Ex-post evaluation of N_2O reductions co-benefits ensuing from nitrogen management policies

Based on study commissioned by DG Clima

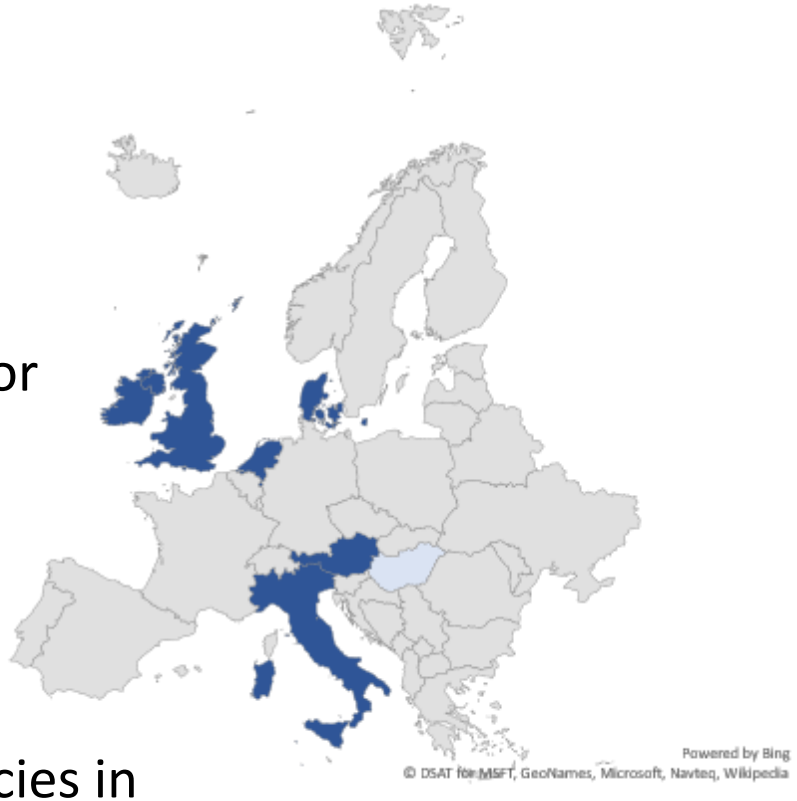
Support collection and assessment of information and data on climate and energy policies in the context of the European Semester and the Energy Union governance, including ex-post policy evaluation

Introduction

- Starting point
  - EEA database on climate change mitigation policies and measures in Europe (PAM database)

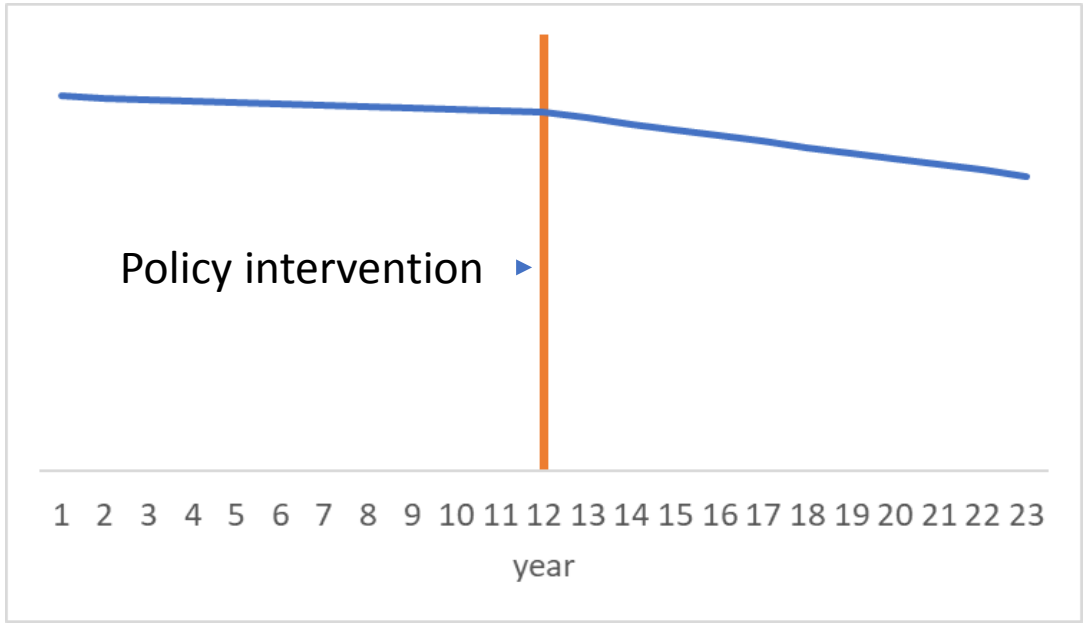
- Previous studies
  - Detailed EU-wide assumptions based scenario modelling for 2000-2008
  - Various approaches used in country or regional analyses

- Aims
  1) Gather evidence on policy effects
  2) Consider relevance of econometric analysis to GHG policies in agriculture

