

The Distributional Effects of a Carbon Tax: The Role of Income Inequality

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Introduction

Main research questions

- Are carbon taxes regressive?
- What is the role of inequality in facilitating regressivity?

Context: general presumption of regressivity of carbon/ fuel taxes

Our paper: Sweden's carbon tax, and its distributional effects, over time

- Role of changing income inequality in driving trends in regressivity



Overview of paper

Research hypothesis

- For carbon taxes on goods which are necessities, and where $0 < e_i < 1$, ... rising income inequality increases the regressivity of the tax
- And heterogeneity of e_i across income groups amplifies this

Data and methodology

- Household survey data 1999-2012: Income and expenditure
- Suits index: to measure (degree of) regressivity

Results

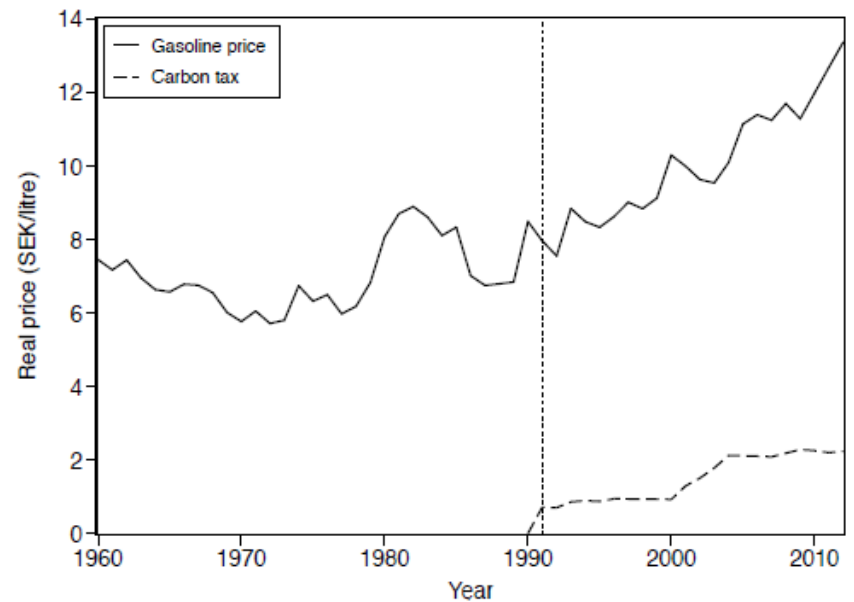
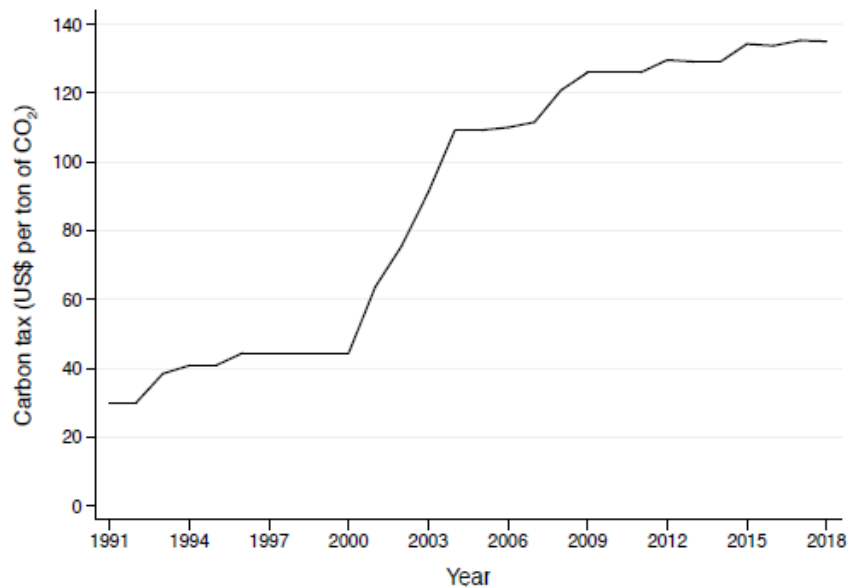
- Regressivity depends on income metric. But trend towards greater regressivity on both measures we use
- Income inequality as significant driver of this process, with implications for thinking about carbon taxes in other countries?

