Mejorando las Regulaciones de Polución Industrial en India

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Sector(s): Environment & Energy

Ubicación: Ahmedabad and Surat, Gujarat, India

Muestra: 900 Industrial Plants

Grupo objetivo: Small and medium enterprises

Resultado de interés: Pollution Climate change mitigation

Tipo de intervención: Audits Monetary incentives

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Socios Implementadores: Evidence for Policy Design (EPoD), Government of India, State of Gujarat Pollution Control Board (GPCB), Harvard University Sustainability Science Program (SSP), International Growth Center (IGC), International Initiative for Impact Evaluation (3ie), MIT Center for Energy and Environmental Policy Research (CEEPR), National Science Foundation (NSF)

Problema de política pública

¿Pueden las regulaciones ambientales reducir la polución en países en desarrollo? Hay mucho en juego para una respuesta a este problema. Las concentraciones de polución en India, China y otros países en desarrollo están a niveles que exceden las concentraciones más altas registradas en países desarrollados. Los reguladores en países en desarrollo contan con instrumentos de comando-y-control tales como inspecciones de plantas y auditorías ambientales, respaldadas por sanciones categóricas por violaciones. ¿Cuán bien funcionan estos métodos para limitar la polución? ¿Cuánto cuestan estos en términos de actividad económica reducida?

Contexto de la evaluación

El Comité de Control de Polución de Gujarat (Gujarat Pollution Control Board, GPCB) está encargado de hacer cumplir las normas ambientales a lo largo de uno de los estados más industrializados de India. Los instrumentos regulatorios del GPCB incluyen inspecciones a plantas sin aviso previo, y un esquema de auditoría ambiental dónde firmas de auditoría privadas informan sobre los esfuerzos de disminución y estado de cumplimiento de las unidades especialmente contaminantes. No se conocen los beneficios de estos instrumentos para la calidad ambiental en Gujarat. El Comité de Control de Polución Central ha designado nueve áreas industriales en el Estado como severa o críticamente contaminadas.

Los problemas de incentivo y recursos pueden explicar los altos niveles de emisiones. La información sobre las inspecciones del GPCB sugiere que el Comité está escaso de personal y que el número de inspecciones son demasiado bajas para asegurar el

cumplimiento. Las plantas pueden llegar a ser autocomplacientes sobre la necesidad de limitar sus emisiones si la posibilidad de ser inspeccionadas es baja. Las autorías más en profundidad realizadas por terceros proporcionan poca información, debido a que cada planta selecciona y paga por su propio auditor.



A man conducts a pollution audit in Gujarat, India.

Photo: J-PAL

Detalles de la intervención

Researchers partnered with the gpcb to test the effectiveness of an improved third-party audit system on audit accuracy and pollution. From a sample of 473 industrial plants in Ahmedabad and Surat, the two largest cities in Gujarat, 233 were randomly assigned to receive a new audit system in which auditors were randomly assigned to the industrial plants they would monitor, paid from a common pool, and monitored for accuracy. The remaining 240 plants served as the comparison group and remained in the status quo audit system.

To measure audit accuracy, researchers compared the pollution readings from auditors' reports to the pollution readings from the independent backchecks. Auditors and backcheckers used the same technology and standardized procedures to measure pollution, looking at six water pollutants, including biochemical oxygen demand, chemical oxygen demand, and total dissolved and suspended solids, and three air pollutants: sulfur dioxide, nitrogen oxides, and suspended particulate matter. Backchecks were conducted in a random subset of plants soon after auditors had measured pollution in those plants in 2009 and 2010. They were also conducted in all plants one year after the new audit system was in place. This allowed researchers to directly measure auditors' accuracy under the status quo and new systems as the difference between the auditor and backcheck pollution readings. This measurement is unique as it is generally not possible to observe the truthfulness of auditor reports in other

contexts.

	Comparison group: Status quo audit system	Treatment group: New audit system
Auditor selection	Plants selected and paid their own auditors.	Auditors were randomly assigned to the plants that they would monitor.
Auditor fees	Plants paid auditors directly and negotiated the price of the audit.	Auditors were paid a fixed fee of 45,000 rupees per audit from a common pool.
Monitoring	Auditors' reports were not verified for accuracy.	Twenty percent of auditor pollution readings were randomly selected to be double checked, or "backchecked," by the technical staff of independent engineering colleges. Auditors were aware that they might be backchecked, but were not told when.

