

The Effect of Conditional Cash Transfer Policies on Regional Crime Levels:

Evidence from a Synthetic Controls Framework

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Motivation:

- large regional inequality between Colombian municipalities and high homicide rates.
- There is no certainty over the effect of conditional transfers on violent crime, and especially on homicides.
- Scarce academic literature on the impact of CCT programs on crime at the municipal level in Colombia.

Research Objective:

- Which are determinants of homicide rates for Colombian municipalities?
- **To what extent the coverage of conditional cash transfer program in Colombia (the pacific region of Colombia) may affect homicide rates?.**

Methods:

- Bayesian Model Averaging **BMA** (Fernandez et al. (2001)).
- Synthetic control methods (Abadie and Gardeazabal (2003)).

Data:

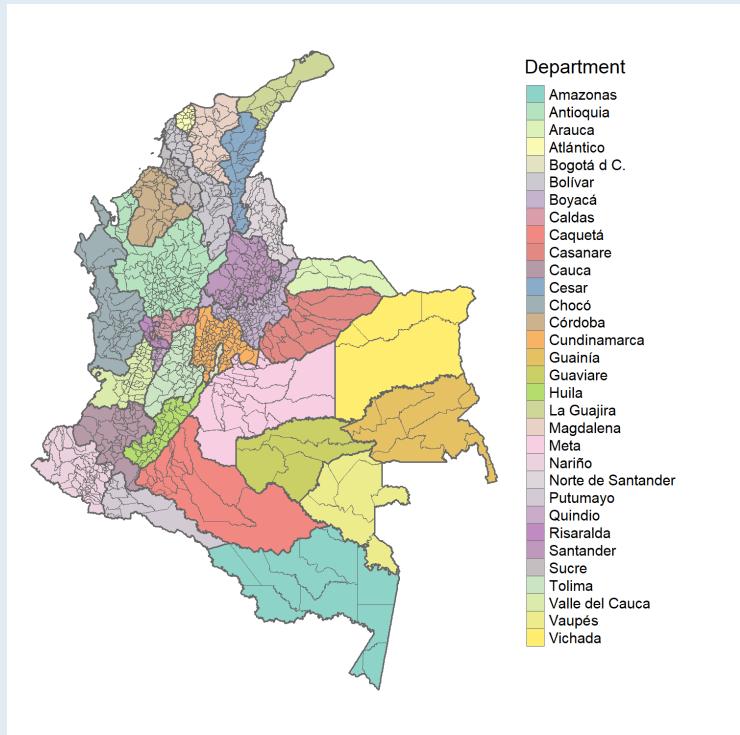
- Municipal panel dataset CEDE, released by the University of The Andes.
- National Administrative Department of Statistics.

Main Results:

1. 15 variables are found to be important determinants of homicide levels. They are related to **crime, inequality, drug-trafficking, conflict and literacy**.
1. The importance of spatial effects is highlighted by the fact that out of 15 variables **9 are spatially lagged variables**.
2. It was reported that by 2018, **the average homicide rates were lower for high CCTs coverage municipalities** when compared to synthetic controls ("copies" made out of a pool of low CCT coverage municipalities).

