

Comments to “On the Effects of Enforcement on  
Illegal Markets”, by Sandra Rozo, Daniel Mejía  
and Pascual Restrepo

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# Main contributions of paper

- High degree of internal validity
  - Fuzzy RD
  - Conditional differences-in-differences
- Unlike many RDs, their LATE is identified off from a large subsample of coca planted areas
  - Relevant implications for policies against illicit behavior

# Policy implications

- Reducing the supply of cocaine in the US by 1 kg (by spraying it) costs 462,000 – 1,500,000
- Price of 1 kg of cocaine in retail market: 150,000
- It would be cheaper for the US to buy all the cocaine that is exported from Colombia and then destroy it, rather than spraying it with herbicides!

# Outline

- Summary
- Empirical strategy
- Extensions
- Additional questions to explore

# Summary

Hypothesis:

- Aerial spraying of coca cultivation with herbicides should decrease the size of land cultivated with the illicit crop

Why:

- Decision to engage in illegal activities is shaped by incentives and penalties (Becker, 1968, Stigler, 1970)

# Summary

## Mechanism:

- Spraying increases the cost of coca cultivation, therefore decreases farmers' incentive to pursue it

## How:

- Fuzzy Regression Discontinuity based on diplomatic friction
  - Compare coca cultivation in cells near both sides of the 10 km threshold
- Conditional differences-in-differences
  - Control for predetermined characteristics

# Summary

## Results:

- Significant but small deterrent effects
- Compared to non-sprayed cells, sprayed cells have on average:
  - RD: 0.3 to 0.6 ha/km<sup>2</sup> less coca
  - Diff-in-diff: 0.2 ha/km<sup>2</sup> less coca

# Empirical strategy

- Ideal RD design:
  - RD design is more credible when individuals don't know the cutoffs/rules (Imbens, 2007)
  - Diplomatic friction occurs without anyone knowing it, next day stop spraying
  - Farmers can't relocate strategically
  - Compare the areas in the sprayed and non-sprayed (band) area

# Policy implementation and evaluation challenges

- Initial diplomatic friction in 2006
- Actual long term implementation starting in 2008
- Imperfect government compliance
- Possible concerns:
  - Strategic relocation in anticipation – spillovers
    - Production increased in non-sprayed relative to sprayed area in 2009-10
  - Sign of bias unknown:
    - Displacement of coca farmers from sprayed to non-sprayed?
    - Farmers diversifying away from legal crops to coca in non-sprayed area?

# How did the authors deal with these challenges

- Striking graphical analysis, show discontinuity in forcing variable
- Continuous spraying and cultivation before policy implementation
- Robust econometric results
  - Results hold by year, pooling all years and with 3 different bandwidths (3 km, 2.75 and 2.5 km)
  - Clustered standard errors at grid level
- Government did not adjust strategically
  - Did not compensate with an increase in manual eradication
  - Did not adjust the non-sprayed area strategically
- Show that results are an overestimation of true effect of spraying on overall cultivation: cultivation in the non-sprayed area increases within cells, and not because farmers grow coca bushes in new cells
- Also, differences-in-differences conditional on history of cultivation and spraying as well as some cell characteristics, and estimates are very similar to RD

# Extensions

- More evidence on the **mechanism**
  - By showing us how spraying increases the **cost** of cultivating coca
    - UNODC surveys on cost structure of coca farmers could help calculate actual changes in costs due to spraying
  - And that this costs **decreases** cultivation in sprayed areas
    - Either coca farmers leave (hopefully from sprayed area to areas other than the band)
      - Migration flows
    - Same farmers substitute away from coca to other crops or economic activities in sprayed areas
      - Land use data
- Optimal bandwidth selection and cross-validate (Ludwig and Miller 2005, 2007, Imbens and Lemieux 2008, Imbens and Kalyanaraman 2008)
- Selection on observables
  - Can show continuity in other variables?

# Related questions that would like to see answered in the paper

- Why is the effect so small?
  - Likelihood of spraying was only 10% higher in sprayed area relative to cells in band?
- How to think in terms of the policy bundle
  - Spraying + manual eradication
- Are there any heterogeneous effects by cells