Sweden's carbon tax: Background

Implemented in 1991

Partial coverage - some sectors exempt

Total rate applied to **transport and heating fuels** (households)



Data and methodology

Household survey data 1999-2012 (source: Statistics Sweden).

- N ~ 2000 each year. (Missing data: 2002, 2010, and 2011)

Two measures of income:

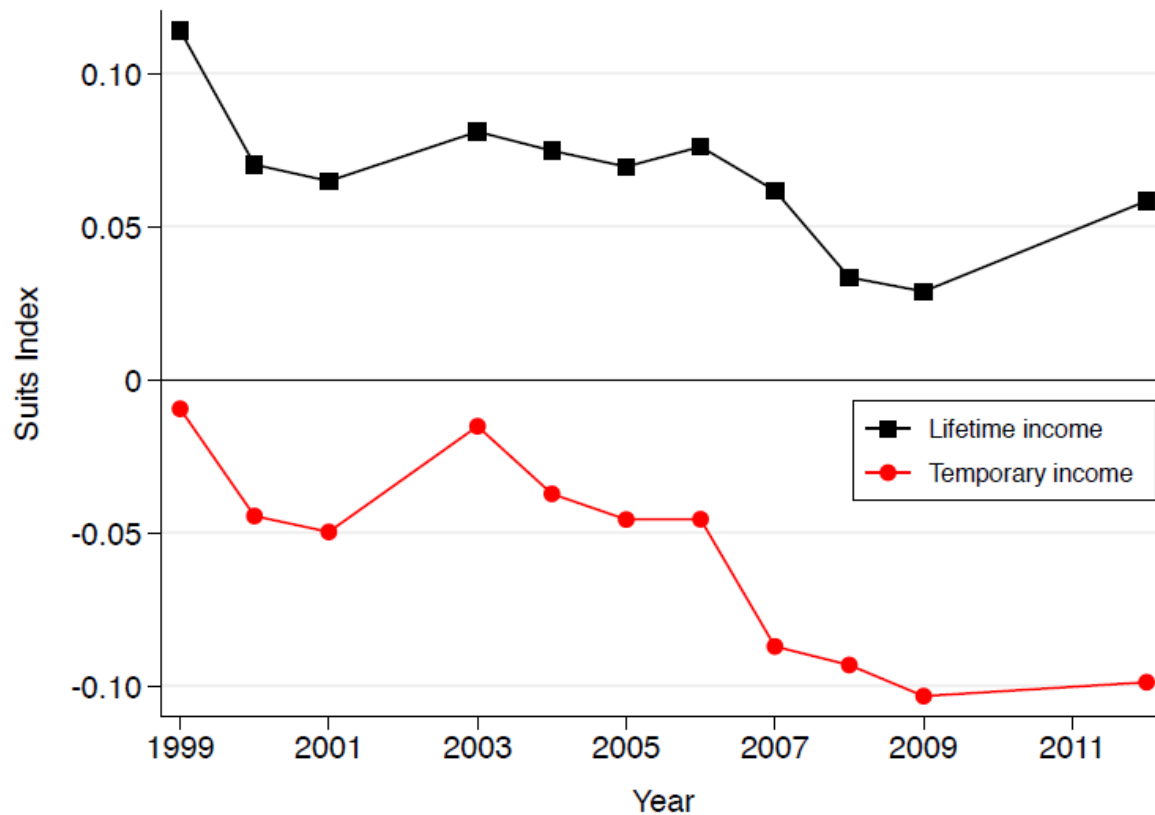
- Annual income: disposable income each year
- Lifetime income: total expenditure as a proxy

