Decoupling of direct payments: expected regionally differentiated impacts on the EU-15 farming sector

An application of the AROPAj model (preliminary results)

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Overview

1. GENEDEC objectives, CAP reform and models involved in the program
2. Modelling approach by AROPAj, overview of the model and recent operational development
3. Implementation of the CAP reform from the political agreement toward the model runs
4. Preliminary results, from FADN content to first implemented scenarios (“hard de-coupling”)
5. What about new member States, what about environmental impacts and spatialization

1. Genedec objective and modelling approach

- Focus on the socio-economic and environmental impacts of the decoupling of direct payments
- Large place devoted to MP models (LP & PMP)
- Focus on the multi-scale analysis (Farm-Group, Region, MS, UE-15)
- Based on FADN, completed by other information sources (JRC / MARS, LUCAS, …)
- Related to other FP6-programmes (scientific and thematic field: > overlapping > IDEMA (economics and de-coupling); > common tools for multidisciplinary approach > INSEA (carbon sequestration and GHG emissions)

2. AROPAj model

- General characteristics
  - Farm is the unit (“economically rational” agent)
  - « generic » principle : a common modelling design for a large set of farm types located in a large set of geographical areas
  - « modular » principle : easy to add activities and modules, farm types, policy tools, Regions
  - Related to FADN, added technical information (“dires d’expert”, coupling with biophysical models)
  - Quite parameterized

2. AROPAj (…)

- Steps of construction
  - Farm design
    (activities, constraints, parameters)
  - Typology : use of FADN under confidentiality and statistical requirements > Regions partitioned into “farm-groups” based on Farm Type, Altitude and Size > now automatically built by cluster analysis
    - **V1**_2001 (FADN-1997) : **734 FGs - 101 Regs - 15 MS**
    - **V2**_2005 (FADN-2002) : **1074 FGs - 101 Regs - 15 MS**
  - Estimation : Initialized values of parameters from FADN and added technical information
  - Calibration
    procedure for the re-estimation of selected parameters
    - V2 : 11 weeks for automatic data-process calibration
- Shell and data-processing tools : Unix, FORTRAN, SAS, GAMS

The producer *k*’s programme :

$$\max_{x,z} \ \pi^k(x, z\,;\, \theta^k,\varphi) = p^k(\theta^k,\varphi)\ x$$

$$\text{s.t. :} \quad A^k(\theta^k,\varphi)\ x - b^k(\theta^k,\varphi)\ z = 0 \quad (\lambda)$$

$$z = N^k \quad (\eta)$$

$$x = 0 \quad (\mu)$$

The calibration process :

$$\min_{q^k} \ \left| x^{*k}(q^k, f) - \hat{x}^k \right|^d$$

where $q \in \Theta$.

2. AROPAj (…)

- V1/FADN-1997 - V2/FADN-2002 - UE-15

Data (FADN)

- *Yields*
- *Area*
- *Variable costs*
- *Producing activities*
- *Size of farms*
- *Altitude*
- *…*

Other sources

- *Emissions coefficients*
- *Soils characteristics*
- *Fertilizer uses and prices*
- *…*

Estimation

Typology
15 countries, 101 regions
V1/734 farm-groups
V2/1074 farm-groups

European Commission DG Agriculture
© EuroGeographics 2001 for the administrative boundaries

