

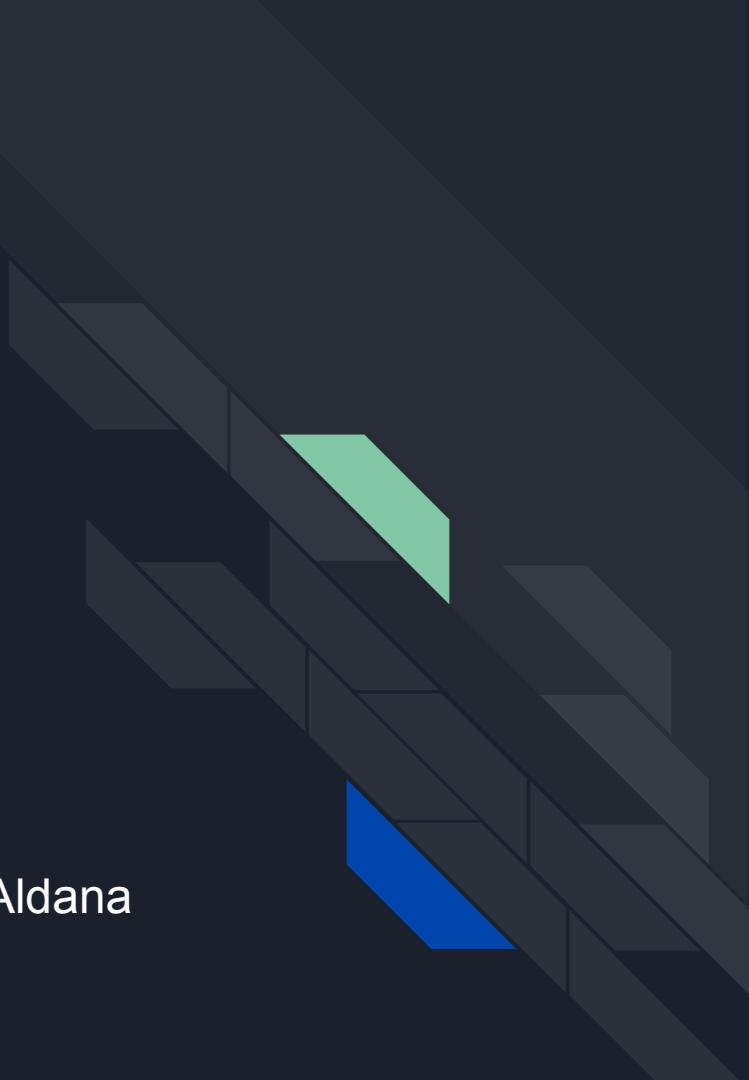
The background features a dark grey gradient with a subtle circular motion blur effect. Overlaid on this are several abstract geometric shapes: a large blue triangle pointing down from the top left, a green parallelogram below it, and a smaller blue triangle pointing up from the bottom left. In the bottom right corner, there's a detailed grayscale illustration of a printed circuit board (PCB) with various components like resistors, capacitors, and a central processing unit (CPU).

# Paper Presentation

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Group # 11  
Netflix II



# Modeling the role of police corruption in the reduction of organized crime: Mexico as a case study

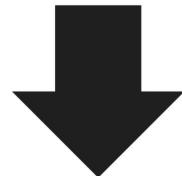
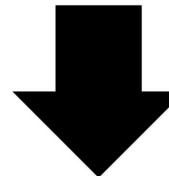


**Andrés Aldana, Hernán Larralde, Maximino Aldana**

# Introduction

- Model the role of police corruption in Mexico and its impact on the reduction of organized crime.
- Corruption is difficult to measure. Mostly done through perception surveys.
- How do crime levels change as a function of police corruption and its perception?
- Restoring public confidence in law enforcement could be as important as direct measures against corruption to reduce crime.

"You are a criminal!  
That's all you'll ever  
be!"



Person becomes a criminal, or continues to engage in criminal acts.

**Labeling Theory of Criminology:**  
Labeling someone a criminal makes that person more likely to commit criminal acts

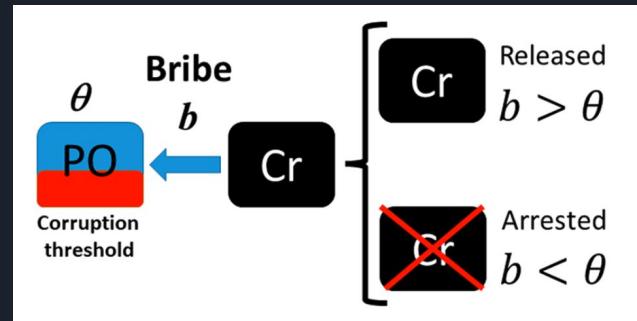
# Methodology

- Agent-based model to explore the dynamics between police corruption, public perception of corruption, and crime rates in Mexico.
- An agent-based model simulates interactions of individual agents to assess their effects on the system.
- Agents: police officers, criminals, regular citizens.
- Examine emergent behaviors arising from the rules governing individual actions and interactions.

