

Instrument Choice and Policy Design for Reducing CO₂ Emissions

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In cooperation with the CTI



Energy funding programme
Swiss Competence Centers for Energy Research



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Confédération suisse
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Swiss Confederation

Commission for Technology and Innovation CTI

Choice and design of regulatory instruments is a crucial decision for environmental policy...

- Two broad categories: **Market/incentive-based** (emissions taxes, tradable allowances, subsidies) vs. **command-and-control** (technology mandates, performance standards)
- Criteria for appraisal: cost-effectiveness, incidence & distributional effects, environmental effectiveness, administrative cost, ...
- For Swiss context, I will focus on two questions:
 1. Should we tax energy use or promote energy savings? (→ instrument choice)
 2. CO₂ tax is only on thermal fuels. Uniform tax on motor fuels? (→ policy design)

Choosing between policy instruments...

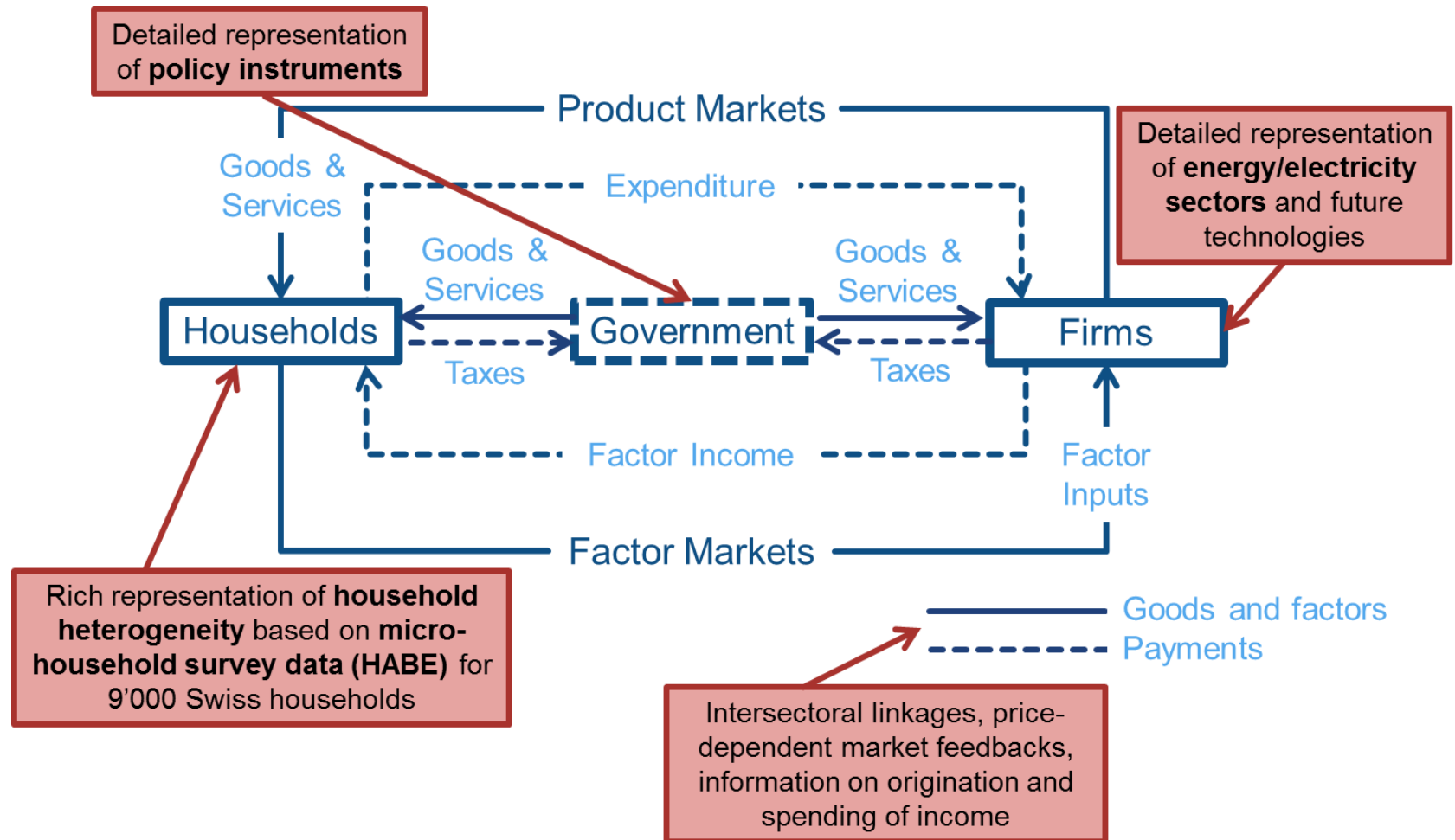
Taxonomy of key instruments in Swiss energy & climate policy