Carbon tax burden measured as percentage of income

Distributional effect measured using Suits index (Suits, 1977)

- +1: Extreme progressivity
- 0: Proportional
- -1: Extreme regressivity

Results: Distributional effects of the Swedish carbon tax

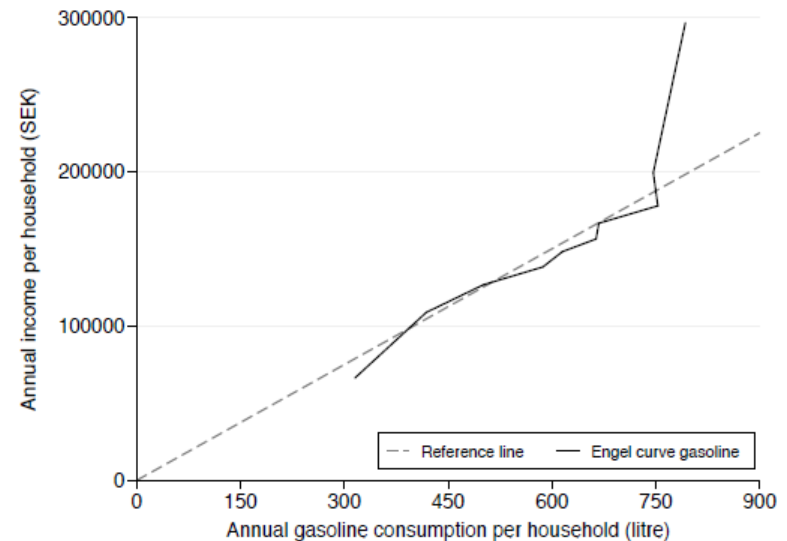
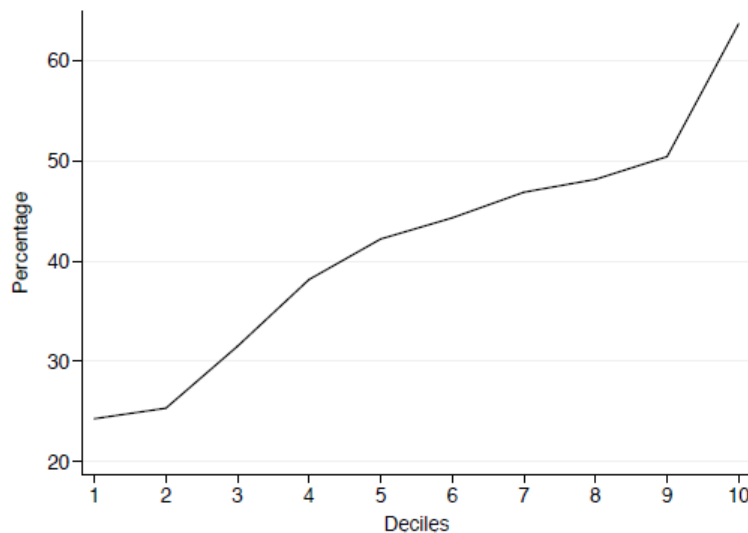


Question: what is driving this trend toward an increase in regressivity?

