Agri-ETS study:

Implementation options for partial ETS variants for the agri-food sector

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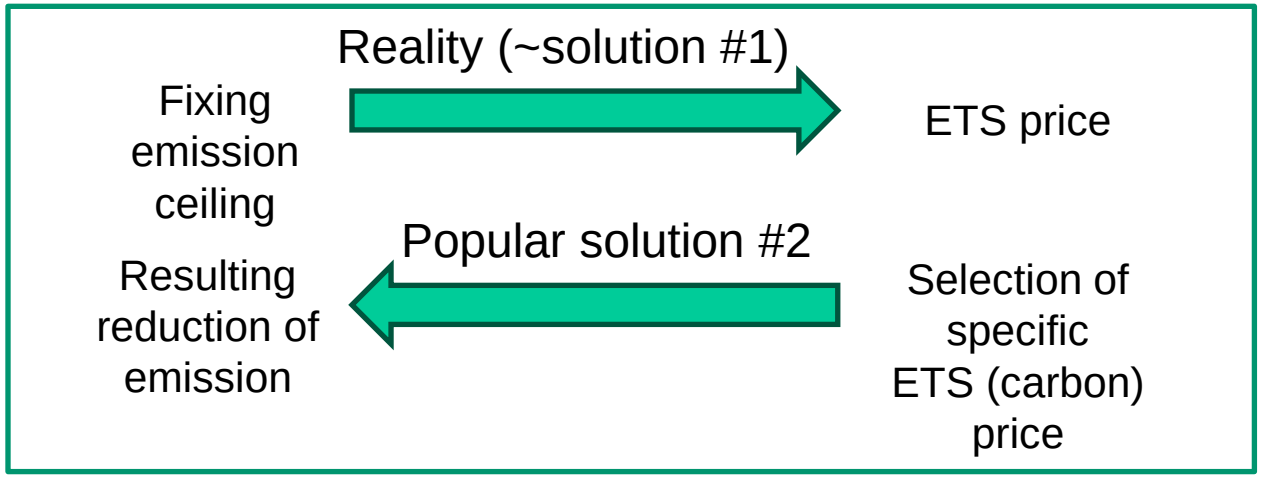
Background 1

- Emission trading systems (ETS): **total emissions capped** at certain threshold requiring agents to obtain **tradable emission permits** for their activities
  - Key problems: monitoring, reporting and verification (MRV) for agricultural emissions occurring on millions of farms
- Influential study: Trinomics (2023) looks at options to ease MRV
  - **Default** (simplified) estimation **vs certified** (more accurate) estimation (and monitoring)
  - **Cut off rules** to exclude smallest farms / firms
  - Different "**points of obligation"** to implement ETS
    - Farmers: challenge to monitor large number of holdings
    - Downstream enterprises (meat processing and dairy) or in upstream input supply firms (fertilizer traders) are less numerous
  - Focus on **emission types** easy to monitor
    - Livestock ETS - enteric fermentation and manure management.

Background (2)

- MRV poses interesting modelling challenge, usually ignored
- Modelling solution #1: regional permit trade with transaction costs (Pérez Domínguez, 2006 and ECAMPA studies) and second iteration loop
- Modelling solution #2: Carbon price implementation gives same results as an ETS implementation, but only if transaction costs are zero



Scenario plan

- MRV is only guiding scenario choice (modelling approach #2)
- Scenarios mimic some policy choices:

