capita (2012 dollars)



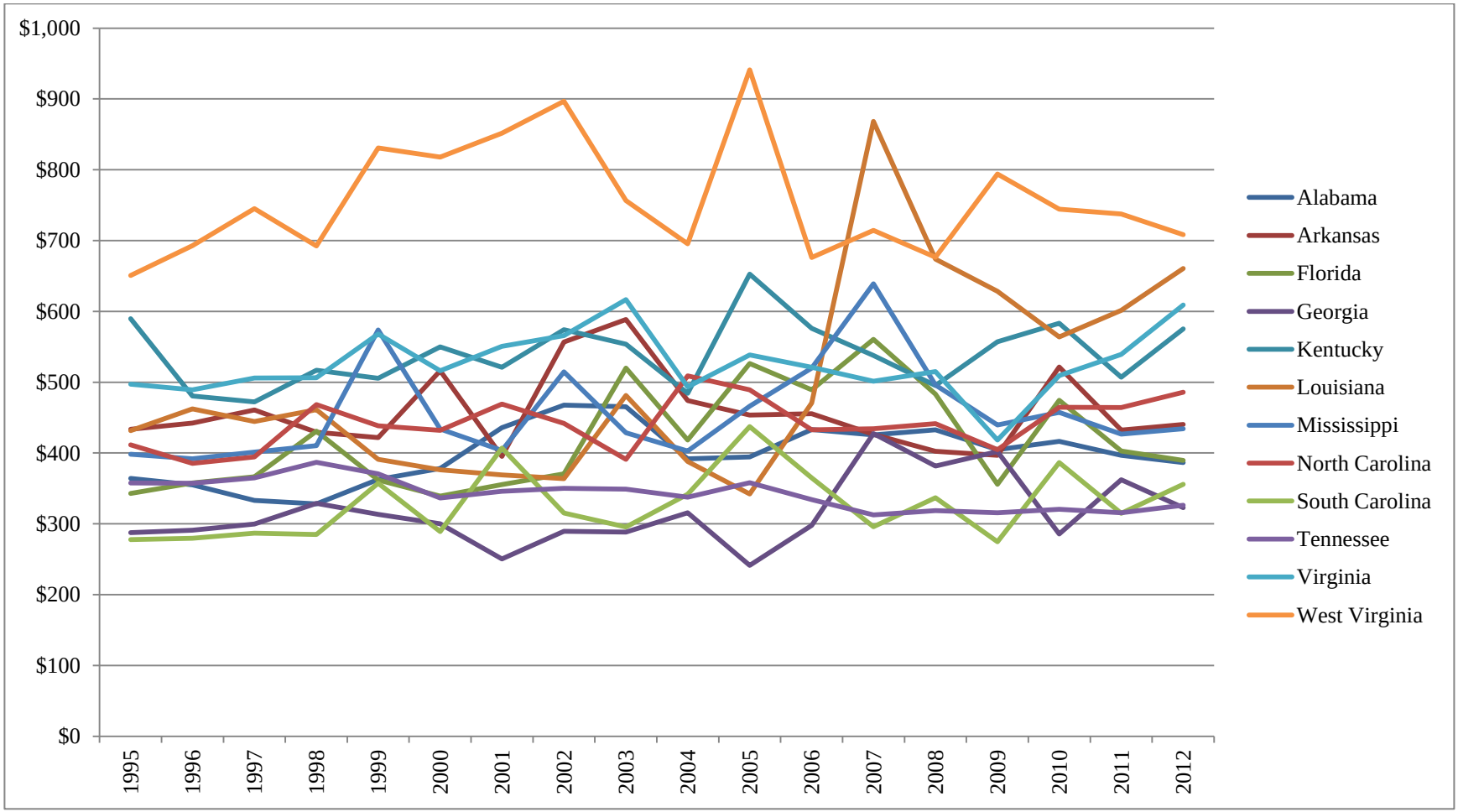
Source: FHWA, Office of Highway Policy Information, *Highway Statistics Series*, Table SF-1; Census Bureau's Annual Estimates of the Population of the United States

Total Revenues

Finally, we report total revenues for each state. Figure 13 details total revenues per capita, adjusted to 2012 dollars. Most southeastern states fell between $300 and $600 per capita. The graph indicates that most states had little if any growth in real revenues. However, it is important to note that some of the categories such as bond proceeds and federal transfers inclusive of hurricane relief and stimulus funds that are aggregated in the FHWA's totals are non-recurring. As a result, there are some fluctuations that must be noted. Several states endured declines from 2008-2009, likely as a result of recessionary effects. Increases in years after the recession are attributable to the injection of stimulus funds while those before the recession can be attributed to hurricane relief funds for Gulf Coast states. Most revenue sources reviewed were static in real terms with many seeing slight declines. Consequently, even when states have nominal revenue growth, it is insufficient to keep pace with price increases in areas such as construction and materials. This reduces the purchasing power of each dollar of revenue. As such, funding goes to fewer infrastructure projects, which in turn contributes to the continued deterioration of the transportation system and exacerbates losses in capacity.

The nature of the data reviewed thus far has focused on trends in state revenue. Our analysis now shifts to focus on the average percentage share of each revenue source by state. Due to variations in year-to-year funding, the average funding levels from each source are more reliable than a single year snapshot. Table 3 takes each state's revenues as reported to the FHWA from 1995 to 2012 and averages the percentage of each state's total revenue procured from different categories. The largest own-source revenue for all states was motor fuel taxes. On average, states in the Southeast received 32 percent of their revenue from motor fuel taxes. Federal government transfers were the second largest revenue category, averaging over 31 percent, followed by motor vehicle and motor carrier taxes at 16 percent.

Figure 13: Total Revenues Per Capita (2012 dollars)



Source: FHWA, Office of Highway Policy Information, *Highway Statistics Series*, Table SF-1; Census Bureau's Annual Estimates of the Population of the United States

Table 3: Average Percentage of Revenue by State

	Motor Fuels	Motor Vehicle and Motor Carrier	Tolls	General Fund Appropriations	Other State Imposts	Miscellaneous	Bonds	Federal Transfers	Local Transfers
Alabama	38%	15%	0%	4%	2%	1%	1%	40%	1%
Arkansas	39%	13%	0%	3%	1%	2%	3%	37%	1%
Florida	28%	15%	11%	3%	2%	4%	13%	21%	3%
Georgia	18%	13%	1%	5%	10%	3%	12%	37%	1%
Kentucky	27%	32%	0%	2%	0%	6%	6%	26%	0%
Louisiana*	29%	10%	2%	15%	2%	2%	11%	29%	0%
Mississippi*	34%	13%	0%	1%	4%	1%	4%	40%	3%
North Carolina	40%	14%	0%	1%	13%	2%	5%	25%	0%
South Carolina	38%	13%	1%	1%	0%	2%	5%	39%	1%
Tennessee	43%	16%	0%	2%	2%	2%	0%	32%	1%
Virginia	24%	23%	3%	5%	14%	3%	10%	18%	1%
West Virginia	27%	22%	5%	3%	0%	2%	6%	35%	0%
Average	32%	16%	2%	4%	4%	3%	6%	32%	1%

*General Fund Appropriations and Federal Transfers for Louisiana are skewed higher due to hurricane relief; Mississippi's federal transfers are also influenced by hurricane relief

Source: FHWA, Office of Highway Policy Information, *Highway Statistics Series* 1995-2012; Table SF-1

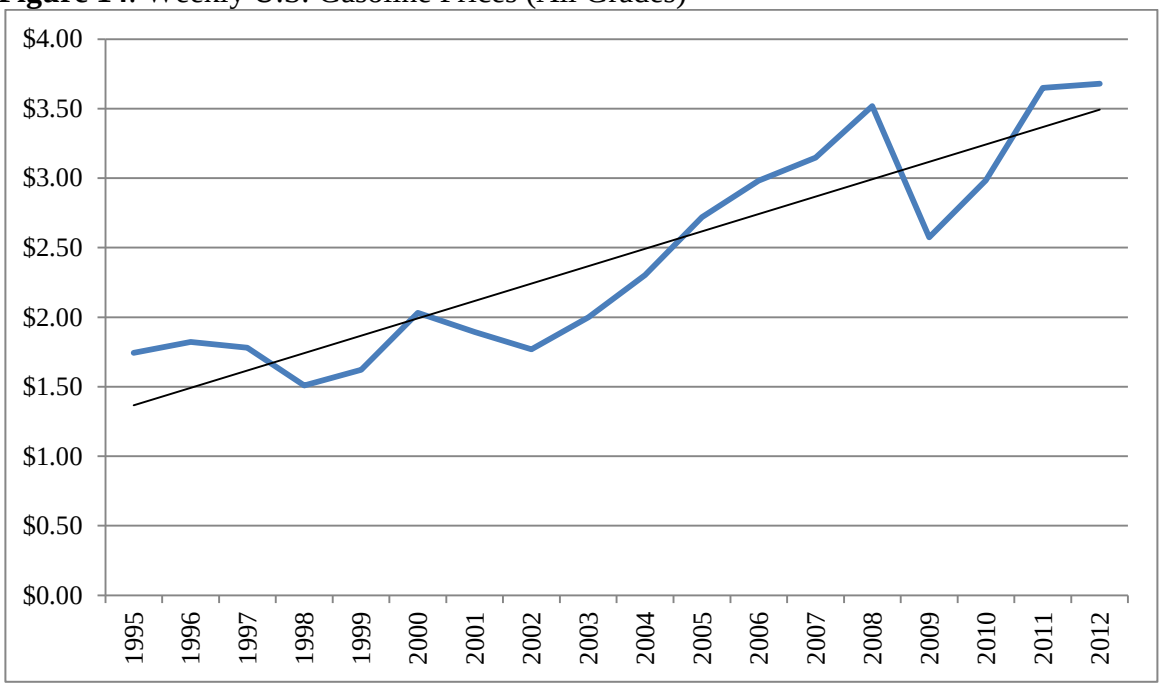
FUTURE REVENUE TRENDS

A number of factors will likely impact future revenues, if we assume no alternative revenue sources are implemented. As noted in the previous section, motor fuels taxes, federal transfers, and motor vehicle and motor carrier taxes are the major sources of transportation revenues in the Southeast. As such, future revenue trends will mostly be driven by factors that influence these sources. These factors include economic conditions, fuel prices, fuel efficiency, and the number of vehicles, among others. While forecasts capture these effects implicitly through historical data, it is useful to review trends and future projections for some of these factors before turning to short term forecasts for major revenue categories.

Economic forecasts by the Congressional Budget Office (CBO) project an average growth rate in real Gross Domestic Product of 2.5 percent from 2014 through 2024. While the predictions of future economic growth are positive, it seems unlikely that current transportation revenues will grow substantially based on economic projections alone. From 1995 through 2007, real Gross Domestic Product grew at an average rate of over three percent annually. There were declines in 2008 and 2009, with positive growth again in 2010 at 2.5 percent. Yet, historically, the last section demonstrated that during this time of generally robust economic growth, real transportation revenues have been largely stagnant or declining in most categories. Still, economic conditions may influence consumer travel choices and consequently transportation revenues, particularly fuel taxes. Fuel prices and improved vehicle efficiency are the most likely to impact transportation revenues from fuel taxes.

As most fuel taxes are levied as an excise tax, or cents per gallon, increasing fuel prices do not directly translate into increased state revenues. Volatility in prices and corresponding changes in consumption patterns can pose challenges in forecasting revenues from fuel taxes. However, as motor fuel is relatively price inelastic due to a lack of substitutes, changes in price will not lead to large-scale changes in short run fuel consumption. Consumers may respond in the long run by purchasing more fuel efficient or even alternative fuel vehicles. States that index fuel taxes to the price of fuel may collect more revenue when fuel prices increase. However, higher fuel prices may also result in lower demand leading to reduced revenue. In the short term travelers can alter their driving habits and in the long run make changes to alternative fuel vehicles. Annual average fuel prices (2012 dollars) for all grades in the United States are shown in Figure 14 with a trend line. The data show volatility in retail fuel prices, however, the overall trend is one of increasing prices.

