



Transaction costs of alternative greenhouse gas policies in the Australian transport energy sector

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ABSTRACT

This study employs a comparative analysis of the transaction costs of alternative policy instruments. The institutional approach to the allocation of resources is emerging to supplement traditional analyses of market and government failures. The causes of these failures are many, but often point to high transaction costs that result largely from institutional impediments. Effective institutions can help reduce transaction costs through more effective signals and incentives, including information generation, to help markets function more efficiently and policies to be delivered more successfully. The study, which contributes to transaction costs measurement, finds that the magnitudes and types of transaction costs associated with setting up and implementing three greenhouse gas reduction policy programs in Australia are substantial and different. The estimated transaction costs of the Tradable Permit and Fee System are relatively high compared to those of the mandatory Fuel Label Program and the voluntary Fuel Efficiency Program, which supports the view that market-based policies can also be costly to deliver. Notwithstanding, transaction costs have frequently been ignored in cost–benefit analyses. It is concluded that transaction costs need to be considered alongside other costs and benefits in the assessment of policies.

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1. Introduction

Concern for the impacts of climate change poses a global challenge for governments, requiring a range of alternative policy instruments. In this context, greenhouse gas emissions associated with environmental and natural resource use, such as the production and use of energy, can be regarded as a type of market failure (Tietenberg, 2007). The greenhouse gases that are emitted into the atmosphere are a ‘public bad’, which exhibits the characteristic of non-excludability. Ill-defined property rights to the atmosphere will promote inefficient allocation of resources (Anderson, 2004).

Good governance and strong property rights institutions can help reduce the transaction costs associated with the formulation and implementation process of policies designed to overcome market failure in the use of the atmosphere as a greenhouse gas sink (Williamson, 2000; Wills, 2006). In this context, the extent of transaction costs that are induced by policy change or new policies is important for assessing the relative efficiency of alternative policies.

Despite the importance of transaction costs in the resource decision making process, the empirical assessment of transaction costs under alternative institutional settings has been a relatively neglected area for various reasons. In general, rigorous practical inclusion or estimation

of transaction costs has been hindered by a lack of methods or formal techniques that can be used to measure transaction costs (McCann et al., 2005), and there are inconsistent definitions and frameworks (McCann et al., 2005; Williamson, 1996).

This paper makes a contribution to the literature on transaction costs measurement, given the scarcity of empirical estimates of transaction costs, which can have a significant influence on the cost of implementing environmental policies. The results support the case for a more realistic comparison of alternative types of policies (Garrick et al., 2013–this issue). Marketable permits are touted as a panacea but the results show that when transaction costs are included, they can be more expensive than other policies. The paper also contributes to the literature by showing that transaction costs are not negligible.

The analysis presents a shift from current practice, particularly in cost-benefit analyses of policies in the Australian transport energy sector where transaction costs have generally been ignored. Transport (35%) and manufacturing (31%) are the largest consumers of final energy in Australia; within the transport sector, road transport is the largest consumer of final energy, around 75% (ABARES, 2011). This makes the transport sector a dominant source of greenhouse gas emissions in Australia. The transport sector is also a large consumer of energy and source of emissions in many other countries in the Organisation for Economic Cooperation and Development (OECD). Transport energy policies that are designed to reduce emissions are similar in many OECD countries (IEA, 2006) and, in that context, the findings of the study can be generalised beyond Australia.

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Section 1 presents the study's background and the research issue and objectives. In Section 2, the conceptual framework of the study is discussed, and transaction costs are defined. Section 3 outlines the questions formulated to investigate the types and magnitudes of transaction costs associated with the three policy programs. Section 4 presents the methods used to collect data and estimate the transaction costs of the policies. In Section 5, estimates of transaction costs of the policies are analysed and discussed based on the research questions. Section 6 presents the findings of the study and their policy implications.

2. Transaction Costs Theory

Institutional economics provides the basis of transaction costs theory, which postulates that the general institutional environment and the specific policies that are in place will influence transaction costs (Williamson, 2000; Coggan et al., 2013–this issue). The institutional approach builds on the concept that many environmental issues, such as greenhouse gas emissions, arise because existing property rights and government regulatory institutions do not provide signals and incentives or coordination (Challen, 2000) for the optimal allocation of environmental resources. The notion is that high transaction costs in the absence of effective institutions are the underlying causes of both market failure and government failure that give rise to suboptimal allocations of resources.¹

The institutional approach proposes that policy instruments best able to help achieve more efficient allocation of environmental resources are those with the higher overall net benefits (Williamson, 2000; Wills, 2006), incorporating transaction costs as a component of the total costs (Stavins, 1995). In this context, the total cost of a policy program is made up of abatement² and transaction costs.