Colombian administrative levels

States and Municipalities

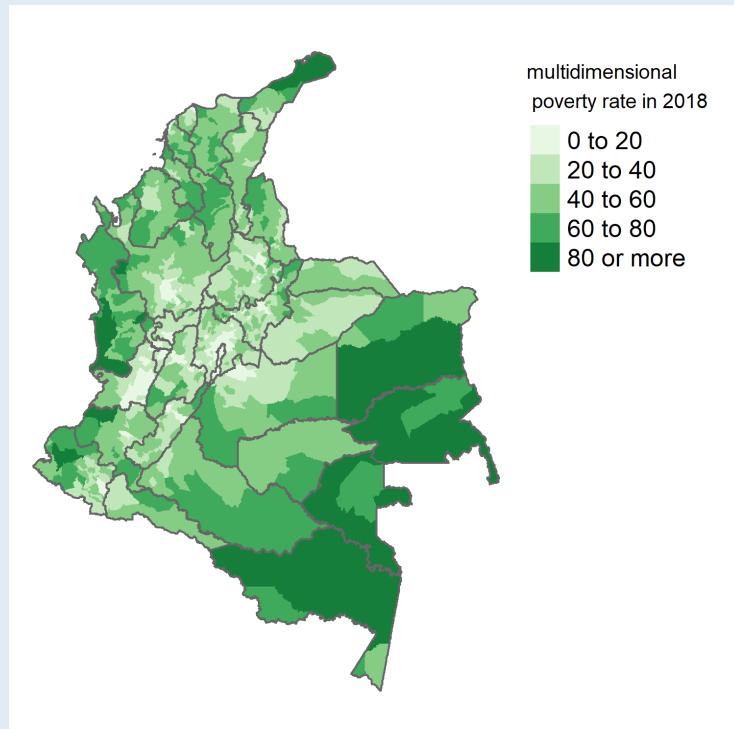


Natural Regions

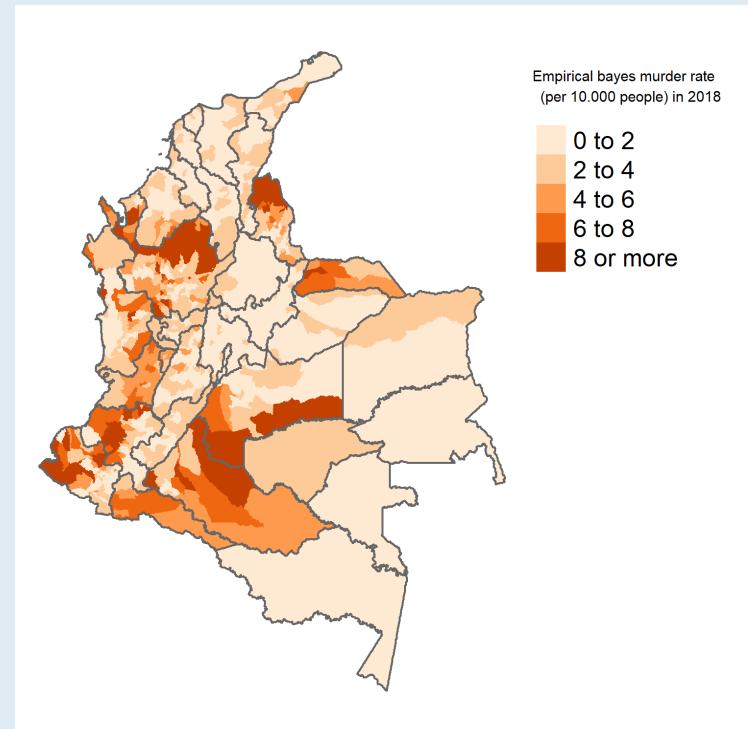


Large regional disparities in Colombia

Well-being



Crime

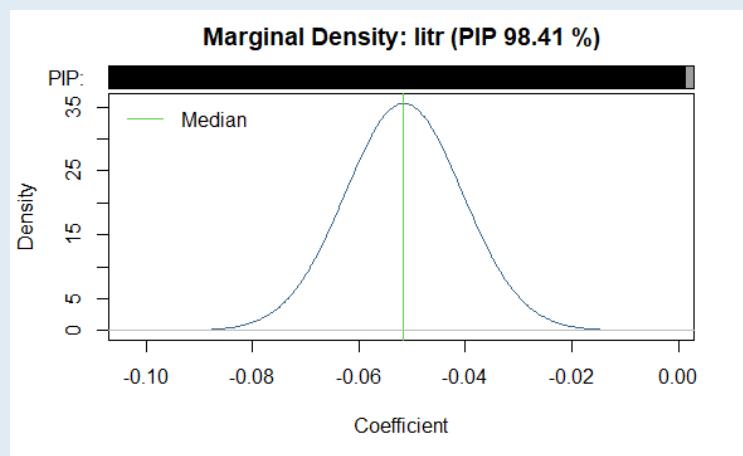
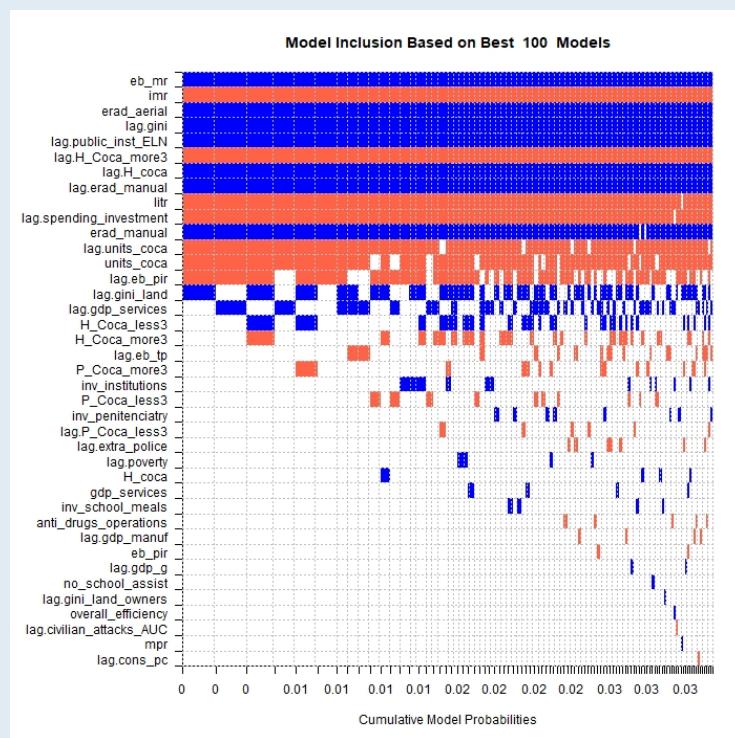


(In Germany = about 0.1 per 10.000
people)

Bayesian Model Averaging BMA - methods and results:

$$y = \alpha_i + X_i \beta_i + \varepsilon, \quad \varepsilon \sim N(0, \sigma^2 I)$$

