



Evaluating Economic Policy Instruments for Sustainable Water Management in Europe

## Case Study Presentation: the Danish Pesticide Tax on Agriculture

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### 1. Danish pesticide policy

- First pesticide action plan 1986.
- Protect humans against health risks and protect the environment.
- Strong Danish norm for having untreated drinking water.
- Two parallel tracks:
  - Strict approval system of new pesticides.
  - Reduce use with 50% 1986-1997 (not reached)
- Current aim regarding reduced use: Treatment frequency index (TFI) at 1.7.
- Pesticide pollution mentioned as a pressure in Danish River Basin Management Plans (WFD).



## 2. Treatment frequency index (consumption index)

- The number of pesticide applications on cultivated areas per calendar year in conventional farming assuming use of a fixed standard dose (based on active ingredients).
- Although subject to criticism, deemed the best available indicator by Danish experts in the 1990's.
- What type of effects a TFI of 1.7 will provide is quite unknown. It was assumed though that a reduced consumption will have positive effects.
- Why 1.7? Possible to reach without substantial economic burden on farmers and society.



## 3. Taxation models discussed 1994-95

- Treatment frequency (too difficult)
- Toxicity (preferred by Ministry of Taxation, but too difficult to rank effects according to EPA)
- Active ingredients in the pesticide (too imprecise)
- % of retail price of pesticide
- Danish green tax reforms in the 1990's.



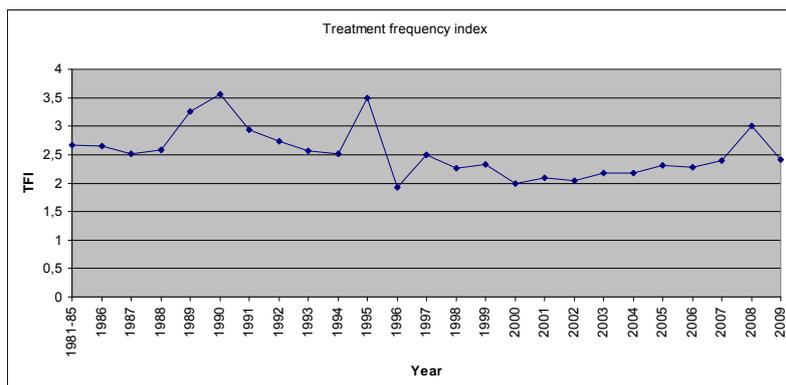
#### 4. Pesticide tax 1996 (doubled 1998)

% of retail price (excl. VAT etc.)	1996	1998
Insecticides	37	54
Fungicides	15	33
Herbicides	15	33
Growth regulators	15	33

- Apparently the worlds highest pesticide tax.
- Charged on manufacturers and importers.
- Price label system.
- 100% reimbursement (in particular lower land tax).
- Private home owners and horticulturists also taxed.
- Expected effect 1996 tax: 5-10% reduction.
- 1998 tax: 8-10% reduction 1998-1999.
- Inelastic demand.
- Revenue € 53-66 million (2001-2008)



#### 5. Does the pesticide tax achieve better environmental outcomes and reduce uncertainty?



- Precise effects unknown (probably small). TFI not lower than '80's and 1993-94.
- 1995 hoarding.
- One of several policy instruments - uncertainty.
- Crops: No substantial changes, explains only small increase.
- Prices: Explain some years but not all.



## 6. Indicators

- TFI critique – only reliable for effects *within* the field.
- Does not address effects on flora and fauna in biotopes adjoining the fields.
- New indicator for env. and health effects of pesticide use: Load is increasing (EPA, not published yet).
- Increasing number of water wells closed. Causes unknown.
- 5% of wells exceed limits.
- Pesticides in 37% of water intakes (quality limits exceeded in 1/3) (2009).
- Test of five water courses (2006). Many different pesticides. No limits exceeded.
- Lack of good time series.



## 7. Part of the explanation for lack of tax effect on agents

- Danish study based on survey of 1164 farmers:
  - 1/3 of the farmers attach great weight to obtaining physical yield and less weight on prices (pesticides and yield).
  - About 1/2 the farmers respond to price incentives in the manner assumed in ex ante analyses.
  - No structural explanation.
  - Pedersen, Christensen, Nielsen and Hasler (2011; 2012)



## 8. Some other results

- Transaction costs relatively low for the authorities.
- Price label system costly for producers and importers.
- Some distributional effects, but probably not large.
- Cost-effective? Maybe.
- Some illegal import of pesticides from neighbouring countries. Most severe example detected Dec. 2011.
- Farmers find the tax unfair.
- About 20% of the the farmers find that the risk to the environment is large or very large.



## 9. The new tax

- Higher and based on environmental and health effects (like the Norwegian pesticide tax).
- Not an easy task – many different env. effects.
- However, more acceptable for the target group.
  
- Transaction costs - probably higher? (more assessment of pesticides)
- Might be more cost-effective.
- Illegal import – more control needed?
  
- Alternative: Tradable quotas?
  
- New command-and-control instruments introduced:
  - Ban on spraying in marginal zones.
  - Compulsory spraying logs.



## 9b. The new tax design – rumors say....

- Average: doubling of the tax.
- Revenue app. €90 million if behav. changes (app. €130 million if no behav. changes).
- Still, 100% reimbursement to the sector.
- Individual tax for each pesticide based on:
  - Health effects farmers using the pesticides.
  - Environmental behaviour of pesticide (degradation, build-up, leaching).
  - Environmental effects (acute poisonousness for animals within field and in surrounding nature)
- Still, many pesticides are prohibited.
- New report issued today (!) from MoE: the load from pesticides on the environment has increased by 30 pct. 2007-2010 (TFI only increased by 11 pct. in the same period).



## 10. TFI and yield in wheat in other countries (2006/2007)

	UK (2006)	France (2006)	Germany (2007)	Denmark (2007)
TFI in wheat	6.74	4.1	5.8*	2.62
Wheat yield, tonnes per ha.	8.0	6.9	7.3	7.3

Source: Jørgensen and Jensen 2011.  
Note: \*Snail pesticides not included.



## 11. Pesticide tax base in other countries

- Norway: Env. and health effects.
- Sweden: Active ingredients.
- Iceland: Active ingredients.
- Finland: Turnover of company (abolished).
- France: ?
- Italy: ?



**Thanks!**

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