

Quantifying the Influences of Telecommuting on Household Total Trips and VMT Generation

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Research Priority: Preserving the Environment

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Project Start and End Date: 06/01/2023 to 10/31/2024

Project Description: The Covid-19 pandemic, alongside changes in technology and shifts in the job market, has led to increasing numbers of workers in the U.S. telecommuting, or ‘working from home.’ As many workers and businesses shift to models allowing for some or all work to be carried out off-site, traditional patterns of commuting are shifting, causing potentially widespread impacts on all aspects of the transportation system. Much of the previously available data on telecommuting classified workers as either fully remote or fully on-site. In the post-pandemic economy, increasing numbers of workers are ‘hybrid’ telecommuters, working from home part-time. While telecommuting provides workers with the ability to decrease VMT by eliminating commutes, previous research has shown that in many cases those who work from home actually generate more VMT than their counterparts, perhaps due in part to having more time to generate non-work trips for leisure and other purposes. As telecommuting becomes increasingly popular, understanding the broader impacts of this trend on travel outcomes is necessary to allow for planning processes that limit VMT generation and its negative social, environmental, and health effects, and to reassess transit systems to meet the changing travel needs of the population. Using a dataset from California, where a proliferation of high-tech companies and industries allowed for the early adoption of telecommuting models, this research aims to quantify the influences of telecommuting on household VMT generation and total trip generation. It will advance the current understanding of the influences of telecommuting on VMT and transit usage in three ways. First, it will explore these influences at the household level with precise locations of where people live to control for both sociodemographic characteristics and neighborhood built environmental features. Second, it will employ a hierarchical two-stage modeling approach. Not only it is the appropriate method to analyze variables with large numbers of zeros, such as transit trip counts, but also it can handle a nested data structure and take spatial autocorrelation and heterogeneity into account. Third, this research will use data from California, where most telecommuting started earlier than elsewhere. That gives a longer time for the impacts of telecommuting to be felt.

Update April 2024: Analysis has been completed and a draft journal article and a webinar discussing the results have been produced. Spatial patterns, descriptive statistics, and basic

statistical testing all indicate relationships linking levels of telecommuting frequency, household trips, and household VMT generation. However, multilevel linear regressions demonstrate that only household trips continue increasing at each level of telecommuting frequency, and multilevel two stage regressions demonstrate that only the occasional telecommuting group (1-5 times monthly) was correlated with increased VMT production. This study adds further insight to previous literature by showing the impacts that telecommuting frequency, local contexts, household characteristics, and the built environment have on travel behavior. The study demonstrates that telecommuting may not be a travel demand strategy in and of itself, but its complementary effect on household trips does not need to increase household VMT generation if policymakers and planners create efficient, sustainable, and equitable transportation systems to filter extra household trips into environmentally sustainable travel modes.

USDOT Priorities: This research focuses on the issue of *Transformation* and planning for the future of our transportation systems using *Data-Driven Insight* into how people's transportation patterns and needs are shifting. It also addresses the USDOT strategic goal of *Climate and Sustainability* and its research priorities of *Decarbonization* and *Sustainable and Resilient Infrastructure*, as well as the side effects these planning processes and outcomes have on issues of *Equity*.

Outputs: This research will generate: 1) one peer-reviewed publication (DRAFT COMPLETED, OUT FOR REVIEW); 2) one policy brief; 3) one conference presentation (SUBMITTED to Future of Transportation Seminar 2024); 4) one or more webinar or training workshop (COMPLETED, https://www.youtube.com/watch?v=gwxHRIfuV9E&t=379s&ab_channel=CETOC); 5) an analytical model of quantifying the impacts of new technologies on transportation systems/travel behavior changes.

Outcomes/Impacts: The results of this research will allow planners and policy makers to make informed decisions regarding the future of transportation systems, including updating public transit projects to meet the changing travel needs of the population and making planning decisions for policies designed to target VMT reduction in the post-pandemic travel environment.

Final Research Report: (Link to be provided after project completion).