Ecological Economics 122 (2016) 90–100

Contents lists available at ScienceDirect

Ecological Economics

journal homepage: www.elsevier.com/locate/ecolecon

Analysis

Environmental taxation and the double dividend in decentralized jurisdictions

Alexander Alexeev *, David H. Good, Kerry Krutilla

School of Public and Environmental Affairs, Indiana University, Bloomington, IN 47405, United States

ARTICLE INFO

Article history:
Received 17 March 2015
Received in revised form 22 December 2015
Accepted 29 December 2015
Available online 14 January 2016

Keywords:
Environmental tax reform
Double dividend
Environmental rent sharing
Jurisdictional competition
Optimal taxation

ABSTRACT

This research explores the implications for jurisdictional welfare of sharing environmental rents between private and public consumption. An integrated model is developed from research literatures on jurisdictional competition, the "double dividend," and on the design of tax-refund instruments. This model shows that jurisdictional welfare increases as environmental rents are initially allocated towards public consumption, yielding a "double dividend", but that this dividend may or may not continue as all rents are shifted to public finance. When the double dividend occurs, the rent allocation both improves the efficiency of the tax system and reduces the private–public consumption distortion that decentralized jurisdictional decision-making creates. In some parameter configurations, there is an optimal rental allocation between the private sector and the local government. At this optimum, environmental and fiscal policies are set at their first-best levels and decentralized jurisdictional decision-making is globally efficient. If less rents are allocated to public finance than this optimum, fiscal and environmental policies will be suboptimal, whereas, if too much rent is allocated for public consumption, fiscal and environmental policies will be set at levels above the global efficiency standard. These results illustrate the crucial importance of environmental rent sharing for the efficiency of jurisdictional decision-making.

1. Introduction

This article assesses the welfare effects of jurisdictional decision-making when an environmental policy is structured as a tax-refund instrument that can be used to flexibly allocate environmental rents between private and public consumption. The economic setting is one where capital is mobile and jurisdictions impose a source-based capital tax to generate public finance. This tax provides an incentive for capital to migrate, generating an efficiency cost to the jurisdiction. An emissions tax is used as an environmental policy instrument to reduce local environmental damages. The rents raised from this tax are retained locally, but can be allocated to varying degrees for public finance or for private consumption. This article assesses how choices about environmental rent allocation will affect jurisdictional welfare.

The existing competition literature does not consider the welfare effects of sharing environmental rents between the private and public sectors locally within jurisdictions. However, there is a large environmental economics literature that studies the efficiency effects of such rent sharing within national economies. This research stems from the increasing popularity of emissions trading – which requires an initial choice about the allocation of environmental rents – and the recognition that the imposition of broad-based energy taxes, or carbon taxes, will generate significant public funds. One strand of research focuses on whether there is a weak "double dividend" when environmental rents are used for public finance, in the sense that the efficiency of policymaking is higher when environmental rents are retained and used to finance revenue-neutral cuts in marginal tax rates, than when the rents are rebated to the private sector (e.g., Goulder et al., 1999; Parry and Bento, 2000). Another research area focuses on the reality that capturing environmental rents for public finance is not always politically feasible. In this research, tax-refund designs have been proposed that share rents between private actors and the public sector. The purpose is to make emissions taxes politically feasible when they are set at high enough levels to deter polluting behavior (See Farrow, 1995; Pezzey, 1992, 2003; Pezzey and Jotzo, 2013).

This article is the first to integrate a flexible policy design for sharing environmental rents within a classic model of jurisdictional competition, and this integrated model produces new insights in several areas. For example, the jurisdictional competition literature focuses on whether competing jurisdictions will offer concessionary tax advantages or lower environmental standards to attract mobile capital, reducing the size of the public sector or the level of environmental quality relative to a global efficiency standard. The flexible rent-sharing model will show that fiscal and environmental policies can be suboptimal, optimal,

* Corresponding author at: School of Public and Environmental Affairs, Indiana University, 1315 East 10th St, Bloomington, IN 47405, United States.
E-mail address: aalexeev@indiana.edu (A. Alexeev).

http://dx.doi.org/10.1016/j.ecolecon.2015.12.004
0921-8009/

or super-optimal depending on the parameters of the economy, and on the way policymakers choose to allocate rents between private and public consumption.

The existence of a weak double-dividend is common in the public finance literature on environmental policy; hence, many authors recommend structuring environmental policies to raise revenue (e.g., Goulder et al., 1999; Parry and Bento, 2000). In the integrated model a "double dividend" can occur in the sense that welfare of jurisdictional decision-making is highest when all environmental rents are dedicated to public finance. However, this only occurs for some parameter configurations. When the double dividend occurs, it is more encompassing than in the standard case because the rent allocation improves both the efficiency of the tax system and reduces a private–public consumption distortion. The latter efficiency issue is assumed away in the standard double-dividend literature, where the private–public consumption shares are specified by assumption.

