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Effectiveness of unit-based pricing of waste in the Netherlands: Applying a general equilibrium model

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ABSTRACT

Differential and variable rates (DVR) in waste collection charging give a price incentive to households to reduce their waste and increase recycling. International empirical evidence confirms the effectiveness of DVR schemes, with limited unwanted side effects. In the Netherlands, currently some 20% of the population is charged at DVR. This is less than in several other countries. Taking into account differences between types of households and dwellings, this study analyses various scenarios for extended use of DVR in the Netherlands. The analysis shows that further penetration of DVR is a cost-effective instrument for waste reduction and more recycling. Moreover, DVR can itself be seen as a necessary condition for the successful implementation of other economic instruments, such as waste taxes. It is therefore recommended to stimulate municipalities to adopt DVR schemes in the Netherlands, accompanied by the provision of adequate facilities for waste separation by households. Before introducing DVR in 'very strongly urbanized' municipalities (i.e. the 12 largest cities in the Netherlands) a pilot experiment in one of them might be useful to test the behavioral response in this category.

1. Introduction

Environmental policies generally include a mix of complementary measures including regulatory, economic, educational and informative instruments. Economic instruments in waste policy, such as taxes, unit pricing and deposits, are gaining popularity among policy makers for different reasons. On the one hand, these instruments are able to contribute to financing waste management activities. On the other hand, they have the capacity of persuading households and producers to strive towards diverting waste from landfills, recycle more waste and optimise the use of resources.

The European Commission (e.g. 2005, 2007) has repeatedly stated that it is in favour of using economic instruments more intensively in waste as well as other environmental policies. The Organisation for Economic Co-operation and Development (OECD) is also a strong supporter of applying economic instruments in waste policy (see e.g. OECD, 2004) and has recommended Member States (including The Netherlands; see OECD, 2003) to extend their use.

In the last two decades, the Netherlands has expanded the use of economic instruments in its environmental policies. The waste sector is no exception to this trend. Economic instruments are also more commonly applied in various segments of the production and consumption chain with the aim to reduce the environmental impact of waste. In some respects, the Netherlands is applying these instruments more intensively than other countries. For example, the tax rate for landfilling waste is higher than in any other EU Member State. On the other hand, there are several areas (such as the application of differential charging for waste collection) where other countries are ahead of the Netherlands.

This paper addresses the potential for a wider use of waste collection charges to deliver efficient solutions for waste problems in the Netherlands. This is achieved in two ways. First, by means of a literature review, an inventory is made of the current practice of waste collection charges in the Netherlands and abroad and evaluating the Dutch and international examples to learn more about the efficiency of these applications in waste management. Second, the economic impact and the feasibility of an extended use of waste collection charges in the Netherlands are analyzed.

The paper is structured as follows. Section 2 describes the theoretical and policy background of waste collection charges. Section 3 sums up experiences of waste collection charges in the Netherlands and other countries. Section 4 explains the methods developed and implemented for analysing waste collection charges. Section 5 analyses the economic impact of different levels of waste collection charges in the Netherlands. Section 6 draws conclusions and formulates recommendations.

2. Background

Since many years, economists have developed theoretical arguments for the use of economic instruments in environmental pol-

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icy. The 'archetype' of these instruments is the 'Pigovian' tax on pollution, which is set at a level equal to the marginal environmental damage, i.e. the damage caused by an additional unit of pollution. If this damage is unknown, a socially optimal solution can still be achieved by imposing a tax that would induce polluters to reduce their pollution to the socially desired level. Alternatively, the latter level can also be used as the 'cap' on total emissions in an emissions trading system, which is in principle equivalent to a tax (though the distributional impact may be different).[1]

The main reason why pollution taxes (or tradable permits) are from an economic point of view preferable to direct regulation is their greater (static and dynamic) efficiency. Economic instruments will ensure that pollution abatement takes place where this can be done at the lowest cost. Polluters who have only abatement options with costs per unit exceeding the tax rate (or, for that matter, the market price of the tradable permit) will continue to pollute and pay. Moreover, economic instruments provide a lasting incentive for the polluter to search for new abatement options, as each tonne of pollutant emitted carries a price tag.

It should be noted that the full benefits of using economic instruments will only be reaped if certain conditions are fulfilled. In particular, all actors should be well informed about their options for pollution control and the associated costs, and the market should function smoothly (ensuring, among others, that price incentives are 'passed on' along the value chain).

