



REPORT

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WHO PAYS FOR ROAD MAINTENANCE?

By Jakob Puckett and Elias Tsapelas

KEY TAKEAWAYS

- Trucks cause between 15 and 49 times more damage to Missouri's roads than cars do depending on whether damage to urban or rural roads is being measured.
- Road maintenance in Missouri is primarily funded by motor fuel taxes, and despite doing the majority of the damage to the state's highways, trucks pay the same fuel tax rate as other vehicles.
- Several policy reforms would allow for better alignment between the total payments made and the damage caused by vehicles, and enacting these reforms would make the financing of road maintenance more efficient.

INTRODUCTION

The roads and bridges in Missouri that are maintained by the state are funded primarily by user taxes and fees, with the motor fuel tax being the biggest source of revenue. In principle, user fees like the motor fuel tax are economically efficient ways to fund road maintenance because they place

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the burden of paying for road repairs on those whose vehicles make the repairs necessary. User fees connect road usage to payment for the road upkeep to varying degrees, depending on how closely the amount of road usage matches the amount paid. In theory, an efficiently operating system allows drivers to make better vehicle and travel choices because they're more informed about the costs of driving. In addition, policymakers can make better-informed transportation investment decisions because the government has a reliable revenue stream that's funded based on road usage. An efficiently operating transportation system also reduces wasted fuel, traffic congestion, and air pollution.¹

A well-designed user fee functions as a signal, informing users and producers about the values of the things they use. While the motor fuel tax is a better way to fund road maintenance than most other taxes, there are still several shortcomings. As seen in Missouri over the past few decades, the motor fuel tax does not automatically adjust to keep up with inflation, meaning that, unadjusted, user fees eventually can become insufficient to cover the cost of repairing the damage inflicted on the roads. As a result, maintenance funding must be supplemented with other taxes or simply deferred to the future, which distorts the value of the signal.

In addition, motor fuel taxes do not automatically keep up with advancements in technology and differences in vehicle type. For example, as cars become more fuel efficient, the disparity between what users pay and the damage they inflict will only grow larger unless the motor fuel tax is adjusted accordingly. This applies as well to the disparity between the damage done by large trucks and that done by small cars, assuming the difference in fuel economy between the vehicles is not enough to make up the difference.

This report examines the motor fuel tax in Missouri and discuss how the state could improve the ways in which it funds road maintenance.

FUNDING MISSOURI'S ROAD MAINTENANCE

The primary generator of road funding in Missouri is the state motor fuel tax. As of July 1, 2022, gasoline and

diesel fuel are taxed at the same rate, which is 22.0 cents per gallon, but the tax rate is set to increase 2.5 cents per gallon in each of the next three years as a result of the passage of Senate Bill (SB) 261 in 2021. In state fiscal year 2021, Missouri collected approximately \$673 million in fuel tax revenues.

While Missouri's fuel taxes are set to increase in each of the next three years, it's important to remember that prior to 2021, the state's motor fuel tax hadn't been increased since 1996. This means the user fee certainly has not kept up with inflation, fuel economy, or changing vehicle damage trends. Before the Missouri Legislature passed SB 262 in 2021, the Missouri Department of Transportation (MoDOT) often cited a figure for unfunded maintenance obligations totaling hundreds of millions of dollars. Regardless of the accuracy of their estimate, it is clear a user fee that had not been adjusted for more than 25 years was no longer providing the valuable signal user fees were designed to provide.

Examining how Missouri's fuel tax compares to fuel taxes in surrounding states is a good place to start (Figure 1).

As Figure 1 shows, all but one of the states surrounding Missouri have higher fuel tax rates than Missouri and tax diesel fuel at a higher rate than gasoline.

