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## Cost-effectiveness of the performance standard system to reduce CO<sub>2</sub> emissions in Canada: a general equilibrium analysis<sup>☆</sup>

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### Abstract

This paper assesses the cost-effectiveness of the performance standard system to reduce CO<sub>2</sub> emissions. Simulation results suggest that this instrument could reduce emissions with almost the same productive efficiency as a permit-trading system. As it does not raise the prices of commodities relative to that of labour, it introduces fewer distortions in labour supply decisions. The results also suggest that the performance system standard could be better than a permit-trading system at avoiding carbon leakage. However, as its information and monitoring costs could be large, a restricted application to some industries may be worth considering when the feasibility of a market-based instrument is uncertain.

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<sup>☆</sup> The views expressed in this document are those of the author and should not be attributed to his affiliation institutions. This paper was written when Yazid Dissou was working at the Department of Finance of Canada.

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## 1. Introduction

Concerns about the warming of the climate have led the international community to find ways to curb emissions of greenhouse gases (GHG) into the atmosphere. In December 1997, Canada, along with 37 other countries (Annex-B countries), signed the Kyoto protocol on the limitation of the anthropogenic emissions of GHG. Canada agreed to reduce its carbon-dioxide-equivalent GHG emissions to 6% below its 1990 level, between 2008 and 2012. In this study, we analyse the cost-effectiveness of an alternative policy instrument to comply with the Kyoto protocol in Canada. We consider the use of a performance standard system to reduce carbon dioxide (CO<sub>2</sub>) emissions.

The choice of a policy instrument to control pollution depends on several considerations: cost-effectiveness, administrative ease and monitoring costs, distributional issues, and political feasibility. Market-based instruments, such as carbon tax and tradeable carbon permits, have often been preferred by economists for reducing pollution since they can help achieve the target in a cost-effective manner. However, the optimal composition of the policy instruments in a given country depends on its socio-economic, cultural and political setting. In some cases, the feasibility of a market-based instrument may be hampered by many factors, among which its uneven sectoral distribution and its adverse effect on labour supply decisions. By raising the costs of energy inputs, market-based instruments have, among others, two undesirable effects on the economy. They harm the competitiveness of carbon-intensive industries and tend to raise the cost of goods produced relative to that of labour. Consequently, they introduce some distortions in the labour supply decisions and thereby on output supply. These costs may not be completely offset by using the revenue they raise to reduce pre-existing distortionary taxes.<sup>1</sup>

Over the last four years, several papers have investigated the potential economic impacts of Canada's compliance with the protocol. Some of the recent contributions on the subject, using computable general equilibrium (CGE) models, are [ab Iorwerth et al. \(2000\)](#), [Dissou et al. \(2002\)](#), and [Wigle \(2001\)](#). Using a market-based policy instrument, namely a carbon permit system, all these studies have found that complying with the protocol will have a negative impact on aggregate output and in particular in carbon-intensive downstream industries.

While this approach is a good start, it needs to be extended to account for alternative ways of reducing emissions. Referring to [Goulder \(2000\)](#), enhancing the political feasibility of the GHG emissions reduction may require addressing these undesirable effects of the carbon permit scheme. In this regard, the desirable policy instrument must avoid raising the cost of energy products, while at the same time reducing the level of pollution emissions. Some papers like [Bernard et al. \(2001\)](#), [Fischer \(2001\)](#), [Goulder et al. \(1999\)](#), and [Fullerton and Metcalf \(1997\)](#), among others, have begun to expand the set of

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<sup>1</sup> Considerable attention has been devoted in the literature to the existence of the double dividend linked to the use of market-based instruments to control pollution (see [Goulder, 1995](#)). Still, a growing body of studies tends to question the existence of this double dividend in the presence of pre-existing distortionary taxes. [Bovenberg and de Mooij \(1994\)](#), [Bovenberg and Goulder \(1996\)](#), [Goulder et al. \(1999\)](#) and [Parry \(1995\)](#) are, among others, some interesting contributions on the subject.

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