

The Indirect Impacts of Smoking Bans in Gaming Venues

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Abstract

Recent changes in smoking laws have influenced gambling behaviour at Electronic Gaming Machine (EGM) venues. In this paper we review the literature that examines the interrelationship between gambling, problem gambling and smoking in order to gauge the indirect effects of smoking bans in gaming venues. We then perform an analysis on the consequences of a smoking ban in Victoria, Australia that was instituted on September 1st, 2002. This analysis investigates the nature of the pattern of drops in local EGM revenue and the impact on the state tax revenue.

JEL codes: L83; H27; I18

Keywords: slot machines, smoking ban, tax revenue, border effects

Section I: Introduction

The stated objectives for smoking bans in public places are primarily defined from a public health perspective. They are to reduce exposure to second hand-smoke and to discourage smoking in general. However, when a government institutes these bans in a gambling venue they have a combination effect.

The direct consequences are to the environment in the venue. Employees and patrons are exposed to less smoke. Smoking is shifted away from the proximity of the gaming machines. However, there may be secondary influences that require examination as well. While it has been found that smokers are no more likely to play gaming machines than non-smokers (Pritsos et al. 2008), if smokers do play they spend over twice as much (Harper 2003). Furthermore, smoking has been linked to problem gambling (Rodda et al. 2004). The introduction of a smoking ban may interrupt the behaviour of these gamblers. This may result in reducing attendances and revenue at gaming venues.

In this paper we examine the impacts of such a ban in the Australian state of Victoria. Victoria, as in most of the Australian states that allow gambling, a large portion of the states revenues are generated by taxes on the gaming industry, and in particular Electronic Gaming Machines (EGMs).¹ Thus, any policy that changes the patterns of gambling may have significant budgetary impact. A contributing factor to this shift in gambling behaviour is the potential flight of local gamblers to an adjacent state where smoking bans have not been enacted. And the socio-economic characteristics of the communities in which they are located.

In this paper we examine the relationship between smoking and EGM gambling and the consequences of a smoking ban. The rest of the paper proceeds as follows. Section II of this paper discusses characteristics of EGM gambling. Section

III examines the relationship between smoking and gambling. Section IV reviews previous research on the effects of a smoking ban in gaming establishments. In Section V we look at the characteristics of the associated fall in gaming expenditure related to the smoking ban imposed on the 1st of September 2002 by the Victorian Government in Australia.² In particular, we look at the relationship between the associated fall in gaming expenditure and socio economic status of the locality in which the gaming venue is located and if there is evidence of a greater drop for those areas that border New South Wales (NSW), where there was no smoking ban in gaming areas at this time. We also examine the impact on State tax revenue. Finally, Section VI presents conclusions.

Section II Electronic Gaming Machines

Worldwide there are a range of different types of gaming machines. These machines can be classified as pachinko machines, amusement machines with prizes and Electronic Gaming machines (EGMs, eg. slots, video lottery terminals, poker machines, pokies). Pachinko machines and amusement machines with prizes have a low maximum spending per game and slow speed of play. EGMs are high-intensity gaming machines and are characterized by high maximum spending per game and fast speed of play. Because they are computers, EGMs can be designed to have more gambling-inducing structural characteristics than for other forms of gambling. Such structural characteristics include: a high number of near winning situations, the use of light and colour effects, sound effects and the inclusion of interesting payment features. In 2008 the worldwide total number of gaming machines was estimated as 7,678,528 (TNS 2008), where 14% were EGMs (Dowling et al. 2005).³

Playing EGMs is the form of gambling most strongly linked to “problem gambling” (Dowling et al. 2005, Lund 2006). The term “problem gambling” is often used to describe interfering patterns of excessive or destructive gambling.⁴ Previous research has linked “problem gambling” with increased accessibility to gambling opportunities, poverty, low socio-economic status and substance abuse (Marshall and Wynne 2004). In particular, problem gambling tends to occur more among men, those with low income, low education and from ethnic minorities (Lund 2006).

It has been estimated that 75-80% of gambling-related problems are associated with EGMs (Delfabbro and Le Conteur 2007). Furthermore, problem gamblers are thought to account for a disproportionate amount of the total expenditure on EGMs. In 2009 the Australian Productivity Commission estimated that problem gamblers account for around 40% of the total gaming machine expenditure (Productivity Commission 2009). Williams and Wood (2007) estimate up to 61% of revenue from gaming machines in the Canadian province of Ontario may come from problem gamblers.