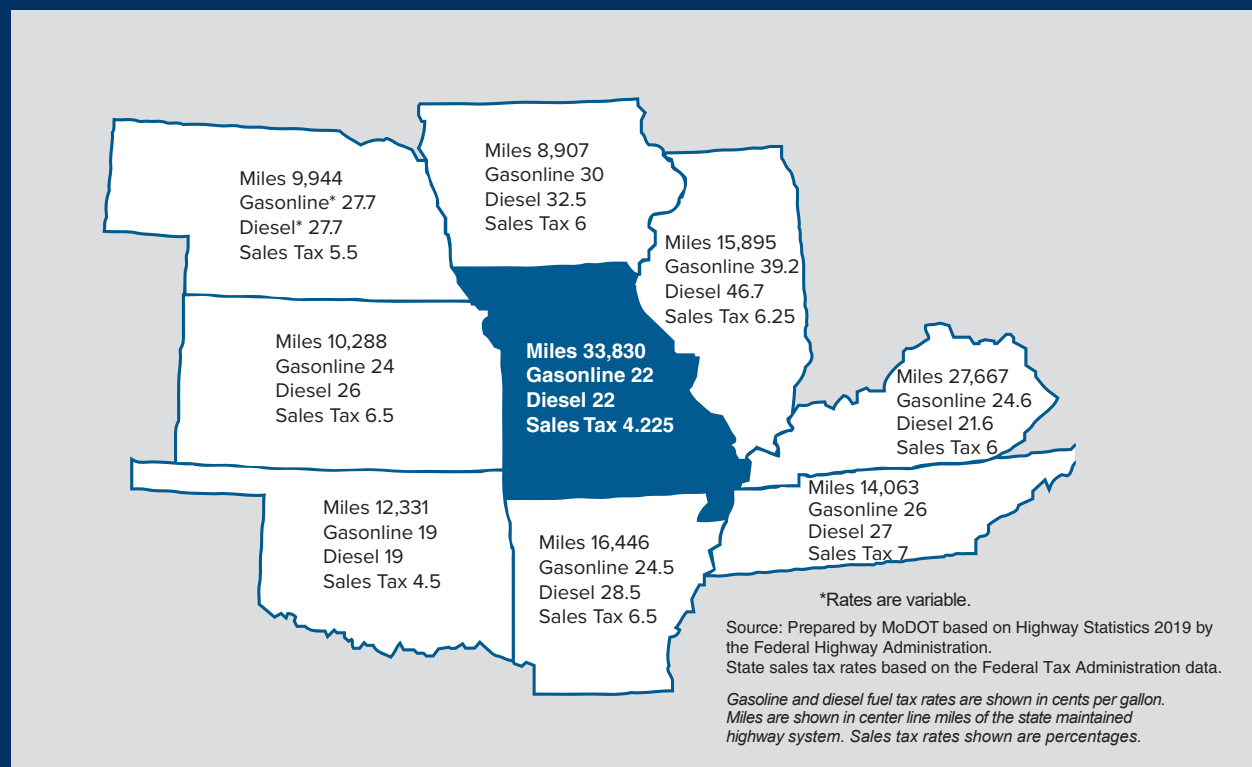
Once SB 262 is fully implemented, Missouri's motor fuel tax for both gasoline and diesel will be set at 29.5 cents per gallon. For gasoline, this will be higher than all surrounding states except Illinois and Iowa. This leaves the question of why Missouri is one of the few states that taxes diesel fuel at the same rate as gasoline. For comparison, Pennsylvania's diesel fuel tax is \$0.741 per gallon, California's is \$0.659 per gallon,² Indiana's is \$0.53 per gallon, and in Illinois it is \$0.467 per gallon.³

One explanation for the difference in rates is the relative damage that diesel-fueled vehicles cause compared to their gasoline-powered counterparts. According to data from the Federal Highway Administration, large trucks are responsible for the vast majority of interstate damage.

Table 1 shows that in 2014 (the most recent year for which data are available), large trucks caused over 90% of the damage ("loading") nationwide to both rural and urban interstates despite making up only about 22% of the traffic by miles traveled on rural interstates and just under 12% of the traffic on urban interstates.

