

Prices vs. quantities: Public finance and the choice of regulatory instruments

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Abstract

Since Montgomery [1972. Markets in licenses and efficient pollution control programs. *Journal of Economic Theory* 5, 395–418] and Weitzman [1974. Prices vs. quantities. *Review of Economic Studies* 41, 477–491], it has generally been assumed that, in a full-information setting, tradable quotas and taxes are equivalent regulatory instruments. We demonstrate that, if the government is motivated by public-finance concerns, this equivalence holds only if quotas are short lived. Moreover, the government prefers quotas with the shortest possible lifetime, or, what is equivalent in our setting, taxes.

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1. Introduction

In this paper we revisit the problem considered by Weitzman (1974) and others of whether a certain economic activity should be regulated by a price instrument (i.e. a tax) or a quantity instrument (i.e. a quota or license).¹ We demonstrate that, when regulation is by tradable quotas allocated by auction and the government is motivated by public-finance

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¹See e.g. Baumol and Oates (1988, p. 57) and Fisher et al. (1996, 11.2.3.1, p. 405). The contribution of Weitzman was, of course, to demonstrate the non-equivalence of taxes and quotas under uncertainty.

concerns, the regulatory outcome depends on the lifetime, or duration, of quotas. Moreover, the government prefers quotas with the shortest possible duration, or, what is equivalent in our setting, taxes. This is true even if information is perfect.

More specifically, we demonstrate that longer-term quotas create an intertemporal ‘inconsistency’ problem, in the sense that the government would over time increase the number of quotas beyond the globally efficient level. When regulation is by taxes, no similar problem arises. Essentially, this is related to the insight that a monopolistic producer of a durable good prefers leasing to avoid the problems of intertemporal credibility associated with selling, see Coase (1972), Bulow (1982) and von der Fehr and Kühn (1994). Here, the public-finance-oriented government corresponds to the monopolist, tax regulation corresponds to leasing, while regulation by long-lived quotas corresponds to selling a durable good. Taxes and quotas are equivalent policy instruments only if quotas have short duration, which amounts to leasing.

The interaction of public-finance and regulatory considerations arises in many different contexts. City planning involves weighing income-generating use of land (such as selling building plots or collecting taxes from commercial properties) against other uses (such as for recreational purposes). In allocation of spectrum, revenues from the auctioning of rights are considered along with the their content (such as duration, coverage and conditions on technology). In fisheries, an important issue has been the distribution of resource rent between public and private parties.² Overall, there seems to be an increasing tendency to use auctions to distribute rights, e.g. in public transportation.

For the sake of concreteness, we formulate our analysis in the context of environmental regulation. Public-finance concerns have been an important issue in the debate on environmental policy.³ When taxes are compared to quotas that are distributed gratis (or ‘grandfathered’)—which have often been the two alternatives considered in practice—taxes are clearly preferred from a public-finance perspective (Hoel, 1998). However, if public finance matters,⁴ then it is more natural to consider quotas that are auctioned rather than grandfathered.⁵ In this case it is not obvious that there is a difference between the two types of instrument; indeed, Montgomery (1972) showed that in a static, full-information setting taxes and auctioned quotas achieve the same outcome. The thrust of this paper is that this result does not carry over to a dynamic setting; here, under quota regulation, the outcome, and hence the performance relative to tax regulation, depends on the duration of quotas. This finding suggests that quota duration needs to be explicitly considered in policy analyses, an issue that has typically been ignored.

Fundamentally, our findings stem from different public-finance properties of taxes and tradable quotas. If a tax regime is in place, a relaxation of regulation leads to a gain from a larger tax base (a quantity effect) which is, however, counteracted by the lower tax rate

²In Iceland, the government has allocated more quotas to the fleet of small fishing vessels. Since total allowable catch is given, this has been at the expense of larger vessels whose quotas have effectively been devalued.

³For example, it has been argued that different stances on taxation may explain the stylised fact that while in Europe the overall tendency has been to use environmental taxation, regulators in the United States have relied more on emission allowances or quotas (Hahn, 1989; Oates, 2000; Oates and Portney, 2003).

⁴Public-finance considerations may arise from distributional concerns as well as social cost of public funds due to distortionary taxation; see e.g. Armstrong et al. (1994) and Laffont and Tirole (1993).

⁵There seems to be increasing interest in auctioning environmental pollution permits, as has been done with e.g. spectrum licenses, transportation concessions and mining and oil-drilling rights. Hepburn et al. (2006) discuss the auctioning of EU ETS allowances.

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