Testing the "Law of Crime Concentration" in Japanese Cities
: A geographical crime analysis of Tokyo and Osaka

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Highlights

- **The "Law of Crime Concentration" was tested in relation to eight property crimes in Tokyo and Osaka.**
- **The degree of concentration depended upon the types of crime.**
- **The degree of concentration of residential burglary in Tokyo and Osaka could be considered comparable to Antwerp.**
- **Regardless of crime types, the degrees of concentration were stable or more concentrated over time.**

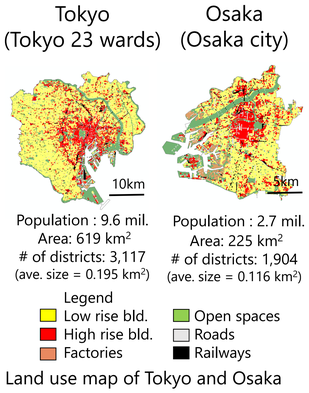
Research Questions and Objectives

- The "Law of Crime Concentration" (LCC) is the well-known phenomenon whereby many crimes are concentrated in certain narrow areas of a city regardless of the city or year (Weisburd, 2015).
- LCC has been tested not only in the United States, but also non-U.S. cities. However, as shown by Lee, Eck, O, and Martinez (2017), no studies have ever tested LCC in Asian cities with low crime. As a first step toward testing LCC's applicability to Asian cities, **this study describes crime concentration in two Japanese cities, Tokyo and Osaka**, focusing on the difference of the degree of crime concentration between crime types and years.

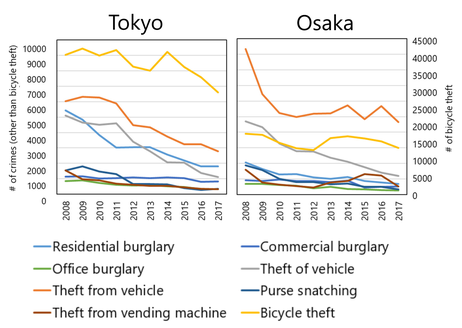
Methodology

Study area and data

Tokyo and Osaka are the first and second largest cities in Japan. The prefectural polices of Tokyo and Osaka, respectively, provide crime data aggregated by crime type and census enumeration district every month. Eight types of property crime —**residential burglary, commercial burglary, office burglary, theft from vehicle, theft of vehicle, bicycle theft, purse snatching, and theft from vending machine**— that occurred between 2008 to 2017 were analyzed.



Land use map of Tokyo and Osaka



Annual change of Number of crimes in Tokyo and Osaka

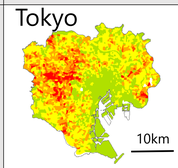
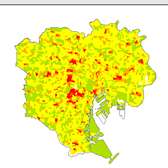
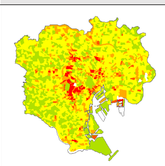
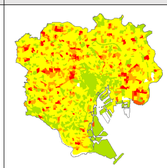
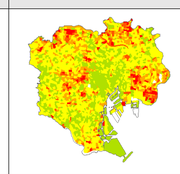
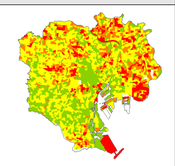
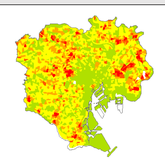
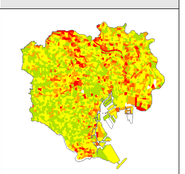
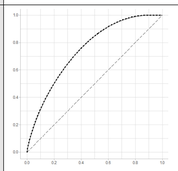
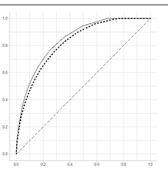
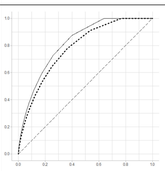
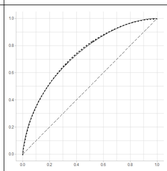
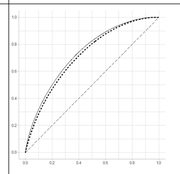
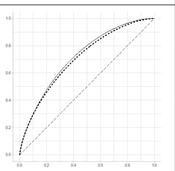
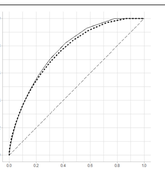
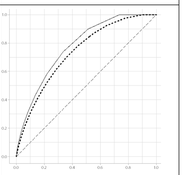
Analysis

Analysis 1: We compared the degree of crime concentration between crime types using **Gini coefficient (G),** which is calculated for crimes that occurred between 2008 and 2017.