Model inputs
- *Prices*
- *Technical parameters*
- *CAP-related parameters*

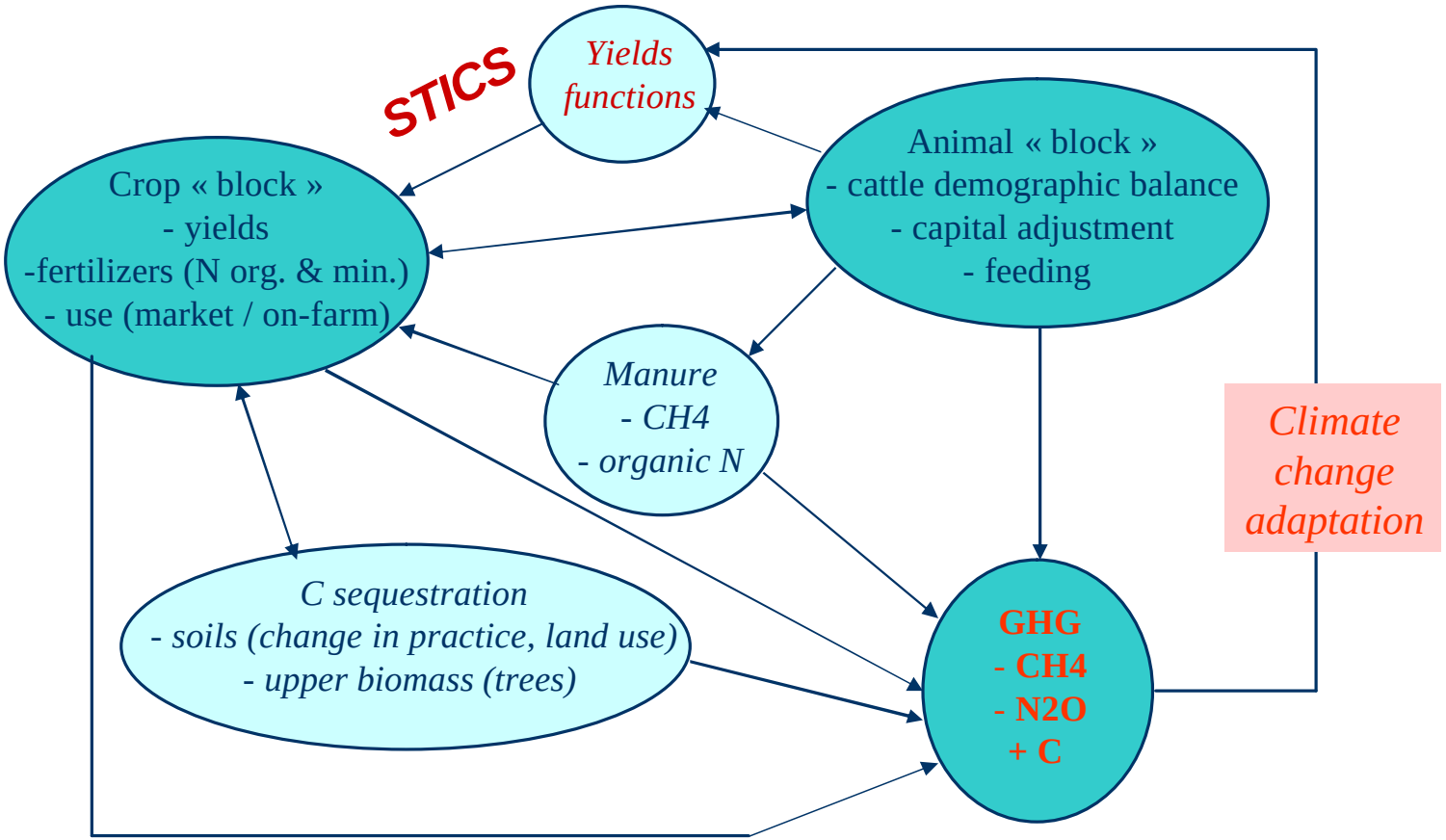
734/1074 models
Maximize gross margin
Subject to :
- *Technical constraints*
- Policy constraints

Calibration

Model output
- *Optimal area*
- *Livestock numbers*
- *Animal feeding*
- *Net emissions*

2. AROPAj (…)

- Module consistency



2. AROPAj (…)

FADN (excluding FTs 2 &3, & permanent crops) : V1 1997 V2 2002

MS	V1 (M ha)		V2 (M ha)		D (%)
belg	belg	1,355	belg	1,432	**5,7**
dani	dani	2,349	dani	2,437	**3,7**
deut	deut	14,736	deu1	6,946	**-0,1**
			deu2	7,782	
ella	ella	1,418	ella	1,220	**-14,0**
espa	espa	11,816	esp1	6,729	**-4,1**
			esp2	4,601	
fran	fra1	14,886	fra1	15,500	**7,2**
	fra2	8,086	fra2	8,542	
gbre	gbre	11,360	gbre	11,647	**2,5**
irla	irla	4,014	irla	3,198	**-20,3**
ital	ita1	3,881	ita1	2,430	**-9,0**
	ita2	4,414	ita2	2,768	
			ita3	2,355	
luxe	luxe	0,104	luxe	0,130	**25,1**
nede	nede	1,867	nede	1,511	**-19,1**
osto	osto	1,882	osto	1,788	**-5,0**
port	port	2,253	port	1,990	**-11,7**
suom	suom	1,765	suom	1,889	**7,0**
sver	sver	3,228	sver	2,639	**-18,2**
		89,415		**87,532**	**-2,1**

MS	V1 (1000 farms)		V2 (1000 farms)		D (%)
belg	belg	36,494	belg	33,770	**-7,5**
dani	dani	48,232	dani	43,591	**-9,6**
deut	deut	255,510	deu1	121,701	**-19,8**
			deu2	83,241	
ella	ella	273,391	ella	198,101	**-27,5**
espa	espa	302,058	esp1	200,539	**9,2**
			esp2	129,420	
fran	fra1	184,019	fra1	179,372	**-3,4**
	fra2	136,173	fra2	134,533	
gbre	gbre	123,538	gbre	118,225	**-4,3**
irla	irla	128,737	irla	76,910	**-40,3**
ital	ita1	250,229	ita1	114,999	**-37,3**
	ita2	346,347	ita2	125,588	
			ita3	133,362	
luxe	luxe	1,523	luxe	1,640	**7,7**
nede	nede	65,351	nede	51,296	**-21,5**
osto	osto	79,280	osto	74,090	**-6,5**
port	port	208,832	port	78,979	**-62,2**
suom	suom	49,294	suom	42,887	**-13,0**
sver	sver	38,021	sver	39,000	**2,6**
		2527,029		**1981,244**	**-21,6**

