



## Revisiting pesticide taxation schemes

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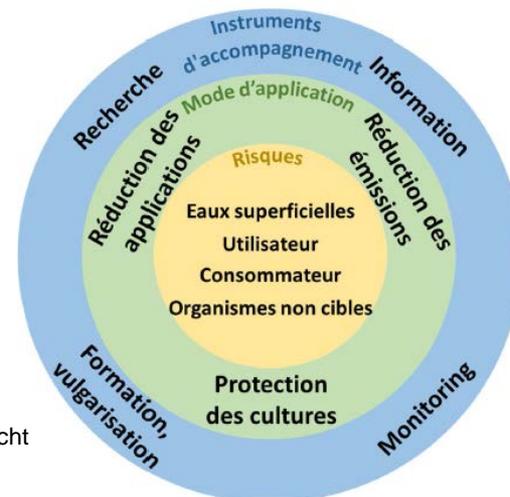
## Background

- Plant protection is essential for the provision of high quality food in adequate quantities
  - But: especially pesticide use has negative effects for the environment and human health
- Major discussions and reform steps in (European) agricultural policies



## Background - Situation in Switzerland

- High intensity of pesticide use; especially in small water bodies, residue thresholds are exceeded
  
- High political and societal awareness. Various interest groups made proposals on policy changes
  
- Government establishes a national action plan (Postulat Moser, NAP drafted in 2016)
  - Goal: 50% reduction of ‘risk’
  - Measures to achieve this goal required
  - Pesticide taxes are part of possible set of measures in NAP



## Criteria for policy evaluation\* and research questions

- i. Effectiveness and efficiency
- ii. Polluter pays principle
- iii. Feasibility, including acceptability among stakeholders (e.g. farmers' income)

- Are pesticide taxes potentially effective?
- What experiences have been made in other countries - how to design such tax?
- How to use tax revenues to increase efficiency and acceptability?

# Are pesticide taxes effective? Elasticity of Pesticide Demand

- Pesticide use is often assumed to be extremely inelastic

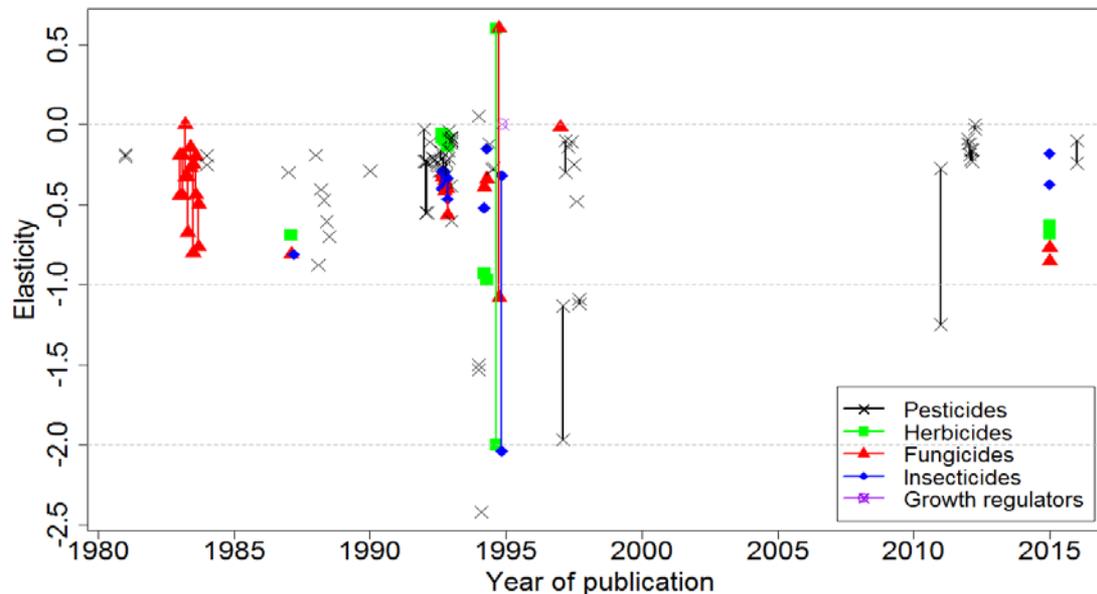
Scienceindustries.ch (e.g. Syngenta, Bayer, BASF)

Die Landwirte dazu zu bewegen, auf ein Mittel zu verzichten, erfordert eine exorbitante Preiserhöhung. Forscher der Universität Wageningen in den Niederlanden haben zum Beispiel berechnet, dass mit einer Lenkungsabgabe von 120 Prozent des Verkaufswertes schlussendlich in den Niederlanden nur eine Reduktion des Einsatzes von Pflanzenschutzmitteln um etwa 4 Prozent erreicht würde.

