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# The impact of a local smoke-free air law on wagering at an off-track betting facility in Indiana

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Received 17 November 2010

Accepted 22 February 2011

## ABSTRACT

**Objective** This study measured the impact of a local smoke-free air law on wagering at an off-track betting (OTB) facility in Indiana.

**Methods** Regression analysis was used to compare the trend in per capita amount wagered at an OTB location that went smoke-free to the trend in per capita amount wagered at two comparison OTB locations that continued to permit smoking. Unemployment rate was included as a covariate.

**Results** During the study period, there was a decreasing trend in the per capita amount wagered at each of the three OTB locations. There was no significant change in the trend for the location that went smoke free or for the locations where smoking has continued.

**Conclusions** There is no economic reason to exclude OTB facilities from smoke-free legislation.

## INTRODUCTION

Many studies have shown that smoke-free air laws do not negatively impact business activity.<sup>1–7</sup> However, the research on smoke-free air laws and gaming revenues is less extensive and has produced mixed findings. One study found that Delaware's statewide smoke-free air law had no effect on gaming revenues,<sup>8</sup> but a separate analysis of the same data but with different model specifications found a significant decrease in revenue.<sup>9</sup> A study of the effect of smoke-free policies on electronic gaming machine expenditures in Australia found a significant decrease in monthly expenditures.<sup>10</sup> In terms of charitable gaming, Glantz and Wilson-Loots<sup>11</sup> reported that local smoke-free air ordinances in Massachusetts had no effect on bingo revenues. In the public policy arena, opponents of smoke-free workplace laws continue to argue that they negatively impact gaming revenues.

On 1 June 2007, the city of Fort Wayne, Indiana implemented a law prohibiting smoking in all workplaces, including bars and gaming venues. The objective of this study was to test the effect of the law on the amount of money wagered at an off-track betting (OTB) facility in Fort Wayne. Two additional OTB sites are located in Indianapolis, Indiana and Merrillville, Indiana. Smoking is permitted in these locations. Therefore, the trend in the amount wagered at the Fort Wayne location was compared to the trend in the amount wagered at each of the other two locations.

## METHODS

A longitudinal model was used to test the effect of the smoke-free air law on per capita handle (ie, the total amount of money wagered) at the OTB

facility in Fort Wayne. The trend in per capita handle for Fort Wayne was compared to the trend in per capita handle for the Indianapolis and Merrillville locations. Monthly handle from 2002 to 2009 was obtained from the Indiana Horse Racing Commission for the three wagering locations. To compute per capita handle, annual population estimates for 2002–2009 for the counties where the wagering facilities are located were obtained from the US Census Bureau. As estimates of economic activity, the monthly unemployment rates for the counties where the wagering facilities are located were obtained from the US Bureau of Labor Statistics through a cooperative program with the Indiana Department of Workforce Development. In addition, annual total taxable sales for 2002–2008 for each county were obtained from the Indiana Department of Revenue.

The effect of the law was tested on seasonally adjusted (Census Method I) per capita monthly handle. The initial regression model allowed each OTB location to have its own slope and intercept over time and included unemployment rates and total taxable sales as covariates modelled jointly over the three cities. A Durbin–Watson (DW) test performed on the ordinary least squares residuals of the full model indicated the presence of lag 1 autocorrelation (DW=1.363; permutation  $p<0.0001$ ). Thus, the remaining analyses were performed using longitudinal models with an AR1 correlation structure.

Preliminary analyses were conducted on annual total taxable sales and monthly unemployment rate, the two covariates that were considered as potential estimates of economic activity. Because 2009 total taxable sales data were unavailable, models were first estimated including data only through 2008. A  $\chi^2$  likelihood ratio test indicated that inclusion of total taxable sales did not improve the overall model ( $\chi^2=3.06$ ;  $p=0.08$ ). Therefore, total taxable sales was dropped as a covariate in further analyses. This allowed for use of the full 2002–2009 data in the remaining analyses. Inclusion of unemployment rate did significantly improve the model ( $\chi^2=5.39$ ;  $p=0.02$ ) and was therefore retained as a covariate.

To determine if the trends for each location were consistent over time, a change in slope and a shift for each OTB location after 1 June 2007 were added to the model. Then,  $\chi^2$  likelihood ratio tests were used to determine if the shifts or slope changes could be dropped without significantly affecting the model fit. Results showed that shifts did not significantly improve the model ( $\chi^2=1.44$ ;  $p=0.70$ ), slope changes did not significantly improve the model ( $\chi^2=4.48$ ;  $p=0.21$ ), and the combined effect

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of shifts and slope changes did not significantly improve the model ( $\chi^2=7.64$ ;  $p=0.27$ ). Therefore, the shifts and slope changes were dropped. The final model was coded with the Fort Wayne (smoke-free) location as the reference:

$$\text{OTB}_{i,t} = \beta_0 + \beta_1 \text{Unemployment}_{i,t} + \beta_2 \text{Merrillville} + \beta_3 \text{Indianapolis} + \beta_4 \text{Time} + \beta_5 \text{Merrillville} \times \text{Time} + \beta_6 \text{Indianapolis} \times \text{Time} + e_{i,t}$$

An overall likelihood ratio test for all fixed effects indicated that the final model significantly explained changes seen in per capita handle ( $\chi^2=712.03$ ;  $p<0.0001$ ).