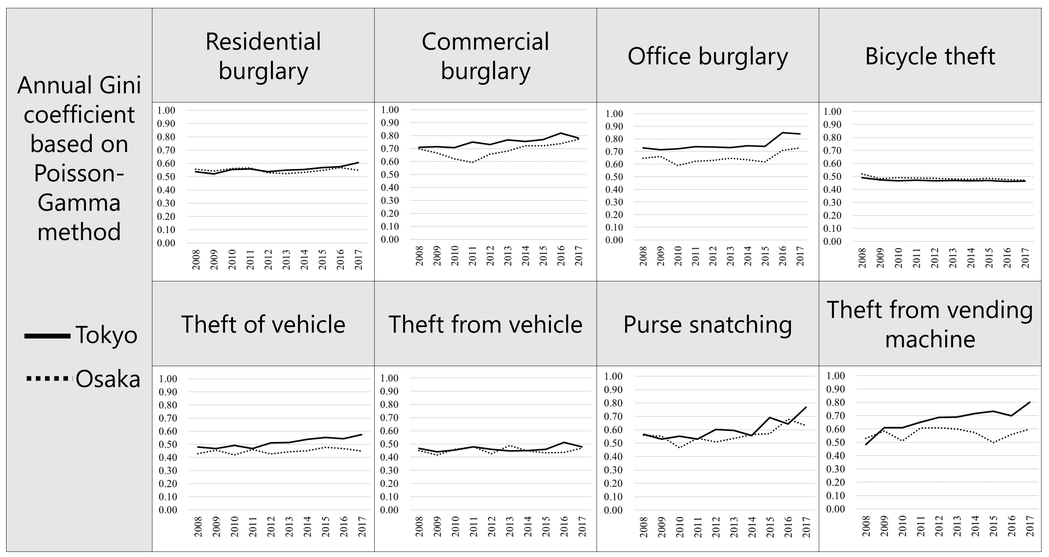
Analysis 2: We identified the annual changing pattern of crime concentration for each crime type using G. In order to avoid bias caused by a small number of crimes, "**Poisson-Gamma method**" was used (Mohler et al., 2019).

Results

Analysis 1: Difference of crime concentration between crime types
— Crime types where the potential targets are distributed disproportionately have a more concentrated pattern

Crime type	Residential burglary	Commercial burglary	Office burglary	Bicycle theft	Theft of vehicle	Theft from vehicle	Purse snatching	Theft from vending machine
Crime Maps (2008—17 in total)								
	Tokyo 10km / Osaka 5km							
	< -0.50 Std. Dev. / -0.50 - 0.50 Std. Dev. / 0.50 - 1.5 Std. Dev. / 1.5 - 2.5 Std. Dev. / > 2.5 Std. Dev.							
The Lorenz curve and Gini coefficient — Tokyo ····· Osaka								
	Tokyo: **0.49** Osaka: **0.50**	Tokyo: **0.69** Osaka: **0.64**	Tokyo: **0.69** Osaka: **0.56**	Tokyo: **0.47** Osaka: **0.48**	Tokyo: **0.48** Osaka: **0.44**	Tokyo: **0.44** Osaka: **0.41**	Tokyo: **0.55** Osaka: **0.53**	Tokyo: **0.55** Osaka: **0.47**

Analysis 2: Difference in the annual change of crime concentration between crime types
— Stable or more concentrated over time regardless of crime type.



Discussion and Conclusion

- **Crime types featuring potential targets were distributed disproportionately**, with commercial and office burglary being more concentrated. This result was consistent with the findings of a study conducted in Vancouver (Andresen and Malleson, 2011; Andresen et al., 2017a; Andresen et al., 2017b).
- Gini coefficients for residential burglary in each year represented in this study (0.52—0.60 in Tokyo and 0.52—0.57 in Osaka) were comparable with the Gini coefficient for residential burglary in Antwerp (Vandeviver & Steenbeek, 2017). Thus, at a minimum, **residential burglaries in Tokyo and Osaka may potentially be just as concentrated as in Antwerp**.
- Regardless of crime type, the degrees of concentration were stable or more concentrated over time. This result is consistent with previous studies concluding that crime concentration stayed static even in situations of crime decrease (Hardyns et al., 2018; Vandeviver & Steenbeek, 2017).
- Therefore, it can be concluded that **LCC is partially validated in Tokyo and Osaka**.