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How to tell green from grey? Towards a methodological framework for evaluating the greening of national tax systems

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ABSTRACT

In this paper, we evaluate four types of indicators that can be used for measuring the greening of a tax system: revenue-based indicators, single tax rates, aggregate tax-rate based indicators and the implicit tax rate on energy. We develop an evaluation framework, introducing two principal evaluation criteria: content validity and comprehensiveness, and four statistical criteria: data availability, comparison over time, international comparability and ease of aggregation. Additional analysis regarding the issue of weighting is carried out for the aggregate tax-rate based indicator. The theoretical and methodological evaluation is supplemented and validated empirically using recent data on the Belgian and Flemish tax system. Finally, conclusions are drawn with regard to the strengths and the weaknesses of the four types of indicators, and recommendations are made for further research.

1. Introduction[1]

Pigou (1920, 1960) argued that taxes should be levied to internalize negative externalities, such as pollution. After Pigou, a whole body of literature emerged, agreeing that taxation is an effective and efficient instrument to reach environmental objectives, and that environmental taxation currently is underused in the combat against environmental problems. Therefore, both academics (e.g. Avi-Yonah and Uhlmann, 2009; Baumol, 1972; Ekins, 2011) and international agencies such as the European Environment Agency, the European Commission and the OECD also consistently urge lagging member states to step up their use of environmental taxation.[2]

A first advantage of environmental taxation is obviously an improvement of the state of the environment (OECD, 2006). Secondly, the additional government revenue creates room for reducing other, more distortionary, taxes, such as labour taxes or corporate income taxes (Speck and Datta, 2009). Recycling tax revenues that way may reduce negative competitiveness and distributional impacts (Ekins and Speck, 1999; Metcalf, 1998; Parry, 1995), and would make the reform more politically acceptable (Dresner et al., 2006). Such a 'green tax reform' aims at realising a so-called 'double dividend', combining an improvement of the state of the environment and a reduction of unemployment.[3] Thirdly, the revenues from environmental taxation offer chances for fiscal consolidation (e.g. OECD, 2010b). Speck and Gee (2011) call environmental tax reforms "*a valuable measure for dealing both with short term budgetary imbalances and spurring the transition towards a green economy*". Ireland gave environmentally related taxes a central place in the budgetary reforms in 2010, which may lift the country to the level of the frontrunners in the EU in terms of greening of the tax system (Andersen, 2010). Finally, like any other tax, environmentally related taxes offer the politically attractive option of earmarking, in which case the revenues are used for a specific (environmental or non-environmental) goal: for instance, water pollution charges used for water purification purposes (Marsiliani and Renstrom, 2000). Theoretically, earmarking revenues for other environmental investments and expenditures is not an efficient use (Brett and Keen, 2000; Laskowska and Scrimgeour, 2002). In practice, however, it may increase public and (hence) political support

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[1] This paper builds on earlier work that was published in a book chapter: Bachus (2012).

[2] For example, in the Roadmap for a Resource Efficient Europe (2011), in the Annual Growth Survey for 2011 and in the European Council Conclusions from March 2011 (European Commission, 2011). For the case of Belgium, a country with a weak tradition in environmental taxation, the OECD has explicitly stated that recommendation as early as in its 1998 Environmental Performance Review on the country (OECD, 1998). It has repeated this plea in its 2007 Environmental Performance Review on Belgium (OECD, 2007). The European Commission, through the European Semester recommendations, has been recommending Belgium to implement a green tax shift for six consecutive years now, from 2011 to 2016.

[3] Some authors support the hypothesis that the (strong) double dividend can be achieved (Pierce, 1991), while other scholars have rejected it (Bovenberg and de Mooij, 1994) or claim it strongly depends on the structure of the economy (Bento and Jacobsen, 2007; Schöb, 2003).

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as public opinion tends to prefer earmarking to revenue recycling (Oates, 1995; OECD, 2001).

Based on the above theoretical arguments, the call for increasing the use of environmental taxation – or for 'greening national tax systems' – to combat environmental externalities is justified. However, it creates the need for a framework to assess countries' progress made towards the goal of greening the tax system in practice. Indicators for the greening of a tax system can fill in that need, especially because they fit in the trend towards more national reporting on indicators for environmental quality.[4]

Up to now, the greening of a tax system is predominantly measured using two indicators: the revenues from environmentally related taxes as a percentage of GDP, and the revenues from environmentally related taxes as a percentage of the total tax revenues. Both revenue-based indicators have merits but also a number of drawbacks. The aim of this paper is to evaluate that prevailing type of indicator along with three alternative types of indicators measuring the greening of a tax system: single tax rates, aggregate tax-rate based indicators and the implicit tax rate on energy. We develop an evaluation framework, introducing two principal evaluation criteria: content validity and comprehensiveness (*infra*), and four statistical criteria: data availability, comparison over time, international comparability and ease of aggregation. In that evaluation, the aggregate tax-rate based indicator needs additional analysis, since it requires adequate application of index number theory, more specifically to address the issue of weighting. We explore if a Lowe or a Laspeyres index is the best fit for evaluating the greening of a tax system. After testing the theoretical findings on the index numbers, we compare the four types of indicators. Finally, conclusions are drawn with regard to the strengths and weaknesses of the four types of indicators, and recommendations are made for further research.