2. AROPAj (…)

land use (M ha)	V1		V2	
	FADN 1997	AROPAj	FADN 2002	AROPAj (partial)
blé dur	2,490	2,661	2,897	2,920
blé tendre	13,117	12,774	13,613	12,095
orges	12,084	10,793	10,600	9,285
avoine	1,476	2,026	1,560	1,981
autres céréales	0,807	1,691	1,083	1,992
seigle	1,324	2,087	1,020	1,565
riz	0,334	0,215	0,353	0,145
maïs grain	3,537	4,566	3,790	4,638
betterave sucrière	2,064	2,056	1,925	1,970
colza	2,665	2,077	2,805	1,780
tournesol	2,013	0,784	1,385	0,958
soja	0,389	0,187	0,216	0,122
autres protéagineux	0,137	0,272	0,051	0,140
légumes secs	1,345	3,265		
friches		0,390		0,405
gel primé		5,788		6,115
gel estimé	5,178		6,409	
pomme de terre	1,058	2,867	1,108	2,656
pois fourragers	0,800	0,629	0,801	0,464
betterave fourragère	0,143	0,130	0,083	0,061
maïs fourrager	3,990	3,439	3,688	4,668
autres fourrages protéagineux	6,772	4,194	7,511	4,431
prairies permanentes	24,083	24,501	24,099	25,638
autres prairies	3,609	2,019	2,535	1,585
Total	**89,415**	**89,410**	**87,532**	**85,615**

MS	farm number (1000)	gross margin / farm (k€)	feoga / farm (k€)	Feoga / ha (k€/ha)
belg	36,5	27,4	13,1	0,353
dani	48,2	39,2	17,0	0,348
deut	255,5	79,5	19,4	0,337
ella	273,4	8,5	3,0	0,578
espa	302,1	23,6	9,0	0,230
fran	320,2	55,1	22,9	0,319
gbre	123,5	80,2	26,5	0,288
irla	128,7	19,5	9,1	0,291
ital	596,6	17,3	4,8	0,347
luxe	1,5	52,4	14,5	0,213
nede	65,4	59,8	14,0	0,489
osto	79,3	21,7	7,7	0,325
port	208,8	7,6	2,7	0,248
suom	49,3	29,4	8,0	0,225
sver	38,0	56,7	17,2	0,203
UE	**2527,0**	**33,2**	**10,9**	**0,309**

V2 : 36 FG missing

3. CAP reform

- The underlying principles of de-coupling
  - To increase common wealth by transferring agricultural support from direct specific activities to undifferentiated land use
  - Under limited agricultural budget (not exceeding the last years amount)
  - With possible implementation devoted to MS (individual or regional base) (CE Agreement 2003)
  - With partial re-coupling authorized for limited series of activities
  - Theoretical justification (numerous papers : OECD,…)

3. CAP reform (…)

- CAP reform (Luxembourg 2003)
  - Single payment scheme (SPS) :
    - Linear reduction and (national reserve)
    - Modulation and financial discipline
    - Farm based / regionalized
    - Decoupled / partially decoupled
    - Crops / grassland / set-aside
    - Time horizon & dynamics
  - Synthesis (among other papers):
    - “GENEDEC-D1”

3. CAP reform (…)

Not taken into account (in the model AROPAj) : cotton, hops, tobacco

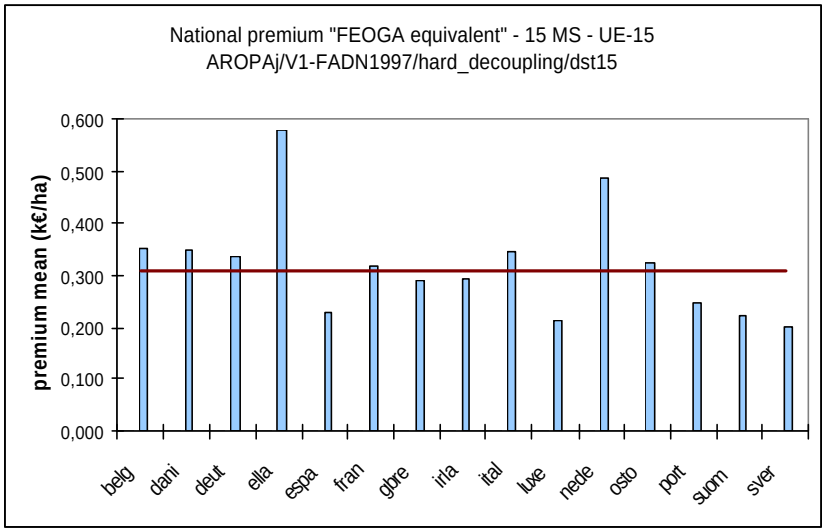
		Full decoupling	Partial decoupling
Historic		***Ireland, Scotland, Wales***	***Austria, Belgium, France, Greece, Italy, Netherlands, Portugal, Spain***
Hybrid	**Static**	***Luxembourg***	***Denmark, Northern Ireland***
	dynamic	***Germany, England***	***Finland***