It is widely believed that greater gambling availability leads to increased gambling participation. Two recent studies that highlight the relationship between problem gambling and EGM density include Storer et al (2009) and Lund (2009). By examining 34 problem gambling surveys that were conducted in Australia and New Zealand since 1991, Storer et al (2009) conclude that the prevalence of problem gambling increases with increasing density of EGMs. This is estimated to be at a rate of approximately 0.8 problem gamblers per EGM. Furthermore, they found no evidence of a plateau in the relationship between problem gambling prevalence and increasing density of EGMs. Lund (2009) examined the Norwegian ban on EGMs from 1st July 2007.⁵ Prior to the ban there had been no restrictions specifying where

such machines could be placed. In 2003 it was estimated that there was approximately one machine per 250 people and the most common type of gambling for problem gamblers was playing on EGMs (Lund 2006). Many of these EGMs were located in easily accessible areas such as shopping centres and railway stations. Lund (2009) shows that after the ban, gambling participation, gambling frequencies and gambling problems all declined. In particular, she found no indication that there was any substitution of EGMs with other types of gambling.

A number of studies have noted a tendency for EGMs to be located in more socioeconomically disadvantaged regions. Marshall and Baker, (2001) found the distribution of EGMs to be skewed towards less advantaged regions in Melbourne which were characterized by higher levels of population from non-English speaking backgrounds and high unemployment. Gilliland and Ross (2005) found a similar spatial distortion of EGMs and socio-economic conditions in Montreal and Laval.

In sum, EGMs appear to be responsible for higher levels of “problem gambling”. They do not appear to be strong substitutes for other forms of gambling. Also that the most profitable locations for EGMs appear to be in the lower socio-economic neighborhoods.

Section III. The Relationship between Gambling and Smoking

Tobacco smoking is identified with a range of adverse health effects. It is the main known cause of cancer-related death worldwide (Sasco et al. 2004) and has been linked to 13 different cancers (WHO 2008). It has also been identified as a major cause of heart disease and stroke (Mattson et al. 1987). Worldwide it is estimated there are 1.3 billion smokers. In 2000, it was estimated that 21% of total global cancer deaths were caused by smoking. Furthermore, smoking was shown to

be an important determinant of cancer mortality for men in all regions and for women in industrialized countries (Ezzati et al. 2005). On average, smokers lose 8 years of their life which represents 4 million smoker deaths each year worldwide. (Edwards 2004). In high income countries, low socioeconomic status is associated with an increased likelihood of being a smoker and smoking more cigarettes per day. In low and middle income countries, men of low socioeconomic status are more likely to smoke than men of high socioeconomic status and for those men from a low socioeconomic status who smoke, their daily consumption of cigarettes is similar to or greater than high socioeconomic status men who smoke (Davis et al 2007).

There are also known harmful health effects in adult non-smokers from the inhalation of other people's tobacco smoke (passive smoking, second-hand tobacco smoke). These may include irritation to the eyes, nose and throat, allergy, headache, nausea, decreased lung function, chronic airways disorders, lung cancer and emphysema (Winstanley et al. 1995). Non-smokers exposed to second-hand tobacco smoke at work have a 16-19% increase in risk of developing lung cancer (Sasco et al. 2004). Smoking in workplaces and indoor public areas is a major source of second-hand smoke exposure. Globally about 1/3 of adults are regularly exposed to second-hand smoke (WHO 2009).

There appears to be a high degree of complementarity between tobacco use and gambling. A number of studies have found high rates of tobacco use among gamblers (McGrath and Barrett 2009). In particular, a higher rate of smoking has been observed in gamblers undergoing treatment. Estimates of daily tobacco use among problem gamblers range from 41% to 69% (Grant et al. 2008). Rodda et al. (2004) identify higher rates of tobacco dependence and anxiety among problem electronic gambling machine players. Similarly, Grant and Potenza (2005) note that

daily tobacco use in pathological gamblers who seek treatment is common and appears to be associated with the greater urge to gamble. This relationship also appears in the research by Petry and Oncken (2002) who found that of the gamblers seeking treatment, those who smoked on a daily basis gambled on more days and spent more money per month than gamblers who did not smoke on a daily basis. In Victoria, Australia it was found that smokers were no more likely to play EGMs than non-smokers. However, if smokers did play they spent over twice as much (Harper 2003).

