How and why we detail household final demand to cover multiple household activities

Topic: Sustainable Production and Consumption Policies
Author: Sofia Topcu Madsen
Co-Authors: Bo P. Weidema

Input-output analyses are increasingly used to estimate consumption-based environmental footprints, driven by a need for demand-side climate change mitigation approaches. For instance, several input-output analyses have distinguished different household income or geographic segments and estimated the climate footprint associated with their consumption across different final demand categories, such as food or transport. While these studies show who drives the total consumption and their environmental impact per $ or kg consumed, it is equally important to show how the households consume and their emission per minute spent in an activity. A growing body of research has emerged in recent years, shedding new light on the environmental impacts of how people consume by linking the environmental footprint from input-output analyses with household activity patterns obtained from time-use surveys. The current study goes a step further and demonstrates how household activity patterns can be integrated into the input-output structure and why it is important.

The current study aims to develop an input-output structure detailing the use of market and household-produced products in household activities that can be used to calculate the climate footprint associated with a minute spent in household activities like eating or reading. As a start, it collects relevant data from the United Kingdom, Denmark, and the United States. It demonstrates that the developed set of methods is relevant and valid across the three countries. The methods will be used to detail the final demand in a multi-regional environmentally extended input-output table developed in the project called â€œGetting the Data Rightâ€• led by researchers at Aalborg University (https://www.en.plan.aau.dk/research/the-danish-centre-for-environmental-assessment/getting-the-data-right). Method-wise, the study is inspired by an area of research earning recognition in the 1990s integrating household production into input-output tables to estimate total production in the economy and disparities in the sphere of production (market and household) between men and women. Household production activities resemble market activities; one could pay a third person to perform them without loss of utility. Activities like meal preparation, cleaning, and childcare are household production.

The study uses time-use diary data and household budget data from the relevant countries to detail the final demand for the most recent available years. Further, it uses energy, water, and other end-use data sources to enable the distribution of products to household activities. The study details households by their equivalized income and household composition. In the case of the UK, 33 household groups were created, each described by their income and composition. The groups are representative of the UK population and represented in the time-use survey and household budget survey. For each household group, a household supply and use table is created with household production activities as the rows and columns. Household-produced products are valued based on the price of an equivalent market product. The use table includes additional columns for the household final consumption activities, such as eating, relaxing, or exercising. Household production activities, including secondary production, provide inputs to other household production and final consumption activities. Products are distributed based on end-use data, a priori reasoning, and a time proportionality principle. This is used to create a household input-output table for each household group which is used to distribute the final demand vector to household groups and activities. An account of time use during the entire day, including during market work time, is

included for each household group.

When used to detail the final demand in the input-output database, the methodology can be used to generate novel results in that it allows an integrated analysis of the economic, environmental, and social spheres. For instance, the simultaneous effect on emission levels and consumption inequality from a policy change can be estimated. Results can inform policymakers about whether targeting the structure of household activity patterns or the consumption during an activity is most relevant to mitigate climate change. Opposed to the recent studies on the topic, the outputs of household production activities are allocated as inputs to final consumption activities. Thus, the calculation of total expenditures and the associated environmental footprint of the final consumption activities include the household-produced inputs.