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Analysis

Controlling non-additional credits from nutrient management in water quality trading programs through eligibility baseline stringency ☆

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ABSTRACT

A concern for programs that offer payment for environmental services is that those services be additional. Non-additional services are those that would have been provided without the payment. One source of non-additionality is farmer misrepresentation of their pre-program management. Farm management practices are often difficult to observe, particularly those that do not involve structural changes, such as nutrient management. If practices are difficult to observe, management oversight lax, and enforcement weak, the farmer has an incentive to provide biased information that increases the likelihood that he will receive a more favorable baseline for calculating services created, and a larger payment. This is a moral hazard problem. The presence of non-additional credits in a water quality trading program can result in the degradation of water quality. Point source discharges above permitted levels are replaced by equivalent reductions from unregulated nonpoint sources. If the abatement that point sources purchase from nonpoint sources is non-additional, discharges will be higher than if the abatement was truly additional. Preventing non-additional credits from entering a water quality trading market is one of the goals of program design. In this paper we assess how program eligibility baseline choice affects the incentive to misrepresent baseline nutrient management practices.

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1. Introduction

Additionality is a measure of the extent to which a payment for an environmental service is necessary for its provision (Claassen et al., 2013; Gillenwater, 2011; Marshall and Weinberg, 2012). Non-additional services are those that would have been provided without the payment. Inclusion of non-additional services in a conservation program can result from a failure of the resource agency to accurately measure pre-program management, a failure to account for new, profit enhancing practices that are just starting to be implemented in the farming community, strategic actions by farmers to misrepresent their current management in order to obtain a larger payment, or through a policy choice by the resource agency.

The consequences of non-additionality depend on the type of program providing the economic incentive. For a cost-share program such as the Environmental Quality Incentive Program, paying for a practice that would have been adopted without the payment reduces the economic efficiency of the program; payments result in less environmental improvement than if all improvements were additional (Claassen et al., 2013). However, environmental quality itself is not threatened.

In the case of a water quality trading program, however, payments for non-additional practices can result in the degradation of water quality. In a point/nonpoint trading program a regulated point source is able to purchase abatement from unregulated nonpoint sources to offset abatement that it would otherwise have to provide through enhanced treatment technologies (Ribaudo et al., 2008). In essence, the point sources are allowed to discharge more than their discharge permit would otherwise allow with the expectation that purchased nonpoint source reductions will provide the offsetting abatement. If the abatement that point sources purchase from nonpoint sources is non-additional, discharges will be higher than if the abatement was truly additional or if point sources provided the abatement themselves. Preventing non-additional credits from entering a water quality trading market is one of the goals of program design. In this paper we assess how baseline stringency can be used to reduce the incentive for strategic actions by farmers to misrepresent their management.

1.1. Sources of Non-additionality

Four general mechanisms lead to the creation of non-additional credits in a trading program. One is the intentional choice by a resource management agency to reward "good stewards" for previous adoption of management practices that provide environmental services. A point of contention in programs that pay for environmental services is how to reward "good stewards" who have been providing environmental

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services voluntarily, making investments in management improvements out of their own pocket (Ribaudo et al., 2008). Maryland's water quality trading program and USDA's Conservation Stewardship Program both allow payments for services generated by past actions. The presence of non-additional credits hurts program efficiency and in Maryland's case can result in water quality degradation unless compensating abatement is obtained elsewhere.

A second source is how expiring conservation contracts are handled. Conservation programs such as EQIP provide financial incentives to farmers for installing a variety of environmental quality-enhancing practices. When a contract expires the question is whether future environmental services are additional or not (Claassen et al., 2013). A resource management agency may reason that once the contract expires the farmer will stop following the practice and the environmental services will cease, so a payment allows the services to continue (Miller and Duke, 2013). However, a farmer may find the practice beneficial and continue to implement it after the contract expires (which is the intent of the conservation payment in the first place). In this case paying for environmental services would be non-additional.

A third possibility is a failure to account for adoption trends for new practices that increase net returns or provide other private benefits to farmers (Claassen et al., 2013; Mezzatesta et al., 2013). Farmers are most likely to voluntarily adopt practices that increase net returns. However, the adoption process can be slow. The environmental services from practices a farmer would have eventually adopted on his or her own are non-additional. Due to the heterogeneity of farms and farmers and the difficulty in obtaining privately held cost information, it would be very difficult for an agency to identify a priori whether an individual farm would benefit from a particular practice without a financial incentive.

