HEALTH ECONOMICS
Health Econ. **14**: 1273–1281 (2005)
Published online 7 September 2005 in Wiley InterScience (www.interscience.wiley.com). **DOI:**10.1002/hec.1016

ADDICTION

Smoke-free laws and bar revenues in California – the last call

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Summary

California was the first state to implement smoke-free restaurant and bar laws, in 1995 and 1998, respectively. We analyze how these laws affected the distribution of revenues between bars and restaurants. Critics of smoke-free bar laws have often claimed that a prohibition on smoking reduces bar revenues. Similar claims are made for the effects of smoke-free restaurant laws. Such claims implicitly assume that a smoke-free law reduces expenditures by smokers by more than it increases expenditures by non-smokers. Using tax revenue data from 1990 to 2002, our analysis suggests that the actual effect is just the opposite: the 1995 smoke-free restaurant law is associated with an *increase* in restaurant revenues, while the 1998 smoke-free bar law is associated with an increase in bar revenues. Copyright © 2005 John Wiley & Sons, Ltd.

Keywords smoke-free policies; bar revenue

Introduction

Smoke-free restaurant and bar laws are being considered, and often implemented, by a large number of jurisdictions around the world. Within the US, California was the first state to implement a statewide smoke-free restaurant law in January 1995, and a statewide smoke-free bar law in January 1998 [1,2]. These laws have clearly reduced the exposure of bar and restaurant employees to secondhand smoke [3], and as such should have reduced their susceptibility to respiratory and heart diseases [4,5]. The tobacco industry and its front groups, however, have consistently attacked these laws on a variety of levels [6,7]. A common argument is that customers will be driven away and consequently businesses will lose revenue. In the current paper we examine the validity of this argument.

The claim that smoking bans will reduce restaurant and bar profits stems from an assumption that smokers will substitute away from spending time in these locales in favor of other forms of leisure activity. In practice, any exit of smokers is likely to be at least partially offset by a substitution by non-smokers towards spending time in bars and restaurants. Whether the overall effect is favorable or unfavorable for bars and restaurants is ultimately an empirical matter.

In this paper we present evidence that no-smoking laws in California have actually increased revenues for the establishments affected. Our central findings are that, relative to trend, restaurant revenues increased following the introduction of the smoke-free restaurant law in 1995; and likewise, bar revenues increased (again relative to trend) after the smoke-free bar law was introduced in 1998. In both cases, these findings suggest that any substitution by smokers *away* from the

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Received 1 September 2003
Accepted 8 April 2005

establishments affected was more than offset by the substitution by non-smokers *towards* the same establishments.

It is of course possible that the increases in restaurant and bar revenues after the 1995 and 1998 laws, respectively, was a result of other factors, and that these non-smoking laws were unfavorable for the establishments they targeted. For instance, perhaps the increase in bar revenues after 1998 would have been *even larger* had smoking in bars remained legal? Two further findings suggest that this is unlikely to have been the case.

First, the findings that restaurant revenues increased after 1995 and bar revenues increased after 1998 are robust to the inclusion of individual time trends for different counties. In other words, even after controlling for secular trends in entertainment expenditures in different counties, there are still noticeable increases in restaurant revenues after 1995 and bar revenues after 1998. Thus if one wants to maintain that these increases were *not* due to the smoke-free laws, one would have to argue that some other *statewide* change occurred in the same years.

As noted above we are inclined to interpret the increases in restaurant and bar revenues in 1995 and 1998, respectively, as evidence of substitution effects by non-smokers outweighing substitution effects by smokers. Our second set of supporting results concerns the existence of substitution effects of this kind.

Our results suggest that in 1995 non-smokers substituted from bars to restaurants. One would expect this effect to be most pronounced in counties where restaurants are good substitutes for bars. Consistent with this hypothesis, we find that the rise in restaurant revenues was largest in counties with a higher ratio of restaurants to bars.

Likewise, one would expect the 1998 rise in bar revenues to be more pronounced in counties where substitution from restaurants to bar is easiest. Again, consistent with this hypothesis, we find that the rise in bar revenues was larger in counties with a higher ratio of bars to restaurants.

