

Authors

Santiago Saavedra
Universidad del Rosario

Technology and State Capacity: Experimental Evidence from Illegal Mining in Colombia*

Santiago Saavedra¹

June 30, 2022

Abstract

New monitoring technologies can help curb illegal activities by reducing information asymmetries between enforcing and monitoring government agents. I created a novel dataset using machine learning predictions on satellite imagery that detects illegal mining. Then I disclosed the predictions to government agents to study the impact on illegal activity. I randomly assigned municipalities to one of four groups: (1) information to the observer (local government) of potential mine locations in his jurisdiction; (2) information to the enforcer (National government) of potential mine locations; (3) information to both observer and enforcer; and (4) a control group, where I informed no one. I use an independent expert validated dataset that measures gold mining to evaluate the effect of the intervention. I find that the effect of treatment is relatively similar regardless of who is informed: in treated municipalities, illegal mining is reduced by 11% in the disclosed locations and surrounding areas. However, when accounting for negative spillovers — increases in illegal mining in areas not targeted by the information — the net reduction is only 7%. These results illustrate the benefits of new technologies for building state capacity and reducing illegal activity.

JEL classification: H26, K42, O13, O17, Q53

Keywords: Illegal mining, Monitoring Technology, Colombia

*This study is registered in the AEA RCT Registry, unique identifying number: "AEARCTR-082397. I acknowledge support from Google's Artificial Intelligence Impact Challenge. Thanks Alianza EPI-Colombia Científica grant with code 60185 and FP44842-220-2018. I am grateful to Teniente Calisto Rodríguez and Colombia's Air Force for invaluable help in this project, and Stanford University's Computing Center for access to their capabilities. This paper was enriched by comments from Achyuta Adhikary, Agorito Bergues, Aron Chandrasekhar, Pascale Dupas, Melanie Marles, Robert Reicher, Mauricio Romero, and seminar participants at PacDev 2022, CU Denver, CU Boulder environmental lunch, ISA Arizaga, Rosario-Andes Taller Applied. Juan de las Heras, Sergio Perilla, Juan Pablo Martínez, Carolina Vélez, Juan Andrés Rues, Carlos Beltrán, Oscar García, Santiago Fernández, Andrés Fabón and Mariana Gallego provided instrumental assistance in constructing and validating the predictions.

¹University of Colorado, Denver and Universidad del Rosario, Department of Economics, ssaav@gsu13.com.

Technology and State Capacity: Experimental Evidence from Illegal Mining in Colombia

New monitoring technologies can help curb illegal activities by reducing information asymmetries between enforcing and monitoring government agents. I created a novel dataset using machine learning predictions on satellite imagery that detects illegal mining. Then I disclosed the predictions to government agents to study the impact on illegal activity. I randomly assigned municipalities to one of four groups: (1) information to the observer (local government) of potential mine locations in his jurisdiction; (2) information to the enforcer (National government) of potential mine locations; (3) information to both observer and enforcer, and (4) a control group, where I informed no one. I use an independent expert validated dataset that measures gold mining to evaluate the effect of the intervention. I find

that the effect of treatment is relatively similar regardless of who is informed: in treated municipalities, illegal mining is reduced by 11% in the disclosed locations and surrounding areas. However, when accounting for negative spillovers — increases in illegal mining in areas not targeted by the information — the net reduction is only 7%. These results illustrate the benefits of new technologies for building state capacity and reducing illegal activity.

May 27, 2022