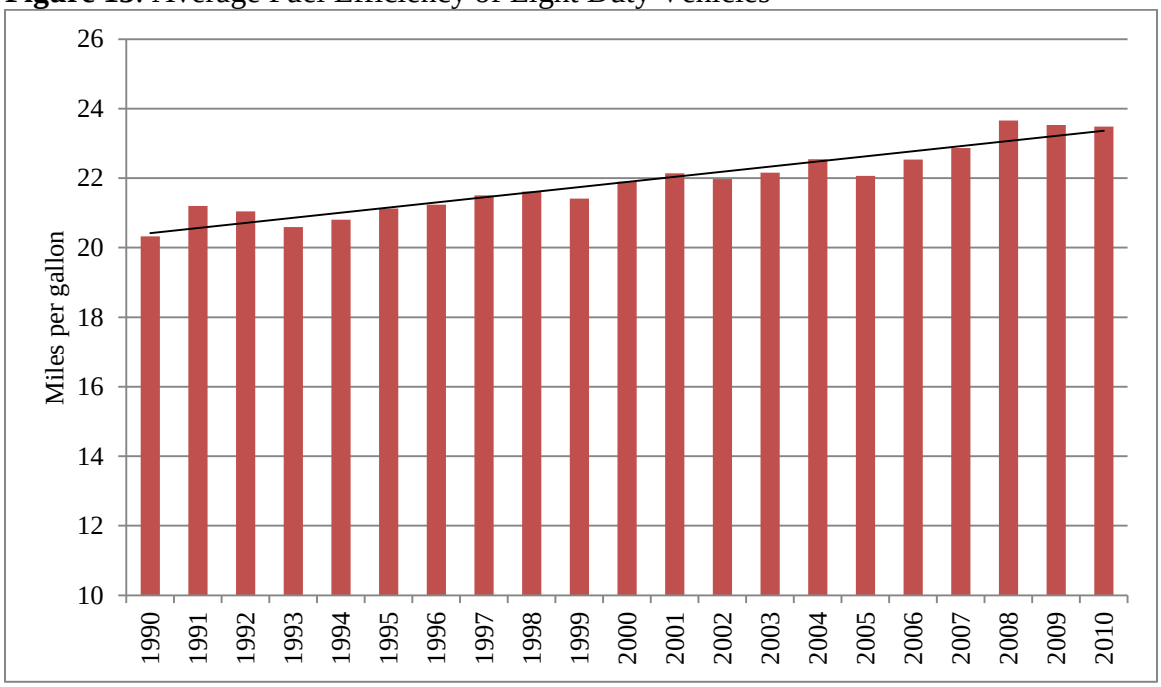
Figure 14: Weekly U.S. Gasoline Prices (All Grades)



Source: Energy Information Administration; U.S. All Grades All Formulations Retail Gasoline Prices (Dollars per Gallon)

The combination of fuel efficiency and fuel prices influence fuel tax revenues. As prices continue to increase, it is likely, also, to drive up the use of fuel efficient vehicles. Tax collections will be significantly affected as a larger share of the driving population purchases these vehicles. Figure 15 charts the fuel efficiency for U.S. light duty vehicles from 1990 to 2010. Fuel efficiency, on average, has gone up in recent years, albeit at a slower pace than the price of fuel. From 2000 to 2010, efficiency increased by approximately seven percent. The use of alternative fuel vehicles has also ticked up of late.

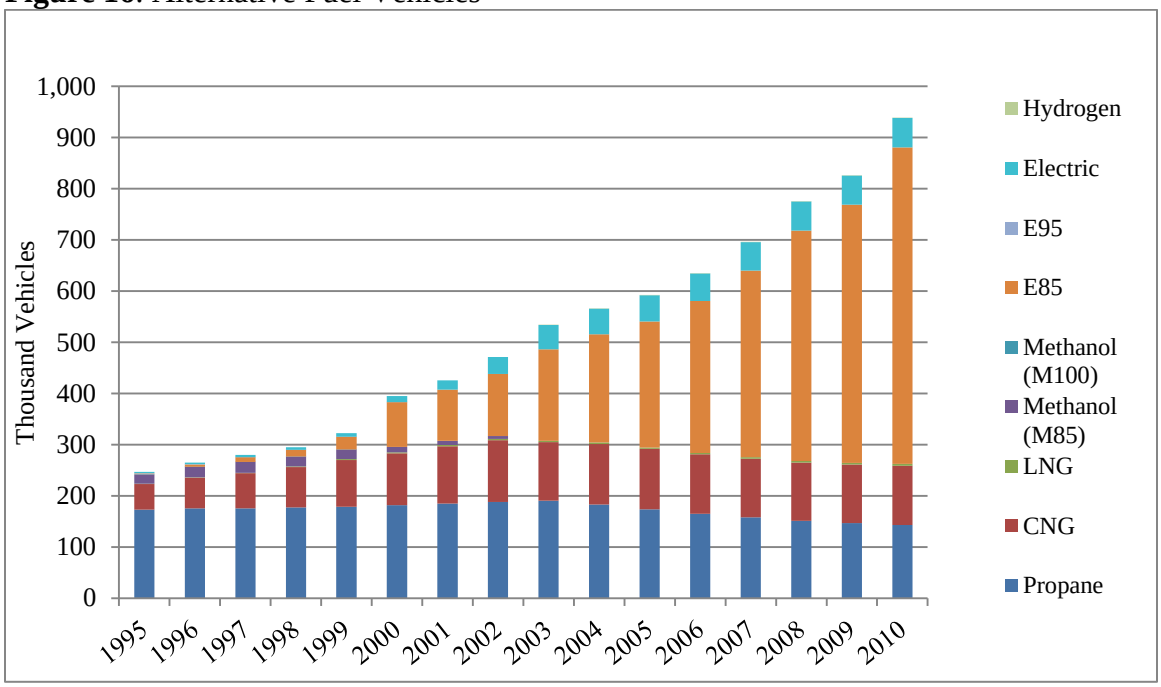
Figure 15: Average Fuel Efficiency of Light Duty Vehicles



Source: Bureau of Transportation Statistics, Table 4-23

Figure 16 shows the number of alternative fuel vehicles by type in the U.S. The total number of alternative fuel vehicles has increased, especially those powered by E85. It is important to note that, as a percentage of the automobile market share, alternative fuel vehicles still have less than a one percent share. Continued increases in efficiency and market penetration of alternative fuel vehicles are likely to coincide with declining fuel consumption, which will slowly erode revenue collected from motor fuels taxes. Increases in efficiency can be a response to consumer demand for more fuel efficient vehicles as well as government mandates through CAFE standards. CAFE standards were enacted by Congress in 1975 to "reduce energy consumption by increasing the fuel economy of cars and light trucks" (National Highway Traffic Safety Administration, 2014). If manufacturers do not meet these standards, they are subject to penalties of $5.50 for each tenth of a mile per gallon they fall under the CAFE standard. CAFE for each manufacturer is the sales-weighted average fuel economy of its cars and light trucks. Updated standards were published in 2011 and 2012, setting standards for manufacturers through model year 2025. These changes will set standards equivalent to 54.5 miles per gallon for cars and light duty trucks by 2025 (White House, 2012).

Figure 16: Alternative Fuel Vehicles

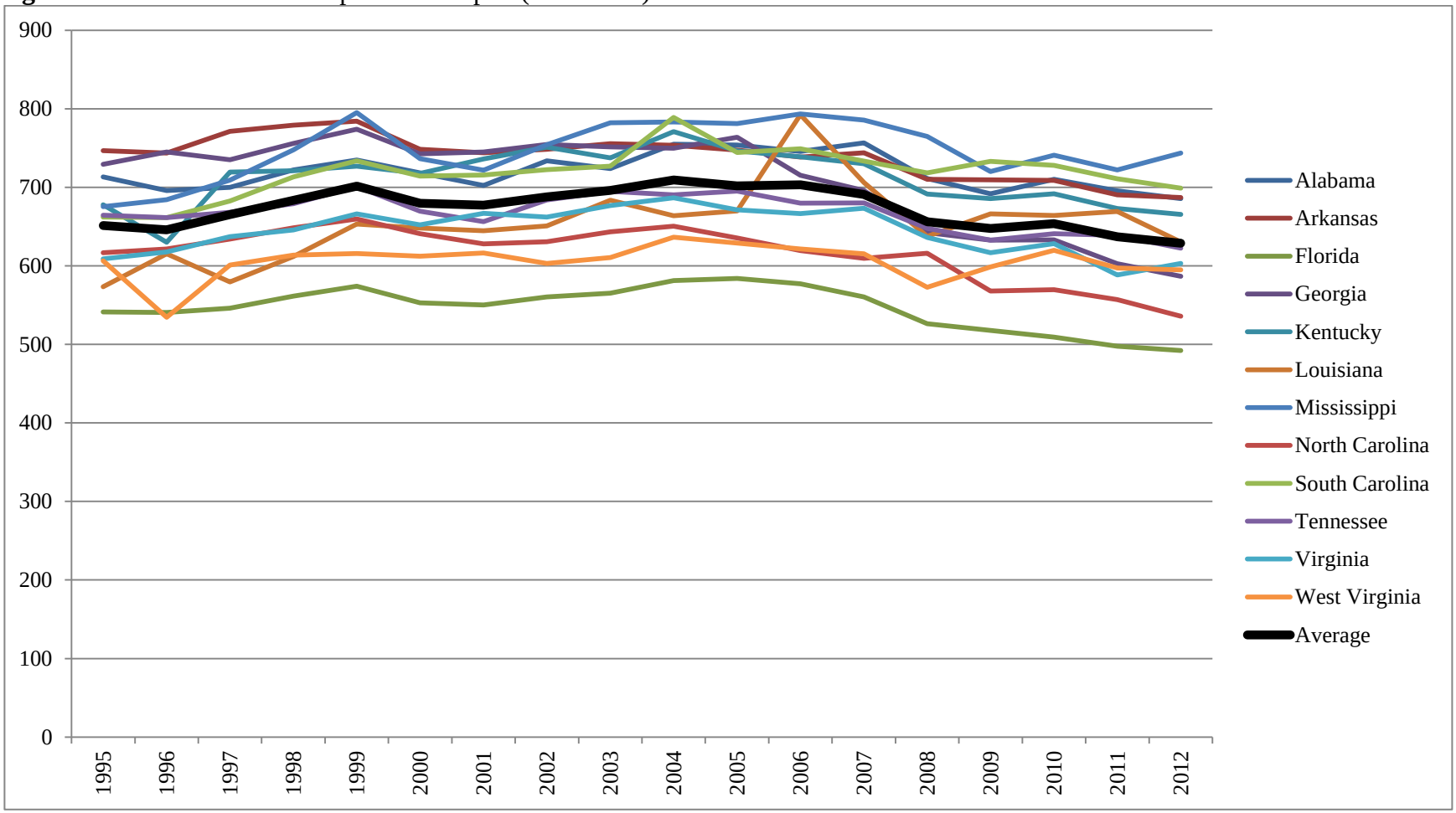


Source: Department of Energy, http://www.eia.gov/renewable/afv/users.cfm#tabs_charts-2

Because fuel consumption is the chief indicator of motor fuels tax revenue, Figure 17 illustrates consumption levels in each state as well as a region average. Since 2006, fuel consumption has slightly decreased. Over this period, the average fuel consumption in the region has shrunk 11 percent. Florida has consistently consumed the least amount of fuel per capita while Arkansas and Mississippi have been the most voracious consumers. If continued strides are made in fuel efficiency and advancements with alternative fuel vehicles, fuel consumption may continue to decrease, with the possibility of this decline accelerating.