4. Preliminary results

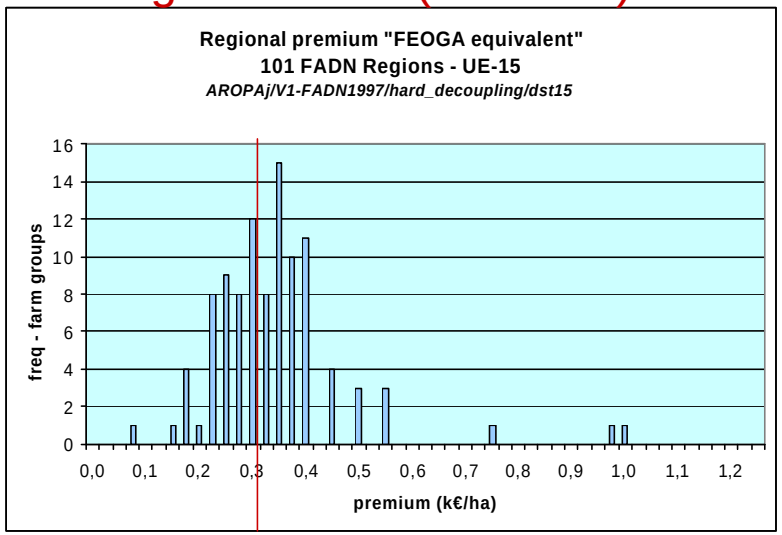
- Premium computed so that the agricultural expense is unchanged compared to the Agenda 2000 situation

Regional differentiation of the equivalent support per hectare :

MS scale



Regional scale (~NUTSII)

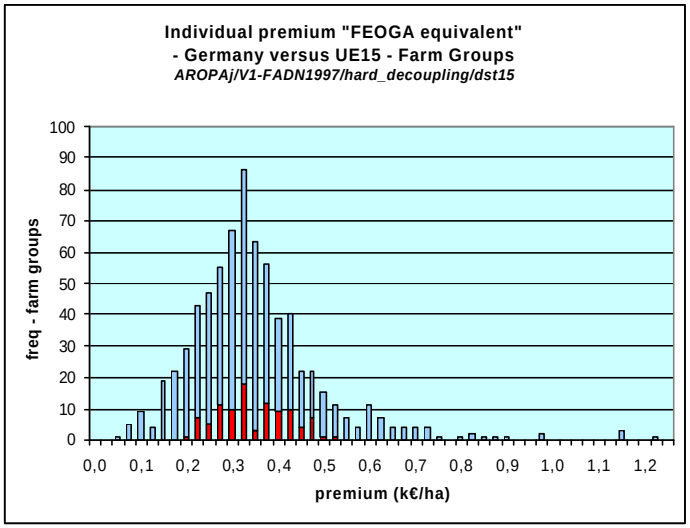


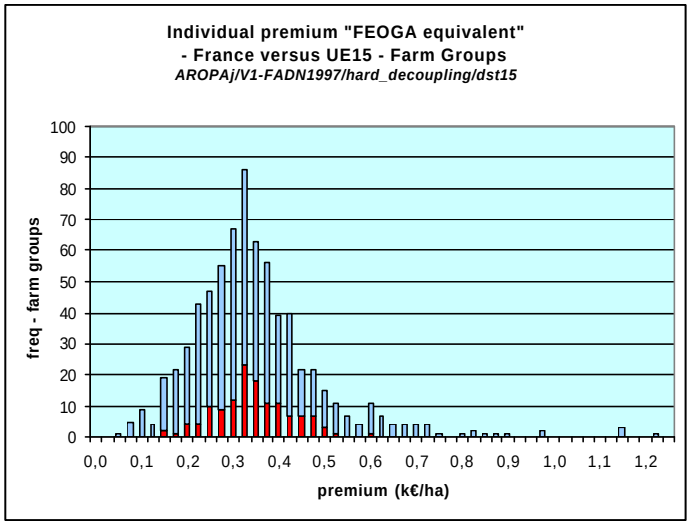
4. Preliminary results (…)