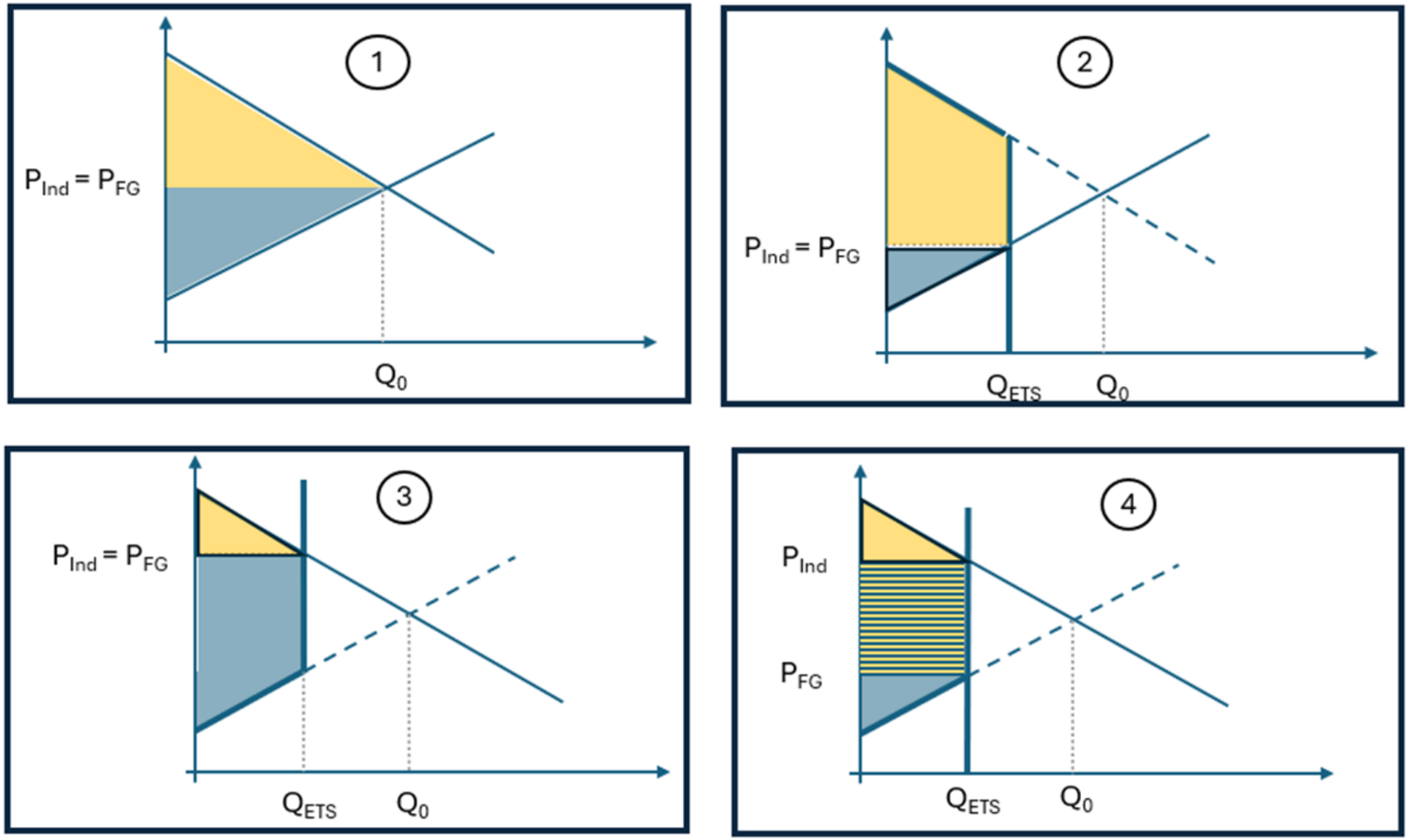
Scenario Name	**Emission Coverage**	**Point of obligation**	**MRV**	**Emissions rights granted to…**
Farm level	Livestock emissions	Farm gate	Certified (full accounting of emissions)	Farm sector
Industry - default	Livestock emissions	Processing industry	Simplified (default values per activity)	Industry
Industry - certified	Livestock emissions	Processing industry	Certified (full accounting of emissions)	Industry

Bonus payment system idea

- Default monitoring: Emissions are estimated based on sales of meat of different animal types =>
  - Higher carbon price charge on ruminant meat (cattle, sheep) than non-ruminants (pigs, poultry)
- Certified monitoring: Meat processors offer bonus payments if farmers voluntarily apply feed additives
  - During the year random checks if feed additives (line seed, nitrates, 3NOP) have been really applied, when stated by farmers
  - If no cheating detected: extra payment according to the value of saved emissions
  - No problem in modelling as technology choice is fully transparent
    - In reality: difficult for change of feed mix in favour of concentrates (saves emissions), as total feed mix is more challenging to monitor than feed additives

Basic market effects, graphically

1) Initial equilibrium between farm supply and meat processor demand
2) ETS on meat processors
3) ETS on farms
4) ETS on farms or processors with auctioning



Implementation in supply model

- Standard case is farm level ETS = carbon price on selected emissions, determined from technology choice and activity levels
- Variation in this study: carbon price only for technology choice in supply model