A fourth possibility is that farmers strategically misrepresent their management choices (Duke et al, 2012; Miller and Duke, 2013). Farm management practices are often difficult to observe, particularly those that do not involve structural changes (Jackson-Smith et al., 2010). Nutrient management is such a practice. Even on-field inspections will not reveal fertilizer application rates or timing. Since farmers are not generally required to report their practices to any government agency, the only way for a resource management agency to know whether a practice is current or new is through farmer self-reporting. If practices are difficult to observe, management oversight lax, and enforcement weak (asymmetric information), the farmer has an incentive to provide biased information that increases the likelihood that he will receive a more favorable baseline for calculating services created, and his payment (Gillenwater, 2012; Miller and Duke, 2013; Duke et al., 2012; Shabman et al., 2002).

Duke et al. (2012) used survey data from Maryland to estimate the potential incentive for farms that are below (meeting) a water quality baseline to misrepresent their use of annual management practices in a water quality trading program. They found that loose rules about additionality for annual practices and the difficulty of monitoring practice implementation leads to the potential for non-additional credits.

Giannakas and Kaplan (2005) empirically analyzed the economic determinants of producer noncompliance with the Highly Erodible Land Conservation provisions of the 1985 Food Security Act. They found that the lack of a strong auditing program induces producers that do not adopt necessary conservation practices to masquerade as adopters and claim government payments for which they are not entitled, assuming producers respond only to economic incentives. Noncompliance was shown to increase with the costs of adopting conservation practices.

Whether cheating is an issue in existing conservation or regulatory programs is largely unknown due to a lack of data. U.S. Department of Agriculture (USDA) assessments have generally found high levels of adherence with the compliance provisions for highly erodible land and wetlands (which are generally much easier to detect than the use of nutrient management), but the U.S. General Accounting Office found deficiencies in the review process that brought into question USDA's assessment (U.S. GAO, 2003).

Maryland, Delaware, and Virginia all have requirements for nutrient management plans on at least some cropland. Compliance rates range from 65% in Maryland to 80% in Virginia and Delaware based on small samples (8–10%) of fields (Perez, 2011). However, adherence with nutrient management plans has generally been difficult to detect with on-farm inspections (Perez, 2011). Survey data from the Natural Resource Conservation Service's (NRCS) Conservation Effects Assessment Project for the Chesapeake Bay Watershed found that only about 10% of cropland was meeting NRCS criteria for good nutrient management in 2006 (USDA, NRCS, 2011). This finding suggests that nutrient management plans are inadequate or are being ignored.

The asymmetry in information between farmers and the resource management agency makes this a moral hazard problem (Hanley et al., 1997). Moral hazard occurs when the party with more information about its actions has an incentive to behave inappropriately from the perspective of the party with less information. In our example, the economic benefits of misrepresenting baseline practices with little risk of getting caught could lead to environmental harm (poorer water quality).

Motivated by the findings of Duke et al. (2012) and the role that point/nonpoint trading is expected to play in the Chesapeake Bay watershed, we extend this work by examining how baseline choice influences the incentive to misrepresent practices and offer non-additional credits in a trading program.

1.2. Point/Nonpoint Trading and Additionality

In simple terms, trading programs provide a means of reallocating pollution control responsibility from dischargers with relatively high marginal abatement costs to those dischargers with relatively low marginal abatement costs, thus reducing total control costs for achieving a particular environmental goal. In a point/nonpoint trading program, point sources regulated through the National Pollutant Discharge Elimination System (NPDES) permit program of the Clean Water Act may be required to reduce pollution discharges because of a Total Maximum Daily Load (TMDL), which sets a pollutant discharge limit or cap for an impaired watershed. Without a trading program point sources would have to meet the new discharge limits through treatment technology upgrades. With trading, regulated sources can offset required abatement through purchases of abatement credits from unregulated nonpoint sources such as agriculture. Nonpoint sources can produce credits by adopting improved management systems. Abatement is generally certified by the resource agency and farms are awarded credits based on their level of abatement. Agriculture is widely believed to be able to abate pollution for a much lower unit cost than point sources (Van Houtven et al., 2012).

Credits from agriculture are usually calculated at the field level using a model such as the Maryland Nutrient Trading Tool (Maryland Dept. of Ag., 2013). The farmer inputs soil and field characteristics, “current” or baseline management, and which practices he intends to implement, and the model estimates the number of credits that would be produced. Most trading programs require some type of site visit to verify baseline practices and the model calculations.

Structural practices are relatively easy to verify in a baseline, many through remote methods. On the other hand, annual management practices such as nutrient management may be very difficult to observe. Such practices have relatively low upfront costs and the decisions of whether and how to implement them can be made annually, depending on economic and environmental conditions. A resource management agency generally has to rely on farmers' personal statements to determine whether a management practice is current or new.

Let′s assume that a farmer has a nutrient management plan (NMP) and he has been following it for years. The opportunity arises to enter a water quality trading program and to produce and sell credits generated by reducing nitrogen losses from his fields. Even though he has been following a nutrient management plan, he may be tempted to claim that the NMP is a new practice. Perhaps this is seen as a way of finally receiving an