Journal of Environmental Policy and Planning JEPP@21 Workshop, Berlin, 8th – 10th September 2019

Environmental policy mixes as a necessity in a world of multiple target group motivations and decision-making rationales: Matching agri-environmental policy instruments to farmer motivations

Anders Branth Pedersen(1), Helle Ørsted Nielsen(1), Carsten Daugbjerg(2)

(1)Aarhus University, Department of Environmental Science

(2)University of Copenhagen

Policy instruments

- Shift observed by many: from CAC towards new modes of governance or smarter forms of CAC (Wurzel et al. 2013).
- Environmental economists have for decades been advocating market-based instruments
- Jordan et al. 2013: “Instead of adopting a rather static perspective which simply describes the presence and/or absence of particular instruments of governing, future work could usefully explore the causal relationship between policy instruments and outcomes ‘on the ground’….”
- Howlett 2018: points to the need for more knowledge on the match between policy instruments/tools and their targets

We argue

- Often target groups for environmental policies are considered homogenous (economic man etc) – in particular when policies are designed
- However, many motivations can be at play in a target group.
- Policy mixes that can target multiple motivations needed
- More knowledge on the range and distribution of decision-making rationales within a target group needed.
- Case: Danish farmers' responses to pesticide taxes

Colourbox.com

Farmer motivation and pesticide taxes

- While market-based instruments may not always result in economically rational behavior when directed towards consumers, farmers engaged in capital intensive modern farming can be assumed to behave in a business-like manner
- The Danish tax is probably the highest pesticide tax in the world (therefore more likely to observe effects)
- And therefore possible to test responses

Colourbox.com

Policy instruments and behavior

- Needless to say, effectiveness depends on accuracy of behavioral assump.
- Dahl & Lindblom (1953), Laswell (1954), Lowi (1966) points to the importance of characteristics and behavior of target group (Howlett 2018)
- From the 1980's field dominated by assumptions on firms as profit-maximizers and individuals as utility maximizers
- Later, behavioral economists and cognitive psychologists: There are empirical shortcomings around 'the rational decisionmaker'
- Selective use of information, cognitive shortcomings and biases
- After 'Nudge' (Thaler & Sunstein 2008) behavioral approach made a more significant impact on the literature in the field

Policy mix

- Policy mixes often a result of layering (Thelen 2003; Howlett & Rayner 2007)
- Can lead to tense layering (Kay 2007) without overall logic behind the mix
- Gunningham and Sinclair (1999) – when firms behave in less than rational ways, voluntarism might be complementary to economic instruments

Motivation

- Behavioral policy research focuses primarily on the cognitive dimension (ability to make fully rational decisions).
- However, *motivation* might be important within environmental policies – objectives pursued, values guiding actions etc.
- Types: Economic motivation, social approval, normative (morally based duty)
- We should expect heterogeneity in motivation among targets – not homogeneity
- This has not carried over in the literature on MBIs
- Better instrument mixes might be needed
- And when designing instruments important to understand what it takes to activate economic motivation (size of tax/subsidy)

Farmer motivation

- Literature on farmer motivation going back to the 1920's (UK) and the (1940's) US (Garforth & Rehman (2006))
- Dormant until Mitchell (1968) and Gasson (1973)
- Showed that goals and values are complex
- In 2000's more focus on deriving orientations and categories of farmers based on motivation, in particular through normative studies
- However, not much focus on what it means for economic optimization in relation to environmental taxes etc
- Maybe because taxes are often so low that no changes are observable

Danish pesticide taxes 1996-2013

- 1996: 15-37% on retail price
  - Ex ante expectation based on rational behavior: 8 pct reduction.
- 1998: Doubled on average
  - Ex ante expectation (with a changed price elasticity) 8-10 pct reduction.
- Never any full evaluation but indications are that they only had a very modest effect

New ‘true’ environmental tax based on load 2013

Table 1
Input parameters included in the calculation of PL_{ECO} and PL_{FATE}, maximum values and reference active ingredients for each input parameter.

