The effect of smoke-free policies on revenue in bars in Tasmania, Australia.

Anita Lal and Mohammad Siahpush

Tob. Control published online 16 Jul 2009;
doi:10.1136/tc.2008.028589

The effect of smoke-free policies on revenue in bars in Tasmania, Australia.

Corresponding author:

Anita Lal
Research Fellow
Deakin Health Economics
Public Health Research, Evaluation and Policy Cluster
Faculty of Health, Medicine, Nursing and Behavioural Sciences
Deakin University
221 Burwood Highway
Burwood, VIC 3125, Australia

email: anita.lal@deakin.edu.au
phone: +613 9251 7138
fax: +613 9244 6624

Co-author

Mohammad Siahpush, PhD
Professor
Department of Health Promotion, Social and Behavioral Health
College of Public Health
University of Nebraska Medical Center
986075 Nebraska Medical Center
Omaha, NE 68198-6075
USA

Email: msiahpush@unmc.edu
Tel: 402-559-3437
Fax: 402-559-3773

Word Count: 2839
Key Words
Tobacco smoke pollution, public policy

ABSTRACT

Objective: To examine the impact of smoke-free policies on revenue in Tasmanian bars.
Method: Monthly sales turnover from January 2002 to March 2007, provided by the Australian Bureau of Statistics was analysed. There were two outcome measures: (1) the ratio of monthly bar sales turnover in Tasmania to monthly bar sales turnover in four other Australian states, and (2) the ratio of monthly bar turnover to monthly retail turnover in Tasmania. Linear regression was used to assess the impact of the smoke-free policy on expenditure.
Results: The smoke-free policy had no effect on sales turnover.
Conclusion: The smoke-free policy protects hospitality workers and patrons from exposure to second-hand smoke and has had no adverse effect on sales turnover.

INTRODUCTION

Smoke-free laws in bars are being considered and enforced in many jurisdictions around the world to protect workers and patrons from second-hand smoke. There is no risk-free level of exposure to second-hand smoke and these laws reduce the risk of premature death from lung cancer, respiratory and cardiovascular disease in non-smokers. [1] Resistance to smoke-free laws consistently comes prior to their introduction from business owners, hotel associations and the tobacco industry claiming that businesses will lose revenue as a result of the laws. Leading up to the introduction of the smoke-free law in Tasmanian bars, the Australian media reported fears by pub owners, the Australian Hotels Association and the tobacco industry that the laws would not be good for business. [2, 3]

A review of studies on the economic effects of smoke-free policies in the hospitality industry reports no impact or a positive impact of smoke-free restaurant and bar laws on sales and unemployment. [4] Although there have been numerous studies examining the impact of smoke-free laws on sales in restaurants, there have only been two published studies that have examined the effect of smoke-free bar laws on sales; one from the United States and one from Canada. [5, 6] Both concluded that the smoke-free law had no negative effect on sales. In fact in California, the first state to introduce a smoke-free bar law in January 1998, the law was associated with an increase in sales. [5] Our study is the first to examine the effect of a totally smoke-free policy in bars in Australia.

Smoke-free restaurant laws in Tasmania were implemented on 1 September 2001, with no detrimental effect on sales in these venues [7]. Tasmania was the first state in Australia to introduce smoke-free laws in bars, pubs and licensed clubs on 1 January 2006. The law requires that indoor areas of pubs, clubs and nightclubs be completely smoke-free. This is a requirement under the Public Health Act 1997 intended to protect workers and the public from exposure to second-hand tobacco smoke. The Act also restricts the areas in which patrons can smoke outdoors at pubs, clubs and nightclubs: the area must not be serviced, which includes the delivery of food and beverages, must not have a roof, or may have a roof but must not have a perimeter consisting of more than 50% walls or windows. [8] In 2001 Tasmania had a population of 472,000 [9] about 2.5% of the population of Australia. There were 521 pubs and licensed clubs in the state in the 2007 financial year. [10]

The aim of this study is to assess the impact of the smoke-free law on sales turnover in Tasmanian bars.