The integrated model also shows that jurisdictional welfare will decline for some parameter configurations when all environmental rents are used for public finance, by increasing the size of government above its optimum. In this case, shifting some rents to the private sector does not impose the efficiency penalty implied in the standard double-dividend literature (see, for example, Felder and Schleiniger, 2002). An optimal degree of private–public rent sharing is possible for some parameter configurations. At this optimum, jurisdictional decision-making is globally efficient. This result is not common in second-best models of jurisdictional competition without coordination by a centralized authority.

We start in the next section with some background on the several literatures that inform our study, before turning to the development of an analytical model. This model is used to describe first-best solutions for local fiscal and environmental policies when jurisdictions have access to lump sum financing, and then to establish second-best capital and environmental taxes as a function of environmental rent sharing when lump sum taxation is unavailable. In the following section, the model is specified using Cobb Douglas functions. This model is solved, and optimal rent sharing is determined as a function of production and utility function parameters. Numerical simulations are then conducted to study the effects of systematically shifting environmental rent allocations from private to public consumption. The simulated outcome variables include the level at which emissions and capital taxes are set, the sectoral distribution of output into private consumption, public consumption, and environmental quality, and the level of jurisdictional welfare. The final section of the article offers conclusions and recommendations for future research.

2. Background

In this section we consider some relevant parts of the three research areas that inform our research: the first on jurisdictional competition, and the second and third on the double-dividend and tax-refund systems.

2.1. Jurisdictional Competition Literature

The literature on jurisdictional competition is vast, so we focus here on a pertinent sub area that addresses local rent capture and second-best market distortions.[1] As a benchmark, a study by Wellisch (1995) shows that jurisdictions set environmental policies efficiently if there are no other market distortions and the environmental policies capture and return environmental rents to local, immobile residents. In this model, firms can locate in different jurisdictions, and the local pollution they generate is the only market distortion. Using emissions taxes or auctioned permits, jurisdictions capture the environmental rents if the rents are returned to immobile residents. In this case, the jurisdiction experience losses when policymaking induces firm exit. Bearing both the benefits and costs of environmental policy, jurisdictions set policies at the efficient level.

A similar kind of result is obtained in the classic model of Oates and Schwab (1988). In this model, the mobile factor is capital. An emissions standard is set in proportion to labor input, enabling immobile residents to capture environmental rents through higher local wages. This compensation incentivizes the efficient level of environmental regulation, in the first-best case that lump sum financing is available and used to finance the optimal provision of the public good.

If jurisdictions are not able to capture the environmental rents, or there are other market distortions, jurisdictional environmental policymaking is not likely to be efficient. In Wellisch (1995), the mobile firms capture the environmental rents when the policy instrument is a firm-specific environmental standard. In this case, jurisdictions set standards that are higher than is globally efficient, because they derive the benefits of diminishing pollution when firms exit, but do not forgo pollution rents. Even if rents are captured locally, however, jurisdictional policymaking may not be efficient if there are other market distortions. When the capital market is distorted in the Oates and Schwab model, environmental standards are set less stringently than is globally efficient as a second-best means to attract capital into the jurisdiction. Kim and Wilson (1997) derive the same basic result when the tax distortion is in the labor market.

Kunce and Shogren (2005a,b) formulate blended models that reflect both firm and capital mobility, the use of environmental standards that partially capture jurisdictional rents, and capital market distortions. Outcomes in these models reflect the assumed relationship between emissions and capital in production, whether or not the level of public goods provision is efficient, the choice of policy instruments, and the behavioral response of firms to policymaking. In general, decentralized policymaking is not likely to be efficient.

Overall, the jurisdictional competition literature shows that welfare outcomes are a function of the availability of policy instruments; the presence or absence of more than one market distortion; and the structure of markets (Kim and Wilson, 1997; Markusen et al., 1995; Wilson, 1996). Our contribution is to show that local environmental rent sharing also crucially matters for efficiency properties of jurisdictional decision-making.

2.2. Rent Capture and Sharing in the Public Finance and Environmental Economics Literatures

Although the current jurisdictional competition literature does not address the welfare effect of allocating environmental revenues between public finance and private consumption within a jurisdictional accounting boundary, this topic, as noted, is an important one in public finance and environmental economics. Three options for distributing environmental rents are assessed. The "double dividend" literature assesses the efficiency effects of cutting marginal labor or capital tax rates and replacing the lost revenue with the rents raised through environmental policymaking (e.g., De Mooij, 2000). The focus of this research is on the role environmental revenues can play in minimizing the net-costs of achieving an exogenous revenue target. A variant of this option is to use environmental rents to finance debt reduction (Hahn, 2009). In the second-best general equilibrium setting of the double-dividend literature, the use of environmental rents for public finance, as noted above, offers an efficiency gain relative to rebating environmental revenues to the private sector. In some specifications, using environmental rents to displace capital or labor taxes leads to net-cost reductions in the gross efficiency cost of the tax system, giving a "strong double dividend," e.g., Carson et al. (2015).[2]

[1] For general survey articles, see Alm and Banzhaf, 2012; Oates, 2002; and Wilson, 1996.

[2] See Bovenberg (1999) for the modeling assumptions that give rise to a "strong double dividend."