The effects of liquor licensing restrictions on alcohol related violence in NSW, 2008-2013

Patricia Menéndez, Fernando Tusell and Don Weatherburn,
NSW Bureau of Crime Statistics and Research

February 19, 2015

NSW Bureau of Crime
Statistics and Research

Liquor Licensing Restrictions 2008-2013

- 1 July 2008: commencement of enhanced enforcement powers for 2007 Liquor Act.

Liquor Licensing Restrictions 2008-2013

1 July 2008: commencement of enhanced enforcement powers for 2007 Liquor Act.

30 October 2008: commencement of the freeze on 24 hour licenses.

Liquor Licensing Restrictions 2008-2013

1 July 2008: commencement of enhanced enforcement powers for 2007 Liquor Act.

30 October 2008: commencement of the freeze on 24 hour licenses.

1 December 2008: commencement of the declared premises scheme.

Liquor Licensing Restrictions 2008-2013

1 July 2008: commencement of enhanced enforcement powers for 2007 Liquor Act.

30 October 2008: commencement of the freeze on 24 hour licenses.

1 December 2008: commencement of the declared premises scheme.

22 August 2011: commencement of the Responsible Service of Alcohol (RSA) re-training requirement for paper certificate holders required to obtain a competency card.

Liquor Licensing Restrictions 2008-2013

1 July 2008: commencement of enhanced enforcement powers for 2007 Liquor Act.

30 October 2008: commencement of the freeze on 24 hour licenses.

1 December 2008: commencement of the declared premises scheme.

22 August 2011: commencement of the Responsible Service of Alcohol (RSA) re-training requirement for paper certificate holders required to obtain a competency card.

January 2012: commencement of the *Three Strikes* scheme.

Need for a Rigorous Evaluation

Interventions are very close in time.

Long term dynamics in assaults are not constant.

Adequate models to lead to adequate conclusions.

Data and Sources

Criminal counts of the police incident categories of

- Actual bodily harm (ABH)
- Grievous bodily harm (GBH)

Consumer sentiment Index (CSI)

Recorded monthly data from January 1996 to December 2013.

Data sources:

NSW Bureau of Crime Statistics and Research.

NSW Police Computerized Operational Policing System (COPS).

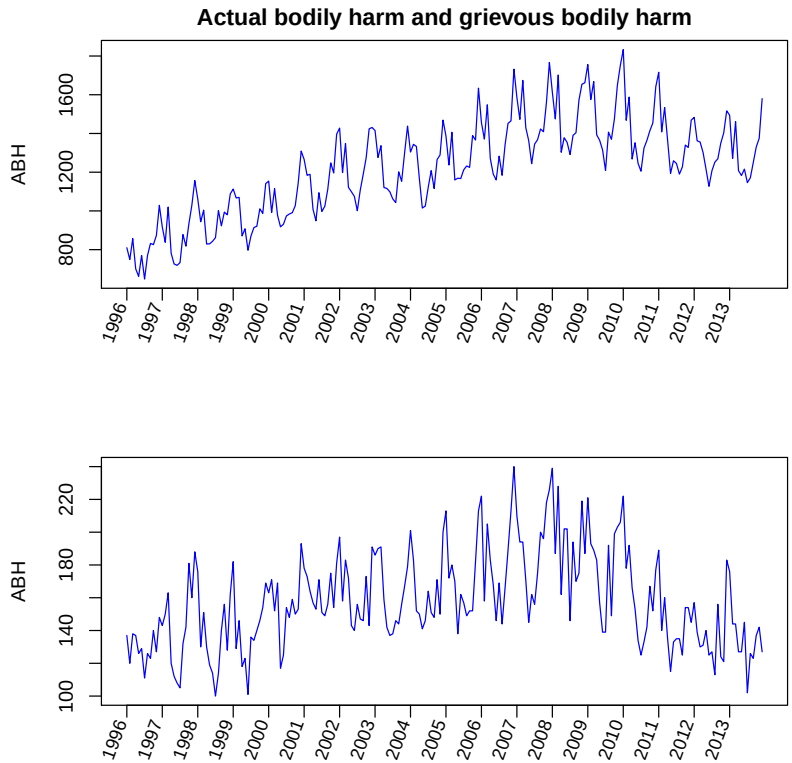
Melbourne Institute of Applied Economic and Social Research.