Figure 1 Missouri's Fuel Taxes in Regional Context

Despite Missouri's fuel tax rates increasing in each of the past two years, the state still collects less per gallon than most surrounding states.



Source: Missouri Department of Transportation.

Using the relationships from this table, we can see that trucks cause between 15 (94/6) and 49 (98/2) times as much overall damage as cars do on interstates. Without Missouri-specific data available, we can estimate conservatively that large trucks are at a minimum causing 15 times more overall damage than cars on Missouri's roads. This discrepancy is probably even higher because Missouri has many more miles of rural roads than urban roads. The question, then, is how much are trucks paying in motor fuel taxes relative to cars, and does this account for the damage disparity between the vehicle types?

Due to state data limitations, it is hard to determine exactly how much of the money raised for Missouri's

Table 1: Percentage of Traffic and Wear ("Loading") on Interstates by Vehicle Type Nationwide⁴

	Rural Interstates		Urban Interstates	
	Traffic	Loading	Traffic	Loading
Passenger Vehicles	76.6%	2%	87.3%	6%
Large Trucks	22.1%	98%	11.8%	94%

Source: Federal Highway Administration, 2014 data.⁵

transportation system comes from cars or trucks, individually. However, MoDOT has stated that a good rule of thumb is that roughly four billion gallons of fuel are sold in the state each year, with three billion being gasoline and one billion being diesel. Figure 2 provides an overview of where MoDOT's money comes from and where it goes.

This means that if we assume that trucks primarily rely on diesel fuel and cars predominantly use gasoline, trucks are likely paying less for road maintenance than cars pay,

Fuel Taxes and Commercial Trucks

It should be noted that trucks pay fuel taxes differently than cars do. Car drivers pay fuel taxes only when and where they purchase fuel. For instance, if an Illinoisan drove to Missouri once a week to buy gasoline but spent the rest of the week driving on Illinois roads, he would only pay fuel taxes in Missouri.

This is not the case for trucking companies. Commercial trucks are subject to the International Fuel Tax Agreement (IFTA), established nationwide in 1984 to administer and collect fuel taxes for trucks with cross-jurisdictional routes. Due to the IFTA, trucks pay fuel taxes based on their estimated fuel usage on roads in every state in which they travel, regardless of where that fuel was purchased.⁷ For instance, say a truck driver purchased fuel in Missouri and then drove 50 miles in Missouri and 50 miles in Illinois. Under IFTA, and through the Department of Revenue of the state his company is registered in, he would pay Missouri's per gallon fuel tax based on the estimated gallons of fuel he used to travel on Missouri's roads, and then pay Illinois's fuel tax based on the estimated gallons of fuel he used to travel on Illinois roads.

despite the fact that trucks do significantly more damage to Missouri roads than cars do.⁶

POLICY OPTIONS

Option 1: Change fuel tax rates

One of the easiest ways to bring greater parity to road maintenance funding in Missouri is for policymakers to adjust the motor fuel tax rates. To estimate the impact of making changes to the rates we can use an online calculator created by MoDOT⁸ that allows you to see the amount of revenue raised when rates are adjusted (Table 2). This means that since we know the current rates and revenues raised, the calculator can be used to estimate how much the rates would need to be changed to maintain similar revenue levels while improving the damage-to-payment disparity.

It follows that raising the diesel fuel tax relative to the gas tax would increase revenue from trucks, while beginning to address the current funding disparity. Starting with the motor fuel tax rate as of January 2022, which was 19.5 cents for both gas and diesel, the calculator estimates approximately \$773 million in annual revenue collection. Then, for each cent you change the gasoline and diesel fuel tax, you can expect to generate or lose approximately \$28.7 million and \$10.9 million per year in new revenue, respectively (absent any adjustment for potential behavioral changes by consumers).

