Essays on Environmental Taxation and Climate Policy

av

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Abstract

Paper I: Greenhouse gas taxes on animal food products - rationale, tax scheme and climate mitigation effects

Agriculture is responsible for 25–30% of global anthropogenic greenhouse gas (GHG) emissions but has thus far been largely exempted from climate policies. Because of high monitoring costs and comparatively low technical potential for emission reductions in the agricultural sector, output taxes on emission-intensive agricultural goods may be an efficient policy instrument to deal with agricultural GHG emissions. In this study we assess the emission mitigation potential of GHG weighted consumption taxes on animal food products in the EU. We also estimate the decrease in agricultural land area through the related changes in food production and the additional mitigation potential in devoting this land to bioenergy production. Estimates are based on a model of food consumption and the related land use and GHG emissions in the EU. Results indicate that agricultural emissions in the EU27 can be reduced by approximately 32 million tons of CO_2-eq with a GHG weighted tax on animal food products corresponding to €60 per ton CO_2-eq. The effect of the tax is estimated to be six times higher if lignocellulosic crops are grown on the land made available and used to substitute for coal in power generation. Most of the effect of a GHG weighted tax on animal food can be captured by taxing the consumption of ruminant meat alone.

Paper II: The Swedish nitrogen tax and greenhouse gas emissions from agriculture

The Swedish tax on nitrogen in synthetic fertilizers was abolished in 2010, possibly to compensate farmers for planned future increases in the CO_2 tax for the agricultural sector. This study estimates the effect of the nitrogen tax on agricultural emissions of nitrous oxide (N_2O), another greenhouse gas (GHG) that is more potent than CO_2. Price elasticities of nitrogen fertilizer use are estimated from county-level panel data and combined with the standard GHG accounting approach for international reporting of N_2O emissions, as well as an alternative emission function suggested in the literature, to estimate the impact of the tax on emissions. The results suggest that annual direct N_2O emissions from agricultural soils in Sweden would have been on average 160 tons higher without the tax. Results also indicate that higher N_2O emissions from the removal of the N tax has the potential to fully offset the decreases in GHG emissions that can be expected from the future tax increase on CO_2 from agricultural diesel use.

Paper III: On refunding of emission taxes and technology diffusion

We analyze diffusion of an abatement technology under a standard emission tax compared to an emission tax which is refunded in proportion to output market share. The results indicate that refunding can speed up diffusion if firms do not strategically influence the size of the refund. If they do, it is ambiguous whether diffusion is slower or faster than under a non-refunded emission tax. Moreover, it is ambiguous whether refunding continues over time to provide larger incentives for technological upgrading than a non-refunded emission tax, since the effects of refunding dissipate as the overall industry becomes cleaner.

Paper IV: Diffusion of NO_x abatement technologies in Sweden

This paper studies how different NO_x abatement technologies have diffused under the Swedish system of refunded emissions charges and analyzes the determinants of the time to adoption. The policy, under which the charge revenues are refunded back to the regulated firms in proportion to energy output, was explicitly designed to affect investment in NO_x reducing technologies. The results indicate that paying a higher net NO_x charge increases the likelihood of adoption, but only for end-of-pipe post-combustion technologies. We also find some indication that market power considerations in the heat and power industry reduce the incentives to abate emissions through investment in post-combustion technologies. Adoption of post-combustion technologies and the efficiency improving technology of flue gas condensation is also more likely in the heat and power and waste incineration sectors, which is possibly explained by a large degree of public ownership in these sectors.

Keywords: environmental economics, environmental regulations, greenhouse gas emissions, agriculture, consumption tax, nitrogen tax, emission tax, refund, refunded emission charge, abatement technology, technology diffusion, imperfect competition, NO_x emissions

JEL Classification: H23, O33, O38, Q11, Q18, Q54, Q52

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