

The benefits of action on implementing carbon taxation in Ireland. A demand system approach.

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“.. Climate change is not science fiction. This is a battle in the real world, it is impacting us right now”(Arnold Schwarzenegger)



International research shows that climate change will impact households income. There are many channels through which this can manifest such as losses in agricultural productivity, increases in crime, coastal storms, disruption in energy supply and human mortality, Hsiang et al. (2017)

Motivation

- What are the net distributional effects of carbon taxation?
- How is the tax burden experienced by different household types?
- How large is the burden?
- Which compensatory measures (e.g. lump-sum transfers) can benefit different groups?
- How to evaluate the effectiveness of these measures?

Literature review

- Hsiang et al. (2019) estimated the income losses due to increases in global temperature
- Streer et al. (2021) show that carbon taxes can help to keep increases in temperature below 2°C
- Poterba, 1991; West, 2004, 2005; Fullerton and West, 2000 and Tovar and Wolfing, 2018 analyse the distributional effects of carbon taxes

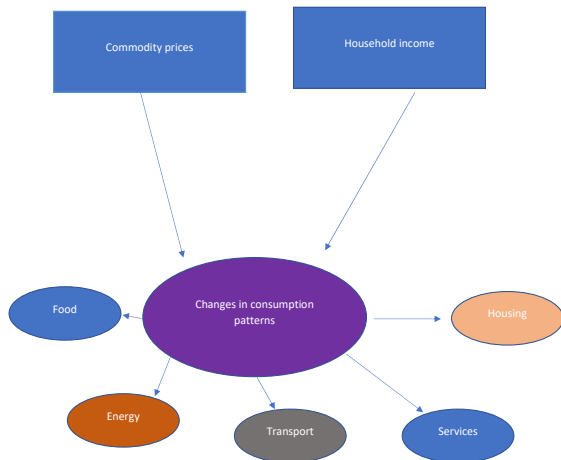
Data and methodology

Data

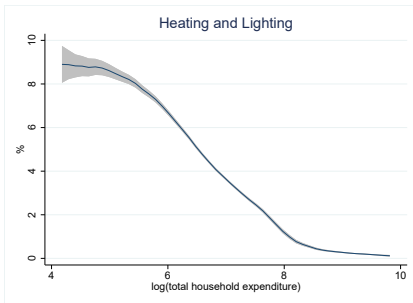
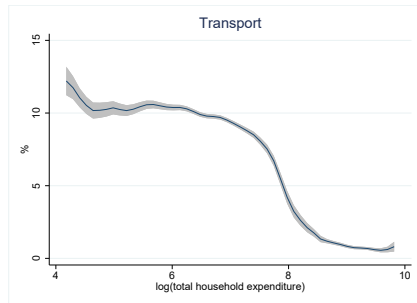
- Estimation: Household Budget Survey (1994, 2000, 2004, 2009, 2016)
- Price indices for different commodities
- Simulation: Household Budget Survey (2015-2016)

Data and methodology

Arthur Lewbel and Krishna Pendakur (AER, 2008)



Data and methodology. Engel curves



Simulation

- Hsiang et al. (2017) estimated that an increase in 1°C would imply a decrease in gross domestic product of 1%.
- Streer et al. (2021) show that if carbon taxes are high enough the temperatures will be below 2°C
- Benefits of action are allocated: equally, disproportionately impacting low income households, and according to willingness to pay for environmental protection

Simulation

- We analyse the effects of an additional tax of 80 Euro per CO2 tonne.
- We analyse the effects of a lumpsum transfer of 40% of carbon tax revenues

Results: Changes in energy demand

Table: Uncompensated own price elasticities (statistically significant at 1% level)

Elasticity:	Heat. and light.	Transport
First quartile		
Own Price	-0.456	-0.439
Fourth quartile		
Own Price	-0.546	-0.714

Results: Additional cost

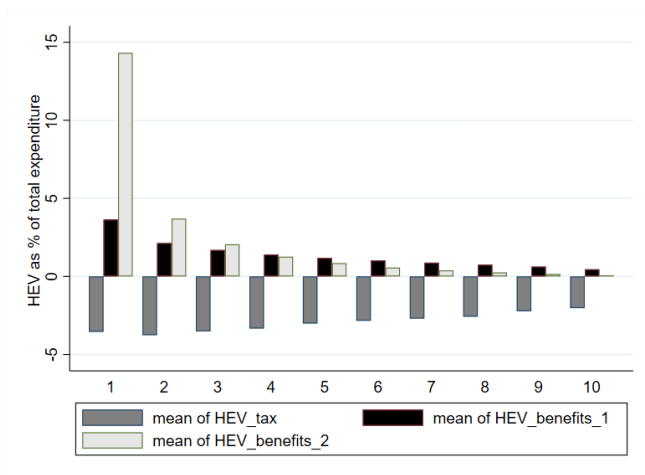


Figure: Hicks' equivalent variation (in % of total expenditure) across expenditure deciles. Scenarios: tax and benefits.

Results: Emissions reduction w.r.t to the base scenario

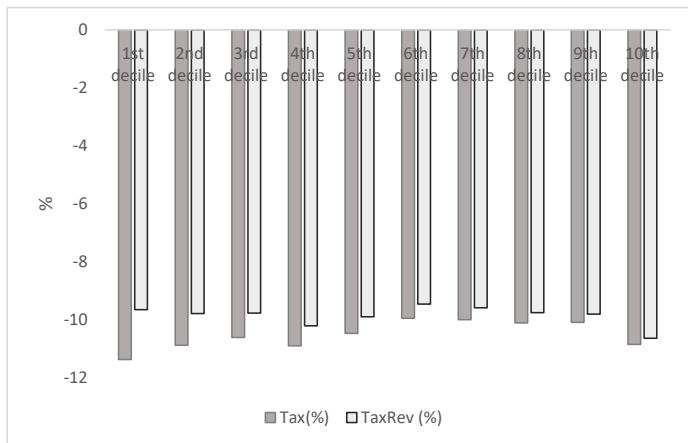


Figure: Emission reduction w.r.t. to the base scenario

Results: Coefficient of variation in HEV

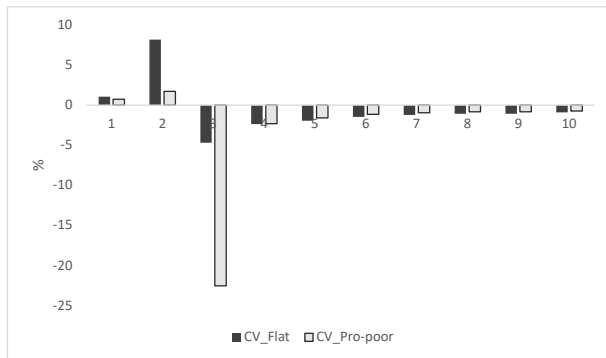


Figure: CV across income deciles

Conclusions

- Carbon taxation is indeed effective in reducing energy demand
- Once the benefits of action are considered, low income households are not disproportionately affected. In particular when the benefits accrued to low income households.
- It is important to consider several channels where inequality could appear.
- It is important when designing carbon taxes to balance short (i.e. boost the incomes of less affluent households) and long run objectives (i.e. encourage substitution away from carbon intensive consumption)

Thanks!

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