FACULTEIT BIO-INGENIEURSWETENSCHAPPEN

Analysis of policy interventions in tradable permits

Jeroen Buysse [1,*], **Bart Van der Straeten** [1], **Stephan Nolte** [1], **Dakerlia Claeys** [2], **Ludwig Lauwers** [2,1] and **Guido Van Huylenbroeck** [1]

[1] Ghent University, Department of Agricultural Economics, Coupure links 653, 9000 Gent, Belgium

[2] Institute for Agricultural and Fisheries Research, Merelbeke, Belgium

[*] Corresponding author. Tel.: +32 (0)9 264 59 29; fax: +32 (0)9 264 62 46; e-mail: J.Buysse@Ugent.be

Problem statement

- Traditional production quota replaced by new environmental tradable permits
- New types of rules and policy interventions
- What is their impact?
- Application to the case of Nutrient Production Rights in Flanders

Nutrient production rights (NPR)

- NPR assigned at the farm level in 2007 based on reference period 1995 - 1997.
- Each type of animal corresponds to an amount of NPR
- NPR can be traded between individual farms
- Penalty for overuse of 1 euro first year and 2 euro second year per NPR
- The national cap is currently larger than the corresponding animals

Overuse of NPR in 2008

	Number of farms with overuse	Number of NPR's overused	Average Fine per farm with overuse (1 euro penalty)
Cattle	2 339	2 625 716	1 123
Pigs	477	1 043 900	2 188
Poultry	117	409 792	3 502
Total	2 880	3 480 532	1 209

Analysis of policy choices in tradable permits: research questions

1. Free choice of selling versus incentives for structural change
   - In NPR: a seller of NPR has to stop animal production
2. How to reduce the cap (total amount of permits)
   - In NPR: flat rate reduction on traded NPRs
3. How to prevent speculation
   - In NPR: permits not used during 3 years can not be sold

Short run model of trade in permits (analysis of research question 1)

- Farms can trade NPR or stop animal activity
- Only bilateral trade (within the network of 500 farms)
- Fixed transaction cost (sensitivity analysis)
- Applied to administrative dataset of population:
  - NPR per animal category
  - animal production
  - randomly assigned gross margin obtained from FADN

Impact of bilateral trade with fixed transaction costs

Cost per transaction tc (in euro)	Total penalty (in euro) $\Sigma_{ia}\, f\, \mu_{ia}$	Number of transactions $\Sigma_{ia}\, \beta_{ija}$	Trade $\Sigma_j\ \tau_{ija}$ (in NPR's)				Production reduction $\Sigma_{ia}\, \rho_{ia}$(in NPR's)			
			other	bovine	pig	Total	other	bovine	pig	Total
Scenario A: selling farms can continue animal production										
200	228	79	15 141	59 778	4 733	79 652	2 352	4 421	0	6 773
400	582	73	14 809	53 255	4 733	72 797	2 494	4 902	0	7 396
600	2602	57	12 318	53 795	4 183	70 297	3 971	5 739	550	10 260
800	4676	47	11 858	53 828	2 882	68 568	3 971	6 922	1 495	12 388
Scenario B: selling farms have to stop animal production										
200	131	85	106 659	190 334	14 942	311 936	4 148	15 278	0	19 426
400	822	71	103 421	149 707	13 336	266 463	5 142	25 326	0	30 468
600	2691	57	26 735	126 706	12 771	166 212	20 328	22 145	550	43 023
800	4408	46	19 786	124 448	7 104	151 338	16 263	18 832	1 495	36 590

Multiperiod simulation of NPR trade (research question 2 and 3)

- 3 farm types with different production technology
- Simulation of production changes and trade of NPR's of a period of 7 year
- Maximisation of the expected profit from production and the sales of NPR
- Implementation of policy alternatives: reduction rate (rr) on traded NPR / no selling of unused NPR
- Perfect market assumed

Three farm types

Farm type	Optimal unconstrained production level	Initial distribution of NPR
1	10	10
2	2.5	5
3	5	0

Impact of flat rate reduction: production at the end of the 7 year period

'rr'	farm type 1		farm type 2		farm type 3		Total	
	production	NPR	production	NPR	production	NPR	production	NPR
0	8.6	8.6	2.2	2.2	4.2	4.2	**15.0**	15.0
0.1	8.4	8.4	2.1	2.1	4.0	4.0	**14.5**	14.5
0.2	8.6	8.6	2.1	2.1	4.0	3.4	**14.7**	14.1
0.3	8.8	8.8	2.2	2.2	4.0	2.8	**15.0**	13.8
0.4	9.1	9.1	2.3	2.3	4.0	2.2	**15.3**	13.5
0.5	9.4	9.4	2.4	2.4	4.0	1.6	**15.8**	13.4

Impact flat rate on traded permits

- Reduces trade and stimulates production if combined with low penalty for overuse

- Happens in reality if
  - Gross margin per NPR is for some farms higher than penalty: yes
  - Transaction cost prevents selling but continue production if gross margin per NPR between 75% and 100% of penalty: yes

Impact of speculation prevention: not selling unused NPR

Year	farm type 1			farm type 2			farm type 3			Total	
	production	NPR	Net trade	production	NPR	Net trade	production	NPR	Net trade	production	NPR
Only flat rate reduction of traded NPR: reduction rate = 25%											
T-2	10,0	10,0		2,5	5,0		4,0			16,5	15,0
T-1	10,0	10,0		2,5	5,0		4,0			16,5	15,0
T-0	10,0	10,0	-1,3	2,5	5,0	-2,8	4,0		3,0	16,5	15,0
T-1	8,7	8,7		2,2	2,2		4,0	3,0		14,9	14,0
T-2	8,7	8,7		2,2	2,2		4,0	3,0		14,9	14,0
T-3	8,7	8,7		2,2	2,2		4,0	3,0		14,9	14,0
+ not selling unused NPR: reduction rate = max(1-production/NPR , 25%)											
T-2	10,0	10,0		2,5	5,0		4,0			16,5	15,0
T-1	10,0	10,0		2,5	5,0		4,0			16,5	15,0
T-0	10,0	10,0	-1,3	2,5	5,0	-2,2	4,0		1,9	16,5	15,0
T-1	8,7	8,7		2,6	2,8	-0,4	4,0	1,9	0,3	15,4	13,5
T-2	8,7	8,7		2,4	2,4	-0,2	4,0	2,2	0,2	15,2	13,3
T-3	8,7	8,7		2,2	2,2	0,0	4,0	2,3	0,0	14,9	13,3

Conclusions

1. Incentives for structural change: seller has to stop
   - Inefficient but effective: profitable activities stop but lower total production
2. Reduce the cap by flat rate on trade
   - Inefficient and ineffective: more penalties with increase in production
3. Prevent speculation by not selling unused NPR
   - Inefficient and ineffective: more penalties with increase in production in the short run

Thank you