On measuring dependence of income distribution and crime

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Background

• The effects of income distribution are a politically important and current topic
• Studies suggest that income inequality lowers GDP growth
• Studies on the effects on crime have been somewhat limited in scope
• Do different sorts of income distributions explain different sorts of crime?
Income distribution

- Most commonly used index is Gini coefficient
- Based on Lorenz curve (cumulative portion of total disposable income)
- Describes the equality of the distribution
- Different distributions can have the same Gini coefficient
- Other indices might explain crime better
Gini coefficient

Gini = A/(A+B)
Other indices used for income distribution

- Percentile ratios (P90/P10, P90/P50...)
- Share ratios (S90/S10)
- Atkinson index

\[
A_\varepsilon(y_1, \ldots, y_N) = \begin{cases} 
1 - \frac{1}{\mu} \left( \frac{1}{N} \sum_{i=1}^{N} y_i^{1-\varepsilon} \right)^{\frac{1}{1-\varepsilon}} & 0 \leq \varepsilon \neq 1 \\
1 - \frac{1}{\mu} \left( \prod_{i=1}^{N} y_i \right)^{\frac{1}{N}} & \varepsilon = 1
\end{cases}
\]
Crime

• Unequal income distribution is one possible macro-level crime determinant
• Only intentional homicides and robberies were studied due to lack of reliable data
• Both crime types were also combined to a crime index to approximate overall (violent) crime rate
• Crime index = log(homicide rate/average of homicide rates + robbery rate/average of robbery rates)
Methods

• Part I: observing correlations during three different periods in the 21st century
• Do we find differences between the correlations of different indices?
• Part II: multiple linear regression analysis for OECD countries to study possible causation better
• Other explanatory variables: GDP, GDP growth, education
## Results (I)

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Results (I)
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Results (II)

![Heatmap Image]
Results (II)

- Income distribution remained the main and statistically significant contributor to violent crime
- Robbery rates are harder to explain by macro-level factors (reliability)
- Enrolment rates for 15-19 year-olds are highly linked with income distribution
Conclusions

• There is a clear and strong link between income distribution and crime
• Letting inequality of income distribution rise will likely lead to higher crime rates
• All indices for income distribution explain crime roughly as well on macro-level
References

- https://data.oecd.org/
- http://www.lisdatacenter.org/
- https://data.unodc.org/
- http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2652960/