



Taxes versus standards under cross-ownership



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ABSTRACT

This paper analyzes the effect of passive investment in rival firms on the setting of uniform taxes and uniform absolute emission standards by the government. When firms are equal and there is no cross-ownership, standards and taxes are equivalent and generate the same social welfare. However, under cross-ownership that result does not hold since cross-ownership reduces market competition, which has a different effect on taxes and standards. In general, we find that when cross-ownership is low social welfare is greater with a tax, and when it is high social welfare is greater with a standard.

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1. Introduction

In the real world there are many examples of firms acquiring a stake in their rivals. This gives them a share in the profit but not in the decision making of those rivals (see [Gilo et al., 2006](#)).¹ As these firms generate pollutant emissions that damage the environment, passive investments by firms affect their output levels and their pollutant emissions. This means that governments need to take partial cross-ownership into account when designing their environmental policies. However, it is usually assumed in literature on the environment that each firm is owned by a different shareholder (see, for example, [Duval and Hamilton, 2002](#); [Bárcena-Ruiz, 2006](#); [Requate, 2006](#)). The only exception is the paper by [Bárcena-Ruiz and Campo \(2012\)](#), who show that partial cross-ownership affects the environmental taxes set by governments.² Seeking to fill this gap

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¹ An explanation of the factors that explain why partial ownership arrangements are formed can be found in [Alley \(1997\)](#). Firms may acquire a stake in another firm to gain access to that firm's technology and expertise, especially when there are positive spillovers across firms (see [Lopez and Vives, 2016](#)). Cross-ownership may facilitate collusion by reducing each firm's incentive to compete and may thus result in higher prices and profits. Thus, cross-ownership affects the degree of competition in an industry (see, for example, [Reynolds and Snapp, 1986](#); [Farrell and Shapiro, 1990](#); [Malueg, 1992](#); [Ono et al., 2004](#); [Gilo et al., 2006](#)).

² They consider two firms located in different countries, with each firm owning the same percentage of the stock of its rival. Environmental damage is global, so environmental pollution produced in each country spills over to the other. They compare cooperative taxes (i.e. those that maximize the joint welfare of the two countries) with non-cooperative taxes (in this case each government sets the tax that maximizes its own welfare). They find that when the stake held by one firm in its rival is great enough and environmental spillovers are low enough, cooperative taxes are lower than non-cooperative taxes; otherwise the opposite result is obtained.

in literature, this paper examines how cross-participation at ownership level affects the setting of an environmental tax or standard by the government.

The determining of optimal environmental taxes has received a great deal of attention in the economic literature that analyzes the environment. Pigouvian taxation is regarded as a benchmark according to which under perfect competition the optimal environmental tax is equal to the marginal environmental damage. The problem of optimal environmental taxation considering a single market and imperfectly competitive firms was analyzed first in Buchanan (1969) and then in Barnett (1980). They show that for an externality produced by a monopolist, the optimal tax is lower than the marginal environmental damage.³ This analysis has been extended to consider an oligopoly market. Levin (1985) proves the above result in the case of a Cournot duopoly.⁴

The economic literature that analyzes the environment has also considered the use of standards, and compared the two environmental policies. Helfand (1999) reviews the main arguments over pollution taxes versus standards.⁵ She argues that if firms are identical and there is no uncertainty then taxes and standards are equally efficient at maximizing social welfare. However, Baumol and Oates (1988, ch. 4) find that taxes are superior when firms vary.⁶ Helfand (1999) also argues that the greater efficiency of taxes over standards depends on several factors such as, for example, how the standards are formulated, the presence of asymmetric information, and changing conditions over time. Heuson (2010) analyzes the optimal choice of pollution control instruments under imperfect competition assuming uncertain abatement costs, and finds that taxes have a comparative advantage over standards. Lahari and Ono (2007) assume one country and imperfect competition, and show that a relative emission standard is welfare-superior to an emission-equivalent tax when the number of firms is fixed. They compare the two instruments with a fixed number of firms and under free entry and exit of firms. However, they do not analyze whether the government prefers the tax or the standard.

