

Emission Taxes and the Nexus between Technology Improvement and Technology Adoption

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Abstract

We study the impact of a policy mix, consisting of an emissions tax and an R&D subsidy on both abatement technology improvement (R&D) and technology adoption. In an upstream industry with market power (monopoly or duopoly) an improved abatement technology is developed for polluting downstream firms that are subject to the aforementioned policy mix. These firms can adopt the new technology, which has different value for each firm, leading to product differentiation. First, we study the optimal policy, which includes output subsidies. Next, we examine second-best policy mixes, such as emission taxes and R&D expenditure subsidies, for different market forms. We identify novel aspects of these policy mixes. For instance, in a monopoly, the optimal second-best policy must account for the intra-marginal benefits of adopting firms. In a duopoly, the policy mix must also address strategic under- or overinvestment by upstream technology developers.

Keywords: abatement technology, environmental R&D, emission taxes, R&D expenditure subsidy, technology adoption, vertical industry structure

JEL codes: D21, D62, H21, L12, L13, O14, O33, Q55