Extraneous Factors

Alcopops

Global Financial Crisis

Modeling Approach



Model the different components in the time series of assaults.

Mean level, seasonal patterns and random disturbances.

Components are allowed to change over time.

General Approach: Time Series Structural Models

Model:

$$y_t = \mu_t + \gamma_t + \epsilon_t,\ \epsilon_t \sim N(0, \sigma_\epsilon^2)$$

$\mu_t \Rightarrow$ the level (intercept plus slope)

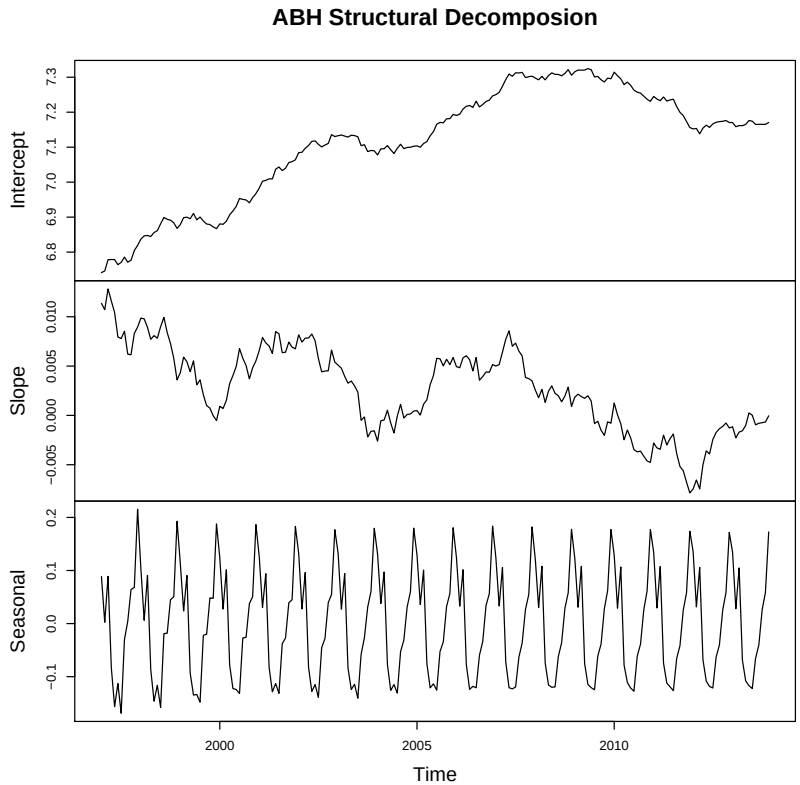
$\gamma_t \Rightarrow$ the seasonal component

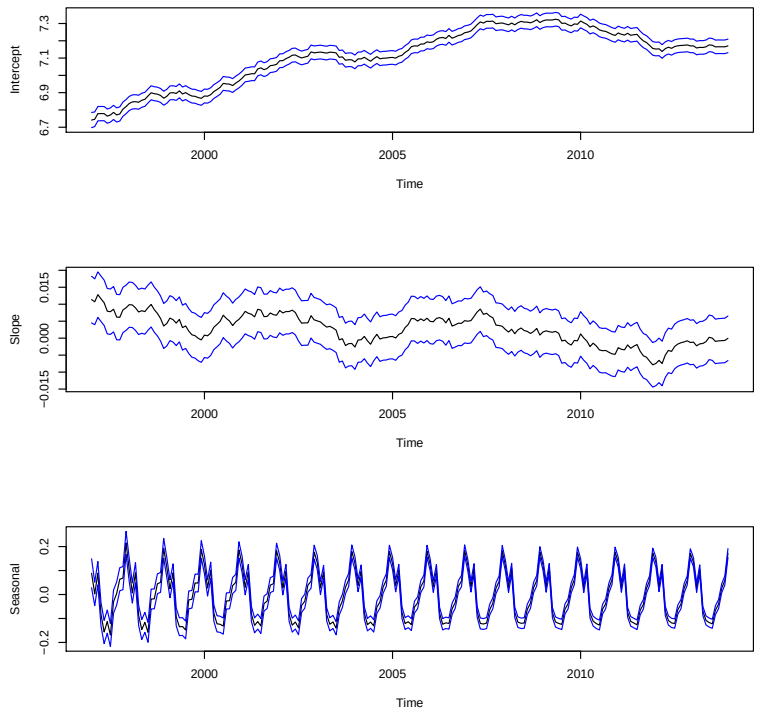
$\epsilon_t \Rightarrow$ error or observation disturbances

