Estimating the Effect of State-Level Hybrid Vehicle Subsidies

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Introduction

This poster presents the methods and results of an econometric evaluation of state-level subsidies for hybrid electric vehicles (HEVs) on demand. The motivation for this research comes from the understanding that improved energy and transportation policies could reduce oil consumption and U.S. dependence on foreign oil. According to the Energy Information Agency (EIA), transportation currently accounts for 60 percent of U.S. oil demand. Subsidies for efficient technologies such as HEVs have begun to gain momentum politically and have been enacted. After the introduction of the hybrid electric vehicles (HEV) into the U.S. market, the federal government implemented a $2000 subsidy for these vehicles. In addition to this federal incentive, individual states implemented their own set of incentives. Four types of subsidies at the state-level have been identified: HOV lane exemption, excise tax exemption, sales tax exemption, and income tax exemption. HOV lane exemptions allow hybrid owners to purchase a special license plate to utilize the HOV lane regardless of how many passengers are in the vehicle. Because not all states have implemented these subsidies or have implemented them at different times, this policy topic becomes an ideal candidate for evaluation using an observational study postulation.

Methods

To estimate the effects of HEV subsidies, this research first employs a variety of methods commonly used in observational studies, fixed effects and difference-in difference estimation (DiD). Although DiD and fixed effects are empirically similar, DiD allows for time specific intercepts, whereas fixed effects does not. In addition, this research uses alternative methods to identify whether the previous results produced biased estimators originating from selection bias. In order to attempt to remedy this issue, this research uses matching methods similar to Dale and Kruger (2003), matching states that enacted this policy to similar states that had proposed, but not yet enacted this legislation. The group of states that have proposed legislation, but have not yet passed legislation, is significant. In 2005 alone, over 30 states proposed new legislation to support diffusion of this new technology.

Although initial analyses using fixed effects and difference-in-difference estimations produce significant positive estimators for some of the subsidies, the analysis using the matching method does not. Since the three results from these analyses are not consistent, conclusions that the subsidies increase state level demand cannot be made. In addition, this matching method demonstrates the possible biased analyses that come out of using traditional fixed effects or difference-in-difference when not accounting for selection bias in observational studies.

Results

Future research will analyze the same question with individual level data and then compare results above with the results of individual level data. Fortunately, data scheduled to be released in fall 2009 from the National Household Transportation Survey (NHTS) contains questions to that can address this policy topic.