Can carbon tax eat OPEC's rents?

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Abstract

We consider the optimal emission tax for a stock pollutant when the pollutant flow is also regulated by a resource-exporting cartel. We consolidate, clarify, and generalize a set of previous results to obtain clear isolation of the Pigouvian and trade-policy components of the tax. Because of the trade-policy component, the tax can shift more rents from the cartel than the pollution causes damage-related costs. This leads to the possibility that the pollution problem accompanied by the coordination of taxation can bring about net benefits at the expense of the cartel.
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1. Introduction

Fuel taxes are controversial. Some find them punitively high and argue that they should be reduced in response to increased fuel prices. Others argue that fuel taxes should be increased to reduce traffic congestion and various environmental externalities, including global warming which fossil-fuel burning possibly contributes to.[1] Politicians often like fuel taxes because they have good revenue-raising properties and since the threat of global warming provides a prominent efficiency reason for taxing the carbon content of fuels.[2]

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[1] During the summer and fall 2000 the soaring fuel prices led to protests across Europe and to pressure on politicians to reduce fuel taxes. See [6,9] for arguments in favor and against the tax reductions.

[2] In Britain, where the gasoline excise taxes are record high, the Labour government has defended high taxes on three grounds: pollution and emissions of greenhouse gases, traffic congestion, and revenue raising (see [14]).

The arguments in favor and against carbon taxation are complicated by the presence of a resource-exporting cartel (OPEC). According to one hypothesis, OPEC may react strategically and increase the producer price to receive a major part of the tax revenues that would otherwise remain in oil importing countries [20–22]. On the other hand, while the prices of fuels are to a large extent beyond the control of individual countries importing fuels, there is no reason to believe that fuel prices cannot be affected by a coalition of importing countries coordinating their carbon taxation. Our objective is to consider the optimal design of the carbon tax in the presence of two-sided strategic interaction: the buyer side coordinating taxation understands the effect of taxes on fuel prices, and seller side coordinating sales understands the effect of sales on taxation.

Our new result is the general and explicit isolation of the Pigouvian and strategic trade-policy components of the optimal tax for a stock pollutant. When the buyer side coordinates the emission taxation, the optimal tax includes an *import-tariff* element shifting rents from the resource-exporting cartel. We show that the tax must shift more rents than the pollution causes damage-related costs if the pollution problem is not too severe. The result means that the payoff for the importing countries can exceed the payoff realized in the absence of pollution—in this sense, the pollution problem accompanied by carbon taxation can bring about net benefits for the Kyoto countries at the expense of the OPEC group. Our results are consistent with the common view that carbon taxation is a threat rather an opportunity to OPEC. Because several recent papers [15,20–22] contradict this view, it is important to clarify the issue.

These results should not be surprising, given the literature on optimal tariffs in exhaustible-resource markets. Karp [11] and Karp and Newbery [12] show that buyers with monopsonistic power can use a dynamic optimum tariff to decrease the sellers' resource rent. Analogously, coordinating carbon taxation creates a strategic incentive to use the tax as a partial import tariff—in the limiting case where damage-related costs are absent the tax exactly coincides with the import tariff.[3] What is more surprising is that the tax includes an *import-subsidy*, not an import-tariff, component when the pollution problem is severe. The type of the trade-policy component thus depends on the severity of the pollution problem.[4] Because of the trade-policy component, the optimal carbon tax generally deviates from the neutral Pigouvian tax which would internalize only the damage cost of pollution.[5]

We apply a differential game that is close to that previously used by Wirl [21], Tahvonen [17,18] and Rubio and Escriche [15]. The dynamic approach is needed because the payoffs on both sides depend on the sellers' unextracted resource stock. We consolidate, clarify, and extend a set of

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[3] Similar issues are discussed in a static context by [2, pp. 266–278].

[4] The optimal static tariff can be negative (a subsidy) depending on the shape of the consumer demand curve [3,8]. Here, the subsidy component arises in a dynamic game where the seller side has an incentive to excessively delay the resource use because the demand falls rapidly as a function of the extracted stock when damage-related costs are large. The subsidy is the buyers' strategic response altering the timing of the resource use.

[5] Rubio and Escriche [15] conclude that "the tax corrects only the market inefficiency caused by the stock externality, and has no effect on the cartel's monopoly power" (p. 298). They show the equivalence of the following two equilibria. In one, the buyers' tax and sellers' price are strategically chosen. In another, buyers' do not use a tax but internalize external pollution costs in their strategic demand decisions. Because both approaches involve the same degree of coordination on the buyer side, the two equilibria are equivalent. This does not, however, imply that the tax is a Pigouvian tax in any traditional sense—the coordination on the buyer side will lead to the deviations identified by our analysis.