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*
    LINEAR_(RUNR)..    v_linObjePart(RUNR)  =E=
*
*       --- sales/purchases valued by "unit value" price
*           from gross Economic Accounts for Agriculture
---------------------------------------------------------- 2 line(s) not displayed ----------
        SUM(  RUNR_OMOBJE(RUNR,OM_OBJE),
              v_netPutQuant(RUNR,OM_OBJE) * ( SUM(R_RAGG(RUNR,MSACT), (%data%(MSACT,"UVAG",OM_OBJE,"Y")
---------------------------------------------------------- 70 line(s) not displayed ----------
*      ---  carbon tax on selected GHG emission types
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        - sum(ghgs,p_carbonTax(RUNR,ghgs,"perton") * (

$ifi not %mitiTecPol%==on    (v_CO2EquEmis(RUNR,ghgs)
---------------------------------------------------------- 1 line(s) not displayed ----------
*      ---  carbon tax on selected GHG emission types assuming constant baseline activities: incentivis
*           without (direct) impact on activity levels:
$ifi     %mitiTecPol%==on    (v_FxActEmis(RUNR,ghgs)
---------------------------------------------------------- 1 line(s) not displayed ----------

        * p_globWarmPot(ghgs) - p_carbonTax(RUNR,ghgs,"refGWP")))
```

Implementation in market model

- Carbon price = negative subsidy, levied on meat quantities (and milk) according to average emissions per ton in EU
- Nonzero if processors = point of obligation (default monitoring or certified monitoring)

