Apr 15th, 1:00 PM - 3:00 PM

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Repository Citation
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**Socioeconomic Effect on Crime in the Southwest United States Pre- and Post-Great Recession**

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**Introduction**

Facing the Great Recession, the Southwest megapolitan cluster in the United States including Las Vegas, Southern California and Sun Corridor in Arizona had a massive negative economic shock. Skyrocketing unemployment, massive foreclosures and other socioeconomic factors may negatively affect our safe environment with changing patterns in crime. This study aims to investigate the impacts of socioeconomic factors on different types of crimes committed in the megapolitan cluster of the Southwest United States. Using annual crime datasets, we look at the three years before the Great Recession and subsequent three years (2005-2010). The metropolitan areas, Los Angeles, CA, Las Vegas, NV, Phoenix, AZ, and Tucson, AZ and surrounding neighborhood counties are included for the analysis.

**Methodology**

**Exploratory spatial data analysis (ESDA)** is an extension of exploratory data analysis (EDA) to detect spatial properties of data sets. There are two techniques in which ESDA is used to detect spatial autocorrelation; global and local.

- **Global Spatial Model:** Moran’s I
  \[ I = \frac{1}{N} \frac{1}{N} \sum_{i} \sum_{j} W_{ij} (x_i - \bar{x}) (x_j - \bar{x}) \]
  where \( N \) is the number of spatial units indexed by \( i \) and \( j \), \( x \) is the variable of interest, \( \bar{x} \) is the mean of \( x \), and \( W_{ij} \) is an element of a matrix of spatial weights.

- **Local Spatial Model:** Local Indicators of Spatial Association (LISA) where \( I_i \) is the Moran’s I measure of global autocorrelation, \( I_i \) is local, and \( N \) is the number of analysis units the map.

**Spatial Weights Matrix** quantifies the spatial relationships that exist among the features in the dataset. Distance-based weights matrix is applied for this study with a radius of 120 miles.

**Spatial Regression Model** is developed when the values of \( y \) in one unit \( i \) are directly influenced by the values of \( y \) found in \( i \)'s “neighbors.”

**Ordinary Least Squares Regression:**

\[ y_i = x_i \beta + \epsilon_i \]

**Error Term:** \( \epsilon_i = p \omega y_i + \epsilon_i \), spatially lagged term for the dependent variable and an independent error term

**Spatially Lagged Model:**

\[ y_i = x_i \beta + p \omega y_i + \epsilon_i \]

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**Spatial Distribution of Annual Violent Crime**

**Spatial Distribution of Annual Property Crime**

**LISA Map of Annual Violent Crime**

**LISA Map of Annual Property Crime**

**Coefficient of Spatial Lag Model for Violent Crime**

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2008</th>
<th>2010</th>
</tr>
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<tbody>
<tr>
<td>W_CRIMVIO</td>
<td>0.53***</td>
<td>0.42***</td>
<td>0.44***</td>
</tr>
<tr>
<td>CONSTANT</td>
<td>-226.86***</td>
<td>-178.13***</td>
<td>-153.85**</td>
</tr>
<tr>
<td>UNEMPLOYMENT</td>
<td>-18.04***</td>
<td>-19.46***</td>
<td>-5.86</td>
</tr>
<tr>
<td>NO DIPLOMA</td>
<td>993.17***</td>
<td>1223.54***</td>
<td>632.58*</td>
</tr>
<tr>
<td>FEMAFAF</td>
<td>2095.96***</td>
<td>1976.44***</td>
<td>1898.60***</td>
</tr>
</tbody>
</table>

*P < 0.05  **P < 0.01  ***P < 0.001

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**Conclusion**

The spatial autocorrelation of annual crime is more noticeable in violent crime than for property crime. Specifically in Clark County of NV, we can see that there is a significant increase of violent crime while other counties have either changed very little or not at all. Regardless of time, California has higher concentrations of violent crime compared to most part of Arizona. The changes in property crime are very minimal and show slight increases in five counties. From a local spatial autocorrelation perspective (LISA), there are clusters of high rates of violent crimes in California while Arizona has clusters of low rates of violent crimes regardless of time.

Specified spatial lag model confirms that there is a strong and positive neighborhood effect. Unlike our expectations, there is a negative effect of unemployment on violent crime. With the increase in the shares of ‘no diplomas’ and ‘female head-of-households’, the violent crime rate increases as expected.

From this study, we identified the temporal shift of spatial distribution in crime and this will guide policy makers to reallocate limited resources effectively into those areas.

Limitations of this study include a small sample size due to the availability of data. Future directions include expanding the study area into different parts of the United States and gathering more socioeconomic and demographic data from smaller counties. Using different types of neighborhood structures could have yielded different spatial distribution patterns of crimes considering neighborhood effects.