Thus we can conclude that the literature shows a strong link between smoking and detrimental health effects both for the smoker and the passive smoker. There is also a strong association between smoking and “problem-gambling” behaviour that may well act as the mechanism by which smoking bans influence gambling behaviour.

Section IV. Smoking Bans – A Review of Previous Literature

To improve health outcomes for both workers and patrons by reducing exposure to environmental tobacco smoke, smoking bans have been introduced in a number of gaming establishments worldwide. However, these bans may also break the “*trance-inducing rituals*” associated with gambling by requiring players who smoke to interrupt their play to go outdoors to smoke (Harper 2003). Thus, smoking bans may act as a method of harm minimization for some gamblers. It may also have implications for gaming revenue, admissions and tax revenue.

A number of studies have examined the effect of the smoke-free laws introduced in the US state of Delaware implemented on November 27th 2002. Mandel et al. (2005a, b) concluded that there was no change in gaming revenue for the EGMs

in the State's three racetracks. However, after correcting data errors in these earlier studies and also adopting a more robust methodology, Pakko (2006) found that there was a revenue loss of 13% compared to the year preceding the smoking ban. In a further study Pakko (2008), found that the Delaware casinos differed in the magnitudes of percentage losses. The casino with the largest proportionate loss due to the smoking ban faced the most direct competition from alternative gaming facilities in Atlantic City, New Jersey that were not subject to smoking bans. Thalheimer and Ali (2008) estimate a system of EGM demand equations for each of the three Delaware casinos. Across the three Delaware casinos the falls in gaming demand varied between 12.7-17.8%. However, it was found that these amounts were not significantly different across the three casinos. Thus it was concluded that the smoking ban reduced gaming demand by 15.9%.

Two other studies have looked at the introduction of smoking bans using the experiences in the Australian state of Victoria and the US state of Illinois. Using data from the Victorian experience, Lal and Siahpush (2008) concluded that the smoke-free policy on all EGM locations instituted on September 1st 2002 led to a sudden 14% sustained drop in the mean level of state-level monthly EGM expenditure. Garret and Pakko (2009) examine the effect of a smoking ban in all Illinois casinos in January 1st 2008 on both casino revenue and attendance. Results indicated that casino revenue declined by more than 20% and total admissions fell by 10%. A further implication was substantial losses in tax revenue for the state and local communities that host the casinos. Total Illinois tax revenue was down by \$200 million.

In these three cases the imposition of smoking bans in gaming facilities has reduced gambling by substantial amounts. In the next section we will re-examine the

evidence from the Victorian smoking ban and try to establish why the ban varied regionally in its impact on gaming revenues.

Section IV. Smoking Ban Victoria, Australia

In 1991 the Victorian legislature allowed the introduction of EGMs into selected hotels and clubs licensed to serve alcohol.⁶ Two corporations, Tatersalls and Tabcorp are licensed to own and lease gaming machines to approved clubs and hotels. Each corporation is permitted to operate 50% of the maximum permissible number of these gaming machines.⁷ Victoria has imposed a state wide cap of 27,500 machines in hotels and clubs. From the 1st of September 2002, the Victorian Government imposed a ban on smoking in gaming areas of licensed premises. No smoking was permitted in venues with gaming machines that consisted of only one room and gambling rooms in venues that had two or more rooms. For the first time since EGMs were introduced into Victoria, expenditure on the machines dropped in 2002-3. There was also a reduction in problem gamblers seeking help with state-wide counselling numbers falling from 5,309 in 2001 to 3,508 in 2003 (Abbott 2006).

Section IV.A The local Impacts of the Smoking Ban

First we investigate how the Victorian bans had a differential impact on different regions depending on the proximity to the border with New South Wales where there were no smoking bans in effect at the time. We also investigate how the local socio-economic conditions influenced the degree of the impact of the ban. Then we determine the impact of the bans on the Victorian state tax revenues.