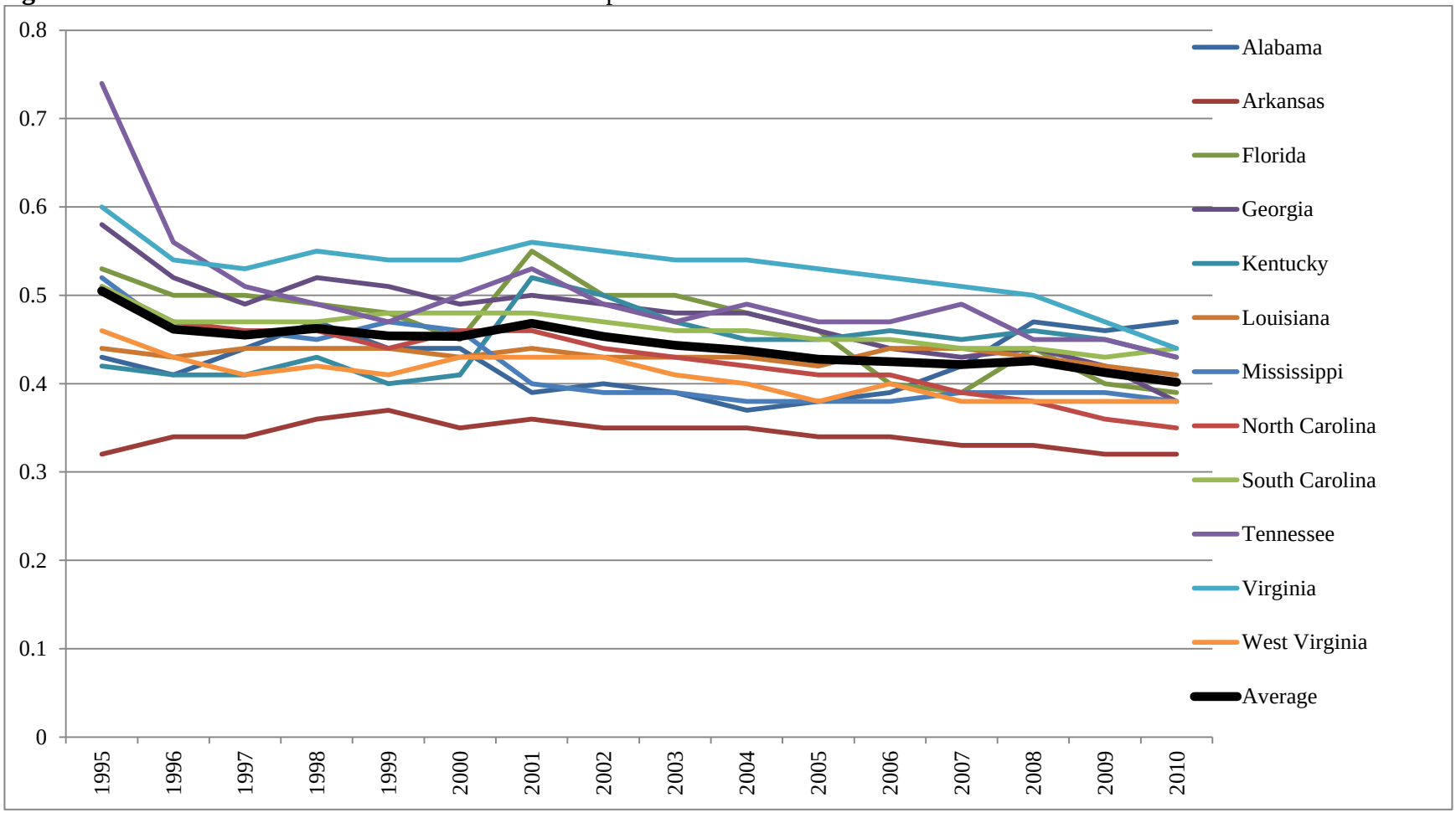
Fuel consumption, and by extension fuel tax revenues, as well as motor vehicle taxes depend on the number of vehicles in a state. Economic conditions and long-term responses to increased fuel prices may affect consumer transportation choices. Private and commercial automobile registrations per capita are displayed in Figure 18, along with the southeastern states average. The average has declined from a high of 0.51 vehicles per capita in 1995 to 0.40 vehicles per capita in 2010. Virginia sits atop this list with 0.53 vehicles per capita while Arkansas had the lowest at 0.34. As consumers chose other methods of transport and own fewer vehicles, tax revenues from both fuel taxes and motor vehicle taxes are likely to decline. All of the observed trends associated with own-source user revenues indicate there is little potential for future growth in revenues if current funding structures are maintained. Although the magnitude of the changes in these underlying indicators is small, if current trends persist over several years it will likely have negative effects on revenues.

Figure 17: Motor Fuel Consumption Per Capita (In Gallons)



Source: FHWA, Office of Highway Policy Information, *Highway Statistics Series*, Table MF-21; Census Bureau's Annual Estimates of the Population of the United States

Figure 18: Private and Commercial Automobiles Per Capita



Source: FHWA, Office of Highway Policy Information, *Highway Statistics Series*, Table MV-1

Forecasts

While there are a number of revenue categories, applying forecasting models to small categories that experience significant variation in revenues increases the likelihood of forecast errors. Gibson et al.'s (2013) forecasts for Kentucky showed that aggregate forecasts and projects concerned with larger revenue categories provided a better goodness of fit than individual categories. Thus, we maintain a focus on sources that constitute a majority of the southeastern states' total revenues. The majority of revenue sources for states (see Figure 14) are federal transfers, motor fuel taxes, and motor vehicle and motor carrier taxes. On average, these revenue streams account for over 80 percent of southeastern states' revenues. We developed additional individual state forecasts in other categories when a category averaged over five percent of a state's revenue and displayed a historical trend.

All forecasts are for a period of five years with the exception of federal transfers, which are discussed below. The five year timeframe is a reasonable short-run estimate because the underlying factors that are held constant in the simple models generally change slowly – if at all – over a short forecasting period. Significant political, economic and technological changes may emerge over the long run, which poses challenges for extending the forecast horizon. As with any forecasts, the results represent a guess of future revenues based on historical data. Significant changes to revenue sources would render the forecast data inaccurate and of little use. To calculate the expected future revenue shares of each source, total revenues are forecasted to obtain expected future revenue shares.

Given the HTF's precarious financial situation, and the fact that federal transfers are not own source revenues and thus potentially influenced by political factors, these forecasts may have the potential for greater error than other revenue forecasts. The continuing uncertainty around the HTF and the overall federal budget situation places federal funding in a condition of continued flux that must be monitored in each state. The next federal transportation authorization bill may significantly change federal funding levels, thus these should be viewed with an abundance of caution. Additionally, as the FHWA data aggregates sources such as hurricane relief and non-highway specific revenues and reports bond proceeds as revenue, we make several adjustments to the data used to forecast federal transfer revenues, and thus total revenues. To forecast federal transfers, we turn to federal apportionments as designated by the last three federal highway bills: the Transportation Equity Act for the 21st Century (TEA-21), the Safe Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), and the Moving Ahead for Progress in the 21st Century Act (MAP-21). This provides us with historical data from 1998 through 2014 for forecast purposes versus data from 1995 through 2012 for the other categories. To produce comparable time period forecasts with the other FHWA categories, we merely forecast federal transfers for three years and list the reported amounts in 2013 and 2014. Then, when forecasting total revenues, we subtracted out the FHWA reported level of federal transfers and bond proceeds for the forecasts. Then, we added the federal transfer forecasts based on the apportionment data to produce total revenue forecasts suitable for calculating expected future revenue shares.

We used time trend regressions to forecast future variability in the three major revenue categories, individual categories over five percent, and total revenues. Time trend regression is a simple yet robust methodology. In this approach, historical revenues are regressed on a time

variable as shown in equation (1) below.

$$Y_t = \beta_0 + \beta_1 T_t + \varepsilon_t \quad (1)$$

Y_t represents the revenue from each category in year t, while T is the trend value for each year t. Using a trend value for each year is appropriate because many revenue sources show a trend over time, and this must be accounted for to produce reliable forecasts. Detailed regression results for each revenue category are included in the Appendix. Tables 4-8 summarize forecasted values for motor fuel taxes, motor vehicle and motor carrier taxes, federal transfers, other revenue categories over five percent, and total revenues. It is important to note that the structure of Virginia's motor fuels tax changed in 2013 from an excise tax to a wholesale tax, which is discussed in more detail later. The forecasted values for motor fuel taxes in Virginia do not reflect this change, as there was not any data available that reflected the new structure. Given this change, it is likely that the actual revenues in upcoming years will differ significantly from the forecasted values for Virginia's motor fuel tax revenues.

Table 4: Motor Fuel Tax Revenue Forecasts

	2013	2014	2015	2016	2017
Alabama	$654,554,000	$646,479,000	$638,404,000	$630,329,000	$622,254,000
Arkansas	$498,829,000	$497,769,000	$496,709,000	$495,649,000	$494,589,000
Florida	$2,445,017,000	$2,467,963,000	$2,490,909,000	$2,513,855,000	$2,536,801,000
Georgia	$476,638,000	$469,380,000	$462,122,000	$454,864,000	$447,606,000
Kentucky	$706,062,000	$713,878,000	$721,694,000	$729,510,000	$737,326,000
Louisiana	$608,148,000	$599,311,000	$590,474,000	$581,637,000	$572,800,000
Mississippi	$415,690,000	$409,747,000	$403,804,000	$397,861,000	$391,918,000
North Carolina	$1,761,286,000	$1,779,894,000	$1,798,502,000	$1,817,110,000	$1,835,718,000
South Carolina	$544,964,000	$541,939,000	$538,914,000	$535,889,000	$532,864,000
Tennessee	$869,150,000	$860,143,000	$851,136,000	$842,129,000	$833,122,000
Virginia	$950,123,000	$942,047,000	$933,971,000	$925,895,000	$917,819,000
West Virginia	$343,396,000	$339,978,000	$336,560,000	$333,142,000	$329,724,000

Table 5: Motor Vehicle and Motor Carrier Taxes

	2013	2014	2015	2016	2017
Alabama	$186,037,000	$183,324,000	$180,611,000	$177,898,000	$175,185,000
Arkansas	$145,120,000	$144,452,000	$143,784,000	$143,116,000	$142,448,000
Florida	$1,077,399,000	$1,095,057,000	$1,112,715,000	$1,130,373,000	$1,148,031,000
Georgia	$228,509,000	$229,139,000	$229,769,000	$230,399,000	$231,029,000
Kentucky	$568,130,000	$554,795,000	$541,460,000	$528,125,000	$514,790,000
Louisiana	$154,931,000	$152,566,000	$150,201,000	$147,836,000	$145,471,000
Mississippi	$147,683,000	$146,384,000	$145,085,000	$143,786,000	$142,487,000
North Carolina	$648,630,000	$662,828,000	$677,026,000	$691,224,000	$705,422,000
South Carolina	$208,568,000	$216,791,000	$225,014,000	$233,237,000	$241,460,000
Tennessee	$320,753,000	$323,958,000	$327,163,000	$330,368,000	$333,573,000

Virginia	$656,392,000	$647,670,000	$638,948,000	$630,226,000	$621,504,000
West Virginia	$278,212,000	$277,703,000	$277,194,000	$276,685,000	$276,176,000

Table 6: Federal Transfers

	2013*	2014*	2015	2016	2017
Alabama	$731,655,008	$732,263,043	$763,803,000	$765,264,000	$766,725,000
Arkansas	$499,299,076	$499,714,166	$506,122,000	$507,961,000	$509,800,000
Florida	$1,827,170,634	$1,828,689,002	$2,029,467,000	$2,044,563,000	$2,059,659,000
Georgia	$1,245,202,087	$1,246,238,772	$1,310,004,000	$1,309,300,000	$1,308,596,000
Kentucky	$640,759,832	$641,292,458	$662,229,000	$663,535,000	$664,841,000
Louisiana	$676,850,440	$677,413,014	$723,716,000	$732,032,000	$740,348,000
Mississippi	$466,416,067	$466,803,812	$473,662,000	$475,111,000	$476,560,000
North Carolina	$1,003,928,569	$1,006,630,450	$1,068,454,000	$1,070,099,000	$1,071,744,000
South Carolina	$605,456,365	$646,306,850	$657,754,000	$660,732,000	$663,710,000
Tennessee	$814,927,118	$815,605,297	$837,109,000	$837,807,000	$838,505,000
Virginia	$981,362,913	$982,180,040	$1,064,174,000	$1,070,610,000	$1,077,046,000
West Virginia	$421,447,021	$421,797,542	$430,170,000	$431,725,000	$433,280,000

*actual values reported in 2012 dollars

Table 7: Other Revenue Categories

	2013	2014	2015	2016	2017
Other State Imposts					
Georgia	$459,963,000	$476,081,000	$492,199,000	$508,317,000	$524,435,000
North Carolina	$593,002,000	$602,680,000	$612,358,000	$622,036,000	$631,714,000
Virginia	$715,953,000	$730,670,000	$745,387,000	$760,104,000	$774,821,000
Tolls					
Florida	$1,279,792,000	$1,319,317,000	$1,358,842,000	$1,398,367,000	$1,437,892,000

Table 8: Total Revenues*

	2013	2014	2015	2016	2017
Alabama	$1,791,588,008	$1,794,205,043	$1,827,754,000	$1,831,224,000	$1,834,694,000
Arkansas	$1,198,677,076	$1,196,971,166	$1,201,258,000	$1,200,976,000	$1,200,694,000
Florida	$7,510,991,634	$7,641,765,002	$7,971,798,000	$8,116,149,000	$8,260,500,000
Georgia	$2,661,479,087	$2,676,239,772	$2,753,729,000	$2,766,749,000	$2,779,769,000
Kentucky	$2,080,018,832	$2,074,731,458	$2,089,848,000	$2,085,334,000	$2,080,820,000
Louisiana	$1,632,955,440	$1,632,169,014	$1,677,123,000	$1,684,090,000	$1,691,057,000
Mississippi	$1,098,302,067	$1,088,813,812	$1,085,796,000	$1,077,369,000	$1,068,942,000
North Carolina	$3,943,716,569	$3,984,150,450	$4,083,706,000	$4,123,083,000	$4,162,460,000
South Carolina	$1,440,692,365	$1,492,792,850	$1,515,490,000	$1,529,718,000	$1,543,946,000
Tennessee	$1,959,864,118	$1,942,458,297	$1,945,878,000	$1,928,492,000	$1,911,106,000
Virginia	$3,783,404,913	$3,795,814,040	$3,889,400,000	$3,907,428,000	$3,925,456,000
West Virginia	$1,317,169,021	$1,322,102,542	$1,335,058,000	$1,341,196,000	$1,347,334,000

*includes federal transfer forecasts in Table 6 and adjusted total revenue forecasts

Using forecasted values for each of the three major revenue categories, as well as total revenues, we are able to calculate expected future revenue shares derived from each source over the same forecast time period (Tables 9-12). This calculation merely took the category's forecasted value for each future year and divided it by the forecasted value for total revenues for that year.