```
 PPri_(RMS,XXX)
---------------------------------------------------------- 2 line(s) not displayed
      v_prodPrice(RMS,XXX)
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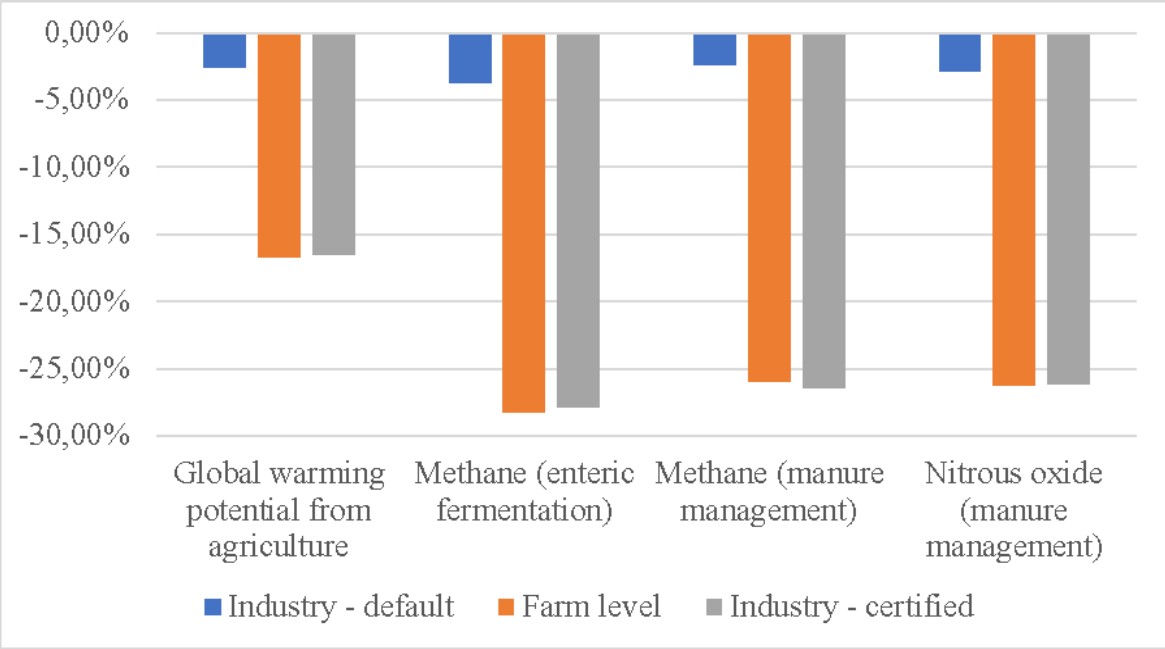
         =E=
*      ---  market prices
           (SUM(RMS_TO_RM(RMS,RM),v_marketPrice(RM,XXX))
*      --- producer price margin - either additive or relative - default is relative
              * (pv_prodPriceMarg(RMS,XXX)
---------------------------------------------------------- 4 line(s) not displayed
*      --- plus support meassures - all transfered into per ton definition
              + DATA(RMS,"PSEi",XXX,"CUR")
              + DATA(RMS,"PSEd",XXX,"CUR")
```

Results, EAAE paper (1)

Changes in emissions



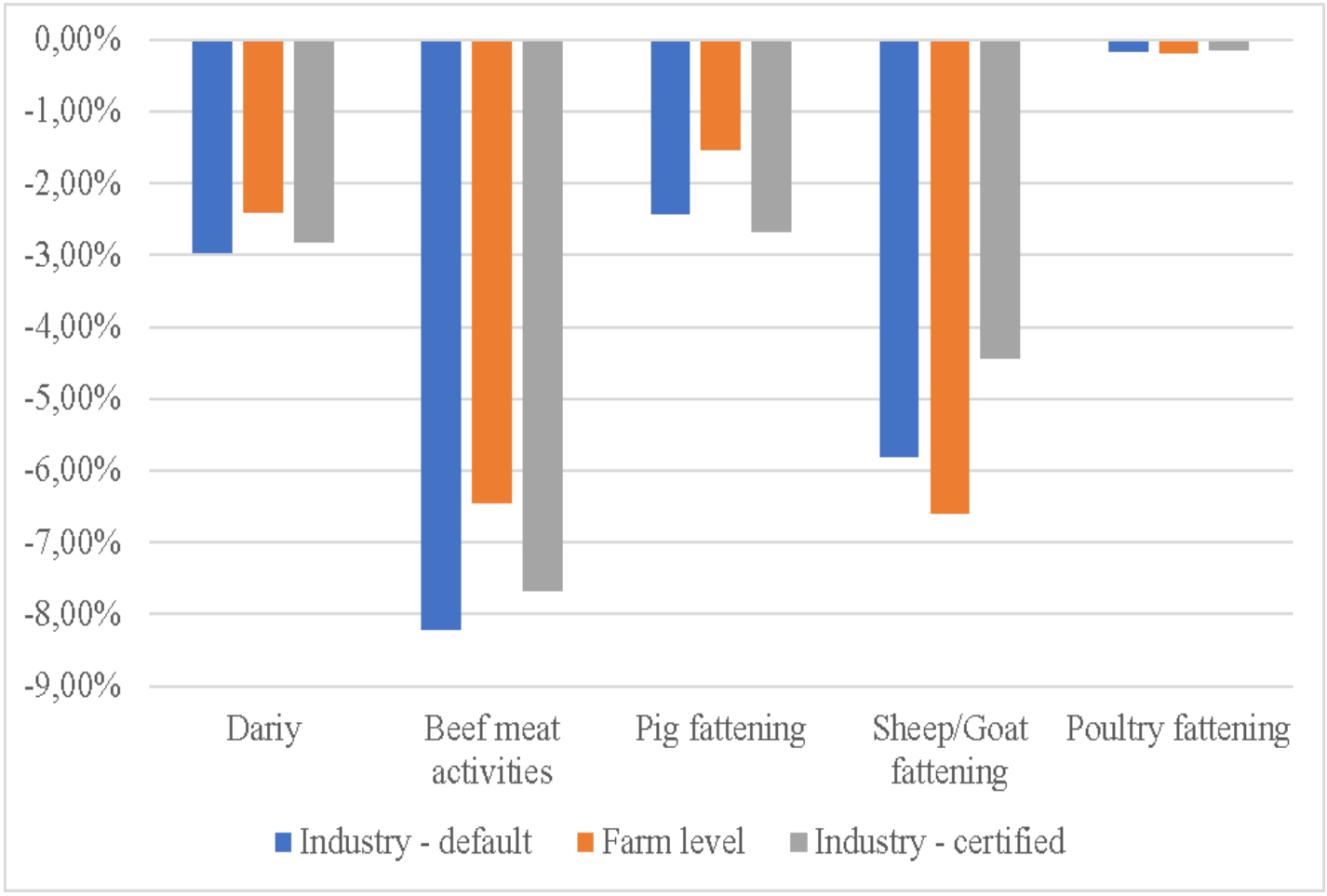
Uptake of mitigation techs

		Feed additives			Anaerobic digestion
		Line seed	Nitrate	3NOP	
Default monitoring	All cattle activities				0.01
	Beef meat activities				
	Pig fattening				0.03
Full monitoring	All cattle activities	0.13	0.23	0.28	0.11
	Beef meat activities	0.15	0.12	0.19	0.09
	Pig fattening				0.66

- Significant mitigation potential under certified monitoring system: driven by the update of mitigation technologies
- Almost identical to farm level ETS

Results, EAAE paper (2)

- Animal activities are affected depending on emission intensity, responsiveness and initial income



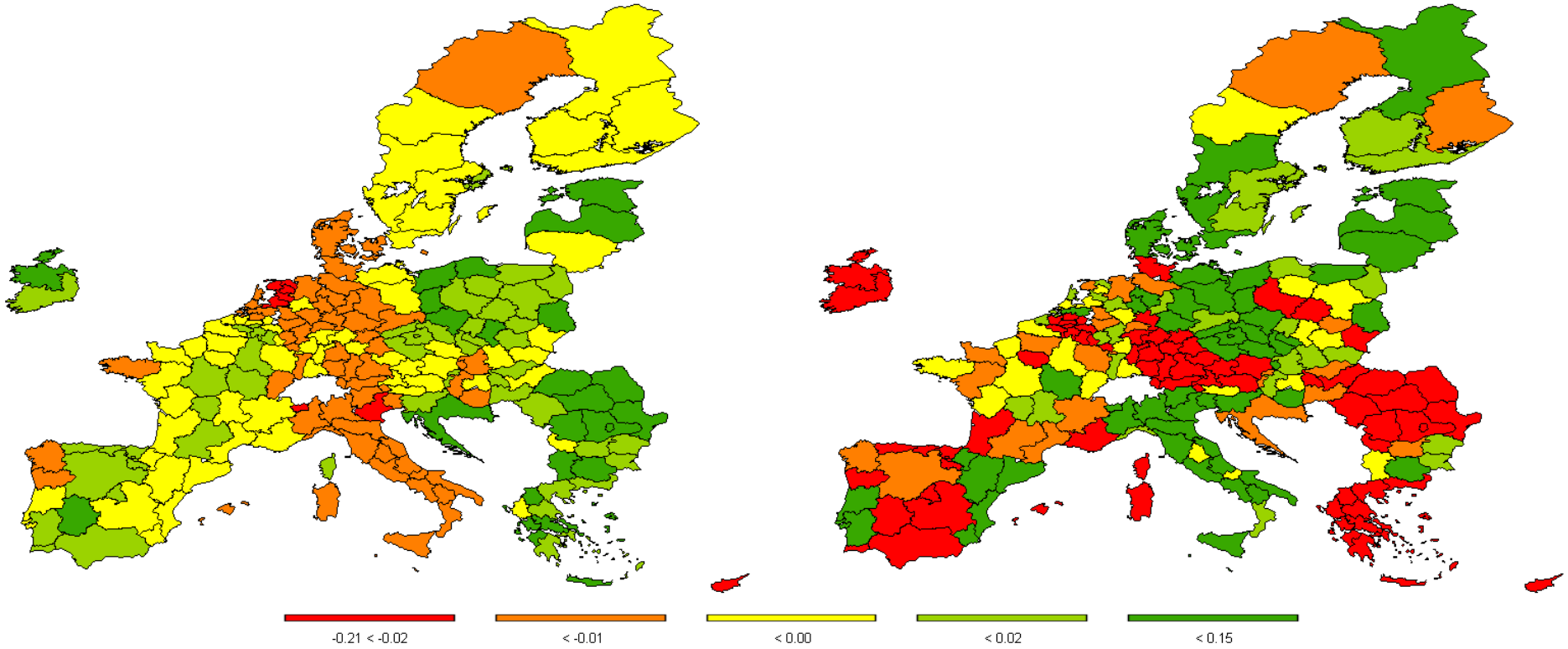
Results, EAAE paper (3)

- Market and income effects depend on the point of obligation

- **Positive** under **famer ETS** due to supply cut and **negative** under **industry/downstream** due to lower demand

Results, EAAE paper (4)

Buyers (negative) and sellers (positive) of permits



- Under default monitoring (left map), hot spot regions = buyers of permits. They have higher emissions than granted permits (allowances)
- Under certified monitoring (right map), regions with high grazing shares such as Ireland not suitable to implement feed additive techs, thus switch to buyers
- Subnational differentiation depends on regional specialization: quite complex

Summary

- Importance of the MRV system and the point of obligation
  - Farmers certified: emissions are priced on farm level assuming full monitoring of technologies incentivizing mitigation actions – positive farm income effect and significant mitigation potential
  - Industry default: price of meat and dairy products ignores the uptake of mitigation techs – negative farm income effect and low mitigation potential
  - Industry certified: bonus system for products produced with mitigation techs due to full monitoring – negative farm income effect and significant mitigation potential
- Side remark: ETS is mimiced through cost neutral carbon pricing in the model
  - Reference level for carbon price charge is set to ensure net zero cost at EU level, like in a “real” ETS.
  - Technically achieved by using tax allowances.