The findings of the papers cited above have been extended to consider international trade. In this regard, Ulph (1996a) analyzes whether governments use standards or taxes assuming international trade. He shows that whether welfare is higher using standards or taxes depends on whether producing countries are also significant consumers of the polluting product, and on whether all governments or only a subset of them act to reduce emissions. Ulph (1996b) assumes two countries and one firm located in each country, and shows that when governments do not act strategically taxes and standards are equivalent policy instruments. However, when governments act strategically (i.e. governments decide taxes and standards non-cooperatively) both output and emissions are greater when they use taxes than when they use standards.

In this paper we analyze whether or not the greater efficiency of taxes than standards depends on cross-ownership of firms.⁷ We assume a duopoly where firm 1 owns a stake in firm 2 but each firm is controlled by its main shareholder.⁸ We consider imperfect competition, one market and one government. That government may set up a uniform tax or a uniform absolute emission standard. The purpose of this paper is to investigate whether partial cross-ownership affects the preference of the government for one policy instrument or the other.

There are examples of cross-ownership between firms from the same country, such as the case of the Korean automobile producers Kia and Hyundai (Hyundai owns a 33.9% of Kia, see <http://www.4-traders.com>). Alley (1997) discusses the example of the Japanese firms Toyota, Daihatsu and Hino. Gilo et al. (2006) cite the example of Microsoft, which acquired approximately 7% of the nonvoting stock of Apple, its historic rival in the PC market, in August 1997 and in June 1999 took a 10% stake in Inprise/Borland Corp., one of its main competitors in the software applications market.⁹ Moreover, in advanced countries governments set environmental taxes and standards to get firms to internalize the damage generated by their pollutant emissions (see, for example, European Environmental Agency, 2007). We set our model in this context.

We consider as a benchmark the case in which the output and abatement levels of the firms maximize social welfare. When there is no cross-ownership and the government sets a uniform tax two effects are present (see Barnett, 1980). First, polluters are imperfectly competitive so they have market power, which encourages them to reduce their outputs below those of the benchmark case. Second, in the absence of environmental policies polluting firms do not internalize the environmental damage caused by their pollutant emissions. Thus, when the government sets a tax to control pollutant

³ Sandmo (1975) analyzes the optimal configuration of commodity taxes when one of the commodities generates an externality. Myles (1989) obtains optimal commodity tax rules for a general equilibrium model with imperfect competition.

⁴ The optimal tax is not necessarily lower than the marginal environmental damage. In this regard see Simpson (1995) and Kurtyka and Mahenc (2011).

⁵ See also Requate (2006) for a survey on this issue.

⁶ When firms have different abatement costs, and when the abatement level depends only on total emissions, abatement costs are higher with a standard than with a tax. This result holds for all levels of pollution.

⁷ A subsidy per unit of output, financed with lump sum taxes, could be used to correct product market distortions (see Barnett, 1980; Kennedy, 1994). It can be shown that if two policy actions are assumed (a tax on emissions and a subsidy per unit of output), the tax set by the government equals the marginal environmental damage. The product market distortion is corrected by the subsidy and the pollution externality is corrected by the tax. If we assume a subsidy and a standard, the distortions cannot be corrected since the two firms generate the same level of total emissions but firm 2 produces more than firm 1. The subsidy is distorted by the strategic behavior of firm 1. As a result, welfare under the tax is greater than under the standard. We assume that it is not possible to use production subsidies, so as to focus our analysis on the analysis of the environmental policy chosen by the government under cross-ownership.

⁸ This asymmetry is the fundamental force driving the results of the paper. In fact, the first firm reduces its output with the stake that it owns in its rival, while the other firm increases its production with that stake. As a result, the output of industry decreases.

⁹ There are also examples of partial cross-ownership of rivals between firms from different countries. In the oil industry, Pemex holds a 9.3% stake in Repsol (see www.repsol.com), and British Petroleum holds a 19.75% stake in Rosneft (see www.bp.com). In the automobile industry, Renault holds a 44.3% equity stake in Nissan Motor and Nissan Motor owns a 15% stake in Renault (see www.renault.com).

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