METHOD

Data Source and Variables

Data on pub, bar, tavern and licensed club sales turnover were obtained from the Retail Trade Survey undertaken by the Australian Bureau of Statistics (ABS). [11] This survey aims to provide information about month-to-month movement of retail turnover across all retail sectors in states and territories of Australia and Australia as a whole. Turnover consists of retail and wholesale sales. This includes takings from repairs, meals and hiring of goods (except for rent, leasing and hiring of land and buildings) commissions from agency activity (e.g. commissions received from collecting dry cleaning, selling lottery tickets, etc.) and net takings from gaming machines. The sampling frame for the survey is the ABS Business Register, which sources its information about new businesses from those applying for group employer registration with the Australian Taxation Office. [11] The survey is conducted monthly by both telephone interview and a mailed questionnaire. Sampling is random and stratified by state, industry and business size. Voluntary rotation techniques are used, with retailers participating in the survey for a three year period. The sample size of the retail business survey in Tasmania is approximately 433 businesses. [11]

The scope of the survey for the category of pubs, bars, taverns and licensed clubs includes businesses in Australia that generated income predominantly from the provision of alcoholic beverages for consumption on the premises, or in selling alcoholic beverages for consumption on or off the premises (e.g. from bottle shops at such premises) and hospitality club organisations that generated income predominantly from the provision of hospitality services (i.e. drinking facilities, gambling, meals and other hospitality services) to members. Businesses mainly engaged in the provision of accommodation and retailing alcoholic beverages for consumption off the premises were excluded from these surveys. [12] Licensed clubs are defined as hospitality club organisations that provide drinking facilities, gambling, meals and other hospitality services to members. Clubs whose main activity was the provision of sporting services are not included within the scope of this industry.[12]

Turnover dollar figures used in this study have been adjusted for inflation using the 2007 Consumer Price Index (CPI). [20] The data have also been seasonally adjusted by the ABS to remove systematic calendar related effects. These include increased spending in December as a result of Christmas, as well as trading day influences arising from the varying length of each month and the varying number of particular days in each month.

Following Glantz and Smith [13, 14], to account for underlying economic trends, unemployment and population changes we computed the following two ratios:

- ratio of monthly turnover for pubs, taverns, bars and clubs in Tasmania to monthly turnover for pubs, taverns, bars and clubs in New South Wales, Victoria, South Australia and the Northern Territory from January 2002 to March 2007

- ratio of monthly turnover for pubs, taverns, bars and clubs to total monthly retail turnover (minus pubs, taverns, bars and clubs turnover) in Tasmania from January 2002 to March 2007

These two ratios, hereafter RATIO1 and RATIO2, would be expected to decrease if the implementation of the smoke-free policy had an adverse effect on bar sales. The remaining Australian states were not included in RATIO1 because they had smoke-free laws implemented during the time under analysis. Gaming turnover for Victoria was subtracted from the bar turnover for Victoria as smoke-free laws in gaming venues were implemented during the period under analysis and may influence the results. Table 1 shows selected demographic details of the states used in the analysis. While there are some differences in these figures, the fact that they have remained stable over the period of the study and that we have used a ratio indicator means that these slight differences would have minimal effect on the findings of the study.

Table 1 Selected demographic details of Australian states used in analysis, 2001

State	Population size [9]	Average income[15]	Smoking prevalence [16]
Tasmania	472,274	$801.00	21.1%
New South Wales	6,605,059	$932.70	19.1%
Victoria	4,833,401	$860.20	21.9%
South Australia	1,516,738	$835.60	22.4%
Northern Territory	198,347	$845.30	29.3%

Statistical analysis

We used linear regression to examine the effect of smoke-free legislation on RATIO1 and RATIO2. To control for secular trend, a difference transformation was used. [17] We obtained the first difference of RATIO1 and RATIO2 by subtracting the first lagged value of each series from its current value. These transformed variables were used as the outcome and a dummy variable representing the smoke-free legislation was used as the predictor in regression models. The differencing procedure removes a linear trend and has many advantages over simply adjusting for time as a covariate in regression models. [18] Once the data were detrended, we used the diagnostic Q statistics to test the null hypothesis of no autocorrelation. [19]

Each Q statistic is a chi-square statistic calculated from a set of autocorrelations. We present Q_4 , Q_{10} , and Q_{16} which are computed from the correlation of the time series with its first 4, 10, and 16 lags, respectively. Q statistics with large p-values indicate no autocorrelation. All analyses were performed with Stata 8 SE.

In our previous work, which focused on the economic impact of smoke-free legislation in restaurants and gambling venues, [7, 20-22] we used autoregressive integrated moving average models (ARIMA). This technique was not needed in the present analysis as the serial dependence of data disappeared after detrending.

