Psychological frameworks to explain rebound effects in car-based mobility

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Content

• From an economic to a psychological analysis of rebound
• Psychological framework
• How to study R?
• How to deal with R?
Definition by Economists

Direct rebound-effect = technological efficiency gains lead to higher consumption through gains in money or value

Efficiency = energy input/ performance output → a relational measure
Analysis and relevance of rebound

• Controversy about estimation methods and results
  (e.g. Frondel et al. 2012: 57-62% vs. Gillingham et al. 2013: 5-30%)
  → Substantial risk of rebound

• Private car use accounts for 33% of household energy consumption in Germany
  (Frondel et al. 2013, p. 77)
  → high impact behavior
  → How do people use energy efficient cars?

• focus on cars with combustion engines
  (Grüttner et al. 2013)
Multi-causal definition

Rebound = The **discrepancy** between the decrease in energy consumption expected from technical efficiency improvements (**engineering savings**) and the actual total energy consumption affected by consumer behavior.

ICCT(2013): huge discrepancy between official and real-world fuel consumption and CO2 emissions (EU, USA), in average 25 %
Rebound vs. Spill-over

• **Rebound**
  – technical component: efficiency gain
  – Human-technology interaction
  – Focus on energy consumption and money

• **Spill-over (e.g. Thøgersen & Crompton, 2009)**
  – Positive: one pro-environmental behavior leads to another
  – Negative: moral licencing
  – Behavioral change as starting point
  – Focus on ecological impacts of behavior
3 forms of direct rebound in consumer behavior

1. Buying vehicles that are more efficient but bigger, heavier and more powerful than their previous ones
   – e.g. changing from a station-wagon to a sport utility vehicle

2. Driving longer distances with the more efficient car
   – e.g. changes of modal split in favor of car-based mobility

3. Adopting more energy-intensive use patterns
   – e.g. driving faster or with less anticipation
Heterogenous previous findings

• “How do people buy fuel-efficient cars?” (Peters 2009)

• Psychological and other determinants
  – Environmental knowledge → more fuel efficient cars, but no effect on numbers of cars or miles driven (Flamm 2009)
  – R found only for cars with > 8 l/100 km and for diesel cars; R if household head enjoys driving, no worry for the environment (Matiaske, Menges, Spieß 2012)
  – R (miles driven) if belief in ecological advantage of Prius (Ohta & Fujii 2010)

→ R is NOT a direct function of financial savings
  (Matiaske et al. 2012)
CADM (Klöckner & Blöbaum 2010) – modified and adapted to rebound in car-based mobility

- **Habitual processes**
  - Mobility behavior routines

- **Intentional processes**
  - Money-saving attitude
  - Sufficiency attitude

- **Situational Influences**
  - Money-saving attitude
  - Sufficiency attitude

- **Normative processes**
  - Moral leaking
  - Social comparison

- **Subjective Facilitations**
  - more money
  - more comfort
  - less environmental impact

- **NON-ecological behavior**
  - (1) bigger car
  - (2) driving more
  - (3) driving faster
How to study R in behavioral science?

- Conscious (over-estimated) vs. unconscious determinants
- Consumption measure (fuel consumption/tkm) AND self-descriptions
- Money, time, comfort, conscience, symbolics + social practices of car-use
- Cross-cultural transferability of R studies?
- Contextual influences and actors: automobile industry, (EU-)politics: pre-shaping of individual’s decision?
I LOVE MY
SUV
They told me to go green
so I bought this shirt
How to deal with rebound?

• Societal
  – Technology as the solution?
  – Material consumption and the „good life“?

• Political
  – Efficiency AND sufficiency!

• Actors and individual
  – Label Fuel-Efficiency and parsimony as core innovative characteristics of a car (not big size, power range etc.)
  – „You do contribute to ecological conservation by an efficient car – but only if you really decrease your total energy consumption“
  \(\Rightarrow\) enhancing spill-over instead of rebound
References


Behavioral measurement of R

• Form 1
  – Comparison of technical attributes of car 1 and car 2
  – Find out how consciously people think about and know the efficiency degree of their cars and other technical characteristics
  – Akteursanalyse wichtig

• Form 2 of R
  – In l/tkm (Santarius?...)
  – Siehe Ohta und Fuji

• Form 3
  – GPS tracking
  – questionnaires