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# The road mileage user-fee: Level, intensity, and predictors of public support

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ABSTRACT

The road mileage user-fee is viewed as a promising alternative to the fuel tax, which in recent years has proven to be an inadequate means of financing road infrastructure. Public opposition is often thought to be a barrier to the political feasibility of the road mileage user-fee. We use a nationally representative public opinion survey to investigate the level and intensity of support for replacing the fuel tax with a general mileage user-fee and with three specific modes of administration of the fee. Our results confirm that public opposition to the adoption of mileage user-fees to address the growing revenue inadequacy of fuel taxes is high, with the number of opponents exceeding the number of supporters by a ratio of 4-1. Furthermore, public support is somewhat sensitive to respondents' belief in the user-pays principle and perceptions of the characteristics of the mode of administration. Additionally, relative to supporters, those who oppose the mileage user-fee are more likely to state that they are willing to take political action against the adoption of mileage user-fees.

## 1. Introduction

The fuel tax has grown increasingly inadequate as a means of financing road infrastructure in the United States. The annual tax revenue generated by the federal fuel tax is more than $20 billion lower than the $54 billion required each year to maintain highway performance at its current level (Kile, 2011). Similar shortfalls exist at the state level. For example, a panel of experts in Colorado found that the state would face a funding gap of $51 billion by 2030, even if the state settled for simply sustaining the current transportation system (Ungemah et al., 2013).[1]

There are two primary explanations for the inability of revenues to keep up with expenditure requirements: the gasoline tax rate is rarely adjusted for inflation in the cost of road construction, maintenance, and repairs, and it collects less revenue as cars become more fuel efficient (Wachs, 2007). The federal fuel tax rate was last changed in 1993. Although 10–12 states changed their tax rates in any given year between 1998 and 2011, only 27 of the 50 states changed their gasoline tax rates over this period, and those states that have changed the rate have typically done so only once. Since the unit cost of roadway construction and repairs has risen substantially during this period, the purchasing power of the revenues from the gasoline tax has been eroded (Wachs, 2007).[2]

The other growing source of revenue shortfall is the increase in fuel economy of new motor vehicles in response to stricter regulations. The federal government is raising passenger vehicle mileage standards from about 25 miles per gallon in 2005 to more than 50 miles per gallon by 2025 (Mitchell and Terlep, 2011). For the first time, new commercial trucks, including heavy-duty trucks, will also be required to achieve steady and significant gains in fuel economy (Harrington and Krupnick, 2012). Additionally, the state of California is requiring that at least 15% of all new passenger vehicles sold in the state run on electricity (or otherwise achieve zero emissions) by 2025 (CARB, 2013). As average vehicle fuel economy increases, the amount of fuel consumption and fuel tax revenues declines, even when an adjustment is made for the boost in miles of travel due to the lower marginal cost of traveling (CBO, 2012).[3]

With inflation adjusted revenues falling and construction, main-

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[1] Existing evidence points to similar funding shortages in other states: New York (Peters and Gordon, 2009), Alabama (Sisiopiku et al., 2006) and New Mexico (Cambridge Systematics, 2007).

[2] The national highway construction cost index increased rapidly between the first quarter of 2003 (baseline) and mid-2006. Although there was a significant decline during the recession (2007–2009), the index has resumed its upward trend since 2009. The data are available here: https://www.fhwa.dot.gov/policyinformation/nhcci.cfm.

[3] The fuel tax is almost always a per unit tax on the volume of fuel consumed instead of an ad-valorem tax on the value of fuel purchased.

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tenance, and repair costs increasing, governments across the country have been searching for solutions. One policy option is the use of a mileage user-fee, which – in its simplest form – is a charge for each mile of vehicle travel (Associated Press, 2009; Kost, 2009; Sorensen et al., 2010a, 2010b). Although there are concerns regarding perceived invasion of privacy, administrative costs, and reduced incentives for buying less fuel efficient vehicles, this solution is seen as promising by a number of transportation and public finance scholars because of its revenue-raising capability and its respect for the user-pays principle (Wachs, 2007; Kost, 2009; Duncan and Graham, 2013). In fact, twenty three states have commissioned mileage user-fee studies, and the single most important motivation for this increased attention given to mileage user-fees in US states is their ability to generate revenues in the face of a "dying" fuel tax.[4]

Although mileage user-fees appear to be gaining traction among policy makers in the US, a key determinant of adoption is public acceptability.[5] The objective of the current study, then, is to provide information on public opinion regarding the replacement of fuel taxes with mileage user-fees to address the growing revenue inadequacy of fuel taxes. Specifically, we address the following four research questions:

1. What is the overall level of support for or opposition to a mileage user-fee that is meant to replace existing gasoline taxes? Does it vary by administration mode and/or by level of government administering the fee?
2. Does support/opposition vary by respondent sociodemographic, political and driving characteristics?
3. Does support/opposition vary by respondent perceptions regarding characteristics of the technology used to collect mileage data (e.g., privacy, convenience, fairness) and/or the extent to which respondents support the user-pays principle?
4. What is the intensity of support for/opposition to replacing the gasoline tax with a mileage user-fee? Does the intensity vary by administration mode?