Hypothesis: for goods which are necessities

Rising income inequality increases the regressivity of a carbon tax

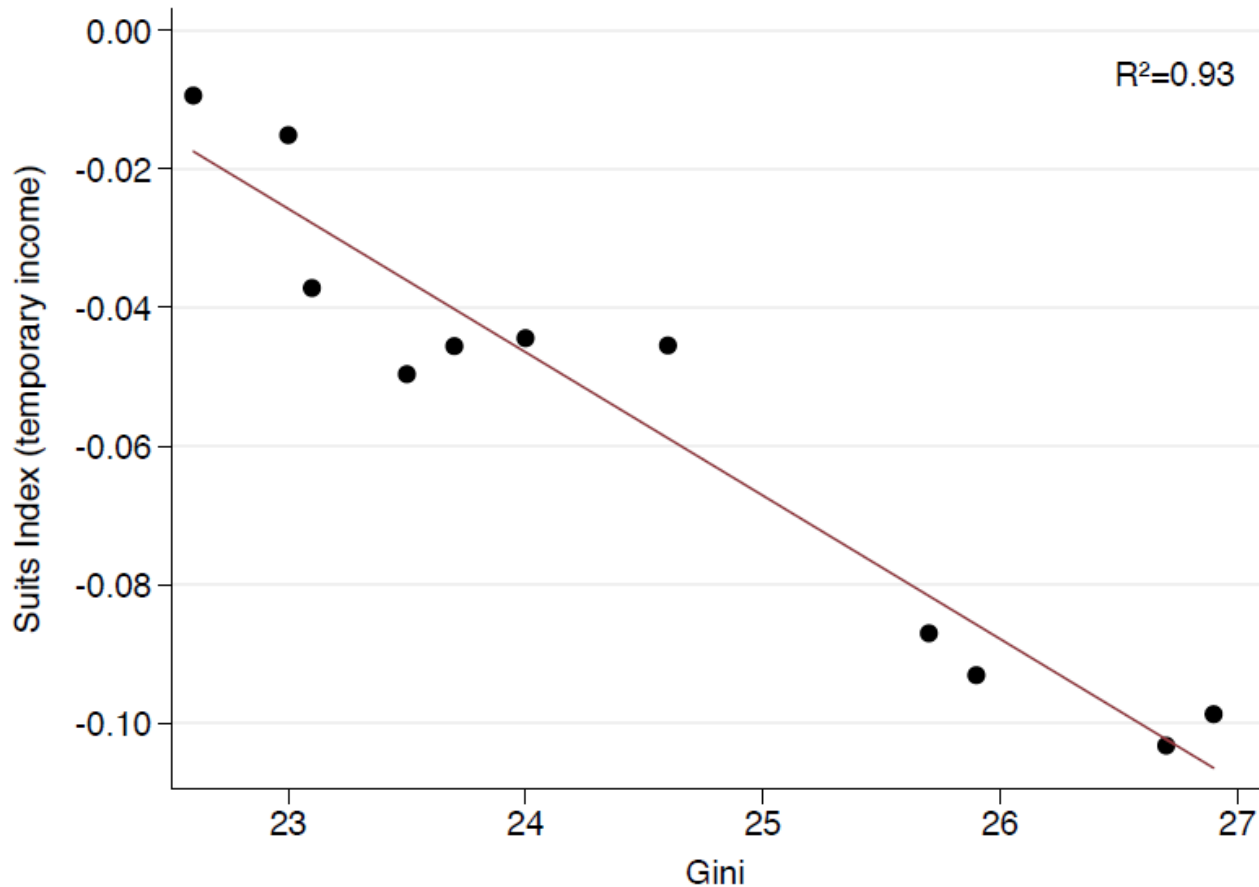
The role of income inequality?