- **how can researchers select just a handful of determinants?**
- **how to evaluate the importance of the inclusion of specific determinants in the model?**
- Bayesian Model Averaging (BMA) methods attempt to overcome these problems by estimating linear models for all (**MANY**) possible combinations of determinants X_i



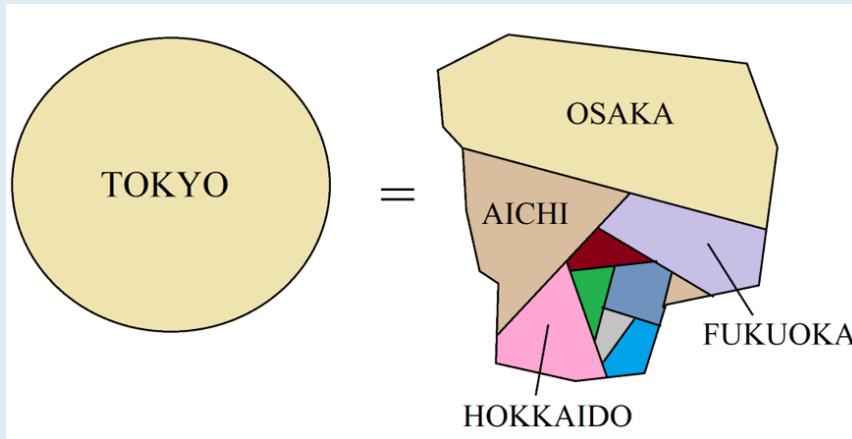
212 variables between original and spatially lagged variables were tested as determinants of 2018 homicide rates.

