***How will the adoption of electric vehicles affect transportation funding deficits in the United States?***

Alan Jenn: Carnegie Mellon University PhD Candidate, Engineering and Public Policy

5000 Forbes Avenue, 129 Baker Hall, Pittsburgh, PA 15213, USA

Phone: (858) 342-2052, E-mail: ajenn@andrew.cmu.edu

## Overview

One of the largest issues in the United States transportation infrastructure is the lack of available funding for construction of highways, public transit, and road maintenance and repair. In 2010, the various state and local governments accumulated approximately $86 billion in funding for transportation infrastructure through fuel use taxes, vehicle registration fees, and various transit taxes but spent over $200 billion on transportation infrastructure construction and repair [1]. This study seeks to examine the decrease in fuel-use taxes from the adoption of electric vehicles and hybrid vehicles both at the margin and fleet-wide. I compare various models of electric vehicles against baseline internal combustion engine vehicles across all 50 states to see how transportation infrastructure revenue decreases on differing fee schemes. This study identifies which state policies are at greatest risk given scenarios of adoption, as well as which schemes are either not affected or are able to overcome the lower use taxes from higher fuel efficient vehicles.

## Methodology

I first compiled information and contacted various state-level department of transportation agencies to gather data on fuel use taxes, registration fees, title fees, inspection fees, and other transit related annual fees. I then built a flexible model in which the lifetime fees from various sources of funding and alternative vehicles are incorporated with a variety of vehicular inputs as parameters to help determine the corresponding fees paid in each state. Several vehicle models are included in the analysis, including the Toyota Prius, Honda Civic, Ford F-150, Chevrolet Volt, and Nissan Leaf. Spatial analysis was then conducted in ArcGIS with a number of comparative metrics such as decrease in fuel-use taxes standardized to each state’s corresponding funding and expenditure levels or decrease as a function of total lifetime fees. With the calculator, we are also able to project fuel tax revenues from all 50 states by running a general additive model non-parametric regression that will predict vehicle shares by make and model several years into the future.

## Results

## While the fuel-use tax decreases are a significant portion of many states’ revenues when analyzing high fuel efficiency vehicles, there are a small handful of states which are not greatly affected by the adoption of electric and hybrid vehicles. The states can, for example, be seen below in Figure 1 where the lifetime fuel use taxes are low but overall lifetime tax fees are comparatively high (e.g. Wyoming and Colorado). As it turns out, the policies enacted by individual states can have a significant effect on overall revenue generation. In particular, some states are able to recoup the loss of revenue in fuel-use through other mechanisms such as registration fees. The decrease in revenue on the margin can be weighted by the current and projected state deficits to identify the highest at risk states over the coming years (analysis yet to be conducted).

##

## Figure 1: Total lifetime fees for Toyota Prius compared to lifetime fuel taxes for Toyota Prius

## Conclusions

The results from this study lead to some particularly interesting policy implications: the most “successful” states that avoid issues with fuel-use tax increases actually increase revenue by shifting the proportion of fees to registration fees. Registration fees that are a function of the MSRP (manufacturer’s suggested retail price) take advantage of hybrid and electric vehicles’ inherently higher sticker prices (due to premiums with battery cost). The implementation of this fee in many states would avoid many legislative, equity, and political feasibility issues that policies such as raising gasoline taxes would induce.

## References

[1] Barnett, Jeffrey L., Philip M. Vidal. “State and Local Government Finances Summary: 2010”. US Census Bureau. September 2012.