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Transboundary spillovers and decentralization of environmental policies

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Abstract

Most US federal environmental policies allow states to assume responsibility for implementation and enforcement of regulations; states with this responsibility are referred to as “authorized” or having “primacy.” Although such decentralization may have benefits, it may also have costs when pollution crosses state borders. This paper estimates these costs empirically by studying the free riding of states authorized under the Clean Water Act. The analysis examines water quality in rivers around the US and includes fixed effects for the location where water quality is monitored to address unobserved geographic heterogeneity. The estimated equations suggest that free riding gives rise to a 4% degradation of water quality downstream of authorized states, with an environmental cost downstream of \$17 million annually. © 2004 Published by Elsevier Inc.

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1. Introduction

Public policies for pollution control in the United States are a hybrid of centralized standard setting and decentralized implementation and enforcement. Some observers question the efficiency of centralization and argue for greater decentralization of environmental decision-making. Decentralization may allow policies to vary more with their local benefits and costs:

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although centralized policies could contain local variation, federal authorities may find much variability politically difficult and may have less information than state authorities. However, decentralization may be costly if the federal government can realize economies of scale in expertise, if “a race to the bottom” in environmental quality occurs as states compete for new investment, or if there are transboundary spillovers and states free ride.¹

This study evaluates the empirical relevance of the latter concern about decentralized environmental policy. In particular, it examines whether states that control their Clean Water Act (CWA) programs free ride on downstream states. States received this control—known as “authorization”—over their programs at different times. Using data on in-stream water pollution levels at about 500 river monitoring stations around the country from the National Stream Quality Accounting Network (NASQAN), I estimate equations that model water quality at a station as a function of whether the state or any upstream neighbor has authority over its CWA program, time-varying state and river characteristics, and a monitoring-station fixed effect for unobserved geographic heterogeneity. The paper uses a water quality index (WQI) based on levels of five common pollutants.

A few empirical recent papers examine interstate free riding in environmental policy. Gray and Shadbegian [10] analyze the emissions of pollutants by pulp and paper plants and find evidence of higher water and air pollution when out-of-state residents receive a larger share of the benefits of pollution control. They also examine monitoring activities, but find no evidence of border effects there. Helland and Whitford [12] find toxic chemical releases to be higher in border counties, which they interpret as evidence of spillovers.

My study builds on this research in several ways.² Examining the effects of authorization offers some econometric advantages. The identification of the coefficients comes from changes in policies over time, allowing the estimated equations to include fixed effects for the location where water quality is measured. Earlier studies of free riding are identified only by geography and thus potentially confounded by other heterogeneity associated with proximity to state borders. For example, locations near borders, such as along the Mississippi River, may have higher populations and different economic activities than other locations, even within the same region. In addition, for a coefficient of particular interest in the current study, identification comes entirely from changes in the status of a neighboring state, thus reducing concerns about policy endogeneity.

Examining the effects of authorization not only helps to establish that the border effects are free riding, but also provides information on the mechanism through which free riding occurs. It provides an assessment of the type of decentralization that most federal environmental programs employ.

I examine effects on in-stream water quality, which offers advantages and disadvantages relative to earlier studies. Water quality captures free riding regardless of the source of pollution.

¹Recent overviews of federalism in environmental policy include [5,21,23]. Dinan et al. [6] provide an example of the costs of uniform federal standards in the Safe Drinking Water Act. A substantial literature addresses the “race to the bottom” (see [15–17,22,28]).

²A small literature also examines free riding across international borders [20,26]. Like the previous literature examining interstate spillovers, this international literature relies on geographic variation only. Thus, the current research differs from this research methodologically, by allowing fixed effects, and conceptually, by focusing on free riding in a federal systems, where safeguards against free riding should be in place.

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