	Comparison group: Status quo audit system	Treatment group: New audit system
Accuracy incentives	None.	In year two, auditors were also given incentive payments for accurate reports.

Resultados y lecciones de la política pública

When auditors were hired and paid by the firms they were auditing, as in the status quo audit system, false reporting and pollution were high.

Auditors in status quo plants were paid about 24,000 rupees per audit on average, which is well below the average cost of conducting a full audit at 40,000 rupees. This suggests that many auditors did not conduct all the tests needed to complete an audit properly.

Twenty-nine percent of audit reports in comparison plants falsely reported pollution as below the relevant regulatory standard. For particulate matter pollution, auditors reported that 7 percent of plants violated the standard, while in fact 59 percent were in violation. They also reported that nearly three-quarters of plants polluted just below the standard, but the independent backchecks reveal that only 19 percent of plants polluted in this narrow range. This shows that auditors systematically reported firms as being narrowly compliant with national pollution standards.

The new audit system led auditors to report pollution more truthfully and substantially lowered the number of plants that were falsely reported as compliant with pollution standards.

Relative to auditors in comparison plants, auditors working under the new system reported much higher pollution. They were also 23 percentage points (or 80 percent) less likely to falsely report a pollution reading as compliant with the relevant regulatory standard. Auditors working under the new system also reported that far fewer plants were polluting right below the standard. However, their reports still bunched a little beneath the standard, relative to the true pollution readings.

Since some auditors worked in both treatment and comparison plants, researchers were able to compare their behavior under both audit systems. They found that the same auditors reported pollution more accurately under the new system than they did in comparison plants that they were auditing at the same time. This shows that the increased accuracy was due to the new audit system and not to treatment plants having better auditors or auditing firms with more financial resources.

Industrial plants reduced pollution in response to more accurate audits.

Plants facing the new auditing system reduced pollution by 0.21 standard deviations on average. This reduction is driven by an even larger reduction in water pollution, which is a top regulatory priority for the GPCB. The pollution reductions came from the highest-polluting plants. In practice, the GPCB reserves the harshest penalties, like plant closure, for plants with readings that significantly exceed the standard. This is reflected in the fact that the dirtiest plants responded by reducing emissions the most.

When auditors are chosen and paid by the firms they are auditing, third-party audit systems may yield very inaccurate reports.

In Gujarat, when auditors were hired and paid by the plants they were auditing, they did not provide regulators with reliable information about pollution. There is evidence that many auditors did not even conduct all the tests necessary to complete a full audit. If they are to be an effective policy tool for enforcing regulation, third-party audit systems must be designed to incentivize accurate reporting.

Resolving this conflict of interest can lead to more accurate reporting.

Randomly assigning auditors to industrial plants, paying them a fixed fee from a central pool, and double checking their accuracy led auditors to report industrial pollution much more accurately.

When the environmental regulator received better information about pollution levels, industrial plants responded. In response to more accurate pollution audits, the dirtiest industrial plants reduced their emissions substantially.

This suggests that plants may also change their behavior if the regulator obtained more accurate information through other means, such as its own inspections or better emissions monitoring technologies.

Eliminating conflicts of interest for auditors could improve third-party audit systems in other sectors beyond environmental regulation.

The core problem in Gujarat's environmental audit system—that auditors had poor incentives to report pollution levels accurately when they were chosen and paid by the firms they audited—exists in virtually all other third-party audit systems. This evaluation provides the first-ever findings on removing the fundamental conflict of interest that characterizes third-party audit markets. It seems reasonable to assume that a version of these reforms adapted to the particular institutional features of other third-party audit markets would produce similar results.

Duflo, Esther, Michael Grenstone, Rohini Pande, and Nicholas Ryan. "Truth-Telling by Third-Party Auditors: Evidence from a Randomized Field Experiment in India." Working Paper, MIT, March 2, 2012. Duflo, Esther, Michael Greenstone, Rohini Pande, and Nicholas Ryan. 2013. "What Does Reputation Buy? Differentiation in a Market for Third-Party Auditors." American Economic Review 103(3): 314-19.