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ANALYSIS

Environmental tax reform and the double dividend: A meta-analytical performance assessment

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Abstract

In this paper, we offer a meta-analytical synthesis of recent (simulation) studies on environmental tax reform (ETR). The studies considered here look at both environmental effects (e.g., reduction in CO₂ emission) and economic effects (e.g., employment gains) consequent upon such a tax reform. The existing statistical results from the literature mainly suggest that the tax type, the recycling policy, and the economic model used in the simulations significantly influence the chance that a ‘double dividend’ effect can be obtained. These empirical results are, however, not entirely conclusive regarding the question of which combination of policies and models will lead to a higher double dividend. This issue is investigated in our study by a quantitative meta-analytic approach. Our meta-analytic statistical experiment demonstrates that the total effect of a tax-and-recycle policy has a significant influence on the economic variables (second dividend), when employment is used. It is also shown that different definitions of the double dividend contribute in determining the success of ETR, in particular since the effects on GDP are less clear than for employment. These findings should be taken into consideration when deploying an ETR in a policy context, in order to prevent a situation where ETR is rejected or accepted solely due to characteristics of one simulation study rather than through a wide set of results from different studies.

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1. Introduction

Environmental Tax Reform (ETR) has in recent years become a much-debated issue in environmental

policy (see, e.g., [Bosquet, 2000](#), for an extensive overview). It is based on the introduction of green taxes and the refund of the revenues through reductions of distortionary taxes. This issue is currently the subject of a heated policy debate; it is co-determined by the rise in the politicians’ understanding of complex environmental problems, such as

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multi-source pollution caused by industries and households; the increasing energy needs of several countries; and the uncontrolled exploitation of the earth's natural resources. The theoretical discussion on ETR focusses on the concept of the 'double dividend' (DD), i.e., the joint occurrence of an environmental and economic benefit. Although possible, this DD is not guaranteed to emerge (Bosquet, 2000); Bovenberg and de Mooij (1994) find that a double dividend exists "in the sense that a cost reduction can be achieved by using revenues from pollution taxes to cut distortionary taxes rather than returning these revenues in lump-sum fashion". Bovenberg and Goulder (1996) extend earlier work by considering pollution taxes imposed on intermediate goods, and find that environmental taxes may exacerbate the effects of distortionary taxes. The empirical literature suggests that, under certain conditions, ETR can lead to a DD. The wide range of studies surrounding the expected effects of ETR calls for a quantitative research synthesis, where policy analysis itself is analysed. For an extensive discussion of meta-analysis in environmental economics, see van den Bergh et al. (1997) and Florax et al. (2002).

ETR originates from the consideration that there is a lack of effective environmental policy in most of the industrialised or emerging countries. It is a *sine qua non* that these countries at least stabilise their emissions of CO₂ and—in the opinion of the Intergovernmental Panel on Climate Change (IPCC)—reduce them even by as much as 60–80% "immediately" (see, e.g., Barker et al., 1993).

In this paper, we consider key factors that influence the performance of ETR. Different types of environmental policies can be distinguished and implemented. Carbon taxes or energy taxes, for example, can be used on the economic efficiency side, while the instrument of financial recycling aims to reduce labour costs. The aim of our paper is to offer a quantitative comparative study of the estimated performance of ETR policies, as far as they can be traced from a large set of applied studies. The statistical instruments employed in our study are based on meta-analytical principles. Next, in Section 2, we will discuss the main characteristics of ETR and DD. Section 3 will then present several comparisons of the principal features of the ETR studies included in our database. This overview will be followed by a

statistical meta-analytical examination of the critical factors influencing ETRs environmental and the economic results, as far as these can be identified from our database. Finally, some concluding remarks will be made, while also new directions for future research will be suggested.

2. Environmental tax reform and double dividend

2.1. Prefatory remarks

Over the past decade, ETR has become an important vehicle in environmental policy. In 1997, the European Commission revised the Community framework on energy products taxation, proposing a new ecotax policy (European Commission, 1997a,b; Jansen and Klaassen, 2000), since the minimum excises on mineral oils from the previous Directive (92/82/EEC) were no longer sufficient according to the results of recent studies. Furthermore, the May 1995 proposal on CO₂ and energy taxation (European Commission, 1995) did not find sufficient support among European politicians, as the European Commission wanted to encourage Member States to shift taxes away from personal income and labour cost towards environmental instruments. The discussion on ETR was originally started by Tullock (1967, p. 643), who suggested that pollution taxes ought to be reutilised in the system, in order to "insure optimum utilization of our natural resources". This concept has been pushed further in Lee and Misiolek (1986, p. 347), who define it as "a natural consequence of a program of pollution taxation". As a consequence of this evolving subject, subsequent literature has addressed the issue of the estimation of the optimal tax rate, in terms of marginal social damages and net efficiency gains (see, e.g., Terkla, 1984; Lee and Misiolek, 1986; Bovenberg and de Mooij, 1994; Bovenberg and Goulder, 1996; Jaeger, 2002). This particular issue is, however, beyond the scope of this paper and will not be examined in our study.

The ETR mechanism consists of recycling revenues from environmental taxes—on carbon products, energy consumption, or use of natural resources—in order to reduce taxes on other phases of the production process. This is usually done by making labour less expensive (for an in-depth treatment of the

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