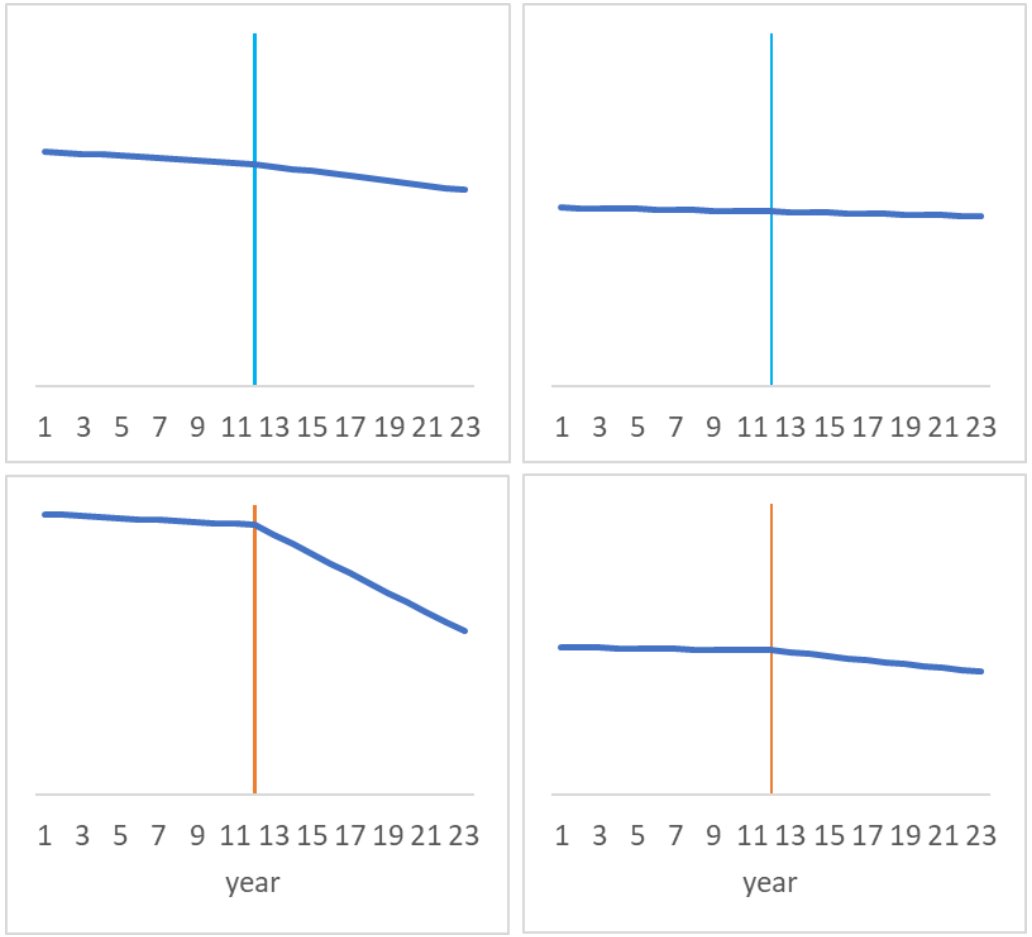


Approach: qualitative and quantitative

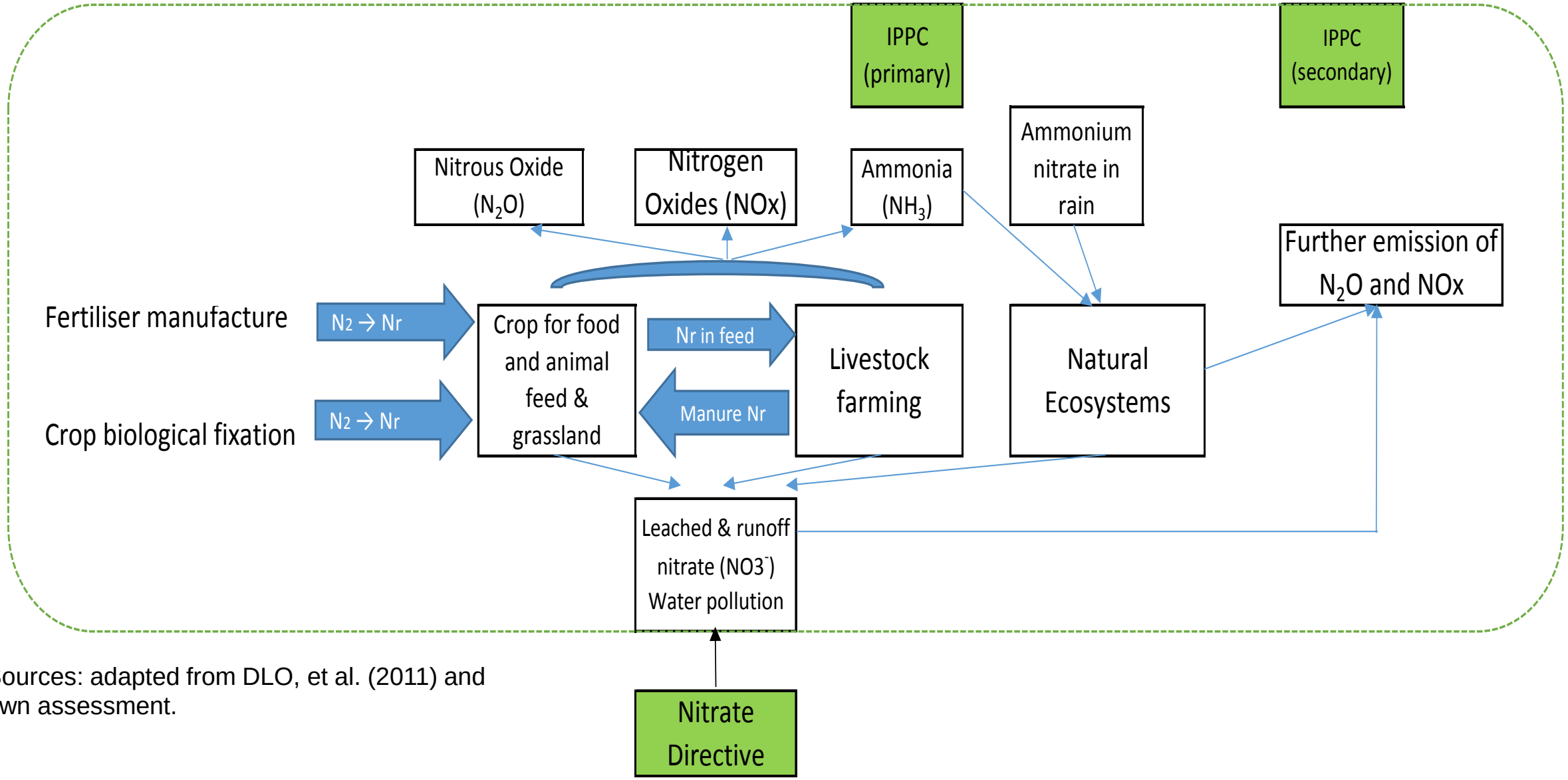
- Single geographic area: time series



- Multiple geographic areas: panel analysis



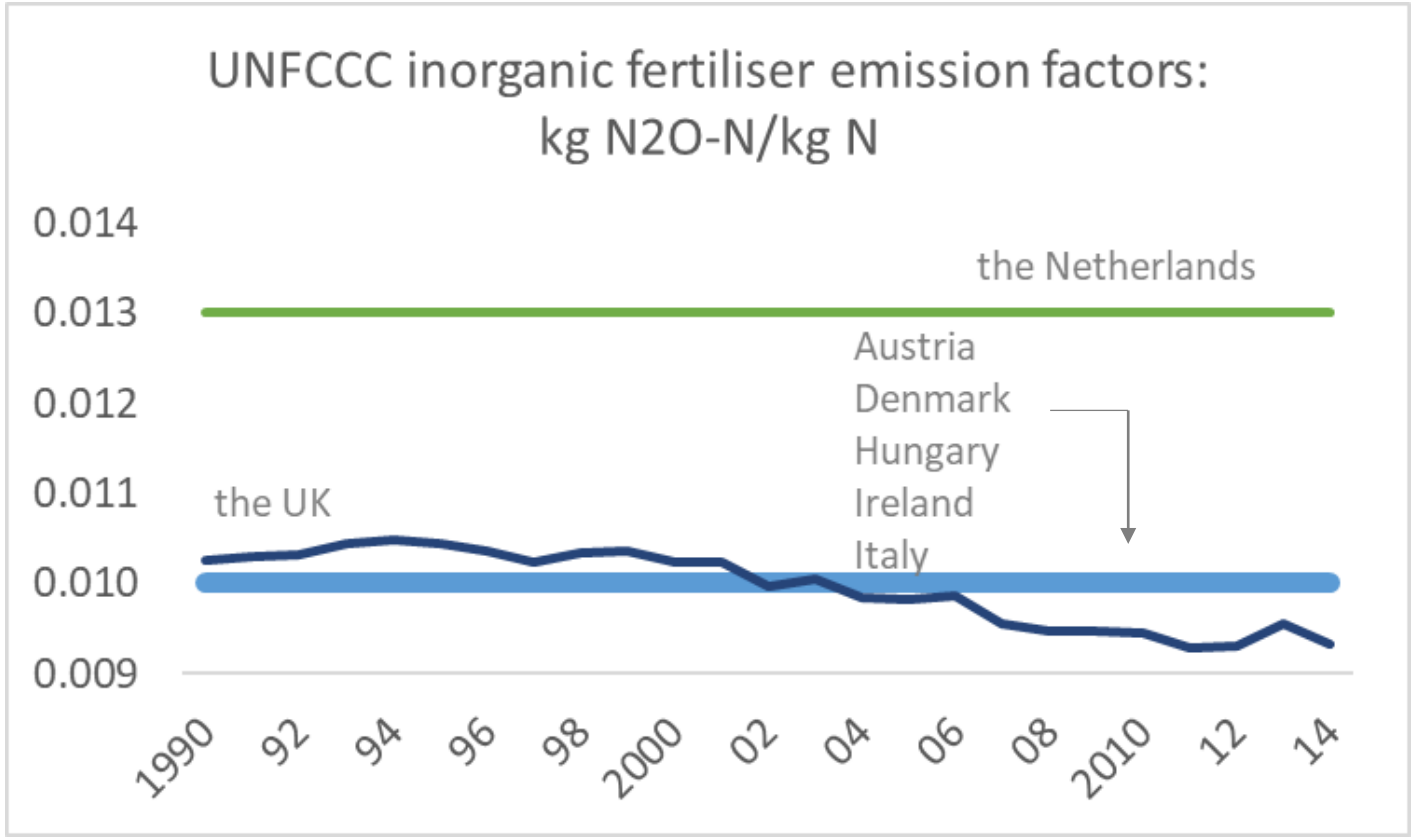