Our analysis focuses exclusively on the revenue motivation for adopting mileage user-fees so the results do not account for the ability of mileage user-fees to address congestion and emissions externalities. Nonetheless, we believe that the revenue motivation is important on its own given the current focus in the US on addressing the inadequacy of the fuel tax.[6]

The remainder of the paper is structured as follows. Section 2 describes road user-fees and highlights the importance of mileage collection technology. Section 3 provides a brief literature review, and the empirical approach including survey design, sample selection, and model specifications are described in Section 4. The results are presented in Section 5 and discussed in Section 6. We conclude in Section 7.

## 2. Road user-fees

Road user-fees are direct charges levied for the use of roads. These charges are assessed through different pricing strategies which include per-use, distance, and/or time-based fees (FHWA, 2016). The fees typically focus on congestion and peak-hour demand management, environmental externalities resulting from excessive road usage, and revenue generation for road construction and maintenance.

A key feature of distance-based road user-fees (mileage user-fee hereafter) is the mileage-collection technology. Collection technology can be classified into two broad categories: odometer and electronic monitoring. The mileage information recorded by the odometer can either be self-reported or recorded via inspection by a government official. Electronic monitoring devices have the option to transmit mileage information wirelessly, but differ greatly in the amount of information they collect and transmit; some devices collect number of miles only, while others also collect location and/or time-of-travel information. The choice of collection technology is crucial because it affects the characteristics of any proposed user-fee, including costs, convenience, privacy, fairness, compliance, and pricing flexibility (e.g., to account for inter-state travel and congestion pricing). For example, while the odometer readings raise few privacy concerns, there are concerns about compliance, and it does not facilitate pricing flexibility. In contrast, GPS-based systems allow for flexible pricing, but are subject to privacy concerns and are more expensive to implement. Therefore, the choice of mileage-collection technology might affect public support through its effect on the characteristics of the fee.

Although there is a very extensive literature on road user-charges, we are not aware of any study that identifies the effect of mileage-collection technology on public support (see Section 3). A key contribution of our paper is to identify the impact of mileage-collection technology on support for mileage user-fees. Our analysis focuses on three types of collection technology: self-reporting odometer readings; basic-GPS, which collects and transmits only the number of miles driven, and advanced-GPS, which collects and transmits miles driven as well as the time and location of each mile that is driven.

## 3. Literature review

Road user-charges is the subject of a vast academic literature including a substantial number of studies focusing on public attitudes (Jaensirisak et al., 2005; Dieplinger and Fürst, 2014). We classify this literature into two broad categories: one focusing on social and environmental *externalities* and the other on *revenue generation*. Studies in the former category tend to focus on the change in travel behavior across pricing strategies or on the determinants of acceptability of road pricing schemes often with little or no information about the collection technology. They find support in the range of 10% (Schlag and Schade, 2000) to 50% (Agrawal et al., 2009), and that acceptability depends on allocation of collected revenues (Harrington et al., 2001; Schuitema and Steg, 2008), belief about expected consequences of pricing policies on own car use (Guo et al., 2011; Whitty, 2013), financial costs (Kallbekken et al., 2013), and perceptions of equity and fairness (Jakobsson et al., 2000; Fujii et al., 2004; Hiramatsu, 2010).[7]

A similarly low level of support is found in studies that focus on replacing gasoline taxes. For example, Ellen et al. (2012) find support of 39% for a 1.6¢-*per*-mile tax in the state of Georgia, while HNTB Corporation (2012) finds that 23% of the US population supports a federal mileage user-fee. However, these studies do not specify the technology used to collect mileage data. Agrawal and Nixon (2014), in a study more closely related to ours, find that 19% of the US population support replacing the gas tax with a 1¢-*per*-mile tax administered with electronic meters that track mileage. They find that support increases to 43% if the mileage rate varies with vehicle emissions, thereby serving as an anti-pollution policy.

Our study makes several important contributions to the branch of the literature that focuses on *revenue generation* (e.g., Harrington

[4] Table A1 in the online appendix provides a list of the states that have given serious consideration to the adoption of mileage user-fees.

[5] Evidence that mileage user-fees are gaining traction in the US is presented in Table A1 of the online appendix where we document the studies that have been done on mileage user-fees across US states. There have been 6 pilot programs across 16 states so far. Additionally, Oregon began implementing a voluntary mileage user-fee in July of 2015.

[6] We acknowledge that efficiency and equity are other important factors to consider when deciding whether or not to adopt a mileage user-fees.

[7] See Zmud (2008) and Anas and Lindsey (2011) for a more detailed summary of this branch of the literature.