

Cost efficiency and distributional effects of new nitrogen regulation in Denmark

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Abstract

Denmark is according to EU's Water Framework Directive (WFD) obliged to protect and, where necessary, restore water bodies to reach good status (European Commission, 2024). In line with this directive, The Danish Environmental Protection Agency published the River Basin Management plans in 2023 stating the maximum discharges of nitrogen to coastal waters to achieve good status (Miljøministeriet, 2023). It requires a large reduction in the discharges from agricultural land to reach this threshold. Therefore, the politicians asked for a proposal of a new and more cost-efficient nitrogen regulation (Finansministeriet, 2021). Eriksen et al. (2024) proposed a more cost-efficient nitrogen regulation for Danish agricultural areas in which a quota-based farm-level model of nitrogen discharge to coastal water catchments is the regulatory framework. A transition to a new model requires a lot of decision making with large consequences for the farmers but also high demand for data to model the nitrogen leaching and retention to coastal waters. The proposed model is based on detailed mapping of run-off, carbon and clay content in soil, other soil characteristics, and nitrogen retention. The farmer is expected to deliver field level information on the crop rotation, nitrogen, and instrument use to comply with the quota restrictions. The current analysis will give insights into cost efficiency and distributional effects of different endowments of quota compared to a reference situation. The results show that nitrogen retention is the critical differentiation factor necessary to consider when placing the quota endowment. If the farmers are allowed the same leaching from the root zone, then the welfare distribution is as evenly distributed across all farmers as all other quota endowment distribution models analyzed. The welfare distribution of the losses incurred by adhering to lower nitrogen discharges could be more evenly distributed by allowing transferrable quotas within the coastal catchment areas.

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