Co-benefit pathway: nitrogen management and N_2O emissions



Sources: adapted from DLO, et al. (2011) and own assessment.

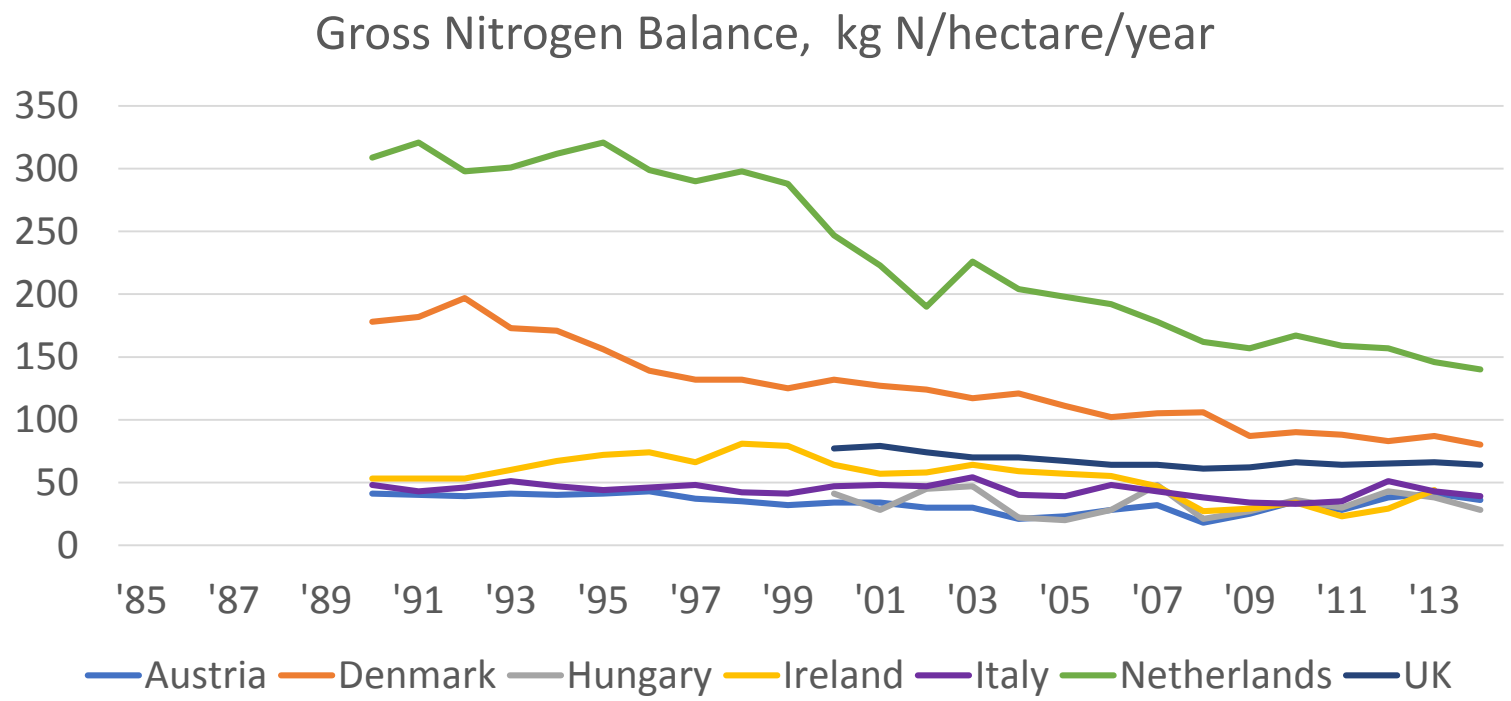
Variable of interest: direct soil N_2O emissions

