A Tale of Gold and Blood: The Unintended Consequences of Market Regulation on Local Violence

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INTRODUCTION

This paper shows how market agents themselves can help monitor illegal activities – and how this can be relevant to deter violence associated with illegality.

- Governments in developing countries often struggle with the pervasiveness of illegal activities in the production of valuable natural resources.
- When direct government monitoring is low/hard, market incentives might help regulate illegal activities.
- We show that relatively small changes to these incentives can have large effects.

RESEARCH QUESTION AND HYPOTHESIS

We inquire **how market de-regulation, by changing the incentives to private monitoring for some players, can affect the equilibrium level of illegal activities and violence.**

- **Context:** 2013 Brazilian gold market de-regulation that facilitated the process of laundering illegally mined gold – that is, the conversion of illicit gold into licit gold.
- **Setting:** Brazilian Amazon, where gold-mining is an important activity, but also notoriously hard-to-monitor because of the forest.
- **Hypothesis:** The policy should lead to ...
  1. a decrease in the incentives for local gold stores to verify whether the product has legal origins or not.
  2. an increase in demand for illegal gold, and consequently a stimulus to illegal exploitation.
  3. an increase in disputes for illegal gold deposits among miners.
  4. an increase in violence associated to these disputes.
- **Empirical Strategy:** Difference-in-Differences comparing municipalities with legal and illegal gold deposits, before and after the regulatory change in 2013.

2013 REGULATORY CHANGE

Before 2013: both gold buyers and gold sellers had to report potentially illicit operations from their counterparts.

After 2013: buyers were exempted of the liability for buying illegal gold

- Buyers were allowed to acquire raw gold under the **Principle of Good Faith**, assuming that all documents provided by miners were legitimate → now **only miners are liable**.
- This allowed for gold and money laundering using existing mining permits.
- For example, multiple sellers declare their (illegal) gold originates from one single permit area, regardless of their true origin.

DATA

Main challenge: identifying illegal mining activity.

- We overcome that by focusing on the location of gold deposits and whether they are inside Conservation Areas and Indigenous Territories, **where mining is strictly forbidden**.
- The municipalities with deposits in these protected areas are considered **more exposed to illegal mining**.

Figure 1 shows that gold deposits are widely distributed across the Amazon and also that there is a lot of intersection with protected areas.

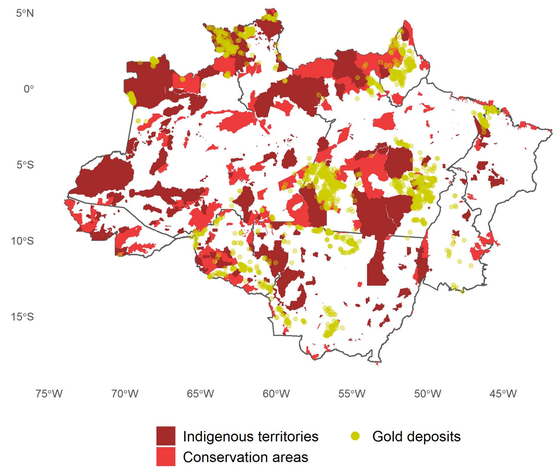

Fig. 1: Gold deposits, Indigenous Territories, and Conservation Areas in the Brazilian Amazon as of 2020
(Sources: Ministry of Environment, FUNAI, and Brazilian Geological Service)

Preview of results: Figure 2 suggests that after 2013 the homicide rate **increased disproportionately in municipalities more exposed to illegal gold**.