2.1. What are Transaction Costs?

Transaction costs are "...all costs incurred in negotiating terms or in discovering, correcting or defending any change in economic organisation, particularly a change towards an optimal position" (Mishan, 1981, p. 403). Hence they are defined in this study as the time, money, and other resources (opportunity costs) used by producers and consumers associated with organising and participating in a market (Stavins, 2000) and/or designing and implementing a government policy (Paavola and Adger, 2005). Transaction costs include the costs of specifying property rights, both private rights and the rights created by government environmental policies (Coase, 1988; Bennett, 1995; McCann et al., 2005; Norgaard and Jin, 2008). Different types of transaction costs may be incurred by different agencies and at different periods – set-up and ongoing periods – in the life cycle of a policy measure (McCann et al., 2005).

The separation of transaction costs into elements or components is important for measurement and hence policy design and delivery. Within each element, transaction costs may consist of labour, travel and the costs of supplies (McCann and Easter, 1999). A typology can ensure that all relevant types of costs have been taken into account (Marshall, 2013–this issue). It can also facilitate the collection of data on transaction costs. McCann et al. (2005, p. 532) point out that a typology can help compare empirical studies because some studies incorporate a wider range of transaction costs than others.

Various works on the typologies of transaction costs exist in the literature. Building on earlier work, particularly by Hubbard (1997), McCann and Easter (1999) and Thompson (1999), McCann et al. (2005, p. 533) presented the types of transaction costs associated

with public policies that might be incurred by legislature (courts), agencies and other stakeholders.

In this study, seven elements are identified for transaction costs, based largely on the work by McCann et al. (2005) and to a lesser extent on the work by Ofei-Mensah and Bennett (2004). The magnitude of transaction costs (T) involved with a policy program is represented by the sum of the elements in Eq. (1):

$$T_{ijt} = \sum \beta_t (R_{ijt} + K_{ijt} + I_{ijt} + A_{ijt} + C_{ijt} + M_{ijt} + F_{ijt}) \quad (1)$$

where i = policy; j = the paying entity; t = time period; β = discount factor; and variables R, K, I, A, C, M, F = transaction cost elements.

The paying entities, bearing the transaction costs, are the public and private agencies that participate in the policy program. The elements of transaction costs are defined below.

- Research and information (R) costs are concerned with gathering and analysing information or market intelligence during policy formulation to define the nature of the problem and make decisions. They include the costs of: inquiring and seeking clarification about the policy measure; conducting public education; preparing application and guidelines; searching for information about buyers and sellers.
- Enactment (K) costs are largely associated with legislation.
- Implementation (I) costs include the costs of designing permit allocation system, defining trading rules, and regulatory delay.
- Administration (A) are ongoing costs involving communication and assistance. They include the costs of: giving information about a policy; assessing applications; performing auditing tasks; providing permit price forecasts; keeping records; consultation processes; developing required resources such as training agency staff for new tasks, purchasing and installing relevant equipment.
- Contracting/trading (C) costs include bargaining costs associated with interviews and supplementary information and negotiating over prices to facilitate drawing up contracts (Anderson, 2004), which are necessary for exchange of information between parties that lead up to a decision. They also cover the direct financial costs of engaging in trade such as the costs of allocating permits, organising purchase or sale of permits, identifying and matching potential trading partners and fulfilling brokerage needs.
- Monitoring/detection (M) costs are largely the costs of monitoring subsequent behaviours to ensure that they are consistent with the decision. Examples are the costs of policing property rights or contracts, through inspection, to determine whether the terms of the contract are being observed. They also involve evaluation costs to determine the effectiveness of policy programs.
- Enforcement (F) costs involve time and money in enforcing compliance through the legal system, such as costs associated with engaging in or dealing with lawsuits.

3. Research Questions

The potential contribution transaction costs can make to determining efficient policies poses some questions:

- (a) Are the key elements that influence transaction costs the same across different policies?
- (b) How large are the transaction costs of each policy relative to the other costs or benefits of that policy?³
- (c) How cost effective are the policies?

There is also the question regarding the size or proportion of transaction costs incurred by the public and private participants of the policy programs.

¹ The fundamental source of high transaction costs is not necessarily limited to institutional impediments, noting that such costs can also flow from the fundamental nature of the environmental and natural resource issues.

² Compliance or production costs.

³ Although the focus of the study was on the measurement of transaction costs, estimates of other costs or benefits, associated with each policy option used as a case study, were derived from secondary data sources.

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