Results

Figure 1 shows the plots of the CPI and seasonally adjusted bar turnover in Tasmania from January 2002 to March 2007. The vertical line represents January 2006 when the smoke-free law (the intervention) came into effect. The average monthly turnover in the period before the introduction of the law was $20.7m. The average monthly turnover increased to $23.3m in the period after the law. The graph shows an upward trend from July 2002 indicating an increase in bar turnover. The plot of RATIO1 and RATIO2 are shown in Figures 2 and 3, respectively. The fluctuations in the two plots mirror each other and there is a general downward trend in both ratios.

----------------------Insert Figures here--

As shown in Table 2, the introduction of smoke-free legislation had no effect on either RATIO1 or RATIO2. The constant was not suppressed in the regression equations. Because the relative magnitude of the effect of legislation was extremely small in both regression models, the tests could not achieve high power. The power in the RATIO1 model was 5% and in the RATIO2 model was 17%. Even if we had monthly data for thirty years, the power of the tests would not reach 70%. The Q statistics reveal that there is no autocorrelation in the detrended time series, which validates the results of the linear regression estimates.

Table 2. Regression of differenced RATIO1[a] and RATIO2[b] on Smoke-free legislation[c]

	RATIO1	RATIO2
Coefficient[d]	-0.000049 (SE=0.000370; p = 0.894)	–0.000103 (SE=0.000911; p = 0.910)
R^2	0.000	0.000
Q_4	4.429 (p = 0.351)	8.100 (p = 0.088)
Q_{10}	15.618 (p = 0.111)	16.588 (p = 0.084)
Q_{16}	20.276 (p = 0.208)	20.294 (p = 0.207)

[a] RATIO1 represents the ratio of monthly turnover for pubs, taverns, bars and clubs in Tasmania to monthly turnover for pubs, taverns bars and clubs in Victoria, New South Wales, South Australia and the Northern Territory.
[b] RATIO2 represents the ratio of monthly turnover for pubs, taverns, bars and clubs to total monthly retail turnover (minus pubs, taverns, bars and clubs turnover) for Tasmania.
[c] Coded 0 for the data points (ie months) with no such legislation and 1 otherwise.
[d] "Coefficient" refers to the effect of the smoke-free legislation dummy variable.

As mentioned above, RATIO1 was computed by dividing monthly turnover for pubs, taverns, bars and clubs in Tasmania by the sum of the monthly turnover for pubs, taverns, bars and clubs in New South Wales, Victoria, South Australia and the Northern Territory. In supplementary analyses, we computed a ratio separately for each of the four comparison states. None of the four ratios were associated with the smoke free law, as the p-values for the effect of law were 0.944, 0.761, 0.571, and 0.984, respectively.

DISCUSSION

The results of these analyses suggest that the presence of a law prohibiting smoking in bars in Tasmania was not associated with a decline in monthly bar turnover. The findings from this study are consistent with other research from the United States and Canada using aggregate data on bar sales.

There are a number of potential limitations to this study. There are two types of error possible in the estimates of retail turnover: sampling error and non-sampling error. [11] Sampling error may be larger for the first month of each quarter, when some of the businesses in the sample are replaced by other businesses so that the reporting load can be spread across retailers. [11] Non-sampling error arises from inaccuracies in collecting, recording and processing the data. The most significant of these errors are misreporting of data items, deficiencies in coverage, non-response, and processing errors. Every effort is made to minimise reporting error by the careful design of questionnaires, intensive training and supervision of interviewers, and efficient data processing procedures. [11] We note that even though we used seasonally adjusted estimates of turnover, these adjustments do not eliminate the effect of irregular influences, such as abnormal weather and industrial disputes that may influence turnover. Over the period under study there were no such irregular events.

Research from California showed there was an increase in bar sales following the smoke-free laws. [5] While some smokers may avoid smoke-free bars, the evidence suggests that the percentage of smokers who do this is extremely small and is more than compensated for by increased patronage from non-smokers. [5] There is also survey evidence that bar patrons in California are spending more time in bars, approve of the law and are observing higher compliance with the smoke-free bar law. [23] These studies suggest that Californians are not only reporting these behaviors, but are actually spending more money at bars. A review of the evidence from the most rigorous studies suggests no overall adverse effect of smoke-free laws on bar trade. [4]

In 2001 the Supreme Court of New South Wales, Australia awarded damages of $A466,000 to a former non-smoking bar worker after she took her former employer to court for a claim that her throat cancer was caused by exposure to second-hand smoke. [24] Australian jurisdictions have already taken steps to reduce the likelihood of similar cases and the extent of future human exposure to second-hand smoke by implementing smoke-free bar laws throughout 2007 and by having them earmarked for implementation in future. Other jurisdictions which are considering the introduction of smoke-free bar laws in these establishments should be encouraged by the findings of this study, by adding further reason to expect no negative impact on business.