Aim:

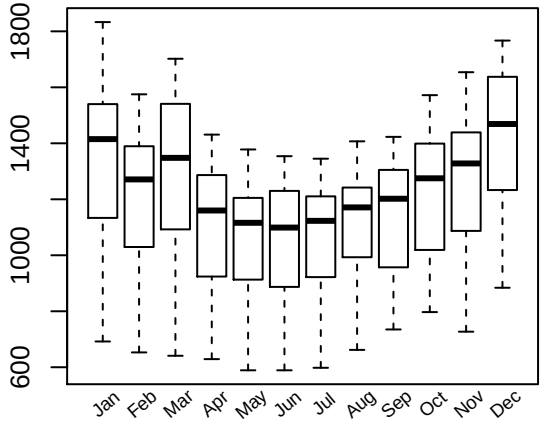
Quantify changes in the level of the series due to the liquor licensing reforms.

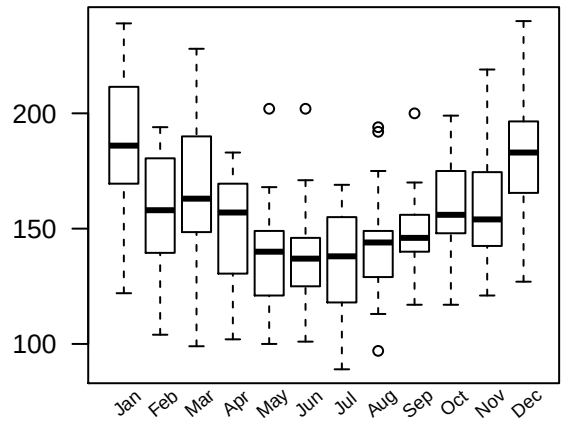
Time Series Structural Model Decomposition

