

Referee Report on "Welfare Effects of Fuel Tax and Purchase Incentives for Low-Emission Vehicles"

July 3, 2024

Summary

This paper, authored by Tatsuya Abe, investigates the welfare effects of fuel taxes and purchase incentives for low-emission vehicles in the Japanese new car market. Using an equilibrium model that combines household-level survey data and product-level aggregate data, the paper assesses the impacts on car ownership, usage, and market equilibrium. The main findings are:

1. Purchase incentives significantly increase social welfare by reducing market distortions but also result in increased environmental externalities due to a rebound effect.
2. The rebound effect, ascribable to the low usage cost of fuel-efficient vehicles, offsets approximately 7% of the CO₂ emission reductions achieved by shifting the fleet composition towards low-emission vehicles.
3. Fuel taxes are found to be less costly and less regressive compared to emission-based product taxes for achieving similar environmental benefits.

Comments and Questions

Clarity and Precision of the Research Question

The research questions are clearly articulated and well-motivated in the introduction. The paper addresses an important and timely issue concerning environmental policy in the automotive sector. However, the scope of the question could be more precise. The paper aims to assess both welfare and environmental impacts, but a more focused question could improve the coherence of the analysis.

Model Specification and Consistency

The model integrates household-level and product-level data, providing a robust framework for analysis. However, it does not leverage the full potential of the panel data structure, particularly in incorporating time-variant household-level changes. For instance, observable attributes such as household income and unobservable attributes such as households' attitudes towards the environment may evolve over the study period, influencing their car ownership and usage decisions. Ignoring these dynamic changes could lead to biased estimates and oversimplified conclusions. Incorporating random effects models with time-varying covariates could capture these evolving attributes.

Results and Interpretation

The results are clearly presented and effectively linked back to the research question. The paper provides a comprehensive analysis of the welfare and environmental impacts of the policies studied. However, the robustness of the results could be improved by exploring alternative specifications. Specifically, the paper should consider conducting sensitivity analyses, such as testing different model assumptions, using alternative estimation techniques, and incorporating additional robustness checks. This would enhance the credibility and reliability of the findings, ensuring that the conclusions drawn are not sensitive to specific model choices.

Caveats and Limitations

While some limitations are mentioned, a more explicit discussion of the study's limitations and potential biases would be beneficial. For example, a discussion of the effects of potential measurement errors would enhance the transparency and reliability of the findings.

Empirical Strategy and Data Utilization

The empirical strategy is sound, with a clear link between the theoretical model and the estimating equations. The data used is appropriate and well-suited for the analysis. The author provides a thorough description of the data sources and sample, ensuring replicability.

Policy Recommendations

The paper would benefit from a section on policy recommendations based on the findings.

Mathematical Rigor

Some derivations could be more detailed to enhance clarity, such as the derivation of the driving demand using Roy's identity.

Overall Evaluation

This paper makes a great contribution to the literature on environmental economics and policy, particularly in the context of the Japanese car market. The research question is well-defined, and the methodology is robust and appropriately applied. The data used is comprehensive, and the results provide valuable insights. However, in my opinion, the paper could benefit from a clearer focus in the research questions, correction for household variables subject to changes over time, and a more thorough discussion of potential limitations and robustness checks.