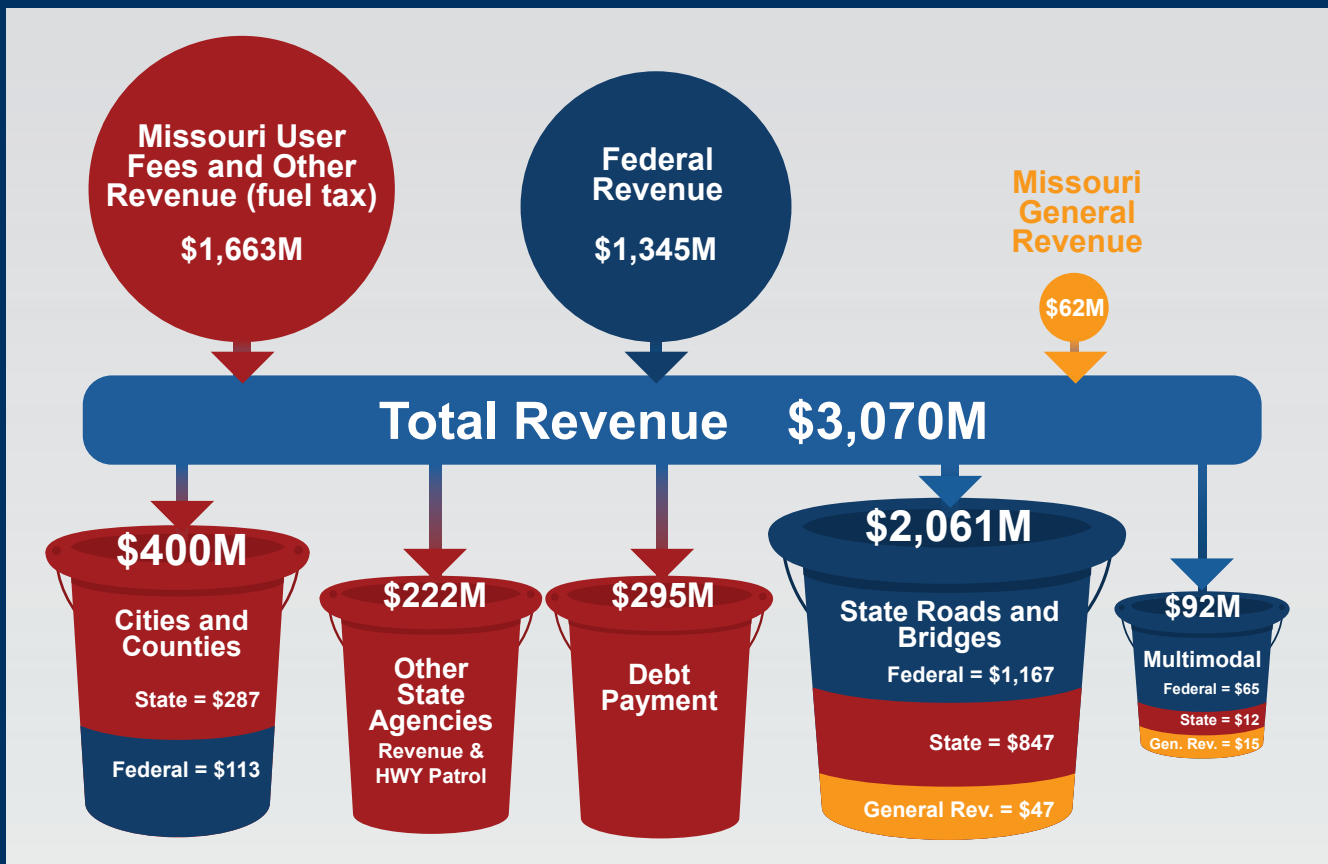
We can then adjust the fuel tax rates to see revenue estimates. For instance, for MoDOT to raise \$773 million while raising 15 times more revenue from diesel trucks than cars (and cars still paying something), the diesel fuel tax would have to be nearly 69 cents per gallon while the rate for cars would be only 1 cent per gallon. Therefore, it is likely impractical to suggest that state motor fuel tax rates could be adjusted to achieve an overall 15:1 payment ratio corresponding to the damage done by trucks as compared to cars. However, the directional principle—cars should be paying less and trucks more—still applies, and there are ways lawmakers could adjust fuel tax rates to achieve greater parity.

