**[*On the Precision of Private Information and Environmental Taxation.***

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## Overview

In this paper, we present an analysis of how environmental taxes should be optimally levied when the regulator and firms, face uncertainties about the state of the world in a Stackelberg-Cournot game. In the first period, given costs uncertainties, the regulator chooses the intensity of emissions taxes in order to reduce negative externalities. In the second period, facing industry-related shocks (common signal) and firm-specific shocks (private signals), firms compete in the marketplace as Cournot rivals and choose outputs. Under this information structure, each polluting firm can strategically manipulate both its rival and the regulator’s prior cost perceptions. The adopted setting allows us to analyze the influence of common and private signals on the efficiency of the regulatory instrument and to consider the consequences of varying the informativeness of signals. Further, we examine the welfare effects of the precision of privately-hold information. Where there are threats of serious environmental damage, there is no reason for postponing any regulatory policy to correct externalities. This is particularly the case when the regulator is dealing with irreversible loss, and when it is uncertain about the likelihood of that loss. Environmental taxes must be set accordingly in order to avoid or diminish environmental harm, including threats to human life or health. Finally, we consider firms’ incentives to share information about their costs. Our findings show that, information precision enables the fine-tuning of the tax rules towards specific environmental circumstances, improves the ability of the regulator to levy firm-specific taxes, and is welfare enhancing. However, despite its advantages, more precise private information may produce anticompetitive effects: under specific cases, there is room for the development of mutual and beneficial sharing information process between firms.

## Methods

The modelling framework for the analysis of environmental taxes with abatement costs uncertainties and market power aims to place our results in relation to the respective literature. Our modeling strategy is to consider affine information structure with common and private shocks (signals). We determine the Bayesian Nash equilibrium of the game in which the regulatory instrument is made under informational constraint, i.e., before the realization of the state of the world. Further, we examine the consequences of varying the informativeness of signals and its impact on welfare and collusive behavior.

## Results

* We show that, facing common and private signals, the regulator sets firms-specific taxes.
* Information precision is welfare enhancing and enables the fine-tuning of the intensity of the tax towards specific environmental circumstances.
* However, precision may impact negatively welfare, when there are threats of serious environmental damage, e.g., irreversible loss.
* Information sharing under common and private signals may occur and undermines the performance of the policy in force.
* Comparative statics are performed meaningfully in order to analyze changes in environmental taxes in response to changes in the parameters of the model which sometimes are inherently difficult to estimate.

## Conclusions

## Today, efforts to enhance informational access may offer important lessons for environmental regulation moving forward. Facing industry wide and firm-specific shocks, there are enormous opportunities to make the best use of available set of data to enhance the quality of the environment. Such information (and precision) may be used to overcome a serious lack of information on polluted activities, and could have impact on firms' behavior and levels of pollution. Furthermore, where there threats of serious environmental damage, there is no reason for postponing any externalities pricing policy. This is the case when damages yield irreversible direct and social losses.

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