

REVISED ABSTRACT

Title: Dynamics of Crime Spread Across a Network of Regions

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The spread of crime across different regions in an organized system is complex and dynamic that calls for a topical approach. In this paper, we formulate a compartment model to study the effects of crime spread across a network of regions. Our model equations are based on the Kermack-McKendrick Compartment Model for contagious diseases. Previous research papers on mathematical models of crime normally assume no movement between regional populations. Given the infrastructure in urban areas, this is an unrealistic assumption. The purpose of this model is to develop these preceding models by incorporating the movement between regional populations. Such integration shall enable us to understand how high travel rates between different regions affect the criminal population in these areas. To that extent, we assume that crime is contagious. Using this movement, we analyze how varying different parameters of our model equations influence the long-run criminal population in each region. Furthermore, we developed our model to demonstrate how specific interactions between the parameters in our model equations allow prison to function as a “school of crime”. This analysis allowed us to make conclusions about long-term incarceration rates and crime policies. The model developed in this paper lays the foundation for future models on the dynamics of crime spread. Using the appropriate data, we can potentially apply this model to real-world scenarios.