Victoria is subdivided into a number of Local Government Areas (LGAs) that can be defined as being metropolitan, regional or rural. The Victorian Commission

for Gambling Regulation reports LGA level annual data on EGM expenditures and the number of EGMs. Using the annual expenditure on EGMs per LGA for the years 2002-2003 we construct the variable *%Change in EGM Expenditure 2002-2003*, in \$2002 (*% ΔExpend*). Also for these years we construct a variable that reflects the percentage change in EGM numbers within the LGAs (*% ΔEGM numbers*). As a measure of socioeconomic status for each LGA we use the Index of Relative Socio-Economic Disadvantage (*IRSED*) produced by the Australian Bureau of Statistics. This measure is derived from a weighted average of a number of Census attributes that reflect socio-economic status. These include low income, low educational attainment, high unemployment and a greater proportion of the local workforce in relatively unskilled occupations. The *IRSED* is scaled across Australia so that the average score is 1000. The higher the score the lower the level of disadvantage in the LGA. Scores lower than 1000 indicate relatively disadvantaged areas (Victorian Government Department of Human Services 2003). We also identify the LGAs that border the state of New South Wales by defining a dummy variable *border*.⁸

Table 1: Summary Statistics

Variable		Border	No Border
% <i>ΔExpend</i>	<i>Mean</i>	-15.8 %	-12.4%
	<i>Minimum</i>	-25.1%	-19.8%
	<i>Maximum</i>	-8.9%	-2.2%
IRSED	<i>Mean</i>	993.2	1015.2
	<i>Minimum</i>	976.7	876.9
	<i>Maximum</i>	1033.7	1122.2
% <i>ΔEGM numbers</i>	<i>Mean</i>	0.294%	-0.296%
	<i>Minimum</i>	0.000	4.688%
	<i>Maximum</i>	2.643%	-6.749%
Observations		9	51

Table 1 reports the summary statistics of these variables categorized as to whether the LGA is located on the border of NSW or not. Out of a total of 60 LGAs,

9 are defined as bordering NSW. From Figure 1, one can note that the impact of the smoking ban in Victoria differed across LGAs.⁹ On average the fall was larger for those LGAs that bordered NSW. Note that all the LGAs that border NSW are either classified as regional or rural. This is reflected in the statistics for *IRSED* where the values are more similar for those LGAs on the border than those for the rest of Victoria which are made up of metropolitan, regional and rural LGAs. This can be viewed in Figure 2 which compares the box plots of *IRSED* by the border location of the LGA. The distribution for those on the border is more compact indicating the homogeneity of the mainly rural LGAs along the border. Another feature of the data that can be noted in Table 1 is the small variation in the number of EGMs between the two years.

Figure 1 Comparison of the change in EGM Expenditure 2002-2003 (\$2002)

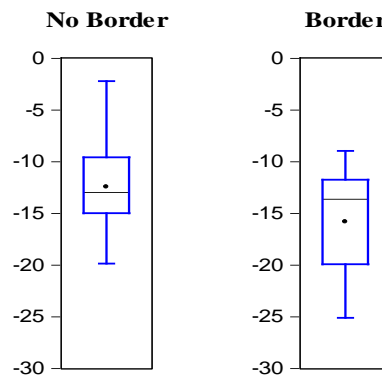


Figure 2 Comparison of *IRSED*

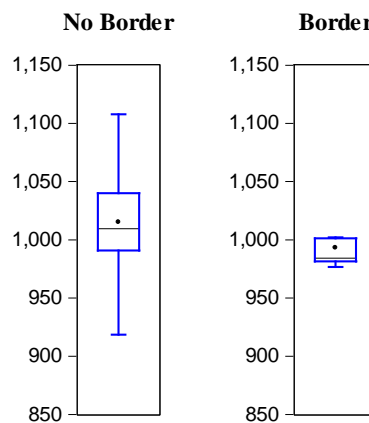


Table 2 presents the results of a regression in which $\% \Delta Expend$ is the dependent variable and *IRSED*, $\% \Delta EGM$ numbers and *border* are explanatory variables. The small number of EGM machines moved between venues during 2002-2003 is accounted for by including $\% \Delta EGM$ numbers as a regressor.

Table 2: Estimation Results

<i>Dependent Variable:</i> %Change in EGM Expenditure 2002-2003 (\$2002)			
<i>Variable</i>	<i>Coefficient</i>	<i>t-statistic</i>	<i>P value</i>
<i>Intercept</i>	23.441	2.028	0.047
$\% \Delta EGM$ numbers	0.5034	2.678	0.010
<i>IRSED</i>	-0.0352	-3.121	0.003
<i>Border</i>	-4.4454	-2.421	0.020
$R^2 = 0.232$		$F\text{-Stat}=5.653$	

Number of observations=60. t-statistics based on White Heteroskedasticity-Consistent Standard Errors.

