Introduction

One important policy highlighted in the Green New Deal is the goal of clean water. Relatedly, the legislation calls for "investing in sustainable farming and land use practices."[i] Connecting these points and improving water quality through agricultural practices is feasible. Nonpoint source pollution from agricultural activities is currently the largest contributor to water pollution of lakes and rivers.[ii] Currently, water quality improvements from agricultural pollution are incentivized through sustainable land use management under the Environmental Quality Incentives Program (EQIP). With evidence of limited success, the program is not effective and its voluntary nature, transaction costs, and lack of monitoring and stringent ambient quality standards leave room for improvement. Integrating a water quality tax could greatly improve efficacy and efficiency.

EQIP Design

Agricultural production pollutes bodies of water. This is a clear negative externality that is not internalized by the polluting agent. The first equimarginal principle dictates that net benefits are maximized when the social marginal benefits equal the social marginal costs. Evidently, marginal benefits do not equal marginal costs, thus decreasing social welfare and producing a suboptimal solution and. Such market failure necessitates government intervention. One notable intervention is EQIP, a voluntary program that incentivizes farmers to invest in more sustainable technologies and farming practices.[1] Farmers receive technical and financial assistance for implementation of conservation practices through contractual agreements. Ultimately, EQIP attempts to reduce the negative externalities of agricultural production and better equate social marginal costs and private marginal costs.

EQIP's design arose for various reasons. First, nonpoint source pollution is not regulated under the Clean Water Act (CWA), so it is a means to fill the gap in existing legislation. Amending the CWA is a difficult political task. The CWA's failure to achieve its ambitious water quality targets resulted in part because of "Congress' unwillingness to adopt…measures to control nonpoint source pollution."[iii] This political obstacle led to a voluntary incentive program. Additionally, subsidization extends to forgone income, mitigating the risk associated with implementing new BMPs- a large concern for farmers whose income depends upon the expected return of crop yields. Finally, research has documented that farmers can be reluctant to adopt farming BMPs, even when these practices may be cost saving. There are two likely reasons for this. One is the issue of information access; farmers are not aware of BMPs or how to implement them. Second, farmer mistrust of regulation is prevalent. EQIP aims to overcome the lack of information and farmer mistrust by having agents work directly with farmers to develop personalized land use plans. The subsidies aim to solicitate participation from farmers with high marginal costs of abatement (i.e. farms for which the Porter Hypothesis may not hold).

These political frictions regarding and the attempt to overcome risk, lack of information, and mistrust likely shaped the current structure of EQIP.

EQIP Success

While EQIP's 41,471 contracts covered 12.9 million acres of land in 2019, documented success in reducing water pollution is limited.[iv] Few studies have focused on the impact of EQIP in

[1] The Conservation Reserve Program (CRP) is another notable program. The Executive Summary focuses on EQIP, however CRP is designed similarly to EQIP, so many principles apply to a discussion of CRP.

improving water quality. Preliminary evidence finds that increasing EQIP payments can significantly reduce the downstream Phosphorus concentration; EQIP payment reduces downstream Nitrogen concentration, though the effect is marginally insignificant. No significant effect is detected on other water quality measurements.[v]

EQIP lacks both stringent environmental quality standards to measure success against and a framework for monitoring and evaluation of granted land. Due to the non-localized nature of water pollution, particularly of nonpoint sources, monitoring pollution levels is inherently difficult. Nonetheless, EQIP does not attempt to tackle this issue. There is evidence of some local efforts of grant administrators partnering with local NGOs to assist in monitoring water quality, such as in Arkansas. However, data for this program is for private farm use.[vi]
Additionally, voluntary involvement in BMPs may not be stringent enough to achieve the socially desired equilibrium level of water pollution. The first equimarginal principle is not attained unless all costs are internalized to the polluting agents, not merely a self-selected group of costs. Those who care more about environmental quality will self-select into the program, rather than those do not care about environmental quality (likely large polluters with large potential to impact environmental quality).

Current Inefficiencies
While the voluntary nature of the program is an innovative way to reduce mistrust of government intervention, the current consequences and scope of water quality degradation necessitate more stringent action. First, the application and contracting agreement process is lengthy, requires a lot of resources, and is not always aligned with growing season timelines. Therefore, transaction costs may be high, creating inefficiency.
Second, governmental cost-sharing and subsidies are not cost-effective. The second equimarginal principle, which dictates that cost-effectiveness is achieved when the marginal cost of abatement across firms are equal, is not satisfied. EQIP does not allow for any cost-sharing to occur across farmers with heterogeneous abatement costs. Instead, abatement decisions are made at the farm-level, without consideration of the local market. Failure to equate marginal abatement costs across firms is not a cost-effective means in achieving aggregate environmental improvements.

Finally, subsidizing BMPs may incentivize initial take-up, but there are no incentives for farmers continued use of BMPs. EQIP relies on the hope that farmers who begin using sustainable land practices will then keep doing so when the contract period ends. However, sufficient enforcement mechanisms to ensure this occurs do not exist. Contracts hold farmers accountable to convert their land practices, but continuation of such practice is not certain. Therefore, weak institutional enforcement leads to inefficient solutions.