Table 9: Expected Future Revenue Shares Motor Fuels Tax

	2013	2014	2015	2016	2017
Alabama	37%	36%	35%	34%	34%
Arkansas	42%	42%	41%	41%	41%
Florida	33%	32%	31%	31%	31%
Georgia	18%	18%	17%	16%	16%
Kentucky	34%	34%	35%	35%	35%
Louisiana	37%	37%	35%	35%	34%
Mississippi	38%	38%	37%	37%	37%
North Carolina	45%	45%	44%	44%	44%
South Carolina	38%	36%	36%	35%	35%
Tennessee	44%	44%	44%	44%	44%
Virginia	25%	25%	24%	24%	23%
West Virginia	26%	26%	25%	25%	24%

Table 10: Expected Future Revenue Shares Motor Vehicle and Motor Carrier Taxes

	2013	2014	2015	2016	2017
Alabama	10%	10%	10%	10%	10%
Arkansas	12%	12%	12%	12%	12%
Florida	14%	14%	14%	14%	14%
Georgia	9%	9%	8%	8%	8%
Kentucky	27%	27%	26%	25%	25%
Louisiana	9%	9%	9%	9%	9%
Mississippi	13%	13%	13%	13%	13%
North Carolina	16%	17%	17%	17%	17%
South Carolina	14%	15%	15%	15%	16%
Tennessee	16%	17%	17%	17%	17%
Virginia	17%	17%	16%	16%	16%
West Virginia	21%	21%	21%	21%	20%

Table 11: Expected Future Revenue Shares Federal Transfers

	2013	2014	2015	2016	2017
Alabama	41%	41%	42%	42%	42%
Arkansas	42%	42%	42%	42%	42%
Florida	24%	24%	25%	25%	25%
Georgia	47%	47%	48%	47%	47%
Kentucky	31%	31%	32%	32%	32%
Louisiana	41%	42%	43%	43%	44%

Mississippi	42%	43%	44%	44%	45%
North Carolina	25%	25%	26%	26%	26%
South Carolina	42%	43%	43%	43%	43%
Tennessee	42%	42%	43%	43%	44%
Virginia	26%	26%	27%	27%	27%
West Virginia	32%	32%	32%	32%	32%

Table 12: Expected Future Revenue Shares for Other Categories

	2013	2014	2015	2016	2017
Other State Imposts					
Georgia	17%	18%	18%	18%	19%
North Carolina	15%	15%	15%	15%	15%
Virginia	19%	19%	19%	19%	20%
Tolls					
Florida	17%	17%	17%	17%	17%

If current revenue-generating regimes remain in place and are unaltered, there will be no significant real gains in revenue over the forecast time period. In fact, many states are forecasted to have small declines in fuel tax and motor vehicle and motor carrier taxes. As a result, the expected share of future revenues from the main revenue sources either holds relatively constant or declines by a few percentage points, with no significant deviations forecast. Certainly, over a longer timeframe their overall revenues may decline, and individual categories, which vary in their vulnerability to changing travel habits and fuel efficiency standards, may undergo marked shifts that could transform the composition of state transportation revenues. To continue this analysis, we now explore literature on what alternative options are available for states.

POTENTIAL REVENUE ALTERNATIVES

If policymakers determine that their state's current revenues will not produce enough future revenue, then they will need to consider alternative revenues and funding sources. A number of proposals for alternative revenue sources have been advanced in the literature and attempted or piloted by state governments. We review these and discuss potential challenges related to their implementation below. Given that some state revenue relies on the HTF, we examine it first, followed by various proposals, including some that have been tested at the state level.

Preserving the solvency of funds like the HTF is critical to meet transportation funding needs. The Government Accountability Office (GAO) has published some possible reforms and revenue restructuring alternatives to bolster the future viability of the HTF. These proposed reforms are highlighted here, as they provide insight into possible future changes, both to the HTF and, perhaps, for state funds as well. They include (1) boost the return on investments in transportation by improving the disbursement and impact of funds, (2) changing revenue sources and accounting for inflation, and (3) supplementing traditional revenue sources to the states by providing alternative financing solutions, such as bonds, loans, or credit assistance (GAO, 2009-b). The National Surface Transportation Policy and Revenue Study Commission of 2007 also recommended practices such as increasing motor fuel tax rates by five to eight cents per gallon

each year for five years, instituting new fees on freight, reinstating interest payments on invested balances, and reducing tax evasion. Industry groups have also proposed increasing current excise taxes, which could generate additional revenues, while the GAO encourages the use of additional indicators that may help predict revenues, and thus quickly identify potential revenue changes or shortfalls such that policymakers have sufficient time to take action. Proposals for alternative funding sources have also included the HTF (CBO, 2011-a; GAO, 2012). We discuss these types of funding structures within the context of state-level alternatives.

A number of proposals have sought to alleviate the pressure current revenue sources are exposed to by using reforms to create incremental gains and extend the solvency of these traditional sources. While these may not be considered "alternative" funding sources, they represent a departure from the current funding structures and administrative practices. Fuel tax evasion is a problem that results in up to five percent in lost revenues for state gas taxes (Denison et al., 2000). Increased enforcement efforts are likely to reduce evasion levels. Additionally, exempting certain users reduces revenue and could be eliminated or more strictly enforced. As noted, inflation has eroded purchasing power of tax revenues that are not indexed at the state level as well. Indexing fuel taxes to a measure of inflation, such as the Consumer Price Index or a construction cost index can mitigate the erosion of revenues due to escalating costs.

Over the past several years, as policymakers have sought ways to alleviate strained budgets and meet demand, research into alternative funding mechanisms at the state level, as well as the local level, has increased substantially (Goldman & Wachs, 2003). When evaluating the potential of new revenue sources several criteria may be considered in order to provide sufficient funding to meet state transportation needs into the future while ensuring that equity is maintained. To that end, when considering a new funding source, policymakers must determine whether the new funding source will yield similar revenue levels as traditional sources, or if higher revenue yields are needed to satisfy unmet needs. Oregon's Road User Fee Task Force identified criteria that a new revenue source should meet. The criteria, as detailed by Whitty (2007), include:

- Users paying for the infrastructure;
- Local government autonomy over traditionally local revenue sources;
- Sufficient revenues to replace the current revenue structure;
- Transparency;
- Minimize the burden placed on citizens and those business entities that may be required to collect taxes or fees;
- Minimize evasion; and
- Public opinion should be favorable.

The National Surface Transportation Infrastructure Financing Commission (2009) also denoted a number of evaluation criteria that can be used when assessing alternative funding mechanisms. The list of criteria include:

- Determining revenue generating potential;
- Sustainability of the alternative source in the future;
- Political feasibility;
- Implementation and administration cost and efficiency; and
- Promotion of efficient infrastructure use.

The Commission encourages evaluation based on several equity measures such as social and spatial while ensuring that alternative options promote safety and address externalities like pollution and noise. After identifying varying sources that may meet some of these criteria, states may want to further evaluate their options by researching the underlying components of each proposal. Steps that are likely to be undertaken during this process include the following (Rufolo, Bertini, & Kimpel, 2001):

- Should an alternative pricing system continue utilizing the fuel tax or discontinue it;
- Whether out of state mileage should be taxed;
- Accounting for social costs such as pollution in pricing;
- Length of time for conversion to alternative scheme;
- Instituting variable pricing during periods of increased travel;
- Level of desired administrative costs; and
- Technology needed and privacy concerns.

Penner, Dahl, and Derthick (2006) described an optimal system in these terms: "Ultimately, in the fee system that would provide the greatest public benefit, charges would depend on mileage, road and vehicle characteristics, and traffic conditions, and they would be set to reflect the cost of each trip to the highway agency and the public" (p. 4). The CBO (2011-b) focuses on economic efficiency through user fees "when users of highway infrastructure are charged according to the marginal (or incremental) cost of their use, including external costs that are imposed on society" (p.6). Transitioning from one revenue source to another, and the process involved, must also be considered by policymakers (Transportation Research Board, 2006). The "principles of reform" to guide any changes in revenue structures were also identified and are listed here:

- Maintain focus on user fees as a means for financing infrastructure;
- Apply pricing when possible;
- Align federal, state, and local government responsibility; and
- Ensure equity and environmental considerations when reforming revenue structures.

Various options for state-level reforms are listed in The National Surface Transportation Policy and Revenue Study Commission of 2007, including indexing fuel taxes for inflation; increasing taxes and levying new fuel sales taxes and vehicle sales taxes if applicable; increase registration fees, vehicle miles travelled (VMT) fees, or mileage fees. The Commission's report evaluated various options based on rating criteria such as adequacy, stability, equity, and ease of implementation among others in Exhibit 5-20 with more detailed discussions in Exhibit 5-21 (p.5-38, 5-39). Several options were ranked as good, including VMT fees, tolling, and vehicle sales taxes, while only indexing fuels taxes was rated very good. One of the alternatives recommended as a short-term fix, indexing the fuels tax, may not have good long-term viability (Costa, Plotnikov, & Collura, 2013). Still, a number of states have adopted this measure to ensure that rates keep pace with inflation, although others have adopted standard tax increases (Burwell & Puentes, 2009). Pulipati and Mattingly (2014) use preference rankings to analyze different funding options, such as increasing fuel taxes, sales taxes, or utilizing a VMT fee, concluding that "Due to their stronger performance with respect to ease of implementation,

equity and public acceptance, the authors recommend increasing the fuel tax steadily and tolling all new freeway capacity; while gradually moving towards congestion based tolls on all toll roads as the set of future funding options requiring further investigation" (p.2).

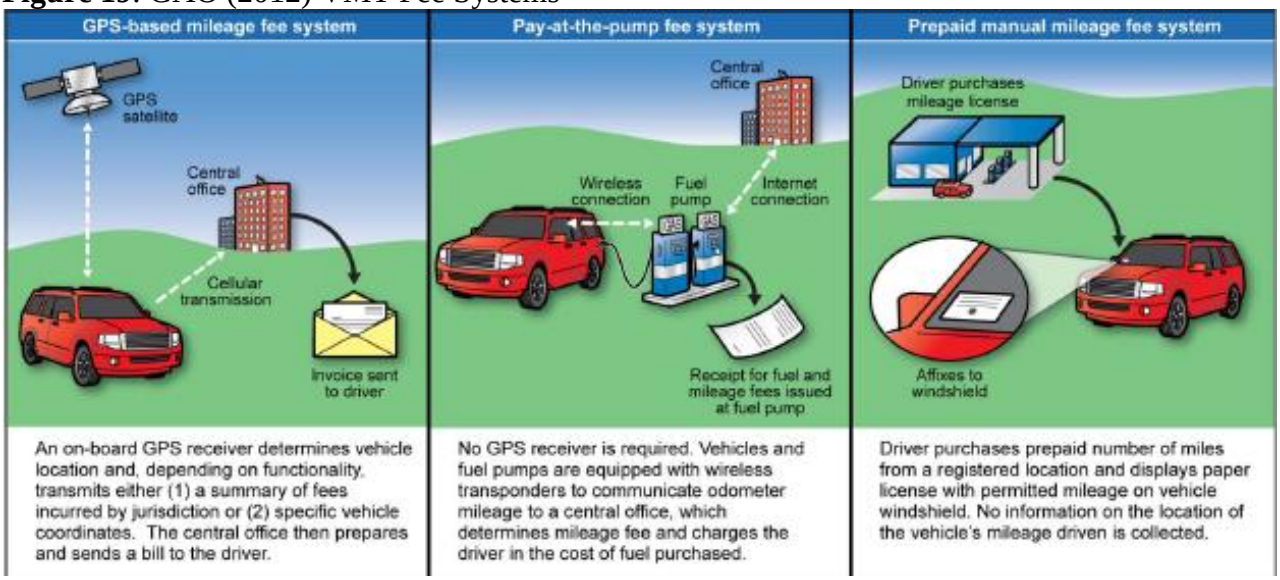
A review of the literature on alternative transportation revenue options resulted in three main options that are highlighted. Literature and reports on VMT fees, Tolling, and Public Private Partnerships are synthesized. We focus on each of these options in their own section, with an additional section on other alternatives or state-specific options that are not as prominently featured in the literature.

Vehicle Miles Travelled Fees

Although most funding comes from fuel taxes, the costs of maintaining highways may be more closely linked to miles travelled rather than simply the amount of fuel being consumed. Shifting to a VMT fee carries benefits, including reduced congestion, road deterioration, and emissions, while boosting secondary values, like mileage based insurance costs and safety improvements (Sorenson, Ecola, & Wachs, 2013). Rufolo, Bertini, and Kimpel (2001) compared VMT taxes to fuel taxes: "Similar to the fuel tax, a VMT fee is directly related to vehicle use; provides a stable and predictable revenue stream; and is subject to similar problems regarding inflation. Revenues from a VMT fee are not adversely affected by the proliferation of alternative fuel vehicles or improvements in fuel economy" (p.11). VMT fees are more likely to adequately capture driving externalities as well (Parry, Walls, & Harrington, 2007). Donath et al. (2009) estimated that producing revenues equivalent to those realized by the HTF in 2006 would require a national VMT fee structure that charges a fee of 1.13 cents per mile (see GAO (2012) p.22-29 for a discussion of international systems in Germany and New Zealand). This kind of system would encourage drivers to consider costs and benefits when making driving decisions and to only drive when they perceive the benefits as outweighing the costs, thus potentially reducing congestion by encouraging drivers to travel more efficiently.