- Relatively uncertain estimate
- International reporting convention limitations



Variable of interest: Gross Nitrogen Balance

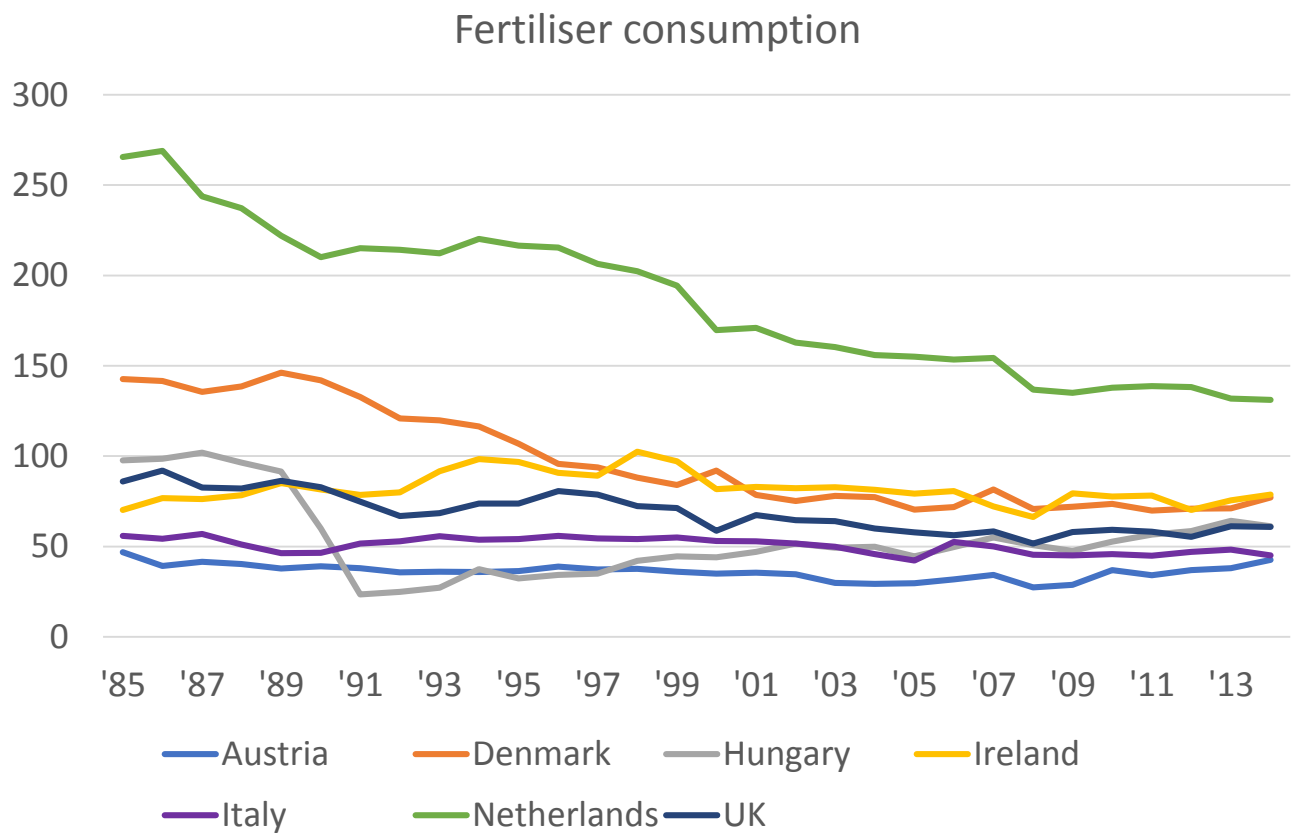
- Indirect link: affects multiple pollutants



