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The role of transaction costs for the optimal supply of carbon sequestration from cover crops in Denmark

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Abstract

Climate change suggests the use of carbon dioxide removal technologies, such as soil carbon sequestration in agriculture, to complement mitigation efforts. However, there could be challenges with implementing sequestration measures due to transaction costs, such as farm expenses for research, information, and planning. The purpose of this study is to investigate how transaction costs affect the cost-effective supply of carbon sequestration from cover crops in Denmark. We develop a model of the optimal adoption of cover crops, accounting for farm spatial heterogeneity and potentially nonlinear transaction costs to adoption. In the presence of transaction costs and at a carbon price of 220 €/tCO2e (suggested as an appropriate level of a CO2e tax for Danish agriculture) increased cover crop cultivation will only offset 15.4 tCO2e per year, corresponding to 0.002% of the Danish agricultural emissions reduction target. Assuming zero transaction costs overestimates the annual sequestration supply at the given price by 13,030 tCO2e. Total abatement and transaction costs for cover cropping are on average 78 € per ha and transaction costs can represent up to 90% of total costs for low carbon prices. Transaction costs also alter the cost-effective distribution of carbon sequestration across space and farm size groups.