Numerous authors have examined the effects of smoke-free restaurants on revenues, employee counts, and tourism [8,9]. Studies appearing in peer-reviewed journals have either reported favorable effects of the smoke-free restaurant law, or else have failed to detect any statistically significant effect. Closest to the current paper, Bartosch and Pope [10], Bartosch and Pope [11] and Hyland *et al*. [12] have looked at the effects of smoke-free restaurant laws on revenues; neither study was able to detect a statistically significant reduction in revenues. Likewise, Glantz [13] examines aggregate California bar revenue data up to 1999. He concludes that the implementation of the smoke-free laws positively impacted bar revenues.

Relative to these previous papers, we make three main contributions. First, by using county-level data we are able to more effectively control for changes in revenues stemming from factors *other* than the introduction of smoking bans. Second, Glantz's findings on the effects of the smoke-free bar law are based on a single year of data after the introduction of the smoke-free bar law, and as such must be viewed as being somewhat preliminary. By also including revenue data from 1999 to 2002, our paper considerably strengthens his findings. Third, we discuss in considerably greater detail *why* a ban on smoking in bars (respectively, restaurants) may have led to an increase in bar (respectively, restaurant) revenues. In particular, we present evidence consistent with the hypothesis that smoke-free laws induce substitution of expenditures between bars and restaurants.

The choice between bars and restaurants

Our main object of interest in this paper is the effect of no-smoking laws on the distribution of revenue between bars and restaurants. Throughout the paper, we denote the bar sector's share of total expenditures in eating and drinking establishments by $P_{B/ED}$. That is, $P_{B/ED}$ = (total bar revenue)/(total revenue of all eating and drinking establishments). In the next section we detail how this quantity is measured.

By definition, $P_{B/ED}$ can be decomposed into a weighted sum of $P^{S}_{B/ED}$, the proportion of eating and drinking expenditures *by smokers* that takes place in bars, and $P^{NS}_{B/ED}$, the equivalent expenditure measure for *non-smokers*. That is,

$$P_{B/ED} = \alpha P^{S}_{B/ED} + (1 - \alpha) P^{NS}_{B/ED}$$

where α is the proportion of all total expenditure on eating and drinking accounted for by smokers.

The effect of no-smoking laws stressed by tobacco groups and other opponents of smoke-free laws is:

Prediction 1. A ban on smoking in bars will reduce $P^{S}_{B/ED}$.

The basic reasoning behind this prediction is smokers find smoke-free bars less attractive, and substitute to other forms of leisure activity. Similar reasoning implies the following three predictions:

Prediction 2. A ban on smoking in restaurants will increase $P^{S}_{B/ED}$, as smokers substitute from restaurants to bars.

Prediction 3. A ban on smoking in bars will increase $P^{NS}_{B/ED}$, as non-smokers substitute from restaurants to bars.

Prediction 4. A ban on smoking in restaurants will decrease $P^{NS}_{B/ED}$, as non-smokers substitute from bars to restaurants.

From the preceding observations, it is apparent that the overall effect of the laws banning smoking in restaurants and in bars is more complicated than is often suggested. However, the following three additional hypotheses appear plausible:

Hypothesis A. Suppose that a smoke-free restaurant law is enacted *before* a smoke-free bar law. Then at the introduction of the smoke-free bar law the decrease in $P^{S}_{B/ED}$ will be small since there are no easily accessible alternative social venues in which smoking is allowed. Consequently, $P_{B/ED}$ will increase.

Hypothesis B. At the introduction of the smoke-free restaurant law the decrease in $P^{NS}_{B/ED}$ will be most pronounced in those counties where substitution from bars to restaurants is easiest, i.e. where the relative predominance of restaurants to bars in a county is high. As such, $P_{B/ED}$ will decrease by more (or increase by less) in such counties.

Hypothesis C. At the introduction of the smoke-free bar law the increase in $P^{NS}_{B/ED}$ will be most pronounced in those counties where substitution from restaurants to bars is easiest, i.e. where the relative predominance of bars to restaurants in a county is high. As such, $P_{B/ED}$ will increase by more (or decrease by less) in such counties.

Data

The data is taken from the California Board of Equalization's (BOE) *Taxable Sales in California* (*Sales & Use Tax*) quarterly reports from 1990 to 2002. These reports give the revenues for a variety of business types at the state-level, and also at the county-level for the largest 36 of California's 58 counties. For our analysis the relevant business types are: 'Eating and drinking establishments – no alcohol,' 'Eating and drinking establishments – beer and wine,' 'Eating and drinking establishments – all types of liquor.' We measure total expenditure in eating and drinking establishments as the sum total of these three categories.

