

## Incentives for nitrogen effects trading: A Danish farmer survey

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The new regulatory framework for nitrogen emissions regulation in Denmark raises a number of challenges. In particular, the objective to move towards a more targeted approach and the intent to include flexibilities for farmers in the choice of measure to meet the target, poses questions that are yet to be resolved. At this point little is known about how farmers may respond to such flexibility. Which nitrogen reduction measures are the farmers going to choose? Where would different measures be implemented? Which areas would become more intensively or extensively farmed? Another type of flexibility could also be introduced: What if the farmers were allowed to trade nitrogen effects i.e. transfer abatement action between farms? How would this impact the environmental effectiveness and the economic costs of meeting water quality targets? What would the incentives be to trade? Would it be possible to set up a regulation framework that would favour both the agroeconomy and the environment? Currently, little is known about the economic impacts of the different forms of flexibility.

In this study we analyse data from a questionnaire distributed among Danish farmers in the spring 2016. Through a choice experiment (CE) we estimate the demand and supply functions for trading nitrogen effect between farmers. For each farm a nitrogen abatement requirement is calculated based on the amount of arable land, the average nitrogen retention in the catchment area and the sensitivity of the recipient in the catchment. The farmers in the survey choose between buying or selling nitrogen effect or the status quo, which is to meet the nitrogen reduction requirement on their own land. The farmers choosing to buy nitrogen effect from other farmers can choose between 3 different contracts with varying extent of the nitrogen effect. Farmers choosing to sell can choose between 3 different contracts with varying contract length (i.e. combinations of 3 different measures: permanent set aside, energy crops and catch crops) and area used for producing nitrogen effect to the market.

We analyse the linkage between the willingness to trade and structural farm characteristics e.g. soil type, crop rotation, livestock, as well as potential private benefits/costs related to hunting, crop rotation benefits, risks and previous experience applying different nitrogen reduction measures.

The data is used to generate demand and supply curves to find the market price for nitrogen effect. Furthermore we are able to differentiate the market curves due to differences in nitrogen load pressure (spatial variation) and farm types (structural heterogeneity) to explore differences in farmers' expectations to subsidy levels and contract designs.