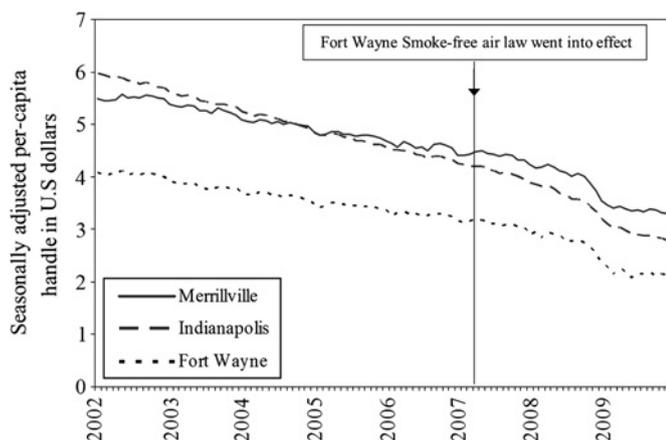
## RESULTS

All three locations demonstrated a decrease in per capita handle over the study period. For the Fort Wayne location, there was a 27.24% decrease in average monthly per capita handle from \$3.61 before 1 June 2007 to \$2.63 after 1 June 2007. For the Merrillville location, there was a 24.27% decrease from \$5.04 to \$3.82. For the Indianapolis location, there was a 30.88% decrease from \$5.04 to \$3.49. Figure 1 displays the decrease in fitted monthly per capita handle at the three gaming facilities from 2002 to 2009.

The fixed effects estimates from the final model are shown in table 1. First, unemployment rate was a significant predictor of per capita handle. As the unemployment rate increased over the study period, per capita handle decreased. In terms of the trends in per capita handle, the Fort Wayne location, as the reference, demonstrated a significant negative trend from 2002 to 2009. For the comparison locations, the negative trend in per capita handle for the Merrillville facility was not significantly different from Fort Wayne from 2002 to 2009. However, the trend for the Indianapolis location was significantly more negative as compared to Fort Wayne across the entire study period. As noted previously, there were no significant changes in the trends for any of the three locations after 1 June 2007, when the Fort Wayne location went smoke free.

## DISCUSSION

Although several studies have tested the economic impact of smoke-free air laws, the current study adds to the less conclusive



**Figure 1** Seasonally adjusted per capita handle at three off-track betting (OTB) locations in Indiana, USA, 2002–2009. The Fort Wayne location went smoke-free on 1 June 2007.

**Table 1** Final model fixed effects results for per capita handle by off-track betting (OTB) location, Indiana, USA, 2002–2009

	Estimate	SE	t Value	p Value
$\beta_0$ (Intercept)	4.671	0.117	40.011	<0.0001
$\beta_1$ Unemployment <sub>i,t</sub>	-0.102	0.018	-5.721	<0.0001
$\beta_2$ Merrillville	1.626	0.132	12.323	<0.0001
$\beta_3$ Indianapolis	1.891	0.130	14.578	<0.0001
$\beta_4$ Time	-0.016	0.002	-9.102	<0.0001
$\beta_5$ Merrillville×time	-0.004	0.002	-1.840	0.067
$\beta_6$ Indianapolis×time	-0.014	0.002	-5.881	<0.0001

The Fort Wayne (smoke-free) location was the reference value. SE, standard error.

literature on the impact on the gaming industry. This study provides additional evidence that smoke-free air laws do not negatively impact gaming activities. Specifically, there was no change in the trend in per capita amount wagered at the Fort Wayne OTB location after the city of Fort Wayne implemented a smoke-free air law. The Fort Wayne location and two comparison locations in Indianapolis and Merrillville all experienced a decreasing trend in per capita amount wagered from 2002 to 2009. This study found no evidence that the trend for the Fort Wayne location became more negative after becoming a smoke-free venue, as opponents of smoke-free air legislation would predict.

The findings from this study suggest that there is no economic reason for policymakers to exclude OTB facilities from smoke-free legislation. Given the well established negative health consequences of secondhand smoke exposure,<sup>12</sup> strong policies should be enacted to protect workers and patrons at gaming facilities from exposure to secondhand smoke. These strong public health policies can be implemented without fear of negative economic consequences.

**Acknowledgements** The authors would like to thank Tim Filler, Stan Glantz, Mary Lay and Kosali Simon for their contributions to this paper.

**Competing interests** None.

**Provenance and peer review** Not commissioned; externally peer reviewed.

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*Tob Control* published online March 22, 2011  
doi: 10.1136/tc.2010.041913

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