A VMT fee can be levied at a flat or variable rate, however, a flat rate does not account for travel time and location (Rufolo, Bertini, & Kimpel, 2001), thus a variable rate may be preferable. However, the technology needed to track time and location in order to implement a variable rate raises privacy concerns. The National Surface Transportation Policy and Revenue Study Commission of 2007 observed that a VMT fee could be applied equally regardless of fuel efficiency and rates could be adjusted based on congestion levels. Vehicle weight, a factor that impacts road conditions, merits consideration as well. Fee structures can also be adjusted between rural and urban areas (Beider, 2011) as well as time of day. This structure would combine congestion pricing aspects with VMT fees, but the administrative and technological expenses are currently prohibitive (Burwell & Puentes, 2009). The simplest form of a VMT fee involves performing odometer readings when vehicles are registered or inspected; self-reporting is not reliable due to the inconsistencies and evasion likely to occur (Bertini, Rufolo, & Kimpel, 2001; Burwell & Puentes, 2009). However, VMT fees based on odometer readings may lead to higher levels of evasion (Wilbur Smith Associates, 1997). Another measure to charge fees is automatic vehicle identification, where readers located on roads monitor vehicle travel and calculates taxes based on that information (Rufolo, Bertini, & Kimpel, 2001). Figure 19 presents GAO-developed illustrations of three potential VMT fee systems.

Figure 19: GAO (2012) VMT Fee Systems



Source: GAO (2012), Figure 6, p.15

GPS-based systems were cited as the most optimal to ensure efficient roadway use because they enable governments to charge based on road usage and the time of day travel occurred. Still, privacy concerns may limit the use of this option, in which case a pay at the pump or prepaid system could be utilized. However, this lacks the same pricing options as a GPS system.

Some of those VMT fee alternatives were noted along with others by Costa, Plotnivkov, and Collura (2013) including: "1) collection using an onboard diagnostic system (OBD) (which is a plug in device that gathers information and calculates total mileage); 2) collection at the fuel pump using an OBD in conjunction with GPS technology; and 3) collection at a vehicle inspection station using the OBD." Each of these VMT alternatives is ranked low, medium, or high by the authors to denote their promise and possibility for success. They use an impact and challenges matrix that contains metrics such as revenue potential, cost, coverage, efficiency as measured by congestion reduction and efficient use of roads, security costs, operations costs, to evaluate the viability of implementing specific alternatives. Estimating capital and operational costs and using several net present value calculations and mileage rates, Costa, Plotnivkov, and Collura determined that vehicle inspection stations in conjunction with OBDs would provide the greatest return on investment. Other factors, such as the ability to join congestion pricing features to standard VMT fees, may eventually trump the greater costs and privacy concerns of fuel pump collection using OBDs and GPS-based systems.

Before installing a VMT-based fee system, state governments would need to determine the tax rates, which could be based on the type of vehicle and usage; these can be measured in either time or distance (Buxbaum, Griffith, & Opiola, 2013). If privacy concerns arise, this could complicate reporting requirements and lead to the use of numerous tracking methods. Buxbaum et al.'s (2013) assessment of potential VMT fee systems in Washington resulted in eight options, divided based on usage, and either time or distance. Their VMT fee options are reproduced and shown in Table 13.

Table 13: Time and Distance Based VMT Fee Structures

Time-Based Concepts	
1. Time Permit	Purchase unlimited road network access for a set period of time.
2. Engine Run Time Charge: In-vehicle device, aftermarket device with cellular reporting, aftermarket device using smartphones	System detects engine run time over a set period and reports charges automatically.
Distance-Based Concepts	
3. Mileage Permit	Purchase a license to drive a certain number of miles.
4. Estimated Annual Mileage Permit with Reconciliation	Pay for estimated mileage for a set period, then reconcile the account based on actual distance driven periodically.
5. Simple Odometer or Other Mileage Reading	Principal reports mileage at the end of a period and pays the corresponding amount owed.
6. Automated Mileage Reporting	System detects mileage traveled and reports charges automatically at the end of a period.
7. Automated Mileage and General Location Measurement	System detects mileage traveled by geographic zone over a set period of time and reports charges, with rates set by zone.
8. Automatic Mileage and Specific Location Measurement	System detects mileage traveled by geographic zone over a set period of time and reports charges, with rates set by road type.

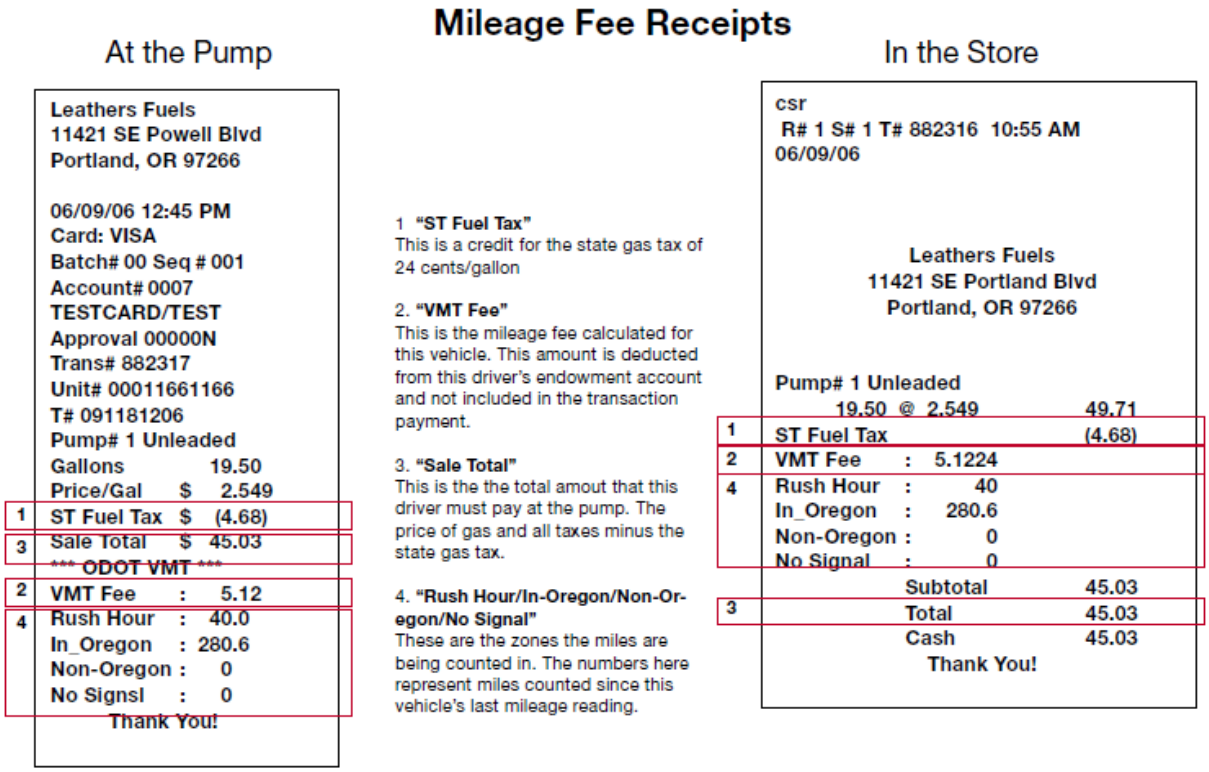
Source: Buxbaum, Griffith, and Opiola (2013), Figure 4, p.282.

The array of VMT fee options presented demonstrates that states considering such a system have a significant number of possibilities to explore. Buxbaum et al. argued that moving to a VMT-based fee system was feasible in Washington, but also that continued evaluation was necessary. The GAO (2012) surveyed state departments of transportation and found unanimous interest in alternative revenue sources, yet only eight were planning to explore a VMT-type fee in the next 10 years.

Penner, Dahl, and Derthick (2006) encouraged states to test VMT fees as a new revenue source. Since then, pilot programs have been tested in Oregon and Minnesota. Oregon established a Road User Fee Task Force in 2001, with the objective of "designing a new revenue collection strategy that could replace the gas tax with a long-term, stable source of funding" (Whitty, 2007, p.1). The state ultimately chose to test a pilot program for VMT fees by equipping vehicles with GPS devices. The GPS systems recorded the number of miles driven, the time of day driving occurred, and where the vehicles traveled – which is necessary given that user fees were not uniform across the state, but rather varied based on geographically-delineated zones. The program was revenue neutral, meaning that the VMT fees would be equivalent to the gas tax applied to mileage rather than to use. Charges were then levied at gas stations where data were

collected. Figure 20 depicts a sample receipt that summarizes VMT fees.

Figure 20: Oregon Sample VMT Fee Receipt



Source: Whitty (2007), Figure 3-2, p. 20

Whitty (2007) discussed the key findings of the pilot program. Critically, the concept of a mileage based fee as an alternative to the gas tax proved viable and could be gradually phased in if the state chose to do so. The results indicated that privacy would be protected, businesses would not bear an undue burden, and the probability of evasion was low. Further, the study indicated that implementing and administering the system would not be too burdensome, financially. To continue shifting toward a VMT fee rather than the traditional gas tax, the next steps would involve the progressive development and refinement of the needed technologies as well as resolution of multi-state travel issues.

As part of the National Evaluation of a Mileage Based Road User Charges, a component of the 2005 Safe Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), a study was conducted to investigate the technical viability of levying mileage fees as well as user attitudes (Hanley & Kuhl, 2011). Over 2,500 volunteers across 12 evaluation sites in the U.S. were equipped with onboard GPS systems, which gathered mileage information and transmitted it to a billing center. Study participants received monthly invoices to simulate the experience of a VMT fee structure. The technology used performed as expected over 90 percent of the time. Miles not registered by the GPS systems were interpolated. Participants were also surveyed during the course of the study to elicit their opinion of the system. The favorability of the system tracked upward during the course of the study, rising from 41 percent at the outset to 70 percent by the time it concluded. Despite privacy concerns, individual

participants preferred at least some level of detail and auditability for the monthly charges.

Minnesota recently tested a mileage-based user fee (MBUF) system, which is another term for a VMT fee, using GPS applications on smartphones to gather information. The Minnesota Legislature authorized this study in 2007, allotting $5 million with the goal of examining technologies that could be used to replace the fuel tax with a revenue-neutral mileage fee. Travel corridors and signage zones were identified in the testing area around Minneapolis-St. Paul to implement variable pricing from $0.01 per mile to $0.03 per mile. Study participants largely endorsed the monthly invoices, and privacy was not cited as a significant concern; participants also preferred that alternative revenue structures be simple and streamlined in their application. Participants were divided, however, on whether they favored fuel taxes or the alternative mileage fees.

VMT fee proposals are not without challenges, such as privacy concerns and administrative concerns including collection efforts and management of potential system errors. Concerns over VMT fees surround the methods used to collect information and how those data may be used. A critical administrative hurdle to overcome is devising strategies to make the complex task of monitoring thousands of vehicles simultaneously logistically feasible. The use of GPS systems raises privacy concerns and cross-border travel adds to the challenge of accurately tracking vehicles at the state level. Another key issue to address is the cost of installing GPS systems in all motor vehicles (GAO, 2012). VMT fees based on odometer readings are problematic because they may promote increased evasion through tampering; a GPS-based method is thus essential. Determining the pricing structure of a new VMT fee to raise sufficient revenue and achieve any additional goals, such as congestion reduction, may pose difficulties because state agencies are relatively inexperienced in this area. (Transportation Research Board, 2006). Political considerations and the expenses associated with each method may drive future deliberations about VMT fees (Rufolo, Bertini, & Kimpel, 2001). Buxbaum et al. (2013) identified various issues that must be considered when transitioning from the gas tax to a VMT-based fee system. The main issues included technological considerations, compliance, policy, organization, attitudes, and implementation costs.