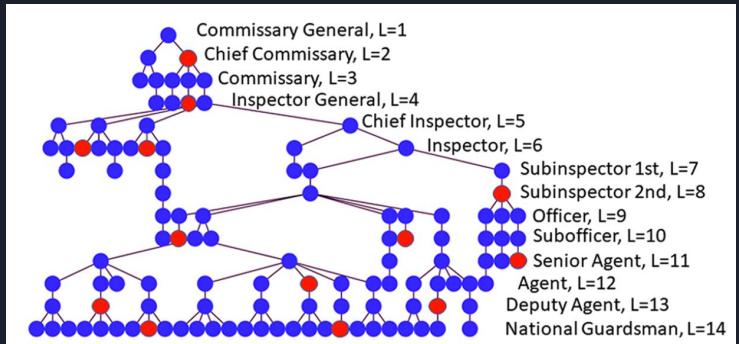


# Methodology

- Simulation runs over time to observe how crime spreads across the population under different conditions.
- Simulations produce a variety of outcomes under different scenarios. Showing how changes in police corruption and public perception can impact crime incidence.
- Valuable tool for policymakers to improve public safety.

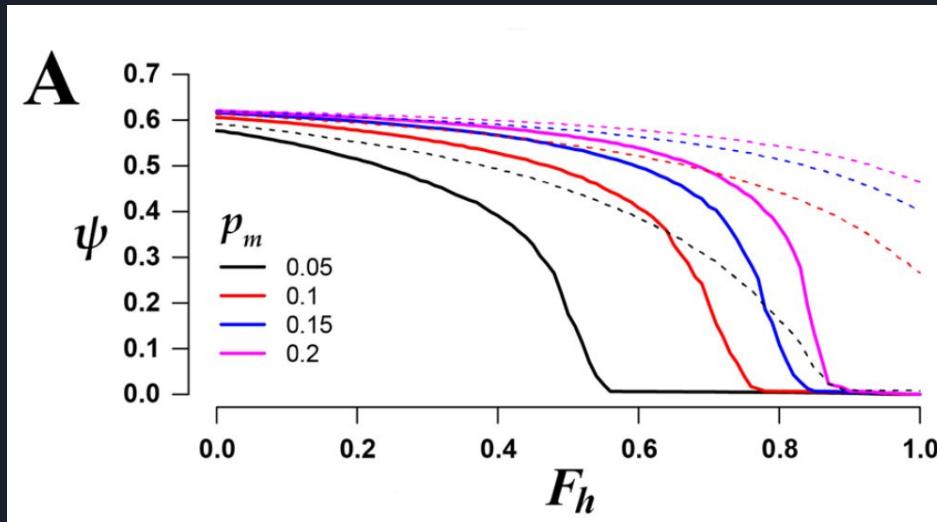


Police officers have a corruption threshold  $\theta$ .  
For honest officers,  $\theta = \infty$ .

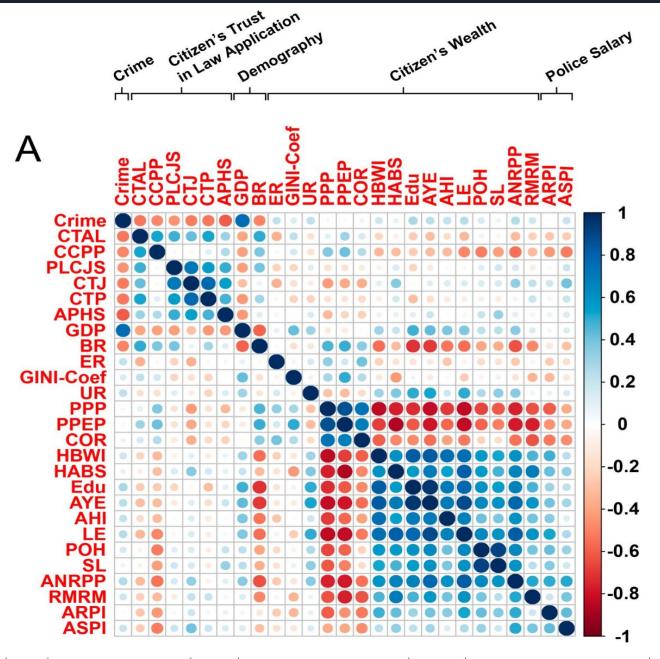


$\theta$  corresponds to an officer's level. Lower levels have a low  $\theta$ , while higher ranking ones have a higher  $\theta$ .