The increasing interest in using economic instruments among policy makers is not merely a matter of discovering that these instruments are (at least in theory and under certain assumptions) superior to direct regulation in terms of static and dynamic efficiency. There is also increasing recognition that the complexity of environmental problems (including waste management) calls for the use of a tailor-made package of instruments, rather than a single, one-size-fits-all solution (see e.g. OECD, 2007b). Hence, besides the efficiency of economic instruments, the growing interest for integrating these instruments in waste policy also results from the general need to broaden the range of policy instruments.

In waste policy, the application of the 'textbook solution' of environmental taxation is in particular complicated by the risk of illicit waste dumping (fly-tipping) that might increase if legal disposal options become more expensive. In some cases, the additional monitoring and enforcement costs required to prevent this could outweigh the efficiency gains resulting from the economic instrument.

Another particular feature of waste policy is that it usually serves different policy objectives, such as preventing resource depletion, improving energy efficiency, reducing emissions from landfill sites and incineration plants, etcetera. When comparing waste policy instruments, it is therefore not sufficient to look at their performance in terms of the primary objective (e.g. x% increase in the recycling rate of a certain waste stream), but ideally one would also like to know if they have different impacts on the various underlying objectives.

In principle, the use of differential and variable rates (DVR) in waste collection charging can be seen as a necessary complement of many other economic instruments such as waste taxes, in order to ensure that the price incentive of the latter is transmitted to households and thus contributes to waste reduction and recycling. As waste collection is historically a public service, the recommended approach in the literature tends to set the price that is to be charged equal to the long-run marginal cost of providing the service. This sets an incentive to householders not to over consume the service while on the other hand forcing bureaucrats away from inefficient allocations due to (among others) greater cost transparency (Morgenroth, 2006).

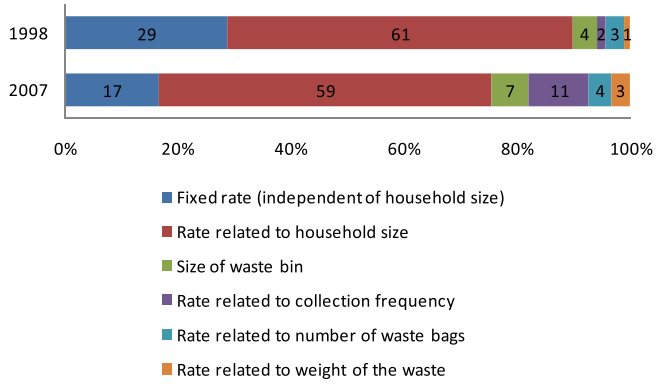

Fig. 1. Waste collection charging scheme types, 1998 and 2007; source: COELO (2007).

Early evidence on the effectiveness of DVR was presented by Fullerton and Kinnaman (1996) and Kinnaman and Fullerton (1997). More recently, the OECD (2006a) has investigated the costs and benefits of DVR in waste collection charging. A literature review revealed, among others, that weight-based and pay-per-bag schemes appear to perform best, while schemes for which the charge is based upon the volume of the container perform worst (see for example Dijkgraaf and Gradus, 2004). Furthermore, schemes are likely to perform best where there is a comprehensive system in place for collection of segregated materials for recycling. The effects of DVR on illegal waste disposal are difficult to estimate.

The same OECD (2006a) study used case studies (in Belgium, Germany and Spain) to arrive at a social cost-benefit estimate for DVR. A key conclusion was that in each of the cases the net social benefit was positive across most of the scenarios that were analysed. Only where external costs of air pollutants as well as the avoided costs of treatment/disposal were assumed to be low, did the balance of costs and benefits result in a net cost associated with applying the DVR scheme.

3. Experiences with DVR in the Netherlands and abroad

3.1. The Netherlands

All municipalities in the Netherlands levy a waste collection charge. In 2007, the average annual charge rate for a household with more than one person amounted to €263 (COELO, 2007).

Municipalities are to a large extent free to determine the charge base. Currently, over 30% of them (especially relatively small municipalities outside the heavily urbanized 'Randstad' region) apply a rate that depends on the amount of waste supplied (SenterNovem, 2007). In 2007, 17.9% of the Dutch population lived in a municipality with DVR; in 2000 this was 9.7% (COELO, 2007).[2] Fig. 1 shows the growth in the share of different types of DVR schemes, and Fig. 2 the growth in DVR schemes among Dutch municipalities.

The impact of rate differentiation in the Netherlands depends on the type of rate setting chosen (COELO, 2007; Dijkgraaf and Gradus, 2004). Payment by weight or by number of bags roughly leads to a decrease in waste supply of 60% for vegetable and garden waste, and of 50% for other (unsorted) waste. This is mainly caused

[1] The basic theory of economic instruments is discussed in Baumol and Oates (1988).

[2] In contrast with SenterNovem, COELO does not count charging based on container volume as a DVR system.