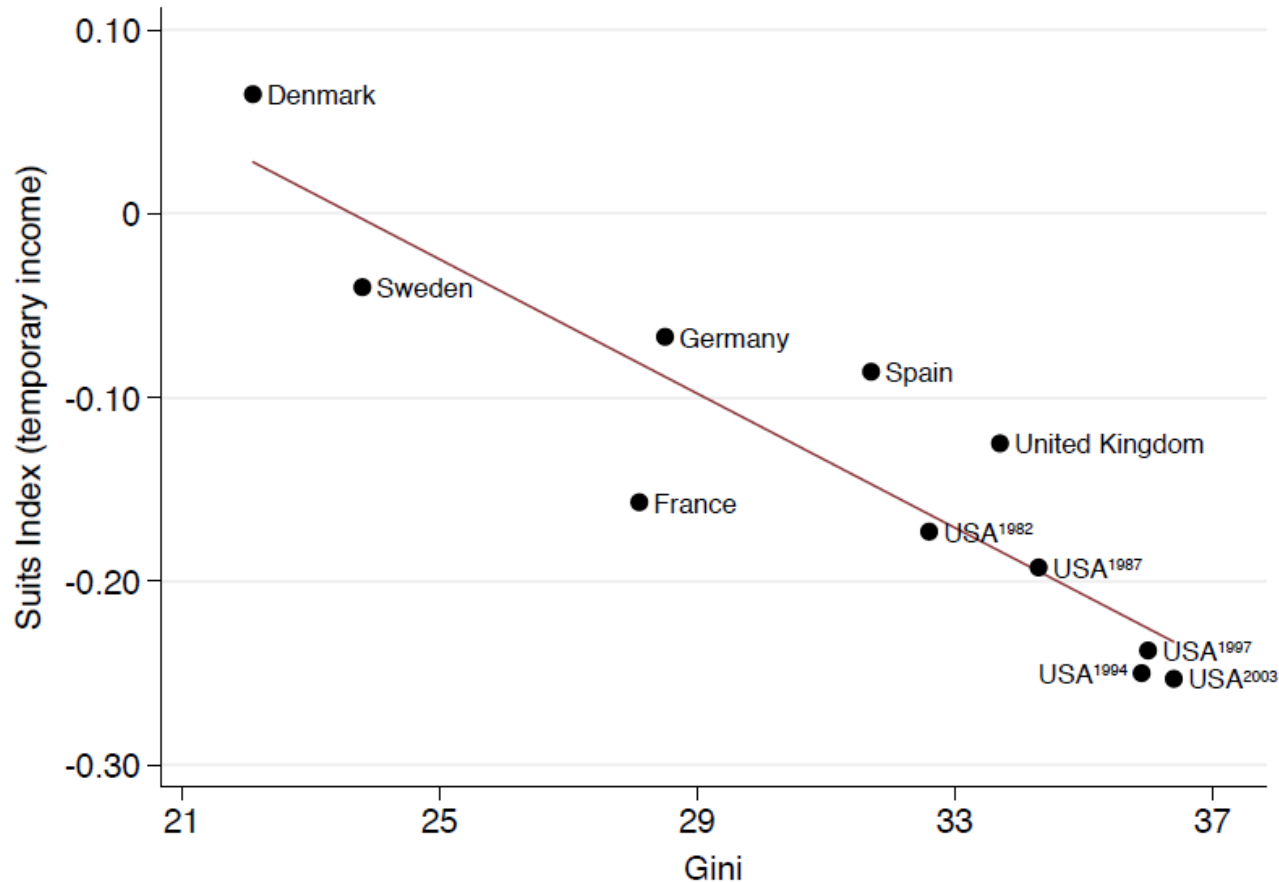
Growth in Real Disposable Income 1999-2012 and Engel Curve for Gasoline

If income elasticity is heterogeneous across deciles e_i^d , with $e_i^1 > e_i^{10}$ then the regressive effect will be amplified

Carbon tax incidence and income inequality: Sweden



Carbon tax incidence and income inequality: Sweden and other OECD



Carbon tax implementation in OECD countries

Country	Year of implementation	Gini at implementation	Status
Finland	1990	21.0	in place
Sweden	1991	22.6	in place
Norway	1991	22.8	in place
Denmark	1992	23.4	in place
Switzerland	2008	29.5	in place
Iceland	2010	26.0	in place
Australia	2012	32.7	repealed
France	2014	29.8	in place

Source: Main source is the Carbon Pricing Dashboard from the World Bank. Gini coefficients are taken from the SWIID database (Solt, 2019)

Concluding remarks

To help **mitigate climate change**, **apply a carbon tax** should be applied: incl. goods that typically are necessities

BUT: carbon taxation likely to be regressive in high-income countries

Income metric matters – i.e. annual or lifetime – for estimated regressivity of carbon tax

(Changing) income inequality is important too

Political economy: is it more difficult to implement carbon taxes in countries with high/ increasing inequality – if so, what can be done to moderate this?