# Main Findings

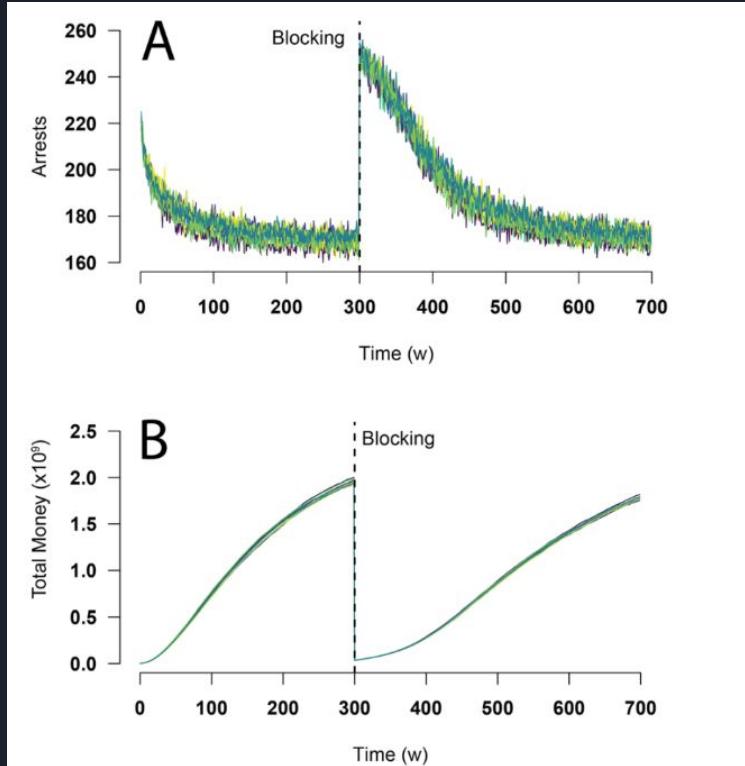


- Relationship between crime incidence rate (y-axis) and percentage of honest officers (x-axis).
- Fraction of honest officers increases as we move to the right.
- Different colors indicate different levels of “maximum turning probability” (probability that an honest officer becomes corrupt).
- Solid lines represent no inflated perception of corruption, while dashed lines show an inflated perception.

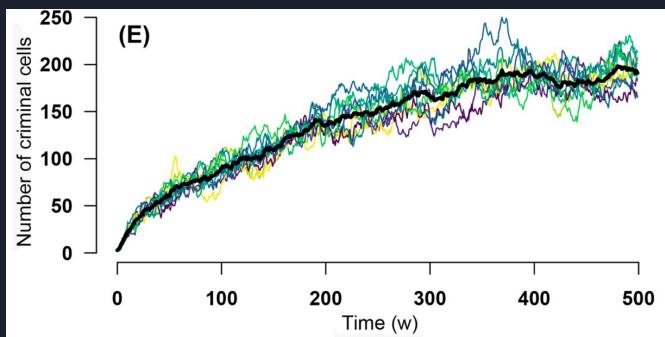
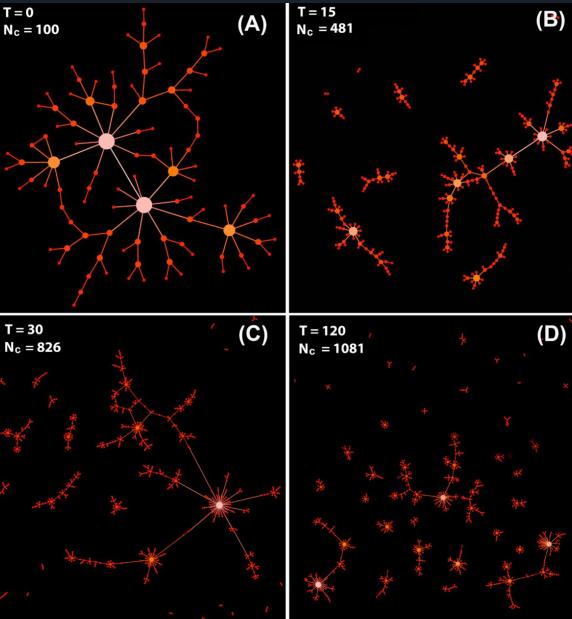


- Figure A shows the correlation between crime incidences and 25 different indicators of Social welfare.
  - Crime is not significantly correlated with social welfare indicators such as family income, poverty, education, etc.
  - Crime is anti-correlated with trust and confidence in police corporations and the justice system (red dots, first row and column).
  - Crime is positively correlated to GDP (First row, blue dot)
  - Crime is higher, citizens trust in the police and justice system is considerably lower.
  - Reason for this anticorrelation may be due, indeed, to there being more police corruption in the regions affected with higher crime rates.
  - Another possibility is that it is easy to get away with the crime due to less trust in the judicial system.

