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Emission trading schemes: potential revenue effects, compliance costs and overall tax policy issues

Jeff Pope [a,*], Anthony D. Owen [b]

[a] Tax Policy Research Unit, School of Economics and Finance, Curtin University of Technology, GPO Box U1987, Perth WA 6845, Australia
[b] School of Energy and Resources, University College London, Torrens Building, 220 Victoria Square, Adelaide SA 5000, Australia

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ABSTRACT

The case for the imposition of carbon (emission) taxes or tradable carbon permits in important tax jurisdictions is arguably strong, based upon the polluter pays principle first proposed by Pigou almost a century ago. This paper briefly reviews the arguments for and against these market-based instruments, and discusses their relative advantages and disadvantages in a practical context. In the case of Australia, the revenue effect of the proposed tradable carbon permits scheme is estimated to be A$11.5 billion in 2010–11. For comparison, this is roughly equivalent to a quarter of the revenue from the Goods and Services Tax. The paper focuses on three neglected aspects of climate change taxation discussion to date: how much tax revenue is likely to be raised, and the administrative and compliance costs of an emissions trading scheme, with particular reference to Australia. In discussing these issues, the paper draws upon selected and relevant international experience, particularly the European Union emissions trading scheme. The challenges of an emissions trading scheme, including integration with the existing tax system, particularly in an Australian context, are also discussed. The paper concludes by emphasising the key challenges and issues facing this 'ultimate externality' debate, particularly from a taxation policy perspective.

1. Introduction

Over the past thirty years, essentially since the First World Climate Change Conference, there has been a considerable amount of scientific research and debate about global warming and climate change. More recently much economic and often high-profile analysis e.g. Stern (2007), Garnaut (2008a, 2008b) has stressed the economic importance of action rather than inaction in an extremely complex international policy environment. However, putting a price on carbon is not new. The first carbon tax[1] was introduced in Finland in 1990, with some other Western European countries following in subsequent years. The most recent carbon tax was introduced in July 2008 by the state jurisdiction of British Columbia, Canada. The European carbon taxes have produced a reasonably robust literature not only on the mechanics and technicalities of these taxes *per se*, including revenue yield, but also on economic incidence upon households and ensuing compensation mechanisms. There is also a strong literature on climate change and carbon reduction in the European Union (EU), especially through the first phase of its emissions trading scheme (ETS) that commenced in 2005 and closed at year-end 2007.

Unfortunately, there is very little literature on and estimates of three of the main aspects of this paper, namely the revenue arising from an ETS, administrative costs, and especially compliance costs. Whilst the carbon pricing aspects overall of an ETS can be described as being in their infancy, discussion of administrative and compliance costs could best be described as embryonic! Thus, the estimates given later in this paper should be seen as crude orders of magnitude and starting points rather than robust estimates.

Before proceeding further, it is important to discuss key terminology. Researchers in the energy field often use the term transaction costs, whereas the equivalent term used in the tax literature is operating costs. These are composed of administrative costs, or all those costs incurred by the Government in implementing and collecting a tax, and compliance costs, or all those costs imposed upon taxpayers (the private sector) over and above the tax revenue itself. Compliance costs may be expressed in gross or net terms. The former reflect the costs to society, whereas the latter reflect the real cost to the taxpayer. Net costs

* Corresponding author. Tel.: +61 8 9266 4034.
E-mail address: jeff.pope@cbs.curtin.edu.au (J. Pope).

[1] Strictly speaking this is a tax on carbon dioxide (CO_2) emissions. The technicalities of carbon (and other pollutants) emissions measurement, atmospheric pollution, climate change, global warming and government emissions targets are not discussed in this paper. For a full discussion of these issues refer to, for example, Stern (2007), Garnaut (2008a, 2008b), Commonwealth of Australia (2008a, 2008b) and [Australian] Treasury (2008). Useful reviews of carbon taxation include the early work by Hoeller and Wallin (1991), OECD (2001), Sterner and Kohlin (2003), HM Treasury (2002) and Aldy et al., (2008).

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are gross costs minus offsets, namely cash flow benefits, tax deductibility and managerial benefits (of particular relevance to small business). This paper focuses upon gross costs and does not consider any offsetting benefits. Psychological costs are recognised but also disregarded here. The tax compliance costs field distinguishes between start-up (transitional) compliance costs and recurrent (ongoing) compliance costs. In the context of an ETS, this distinction is extremely important as an ETS may be fully phased-in over a long period, perhaps a decade or so. The same distinction between start-up and recurrent costs can also be applied to ETS administrative costs, at least in theory. In this paper, the term ETS is generally used in preference to particular terms used by specific countries e.g. carbon pollution reduction scheme (CPRS) in Australia.

For the purposes of this paper, an ETS and its ensuing revenue and operating costs is assumed to be equivalent to that of a carbon tax although the mechanisms are completely different, as discussed later. It is worth noting that the term regulation refers to command and control e.g. outright banning of or restrictions on an activity. The term regulatory compliance costs generally applies to and distinguishes non-tax costs compared to the specific term tax compliance costs that are used here. It is assumed that all compliance costs relating to an ETS come under the term tax compliance costs.

