

Abstract: Challenges in Modeling CAV Energy-Emission Impacts, and What (If anything) can be Learned from Compact Equilibrium Modeling

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This paper first summarizes key challenges modeling energy/travel demand/emission impacts of CAVs, and reviews approaches. Based on this review of approaches, features and challenges, it then seeks to rigorously identify the limits, and potential insights, or more aggregated national analyses that selectively abstract from important, but perhaps not essential detail. It seeks to identify promising strategies for reduced form representation of the important features and phenomena modeled elsewhere in more explicit spatial, temporal, and technological detail. Following the spirit of integrated assessment modeling in climate change analysis, it reports on initial model results with a new compact aggregate framework integrating technological factors and travel demand response, and key behavior interactions and responses. Equilibrium interactions are moderated by economic signals and incentives. Central physical phenomena are represented to the extent possible in a more aggregate framework, with the goal of focusing attention on some of the most important driving factors associated with CAV's and their energy and demand impacts (VMT response to travel costs; speed response to safety and cost; consumer valuation of performance and size; congestion equilibrium effects and representation of how effectiveness of technologies (traffic smoothing, platooning) depend on degree of deployment. We report on results to date regarding the prospects and limitations of such an approach as a planning and market scenario evaluation tool that complements and supplements more extensive detailed simulation tools.

*Note: this is ongoing and developmental work, and would be well-suited to a brief (5 min) presentation, if that is deemed appropriate. Thanks*