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

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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. These data 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).

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 became 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 second 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. There 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.

The technique used to analyse the data has been peer reviewed and published in the Journal of the American Statistical Association (JASA), where the properties of the methodology were rigorously tested on simulated and real data. This paper is publicly available, and can be found at https://www.tandfonline.com/doi/full/10.1080/01621459.2012.716340. It has been used and cited by many authors since its publication in 2012. The code is publicly available https://cran.r-project.org/web/packages/BayesSpec/BayesSpec.pdf.

There are many statistical models which could be used to analyse the effectiveness of the lockout laws. We do not dispute the technique or analysis in [1], however we have taken a different approach. Our approach differs from that of [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.

In response to BOSCAR's request in the press release on June 20th, we are actively working and liaising with BOCSAR researchers to share new data and isolate differences in the studies and clarify the source of different conclusions.

Once we get BOCSAR's consent to share the new results with the latest data, we are making our analysis publicly available on our website to inform interested parties in a timely fashion.

We presented our results to BOCSAR on Monday June 17th. In this meeting it was noted that if different statistical techniques give rise to different inference, then further investigation is needed. This goes to the heart of scientific reproducibility. This was agreed by both parties and we look forward to continue working with BOCSAR.

Bibliography

[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 Statistical Association*, pp. 1575-1589, 2012.