It is important to note a significant limitation in the data we use. The BOE business type category, 'Eating and Drinking Establishments – all types of liquor,' includes 10 635 establishments in 2002. Although we will label this category as 'bars' for the remainder of the manuscript, this category includes *both* stand-alone bars and restaurant bars. (For the purposes of the smoke-free restaurant laws, a stand-alone bar is an establishment where drinks sales account for a substantial portion of revenue.) According to California's Alcohol and Beverage Commission classification, for 2002 only approximately one-third of establishments covered by this category were in fact stand-alone bars. The 1995 smoke-free restaurant law prohibited smoking in restaurants. Consequently, the smoke-free restaurant law potentially affects all of the BOE business types. Likewise, the 1998 law prohibited smoking in bars impacted only about one-third of the establishments in the 'Eating and drinking establishments – all types of liquor' category.

This artifact of the data will make the substitution effects discussed above harder to detect, since not all switches between bars and restaurants will be empirically observable. However, to the extent to which this form of measurement error biases our estimates towards zero, it only strengthens our main results.

Also biasing the result towards zero is that eight jurisdictions, which represent a small proportion of the state's population, passed smoke-free bar laws before the implementation of the statewide law. These ordinances were not uniform in their provisions and were not uniformly enforced. Consequently, we have chosen to not model these ordinances separately.

To further control for possible trends in revenue distribution, in our regressions below we include time-series variation in unemployment rates. The source for this data is the California Employment Development Department, Labor Market Information Division.

Empirical analysis

As discussed, we focus throughout on the proportion of all eating and drinking establishment revenues that are attributed to bars, that is, the ratio of bar revenues to the revenue of the 'All Eating and Drinking' group. It is worth emphasizing that by focusing on the division of total food and drink expenditures between bars and restaurants, we are insulated from many of the time series changes in economic conditions that might cause total expenditures to fluctuate substantially over time.

Statewide analysis

We start with the simplest regression model using only state-level data

$$\begin{aligned}(P_{\mathrm{B/ED}} * 100)_i = {} & \beta_0 + \beta_1 Q_{2_i} + \beta_2 Q_{3_i} \\ & + \beta_3 Q_{4_i} + \beta_4 \tau_i + \beta_5 \gamma_i \\ & + \beta_6 \mathrm{SFR}_i + \beta_7 \tau_i \mathrm{SFR}_i \\ & + \beta_8 \mathrm{SFB}_i + \beta_9 \tau_i \mathrm{SFB}_i + \varepsilon_i \end{aligned} \quad (1)$$

The subscript i denotes the time period. Q_2, Q_3, and Q_4 are quarterly dummy variables. τ is a centered time trend variable. γ is the quarterly unemployment rate. SFR and SFB are dummy variables that take the value one after, respectively, the introduction of the smoke-free restaurant law and the smoke-free bar law. β_1–β_9 are the regression coefficients to be estimated. The error terms ε_i are assumed to be independent and normally distributed. By including the unemployment rate we hope to control for any other secular trends that are not eliminated by examining $P_{\mathrm{B/ED}}$. To account for the fact that the effects of smoking bans may build slowly over time, we have included the dummy variables SFR and SFB both separately, and also in interaction with the time trend variable τ. Conceptually, this approach is similar to fitting a fixed changepoint model at the time of the law's implementation to assess the impact of the laws.

Because we allow for a change in both intercept and slope, it is possible that the estimated impact of a smoke-free law will be a decrease (increase) in bar revenues in the short-term but an increase (decrease) in the long-term. In such cases, the overall impact is ambiguous. Consequently, to assess the effects of the smoke-free laws we examine the modeled $P_{\mathrm{B/ED}}$ after a specific time period from the implementation of the law in comparison to the predicted value of $P_{\mathrm{B/ED}}$ without the implementation of a smoke-free law. For the smoke-free restaurant law, this comparison is