In conclusion, this study has shown that the introduction of a smoke-free law in Tasmania has not adversely affected bar sales turnover. These results are consistent with findings in other countries, indicating that bar owners and government policymakers should be reassured that they can adopt and maintain smoke-free legislation to protect worker and patrons from exposure to second-hand smoke in bars without fear of adverse effects on patronage.

ACKNOWLEDGEMENTS

The authors would like to thank Melanie Wakefield, Michelle Scollo and Todd Harper for useful comments on a previous draft of this paper.

FUNDING

At the time of preparing this paper AL was supported by the Victorian Health Promotion Foundation (VicHealth) and The Cancer Council Victoria and MS was supported by a fellowship from the Victorian Health Promotion Foundation.

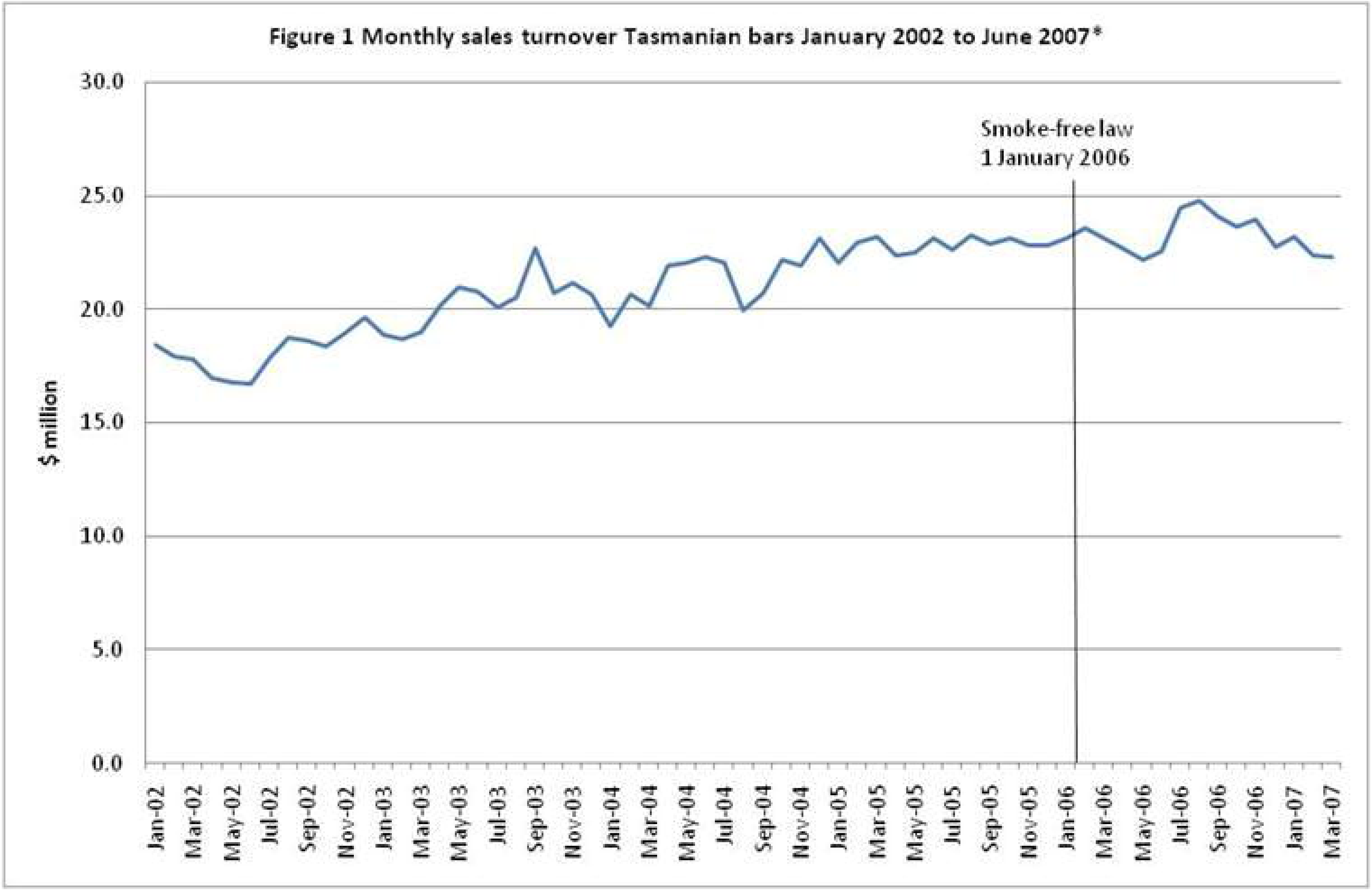
FOOTNOTES

Competing interests: none declared.