- Distribution of farm-group premiums “feoga equivalent” and MS differentiation

UE-15

Germany vs France



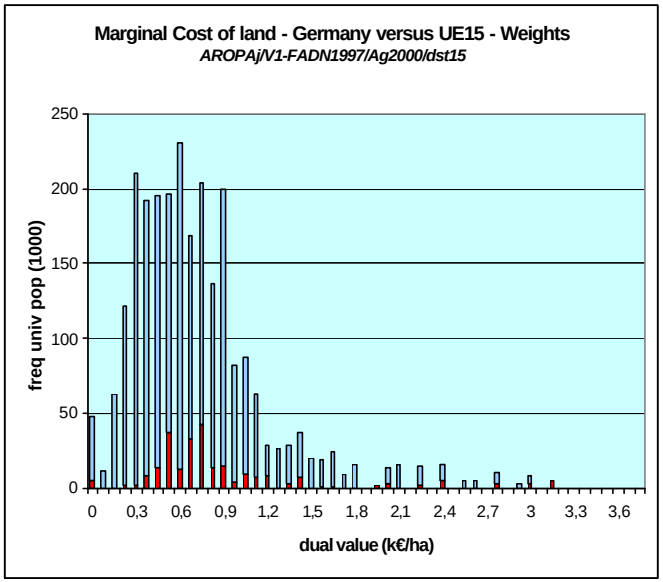


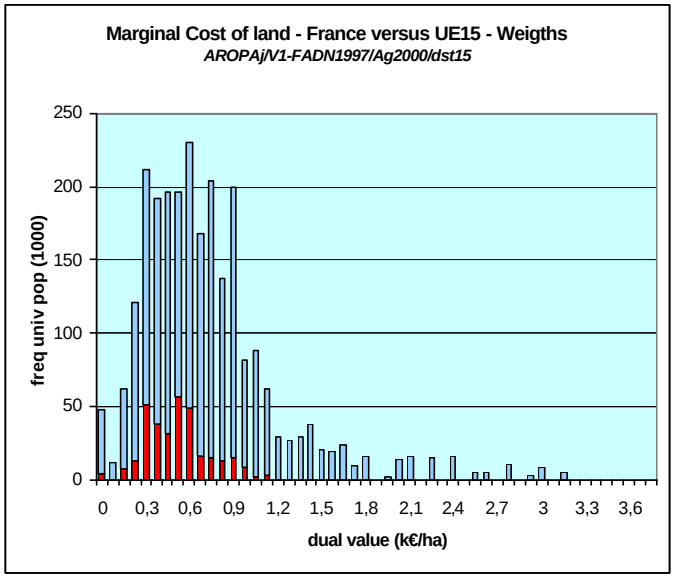
4. Preliminary results (…)

- Distribution of the shadow price of the land “Agenda 2000”

UE-15

Germany vs France



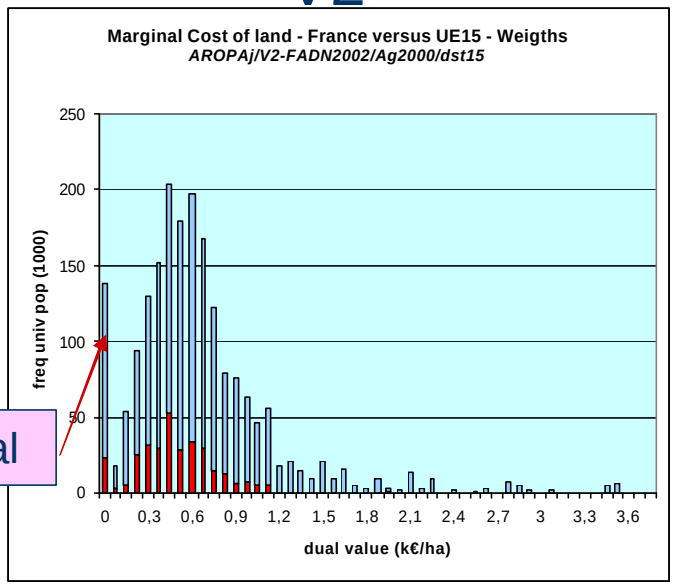


4. Preliminary results (…)

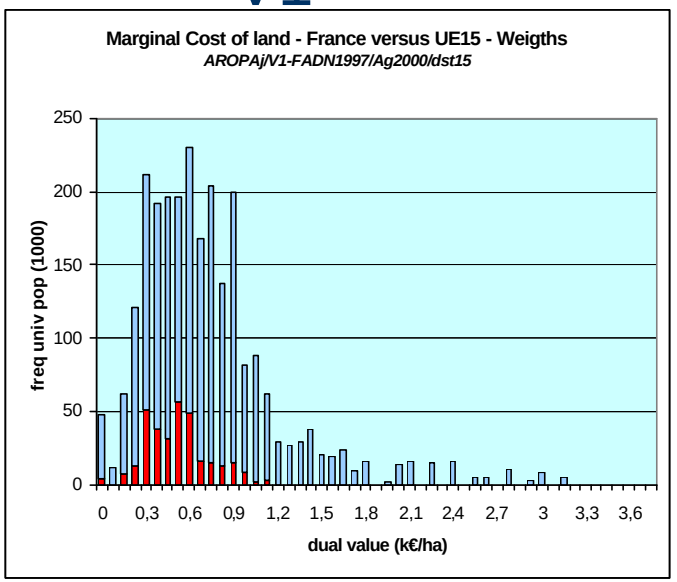
- Distribution of the shadow price of the land “Agenda 2000”