When pursuing a transformative shift in transportation funding, there are likely to be a number of obstacles. VMT fee challenges include cost considerations and public concerns over privacy. But securing public support will ease the transition from one revenue structure to another. Sorenson, Ecola, and Wachs (2013) noted several strategies that can be used to increase future revenues, reduce costs, increase public support, and/or lower public opposition (p. 16). These are listed below:

- Conduct trials and educational outreach
- Include elected officials in trials
- Engage stakeholders in system planning
- Enroll privacy watchdogs
- Begin with a simple odometer based system
- Provide drivers with a choice of technologies
- Make mileage fees a smartphone app
- Design the system to support value-added features

- Integrate with ITS investments
- Encourage competition among vendors
- Institute a transition with voluntary adoption
- Focus initially on alternative-fuel vehicles
- Provide a fixed-fee option
- Convert other funding mechanisms to per-mile fees
- Work with other states to develop a multijurisdictional system

Administrative changes will also need to accompany the transition to a VMT fee system, especially in the areas of account management, usage management, compliance and enforcement, and road usage authority (Buxbaum, Griffith, & Opiola, 2013). Three important components of the process will be the road use assessment or collection of data, the determination of the fee for usage, and the communication of data between the vehicle and the administrative office (Bomberg, Baker, & Goodin, 2009). Part of the fee process will be determining how to coordinate a multi-state effort to deal with vehicles travelling across multiple states. Monitoring individual vehicles will add complexity and potentially increase administrative costs; a corresponding increase in collection points as compared to traditional funding sources, such as motor fuels taxes, is likely as well. For example, a pay at the pump VMT fee system would be as costly and logistically challenging as outfitting gas stations across the country with the necessary equipment would be time consuming and expensive (GAO, 2012). Outside of increased administrative responsibilities, jurisdictional issues from out-of-state travel may also provide a barrier to VMT fee system adoption. Goodin, Baker, and Taylor (2009) developed a list of potential barriers to implementation including some already noted. They also identified public acceptance, equity, and potential enabling legislation among others. Buxbaum et al. used several criteria, including convenience, implementation, transparency, stability and sustainability of the revenue stream, privacy, equity, flexibility, choice (amount of information collected, payment options, technology), and out of state travel measures to evaluate whether various VMT fee systems are practical; these can presumably be applied in other states wishing to evaluate this type of alternative funding approach.

When developing a VMT fee system Goodin, Baker, and Taylor (2009) identified several attributes that are desirable in a new system. Clear program goals and attainable time frames for implementation are needed to ensure a smooth transition. Program goals should include insuring the revenue base against erosion, increasing current revenue levels, and charging users for the costs incurred from using the transportation system. Additionally, flexibility in the administration of the system from a state and/or local perspective will provide administrators with the ability to adapt to unforeseen conditions. Finally, securing federal financial assistance if needed will ensure that transition costs will be funded. Implementation strategies were also identified to assist with a transition to a VMT fee system. These bullet points are listed here (p.45-46):

- Federal government involvement with policies, legislation, and financial support while state governments utilize pilot projects;
- Consortium or commission formed to guide implementation;
- Federal government leads but states move to address their own needs at their own pace;
- Either utilize an interim system based in the Department of Motor Vehicles in the short

term or a longer term incremental transition; and
- Listening to public feedback.

Tolling

Tolling is an alternative funding mechanism that has been more widely used, with technological advancements improving administration (Rufolo, Bertini, & Kimpel, 2001) and public attitudes being largely receptive (NCHRP, 2008). Tolling has been used as a source of capital to finance new construction and is reliant on demand forecasting (NCHRP Synthesis 364, 2006), however, opposition frequently arises when there are proposals to toll roads that are not currently tolled. The use of tolling has been analyzed to some extent and remains a potential funding source under consideration in some states (Vock, 2010; Hackbart et al., 2005). Burwell and Puentes (2009) noted that more states have incorporated tolling, and explained the changes: "Since the 1990s, several factors have led to resurgent interest in tolling. These include (1) revenues from fuel taxes rising more slowly than program costs, (2) widespread adoption of technological advances in electronic toll collection systems, and (3) the interest in pricing schemes to reduce demand and improve system performance by efficiently allocating scarce road space" (p. 17). Electronic tolls simplify the imposition of variable pricing and have low evasion rates (Crabtree, Wallace, and Mamaril, 2008; Forkenbrock, 2000). In states that use tolls, the revenue collected often goes into improving the infrastructure (e.g., road or bridge) it is collected on. In 2010, tolling revenues for state-administered roads amounted to slightly under $24 million.

Most states require that tolls be established through legislation. According to the Federal Highway Administration (FHWA), the toll legislation often contains the following provisions:

- creation of an authority or commission,
- scope, purpose, and function of the entity,
- definition of terms,
- delineation of the district within the entity operates,
- details about the entity's governing board,
- the legal powers of the entity,
- the authority to issue bonds and use tolls,
- authority to set and revise tolls,
- ability to invest bond proceeds,
- administrative requirements (audits, annual reports, etc.),
- constraints on the use of the funds,
- rights and remedies of bondholders,
- tax-exempt status of the entity's property and bonds,
- venue and jurisdiction for legal actions,
- police powers,
- operating, maintenance and repair obligations, and
- relationships with other entities (FHWA, 2011, p.3).

States can consider a number of options for toll pricing (Peterson & MacCleery, 2013). Cost pricing is a method of setting tolls to cover the cost of building and maintaining infrastructure. Value pricing is another option. It involves varying the tolls charged based on congestion levels

and thus functions as a proxy for the value individuals derive from travel, whether this is in terms of avoiding heavy traffic or procuring other travel advantages. Various types of tolling arrangements have been examined by the FHWA, from those that are entirely public to those that are public-private partnerships and those that are purely private enterprises. There are other variations on tolling, such as high occupancy toll (HOT) lanes and truck-only toll lanes, which do not toll entire roadways (Transportation Research Board, 2006). When instituting tolls on previously untolled roads, forecasting travel demand and future revenues under various pricing structures is a key for determining the viability of such changes (Berliner, Collura, & Gao, 2013; NCHRP, 2006). A Transportation Research Board (2006) report identified tolling as a method for "practical reform." While tolling was not necessarily anticipated to increase funding in this study, the report argued it could serve to reduce congestion and accelerate capital construction. The National Surface Transportation Policy and Revenue Study Commission of 2007 recommended that the federal government provide increased flexibility so that state and local governments could introduce new tolling and pricing options, such as interstate tolling and congestion pricing.

A more sophisticated method similar of tolling, congestion pricing, is a system in which users are charged fees that accurately reflect the costs of their driving. This would result in higher costs during peak travel times, thus encouraging more off-peak trips and helping to ease congestion on highways. The Transportation Research Board (2006) provides a description of congestion pricing and the methods by which it can be levied.

> "Peak pricing or congestion pricing is any scheme that imposes charges that are higher for travel on congested roads or during times of peak congestion than under uncongested conditions. The charges reflect the delay cost that each user imposes on other users during the peak. Peak pricing can take the form of a per-mile charge that depends on the time of day or the actual current congestion on a road, or it can take a simpler form such as the London congestion charging scheme under which motorists pay a fee to enter a central city zone" (p. 75).

Congestion pricing demands technologies that can accurately evaluate traffic conditions and set prices accordingly, unless prices are fixed based on time of day. When using congestion pricing, setting the price to accurately reflect the demand is a key principle to ensuring the success of the pricing scheme. "The core principle of congestion pricing is that the price of accessing available roadway capacity should be higher at the places and the times of day when demand for highways (and thus the benefit from using them) is greatest" (Burwell & Puentes, 2009, p.19). Congestion pricing can thus reduce peak demand and the resultant congestion by discouraging non-essential trips. Potentially negative impacts from congestion pricing can arise if one road is overpriced, causing spillover onto other roads (Rufolo, Bertini, & Kimpel, 2001). The FHWA (2006) also noted that congestion pricing may be referred to as value pricing, and that by using market pricing non-essential rush hour travel can be shifted to other times or modes. Like other forms of tolling, the fees for congestion pricing are collected in using electronic collection technology.

As with tolling, varying types of congestion pricing can be used. Congestion pricing can be levied on an entire road, an existing lane, new lanes, and a cordoned area, i.e. a city center. Four types of congestion pricing options are detailed by the FHWA (2006) including: variably priced lanes (such as High Occupancy Toll [HOT] lanes), variable highway tolls (based on time of day

and traffic volumes), cordon charges, and area-wide charges. Several federal programs also support the concept of congestion pricing (FHWA, 2006, p.8). From an environmental and equity perspective, Burwell and Puentes (2009) identify "area-wide congestion pricing" as the most attractive pricing structure.

Public-Private Partnerships

Public-private partnerships (P3s) have gained popularity in recent years (Slone, 2012). Currently, 33 states have laws that allow these partnerships (Bahrevar, Shane, & Jeong, 2014). Although these alliances between governments and private firms may have a financing angle to them, there are cases where they may serve as a direct source of funding for projects with a revenue component designed to finance construction. The Federal Highway Administration (FHWA) defines P3s as follows: "Public-private partnerships (P3s) are contractual agreements formed between a public agency and a private sector entity that allow for greater private sector participation in the delivery and financing of transportation projects." The National Council for Public Private Partnerships (NCPP) has a similar definition of P3s: "A Public-Private Partnership (P3) is a contractual arrangement between a public agency (federal, state or local) and a private sector entity. Through this agreement, the skills and assets of each sector (public and private) are shared in delivering a service or facility for the use of the general public. In addition to the sharing of resources, each party shares in the risks and rewards potential in the delivery of the service and/or facility."

When considering P3 implementation, there are several factors that may be considered. The NCPP lists seven factors that they consider to be best practices that are important to the success of P3s:

1) Having a public official as a proponent;
2) Statutory environment for each P3 implementation;
3) Dedicated public sector team to monitor the progress of P3s from start to finish;
4) Detailed contract;
5) Defined revenue stream;
6) Support from stakeholders and the public; and
7) Careful screening of potential P3 partners.

The list of possible stakeholders and decision makers in P3 projects is detailed by Rall, Reed, and Farber (2010) and includes legislators and other high profile public officials, the public sector agency tasked with overseeing the project, potential funders and equity holders, various advisors in the process such as legal and financial, and voters, users, and/or taxpayers. The Virginia Department of Transportation has six phases in its review process of P3s (Buxbaum and Ortiz, 2007).

1) Quality Control: does the project meet a need; will the project be done efficiently and save money?
2) Independent Review Panel: panel of transportation officials and other affected organizations review and then provide recommendations of proposals for a detailed review and solicitation of public comments.

3) Oversight Board Approval: Commonwealth Transportation Board reviews and determines if the proposals recommended by the review panel should continue the process.
4) Submission and Selection of Detailed Proposal: A Proposal Review Committee will examine the recommendations from the Independent Review Panel and Oversight Board and subsequently request detailed proposals. After review of the detailed proposals, the Department of Transportation can choose to select proposals for negotiations.
5) Negotiations: If the project passes the previous steps then negotiations regarding revenue returns, length of agreement, and other contractual issues are negotiated.
6) Agreement: When language is agreed upon by both parties, then the Attorney General reviews and approves. Final approval is required by the Secretary of Transportation.

Yusuf, Wallace, and Hackbart (2006) list decision making criteria that can be used to determine the type of P3 most suitable for a project. The criteria focus on the financing source, complexity of the project, level of project specificity, and the method of private partner selection. If the criteria lead to a P3 then they list three categories of "success factors" related to P3s which are: the process of developing a P3, the selection of a private partner, and the structure of the partnership and its management. Process factors involve the initial steps toward using a P3 including the economic justification and the organizational leadership and support needed to facilitate the public private relationship. Selection defines the processes used to choose a private sector partner such as solicited bids and the type of contract chosen. Structural factors such as defining roles and developing performance and accountability measures as part of a contract will ensure that all stakeholder roles are well defined.

The FHWA denotes several types of P3 models. We use the FHWA descriptions to identify models that include a funding aspect. Design Build Finance (DBF) encompasses design, construction, and some level of financing from the private sector. This represents the first new construction option that utilizes upfront private capital to finance infrastructure projects. Ownership and maintenance and operations still remain the government's responsibility, as does the project conception. FHWA cites two reasons for using the method of procurement: cash flow limits and need to defer payment. As these arrangements are considered deferred payments rather than debt, any issues with debt limits are avoided.

Design Build Finance Operate Maintain Concession (DBFOM) continues towards increased private sector involvement. In this option, design, construction, financing, and operations are all undertaken by private sector partners. Rather than using deferred payments, the financing is backed by future revenue streams associated with user fees such as tolls. This may expose private partners to revenue risk for new infrastructure construction if forecasted traffic does not meet projections. The FHWA specifies two types of DBFOM arrangements that have been used in the U.S. Real toll DBFOM concessions use tolls generated by users of the infrastructure as the main revenue source. The private partner collects these revenues during the concession period. The public sector may still be financially involved, through right of way assistance or some level of revenue guarantees. There may also be public protections in the event that revenues exceed a threshold resulting in revenue-sharing between the public and private sectors. Availability payment DBFOM concessions leave the financial risk on the public sector. The government entity is responsible for payments to the private sector for their work to design, construct, and operate the infrastructure. This allows the public sector to essentially finance

construction and maintenance of infrastructure without having to issue debt. Payments may be based on certain markers such as construction timelines and operating standards and may be secured by appropriations or pledges of future revenue. These types of arrangements may be used when tolls are not part of the financing plan. Two DBOFM projects and one DBF project that are highlighted by the FHWA are detailed in order to provide examples of how P3 funding is utilized.

