Journal of Environmental Economics and Management 65 (2013) 40–55

Contents lists available at SciVerse ScienceDirect

Journal of Environmental Economics and Management

journal homepage: www.elsevier.com/locate/jeem

The trouble with voluntary emissions trading: Uncertainty and adverse selection in sectoral crediting programs ☆

Adam Millard-Ball *

Environmental Studies Department, University of California – Santa Cruz, 1156 High St, Santa Cruz, California 95064, United States

ARTICLE INFO

Article history:
Received 16 June 2011
Available online 21 June 2012

Keywords:
Adverse selection
Risk-sharing
Carbon offsets
Sectoral crediting
Transportation

ABSTRACT

Sectoral crediting has been proposed as a way to scale up project-level carbon offset programs, and provide sector-wide incentives for developing countries to reduce greenhouse gas emissions. However, simulations presented here suggest that information asymmetries and large uncertainties in predicting counterfactual business-as-usual (BAU) emissions are likely to render sectoral crediting an extremely unattractive mechanism in practice, at least for the transportation sector. The regulator faces a tradeoff between efficiency and transfers/environmental damage when setting the crediting baseline in relation to uncertain BAU emissions. A generous baseline promotes efficiency, as more developing countries participate and implement abatement measures. However, a generous baseline also produces large volumes of non-additional offsets, which lead to either increased global emissions, or transfers between developed and developing countries if developed country emission reduction targets are made more stringent in order to leave global emissions unchanged. I show that any crediting baseline that encourages a non-negligible number of countries to participate in a sectoral crediting mechanism results in environmental damage or transfers that are likely to be too high to be politically feasible.

1. Introduction

The carbon market is the centerpiece of current efforts to fund low-cost measures to reduce greenhouse gas emissions in developing countries. In particular, the Clean Development Mechanism (CDM), an implementation mechanism of the Kyoto Protocol, allows developed countries to purchase carbon offsets from projects in developing countries as a partial alternative to domestic action. By equalizing marginal abatement costs across sectors and across countries, the CDM can in principle substantially reduce the cost of achieving a given abatement target (Anger et al., 2007).

The CDM, however, has come in for substantial criticism in recent years. There is evidence that many of the CDM offsets are not "additional;" i.e., the project would have been undertaken anyway in the absence of the CDM (Wara and Victor,

☆ Special thanks to Suzi Kerr, Lawrence Goulder, Michael Wara, Arthur van Benthem, Lee Schipper, Chris Barrington-Leigh and two anonymous reviewers for helpful suggestions and comments on earlier drafts. I appreciate assistance with the predictive modeling from Mark Bryan and Vera Troeger. I also thank Sonny Kim and Kenny Gillingham for assistance with the GCAM modeling runs, and the Joint Global Change Research Institute for making GCAM available. This research was completed while I was an assistant professor in the Department of Geography and McGill School of Environment, McGill University. I acknowledge support from a U.S. Department of Transportation Eisenhower Graduate Fellowship, a William C. and Jeanne M. Landreth IPER Fellowship, and a David and Lucille Packard Foundation Stanford Graduate Fellowship.

* Fax: +1 831 459 4015.
E-mail address: adammb@ucsc.edu

0095-0696/$ - see front matter © 2012 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.jeem.2012.05.007

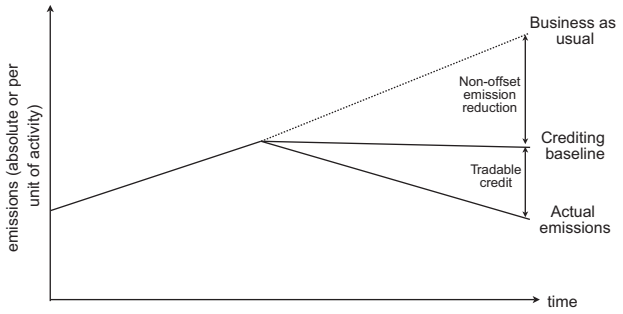

Fig. 1. Concept of sectoral no-lose targets.