$$\begin{aligned}&\hat{P}_{\mathrm{B/ED}}(\tau|\text{smoke-free restaurant effects}) - \hat{P}_{\mathrm{B/ED}} \\ &\quad (\tau|\text{without smoke-free restaurant effects}) \\ &\quad = (\hat{\beta}_0 + \hat{\beta}_1 \tau_i + \hat{\beta}_2 Q_2 + \hat{\beta}_3 Q_3 + \hat{\beta}_4 Q_4 + \hat{\beta}_5 \gamma_i \\ &\qquad + \hat{\beta}_6 \mathrm{SFR}_i + \hat{\beta}_7 \tau_i \mathrm{SFR}_i) - (\hat{\beta}_0 + \hat{\beta}_1 \tau_i + \hat{\beta}_2 Q_2 \\ &\qquad + \hat{\beta}_3 Q_3 + \hat{\beta}_4 Q_4 + \hat{\beta}_5 \gamma_i) \\ &\quad = (\hat{\beta}_6 \mathrm{SFR}_i + \hat{\beta}_7 \tau_i \mathrm{SFR}_i) \end{aligned} \quad (2)$$

where i is a time period after the implementation of the smoke-free restaurant law. For the smoke-free bar law, the comparison is

$$\begin{aligned}&\hat{P}_{\mathrm{B/ED}}(\tau|\text{smoke-free bar effects}) \\ &\qquad - \hat{P}_{\mathrm{B/ED}}(\tau|\text{without smoke-free bar effects}) \\ &\quad = (\hat{\beta}_0 + \hat{\beta}_1 \tau_i + \hat{\beta}_2 Q_2 + \hat{\beta}_3 Q_3 + \hat{\beta}_4 Q_4 \\ &\qquad + \hat{\beta}_5 \gamma_i + \hat{\beta}_6 \mathrm{SFR}_i + \hat{\beta}_7 \tau_i \mathrm{SFR}_i + \hat{\beta}_8 \mathrm{SFB}_i \\ &\qquad + \hat{\beta}_9 \tau_i \mathrm{SFB}_i) - (\hat{\beta}_0 + \hat{\beta}_1 \tau_i + \hat{\beta}_2 Q_2 + \hat{\beta}_3 Q_3 \\ &\qquad + \hat{\beta}_4 Q_4 + \hat{\beta}_5 \gamma_i + \hat{\beta}_6 \mathrm{SFR}_i + \hat{\beta}_7 \tau_i \mathrm{SFR}_i) \\ &\quad = (\hat{\beta}_8 \mathrm{SFB}_i + \hat{\beta}_9 \tau_i \mathrm{SFB}_i) \end{aligned} \quad (3)$$

where i is a time period after the implementation of the smoke-free bar law. The selection of the time period could be chosen to measure the effects over short-, intermediate- or long-term.

In addition to the specification given above in Equation (1), we also conducted the analysis using $\log(P_{\mathrm{B/ED}})$ in place of $P_{\mathrm{B/ED}}$ as the dependent variable and used a model with autoregressive errors. The results were largely unaffected (see below for more detail).

County-level analysis

A weakness of the state-level analysis is its inability to distinguish between changes in bar and restaurant revenues caused by the smoke-free laws, and contemporaneous changes in bar and restaurant revenues caused by other factors. A fixed-effects county-level regression can address some of these issues. While the smoke-free laws affected all counties in California simultaneously, other potential factors are unlikely to have equally impacted bar revenues in the counties at the same

time. Using data for the 36 largest counties, we regressed county-level measures of $P_{B/ED}$ on the county measures of the same explanatory variables as before

$$(P_{B/ED})_{ij} = \beta_{0j} + \beta_{1_j} Q_2\lambda_j + \beta_{2_j} Q_3\lambda_j + \beta_{3_j} Q_4\lambda_j + \beta_4\tau_i + \beta_5\gamma_{ij} + \beta_{6_j}\lambda_j\tau_i + \beta_7 \mathrm{SFR}_i + \beta_8\tau_i \mathrm{SFR}_i + \beta_9 \mathrm{SFB}_i + \beta_{10}\tau_i \mathrm{SFB}_i + \varepsilon_{ij} \quad (4)$$

As before, the superscript i denotes the time period, while j denotes the county. λ_j is a dummy variable for each county j, which we treat as a fixed effect. (The random effects regression produced similar results.) Note that the regression allows for county-specific time trends and quarterly effects (τ and Q are interacted with the county dummies).