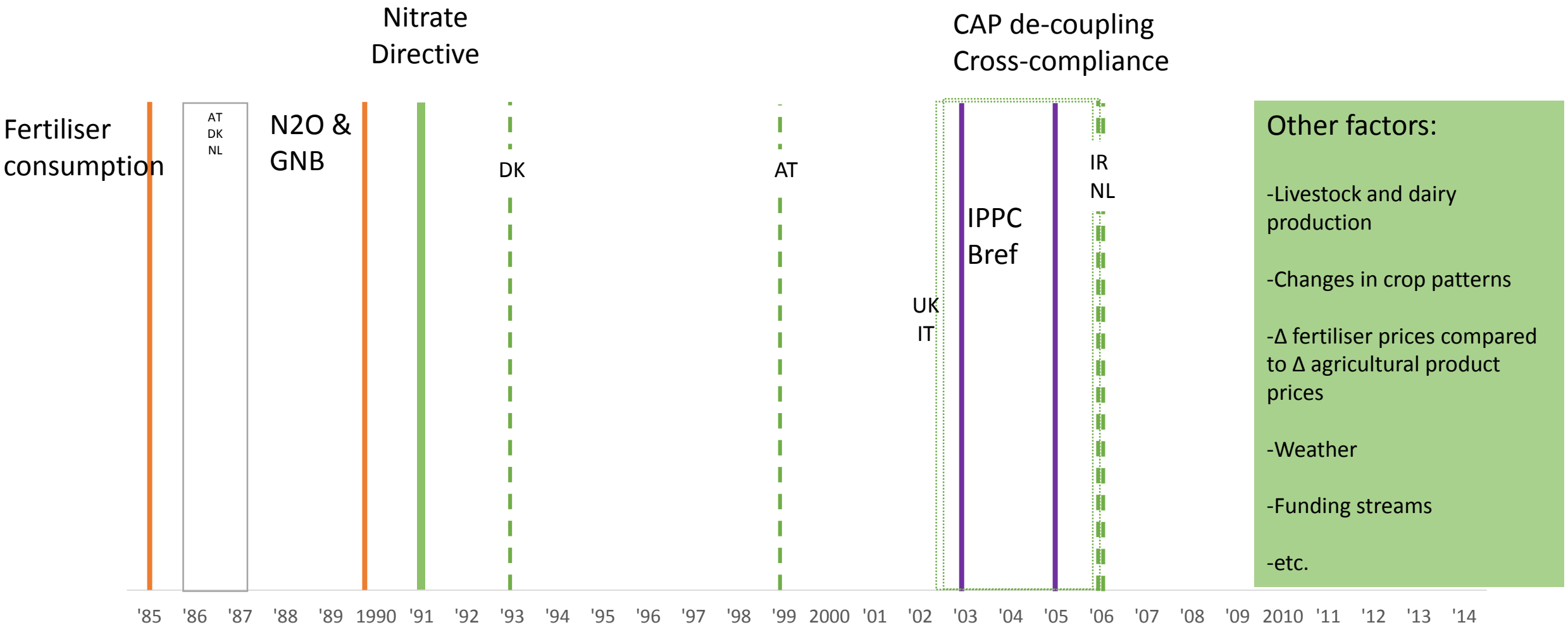
Variable of interest: synthetic fertiliser consumption

- More data available

- Contribution to direct soil emissions ranges between 26%-57% across sample countries and study years.



“Before policy” data, crowded policy space and attribution challenges



Cross country analysis

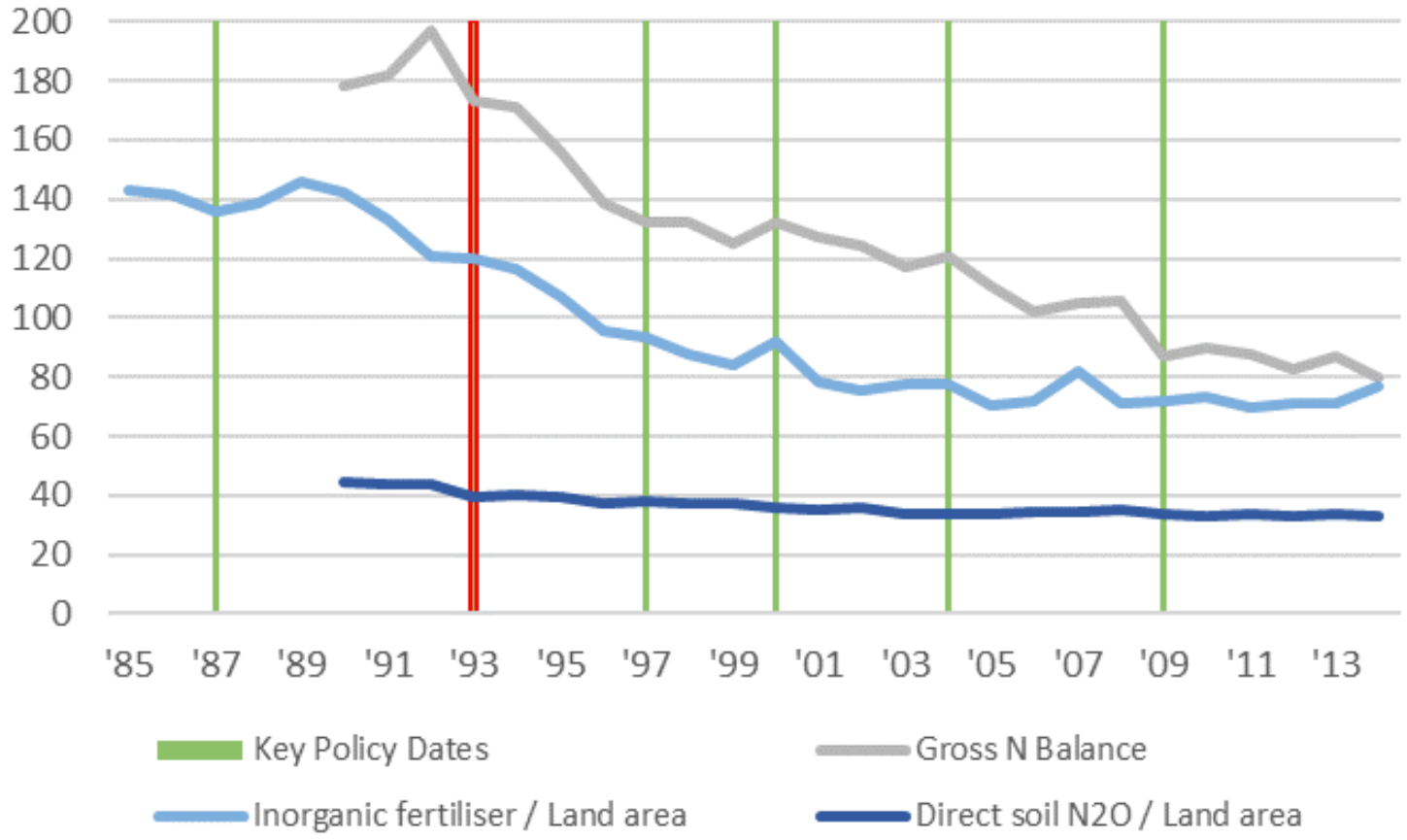
- Should, in principle, provide the advantage of assessing different levels of policy stringency, e.g.:
  - % of NVZ coverage and
  - a more complex analysis including parameters such as manure N limit on grass and nutrient management planning.