UE-15 - France

V2 vs V1



partial

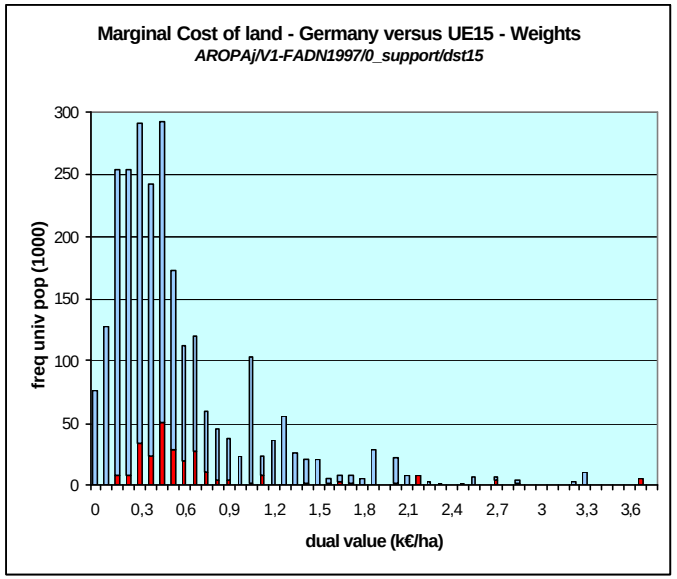


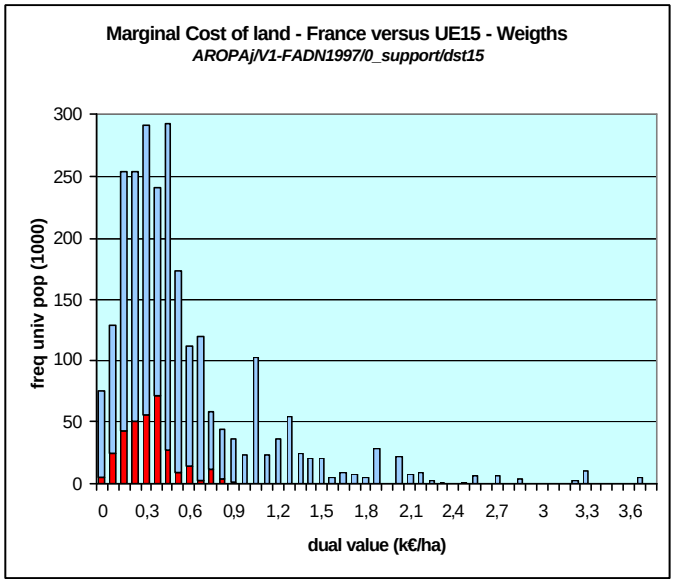
4. Preliminary results (…)

- Distribution of the shadow price of the land “De-coupling 0-support”