We estimated the county-level regression (4) using both weighted and unweighted data. When used, weightings are based on county populations in 2000 (with estimates taken from the California Department of Finance).

Results

Statewide analysis

To evaluate the effects of the smoke-free restaurant and bar laws, we evaluate Equations (2) and (3) using the results from regression (1). Figure 1 graphically displays the model's fit, Table 1 reports the estimates of effects of the smoking bans, and Table 2 displays the regression coefficients themselves. We have evaluated Equations (2) and (3) at one year, two years and five years to measure the short-, intermediate- and long-term effects, respectively.

From Table 1, the smoke-free restaurant law appears to have led to a modest decrease in the bar share of total eating and drinking expenditures. While the point-estimates are negative for all horizons, only the short-term effect is statistically significant. Similarly, the smoke-free bar law led to an increase in bar share of total eating and drinking expenditures. In this case the point-estimates are positive for all horizons; the intermediate- and long effects are statistically significant.

To determine if the trend before the implementation of the smoke-free restaurant law was linear, we examined various specifications of the model for the data from 1990 to 1994. A quadratic time trend variable did not fit the data. While the data fit the $P_{B/ED}$ and $\log(P_{B/ED})$ models similarly, residual analysis suggests the data fits the $P_{B/ED}$ model slightly better.

We also estimated Equation (1) under two alternate specifications. First, we used $\log(P_{B/ED})$ as the dependent variable in place of $P_{B/ED}$. Based on R^2 (97.8 for the $P_{B/ED}$ model vs 97.5 for the $\log(P_{B/ED})$ model), F-statistic size (202.9 vs 184.9,

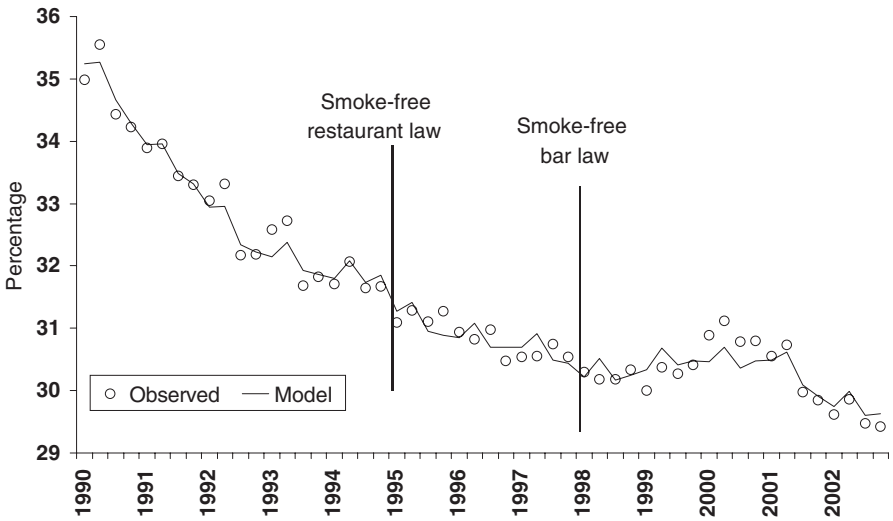

Figure 1. Percentage of quarterly bar revenues as a total of all eating an drinking revenues in California, 1990–2002

Table 1. Effects to the proportion of bar revenues to all eating and drinking revenues in California and 95% confidence intervals due the implementation of the smoke-free restaurant and bar laws

	Smoke-free restaurant law		Smoke-free bar law	
	Effect	95% CI	Effect	95% CI
Statewide				
Short-term	−0.50*	(−0.95, −0.05)	0.22	(−0.24, 0.68)
Intermediate term	−0.53	(−1.16, 0.07)	0.67*	(0.06, 1.28)
Long Term	−0.59	(−1.79, 0.61)	2.03**	(0.86, 3.19)
County-level – weighted				
Short-term	−0.41**	(−0.69, −0.13)	0.33*	(0.02, 0.65)
Intermediate term	−0.41*	(−0.77, −0.05)	0.80**	(0.38, 1.22)
Long Term	−0.42	(−1.16, 0.31)	2.19***	(1.40, 2.98)
County-level – unweighted				
Short-term	−0.35*	(−0.70, 0.00)	0.52*	(0.11, 0.94)
Intermediate term	−0.49*	(−0.92, −0.06)	1.04**	(0.49, 1.58)
Long Term	−0.94*	(−1.84, −0.04)	2.58***	(1.56, 3.59)