- However, sample size and reverse causality between starting nitrogen surplus and policy stringency in our sample does not allow conclusions to be drawn.

Within country analysis: time series

- Time trend and lag approach
- Analysis “per hectare” on average per country. Ideally should include relevant agricultural production aspects such as livestock, dairy and crop production as well as weather; within the analysis time-frame this would require more data-points, possibly in the form of regional analysis.
- Only control for fertiliser prices.
- Despite the limitations, overall, the nature of the results is as expected on basis of our literature review.

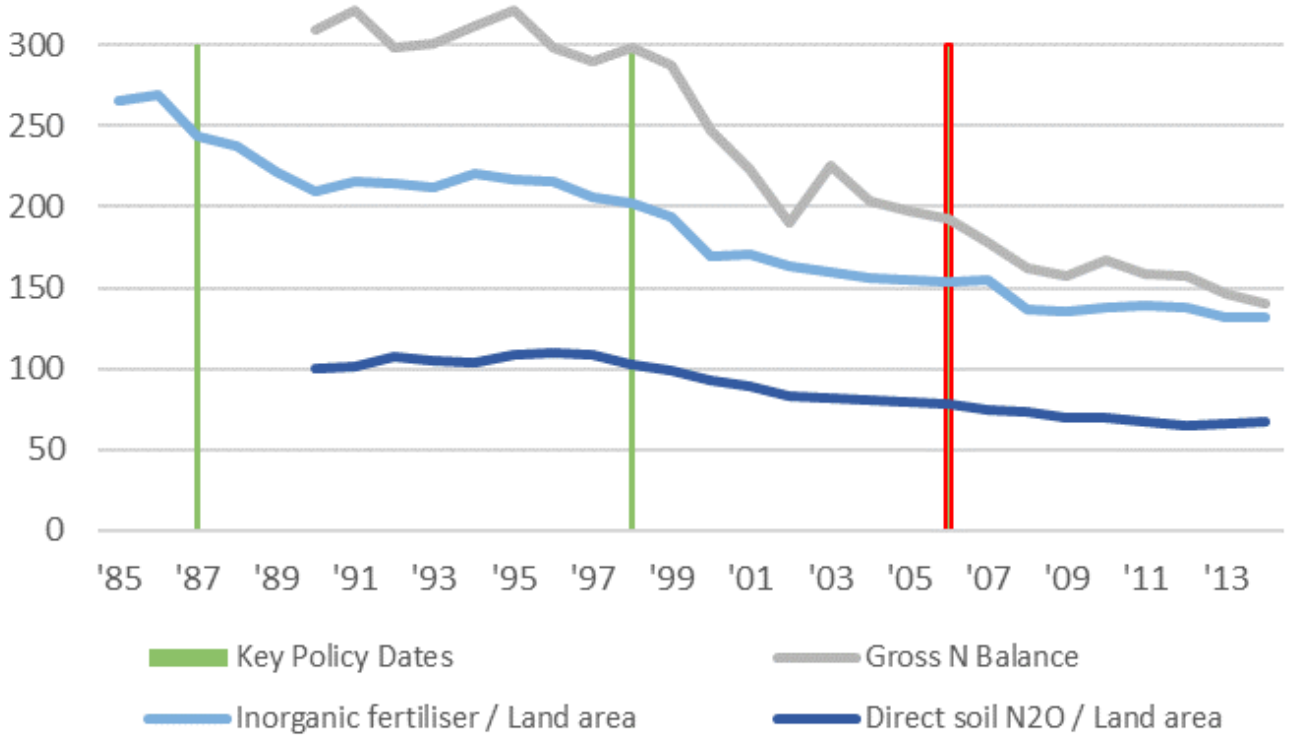
Denmark



Negative significant coefficient of impact of Nitrate Directive on all three variables of interest.

Gross Nitrogen Balance and Inorganic fertiliser in kg N / hectare / y; Direct soil N_2O in 100g / hectare / y