Swiss policy paradigms	Instrument classification in literature	Policy instrument	Policy targets	
			Electricity	CO ₂
Steering-based system	Market-based instruments	Taxes	Electricity tax	CO ₂ tax
		Subsidies	Open competitive bidding	Buildings program
Promotion-based system	Command-and-control instruments	Standards	Efficiency standards for electrical appliances	Emissions standards for new passenger vehicles

Rausch et al. (2017) "Promotion- or Steering-based Energy Policy: Assessing Distributional and Efficiency Impacts"

The image shows two screenshots of news articles. The top one is from the SNF Newsroom, dated 22.02.2017, titled "Reduktion von Energieverbrauch und CO₂-Emissionen: lenken oder fördern?". It features a photo of a woman adjusting a light switch. The bottom screenshot is from the Neue Zürcher Zeitung, dated 22.2.2017, 05:30 Uhr, titled "Lenkungssystem ist viel günstiger als Subventionierung". It features a photo of power lines against a mountain background.

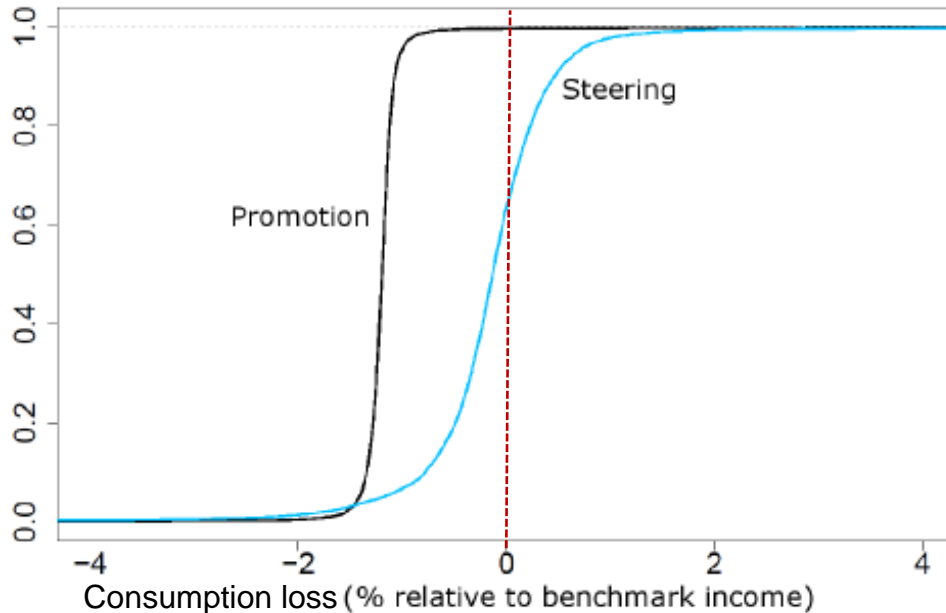
Integrated model enabling macroeconomic and household-level analysis



Main findings #1 - #3

- 1. Market-based regulation pays off at economy-wide level:**
aggregate economic cost under “Promotion” are 5 times higher (central case estimates: ~ 5 vs. 1 billion CHF/per year) for achieving same targets
- 2. Efficiency cost of “Promotion” are hidden:**
relatively small impacts on energy prices for consumers but costs of providing budgets for targeted subsidy programs
- 3. Distribution of cost at household level differs substantially between alternative policy paradigms**

Cumulative distribution of household-level welfare impacts



- Nearly all households are worse off under **“Promotion”**
- 1/3 of households gain under **“Steering”**
- Dispersion of household-level impacts are much larger under **“Steering”** relative to **“Promotion”**

Annual cost impacts (mean):

- **“Steering”**: 0.23% (290 CHF/per hh)
- **“Promotion”**: 1.19% (1548 CHF/per hh)

→ Household heterogeneity + impacts on consumer energy prices

Main finding #4

4. Trade-offs between economy-wide efficiency and equity.

For example, in terms of mean impacts...