After running 2 million regressions...

description	PIP all variables	Post mean all
murder rate	1.000	0.356 (0.031)
infant mortality rate	1.000	-0.058 (0.011)
Coca H aerial eradication	1.000	0.001 (0)
Lag. Coca crops with more than 3 H	1.000	-0.041 (0.006)
Lag. Coca hectares	1.000	0.023 (0.003)
Lag Attacks against public institutions by rebels	1.000	36.062 (7.46)
Lag. H manual eradication	1.000	0.004 (0.001)
Lag. Income Gini	1.000	0.25 (0.041)
H manual eradication	0.990	0.002 (0.001)
Lag. Spending on investment local government	0.986	-0.095 (0.025)
Literacy rate	0.984	-0.051 (0.013)
Number of land units with coca crops	0.961	-0.004 (0.003)
Lag. Number of land units with coca crops	0.943	-0.015 (0.004)
Lag. Personal injury rates	0.681	-0.034 (0.025)
Lag. Land Gini	0.564	0.022 (0.021)

Synthetic control methods

visual intuition (In terms of GDP per capita)



$$TOKYO = 0.4 * OSAKA + 0.2 * AICHI + 0.1 * FUKUOKA + \dots$$

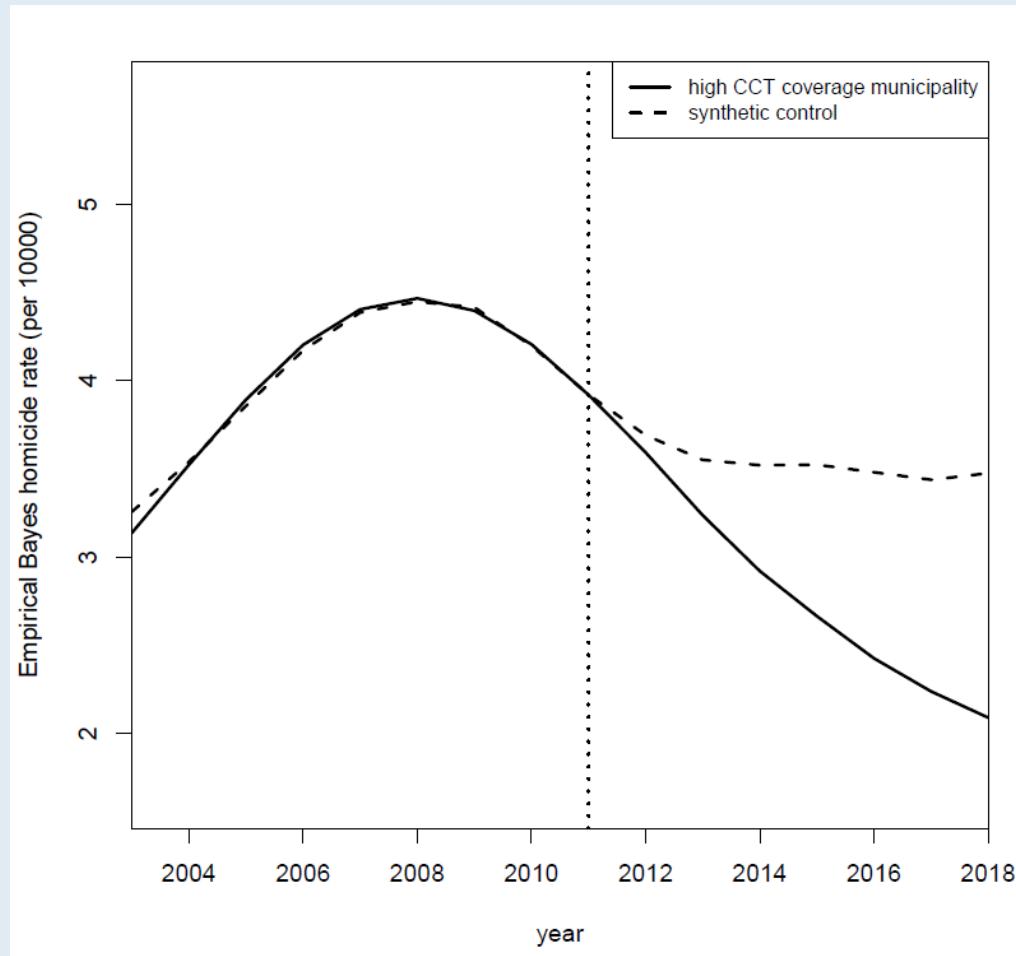
In terms of crime

The weights are found so that the synthetic municipality has a similar crime trend compared to the treatment municipality (2003-2011) and similar determinants of crime.

