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Public disclosure affects emission rates at fossil fuel-fired power plants

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Traditional regulatory approaches to managing firms' environmental performance rely on standards, cap-and-trade programs, and emission taxes. Disclosure laws are an often overlooked – and potentially powerful – tool to modify companies' behavior.

This article explores the impact of a national mandatory reporting-and-disclosure program — the Greenhouse Gas Reporting Program (GHGRP) — that covers CO₂ emissions produced by large stationary point sources like power plants and factories. In a working paper with co-authors Lavender Yang and Pierre Jinghong Liang, we examined whether the requirement to publicly disclose emissions through the GHGRP affects subsequent emission rates.

Our approach to exploring the impact of public disclosure relies on differential disclosure requirements stipulated by the GHGRP, which requires all facilities in the U.S. that emit more than 25,000 tons of CO₂ per year to report those emissions to EPA. The agency then publishes the data on a publicly accessible website. The 25,000-ton cutoff for reporting delineates “treatment” and “control” groups, while the 2010 launch of the program allows for a before-and-after comparison. Fortunately, long-running data collection by the Department of Energy captures data for the period before 2010, though in a much less visible format, including facilities emitting less than the 25,000 ton threshold. Thus, we have pre-and-post-disclosure data for the treatment and control groups. This data allows us to test the effect of CO₂ disclosure on firm behavior.

Our primary outcome of interest is the plant-level emission rate, defined as CO₂ (tons) per megawatt-hour (MWH) of electricity produced. We expected that plants required to disclose their emissions by the GHGRP would reduce their rates relative to those plants that did not have to report. The logical basis for this hypothesis is that emissions are generally viewed by stakeholders (especially those in financial markets) as a negative attribute for firms.

In fact, we found that power plants that are required to report their emissions exhibit a significant reduction in CO₂ emission rates after the enactment of the GHGRP. Specifically, plants whose emission reports are disclosed on the GHGRP website reduced their CO₂ emission rates by 7 percent after 2010, relative to plants that didn't disclose. In addition to this change, which is found for all reporting power plants, the analysis finds that the decrease was even greater for power plants subject to the GHGRP owned by publicly traded firms. These plants exhibit a 10 percent reduction in emission rates. In an additional refinement of these results, plants owned by firms that are part of the Standard and Poor's (S&P) 500 index lowered emission rates by 14 percent, or twice the amount as all reporting plants. Why would publicly traded firms, and especially those on the S&P 500, show such large relative changes in their CO₂ emission rates? One reason is shareholder pressure, since publicly traded firms are directly exposed to financial markets.

Undercutting the viability of disclosure laws as a means to reduce CO₂ releases is emissions leakage, which occurs when companies reallocate production (and emissions) to facilities outside the scope of the disclosure policy. The paper examined businesses that own power plants above and below the GHGRP reporting threshold of 25,000 tons. The analysis finds that such companies reduce emission rates at the plants above the reporting threshold and simultaneously increase the CO₂ discharge rates at plants that they own below the reporting threshold. The evidence from this analysis suggests that this effect is consequential. Emission rates for plants below the reporting cutoff (owned only by firms that also own reporting plants) increase by between 25 percent and 60 percent.

The research indicates that companies subject to mandatory disclosure laws modify their behavior. In the context of the GHGRP, firms reduce their CO₂ emission rates, which suggests a role for disclosure laws in addressing climate change. However, businesses also try to circumvent disclosure by systematically reallocating production outside the scope of the disclosure boundary. This form of emission leakage counteracts the GHGRP's negative effect on emission reductions and suggests that firms find GHGRP disclosure costly.

To maximize the performance benefits and minimize the potential for emission leakage and the creation of pollution hotspots, policymakers designing and implementing disclosure rules should seek as broad a reporting domain as possible.

About the author

Nicholas Z. Muller is the Lester and Judith Lave Professor of Economics, Engineering, and Public Policy at Carnegie Mellon University. His interdisciplinary research focuses on air pollution and climate damages from economic activity in the United States and around the world. Recent work explores how environmental regulation impacts municipal finance systems and how disclosure laws influence firm behavior. Muller's research has appeared in top economics and general interest science journals.