REFERENCES

1. US Department of Health and Human Services. The Health Consequences of Involuntary Smoking. A report of the Surgeon General. Rockville, Maryland: US Department of Health and Human Services, Public Health Service, Centers for Disease Control, Center for Health Promotion and Education, Office on Smoking and Health2006.
2. Rose D. Ban 'won't curb smoker numbers'. The Mercury. 2004 December 31.
3. Whinnett E. Apple Isle smoke ban. Herald Sun. 2004 September 23;Sect. 39.
4. Scollo M, Lal A, Hyland A, Glantz S. Review of the quality of studies on the economic effects of smoke-free policies on the hospitality industry. Tob Control. 2003;12:13–20.
5. Cowling DW, Bond P. Smoke-free laws and bar revenues in California--the last call. Health Econ. 2005;14(12):1273-81.
6. Luk R, Ferrence R, Gmel G. The economic impact of a smoke-free bylaw on restaurant and bar sales in Ottawa, Canada. Addiction. 2006 May;101(5):738-45.
7. Lal A, Siahpush M, Scollo M. The economic impact of smoke-free legislation on sales turnover in restaurants and pubs in Tasmania. Tob Control. 2004;13(4):454–5.
8. Department of Health and Human Services Tasmania. Outdoor smoking areas a guide for licensed premises2006.
9. Australian Bureau of Statistics. 3101.0 Demographic Statistics, June 2008. 2008 [accessed 2009 25 February]; Available from: http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3101.0Jun%202008?OpenDocument.
10. Department of Treasury and Finance Tasmania. Licensed Premises in Tasmania. 2008 [accessed 2008 20 September]; Available from: http://www.treasury.tas.gov.au/domino/dtf/dtf.nsf/6f7ab9ece723e864ca25728a00129307/2a23cfeaac81a794ca257354001b2152?OpenDocument.
11. Australian Bureau of Statistics. 8501.0 Retail trade Australia April 2007. 2007 [accessed 2007 April 14]; Available from: http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8501.0Apr%202007?OpenDocument.
12. Australian Bureau of Statistics. 8687.0 Clubs, pubs taverns and bars 2004-05. 2006 [accessed 2007 20 June]; Available from: http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8687.02004-05?OpenDocument.
13. Glantz S, Smith L. The effect of ordinances requiring smoke-free restaurants on restaurant sales. American Journal of Public Health. 1994;84(7):1081-5.
14. Glantz SA, Smith LRA. The effect of ordinances requiring smoke-free restaurants and bars on revenues: a follow-up. American Journal of Public Health. 1997;87:1687-93.
15. Australian Bureau of Statistics. 6302.0 - Average Weekly Earnings, Australia, Aug 2008 2008 [accessed 2009 25 February]; Available from: http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/6302.0Aug%202008?OpenDocument.
16. Australian Institute for Health and Welfare. 2001 National Drug Strategy Household Survey State and Territory supplement. AIHW cat. no. PHE 37. Canberrra AIHW (Drug Statistics Series No. 10).2002.
17. Yafee RA, McGee M. Introduction to Time Series Analysis and Forecasting with Applications of SAS and SPSS. New York: Academic Press.; 2000.
18. McCleary R, Hay JR. Applied Time Series Analysis for the Social Sciences. Beverly Hills: Sage Publications, Inc; 1980.
19. Diggle P. Time Series: A Biostatistical Introduction. . Oxford: Oxford University Press.; 1990.

20. Wakefield M, Siahpush M, Scollo M, Lal A, Hyland A, McCaul K, et al. The effect of a smoke-free law on monthly restaurant retail turnover in South Australia. Aust NZ J Public Health. 2002;26(4):375–82.
21. Lal A, Siahpush M, Scollo M. The economic impact of smoke-free restaurants and cafes in Victoria. Aust N Z J Public Health. 2003;27(5):557–8.
22. Lal A, Siahpush M. The effect of smoke-free policies on electronic gaming machine expenditure in Victoria, Australia. J Epidemiol Community Health. (in press).
23. Tang H, Cowling DW, Lloyd JC, Rogers T, Koumjian KL, Stevens CM, et al. Changes of attitudes and patronage behaviors in response to a smoke-free bar law. Am J Public Health. 2003 Apr;93(4):611-7.
24. Chapman S. Australian bar worker wins payout in passive smoking case. BMJ. 2001 May 12;322(7295):1139.



