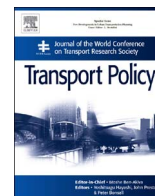




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State and federal fuel taxes: The road ahead for U.S. infrastructure funding

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ABSTRACT

Taxes on gasoline and diesel are the primary sources of transportation funding at the state and federal level. Due to inflation and improved fuel efficiency, these taxes are increasingly inadequate to maintain the transportation system. In most states and at the federal level, the real fuel tax rates decrease because they are fixed at a cents-per-gallon amount rather than indexed to inflation. In this paper, we provide a forecast on state and federal tax revenue based on different fuel taxation policies such as indexing to inflation, imposing a sales tax on gasoline and diesel, or using a mileage fee on vehicles. We compare how those taxation policies perform compared to the policies states use currently under different macroeconomic conditions relating to the price of oil, economic growth, and vehicle miles traveled. The baselines projections indicate that between 2015 and 2040, fuel tax revenue will decrease 42.9–50.5% in states that do neither index taxes to inflation nor impose a sales tax. Revenue will decrease 10.3–33.4% that currently impose a sales tax but do not index to inflation. The decrease for states that index to inflation is 3.4–16%. For all states, the median increase in revenue in 2040 compared to 2015 is 62% from switching to a mileage fee. Indexing fuel taxes to inflation in addition to imposing a states' sales tax increases revenue significantly but suffers from a continuous decline in the long-run due to increased fuel efficiency. Our results indicate that although a mileage fee is politically and technologically difficult to achieve, it avoids a declining tax revenue in the long-run.

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1. Introduction

Each state as well as the federal government taxes gasoline, diesel, and other fuels to finance the construction and maintenance of road infrastructure. Fuel taxes reflect an adoption of the benefit principle in the sense that consumers of the service pay for its provision based on their willingness to pay (Duncan and Graham, 2013). The fuel tax has the advantage that the implementation is relatively easy and that it is approximately proportional to the distance traveled (Forkenbrock, 2005). Nevertheless, it is widely agreed that the motor fuel tax in the United States does not cover all direct and indirect costs (Goldman and Wachs, 2003; Parry and Small, 2005; TRB, 2006; Delucchi, 2007). Direct costs include the wear and tear to pavement done by motor vehicle travel and indirect costs include externalities such as congestion, accidents, and air pollution (CBO, 2011a). Besides not covering all cost of road travel, the revenue derived from fuel taxes in real

terms has been stagnant and in some cases declining over the last decade, due mainly to an increase in fuel economy and fuel tax rates that are not adjusted to inflation. The economics and public finance literature covers well the equity and efficiency implications of various approaches of taxing and financing road travel, but it has not yet quantified the evolution of road funding availability in the future. The purpose of this article is to fill this gap and assess the future federal and state revenue associated with various taxing and revenue-generating schemes.

Fuel tax revenue is determined by the aggregate amount of gasoline and diesel purchased which in turn depends on multiple factors, including but not limited to fuel prices, tax rates, the number of vehicles, fuel economy, vehicle miles traveled per vehicle, and other factors. The current taxation structure and the fuel economy are the two main reasons for the stagnation of fuel tax rates in real terms (Greene, 2011; Gomez and Vassallo, 2013). First, the federal government as well as 35 states use a fixed cents-per-gallon tax. In 21 of those states, the last adjustment occurred before 2000 (FHWA, 2014). The non-adjustment of the cents-per-gallon tax leads to a decrease of the real fuel tax rate over time due to inflation. For example, the federal gasoline tax was set to \$0.184

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in 1997. As a result of the increase in the Consumer Price Index (CPI) since 1997, the purchasing power of the tax rate declined by 31% by 2012. In 15 states, revenue is supplemented by a sales tax imposed on motor fuel sales. For example, Indiana continues the collection of a fixed cents-per-gallon fuel taxes and supplements the tax by a sales taxes based on previous months' fuel prices. Some states have chosen to use revenue from other taxes, mostly sales tax revenue, to cover shortfalls in transportation funding. This approach diminishes the resources available to support other state-provided services and obligations. Other states have engaged in public-private partnerships and increased the use of tolling to generate more revenue. Tolling is not generally considered a funding approach for the whole road system, but is used as a mechanism to provide new roads without limiting budgetary resources. The cost of the infrastructure is not assumed by taxpayers but only by users. In addition, toll fees are likely to be inequitable as this approach asks one segment of all transportation users (those using the toll roads) to finance a broader segment of the transportation system than from which they receive benefit.

Second, the increase in fuel efficiency is outpacing the increase in vehicle miles traveled (VMT). In 2012, the average fuel efficiency of the U.S. light-duty vehicle fleet was 23.3 and 17.1 miles per gallon (MPG) for short wheelbase and long wheelbase vehicles, respectively (U.S. DOT Bureau of Transportation Statistics, 2015). Newly sold passenger vehicles and light trucks have average fuel efficiencies of 36 and 25.3 MPG, respectively. Those values are expected to increase to 41.7 MPG by 2020 and to over 50 MPG by 2025 (EPA and NHTSA, 2012). In addition to increases in fuel efficiency and inflation-driven decreasing tax revenues, the stagnation of VMT has exacerbated the decline in fuel tax receipts. After a steady upward trajectory throughout most of the past decades,

total VMT in the United States has remained relatively flat since 2007 (USPIRG, 2013; FHWA, 2014). This may reflect a temporary change in driving habits during the recent economic recession and rebound along with economic recovery in the future.