Adjusting Missouri's diesel fuel tax rate such that 15 times more revenue would be generated relative to gasoline

Figure 2 Missouri Transportation Funding Overview

Cars and trucks pay several types of user fees and taxes beyond state motor fuel taxes that help provide funding for road maintenance in Missouri. Both vehicle types pay state license and registration fees, motor vehicle sales taxes, and federal fuel taxes. In addition, trucks pay a federal heavy vehicle use tax, a truck and trailer sales tax, and a tire sales tax.

For the purposes of this report, only motor fuel taxes are considered because they are the user fee that is most closely connected to the act of driving on Missouri’s roads. Federal funding for roads is primarily generated by the national motor fuel tax, but this funding is distributed to states based on federally established formulas (not directly tied to the amount of revenue paid in taxes). State vehicle sales taxes as well as licensing and registration fees are only borne by individuals or businesses residing in Missouri, so the higher these costs are, the more that out-of-state drivers and companies benefit at the expense of Missourians. Further, raising state vehicle sales taxes and other fees would increase the likelihood that businesses that operate in multiple states would choose to no longer register in Missouri, thus lowering the collection of funds for road maintenance even further, pushing an even greater burden onto Missourians.



Source: Missouri Department of Transportation.

Table 2: Fuel tax rates and ratios to raise MoDOT's current fuel tax revenue.

	15:1	10:1	5:1	3:1
Gasoline (cents/gal)	1	2.5	4.5	6.5
Diesel (cents/gal)	69	65	59	53.5

Source: Missouri Department of Transportation.

would still leave the state's rate below that of Pennsylvania, but above those of California and Indiana. The sheer amount the diesel tax would have to be increased, while simultaneously lowering the gas tax, to even out the payment disparity illustrates just how difficult achieving payment parity using solely the fuel tax would be. Though it also shows that if the cost of maintaining Missouri's roads increases in the coming years and policymakers are considering adjustments to the state's user fees, increasing the diesel fuel rate without raising the gasoline rate would be a good place to start.

Option 2: Tolling rural interstates

Tolling on rural interstates could be an even more effective way to redistribute the current financial burden of maintenance toward drivers whose vehicles cause the most damage to roads. Toll revenue could also provide a reliable funding stream for cost-intensive and time-consuming road rebuilding projects.

Depending on revenue needs, tolling could partly offset fuel taxes by allowing for a rate reduction, or more likely it could be used to raise new revenues for road infrastructure repairs and investment. For example, MoDOT has released cost projections for rebuilding Interstate 70 ranging from between \$2 to \$4 billion.⁹ While the costs of rebuilding Interstates 44 and 55 have not been published by MoDOT, it is a safe assumption that these projects would cost billions of dollars as well. Tolling specific routes would also make it easier to dedicate funds raised along each route to maintenance of that specific route.

Tolling (and charging trucks at a higher rate than cars) could bring truck payment more in line with the damage

trucks cause on rural interstates. Nationwide, truck tolls are, on average, nearly 3.5 times higher than tolls for cars.¹⁰ A previous Show-Me Institute report describes different approaches MoDOT could take in tolling I-70 to raise \$2 to \$4 billion, with tolls no higher than 17.5 cents per mile for trucks and 4 cents per mile for cars.¹¹ Given the political challenges that tolling proposals would face, policymakers could consider a combination of tolling and a lower fuel tax.

