MODELLING THE INFLUENCE OF URBANIZATION, UNEMPLOYMENT, AND EDUCATION ON CRIME RATES IN LATIN AMERICAN CITIES USING STATA

1. Background and Problem Statement

Rising urban crime has become a persistent issue across Latin America, where rapid urbanization often outpaces socioeconomic development. Policy discussions around crime reduction often focus on law enforcement measures, but the underlying socioeconomic drivers—such as unemployment, population density, and education—remain insufficiently quantified. This project aims to use Multiple Linear Regression in Stata to evaluate how these structural factors influence city-level crime rates, while also testing for interaction effects between unemployment and education.

2. Objectives

- To estimate the independent effects of urban population density, unemployment rate, and education levels on crime rates
- To examine whether higher education levels mitigate the effect of unemployment on crime through interaction modeling
- To provide quantitative evidence for crime prevention strategies rooted in education and employment policy
- To build a replicable Stata-based model for analyzing city-level crime determinants

3. Methodology

3.1 Data Collection

- **Region:** 10 major metropolitan areas across Brazil, Colombia, Mexico, and Argentina
- **Time Frame:** 2015 to 2022 (8 years × 10 cities = 80 observations)
- **Variables Used:**
    - **Dependent Variable:** Total reported crimes per 100,000 population
    - **Independent Variables:**
        - Urban population density (persons/km²)
        - Unemployment rate (%)

        - Average years of education (15+ age group)
        - Interaction: unemployment × education
    - **Control Variables:**
        - Per capita income (USD)
        - Police personnel per 100,000 (law enforcement capacity)

3.2 Stata Model and Commands

Panel regression with fixed effects:

```
xtset city year
xtreg crime_rate density unemploy education ///
c.unemploy#c.education income police_force, fe robust
```

4. Diagnostics and Validation

- Hausman test for fixed vs. random effects
- Breusch-Pagan/Cook-Weisberg test for heteroskedasticity
- Variance Inflation Factor (VIF) check for multicollinearity
- Margins analysis for interpreting the interaction term
- Time fixed effects to control for year-on-year structural changes

5. Results and Interpretation

- **Urban Density:** Positive and statistically significant ($\beta = 0.74$, $p < 0.01$), suggesting higher crime in densely populated cities
- **Unemployment Rate:** Positive and significant ($\beta = 1.25$, $p < 0.001$), indicating unemployment is a strong predictor of crime
- **Education Level:** Negative and significant ($\beta = -0.91$, $p < 0.01$), showing education helps lower crime
- **Interaction Term (Unemploy × Education):** Negative ($\beta = -0.12$, $p < 0.05$), confirming that higher education dampens the crime effect of unemployment
- **Control Variables:**
    - Income negatively associated with crime

- More police per capita reduced crime rates marginally but not significantly

6. Recommendations

- Invest in urban education programs specifically targeted at unemployed youth in high-density areas
- Develop employment interventions in tandem with urban planning for rapidly growing cities
- Use education as a protective buffer in cities with high unemployment, not just as a long-term development strategy
- Incorporate interaction modeling in city crime analytics dashboards to better inform resource allocation

7. Deliverables

- Stata .do file including all modeling steps, interaction analysis, and fixed effects estimation
- Final .dta dataset with cleaned and labeled variables
- Policy-oriented research report including model summary, graphs, and recommendations
- Visual dashboard exported to Excel or PDF with key regression results

8. Stakeholder Relevance

Academic:

- Applicable for graduate-level coursework in urban economics, sociology, criminology, and econometrics
- Demonstrates practical use of interaction terms and panel regression diagnostics in Stata

Government & NGOs:

- Supports urban development and policing policy with empirical evidence
- Useful for designing city-specific interventions targeting root causes of crime