The estimated coefficient on *border* is negative and statistically significant. This implies that conditioned on the level of *IRSED* for the LGA, the fall in the expenditure after the introduction of the smoking ban was 4.4% greater for those LGAs that bordered the state of NSW where there was no smoking ban at that time. This finding supports the claim in a newspaper article (Ryan 2003) where it was noted that “*Smoking punters have crossed the border where they are gleefully greeted by NSW club managers...*” To counter the “*massive*” revenue falls occurring at Victorian venues on the border, the state opposition party proposed a “buffer zone”, that is an exemption to the smoking ban in Victorian gaming venues that were within about 10 kilometres of the border (Gray 2003). However, this proposal was rejected by the Health Minister who argued that the “*bans are a good idea for the health of human beings and that's my primary concern*” Warner (2003)

Given that problem gamblers are more likely to smoke, it was thought that the introduction of the smoking ban may significantly impact upon the behaviour of problem gamblers acting as a harm minimization strategy. However, the estimated coefficient of *IRSED* is negative and statistically significant. This indicates that the smoking ban was associated with greater falls in expenditure for those gaming venues located in the more advantaged LGAs. It has been found that the more advantaged areas are associated with lower smoking prevalence (Siahpush et al. 2005). Furthermore, problem gamblers are linked to low socioeconomic or more disadvantaged areas (Marshall and Wynne 2004). Thus, this result may suggest that problem gamblers were less influenced by the smoking ban than non-problem gamblers. According to a survey of gaming venue managers they reported that the smoking ban had most significantly impacted on non-problem gamblers (Rodda and Cowie 2005). One manager commented that prior to the smoking ban, the gaming rooms used to attract business from diners at the bistro who “*used to put money in while having a cigarette break from dinner*” (Rodda and Cowie 2005, Section 3, pg. 29).¹⁰ Marshall (2003) concludes that while there was a clearly identifiable drop in expenditure, there is no evidence that the smoking ban changed the behaviour of problem gamblers.

This analysis demonstrates that a number of factors influenced the impact of the smoking ban. The percentage fall in revenue was greatest for those gaming venues in more advantaged areas and for those that were closest to the NSW border. In the next section we investigate the state-wide impact of the smoking ban in terms of state tax revenue.

Section IV.B The Tax Revenue Impacts of the Smoking Ban

To investigate how the smoking ban influenced the state tax revenues we present the evidence on how the EGM revenues changed in the years after the introduction of the ban.

Figure 3: Actual and Forecasted Tax Revenue from EGMs for Victorian Government (hundreds of millions \$2002)