The main challenges with this option are legal. Under current federal law, toll-free interstates cannot be converted to tolled interstates without federal approval.¹² Missouri's federal delegation would need to secure authorization for Missouri to toll its interstates. Additionally, appropriate legislation would need to be passed in the Missouri Legislature. Allowing a private concession company to operate the toll road would require passage of a law to allow toll roads to operate via a public-private partnership, as this is currently disallowed in Missouri. Such legislation has been proposed several times in recent years but has not passed.¹³ If a toll road were instead to be operated by the state, it could generate sufficient revenue to trigger Hancock Amendment concerns and place the matter before statewide voters. Moreover, under current law, a turnpike authority or tolling infrastructure cannot be funded with money from the State Road Fund, as those funds are constitutionally bound to other uses.¹⁴ Bonds could be issued, but they could not be backed by the State Road Fund. These challenges are described more fully in a 2021 Show-Me Institute report, "Improving Missouri's Transportation System through Tolling."¹⁵

Option 3: Replace fuel taxes with road usage charges that vary by vehicle weight

Perhaps the most efficient way for the state to fund its maintenance obligations would be to charge drivers for the damage they do to the roads rather than according to the type of fuel they use. This type of user fee would account for road damage and adjust overall funding levels to actual road usage, even as vehicle fuel efficiency increases.

Drivers would be charged for the miles they drive, with rates varying based on the weight of their vehicles. Charging drivers based on their miles driven rather than fuel purchased is also a way to ensure that drivers of vehicles powered by other means—such as electric

vehicles—pay their fair share for road upkeep based on their vehicle weight and mileage.

Several states have implemented road-usage charge (RUC) pilot programs or permanent programs, but no state has used RUCs to fully replace fuel taxes. However, there are reasons to believe this would be more feasible with trucks than with cars. As mentioned previously, trucks already record their state-by-state mileage to pay state fuel taxes under IFTA. Presumably, this is not regarded as an invasion of privacy because it is for commercial trucks rather than personal vehicles. Thus, the ability to perform the bare minimum for RUCs—recording mileage—is already established for commercial trucks.

Implementing road usage charges on passenger vehicles involves additional considerations regarding mileage recording and driver privacy. There are several options for implementing RUCs. Drivers could self-report their mileage during the annual registration process, and some states use an app that allows drivers to upload odometer photos. Another method used by several states that have initiated RUC programs is to record mileage through simple odometer readings. A device that plugs into the vehicle's diagnostics port can measure miles driven without raising concerns about GPS tracking. Drivers are then compensated for the fuel taxes they pay based on the gallons of fuel needed to drive their recorded in-state miles, so they do not end up paying twice for the amount they drive through both fuel taxes and mileage fees.¹⁶

There are a couple disadvantages to recording mileage through odometer readings. Self-reporting mileage through odometer readings could be unfair to people who frequently drive out of state, as they would be charged for those miles too. Additionally, many older vehicles do not have a diagnostics port and would not be able to accommodate a plug-in device.

A more accurate way to measure in-state miles would be to use GPS technology. Several states with RUC programs offer participating drivers the option of using a GPS-equipped plug-in device. Further, since some roads—such as freeways and interstates—are more expensive to build and maintain than others, recording mileage through GPS technology could enable drivers to be charged different rates for different roads. As with odometer readings, drivers are compensated for the fuel taxes they pay based

on the gallons of fuel needed to drive their recorded in-state miles.

Recording mileage through GPS technology raises privacy concerns, and it is important to note what GPS technology does and does not do. GPS satellites do not necessarily track cars (or phones, etc.) that have receivers. It is the GPS receiver itself, whether in a cell phone or transponder, that tracks its own position in relation to a satellite. Unless the receiver is equipped with reporting capability, the device's location is not shared with the satellite.¹⁷

While several states are in various stages of pilot programs, the RUC programs of two states stand out as examples from which Missouri policymakers can learn.