– Across income deciles:

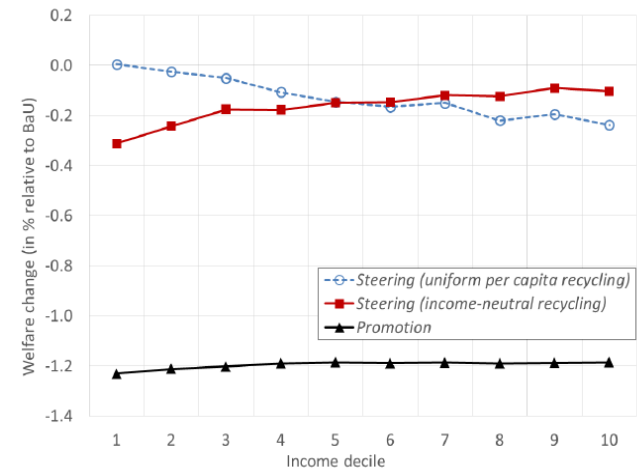
"Steering": progressive for per-capita
and regressive for income-proportional
revenue recycling schemes)

"Promotion": neutral

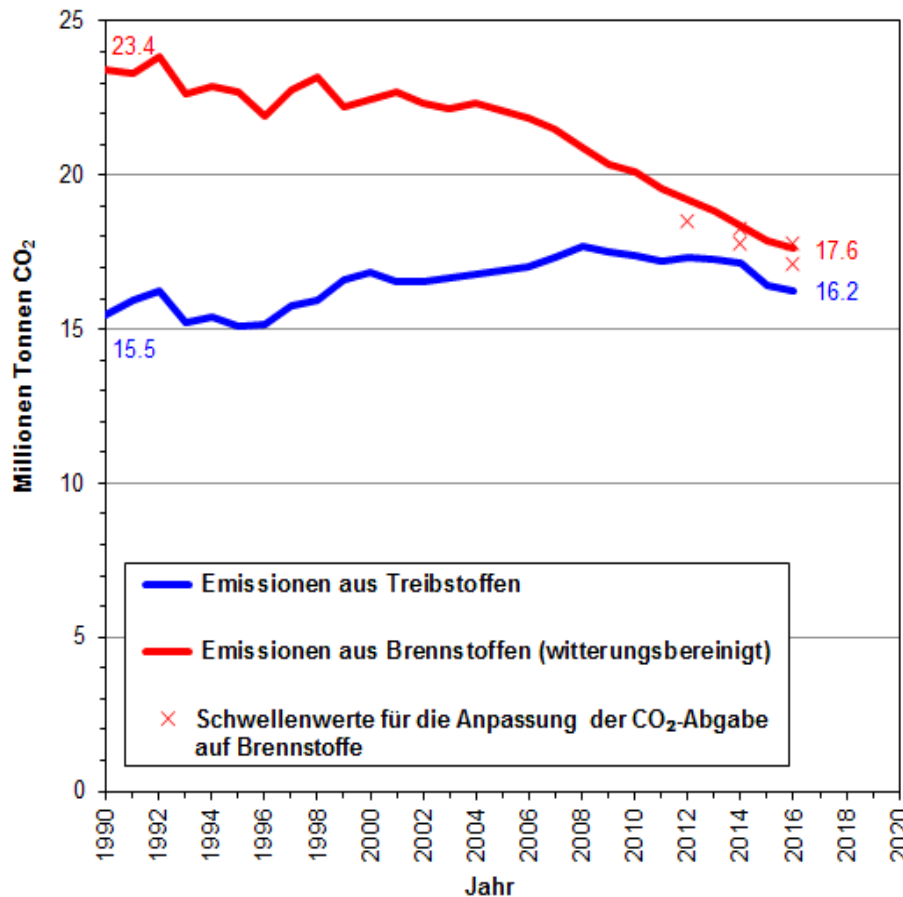
– Across socio-economic groups:

"Steering": house owners more negatively affected than
renters, rural hhs more strongly affected than urban hhs, small gains for
retired hhs

"Promotion": neutral



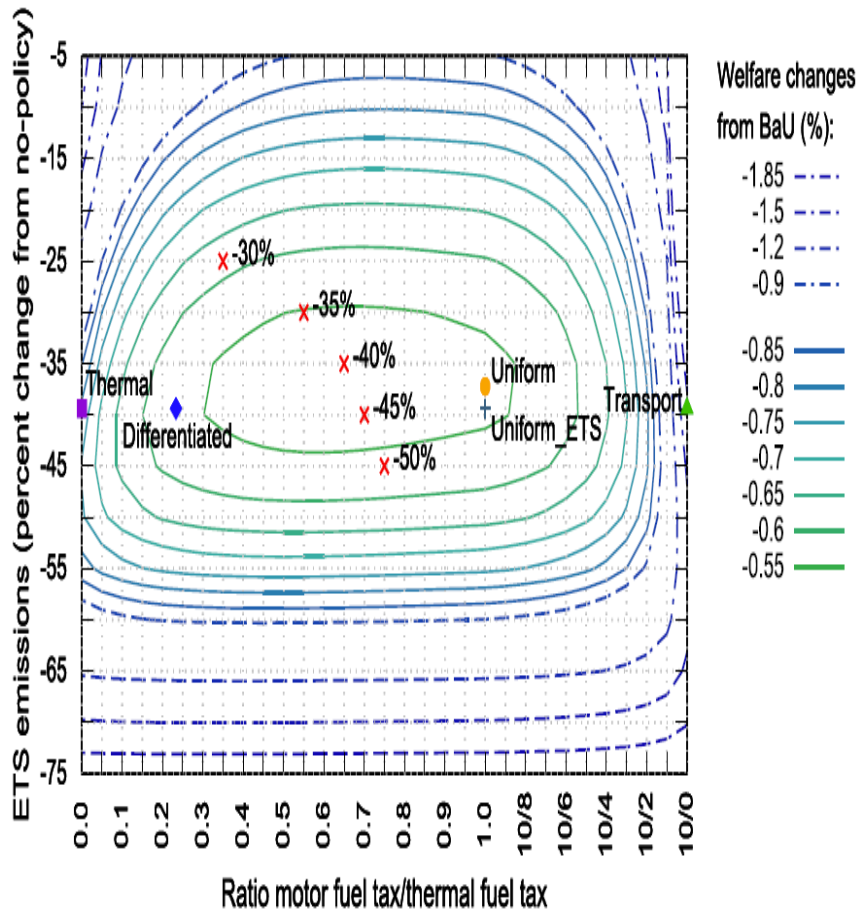
Designing market-based instruments...



- CO₂ tax on thermal fuels in 2018: 96 CHF/ton CO₂
- Motor fuels are exempted
- “Where-flexibility”, cost-effectiveness
 - abate where it is the cheapest →
 - equalization of marginal abatement cost

Should motor fuels be included under Swiss CO₂ tax? At which rate?

Main finding #5: Exempting motor fuels not a good idea...but uniform CO₂ tax across fuels may not be cost-effective either



- **Tax differentiation. Why?** Interaction with pre-existing taxes (→ high mineral oil tax on motor fuels) & transport-related externalities (→ traffic congestion, air pollution)
- Differentiation of CO₂ tax: tax rate on motor fuels 0.1-0.75 of tax rate on thermal fuels, depending on policy stringency
- Only for “large” transport externalities (CHF 1.84/l) ≈ uniform taxes are optimal
- Fully exempting motor fuels is likely to undermine cost-effectiveness

Thank you
for your attention.

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