Suggested Policy Reform
To improve the policy's effectiveness, eliminate the costly subsidization of BMPs and instead institute a location-specific ambient water quality tax. Taxes can be an efficient solution by internalizing the costs of pollution to the producers. Maintaining the voluntary structure and only applying the tax if water quality levels exceed particular thresholds avoids unnecessary burdens and incentivizes use of BMPs without subsidies.
First, it is important to clearly assign externalities to specific polluting agents. Due to spatial dispersion of water pollution, farms can be divided into regional areas in which the geographic collection of land parcels impact the same bodies of water. For instance, a PZ can be farms within a specific watershed, which would better allocate externalities to polluters than zoning

according to county lines. Within a PZ, a total limit of pollution is allowed. A tax will be applied to all agents within a PZ only if the pollutant levels exceed the predetermined level.

Unlike a uniform command-and-control policy in which each agricultural firm needs to reduce pollution by a certain standard to hit an aggregate ambient quality standard, a tax-based approach allows for variance in abatement levels. Since all firms do not have equal marginal abatement costs, allowing for abatement heterogeneity reduces the deadweight loss, since low-cost abating firms will reduce their pollution levels more than high-cost abatement firms. Farmers will implement BMPs up to the point in which their marginal abatement costs equal the stated tax rate, at which point they will decide to pay the tax rather than abate. In aggregate, the desired abatement level is achieved more cheaply.[vii]

Moreover, the threat of a tax is advantageous because it promotes technological advancement for farms, who are profit maximizing, to continually adopt land use practices that are most cost effective. Subsidies may cause farmers to increase their overall level of production if they reduce cost per acre. Evidence indicates that EQIP increased water usage and irrigation expansion.[viii] Therefore, taxing units of pollution if pollution thresholds are exceeded will ensure this expansion does not occur.

Overall, this integrated approach will produce greater levels of abatement than a purely voluntary approach and be more cost effective than a pure ambient tax approach.

Literature on Environmental Taxes and Potential Concerns

There are currently no water pollution taxes in the US. Segerson and Wu (2006) advocate that this model of combining a voluntary approach with the threat of an ambient tax if the desired environmental goal is not achieved can induce cost-minimizing abatement. They note that the threat of a tax itself may serve as enough of a reason to voluntarily abate without even imposing the tax directly.[ix]

Environmental taxes, mainly on carbon and ambient air pollution, have been employed in many OECD countries.[x] Several countries also have groundwater and waste taxes.[xi] Research indicates a significant and negative effect of a carbon tax on emissions in Finland, though evidence in other countries is less significant.[xii] Importantly, the impacts of carbon taxes are weakened by the inclusion of tax exemptions. In order to ensure compliance and maximum abatement, a water pollution tax should not create distortions through exemptions. Another potential problem identified in the carbon tax literature is the tax's regressivity. Producers may shift costs to consumers through increased prices, which adversely impacts low-income consumers, as they spend a greater share of their income on utilities.[xiii] This cost-shifting could be a potential drawback of the water pollution tax. However, since the design of this program necessitates that the tax only applies if pollution exceeds a given allowable threshold, this tax may be less burdensome than a uniform tax per unit of emission, minimizing price increases.

A final potential problem identified in the carbon tax literature is the difficulty in setting a tax price that will effectively induce behavioral change. If the tax price is set below the cost of abatement, then farmers would continue to pollute and pay the tax. With a tax price set too high, increased input costs may cause reduced output or market exit. Adjustment may be necessary in the beginning of implementation to find the desired tax level. Such adjustments must be communicated to suppliers transparently and with advance notice in order to avoid uncertainty and price volatility.

[i] Ocasio-Cortez, "H.Res.109 - 116th Congress (2019-2020)."

[ii] Environmental Protection Agency, United States, "Protecting Water Quality from Agricultural Runoff." 2005, https://www.epa.gov/sites/production/files/2015-09/documents/ag_runoff_fact_sheet.pdf

[iii] Glicksman and Batzel, "Science, Politics, Law, and the Arc of the Clean Water Act: The Role of Assumptions in the Adoption of a Pollution Control Landmark."

[iv] "Environmental Quality Incentives Program (EQIP) | Farm Bill Report (FY 2009 through FY 2019)" NRCS. 2019.

[v] Liu, Wang, Zhang, "The Influence of Environmental Quality Incentives Program (EQIP) on Local Water Quality: Evidence from Monitoring Station Level Data," 2018.

[vi] "2015 EQIP Edge of Field Water Quality Monitoring." NRCS Arkansas.

[vii] Boyd, "Water Pollution Taxes." 2003.

[viii] Nixon, "Irrigation Subsidies Leading to More Water Use." The New York Times. 2013

[ix] Segerson and Wu, "Nonpoint Pollution Control: Inducing First-Best Outcomes Through the Use of Threats." 2006.

[x] OECD, "Environmental Taxation." 2015, https://www.oecd.org/environment/tools-evaluation/environmentaltaxation.htm

[xi] OECD, "Environmentally Related Taxes in OECD Countries." 2001, https://www.cbd.int/financial/fiscalenviron/g-fiscaltaxes-oecd.pdf

[xii] Lin and Li, "The Effect of carbon tax on per capita CO2 emissions," 2011.

[xiii] Mathur, Aparna, "Rethinking the Green New Deal," National Tax Journal, 2019.