The longest-running and best-established program to date is in Oregon. Drivers who voluntarily participate in the OReGO program can pay a per-mile fee for driving and have any fuel taxes reimbursed.¹⁸ Drivers have several options for tracking those miles, such as paying for a block of miles in advance, odometer readings, or using GPS technology to record miles driven.¹⁹ If drivers choose the last option, a third-party provider places a GPS-equipped plug-in device in their car, and the device uses vehicle data to determine in-state miles driven and fuel consumption. To protect drivers' privacy, Oregon state law mandates that only the total weekly miles driven may be reported to the department of transportation. Personal data not delivered to the department of transportation is encrypted and destroyed on a set schedule, in accordance with department of transportation policy and OReGO program requirements laid down legislatively.²⁰ This information cannot be sold or traded without the driver's express consent.²¹

Currently only passenger-vehicle drivers can participate in the OReGO program, and they pay a fee of 1.8 cents per mile.²² Large vehicles (26,000 pounds or heavier) are not part of the program, as they already pay an annual weight-mile tax in lieu of fuel taxes.²³ Thus, while heavy vehicles are not part of the program, they pay more for road maintenance than cars through this extra fee.

Utah's Road Usage Charge program operates similarly and has similar privacy protections, although it is only for electric vehicles (EVs), due to the challenge that EVs pose

to the fuel tax regime. EV owners in Utah can choose to join the program in lieu of paying an additional alternative fuel vehicle registration fee. Participants pre-select their privacy settings, and mileage is collected by a third-party system that sends a monthly total of miles driven to the department of transportation without disclosing additional data unless in connection with a criminal investigation.²⁴ EV drivers pay a fee of 1.5 cents per mile for road usage, up to the maximum amount they would have paid in additional registration fees had they not enrolled in this RUC program.²⁵

Several other states are exploring variants of these programs. California conducted a road-usage charge pilot program that concluded in 2017 and was reauthorized in 2021 to be extended to 2027. Under the original pilot program, rates were devised to be revenue-neutral, although in practice they were not revenue-neutral due to the average fuel economy of the participants' vehicles. In the continuation of the program, drivers will be split into two groups to determine their per-mile fee. Every driver in group A will pay the same per-mile fee, while each driver in group B will have an individualized rate based on their vehicle's fuel efficiency.²⁶ Delaware and several other East Coast states are exploring mileage-based user fees in a series of pilot programs, including programs focusing on commercial trucks.²⁷ It is instructive that the pilot program focused on trucks found that differences in weight, axles, and location of travel, among other factors, made it undesirable to charge all trucks the same per-mile rate.²⁸

MoDOT has studied changing Missouri's vehicle registration fees by basing them on vehicle fuel efficiency rather than taxable horsepower, but concluded that any change would have to be made legislatively.²⁹ This policy change was also recommended by the 21st Century Missouri Transportation System Task Force.³⁰ Several pieces of legislation have been considered, but none have passed.³¹ MoDOT could go further and experiment with how a RUC program would work in Missouri, either by applying for a per-mile fee pilot program grant from the federal Infrastructure Investment and Jobs Act of 2021³² or enacting a similar program on its own, as was also recommended by the 21st Century Missouri Transportation System Task Force.³³

CONCLUSION

Large trucks are causing, at a minimum, 15 times the amount of road damage in Missouri that cars do, but currently pay far too little for road maintenance in proportion to the damage they cause. While it is unlikely that damage and payment ratios will ever perfectly align, policymakers have several options to start narrowing that gap. Raising the diesel fuel tax while lowering the gasoline fuel tax, tolling on rural interstates, and pursuing weight-based RUCs are options other states have pursued to better align damage to payment ratios, and Missouri policymakers should consider such policies.

Jakob Puckett was formerly an analyst at the Show-Me Institute, where Elias Tsapelas is a senior analyst.

NOTES

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