2. Conceptual framework

Except for the theory of pigouvian taxation, there is no clear theoretical framework behind the call for 'more' environmental taxation. Two terms are often used in these discussions: the *greening of the tax system* and *environmental tax reform* (*ETR*).[5] The latter term is usually defined as "a reform of the national tax system where there is a shift of the burden of taxation from conventional taxes, for example on labour, to environmentally damaging activities, such as resource use or pollution" (European Environment Agency, 2005). The term 'greening of a tax system' is used less frequently. We define it as "an increasing emphasis on the environment in the tax system". To operationalize that theoretical concept, we distinguish three ways of greening the tax system: an introduction of new environmentally related taxes (e.g. a newly introduced carbon tax), an increase in the tax rates of existing environmentally related taxes (e.g. increasing fuel tax rates), and an increased use of environmentally relevant clauses in the design of non-environmentally related taxes.[6]

It should be noted that the definition of the term 'environmentally related taxes' as put forward by the OECD, quickly implemented by European Commission and Eurostat (2001)[7] and followed by nearly all authors ever since, holds the choice for a unilateral focus on the tax base, and not on the goals of the policy instrument. As a result, taxes with an environmentally relevant tax base but no environmental goal[8] are included in the definition. Bruvoll (2009) calls for a strict distinction between *environmental taxation*, which are only Pigouvian taxes with an environmental goal, and *environmentally related taxes*, a term which refers to the taxes with an environmentally relevant tax base. She calculated the tax revenues for both groups of taxes for Norway and found that the environmental taxation (in the strict sense) revenues were only one fifth of the revenues using the tax base-definition. Even if we consider that reflection as a useful remark, it is beyond the scope of this paper to further examine that thesis. As a result, the study in this paper concerns the use of environmentally related taxes by countries, which is not per se a good measure of *the degree to which a country uses taxation as an instrument to achieve environmental policy goals*.

3. Evaluation framework

Indicators are used "to simplify information that can help to reveal complex phenomena" (EEA, 2013). Indicators can be either theory-driven or data-driven. The latter attaches great importance to data availability[9] when developing and selecting indicators, whereas the former is primarily concerned with the validity of the indicator (Niemeijer and de Groot, 2008). Content validity refers to the degree to which the indicator chosen actually measures the theoretical concept that it claims to measure (Billiet and Waege, 2003). In that approach, data availability is merely a side condition (out of many).

In this paper, we propose a combined approach. On the one hand, we will use content validity as the central evaluation criterion and treat it as a criterion for exclusion. Whether data or theory driven, if there is a gap between the theoretical concept and what the indicator measures, reliable conclusions are not within reach. However, we also support the view of Turnhout et al. (2007), who claim that discussions and studies on indicators often neglect the importance of the political context. Indicators with high content validity but poor practical, statistical and communication potential, are likely to suffer from low utilization. That observation is supported by the fact that the Statistical Guide on Environmental Taxes (European Commission and Eurostat, 2001) puts special emphasis on the policy-relevant criteria international comparability and data availability.

Based on those arguments, we select two evaluation criteria in the 'validity' group, which is the core group, and four indicators in the 'utilization' group, referring to the practical usability for the users of the indicators, which are mainly international and national policy and statistical institutes. We call the latter group 'statistical criteria'. Table 1 summarizes our evaluation framework.

Core criteria:

1. Content validity: the indicator should actually measure the phenomenon that it claims to measure (Billiet and Waege, 2003);
2. Comprehensiveness: coverage of exemptions, tax cuts and differentiated tax rates: many tax designs include exceptions,

[4] A number of environmental taxation indicators are already part of the European Environmental Accounts (Eurostat, 2010).

[5] Variations on this last term are ecological tax reform, green tax reform and environmental fiscal reform. The term 'fiscal' usually adds subsidies to the research scope.

[6] This means including environmental factors such as energy saving potential (e.g. for real estate taxes) or carbon emissions (e.g. for car taxes) in the calculation. That third way of greening will be further left outside of the scope of this article.

[7] This definition was agreed for reasons of comparability and data availability. Remark that the OECD has an even longer history referring to the polluter pays principle, a concept that also makes the link with the internalization issue.

[8] Transport fuel taxes are an example of an environmentally related tax with (in most cases) no explicit environmental objective.

[9] And to statistical utilization, comparability over time or place and communication potential.