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Short communication

Citizen's participation in permit markets and social welfare under uncertainty[☆]

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ABSTRACT

There are now a number of small or medium-scale experiments where individuals can actively participate in permit markets. Where individuals retain permits, the remaining quota for polluting firms is decreased thereby theoretically increasing global welfare. This result lies on two major hypothesis: first, citizens have rational expectations and, second, they are risk-neutral. In this article, we provide theoretical arguments about the potential welfare-decreasing impact of citizen's participation when at least one of these assumptions is violated. Importantly, our conclusions lead, in some particular cases, to recommend a limited participation of individuals in permit schemes while encouraging a better diffusion of information toward this class of potential participants. This is the case, for instance, when scientific uncertainty about a phenomenon is strong and citizens cannot estimate the marginal abatement cost with confidence.

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1. Introduction

Since Montgomery's (1972) seminal contribution, it is well known that tradable permit markets enable to achieve a pollution target in a cost effective manner as all firms

minimize their pollution abatement cost. An extension of this literature about the productive efficiency of pollution control instruments is to consider social efficiency. This problem is addressed in the prices versus quantities debate starting with the seminal works of Weitzman (1974) and Adar and Griffin (1976).¹ These papers compare the three major

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¹ Both papers reach quite similar conclusions without any reference to each other.

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pollution control instruments² (taxes, standards, permits) under uncertainty (see also Stavins, 1998). Generally, Weitzman (1974) is mentioned for his analytical model and Adar and Griffin (1976) are quoted for their diagrammatic exposition and their demonstration of the potential impact of uncertainty and risk aversion at the firm level.

In this paper, we extend the analysis in Adar and Griffin (1976) to the case of individuals who can, for a number of reasons (to be discussed below), withdraw permits from the market thereby reducing the available quotas and the related level of pollution. We assume that uncertainty about marginal damage of pollution affects both the regulatory agency and citizens' views. Uncertainty at the citizens' level is likely to occur in this setting because of imperfect information (scientific uncertainty, see McNie, 2007 for a discussion of the efficient supply of scientific information) and/or bounded rationality of individuals (see Venkatachalam, 2008). We show that under reasonable assumptions about the degree of uncertainty and citizens' risk preferences, in contrast with a number of contribution in the vein of Shrestha (1998) or Smith and Yates (2003a), opening the permits market to citizens can be damageable from a social point of view (i.e. it is welfare decreasing).

Recent literature suggests victims of pollution (citizens or environmental groups) to be part of the permit market with an opportunity to effectively trade in this market. This policy recommendation dates back to Dales (1968) but did not really attract academic or policy attention until the end of the 90s. Citizen participation in permit markets is a particular form of public involvement or "deliberative democracy" as coined in Soneryd (2004) in a slightly different context. The motivation for introducing pollutees in the tradable mechanism and thus forming a "two-sided market" is as follows: "[...] one-sided markets do not generally attain full social efficiency minimization of the sum of abatement costs and damages because total emission of pollution is equal to the total number of permits issued. Unless the permit-issuing agency has perfect information about the costs and benefits of pollution, it is likely to issue a socially inefficient number of permits." (Smith and Yates, 2003a, p. 181). In her influential paper, Shrestha (1998) demonstrates in a diagrammatic manner the process which leads to full social efficiency. In short, when citizens are allowed to trade in the permit market, they can withdraw as many permits as needed to reach the socially efficient equilibrium where marginal abatement cost (MAC) equals marginal damage (MD).^{3,4}

² Malueg and Yates (2006) coin these three environmental regulations as the "big three".

³ Shrestha (1998) considers marginal benefit (MB) which is equivalent to the concept of MD but for pollution control. We adopt the latter representation in the present paper. Of course, all results translate from one setting to the other.

⁴ Note that a full analysis of social efficiency should consider distributional aspects (see for instance Wadud et al., 2008 for a related issue). Beyond that, ethical and political issues (see Juntti et al., 2009) may also be raised when suggesting market mechanisms such as quotas. We do not, as in the bulk of the economic literature, consider these points in the present paper but acknowledge that they are of central importance for future design of environmental policies.

In practice, regulators generally allow any entity or person to access the emission markets (SO₂ Acid Rain Program, RECLAIM Program, and European Union CO₂ Emissions Trading Scheme). However, at present, citizens are not proactively participating in emissions trading, probably due to high transaction costs (see Woerdman, 2001; Rouse, 2008) and being unaware of this opportunity rather than because optimal levels of pollution have been set at the efficient point by regulators. Israel (2007) also highlights the high transaction costs individuals are facing with when they attempt to participate in the permit market along with a nice presentation of the environmental participation in the sulfur allowances market is in Israel (2007). But as the demand of individuals wishing to take part in the environmental policy grows (Brewer, 2005) and the utilization of market mechanisms for the purpose of environmental protection becomes increasingly accepted, citizens' participation in pollution permit markets may be the next step toward a more participative environmental policy especially in the fight against climate change. On this latter point, the recent success of voluntary carbon offsetting which the global market is worth \$186 m and represents 45 million tones of emissions in 2009 (Hamilton et al., 2010)⁵ is worth mentioning. Nowadays, public participation in decision-making is a commonly stated objective across most sectors of environmental policy (Few et al., 2007; Barr et al., 2011) and consumers' participation in emissions trading (market participation) implies a higher degree of active involvement in decision making than traditional (non-market) forms of public participation (forming interest groups, demonstrating, lobbying).

In this paper, we reconsider the social utility of citizens' participation in the light of two neglected assumptions in the literature to date, namely: (1) the error that individuals are subject to when evaluating their marginal damage and (2) risk aversion about marginal damage at the citizen's level. We motivate both these assumptions using behavioral arguments that have been debated at length in the economic literature and seem to explain a number of puzzles in the economic neoclassical framework. These arguments are different from those highlighted in DiSegni Eshel and Sexton (2009) where the detrimental effect of citizens' participation is due to the imperfect competitive structure of the economy.

The question of whether pollution victims should be allowed to participate in the tradable permit market has been investigated in a number of papers and in different perspectives. A significant contribution is undoubtedly Shrestha (1998) who first emphasized the theoretical advantages of a "two-sided market" where unsatisfied individuals can act to reduce the effective quota by purchasing emission allowances and retiring them from the market. As such, the Pareto-efficient

⁵ The aim of carbon offset programs is to gather a certain capital in the form of donations and to develop emission reduction projects. Citizens' participation in emissions trading differs from carbon offsetting in that carbon offsetting provides avoided pollution (generally in developing countries) rather than actual abated pollution (reduction of the pollution quota set by the regulator in developed countries). The avoided pollution notion refers to the project "additionality" issue as well as the organization in charge of "additionality" verification. See Rouse (2008) for a further discussion on this topic.

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