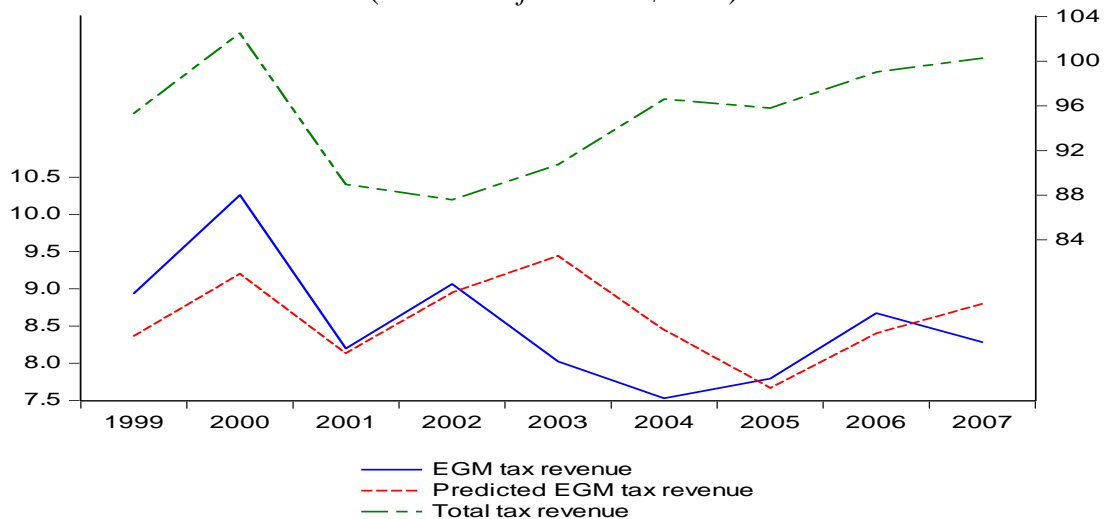
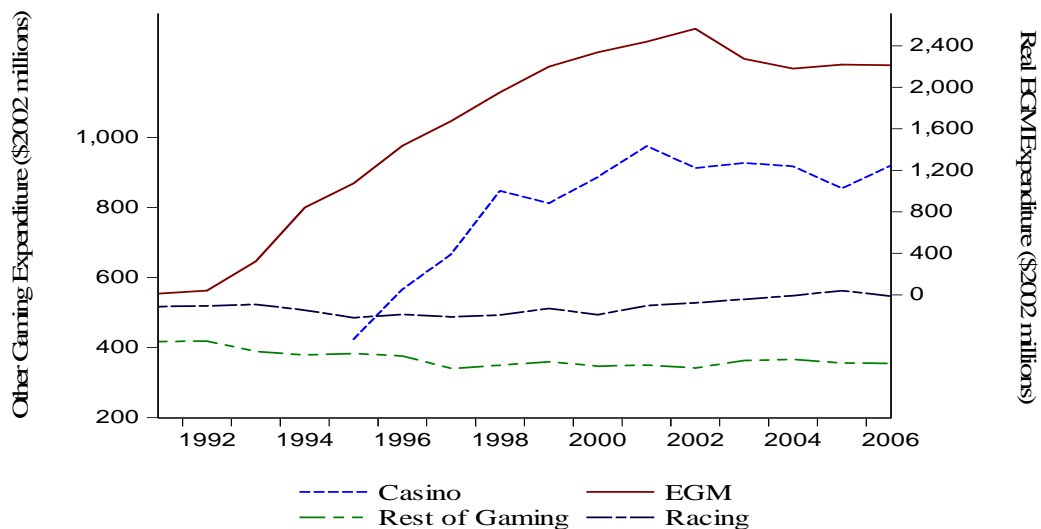


Figure 3 compares the actual and forecast tax revenue from EGM gambling over the period 1998-2007 obtained from Victorian State Budget Papers.¹¹ Tax revenue from EGM gambling constituted between 8-10% of total State tax revenue. In addition, this time period was not associated with an economy-wide downturn (Gillitzer et al. 2005). Figure 3 illustrates that total state revenue was generally increasing over this period. There was a dip in 2001 due to the introduction of a Federal Goods and Services tax which resulted in a change in State tax revenue when a number of state based taxes were removed and a Federal sales tax was imposed. When EGM machines were first introduced the forecasted state tax revenue was well below the actual revenue collected. This was reversed with the introduction of the smoking ban with the actual being less than the forecasted over 2003-2004 by approximately \$234 million (\$2002) or 1.2% of total tax revenue for this period. This

loss was commented on by Australian Hotels Association chief executive Alan Giles who claimed that the smoking ban was “...unlikely to help with problem gambling and all it has done is take \$200 million out of Government taxes that could have gone into the health system...” (Baker 2003).¹²

There was only a minor impact of the smoking ban on other gambling in Victoria. Figure 4 is a plot of the real expenditure for the main components of gambling in Victoria. The dip in real EGM expenditure coincides with the smoking ban. Prior to the smoking ban there had been a dip in Casino real expenditure which was due to a fall in the “high roller” business (Power, 2002) and thereafter until 2004 there was only moderate increases. The Casino was not affected as much by the smoking ban as were the EGMs located in hotels and clubs. This may be due to the close proximity of smoking areas in the Casino to the EGMs. Furthermore, at that

Figure 4: Components of Real Gambling Expenditure in Victoria (\$2002 millions)



time, in the Casino a player could interrupt their play and transfer credit to a card whereas in hotels and clubs cards were less likely to be used (SACES 2005). Both racing and the rest of gaming showed minor increases in real expenditure.¹³ As a

consequence, there was an increase in State revenue associated with taxes from racing and private lotteries. For the two fiscal years following the implementation of the smoking ban the increase due to racing and private lotteries in State revenue was around \$39 million (\$2002) or only about 27% of the actual fall in State revenue due to EGMs. There was another side-effect of the smoking ban to the racing industry though as they received a 25% share of Tabcorp's revenue from EGMs (Bourke 2002).