2008; Haya, 2009; Schneider, 2009; Fujiwara, 2010; He and Morse, 2010). Other lines of criticism relate to problems with the methodologies used to quantify emission reductions (Millard-Ball and Ortolano, 2010); the lack of broad sustainable development benefits from CDM projects (Sutter and Parreño, 2007); and the inability of the CDM to promote innovation and incentivize long-term transformations in energy systems (Sterk, 2008).

Sectoral no-lose targets and other sector-based crediting mechanisms have emerged prominently as a way to address these problems with project-level CDM (Bosi and Ellis, 2005; Figueres, 2006; Center for Clean Air Policy, 2008; Ecofys, 2008; Sterk, 2008; Baron et al., 2009; IETA, 2010). Developing countries would participate on a voluntary basis, and could generate tradable credits (offsets) by reducing emissions to below a sectoral "crediting baseline" (Fig. 1). Emissions above the crediting baseline would not be penalized (hence the "no lose" designation).

There are four fundamental differences between sectoral no-lose targets and the existing CDM. First, the CDM operates at the project level, while sectoral no-lose targets consider aggregate sectoral emissions and do not seek to attribute reductions to any particular project. Second, CDM projects are typically proposed by private investors, while offsets from sectoral no-lose targets would accrue to national governments, who would in turn determine how to pass through incentives to private actors. Third, emission reductions under the CDM are calculated via a two-step process: a binary determination of additionality, followed by an estimate of emission reductions below a counterfactual baseline. In the case of sectoral no-lose targets, both additionality and baseline issues are implicit in determining the crediting baseline. Fourth, the baseline for CDM is typically business-as-usual (BAU).[1] In contrast, most discussions of sectoral no-lose targets assume that the crediting baseline would be set below BAU, as implied in Fig. 1, bringing about a net reduction in global emissions. However, the crediting baseline could be set at any level, including at or above BAU.

The regulator, such as the UN or other multilateral body, faces a key tradeoff when setting the crediting baseline in the presence of uncertainty over BAU. Set the crediting baseline too stringently, and developing countries may not participate—a rational decision if the costs of reducing emissions to the crediting baseline exceed the revenues from the sale of offsets from further emission reductions. Thus, a stringent baseline risks foregoing low-cost abatement opportunities in countries that do not participate. Set the crediting baseline too generously, and it risks being above counterfactual BAU and enabling developing countries to sell non-additional offsets. These non-additional offsets either represent an environmental cost if global emissions increase, or else a transfer cost from developed to developing countries if targets in developed countries are made more stringent to leave global emissions unchanged. The essential tradeoff faced by the regulator is between efficiency on the one hand, and environmental or transfer costs on the other hand, and the ex-ante optimal baseline depends on their relative importance.

One underlying cause of this tradeoff can be overall uncertainty about BAU emissions—i.e., uncertainty that is common to the regulator and the developing country. In this case, the impacts of uncertainty on efficiency, environmental costs, and distributional outcomes will partly depend on how risk is allocated between offset purchasers and the developing country offset suppliers. Another cause can be adverse selection, which arises from information asymmetries between the regulator and individual developing countries. Since a country has more information on its own counterfactual BAU emissions than does the regulator, it can decide to participate if it is granted (by virtue of the regulator's uncertainty) a favorable baseline.

Indeed, adverse selection is an issue with any voluntary emissions trading program, including domestic cap-and-trade systems that allow firms to decide whether or not to participate. In the case of the U.S. Acid Rain Program, generating units with a "generous" baseline (one set above their counterfactual BAU emissions) were more likely to participate, resulting in increased SO_2 emissions and a net social loss after considering abatement cost savings (Montero, 1999, 2000). Adverse selection problems have also been raised in the contexts of crediting rules under project-based CDM (Fischer, 2005) and under opt-in programs for agriculture and forestry (Kerr and Sweet, 2008; van Benthem and Kerr, 2010). With one main

[1] Some CDM methodologies do include a "conservativeness" factor or make conservative assumptions, meaning that the baseline can be slightly below BAU.