* CPI and seasonally adjusted

Figure 2 Ratio of monthly bar turnover in Tasmania to monthly bar turnover in Victoria, New South Wales, South Australia and the Northern Territory (RATIO1)

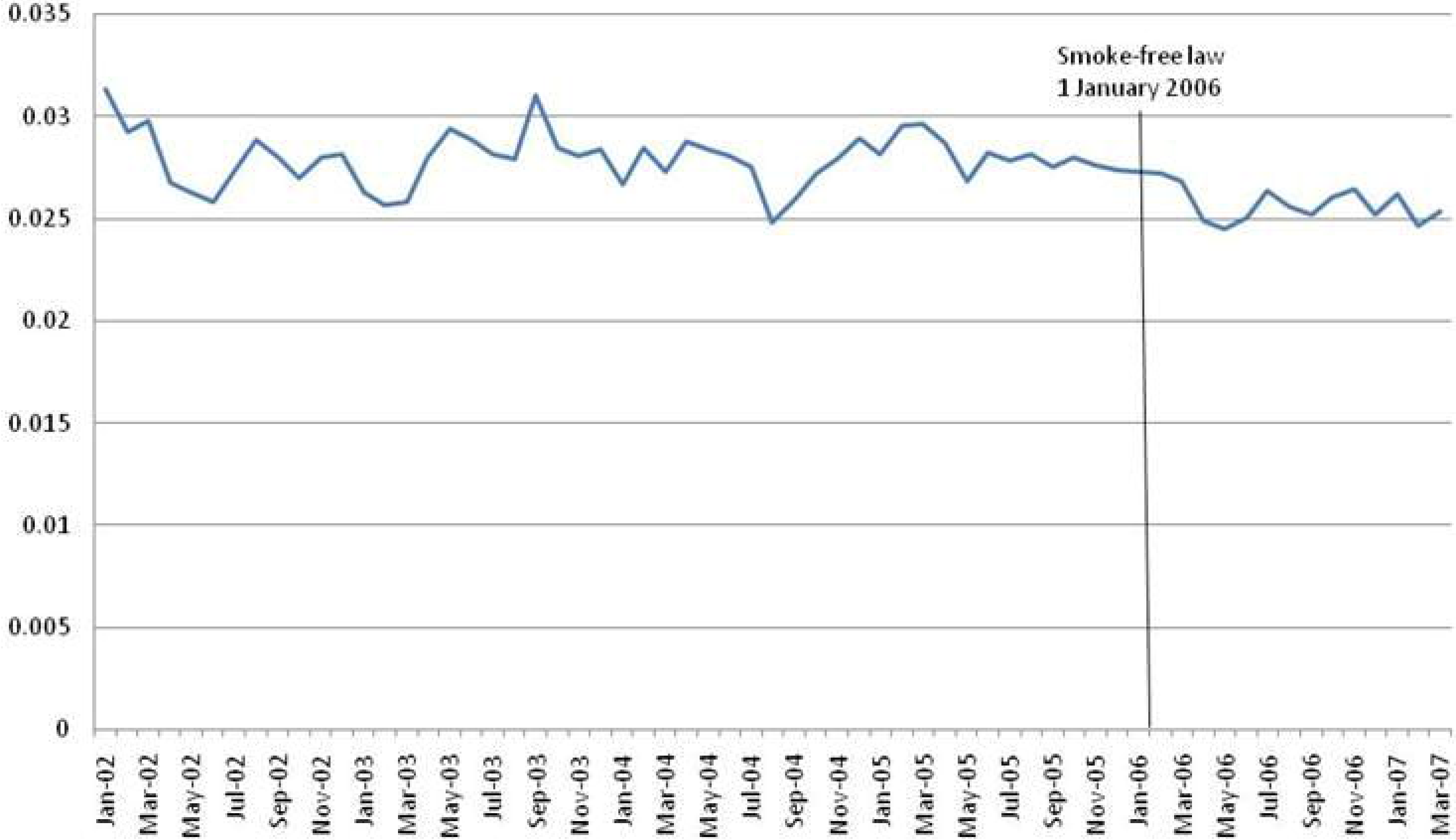


Figure 3 Ratio of Tasmanian bar turnover to Tasmanian retail sales (RATIO2)