Journal of Environmental Economics and Management 66 (2013) 656–670

Contents lists available at ScienceDirect

Journal of Environmental Economics and Management

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

Tax evasion and optimal environmental taxes

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ARTICLE INFO

Article history:
Received 16 October 2012
Available online 20 June 2013

Keywords:
Environmental regulation
Pigouvian tax
Tax evasion
Green tax swap
Tax interactions

ABSTRACT

This paper introduces a new argument to the debate about the role of environmental taxes in modern tax systems. Some environmental taxes, particularly taxes on gasoline or electricity, are more difficult to evade than taxes on labor or income. When the tax base is shifted in a revenue-neutral manner toward these environmental taxes, the result is a net reduction in the amount of tax evasion. Using a carbon tax as a motivating example, the "tax evasion effect" is shown to sharply reduce the welfare cost of controlling emissions. A simple computable general equilibrium model suggests that the impact of considering tax evasion can be large: costs are lowered by 28% in the United States, by 89% in China, and by 97% in India. In countries with high levels of pre-existing tax evasion, a carbon tax will pay for itself through improvements in the efficiency of the tax system.

1. Introduction

> "Developing countries cannot and will not compromise on development."
>
> –Indian Prime Minister Manmohan Singh, at the 2009 United Nations Climate Change Conference in Copenhagen

Policy makers in developing countries have long opposed carbon taxes on the grounds that they are bad for economic growth. Arguing that carbon taxes will raise business costs, hurt profits, and diminish the competitiveness of exports, developing countries have refused to consider climate change agreements without substantial transfers from industrialized countries (Aldy et al., 2010).

To minimize these adverse impacts, environmental economists have suggested utilizing green tax revenue to reduce pre-existing taxes. There was initial optimism that this "green tax swap" or "double dividend" style of reform would lead to two forms of benefits: improved environmental quality through the carbon tax and higher societal welfare through improved tax efficiency. However, further work[1] has found that recycling revenue reduced the real costs of carbon taxes without eliminating them altogether.

Intuitively, a green tax swap concentrates the tax base on environmental goods, hurting welfare by narrowing the tax base. Since, in the case of greenhouse gas emissions, estimates of the size of the negative externality vary widely, economists have separated the environmental benefits of a carbon tax from its other effects on the tax system. The literature has named the welfare gain associated with the recovery of deadweight loss from cutting pre-existing taxes the *revenue-recycling effect*. It has named the welfare loss associated with exacerbating the distortion from pre-existing taxes through the new environmental tax the *tax-interaction effect*. Some authors do not treat these effects separately but combine them into the *tax base effect*.

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[1] See Goulder (1995), Parry (1995), and Bovenberg and Goulder (1996).

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http://dx.doi.org/10.1016/j.jeem.2013.06.004

Later work[2] focused on real-world aspects of second-best tax systems that may decrease the costs of an environmental tax. Much of this was developed for the industrialized country context, focusing on factors prominent in OECD tax systems. When a simulation is presented, only parameters from the United States are used.

This present paper suggests that tax evasion can play a potentially pivotal role in calculating the cost of reform. Certain environmental taxes, like carbon taxes and energy taxes, have unique properties that make them difficult to evade. When considering a green tax swap, shifting the tax base from easily evaded taxes to a difficult-to-evade carbon tax can decrease the total amount of tax evasion in the system. This paper proposes two mechanisms by which decreasing tax evasion can produce social benefits. First, less real resources are spent on evading taxes. Second, taxpayers face effective tax rates that are closer together, reducing the unevenness of the tax base. The existence of tax evasion introduces wrinkles in the efficiency of the tax system that can be ironed out with a shift toward a less evadable environmental tax.

Through simple simulations, the paper finds that the effect of considering tax evasion is quantitatively large, even in OECD countries that have relatively low levels of tax evasion. In the United States, where tax evasion is comparatively low, the cost of a green tax swap is lowered by 28%. In developing countries like China and India, where tax evasion is greater, the effect can lower costs by 89% and 97%, respectively. The simulations suggest that the benefits from lowering costly tax evasion are almost as big as the baseline costs of the green tax swap, even when environmental benefits are not considered.

The literature studying the double dividend is closely related to the optimal tax literature. The model presented here is similar in some respects to that of Cremer and Gahvari (1993), who point out that uniform commodity taxes are not appropriate in the presence of tax evasion. While Cremer and Gahvari focus on describing the optimal tax system, this paper's contribution is to analytically determine the welfare impact of plausible tax reform, and to estimate its magnitude.

Tax evasion is a significant component of nearly all modern tax systems. The U.S. has an overall tax evasion rate of 16% (Slemrod, 2007). Other countries can have even higher rates of tax evasion. One cross-country method of comparing how honestly countries pay their taxes is to compare estimates of the "shadow economy," the portion of goods in an economy that evades taxes and formal regulation. Schneider and Enste (2002) apply a variety of methodologies to estimate the size of the "shadow economy" within each country and major region. These estimates range from 12% of GNP for OECD countries to 44% of GNP for Africa.

Carbon taxes are an important policy topic. The persistent fiscal deficits facing many governments has inspired interest in alternative sources of revenue such as green taxes (e.g., Carbone et al., 2012). If a policy maker is considering raising revenue through a carbon tax or through a broader-based tax, this paper argues that a carefully constructed carbon tax will be relatively more attractive because it will provoke less tax evasion. Moreover, subsidies on fossil fuel, commonly practiced in developing countries, look relatively less attractive because they preclude opportunities to efficiently raise revenue in a manner that minimizes tax evasion.

This paper is organized in sections. Section 2 presents an analytically tractable general-equilibrium model incorporating tax evasion behavior. Section 3 presents a computable general equilibrium (CGE) model that analyzes the magnitude of the impacts proposed here for parameters simulating the U.S. economy. Section 4 applies the methods from section 3 to the set of the 30 highest carbon-emitting countries to estimate how each country's level of observed tax evasion will impact its welfare cost from environmental tax reform. The final section concludes.

2. A model of environmental tax evasion

2.1. Assumptions

2.1.1. Households

Consider a representative household economy, where each household must divide its time endowment (T) between leisure (l) and labor (L). Households work to purchase three consumption goods: X, Y and Z. Good X is a polluting good such as electricity or oil, producing emissions $\phi(X)$. Goods Y and Z are clean goods, but taxes on Y are hard to evade while taxes on Z are easy to evade. For the sake of intuition, we might think of good Y as goods produced by large corporations, while Z represents goods produced by small businesses and the self-employed.[3]

Households maximize the utility function $U(l, X, Y, Z)-\phi(X)$. Households supply labor L_X, L_Y, and L_Z to produce these goods. The household time constraint is $T = l + L = l + L_X + L_Y + L_Z$.

Households receive income from working, from government transfers, and from their ownership of firms. Wages are normalized to 1, so labor income is just the amount of labor supplied. Each household receives lump-sum transfers g from the government. Firms, as shown below, operate in a perfectly competitive market, and therefore produce zero income for households. Households spend their incomes on purchasing goods X, Y, and Z, at prices p_X, p_Y, and p_Z. The household budget constraint is:

$$L_X + L_Y + L_Z + g = p_X X + p_Y Y + p_Z Z \tag{1}$$

[2] See Parry and Bento (2000), Williams (2002, 2003), and Bento and Jacobsen (2007).

[3] Self-employment has been widely linked to higher tax evasion opportunities. See, for example Engstrom and Holmlund (2006) or Torrini (2005).