Projections by the U.S. Energy Information Administration (EIA) under various macroeconomic and driving scenarios indicate that, at least at the federal level, fuel tax revenue will continue to decline (EIA, 2014). Gasoline consumption will continue to decline in the future due to increasing fuel efficiency (Panel (a), Fig. 1). Diesel consumption will increase due to an increasing number of freight trucks and stagnating fuel economy for heavy trucks (Panel (b), Fig. 1). Despite the increase in diesel consumption and vehicle miles traveled (Panels (c), Fig. 1), federal revenue from gasoline and diesel taxes will decline from \$33.1 billion in 2012 to \$16.5 billion in 2040 in the baseline case (Panels (d), Fig. 1). This decline in federal revenue is based on the assumption of fuel tax rates not being adjusted to inflation. The revenue shortfall, in the absence of any policy adjustment, is expected to reach roughly \$68 and \$133 billion per year at the federal and state level, respectively (NSTIFC, 2009). In the very long-run, if the current vehicle fleet is replaced with an increasing number of highly fuel efficient or alternative fuel vehicles, e.g., plug-in hybrid or battery electric vehicles, the revenue from motor fuel taxes will decline further (Forkenbrock, 2005; McMullen et al., 2010). However, previous research has shown that this is not a significant issue in the time horizon considered in this analysis (Dumortier et al., 2015).

Through our analysis, we seek to project the state and federal revenue that is made available from vehicle travel under various tax policy, macroeconomic, and driving habit scenarios. The results can inform policy makers about the revenue that is potentially available for road and infrastructure funding. For this purpose, we

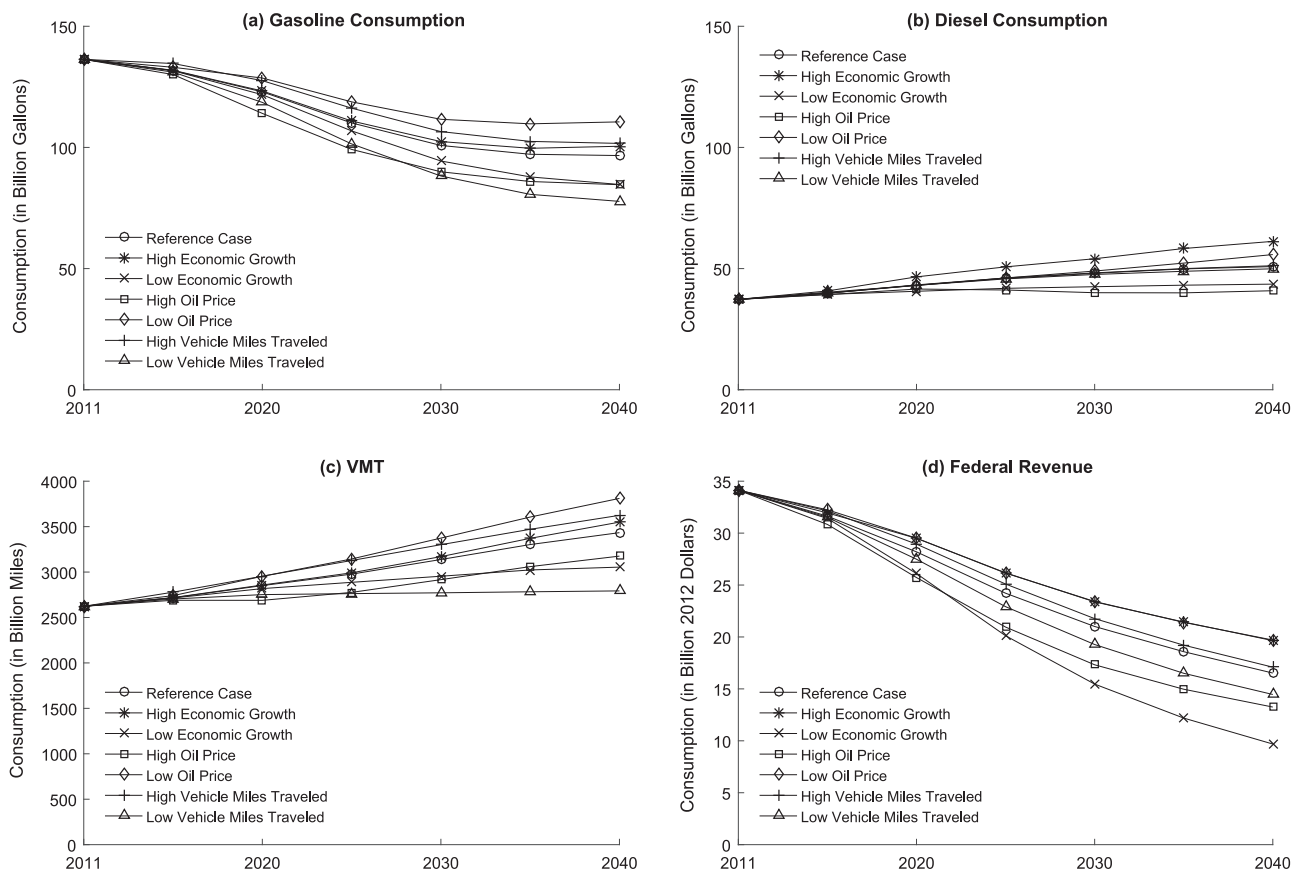


Fig. 1. Consumption of gasoline and diesel (light duty vehicles and freight trucks), vehicle miles traveled (VMT), and fuel tax revenue from the federal gasoline and diesel taxes (in real terms) between 2015 and 2040 under various scenarios. The scenarios are based on the 2014 Annual Energy Outlook by the EIA (EIA, 2014).

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