The Impact of Teleworking on Greenhouse Gas Emissions: A Doubly Robust Difference-in-Differences Analysis Using French Data

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Abstract

Teleworking has emerged as a potentially powerful lever for reducing transport-related greenhouse gas (GHG) emissions, yet its net environmental impact remains empirically uncertain due to offsetting behavioral adjustments. Using a uniquely rich two-period panel survey of 3,530 workers in France, this paper estimates the causal effect of telework adoption on annual mobility-related emissions. We implement a doubly robust difference-in-differences (DRDID) estimator that accounts for non-random telework adoption and heterogeneous mobility patterns, supported by extensive overlap diagnostics and alternative weighting schemes. Teleworking reduces annual mobility emissions by 270-300 kgCO_2e per treated individual, primarily through a large

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decline in commuting-related emissions. A decomposition by trip purpose reveals only limited rebound effects in private mobility, offsetting at most 15-20% of commuting savings. Robustness checks using fixed-effects DID and alternative telework-intensity thresholds confirm the magnitude, sign, and significance of the effect. We further compare the implied marginal abatement cost (MAC) of teleworking with alternative mitigation options, showing that teleworking constitutes a cost-competitive "avoid" strategy within low-carbon mobility portfolios. Finally, we highlight distributional implications: because teleworkable jobs are concentrated among higher-skilled occupations, the environmental benefits of teleworking risk exacerbating existing climate inequalities between teleworkable and non-teleworkable sectors. Overall, our findings demonstrate that teleworking yields sizeable, robust, and cost-efficient mobility-related emission reductions, while emphasizing the need for complementary policies to support frontline workers excluded from this mitigation pathway.

Keywords: teleworking; mobility behavior; commuting emissions; rebound effects; doubly robust difference-in-differences.
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