UE-15

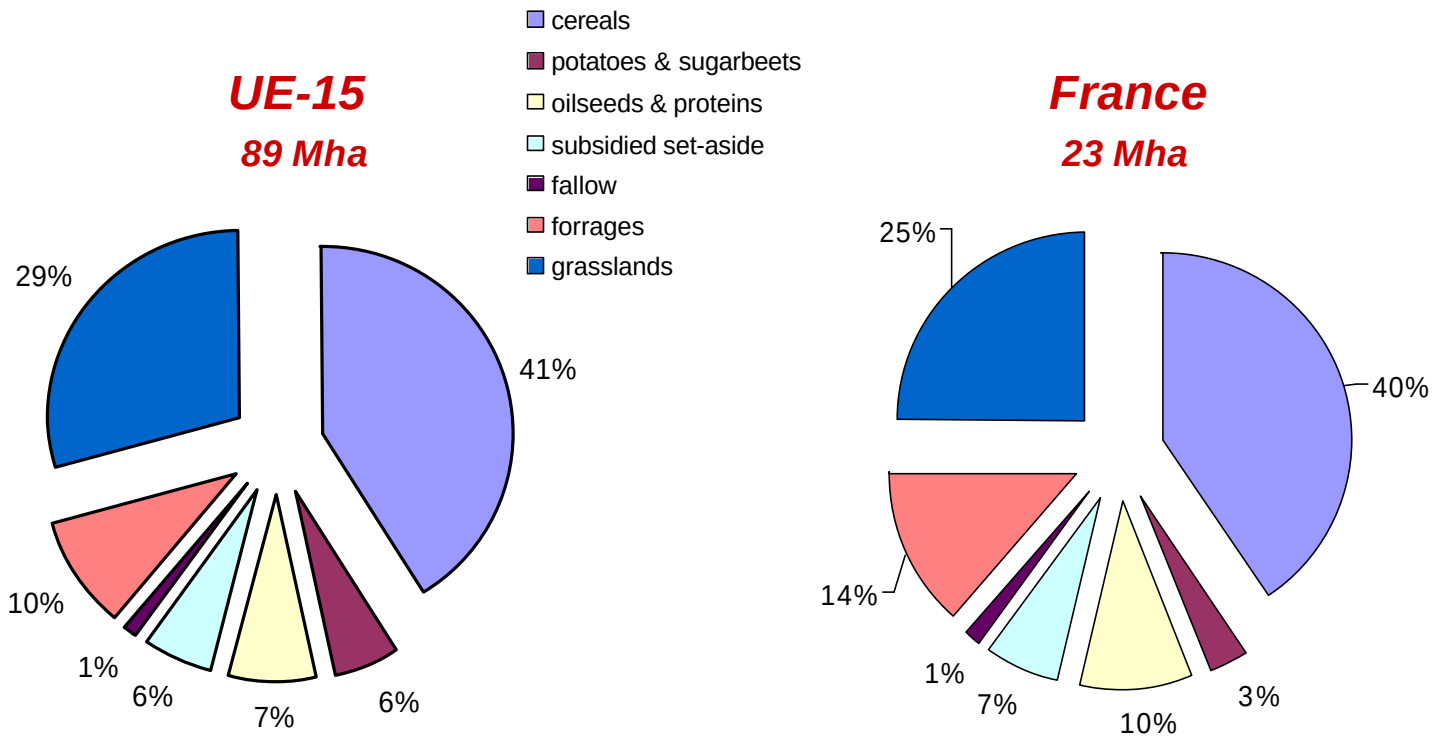
Germany vs France





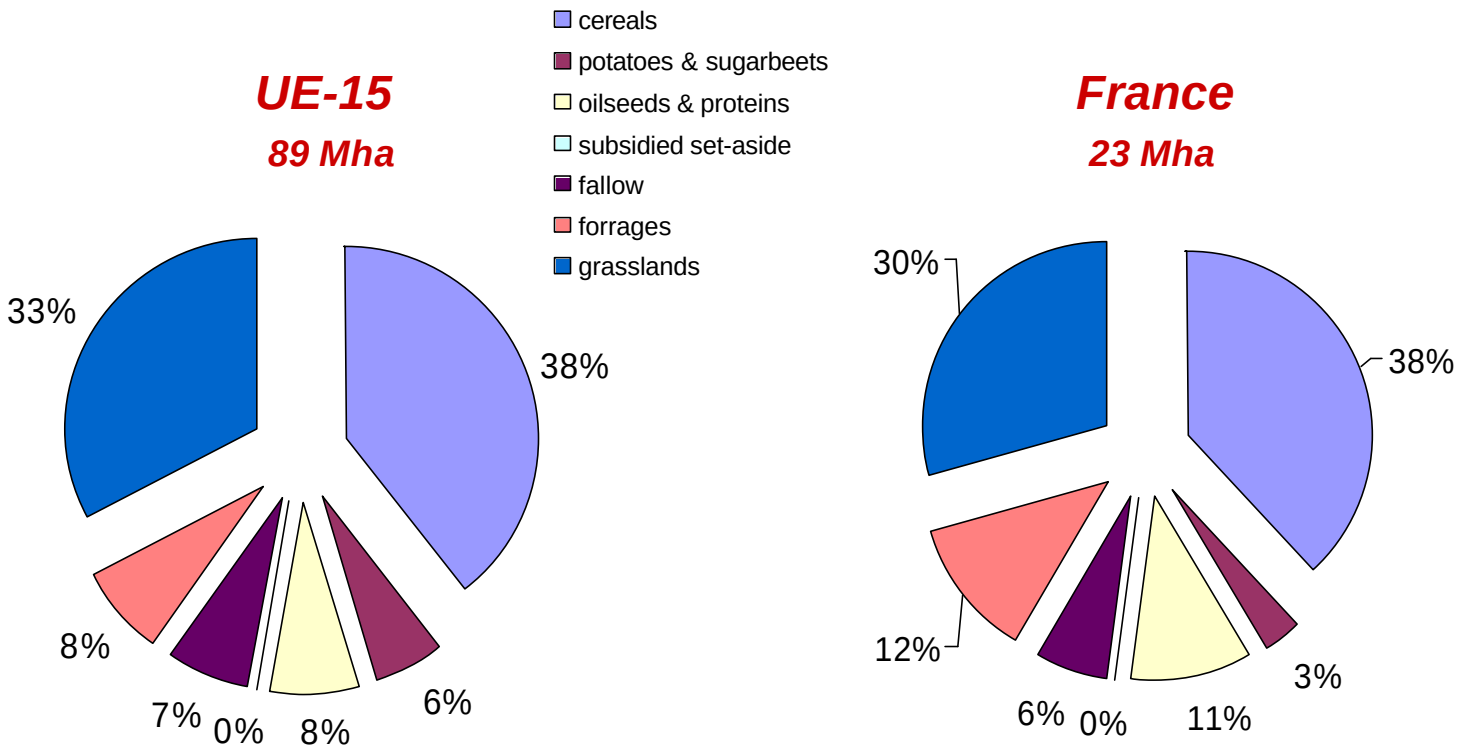
4. Preliminary results (…)

