Data-Driven Analysis of the Impact of The Liquor Amendment Act 2014 (The Lockout Laws) on Non-Domestic Assaults

Centre for Translational Data Science, University of Sydney [1]

The Centre for Translational Data Science (CTDS) has studied non-domestic assaults (NDA) in New South Wales in Kings Cross and its surrounding areas. The data are daily counts of non domestic violence for the period January 2005 to December 2017, and were generously provided by the NSW Bureau of Crime Statistics and Research (BOCSAR). For comparative purposes we confine the areas of our analysis to those used in [1]; namely Kings Cross, The Sydney Central Business District (CBD), Proximal Displacement Areas (PDA) and Distal Displacement Areas (DDA). A map of these areas appears in Figure 1. The lockout laws restrictions were applied to Kings Cross and the CBD, but not to the PDA and the DDA.

Figure 2, displays the number of monthly NDAs for each of the four areas, with detected changed points marked by dotted lines. The estimated average monthly NDAs for each area are shown by the solid line, while the shaded area surrounding this line represents a 95% credible interval for this average.

Key Findings

1. The lockout laws had no impact on the distribution of daily NDAs in the CBD. The CBD experienced a sharp drop in NDAs in August 2011, two and a half years prior to the lockout laws' enactment. NDAs in the CBD have weekly and bi-weekly periodicities. The lockout laws had no impact on this periodicity.
2. Prior to the lockout laws, NDAs in Kings Cross were declining and had a strong weekly periodicity. Following the enactment of the lockout laws, the number of NDAs in Kings Cross decreased sharply and the weekly periodicity was less pronounced. This sharp initial decrease was followed by a steady decline in NDAs between 2014 and 2016. There was an additional structural break in the NDAs in King Cross in 2016. Following this break, the number of NDAs was largely constant.
3. The distribution of daily NDAs in the PDA did not change over the period 2005-2017.
4. The was a sharp decrease in the number of NDAs in the DDA in early 2008. This was followed by a slow decline in NDAs from 2008 to 2014. There was no change point detected in the distribution of NDAs at the time of the lockout laws.

Details of the methodology and techniques used can be found in [2]. The approach used in this analysis differs from the analysis in [1] in four ways:

1. The technique does not assume that the time series are stationary. Instead the number and timing of any structural breaks in the time series are considered to be random variables, and estimated from the data.
2. The technique does not assume a parametric model for the data within each segment.
3. We use daily data from January 2005 to December 2017 whereas [1] used monthly data from 2009-2016.
4. Inference regarding the quantities of interest are made in a Bayesian framework, while those done in [1] are made in a frequentist setting.

References

[1] N. Donnelly, S. Poynton, D. Weatherburn, "The effect of lockout and last drinks laws on non-domestic assaults in Sydney: An update to September 2016," *Crime and Justice Bulletin*, 201, February 2017

[2] O. Rosen, S. Wood, D. Stoffer, "AdaptSPEC: Adaptive Spectral Estimation for Nonstationary Time Series," *Journal of The American Statistics Association*, pp. 1575-1589, 2012.

[3] International Visitors Survey (YE December 2014 to YE December 2017) and National Visitors Survey (YE December 2014 to YE December 2017), Tourism Research Australia.

[1] This work forms part of the PhD thesis of Nicholas James supervised by Professor Sally Cripps and Dr Roman Marchant.