Results: Synthetic control methods

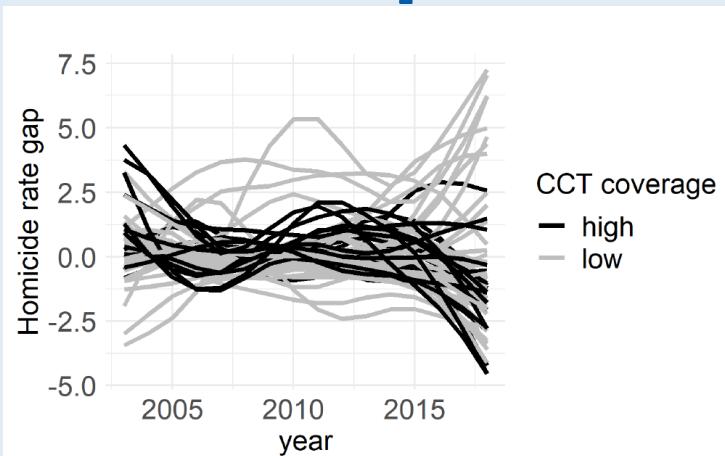
high – CCT – coverage > 70%

low – CCT – coverage < 30%

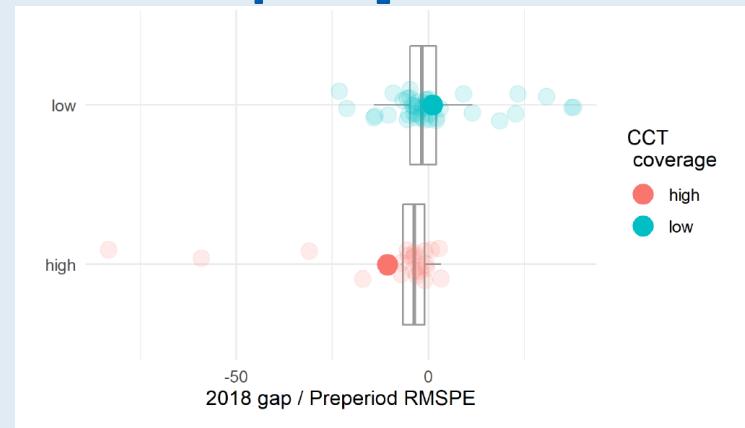


The effect of CCTs on crime

Crime gaps for treatment municipalities
and control placebos



Overall effects = the gap in 2018 / Root
mean squared predicted error



A t-test shows that the mean effect (lower crime) is statistically lower for the treatment group.

The results of the synthetic controls methods are fully reproducible.
<https://github.com/quarcs-lab/Tutorial-synthetic-control-methods-Felipe-thesis-chapter5>

Concluding Remarks

- Supporting previous studies, variables related to **inequality, literacy rates, previous crime levels, institutional capabilities, conflict and drug-trafficking** were reported as significant determinants of homicide rates.
- By 2018, **the average homicide rates were lower for high CCT coverage municipalities** when compared to synthetic copies made out of a pool of low CCT coverage municipalities.

Implications

- CCT programs appear to be comprehensive policies as they can tackle multiple issues such as **poverty, low education outcomes and violence**.
- Given funding constraints, it seems that investing in the expansion of this policy in the Pacific region can be an effective way to improve developmental outcomes in several areas.
- The framework of this paper can be considered a **data science framework to test the impact of regional policies**

BMA → determinants of Y → Synthetic Controls → The impact of X on Y

Further research

- The robustness of the result can be tested by changing the thresholds for low and high CCT coverage. Instead of 30% and 70%, one can use thresholds such as **20%-80% and 25%-75%**.
- A dataset of determinants of crime based on previous literature (instead of the determinants found with the BMA) can be assembled. **This new dataset can be used as the input for the synthetic control analysis.**
- **How can we integrate spatial effects and Synthetic Controls?** Spatial filtering? Adding a distance indicator as one of the determinants in the Synthetic Controls framework?

Thank you very much for your attention

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