This paper is organised as follows. The next section introduces the theoretical issues and section three analyzes the optimal level of pollution and compares carbon taxation with tradable permits. Section 4 discusses the challenges for an ETS, focusing on Australia although some of the issues would be applicable to other countries. The fifth section makes an analysis of likely revenue arising from an Australian ETS and discusses principles of its allocation. Administrative costs and compliance costs of an ETS are discussed in sections six and seven, respectively. The final section makes some concluding comments.

2. Theoretical analysis: background

Historically, regulatory instruments have been the basic mechanism for enacting environmental policy throughout the industrialised world. Environmental quality is seen as a public good that the state must secure by preventing private agents from damaging it. Direct regulation involves the imposition of standards (or even bans) regarding emissions and discharges, product or process characteristics, etc., through licensing and monitoring. Legislation usually forms the basis for this form of control, and compliance is generally mandatory with sanctions for non-compliance.

It is almost 90 years since Professor Arthur Cecil Pigou produced his seminal work on the use of taxation as a means of reducing pollution (in the context of London's famous fogs, or smogs). Pigou (1920) observed that pollution imposed uncovered costs on third parties that were not included in ordinary market transactions. His proposal was to tax pollution by means of a so-called externality tax to internalise within ordinary market transactions the damages caused by pollution. At the time, the Pigou's proposal was regarded as an academic curiosity, but several generations later it was rejuvenated as the core of the "polluter pays principle".

Contemporary energy policy issues are dominated, directly and indirectly, by major concerns at both local and global levels of environmental degradation arising from combustion of fossil fuels. The advent of "carbon pricing" (either through an emissions trading scheme or carbon taxes) represents an attempt to impose a cost on consumers that will limit such degradation (i.e., the deleterious impacts of climate change) to scientifically-determined "acceptable" levels. The resulting higher cost of fossil fuel combustion for power generation should induce a reduction in the demand for power (the "demand effect"), whilst simultaneously stimulating investment in competitively-priced low-carbon power generation technologies (the "supply effect").

The next section discusses two theoretical constructs that should be familiar to economists, but appear to have attracted little attention in the climate change debate. The first distinguishes between "damage costs" and "control costs" in the context of the optimal level of pollution. The second considers the difference in economic efficiency between carbon emissions permits and carbon taxes for achieving the optimal level of emissions of greenhouse gases in the context of uncertainty.

3. The optimal level of pollution

Fig. 1 illustrates that the optimal level of pollution for an economy lies at the intersection of the marginal abatement cost (MAC) and marginal damages (MD) curves (both assumed to be known). This figure also illustrates the equivalence of a carbon tax and tradable emissions permits. If the optimal level of pollution is at point M^*, then the issuing authority should issue a corresponding number of permits to ensure they amount to a total level of emissions of M^*. Since, in equilibrium, all firms in the economy will face the same marginal abatement cost, then the cost of permits for all firms will be μ^*. The tax property works in the reverse of this process; the tax is set at μ^* and hence the total level of emissions is M^*.

In practice, both M^* and μ^* will be unknown. Thus, if an issuing authority issues too few permits (say, M_A), then emissions will have to be reduced to a point below the optimal level and prices will rise accordingly (to μ_A), and vice-versa. For taxes, the authority controls the price (i.e., the tax rate) rather than the quantity of emissions. If it sets the tax rate higher than μ^* (at say μ_A), then emissions will be reduced below their optimal level (M_A), and vice-versa. Thus, errors in issuing the optimal level of emissions permits impact on the price of the permits, whereas errors in setting the price (i.e., the tax rate) impact on the quantity of emissions. It follows that the authority can either fix the price or the quantity, but not both.[2]

In the absence of any pollution charge, firms would have no incentive to abate pollution, and hence the total quantity of emissions would be M^P with a corresponding level of damage resulting from this pollution equal to the area *A*+*B*+*C*. Assuming known abatement and damage cost curves, either an emissions trading scheme or a carbon tax will result in a total abatement cost equivalent to the area *B* to reduce total damages to the area *C*, yielding a net gain to society equivalent to area *A*. Clearly any further abatement would be inefficient, as the marginal cost of abatement would exceed the marginal damage cost.

When calculating the damages arising from an externality, therefore, *A*+*B*+*C* represents the total damage cost. If added, on a unit basis, to the private cost of the product creating the emissions the sum is the total resource cost. In the context of cost–benefit analysis, it is the total resource cost that is assessed. In the context of climate change policy, however, it is the total mitigation or control cost (*B*) that is assessed. The distinction is important in a practical context, since it would be rather illogical to spend more on controlling the cost of pollution than the damage it creates (i.e., reducing emissions below M^*)!

[2] However, a hybrid scheme is possible, whereby if the price of permits reaches a predetermined price ceiling the latter becomes the fixed permit price (effectively, therefore, a carbon tax). The initial years of the Australian CPRS has this arrangement in place to avoid price spikes in the early years of the permit trading regime.