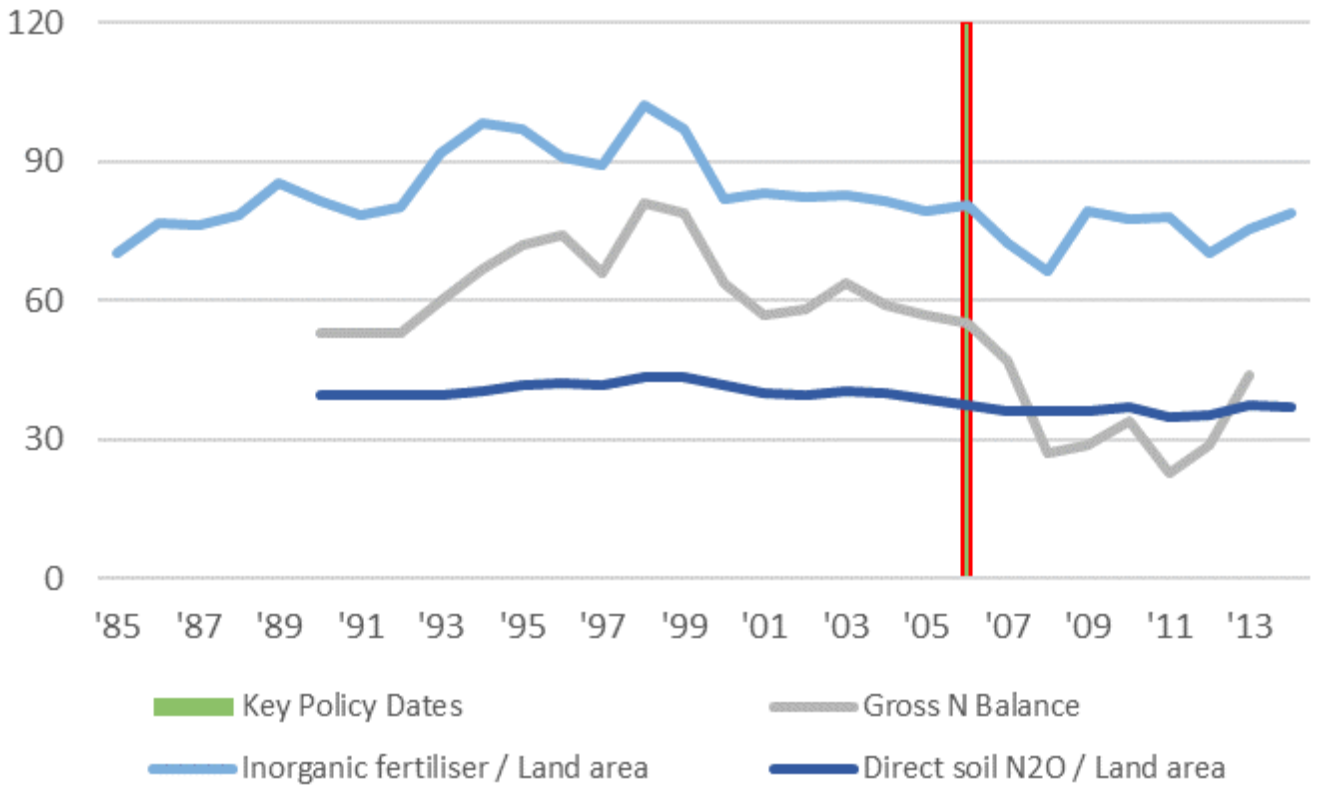
The Netherlands



Negative significant coefficient of impact of Nitrate Directive on all three variables of interest.

Gross Nitrogen Balance and Inorganic fertiliser in kg N / hectare / y; Direct soil N_2O in 100g / hectare / y

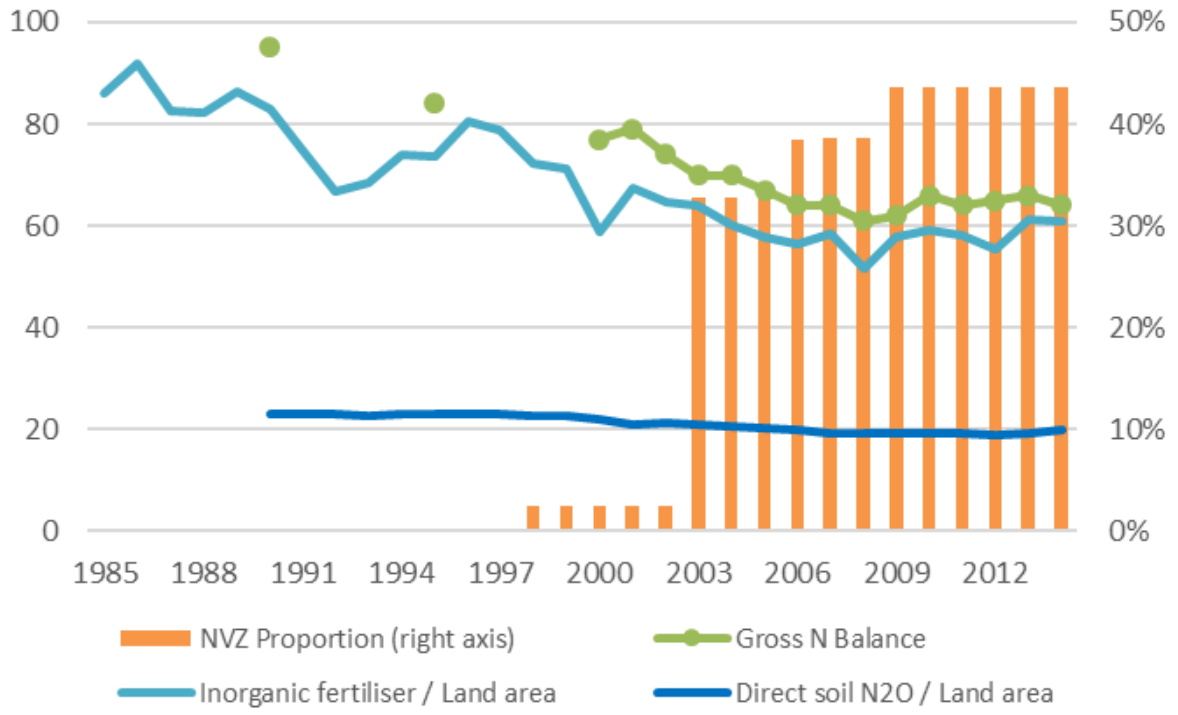
Ireland



Negative significant coefficient of impact of Nitrate Directive on all three variables of interest, but some policy attribution limitations due to timing.

Gross Nitrogen Balance and Inorganic fertiliser in kg N / hectare / y; Direct soil N_2O in 100g / hectare / y