Agricultural land use, *Agenda 2000, V1_2001*



4. Preliminary results (…)

Agricultural land use, *complete de-coupling, V1_2001*

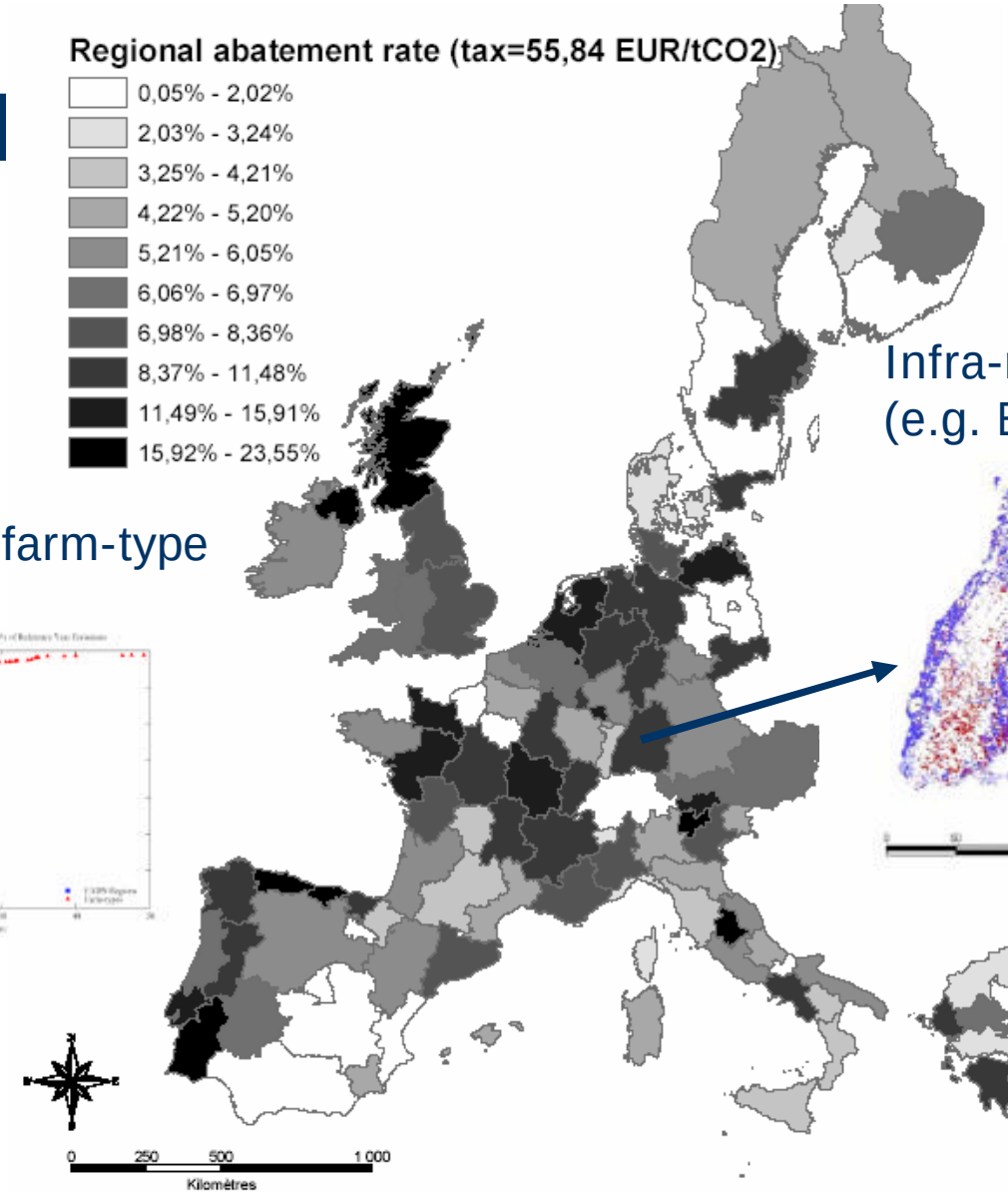


5. New member States

- Modelling “à la AROPAj”
  - FADN (format consistent with 2002 DG-AGRI)
  - Typology : automatic through cluster analysis “V2” (in addition to the existent UE-15 typology)
  - Parameter estimation : data-processing automaton
  - Calibration : data-processing automaton
  - CAP : specific parameters for policy tools
- Other GENEDEC models ready to involve NMS
  - FARMIS (FAL)
- CAP reform
  - Standard implementation ~ total decoupling

5. Environmental ind.

Results INSEA, De Cara & al. 2005)

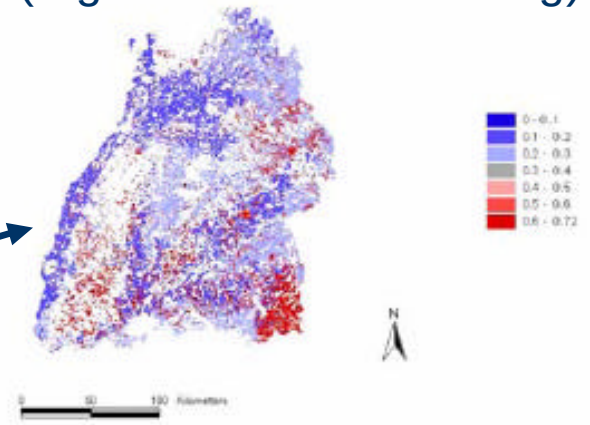


Relative rate of
GHG emission reduction

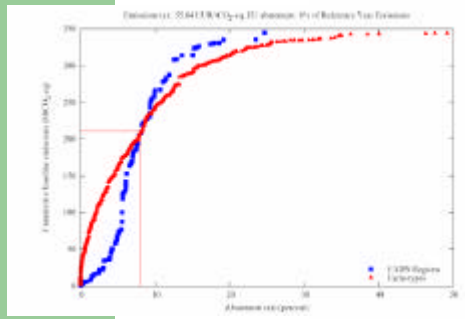
Tax *t* = **56€/tCO2**

when total abatement is 8%

Infra-regional downscaling
(e.g. Baden-Württemberg)



Regional and farm-type distribution



5. Further development (…)

- Module to be improved / N-pollutants (NO2, NH3, NO3?)