Evaluation of results are based on the results of Equations (2) and (3) using one year for short-term, two years for intermediate-term and five years for long-term.
*p-value <0.05.
**p-value <0.01.
***p-value <0.0001.

respectively, with 9 degrees of freedom), and residual diagnostics, the $P_{B/ED}$ model fit was marginally better. Second, we re-estimated Equation (1) under the assumption of autoregressive errors. The autoregressive model suggests that the standard regression model is appropriate (Table 2). Durbin–Watson statistics are as follows: for first-order 1.92 ($p = 0.17$), second-order 1.89 ($p = 0.21$), third-order 1.87 ($p = 0.27$) and fourth-order 1.79 ($p = 0.18$). The results were similar when the quarterly variables were removed from the model.

Summarizing, our basic regression state-level suggests that banning smoking in restaurants increased restaurant revenue relative to bar revenue; while the subsequent ban on smoking in bars led to an increase in bar revenue relative to restaurant revenue. In both cases, the overall impact of a smoking ban appears to have been positive for the establishment class affected.

County-level analysis

Tables 1 and 2 also show our estimates from the county-level regression (4). The results are similar to the statewide analysis: modest decreases in bar revenue (i.e. increases in restaurant revenue) after the smoke-free restaurant law, and increases in bar revenue after the smoke-free bar law. The results are qualitatively similar for the weighted and unweighted regressions.

Finally, we also re-estimated the county-level regression (4) with $\log(P_{B/ED})$ as the dependent variable. Again, the $P_{B/ED}$ model specification was superior to the $\log(P_{B/ED})$ specification based on an R^2 of 97.1 vs 95.9, F-statistics of 310.6 vs 216.7 on 184 degrees of freedom, and the residual analysis.

Substitution effects

As we have seen, our estimates suggest that the introduction of the smoke-free bar law in 1998 increased the proportion of total food and drink expenditures occurring in bars. This is consistent with Hypothesis A above: when a smoke-free bar law is passed after a smoke-free restaurant law, the substitution effect among smokers is smaller than

Table 2. Regression coefficients and their standard errors for selected models

Variable	Statewide	Statewide – using 100*Log ($P_{B/ED}$)	Statewide – using a model with autoregressive errors	Global county-level – weighted	Global county – level variability model – weighted
R^2	97.8	97.5	97.9	97.1	97.5
Second quarter	0.275 (0.097)***	0.851 (0.317)*	0.282 (0.097)**	Varies based on county	Varies based on county
Third quarter	−0.071 (0.098)	−0.215 (0.319)	−0.068 (0.105)	Varies based on county	Varies based on county
Fourth quarter	−0.012 (0.099)	−0.034 (0.327)	−0.001 (0.101)	Varies based on county	Varies based on county
Time	−0.125 (0.013)***	−0.372 (0.043)***	−0.126 (0.017)***	Varies based on county	Varies based on county
Unemployment	−0.354 (0.049)***	−108.7 (15.99)***	−0.344 (0.060)***	−0.297 (0.027)***	−0.261 (0.026)***
SFR	−0.481 (0.203)*	−1.586 (0.662)*	−0.446 (0.240)	−0.406 (0.141)**	9.84 (1.02)***
SFB	−1.593 (0.323)***	−4.892 (1.053)***	−1.541 (0.420)**	−1.521 (0.215)***	11.7 (1.05)***
Time*SFR	−0.006 (0.029)	−0.040 (0.095)	−0.004 (0.037)	−0.001 (0.019)	0.008 (0.018)
Time*SFB	0.113 (0.025)***	0.350 (0.083)***	0.110 (0.033)**	0.116 (0.017)***	0.111 (0.016)**
SFR*RED	NA	NA	NA	NA	−0.147 (0.014)***
SFB*RED	NA	NA	NA	NA	−0.188 (0.015)***

*p-value <0.05.
**p-value <0.01.
***p-value <0.0001.

that among non-smokers since smokers have no obvious substitute to bars.

