

Effect of Household Characteristics and Behavior on Life Cycle Environmental Impact of Household Consumption

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Background

- ✓ Consumer behavior is one of the keys for sustainable production and consumption.
 - ✓ Analyzing consumer behavior considering household characteristics is important to decision making to reduce environmental load from household consumption, as well as sectorial approach in greenhouse gases reduction in industry is crucial.
 - ✓ This study estimated Life cycle CO₂ emission (LC-CO₂) related household consumption considering household characteristics. Also income elasticity of LC-CO₂ is estimated to analyze consumers behavior.
- RQ: *How income growth contributes to household's LC-CO₂ emission?*

Methodology

Method of Estimation

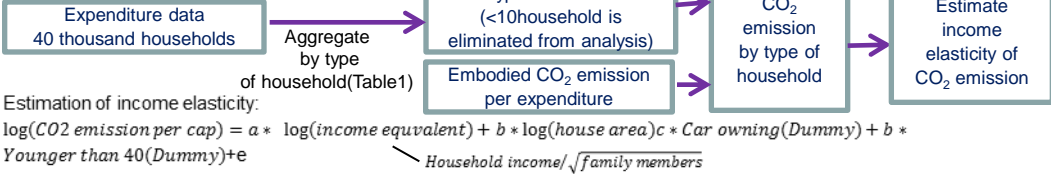


Table:1 Types of household

Type	Pattern
Age of householder	6
N of family member	4
Type of house	2
Area of residence	2
Owning car (or not)	2
Industry (householder)	6

- Data**
- Household Expenditure Survey: Surveys expenditure of 40 thousand household in Japan, data in 1999.
 - 3EID: Japanese Environmental IO database (Embodied CO₂ emission), data in 2000.

Results and Discussion

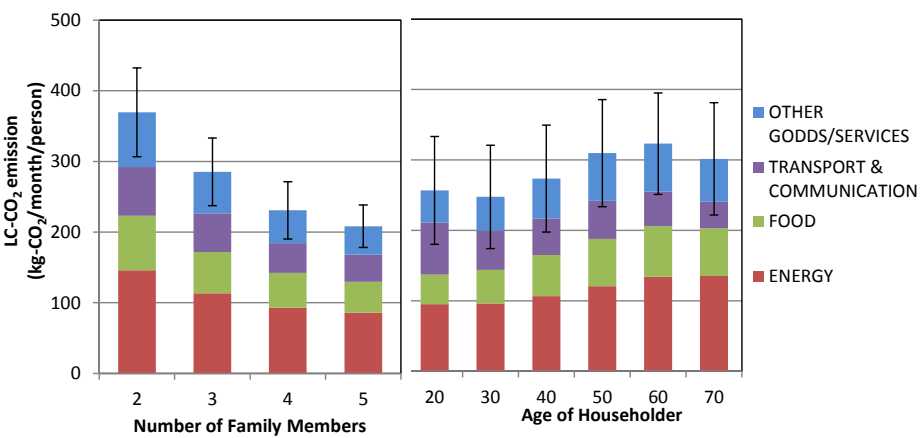


Fig. LC-CO₂ emission from household consumption by household type. Error bar means standard deviation. As household members increase, LC-CO₂ emission per capita decreases. Age 50 or 60 emits highest LC-CO₂, because of higher income than other age.

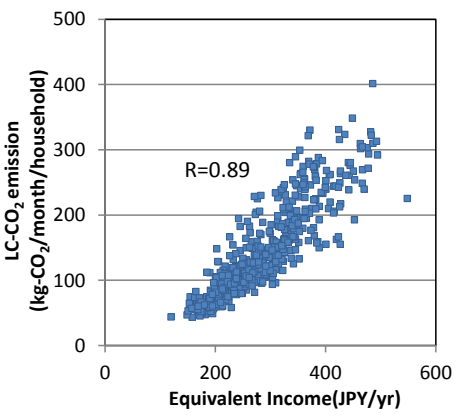
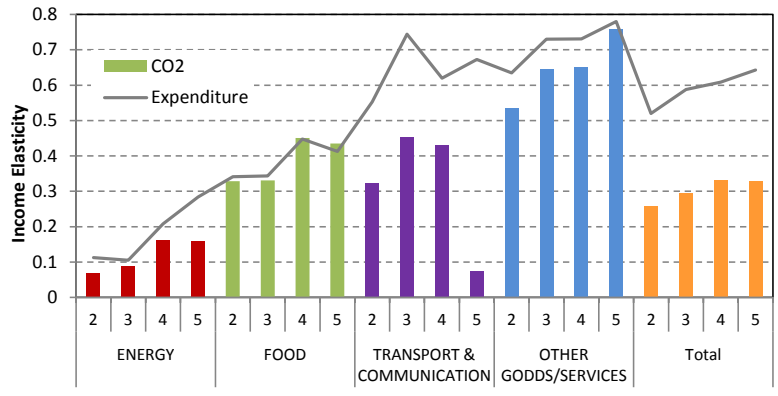


Fig. Relationship between income and LC-CO₂ emission. When adjusting income by family members, the correlation becomes strong.



Number of Family Members	2	3	4	5
LOG(INCOME_equivalent)	0.258**	0.294**	0.333**	0.329**
LOG(HOUSE_AREA)	0.175**	0.146**	0.103**	0.129**
CAR(Dummy)	0.187**	0.140**	0.150**	0.141**
AGE2030(Dummy)	-0.057**	-0.066**	-0.059*	-0.071**
C	3.209**	3.126**	3.112**	2.894**
Adjusted R-squared	0.769	0.776	0.762	0.852
DW Ratio	1.666	1.961	1.607	1.295

Income elasticity of CO₂ emission and expenditure by household types (Fig.) and result of estimation of total CO₂ emission(Table). Income elasticity of LC-CO₂ of energy is lower than other expenditure. Elasticity of energy and other good/services is high in bigger family. Income elasticity of LC-CO₂ is lower than that of expenditure in energy and transportation & communication because of shifting ratio of commodity purchased (e.g. increase of electricity use, communication expenditure). Therefore elasticity of total CO₂ is a half than elasticity of expenditure.

Conclusions

- ✓ LC-CO₂ related to household consumption is effected by household characteristics.
- ✓ Income elasticity of LC-CO₂ of bigger family is higher than other in most commodity.
- ✓ Income elasticity of LC-CO₂ is lower than that of expenditure in Japanese household, by shifting ratio of commodity purchased.