ICT- Households Total Carbon Footprint in France: LCA-MRIO

Topic: Input-Output Analysis: Energy policies (2)
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Abstract
Dematerialization and climate mitigation are frequently promoted as outcomes of digitalization. It is uncertain, therefore, whether household ICT spending reduces or increases overall carbon emissions. Within household budgets, this study examines whether ICT spending crowds out or crowds in non-ICT emissions. We compute per capita ICT and non-ICT carbon footprints using consumption-based carbon footprint accounting and household-level microdata, and we investigate how these footprints relate to ICT spending in middle-income households. To determine whether increases in ICT spending are linked to larger overall carbon footprints (complementary) or to reductions in other emissions (desirable rebound), we next construct an elasticity-based regression model. Rudimentary findings show that ICT spending is positively correlated with total CF, and any rise in ICT spending is likewise linked to total household emissions. The correlation between increased ICT spending and increased non-ICT emissions was another significant conclusion. Heterogeneous rebound dynamics are indicated by the greater ICT-emissions link among urban families and heavy ICT users. These findings will demonstrate how crucial it is to take budget relocation mechanisms into account when assessing the climate effects of digitization.

Research Questions:
RQ1. After taking household size and wealth into consideration, how does the overall household carbon footprint relate to household ICT expenditure?
RQ2. Does greater ICT spending in the middle-class population correlate with either a "desirable rebound"â€”a decrease in non-ICT spending and footprints, or a "consumption-expanding rebound", a rise in non-ICT footprints?
RQ3: Are these associations different depending on the residential context (degree of urbanization) and the ICT-expenditure group (low, middle, and high)?

Method used:
Hybrid LCA-MRIO

Novelty of the research:
In addition to assessing ICT footprint levels,Â Rebound uses microdata to frame the entire household budget and evaluate whether changes in ICT spending are associated with changes in other footprint categories (non-ICT tangibles/services, home energy, and motor fuels) within the same household budget.
Instead of comparing raw averages across all families, where income is the primary determinant, the middle-income focus, as the "rebound-sensitive" section, operationalizes the rebound where it is potentially most obvious (middle 50%).
Also, Heterogeneity where Urbanization (HA09 interactions) tests differences in the ICT rebound.Â ICT intensity groupings (interactions between ICT_group3)
This lends credence to the idea that the effects of digitalization vary by geography and society.Â Evidence of the mechanism through an income effect on ICT and subsequently on the footprint pathway