- Violence: homicides per 100,000 inhabitants

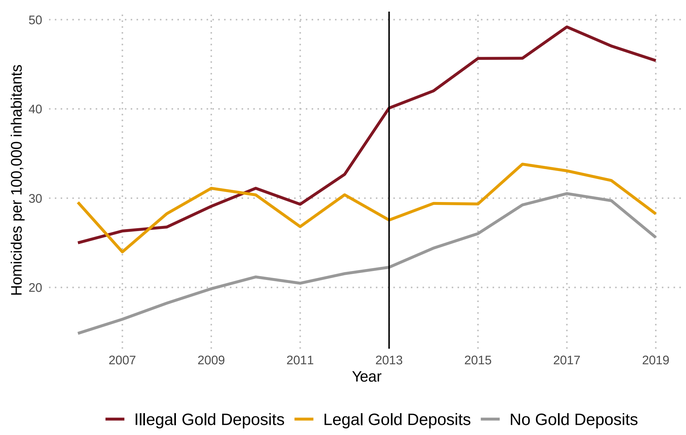

Fig. 2: Violence in municipalities with less than 100,000 people and presence of gold deposits
(Sources: DATASUS, Ministry of Environment, FUNAI, and Brazilian Geological Service)

EMPIRICAL MODEL

Our difference-in-differences model has three groups: (i) municipalities exposed to illegal gold mining, "IGD"; (ii) municipalities exposed to any gold mining, "GD"; (iii) and municipalities not exposed to gold mining, which are omitted.

$$\begin{aligned} Homicides_{it} = \delta_1 GD_i + \delta_2 IGD_i + \delta_3 D_{t\geq 2013} + \\ + \delta_4 GD_i * D_{t\geq 2013} + \delta_5 IGD_i * D_{t\geq 2013} + \\ + \delta_6 GD_i * IGD_i * D_{t\geq 2013} + X'_{it}\rho + \mu_{it} \end{aligned} \quad (1)$$

We are interested in δ_6, which provides the **impact of reducing private monitoring on violence in places more exposed to illegal gold mining**. This effect is conditional on being exposed to **any** gold mining.

RESULTS

Places more exposed to **illegal gold-mining** experience an increase of **more than 8 extra homicides** per 100,000 ($\approx 20\%$) after the regulatory change.

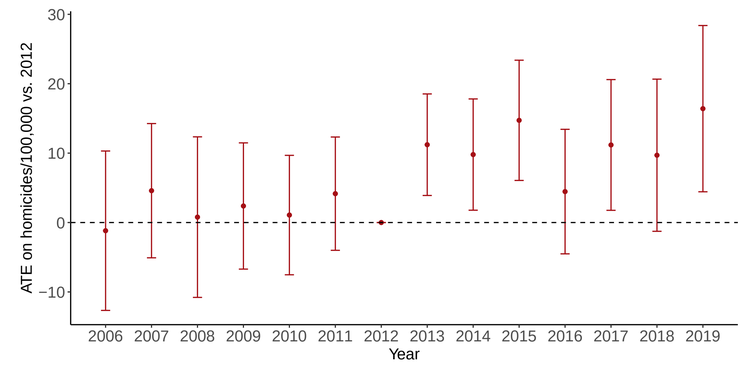

Fig. 3: Effect of reducing private monitoring on homicides in places more exposed to illegal gold mining (95% c.i.)

MECHANISMS AND ROBUSTNESS

Violence is coming from increasing illegal activity in places where mining is strictly forbidden. In this case, we measure illegal activity using the incidence of mining-related environmental crimes and deforestation.

Effect on violence is exclusive to areas exposed to illegal gold mining: **we do not see the same pattern when studying other valuable minerals**.

RELATED LITERATURE

Ariaster B. Chimeli and Rodrigo R. Soares. "The use of violence in illegal markets: Evidence from mahogany trade in the Brazilian Amazon". In: *American Economic Journal: Applied Economics* 9.4 (2017), pp. 30–57. ISSN: 19457790. DOI: 10.1257/app.20160055.

Thiemo Fetzer and Samuel Marden. "Take What You Can: Property Rights, Contestability and Conflict". In: *Economic Journal* 127.601 (2017), pp. 757–783. ISSN: 14680297. DOI: 10.1111/ecoj.12487.

Áureo de Paula and José A. Scheinkman. "Value - Added Taxes, Chain Effects, and Informality". In: *American Economic Journal: Macroeconomics 2* 2.October (2010), pp. 195–221.