Ecotoxicology

Input parameters	Unit	Maximum value	Reference active ingredient
Birds – acute LD_{50}	mg/kg body weight	49	Thiacloprid
Mammals – acute oral LD_{50}	mg/kg body weight	20	Lambda-cyhalothrin
Fish – acute 96 h LC_{50}	mg/L water	0.00021	Lamba-cyhalothrin
Daphnia – acute 48 h EC_{50}	mg/L water	0.0003	Alpha-cypermethrin
Algae – acute 72 h EC_{50}	mg/L water	0.000025	Picolinafen
Aquatic plants – 7d EC_{50}	mg/L water	0.00036	Metsulfuron-methyl
Earthworms – acute 14d LC_{50}	mg/kg soil	3.4	Picoxystrobin
Honeybees – acute 48 h LD_{50}	mg/bee	0.02	Cypermethrin
Fish – chronic 21d NOEC	mg/L water	0.000115	Alpha-cypermethrin
Daphnia- chronic 21d NOEC	mg/L water	0.000115	Alpha-cypermethrin
Earthworms – chronic 14d NOEC	mg/kg soil	0.2	Epoxiconazole

Environmental fate

Input parameters	Unit	Maximum value	Reference active ingredient
Soil degradation – DT50	Days	354	Epoxiconazole
Bioaccumulation	Bio-concentration factor	5100	Pendimethalin
Mobility	SCI-GROW index	10.91	Thifensulfuron-methyl

Source: Kudsk et al. 2018

Examples of 'old' and expected new prices for some widely used pesticides in Denmark. Source: Knowledge Centre for Agriculture, Denmark, 2013

Product name and active ingredient	Old price including old value added tax	Old price excluding tax	Expected new price with new tax
Ally ST (metsulfuron-methyl, 200g/kg) (herbicide)	0,52 €/g	0,39 €/g	0,40 €/g
Boxer (prosulfocarb, 800g/L) (herbicide)	11,40 €/L	8,55 €/L	23,30 €/L
Rubric (epoxiconazole, 125g/L) (fungicide)	47,33 €/L	35,50 €/L	65,00 €/L
Cyperb 100 (cypermethrin, 100g/L) (insecticide)	22,79 €/L	14,82 €/L	226,26 €/L
Cycocel 750 (chlormequat-chloride, 750g/L) (growth regulator)	3,08 €/L	2,31 €/L	13,04 €/L

Source: http://www.endure-network.eu/about_endure/all_the_news/denmark_load_index_now_guides_pesticide_tax
Prices converted to € by ABP

Revenues and reimbursement

Colourbox.com

- Before 2013: 500M DKK (67M €) annually (most of it reimbursed through lower land tax (0,43%)) (Ministry of Taxation et al. 2001)