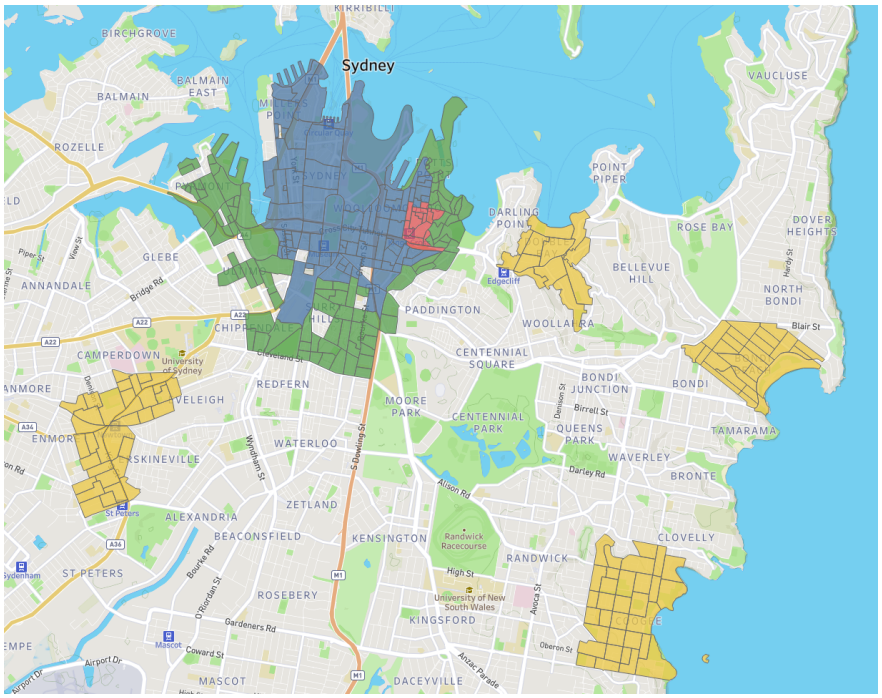

Figure 1: Map of Sydney and the areas of analysis. Kings Cross (Red), Sydney Central Business District (Blue), Proximal Displacement Areas (Green) and Distal Displacement Areas (Yellow)

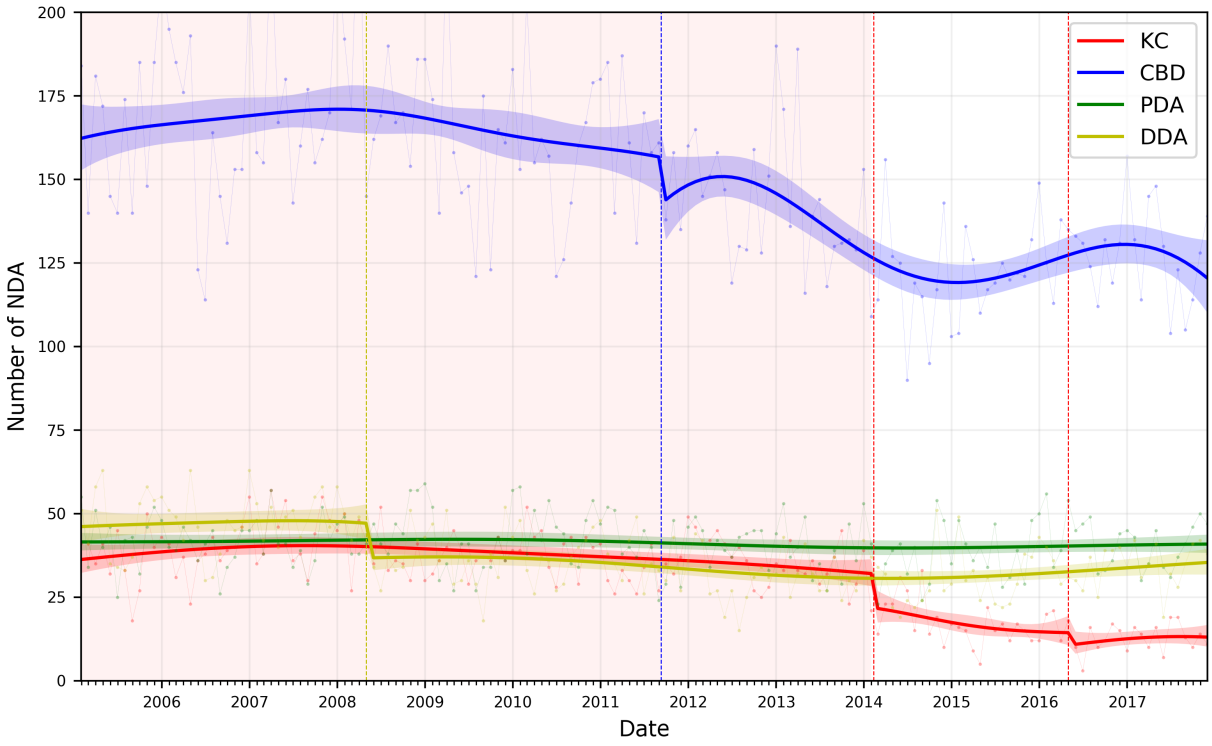

Figure 2: Number of monthly Non-Domestic Assaults (NDA). Change points are represented by vertical dotted lines. Solid lines show the average trend per segment, with its respective shaded area showing 95% credible interval for the average. Raw data is shown with small point markers.