Section V. Conclusions

It has been estimated that 75-80% of gambling-related problems are associated with EGMs (Delfabbro and Le Conteur 2007). A link has also been established between tobacco use and problem EGM gamblers (Rodda et al. 2004). It has also been shown that if smokers do play EGMs they spend over twice as much as non-smokers. Recently, a number of gaming establishments have introduced smoking bans.

One reason for these types of bans is to reduce exposure to second hand smoke for workers and patrons. However, smoking bans may also act as a method of harm minimization for gambling. This is because it is thought that bans may require gamblers to interrupt their play to have a smoke outside and hence break the "*trance-inducing rituals*" associated with gambling (Harper 2003). A review of previous research indicates that these smoking bans do result in substantial drops in revenue and demand for gaming. Another implication is that tax revenue can fall dramatically.

From 1st September 2002, the Victorian Government introduced a ban on smoking in gaming areas of licensed premises which resulted in a fall in EGM

expenditure. An analysis of the percentage fall over local government area showed that the fall in expenditure was greater in less disadvantaged regions. However both smoking prevalence and problem gamblers are linked to more disadvantaged areas. The percentage fall in expenditure was also greater for those LGAs that border NSW which did not impose a smoking ban at this time. This is similar to the experience in the US where bars subject to bans have reported losing customers to nearby communities where bans are not imposed (McCormick-Jennings 2007). In a study of 239 towns in Massachusetts, Bartosch and Pope (2002) found a significant positive effect for towns bordered by those with a highly restrictive restaurant smoking policy. The ban also resulted in a tax revenue shortfall of \$234 million dollars over the period 2003-2004.

Endnotes

1. The Australian state of Western Australia is the only state where such gambling outside of a casino is not allowed.
2. In Australia, gaming expenditure refers to gross profits of gambling operators (prior to fees and taxes). In US studies this term is often referred to as gaming revenue. We use both of these terms.
3. It is thought that the actual total may be larger due to the existence of unregistered and illegal machines. The actual numbers of these could not be verified.
4. In the literature, the term problem gambling is commonly used to include pathological gambling. Pathological gambling has been formally recognized as a medical disorder of impulse control by the American Psychiatric Association (APA) since 1980 (Lesieur and Rosenthal 1991). It is a progressive disease with elements of addiction similar to alcohol and drug addiction. According to the APA, clinicians identify the presence of a gambling disorder by confirming at least 5 out of 10 Diagnostic Statistical Manual (DSM) criteria. Each criterion carries equal weight. In addition, clinicians must determine that the pattern of excessive gambling is not caused by a manic disorder.
5. This ban excluded Bingo Automats although 99.7% of adults in 2007 reported they did not use or seldom used them.
6. The term hotel in Australia is used to refer to establishments that may only have a bar or pub. Most do not have accommodations for sleeping and many also provide live music. They are usually privately owned. Clubs are also

- public bars and pubs but they are owned by an organization such as a veterans association and sports club.
7. There is also a casino in Melbourne. It was opened on 30th June 1994 and has a cap of 2,500 machines. With the introduction of the smoking ban, the casino was also required to be smoke-free, except in TAB rooms, bar areas and high roller rooms that were exempted by the Minister of Health. The data for the casino is not included in the analysis presented here.
 8. These LGAs include Greater Shepparton, Mildura, Swan Hill, Wangaratta, Wodonga, East Gippsland, Moira, Indigo, Towong and Campaspe. Note the LGA of Gannawarra had \$0 expenditure and was not included in the sample. Also note that due to confidentiality requirements only the combined expenditures are reported for Indigo and Towong.
 9. The boxplots shows both the median and mean. The median is depicted using a line through the center of the box, while the mean is illustrated with a dot.
 10. Smoking in restaurants and cafes was prohibited in Victoria in July 2001.
 11. These are available at <http://www.dtf.vic.gov.au>.
 12. A substantial proportion of Gambling tax revenue in Victoria is earmarked for the state Hospitals and Charities Fund and Communities Support Fund.
 13. Rest of Gaming includes Keno, instant lottery, Lotteries, Lotto and Pools.

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