Crime	Crime	COR	Critical Occupation Rate	CTAL	Citizens' Trust in the Application of the Law
HBWI	Homes with Bandwidth Internet	CCPP	Citizens' Civil and Political Participation	HABS	Homes with Access to Basic Services
PLCJS	Perception of Lack of Corruption in the Judicial System	RMRM	Percentage of Homes with Roofs Made of Resistant Materials	CTJ	Citizens's Trust in Judges
AYE	Average Years of Education	CTP	Citizens' Trust in the Police	AHI	Average Home Income
APHS	Access to Public Health Services	LE	Life Expectancy	GDP	Gross Domestic Product
POH	Perception of Own Health	BR	Birth Rate	SL	Satisfaction with Life
ER	Employment Rate	ANRPH	Average Number of Rooms per Home	GINI-Coef	Gini Coefficient
Edu	Education	UR	Unemployment Rate	ARPI	Average Regional Police Income
PPP	Percentage of People in Poverty	ASPI	Average State Police Income	PPEP	Percentage of People in Extreme Poverty



- In the simulation model, after 300 weeks all money from 80% of the richest criminals in the criminal network is seized. (vertical line)
- Number of arrests sharply increase after the blocking, indicating there is not enough money to bribe the police officers and get away.
- Total money in the criminal network decreases after the blocking, but returns to previous maximum after a while.
- This implies that the amount of crime-associated money that is confiscated has little impact on the long-term crime incidence.



- Evolution of the criminal network.
- Figure A shows an initial fully connected criminal network, which exhibits a scale-free-like topology. Hubs can be seen in the network.
- Figures B, C, and D show the effects of police officers capturing criminals.
- This leads to the main criminal network breaking down into smaller subnetworks.
- Figure E shows a steady increase in the number of criminal cells.



# Strengths

- The methodology and findings have broad applicability. The model can be adapted to other countries or regions facing similar issues, making it a valuable tool for comparative studies and international policy development.
- Corruption and its perception are difficult to measure. This study quantitatively models these aspects, bridging the gap between qualitative observations and quantitative analysis.
- An agent-based model offers a flexible approach to simulate complex social dynamics. It allows for the analysis of individual behaviors and their effects on the system, providing insights that are not easily obtainable.



# Limitations

- The model does not simulate potential conflicts between criminal groups after a large criminal organization is fractured. These conflicts can impact the dynamics of crime and violence.
- The simulations do not account for the efforts of law enforcement to combat corruption within its ranks. The model might not accurately reflect the potential impact of internal anti-corruption measures.
- The study does not incorporate a feedback mechanism between the public's perception of police corruption and the actual fraction of corrupt police officers. The model may not fully capture the cyclical nature of corruption, where increased perception of corruption could lead to higher levels of corruption.



# Relation to the Course

- The paper uses network analysis to determine how society perceives police corruption and correlates it to the seemingly increased crime rates due to the public's perception of them.
- The models involve the construction and evolution of criminal networks, where criminals are organized in hierarchical structures. This aspect of the model allows for the analysis of network properties such as connectivity, centrality, and modularity. It also employs a preferential attachment algorithm based on money to simulate the formation of connections in the criminal network. This algorithmic approach is fundamental in understanding the emergence of network hubs and the distribution of node degrees, which was well covered in the course.
- Data mining techniques were applied to analyze patterns in crime data and identify factors contributing to crime outbreaks. By analyzing this data, the paper identifies correlations and dependencies among variables related to corruption.



# Conclusion

- The results presented in this work can be considered by policy makers in developing countries in which a high perception of police corruption leads to a lack of respect for the institutions and those in charge of maintaining order (judges, prosecutors, police).
- While poverty and inequality may be important for the emergence of violent crime in Mexico, they may not be the main causes.
- A high perception of corruption leads citizens to disrespect authorities and behave out of the law, increasing the level of crime.
- Even a slight increase in the perceived level of corruption can lead to a considerable increase in crime.
- Arresting kingpins or confiscating their assets does not seem to reduce crime in the long term, but instead fractures the criminal network, creating more independent cells.

☰

# Questions?

# Thanks!

Paper Link:

[Modeling the role of police corruption in the reduction of organized crime: Mexico as a case study | Scientific Reports](#)