State Highway 130 (Segments 5 and 6)- Austin, Texas

Segments 5 and 6 of State Highway 130 are a 41 mile four-lane highway in Central Texas. When Segments 5 and 6 were completed in 2012, SH-130 provided a 91 mile toll road, offering congestion relief from I-35 in Central Texas. Segments 5 and 6 of SH-130 provide open road electronic tolling. As the first privately developed, operated, and maintained open toll road in Texas, the Texas Department of Transportation and their private partner, SH 130 Concession Company, LLC, signed a comprehensive development agreement in 2007, under a 50 year toll concession. Toll rates are evaluated each year, and adjusted based on the performance of the state's economy. In September 2014, toll rates were raised to $6.98 to travel the 41-mile length of highway for light-weight vehicles.

I-595 Corridor, Broward County, Florida

The I-595 express corridor improvement project, an example of a DBFOM model with availability payments, is designed to improve driving conditions along I-595. In 2009, the Florida Department of Transportation signed a P3 agreement with I-595 Express, LLC to serve as the concessionaire to the I-595 corridor improvements project for 35 years. The reconstruction and widening of the I-595 mainline and associated improvements to frontage road and ramps will cost approximately $1.83 billion for the 10.5 mile stretch of I-595, where the major component of the project is the construction of the I-595 Express.

To assist in keeping I-595 express from becoming congested with vehicles, the toll amount on the roadway fluctuates throughout the day, where tolls are higher during peak periods when demand is greater. Although I-595 Express, LLC is responsible for designing, building, financing, operating, and maintaining the roadway, the Florida Department of Transportation is responsible for setting the toll rates and retaining the toll revenue, as it makes payments to the concessionaire. Toll collection began in April 2014, and the first interest payment is scheduled to begin in December 2014. Principal payments are scheduled to begin in 2031.

Northwest Corridor, Atlanta, Georgia

The Northwest Corridor project will extend 29.7 miles along I-75 and I-575 and will provide more reliable travel times though the use of congestion-based tolling when complete in 2018. The managed lanes in the Northwest Corridor will be constructed via a DBF agreement between the Georgia State Road and Tollway Authority and the private partner, Northwest Express Roadbuilders. Georgia's Department of Transportation is responsible for the oversight of the design and construction of the facility and will provide for the long-term operations and maintenance of the highway. Costs for the Northwest Corridor are approximately $833.7 million, which is being funded using a combination of developer funds and state funds.

Northwest Express Roadbuilders began their design of the Northwest Corridor in December 2013 and construction is expected to begin in October 2014.

Other Options

Outside of the three main options detailed above, there are some other state-level options and that deserve mentioning. Several state-specific reports have developed options for individual states, and while all of these are not necessarily "alternative," they do provide insight into options that some states may consider. Additionally, options that have not received as much research in the literature are noted.

Arkansas's Blue Ribbon Committee on Highway Finance (2010) listed a number of recommendations for increasing revenues. Some of these recommendations involved changes to current revenue sources, while others instituted new revenue options. Changes to current revenues included eventually dedicating sales tax revenue from vehicle sales and parts to the Highway Fund, a 0.5 cent sales tax increase to back a bond issue for highway construction projects, and indexing the current excise tax to the state's construction cost index. A new revenue option proposed was to levy a new excise tax on the wholesale price of fuel.

London et al. (2003) listed several funding sources for South Carolina to consider as a supplement to current sources or as potential replacements. They listed VMT fees, road damage taxes, development impact fees, congestion fees, alternative fuel taxes, environmental fees, and local options. Road damage taxes would be similar to Kentucky's weight-distance tax previously discussed, where taxes are levied based on the weight and mileage of vehicles which translates to pavement wear and tear. Development impact fees are imposed on new developments to ensure that new infrastructure required to service new developments is funded, while environmental fees could be assessed on a per gallon basis as an excise tax or vehicle inspection. London et al. recommend raising and indexing the fuel tax while encouraging the state to be proactive in exploring future options such as VMT fees.

Hackbart et al. (2005) identified six alternative funding sources for Kentucky, including adjusting the indexing formula of the fuels tax, eliminating road fund tax expenditures, levying a usage tax on vehicle repairs, using tax increment financing, having a vehicle enforcement fee to add to current fines and penalties with proceeds going to fund safety operations, and tolling. Eliminating road fund expenditures would limit erosion of the taxable base and provide more equitable treatment of all users. Tolling to develop revenues for new projects would be best for large bridge projects and limited access highways. An example of this is the Louisville Southern Indiana Ohio River Bridges Project (LSIORB). LSIORB is an infrastructure initiative designed to improve interstate mobility across the Ohio River between Indiana and Kentucky. The project involves a downtown crossing and rehabilitation performed by Kentucky, and the construction of a new span on the east end of Louisville. Kentucky's responsibilities are of most interest here. The level of needed project investment has required an innovative funding approach – Kentucky has issued bonds backed by future tolls. Tolls will be collected on the downtown crossing being constructed by the Kentucky Transportation Cabinet, which represents tolling of new capacity on a new northbound bridge; tolls will be imposed on the rehabilitated capacity on the Kennedy Bridge (southbound after project completion) as well. The results of this funding model will be instructive for other states that face similar infrastructure challenges. This type of funding

approach has also been used for the Dominion Boulevard project in Chesapeake, Virginia, as well as for the I-495/Capital Beltway HOT lane in northern Virginia.

As part of its statewide transportation plan, North Carolina developed revenue enhancement options that included VMT fees and tolling on interstates in an effort to improve the quality of service. Other states may wish to consider similar efforts as part of the statewide transportation plans. Williams (2006) also identified some alternative strategies for North Carolina including transportation corporations, tax increment financing, fair share mitigation, and concurrency. Corporations "allow private individuals and local governments to form non-profit corporations for the planning and development of transportation projects. These corporations primarily focus on achieving or expediting major transportation projects and are governed by a board of directors, under the oversight of a state transportation commission" (p. 3). Tax increment financing backs transportation projects with anticipated revenue growth from predevelopment in a particular area. Fair share mitigation requires developers to mitigate the impact of development on transportation infrastructure. This is accomplished by requiring the developer to contribute to improvements that may be necessary to accommodate additional growth. Finally, concurrency seeks to manage growth and public infrastructure by defining service levels and placing some responsibility on developers, similar to fair share mitigation. Some of these strategies may require a local component, but the state may also be involved.

Some states have reduced their ownership of roads by returning them to local governments. While this is not a revenue source per se, it alleviates some of the burden on state funds and transfers roads that "do not fit the state's role in the highway network." This will free up state resources to focus on transportation projects that support economic growth and freight movement. Louisiana's Road Transfer Program[4] seeks to reduce the state's portion of state-owned roads from 27 percent of public road miles to the national average of 19 percent. As part of the program, roads that are graded as less than fair condition are upgraded and credits for 40 years of maintenance can be applied to capital projects; then the roads are transferred. Louisiana notes that: "The Program may be appealing to those parishes and municipalities that have the capacity for additional day-to-day road maintenance but lack the resources for capital improvements." Local governments can benefit from the program by gaining greater autonomy over transportation decisions and planning, traffic regulations, and receiving capital funding.

A novel revenue source being considered by some states, and implemented in others, is the use of advertising to generate revenue for transportation (Slone, 2010). Georgia uses advertising revenue to cover costs associated with a motorist assistance program in Metro Atlanta, while Pennsylvania sells advertising space on tollbooths dotting the Pennsylvania Turnpike; the Pennsylvania initiative generated over half a million dollars in revenue in 2009. Pennsylvania, Florida, and California have also explored advertising on electronic traffic message boards, but concerns over driver distraction remain despite impressive annual revenue projections, which the Pennsylvania Department of Transportation estimated could exceed $150 million.

[4] http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Multimodal/Road_Transfer/Documents/Right-Sizing%20the%20State%20Highway%20System.pdf

PUBLIC OPINION AND CURRENT LEGISLATIVE EFFORTS

Many of the issues that will need to be resolved to implement an alternative revenue option such as VMT fees were detailed in the review of each alternative. Summarily, for most of the options, there were technological and/or privacy/legal issues that would have to be addressed. Certainly, an option such as tolling has a longer track record than VMT fees, but technologies continue to evolve. Additionally, administration of new revenue mechanisms would require a period of learning by state officials and users. General criteria for alternative revenue sources were also presented. Outside of the practical implementation issues, public acceptance will be vital to ensuring that a revenue alternative is successful.

Gaining public acceptance is an important part of bringing new transportation revenue regimes online. NCHRP 686 (2011) noted that successfully implemented regime changes have routinely reached out to the public and engaged the community; while using these strategies does not guarantee public approval, they increase the likelihood of a favorable outcome. A focus on transportation goals at both a community and regional level is needed to determine which option(s) are the most palatable. Subsequent considerations for successfully applying various road pricing options are driven by a number of factors, including the current road situation, availability of alternate travel options, and policy conditions at the time. The presence of a policy champion who supports a change is also likely to exert a significant effect on the end result. Several polling efforts have gauged public opinion on the use of alternative revenue sources or charges to fund transportation projects and systems. NCHRP Synthesis 377 (2008) examined over 100 public opinion studies on tolling or road pricing and identified eight themes that the public wants from highway pricing schemes. Those themes are summarized here:

1) Value and benefits from projects;
2) Seeing specific examples and choices of roadway use;
3) Specificity of revenue usage;
4) Learning via experience using different pricing schemes;
5) Public uses knowledge and information to inform initial opinions of tolling;
6) Belief in equity, desire for fairness by only tolling new capacity or providing untolled alternatives;
7) Simplicity builds public support for road pricing; and
8) Public favors tolls over taxes due to revenues being used locally and the freedom to choose tolled routes.

"These eight themes were consistent regardless of the public polled, the type of road pricing project, region of the United States, or other potentially discriminating factors" (p. 3). Of the surveys examined, 56 percent demonstrated support for "tolling or road-pricing concepts," whereas only 27 percent found support for "tax related initiatives." Table 14, which is reproduced from the report, shows the level of support for various types of pricing.

Table 14: Public Opinion on Road Pricing

	Cordon Tolling	Public-Private Partnerships	Express Toll Lanes	Traditional Toll Roads	HOT Lanes
Majority Support	32%	0%	62%	71%	73%
Majority Opposition	53%	60%	23%	26%	15%
Neither Majority	16%	40%	15%	3%	12%
Total Cases	19	10	13	35	26

Source: NCHRP 377 (2008), Table 2, p. 43

When survey results were partitioned regionally, the South had majority support of 44 percent versus an opposition average of 32 percent across all types of road pricing proposals tested. Of the cases examined, 24 percent had no majority either for or against pricing initiatives. The study concluded that there is less support in the South for road pricing concepts than some other regions, perhaps due to a lack of history with road pricing schemes such as tolling. Agrawal and Nixon (2013) surveyed over 1,500 drivers as part of a Mineta Transportation Institute study. This survey indicated that a majority of individuals surveyed would support higher transportation taxes if they were devoted to specific uses such as road maintenance. A summary of the various options (for replacing the federal gas tax) tested and their level of support is shown in Table 15, which is comparable to surveys conducted during the three previous years. Most of the options involve changes to current tax structures, although two mileage tax options were offered as well.

Table 15: Public Support for Various Tax Options

Option	**Level of Support**
10 cent increase in gas tax; revenue used to maintain roads	67%
10 cent increase in gas tax; revenue used for projects to improve safety	62%
10 cent increase in gas tax; revenue used to improve technology	58%
10 cent increase in gas tax; revenue used to reduce local air pollution	53%
0.5 cent sales tax	51%
10 cent increase in gas tax; revenue used to reduce global warming	50%
2 cent increase in gas tax for 5 years	42%
10 cent increase in gas tax; information on average driver's annual cost	40%
Mileage tax (average 1 cent per mile); varies by vehicle's pollution	39%
10 cent increase in gas tax	23%
Mileage tax with flat rate of 1 cent per mile	19%

Source: Agrawal and Nixon (2013)

Ellen, Sjoquist, and Stoycheva (2012) surveyed 2,000 adults in Georgia regarding various transportation revenue options. The options tested included various increases in the gas tax, several VMT fee options, parking fees, and toll roads. They found opposition to increasing the gas tax and VMT fees, with opposition to VMT fees slightly less than gas tax increases. Monthly parking fees on commuting employees, which are designed to reduce congestion by encouraging alternative modes of transport and carpooling, returned split opinions. Finally, toll roads registered support from a slight majority of respondents.

Legislation relating to transportation revenues is detailed for each state that had applicable activity in a number of related areas. The National Conference of State Legislator's *Funding and Finance Legislation Database* provides information on bills related to state level transportation from 2013 and 2014. Relevant bills that addressed current revenue sources in the categories of state Department of Motor Vehicle fees, taxes on gasoline, and transportation appropriations are summarized in Table 16.

