

ECON - 5253 Presentation

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INTRODUCTION

This project aimed to explore the relationship between crime rates in Oklahoma townships relative to their population and income. OklahomaWatch claims that larger towns are not significantly associated with criminality. We test several hypotheses:

- ▶ H1a: Overall crime is positively associated with population.
- ▶ H1b: Overall crime is negatively associated with income.
- ▶ H2a: Violent crime is positively associated with population.
- ▶ H2b: Violent crime is negatively associated with income.
- ▶ H3a: Property crime is positively associated with population.
- ▶ H3b: Property crime is negatively associated with income.



DATA COLLECTION AND DESCRIPTION

Data was collected from various sources, including with and without the use of an API. All data collection was completed in RStudio.

Data Scraped Without API:

- ▶ Wikipedia (to identify the county of each town)
- ▶ OklahomaWatch (Criminality of towns, including overall crime, violent crime, and property crime, and normalizing these by population)

Data scraped with an API:

- ▶ U.S. Bureau of Economic Analysis (to find the average income for each county)
- ▶ Wikipedia (to find the latitude and longitude of towns)¹

¹Due to challenges in data handling, this data has not yet been integrated into the model.



METHODOLOGY

A Hierarchical Linear Model (HLM) was employed to explore the nested aspects of the data.

$$\text{Rate of Crime} = \beta_0 + \beta_1 \times \text{Per Capita Income} + \beta_2 \times \text{Population} + b_{\text{County}}$$

This model specifies that the offense rate is modeled as a function of per capita income and population, with random intercepts for each county. This means the baseline offense rate varies by county, but the effect of income and population on offense rate is assumed to be fixed across counties.



FINDINGS

Table: Summary of total crime rate model

Coefficient	Estimate	SE	df	T_value	P_value
(Intercept)	52.81	10.89	365.10	4.85	0.00
Per_Capita_Income	-0.00	0.00	379.65	-0.57	0.57
Population	0.00	0.00	349.68	1.43	0.15



FINDINGS

Table: Summary of violent crime rate model

Coefficient	Estimate	SE	df	T_value	P_value
(Intercept)	2.15	0.45	323.22	4.81	0.00
Per_Capita_Income	-0.00	0.00	334.45	-1.21	0.23
Population	0.00	0.00	381.38	0.50	0.62



FINDINGS

Table: Summary of property crime rate model

Coefficient	Estimate	SE	df	T_value	P_value
(Intercept)	17.80	3.66	357.87	4.87	0.00
Per_Capita_Income	-0.00	0.00	381.97	-0.50	0.61
Population	0.00	0.00	354.87	4.02	0.00



FINDINGS

The findings indicate partial support for OklahomaWatch's claim that bigger towns are not significantly associated with crime.

Hypth.	Description	Result
H1a	Overall crime is positively associated with population.	X
H1b	Overall crime is negatively associated with income.	X
H2a	Violent crime is positively associated with population.	X
H2b	Violent crime is negatively associated with income.	X
H3a	Property crime is positively associated with population.	✓ ²
H3b	Property crime is negatively associated with income.	X

Table 1: Summary of Hypotheses

²Although statistically significant, the effect size is negligible.



IMPLICATIONS

Policy

- ▶ State / County resources should be diverted to population centers
- ▶ Companies should consider investing in and moving to smaller towns

Research

- ▶ Opposes Strain Theory by suggesting criminality may be based on other factors than need (such as familiarity or sense of community)
- ▶ Points to future research potential, such as dividing crime into *ad individuum* and *ad statum*, or examining how counties aid each other based on spatial relatedness. State borders should also be considered to see if interstate dealings strain resources



HOW DID AI CONTRIBUTE TO THIS RESEARCH?

This research utilized AI, specifically ChatGPT-3.5 and 4.0, for:

- ▶ Code development and troubleshooting in RStudio and LaTeX.
- ▶ Internet searches for academic research³.
- ▶ Advice on methodologies and argument structures.
- ▶ Assisting in basic mathematics and data cleaning tasks.

The use of AI is equated to any other research tool, ensuring the paper's academic integrity. Critical intellectual processes were conducted by the human research team.

³All AI-found research was verified for accuracy by the research team. ▶