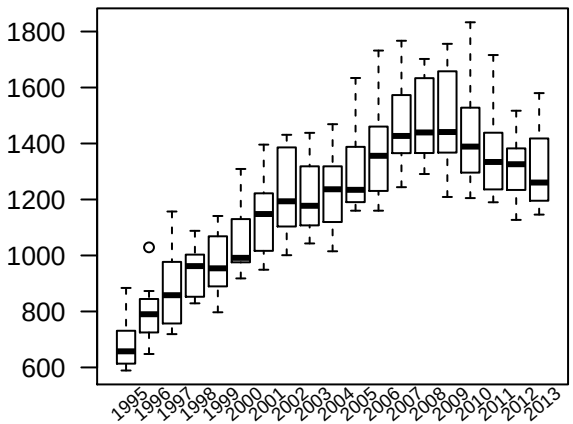


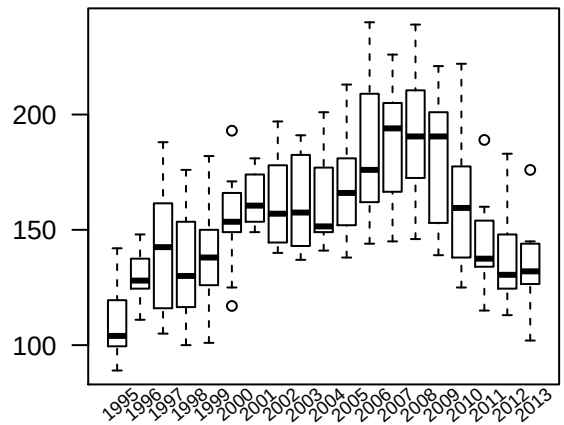


Exploratory Data Analysis: ABH and GBH

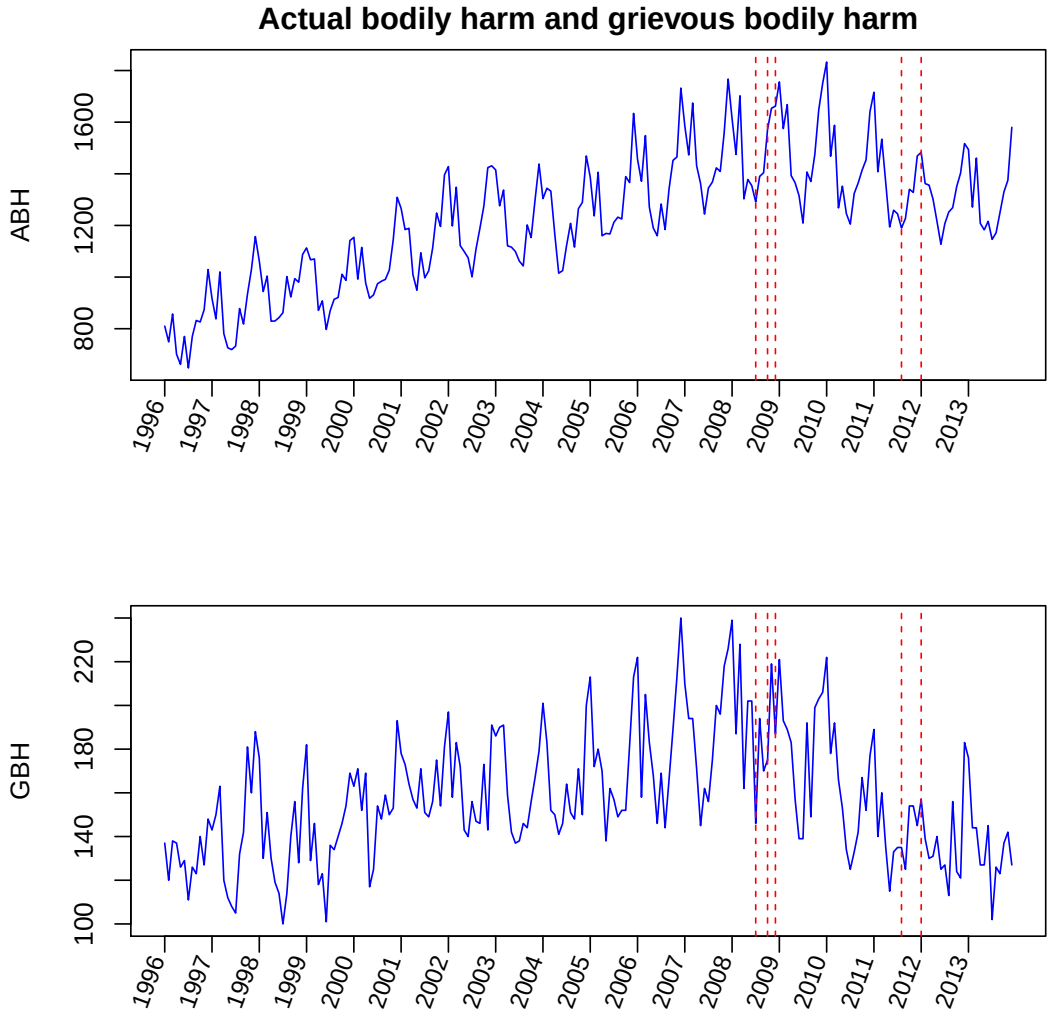








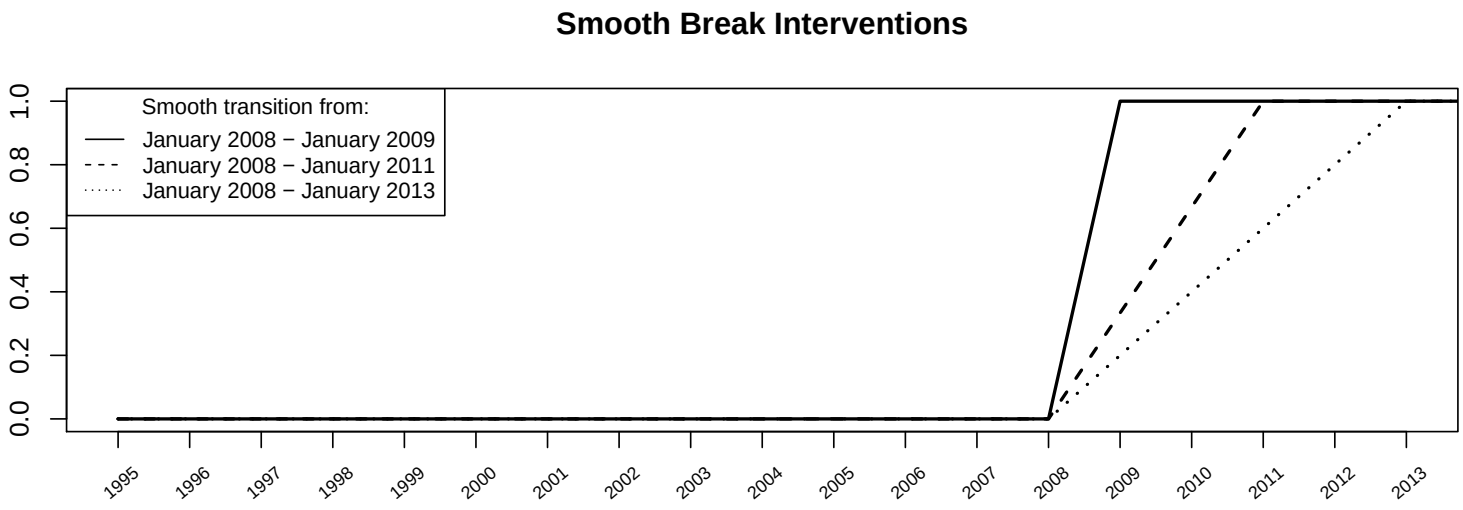
Data Sets and Interventions



Increase up to 2008

Decrease from 2008

Intervention Representation



Assumption: New liquour licensing restriction is introduced
$\longrightarrow$ changes in crime are likely to happen in a smooth way.

Intervention Model

$$x_t = \begin{cases} 0, & \text{if } t \leq \tau_1 \\ (t - \tau_1)/(\tau_2 - \tau_1), & \text{if } t \in (\tau_1, \tau_2] \\ 1, & t > \tau_2 \end{cases}$$

where

$\tau_1 \rightarrow$ beginning of the intervention and

$\tau_2 \rightarrow$ the end of the intervention effect.

Model Including Intervention Variable

Time Series Structural Models:

$$y_t = \mu_t + \gamma_t + \delta x_t + \epsilon_t,\ \epsilon_t \sim N(0, \sigma\ )$$

x_t is the intervention

μ_t is the level and γ_t is the seasonal component

ϵ_t error or observation disturbances

Several covariates might be included in the model.

Models Considered

Models	**Interventions**
Model 1	July 2008 - July 2012
Model 2	July 2008 - July 2013
Model 3	July 2008 - December 2013

Model Selection Criterion: AIC

Akaike Information Criterion:

$$AIC = -2Log(L) + k$$

Takes into account not only the model fit but also the model complexity.

L is the likelihood and

k the number of parameters in the model.

Results Actual Bodily Harm

Interventions

	July 2008 **July 2012**	**July 2008** **July 2013**	**July 2008** **December 2013**
Estimate (δ)	-0.25	-0.38	-0.40
t-statistic	-2.19	-2.67	-2.44
p-value	0.03	0.01	0.01
-loglikelihood	–381.04	-381.77	-381.63
Shapiro test	0.40	0.30	0.25
Box-Ljung test	0.43	0.49	0.47
AIC	-761.92	-763.39	-763.10
Crime Reduction	-22.00 %	-31.27 %	-32.76 %