- Heterogeneous findings, showing elastic or inelastic demands: ‘cherry picking’
- Meta-analysis of all studies that estimate pesticide demand elasticities in Europe and North-America
- 31 studies with 94 elasticity estimates reported
  - Different methodological approaches, i.e. optimization and econometric studies, different crops, time spans considered etc. → meta-regression analysis

# Are pesticide taxes effective? Elasticity of Pesticide Demand

- Median of all elasticities is **-0.28**, rejection of hypothesis of zero (and perfect) elasticity



# Are pesticide taxes effective? Elasticity of Pesticide Demand

Key-results from meta-regression. The demand for pesticides is...

- ...more elastic in the long- than in the short-run (-0.39 vs. -0.18)
- ...less elastic for special crops (such as fruits, vegetables)
- ...more elastic for herbicides than for other pesticides
- ...less elastic for more recent periods of analysis

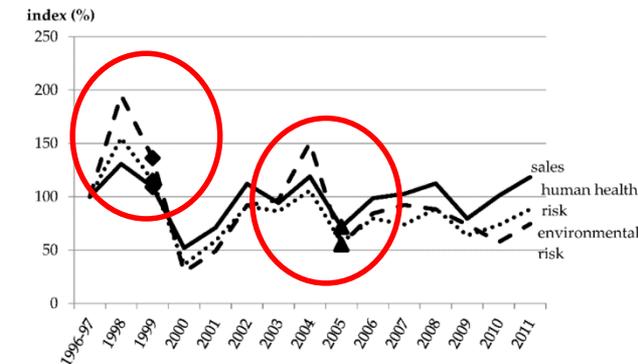
## Experiences from Europe

Pesticide taxation schemes in: Sweden (since 1984), Norway (1988), Denmark (1996), France (2000). Very heterogeneous designs

Lessons learned (literature review and secondary data analysis)\*:

- **Differentiated** taxes led to substitution towards less toxic products and non-chemical strategies
- Overall patterns indicate improvement w.r.t. risk reduction. **But:** quantities increased
- Transaction costs are low
- Strong hoarding activities, no short-term effects of taxes

Exemplary indices for Norway



## Redistribution of tax revenues

- Farmers' potential income reductions crucial argument against tax solution in policy process
  - Existing European schemes use tax revenues not (or only in small parts) for agricultural budget.
  - Despite fulfilling polluter pays principle, no broad acceptance. Leverage effects are not exploited
- Proposal for full 'reimbursement' into the agricultural sector
- Finance measures that reduce pesticide use risks further without creating leakage problems
- i) better equipment (e.g. Aubert & Enjolras 2014), smart farming potentials are massive
  - ii) independent extension (e.g. Wiebers et al. 2002),
  - iii) biological prevention measures such as conservation biological control (e.g. Tschumi et al. 2016),
  - iv) incentive programs to substitute or reduce pesticide use (e.g. 'Extenso', Finger & El Benni 2013)
  - v) specifically designed index insurance solutions for pests (e.g. Norton et al. 2016)

## Policy Conclusions

- Differentiated pesticides taxes can effectively reduce risks. Substitution is incentivized. Total tax burden remains low.
  - Tax rates for highly toxic pesticides have to be large to generate a relevant decrease in their demand.
  - Low transaction costs for pesticide taxation allow re-distribution of tax revenues.
  - Redistribution prevents income effects and can create large leverage effects on pesticide use
  - Taxes on pesticides use do not have considerable short-run effects → but incentives for mid- and long-run reduction of risks for the environment and human health
- Pesticide tax as part of wider set of measures can contribute to reach policy targets in an efficient way

**Thank you very much for your attention**

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