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

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In response to BOCSAR's request of June 20th, 2019, the Centre for Translational Data Science (CTDS) has studied the effectiveness of the lockout laws. We presented our findings at the Parliament of NSW's [Joint Select Committee on Sydney's Night Time Economy](#) on 5 August, 2019.

Our analysis shows that the evidence for the hypothesis that the lockout laws reduced crime is equivocal. Our findings differ from those of the NSW Bureau of Crime Statistics and Research (BOCSAR) and we summarise the reasons for this difference below. We are working with BOCSAR to develop a consistent database for future analysis.

Summary

Using Non-Domestic Assault (NDA) daily data provided by BOCSAR for the period of January 2005 - December 2017, we found that:

- The lockout laws had no significant impact on NDAs in the Sydney CBD.
- Non-Domestic Assaults have been decreasing in NSW since 2008, with a substantial drop in 2011, two and a half years prior to the lockout laws' enactment in 2014.
- BOCSAR's analysis of the CBD area included a number of NDAs which occurred in the Kings Cross area. These same NDAs were also included in their analysis of the Kings Cross area.
- BOCSAR's reported conclusion regarding the 13% drop in NDAs in the CBD, [1], is therefore overstated.

Method

We follow BOCSAR and use Non-Domestic Assaults (NDA) as our measure of effectiveness. The data are daily counts of NDAs for the period January 2005 to December 2017. These data were generously provided by BOCSAR.

For comparative purposes we confine the areas of our analysis to those used in BOCSAR's own analysis in [2], 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.

Key Findings

Evidence for the hypothesis that the lockout laws reduced crime is equivocal. It varies with location, the time period examined, the frequency at which the data are analysed, and the manner in which data are allocated to precincts.

NDA's in NSW have been decreasing since 2008, six years prior to the introduction of the lockout laws. To reduce crime further a better understanding of the causes of this drop, and how it varies across geographic location and across time, is needed.

For the Kings Cross precinct, the data is consistent with the hypothesis that the lockout laws reduced crime. There was a substantial drop in NDA at the time of the introduction of the laws. This result holds for different statistical techniques, using different time periods and frequencies.

Our analysis showed that lockout laws had no significant impact on NDAs in the CBD. NDAs in the CBD have been decreasing since 2008, with a significant drop in 2011, two and a half years prior to the lockout laws' enactment.

This result is in contrast to the findings of BOCSAR. At the request of BOCSAR we investigated this discrepancy and found that it is mainly, although not solely, attributable to the way in which data are allocated to the CBD precinct. Our CBD area includes The Rocks, Haymarket, George St, Woolloomooloo, Central Station, and Oxford St, see Figure 1.

The dataset and used by BOCSAR, in [1] and [2], includes all these areas plus 1837 NDAs that occurred in Kings Cross, which represents 35% of the total NDAs in Kings Cross, see Figure 2.

Although we do not dispute the technique or the analysis in [1] and [2], we believe that the inclusion of NDAs in Kings Cross in the CBD dataset overstates the reported 13% drop.

NDAs in the PDA did not change over the period 2005-2017.

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 NDAs at the time of the lockout laws.

We note that none of the analyses, neither ours nor BOCSAR's, can establish the mechanism by which any reduction occurs. To do so would require more data and using statistical models capable of inferring causality, such as Bayesian graphical models.

The technique used to analyse the data has been peer reviewed and published in the Journal of the American Statistical Association (JASA), [3], where the properties of the methodology were rigorously tested on simulated

and real data. This paper is publicly available and has been used and cited by many authors since its publication in 2012. The code is also 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. Our approach differs from that of [1] and [2] in two major ways:

- Our technique allows for several possible change points, and the timing of these change points to occur on any day from 2005 to 2017. Whereas [2] allows for only one possible change point, which, if present, occurred at the time of the lockout laws.
- We use daily data from January 2005 to December 2017 whereas [2] used monthly data from 2009-2016.

We are currently working with BOCSAR to refine the areas to which crimes are allocated to have a consistent database.

Bibliography

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

[2] 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

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

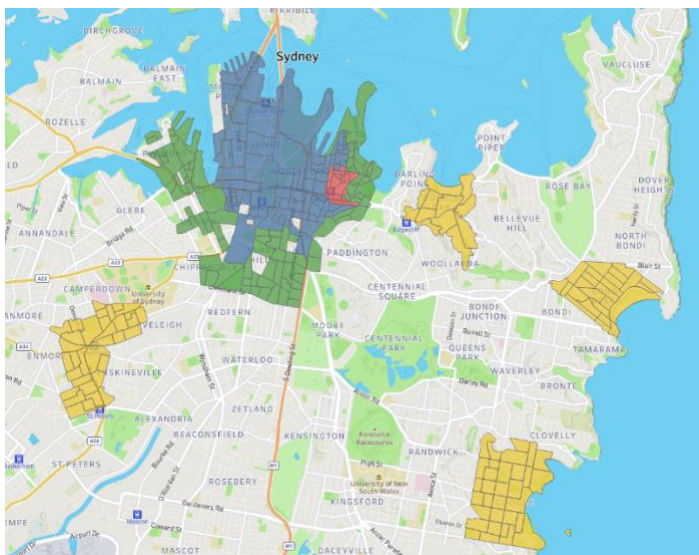


Figure 1: Map of Sydney and the areas of analysis. Kings Cross (Red), Sydney Central Business District (Blue), Proximal Displacement Areas (Green) and Distal Displacement Areas (Yellow)

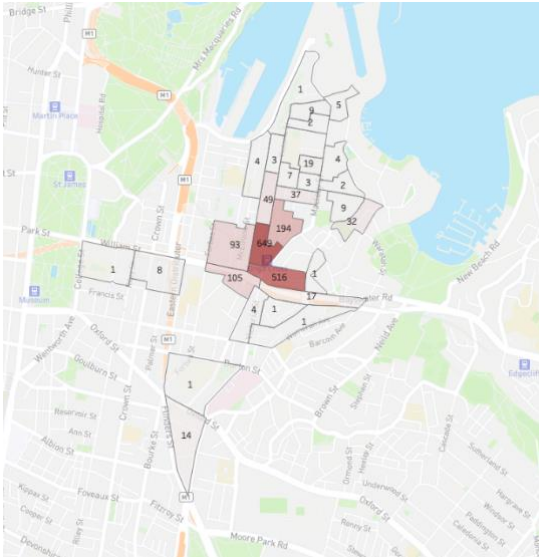


Figure 2: Map of crimes assigned to the CBD by BOCSAR, which happened mostly in the Kings Cross area.