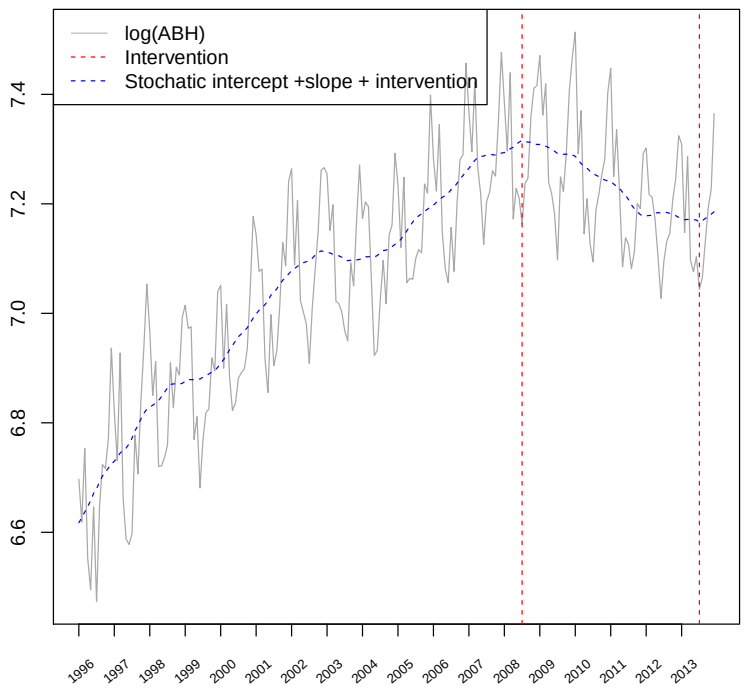
Results Grievous Bodily Harm

Interventions

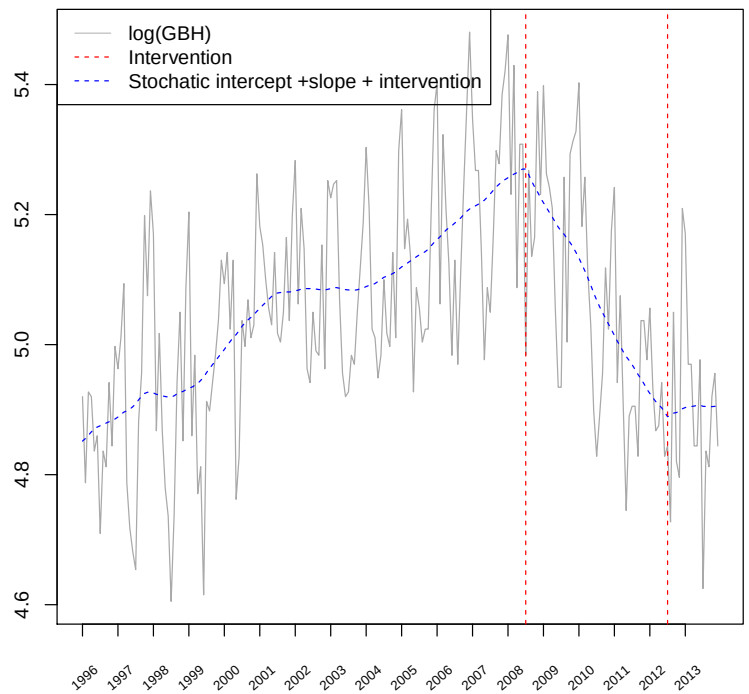
	July 2008 July 2012	**July 2008 July 2013**	**July 2008 December 2013**
Estimate (δ)	-0.51	-0.55	-0.61
t-statistic	-5.69	-4.66	-4.79
p-value	0.00	0.00	0.00
-loglikelihood	-236.23	-235.82	-236.63
Shapiro test	0.12	0.03	0.02
Box-Ljung test	0.32	0.30	0.31
AIC	-472.31	-471.48	-473.10
Crime Reduction	-39.70 %	-42.27 %	-45.52 %

Results: Level, Slope and Intervention

Actual Bodily Harm



Grievous Bodily Harm



Conclusions and future research

Data driven dynamic model for time series.

No reliable control site (we looked at data from Victoria).

Proximity of interventions.

Consumer Sentiment Index was analyzed.

Role of unmeasured factors.

Next: 2014 Liquor licensing reforms.

Conclusions and future research

Data driven dynamic model for time series.

No reliable control site (we looked at data from Victoria).

Proximity of interventions.

Consumer Sentiment Index was analyzed.

Role of unmeasured factors.

Next: 2014 Liquor licensing reforms.

Thank you very much for your attention!