Our estimates also suggest that bar revenues decreased relative to restaurant revenues after the enactment of the smoke-free restaurant law in 1995. Although smokers presumably substituted away from restaurants to bars from 1995 to 1998 (see Prediction 2), the implication is that the substitution effects of non-smokers moving in the opposite effect were more important. If this explanation is correct, Hypothesis B implies that we should see more pronounced decreases in bar revenues in counties where substitution to restaurants would have been easier.

We can test this hypothesis as follows. We proxy for the ease of substitution between restaurants and bars by using a measure of the number of restaurants in each county. More specifically, we construct a county-level variable, RED, that measures average Restaurant revenues as a fraction of total Eating and Drinking revenues over the sub-period 1990–1995. Counties in which RED is larger are likely to be those in which substitution from bars to restaurants is easier.

We then regress:

$$\begin{aligned}(P_{B/ED})_{ij} = {} & \beta_{0j} + \beta_{1_j}Q_2\lambda_j + \beta_{2_j}Q_3\lambda_j + \beta_{3_j}Q_4\lambda_j \\ & + \beta_4\tau_i + \lambda_j + \beta_{5_j}\lambda_j\tau_i \\ & + \beta_6\mathrm{SFR}_i + \beta_7\tau_i\mathrm{SFR}_i + \beta_8\mathrm{SFB}_i \\ & + \beta_9\tau_i\mathrm{SFB}_i + \beta_{10}\mathrm{SFR}_i\mathrm{RED}_j \\ & + \beta_{11}\mathrm{SFB}_i\mathrm{RED}_j + \varepsilon_{ij} \qquad (5)\end{aligned}$$

Hypothesis B predicts that the sign of the interaction term of RED with the dummy variable for the introduction of the smoke-free restaurant, SFR, should be negative. That is, when substitution from bars to restaurants is easier, the decrease in bar revenues stemming from the smoke-free restaurant law is larger. Empirically, this is exactly what we find ($p<0.0001$, see Table 2). We have reported only the regression using weighted data; the results are similar when unweighted data is used.

Similarly, Hypothesis C predicts that one should observe smaller effects of the smoke-free bar law on bar revenues in counties in which substitution from restaurants to bars is harder (i.e. RED is larger). That is, the coefficient on the interaction term RED*SFB should be negative. Again, this is what we find ($p<0.0001$).

Conclusions

Over the period 1995–1998, California first banned smoking in restaurants and then in bars. While these legislative moves were motivated primarily by public health concerns, opponents have often suggested that smoking bans have deleterious effects on the food and drink business. As we have noted repeatedly above, this economic counter-argument against no-smoking laws is much less clear than its proponents suggest: by the same token that banning smoking in bars may reduce the number of smokers going to bars, it may also increase the number of non-smokers who go to bars. In principle, the net effect of no-smoking laws could be either positive or negative as far as both bars and restaurants are concerned.

Because smokers have few alternatives to bars once both bars and restaurants are smoke-free, there are strong grounds to suspect that at least in the case of the 1998 smoke-free bar law the substitution effects stressed by its opponents are weak. That is, far from smoke-free laws reducing bar revenues, they may actually increase them by simultaneously attracting more non-smokers while repelling few existing smokers – who, to reiterate, have few alternative venues available. In this paper we have presented empirical support for exactly this view.

Our analysis suggests that bars are more appealing to the population as a whole when they are smoke-free. Nonetheless, it is quite possible that if an individual bar voluntarily banned smoking it would lose business. This would be the case, for instance, if the bar in question does not promote its new smoke-free status to the population of non-smoking potential customers. Essentially this is an instance of a classic free-riding problem – the bar industry is collectively better off if smoking is banned in all bars, although any individual bar might lose too much business if it banned smoking unilaterally. In such a situation, smoking bans will receive the most support from restaurants and bars when they are as complete as possible. Our results are robust given the various methods used to examine the complex relationship of smoke-free bar and restaurant policies and bar revenues. Statewide and county-level analyses all point to a similar conclusion – an increase (relative to trend) in restaurant revenues after smoking is banned in restaurants, and an increase in bar revenues after smoking is banned in bars.

Tang *et al*. [14] present complementary 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. Our results suggest that Californians are not only reporting these behaviors, but are actually spending more money at – now smoke-free – bars. In contrast, we find no evidence consistent with the concerns often voiced by the tobacco industry that smoke-free laws reduce the revenues of the establishments affected.

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