Table 16: Legislation Update on Current Revenue Sources 2013-2014

State		Bill	Status	Summary
Alabama	2013	S 293	Failed	Clarifies use of 4 cent excise tax; proceeds for vegetation management on county roads (H514 passed; failed in Senate)
Alabama	2013	H 400	Failed	Allows state to institute equivalent motor fuel tax if federal motor fuel tax is eliminated or reduced
Arkansas	2013	S 438, S 876; H 2026	Failed	Repeals transfer from highway fund to general fund of first $4 million in special motor fuels tax
Arkansas	2013	H 1418	Failed	Sales and use tax from new vehicle purchases dedicated to road maintenance and construction
Georgia	2013	H 211	Enacted	From 7/1/13 through 6/30/15; motor fuel tax exemption for operating public school buses
Kentucky	2013	H 36	Failed	Inter-local agreement account created within state road fund; funded by percentage of motor fuel tax for funding county roads and bridges
Louisiana	2013	H 684	Failed	Provides relative to the levy of the state excise tax on gasoline and diesel fuel
Louisiana	2013	H 707	Failed	Temporary suspension until 7/1/19 of 1.5% discount for timely supplier reporting and remitting of fuel taxes
Mississippi	2013	H 265	Failed	Lowered fuel excise tax by 3 cents per gallon but added 6% tax on wholesale price, adjusted twice a year
Mississippi	2013	S 2236	Failed	2% revenue from fuel taxes in Jackson allocated to the city for road construction and maintenance
Mississippi	2013	S 2911	Failed	5% tax on wholesale fuel
Mississippi	2013	H 1030	Failed	Statewide election to raise sales tax 0.5 cents with revenue used for road malignance and construction
North Carolina	2013/2014	H 179	Pending; Failed 2014	Exempts certain agencies from motor fuel taxes
North Carolina	2013/2014	H 961	Pending; Failed 2014	Lowered fuel excise tax
North Carolina	2013	H 966	Pending; Failed 2014	Cap fuel tax rate at current level of FY 2014 and 36.5 cents per gallon in 2015
North Carolina	2013	H 998	Enacted	Cap fuel tax rate from 10/1/13 through 6/30/15
South Carolina	2013/2014	H 3412	Pending; Failed 2014	Sales, use, and excise tax revenue from titling of vehicles to be credited to non-federal aid highway fund
South Carolina	2013/2014	H 3498	Pending; Failed 2014	Increased fuel tax to 26 cents per gallon and adjust twice a year based on wholesale price

South Carolina	2013/2014	H 3645	Pending; Failed 2014	Increased fuel tax to 21 cents per gallon and adjust twice a year by inflation factor
Virginia	2013	HJR 620	Failed	Direct Joint Legislative Audit and Review Commission to study efficiency/sufficiency of funding
Virginia	2013	H 2313*	Enacted	Replaced 17.5 cent per gallon fuel tax with 3.5 % wholesale tax (rises to 5.1% if Congress does not pass internet sales tax legislation), $64 fee for hybrid vehicles, raised state sales tax for transportation from 0.5% to 0.675% over 5 years (sales tax increases from 5% to 5.3%, automobile sales tax increase from 3% to 4.15% over 3 years
West Virginia	2013	S 217; H 2529	Failed	Reduction in wholesale fuel tax
West Virginia	2013	H 2229, H 2231, H 2396, H 2598	Failed	Reduce or eliminate motor fuels taxes on heating fuels
Florida	2014	S 156	Enacted	Reduces registration fee, service charge for license plate, license taxes for motorcycles
Kentucky	2014	H 22	Failed	Removes any adjustment of motor fuels tax to average wholesale price w/out General Assembly action
Kentucky	2014	H 445	Enacted	Increases minimum average wholesale price of fuel on a quarterly basis from $1.786 to $2.878
South Carolina	2014	S 891	Failed	Increase 16 cent per gallon fuel tax by 2 cents per year until it is equal to 36 cents
South Carolina	2014	H 3360	Enacted	Transfer of $50 million to state infrastructure bank for bridges' revenues from sales taxes on vehicles to be used to secure bonding

*several related bills that failed prior to the passage of H2313: S 700, S 717, S 733, S 855, S 925, S 1328, S 1340, S 1355, H 1403, H 1409, H 1472, H 1677, H 1878, H 2063, H 2179, H 2224, H 2253, H 2333

Relevant bills in the categories of alternative fuels, tolls, and VMT fees are summarized in Table 17. Several bills fell into both tables, as they addressed multiple issues.

Table 17: Legislation Update on Alternative Revenue Options 2013-2014

State		Bill	Status	Summary
Georgia	2014	SR 598	Adopted	Created the Senate Public-Private Partnerships Study Committee
Louisiana	2014	HCR 166	Adopted	Established Transportation Funding Task Force to study all potential funding mechanisms
Mississippi	2013	S 2515	Failed	Study of toll road feasibility
North Carolina	2014	S 402	Enacted	$100 fee on electric vehicles
North Carolina	2014	H 159/S102	Pending	Establish Joint Legislative Public Infrastructure Oversight Commission; research on meeting infrastructure needs
North Carolina	2014	S 218	Pending	Prohibits tolling on I-95 for 10 years with approval from General Assembly thereafter
South Carolina	2013	H 3645	Pending	Fee for hybrid, plug in, or electric vehicles
Virginia*	2014	H 975	Enacted	Repealed annual license tax on hybrid electric vehicles from 2013 (H 2313)
Virginia	2013	HJR 753	Failed	Study of tolling policies
West Virginia	2013	S 354	Failed	Study of alternative revenue mechanisms for the state
*several related bills that failed prior to passage of H 975: S 1, H 4, S 38 S 159, S 221, S 506				

Virginia levied a $64 registration fee on electric, hybrid, and alternative fuel vehicles (subsequently repealed) and several other states have considered similar measures.[5] As Boske, Gamkhar, and Harrison (2013) note, there are no studies that have provided any guidance on an appropriate way to collect equivalent fuel taxes for these types of vehicles. They listed three criteria for the Texas Department of Transportation to consider when deciding on potential fees for alternative fuel vehicles (p. 43):

1) Completely recovers foregone gas tax revenues from purely electric vehicles;
2) Recovers foregone gas tax revenue from electric vehicles and other hybrids and alternative fuel vehicles; and
3) Recovers the full annual cost of road usage for an electric vehicle.

While public opinion of alternative revenue proposals may ultimately drive policy decisions regarding future transportation funding, current discussions and proposals can shed insight into funding options being contemplated. There has been much discussion regarding transportation funding issues and possible alternatives, however, even after consulting with the review committee we have been unable to locate many proposed legislative changes in the southeastern states that address new funding options such as VMT fees. Thus, while there is apparent interest in alternative transportation funding schemes, opinion has not coalesced around particular funding ideas. Continued discussion over funding options and levels is beneficial to the conversation on transportation funding. Robust debate will likely yield more optimal outcomes for states that are also palatable for a majority of transportation users.

[5] https://leg1.state.va.us/cgi-bin/legp504.exe?141+sum+HB975

CONCLUSIONS AND RECOMMENDATIONS

This synthesis study has gathered relevant information on current revenue structures used to fund transportation projects as well as potential funding alternatives for states in the Southeast U.S. Currently, most states depend on fuel taxes, motor vehicle and motor carrier taxes, and federal transfers to fund needed transportation projects. We developed short-term forecasts of expected revenues assuming that no changes to revenue structures would be made; these indicated that overall there would be minimal increases in total revenue, although important categories such as fuel taxes indicated slight declines. Short term forecasts designed to develop future expected revenue shares from these sources indicated if no changes were made steady revenue shares would be the likely result.

Ongoing research has zeroed in on a number of alternative funding sources, including VMT fees and tolling options, while changes to current revenue sources are focused on increases in motor fuel taxes. We recommend that states consider some of the evaluation criteria and their own goals for an alternative revenue regime. Particularly, criteria such as revenue potential, sustainability, a user pays approach, transparency, implementation and administrative costs and issues, and finally public acceptance. Then, as pilot projects for options such as VMT fees continue to offer insight into the workability of alternative revenue sources it would be instructive for individual states to participate in such projects to further examine their viability. Engaging the public on more widely understood revenue options, such as tolling, as well as lesser known options such as VMT fees will benefit states by informing the public of different options while instructing them on which options register the most public support. Given the need to introduce such wholesale changes to transportation funding approaches to the public, we recommend that if states are interested in pursuing such changes if they deem that current revenue sources are insufficient now or likely to be in the future, that public outreach be the first step in the process. This could begin by asking the public about current and future transportation needs and whether they are confident in the ability of current revenue sources to fulfill those needs. As fuel taxes are not very visible to the average consumer, such efforts would have to start with current funding structures and the benefits derived from them. After this, it would be prudent to gauge what changes to current revenue sources or alternatives would achieve a public consensus. The alternatives deemed most acceptable by the public could then be tested in pilot programs to appraise implementation and operation costs. This would comprise a next step, by soliciting participation in pilot programs and determining appropriate rates for any new revenue options. These would be based on individual state needs and the willingness of the public to pay for transportation improvements, particularly if the desired outcome is an increase in revenues beyond that which the current regime yields.

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APPENDIX

Motor Fuel Tax Forecasts Regression Results

	Coefficient YR	Standard Error	Constant	Standard Error	Observations	R-squared
Alabama	-8075	987	807979	10680	18	0.81
Arkansas	-1060	1108	518969	11989	18	0.10
Florida	22946	5853	2009043	63358	18	0.49
Georgia	-7258	1366	614540	14783	18	0.64
Kentucky	7816	2234	557558	24178	18	0.43
Louisiana	-8837	931	776051	10076	18	0.85
Mississippi	-5943	1074	528607	11628	18	0.66
North Carolina	18608	4828	1407734	52264	18	0.48
South Carolina	-3025	1030	602439	11153	18	0.35
Tennessee	-9007	1877	1040283	20312	18	0.59
Virginia	-8076	2379	1103567	25749	18	0.42
West Virginia	-3418	780	408338	8442	18	0.55

Motor Vehicle and Motor Carrier Tax Forecasts Regression Results

	Coefficient YR	Standard Error	Constant	Standard Error	Observations	R-squared
Alabama	-2713	1895	237584	20507	18	0.17
Arkansas	-668	527	157812	5696	18	0.10
Florida	17658	4758	741897	51501	18	0.46
Georgia	630	4542	216539	49161	18	0.15
Kentucky	-13335	2944	821495	31862	18	0.56
Louisiana	-2365	2298	199866	24880	18	0.06
Mississippi	-1299	415	172364	4495	18	0.38
North Carolina	14198	3959	378868	42850	18	0.45
South Carolina	8223	2323	52331	25150	18	0.44
Tennessee	3205	1978	259858	21415	18	0.14
Virginia	-8722	4367	822110	47281	18	0.20
West Virginia	-509	937	287883	10139	18	0.09

Federal Transfers Forecasts Regression Results*

	Coefficient YR	Standard Error	Constant	Standard Error	Observations	R-squared
Alabama	1461	1845	733122	17840	17	0.05
Arkansas	1839	890	467503	8605	17	0.23
Florida	15096	6958	1712451	67285	17	0.25
Georgia	-704	4656	1324788	45025	17	0.04
Kentucky	1306	1372	634803	13270	17	0.07
Louisiana	8316	1773	549080	17142	17	0.61
Mississippi	1449	933	443233	9022	17	0.15
North Carolina	1645	3362	1033909	32509	17	0.02
South Carolina	2978	1824	595216	17634	17	0.16
Tennessee	698	2091	822451	20223	17	0.03
Virginia	6436	3435	929018	33219	17	0.20
West Virginia	1555	885	397515	8559	17	0.18

*Based on federal apportionments under highway authorization bills

Total Other Categories Forecasts Regression Results

	Coefficient YR	Standard Error	Constant	Standard Error	Observations	R-squared
Other State Imposts						
Georgia	16118	1870	153721	20241	18	0.82
North Carolina	9678	5756	409120	62308	18	0.15
Virginia	14717	1992	436330	21562	18	0.77
Tolls						
Florida	39525	4059	528817	43932	18	0.86

Total Revenue Forecasts Regression Results*

	Coefficient YR	Standard Error	Constant	Standard Error	Observations	R-squared
Alabama	2009	2912	1021762	61525	18	0.03
Arkansas	-2121	1605	739677	17368	18	0.10
Florida	129255	28410	3227976	307515	18	0.56
Georgia	13724	8156	1155521	88280	18	0.15

Kentucky	-5820	4558	1549839	49334	18	0.09
Louisiana	-1349	5118	981736	55397	18	0.02
Mississippi	-9876	2171	819530	23504	18	0.56
North Carolina	37732	7050	2222880	76315	18	0.64
South Carolina	11250	4218	621486	45661	18	0.31
Tennessee	-18084	3694	1488533	39986	18	0.60
Virginia	11592	9335	2581794	101044	18	0.09
West Virginia	4583	8779	808645	95031	18	0.02

*FHWA Total Revenues minus federal transfers, bond proceeds, and hurricane recovery funds