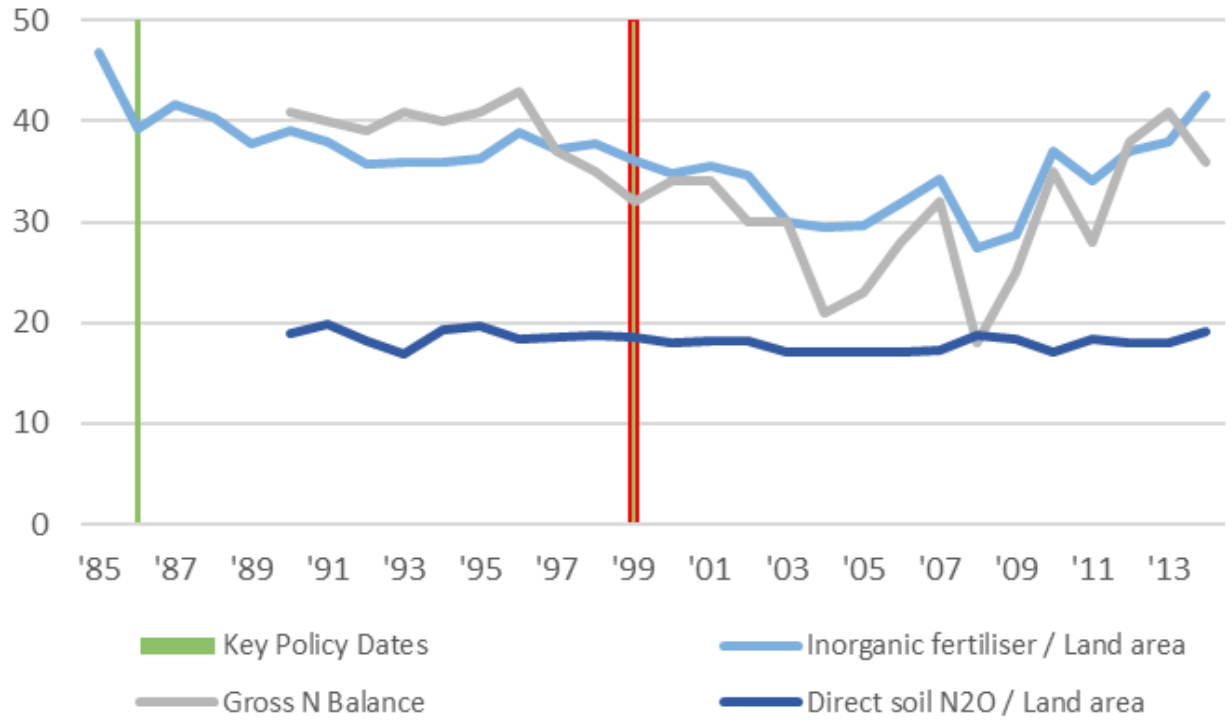
The UK



Negative significant coefficient of impact of Nitrate Directive on synthetic fertiliser use and on gross nitrogen balance but not on direct soil N_2O, timing affects attribution.

Gross Nitrogen Balance and Inorganic fertiliser in kg N / hectare / y; Direct soil N_2O in 100g / hectare / y

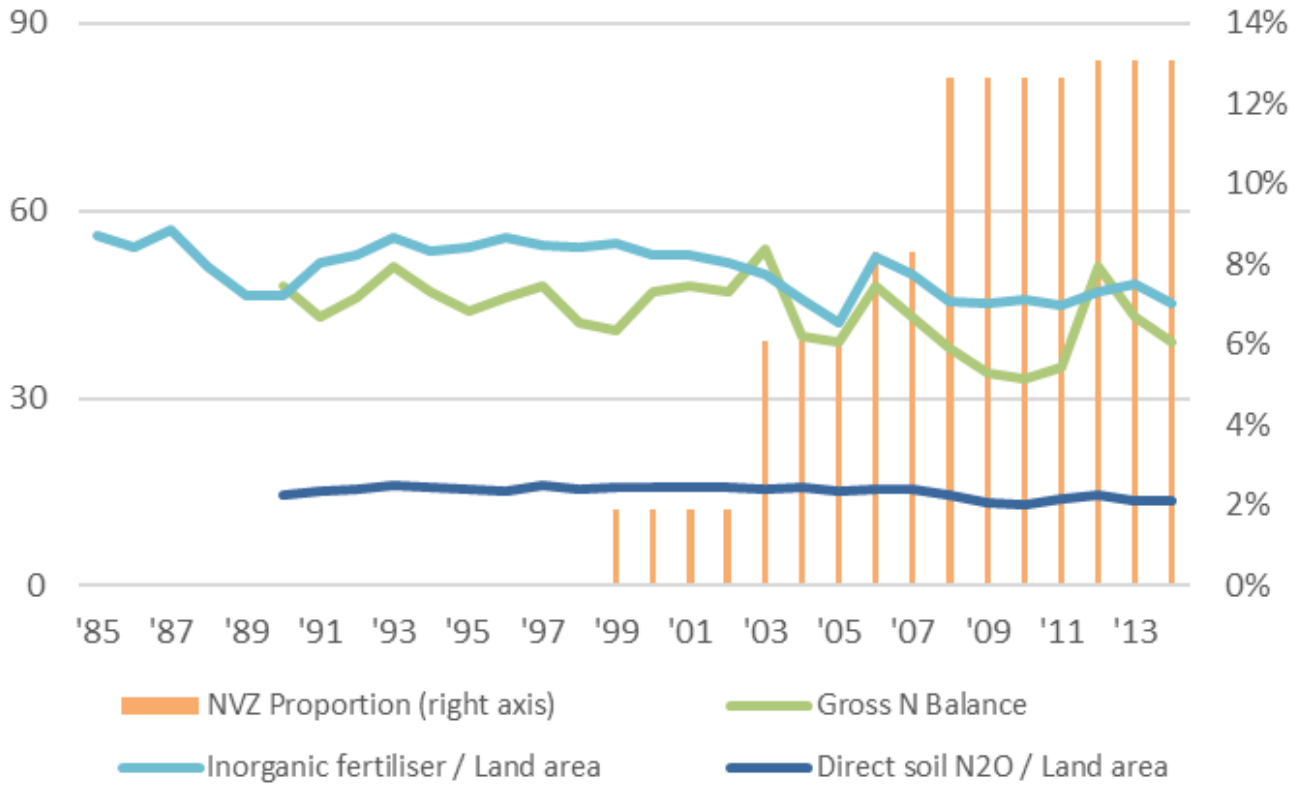
Austria



Negative significant coefficient of impact of Nitrate Directive on all three variables of interest: regression controlling for time, but not significant when controlling for lagged variable.
Increasing trends from 2007 onwards.

Gross Nitrogen Balance and Inorganic fertiliser in kg N / hectare / y; Direct soil N_2O in 100g / hectare / y

Italy



Negative coefficients, but estimation limited by patchy fertiliser price data. Negative coefficients, but results more uncertain than for other Member States

Gross Nitrogen Balance and Inorganic fertiliser in kg N / hectare / y; Direct soil N_2O in 100g / hectare / y

Conclusions

- Individual country success stories depend on awareness and measurement, including through nutrient management planning at farm level. Implementing such nutrient planning does not come without associated costs.
- Both national instruments and ND implementation can lead to nitrogen surplus and fertiliser use reductions.
- Regional breakdown recommended for econometric ex-post evaluation approaches.
- Cross-country comparison: requires further methodological consideration and standardisation of N_2O data estimation.

Thank you!