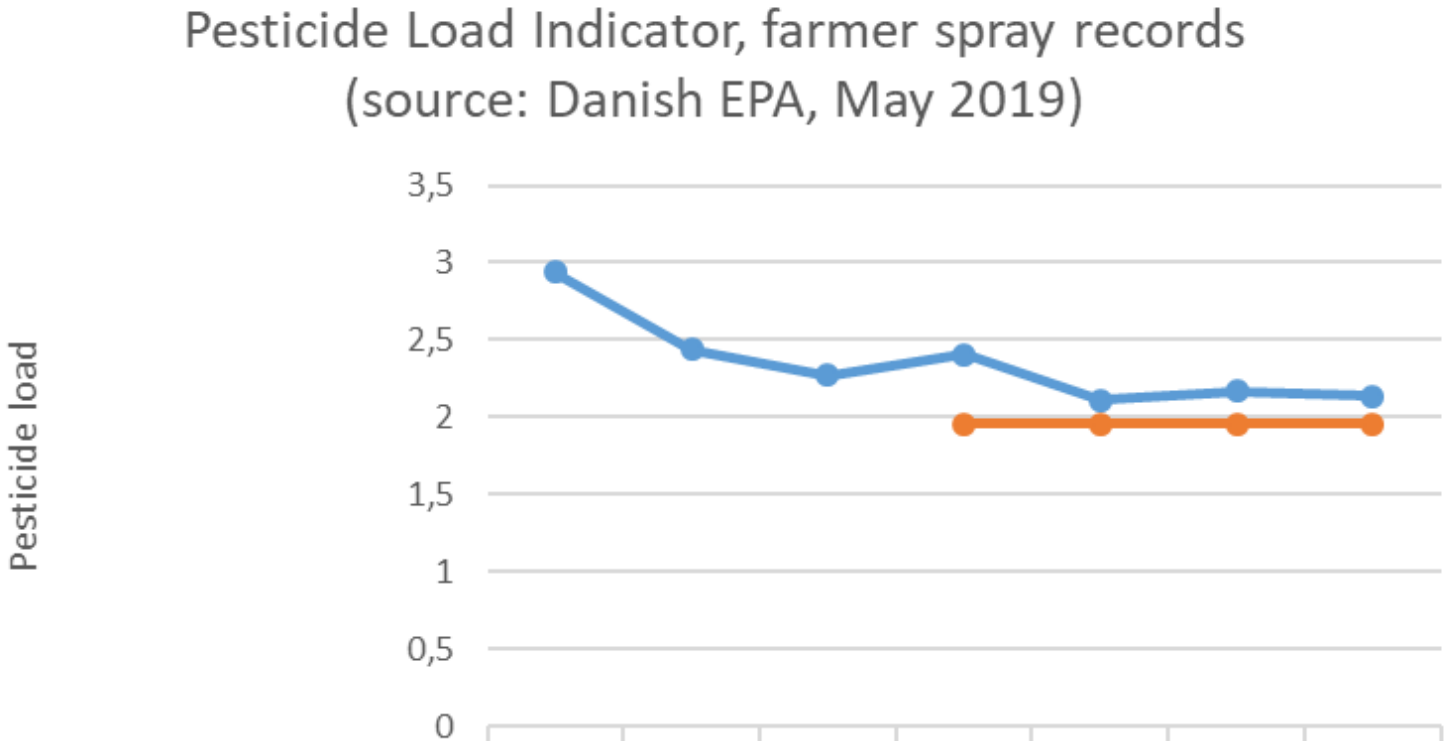
- Expected new revenue size after 2013:
- 1.1B DKK/147M € *without behavioural effect*
- 87M € with a 40 pct. reduction in sales
- 20M € reimbursed to farmers through lower land taxes, i.e. a redistribution

- Revenue, realized: 2017: 530 mill. DKK (71M €) (but difficult to assess finally yet)

Ex ante calculations

- Preliminary analyses indicate that the new pesticide tax can reduce current pesticide use of fungicides, insecticides and herbicides in grain and rape with 40 to 50 pct. The reduction is primarily caused by an economically rational change of pesticide product selection, substituting pesticides with a high load, and therefore expensive, with cheaper pesticides with a lower load, secondarily a smaller reduction in overall pesticide use

Use is decreasing but not 40-50%



	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Pesticide Load Indicator	2,94	2,44	2,27	2,41	2,11	2,17	2,14
Policy aim				1,96	1,96	1,96	1,96

Some uncertainties regarding 2010/11
Last 3 years quite stable, but we are not at 1,96
2016-17: 2,14 – still large effects

Farmer motivation as an explanation

- Pedersen et al. (2012). Survey 1164 responses. 45% of farmers more economically motivated. 32% more production-oriented focused on optimizing yield and pay less attention to prices
- And also find that the last group is less motivated by economic instruments

Colourbox.com

Discussion

- Need to make better policy mixes
- How do we motivate other farmers than the ‘economic men’
- Can’t exempt them from the tax (but also ok – PPP)
- More CAC may be considered unfair by those responding to tax
- Voluntary instruments – need to make room for the production-oriented to exhibit farmer skills. Not an easy task
- Maybe also through peer-group norms through agricultural advisors but they also have their norms, perceptions etc and are not heterogenous (Pedersen et al. 2019)
- More research needed on better policy mixes for target groups with multiple motivations