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## **The Economic Impact of Smoke-Free Laws on the Sales of Bars and Restaurants in Argentina**

Martín González-Rozada

*UTDT*

Mirta Molinari

*Health Ministry*

and

Mario Virgolini

*Health Ministry*

# The Economic Impact of Smoke-Free Laws on the Sales of Bars and Restaurants in Argentina

Martín González-Rozada  
*Business School – Universidad Torcuato Di Tella*  
*mrozada@utdt.edu*

Mirta Molinari  
*Tobacco Control National Program – Health Ministry*  
*mmolinari@msal.gov.ar*

Mario Virgolini\*  
*Tobacco Control National Program – Health Ministry*  
*mvirgolini@msal.gov.ar*

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## Abstract

This paper studies the impact, on the sales of bars and restaurants, of the recent smoke-free laws in the city of Buenos Aires and in three provinces of Argentina. Using a quasi-experimental design and a difference-in-difference estimation procedure we find that the smoke-free laws did not affected negatively the sales of bars and restaurants in the city of Buenos Aires and in the provinces of Córdoba, Santa Fe and Tucumán. Moreover, in the case of Buenos Aires the smoke-free legislation induced an increase in the sales of bars and restaurants of around seven percent.

Key Words: Smoke-free laws; Economic impact.

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\* Martín González-Rozada, Business School, Universidad Torcuato Di Tella, Saenz Valiente 1010, (C1428BIJ) Buenos Aires, Argentina, Mirta Molinari and Mario Virgolini, Tobacco Control National Program, Health Ministry, Av. 9 de Julio 1925, 9no piso. Corresponding author: Martin González-Rozada (e-mail: mrozada@utdt.edu).

## 1. Introduction

In developed countries smoke-free or clean indoor air laws had been applied widely since mid eighties mainly due to the increasing scientific evidence that secondhand tobacco smoke is hazardous to nonsmoker's health (see [1]). As these findings were well accepted by the public, as reflected in many public-opinion surveys (see for example [2]), an increasing number of communities began to apply smoke-free laws. Moreover, there is a large and growing literature reporting that smoke-free laws have no negative effects, or even positive ones, on restaurants and bars revenues and employment (see [3] and the references there) and on tourism and hotel revenues (see [4] and [5]). Despite this scientific evidence, implementation of smoke-free bars and restaurant laws always produces an initial rejection by the tobacco industry-sponsored research and the owners of bars and restaurants in the cities where the laws are applied. The main allegation is the potential economic losses induced by a decline in sales due to the smoke-free laws. It is very common to read opinions –in tobacco industry-sponsored research and in the press- like “the tobacco industry has claimed that smoke-free bar laws caused bar revenues to decline by 30%”[6] even when there is no empirical evidence to backing up such claim.

The history of smoke-free legislation in developing countries is much more recent. In South America by the end of 2006 only one country, Uruguay, and one city and three provinces of Argentina had applied smoke-free laws (see [7]). Trying to pass such laws produced negative reactions by the tobacco industry and by the owners of bars and restaurants using the same arguments mentioned for developed countries. For example, the recent implementation of smoke-free laws in the city of Buenos Aires (Argentina) was vigorously opposed by the owners of bars and restaurants using the same argument about the expected economic losses when applying these laws. National newspapers reflected some of these opinions. The president of the Association of Hotels, Restaurants and Bars was quoted in the newspaper “El Clarín”[8] saying that in the city of Buenos Aires, after the implementation of the smoke-free laws, sales in restaurant and bars will decline around 25 percent. Owners of bars and restaurants were quoted in the same newspaper [9] saying that sales declined fifty percent since the implementation of the smoke-free laws. However, contrary to what is observed in developed countries the empirical evidence about the economic effects of smoke-free laws is very thin. There is only one unpublished study for Uruguay, by Ramos and Curti, on the effects of smoke-free laws on the taxable sales of bars and restaurants.

The main objective of this paper is to contribute to the literature by analyzing, in a scientific way, the economic effects of the smoke-free laws on the taxable sales of bars and restaurants in Argentina. The implementation of smoke-free laws in this country has advanced recently at provincial and municipal levels. At the end of 2006 the city of Buenos Aires and three provinces, Córdoba, Santa Fe and Tucumán have applied smoke-free laws. The first province of Argentina that implemented a smoke-free legislation was Santa Fe through the law 12,432 in November of 2005. This law banned smoking not only in bars and restaurants but also in any building depending on the provincial government and also in public and private transportation. Next in order were the provinces of Córdoba and Tucumán. The implementation of the smoke-free legislation in Córdoba (law 9133) began in June 2006; while in Tucumán (law 7575) began in July of the same year. Finally, in the city of Buenos Aires, the smoke-free legislation (law 1799) was applied in October 2006. This law allowed bars and

restaurants of more than one hundred squared meters to divide physically the place into two sections (smoking and nonsmoking) but in practice almost all restaurants opted to be smoke-free.

Using a quasi-experimental design and the estimation procedure of difference-in-difference we study if these smoke-free laws affected the sales of bars and restaurants in the city of Buenos Aires and in the provinces of Córdoba, Santa Fe and Tucumán.

## 2. Methodology

The usual way to analyze the impact of a public policy like the one we want to study is to use the Before-After methodology. This method consists in comparing, in our case, the average real taxable sales before the implementation of the smoke-free law and after it was applied. The difference between those averages is the economic impact of the smoke-free legislation on the taxable sales of bars and restaurants. The problem with this methodology is that implicitly assumes that the average real sales of bars and restaurants before the smoke-free legislation was applied should be equal to the average real sales of bars and restaurants after the law, should the city decided not to apply it. In other words, before the application of the smoke-free legislation there are two potential outcomes: average real sales of bars and restaurants after the city decides to apply the smoke-free law and average real sales of bars and restaurants after the city decides not to apply the law. The actual effect of the smoke-free legislation is computed as the difference between those two averages. The problem is that one of those averages is not observed. That is, if the city decides to apply the legislation we will only observe the average real sales of bars and restaurants after the city applied the smoke-free law. The average real sales of bars and restaurants after the city decides not to apply the law are not observed. The Before-After study estimate this unobserved average using the average real sales of bars and restaurants in the city *before* the law was applied. So, the implicit assumption of the method is that the average real sales of bars and restaurants in the city *before* the law was applied is equal to the average real sales of bars and restaurants should the city decides not to apply the law.

Of course, this is no necessary true. Imagine, for example, that due to an economic decline, real wages fall implying that average real sales of bars and restaurants decrease over time. In this economic context it is possible that the smoke-free legislation has a null or positive effect on the average real sales of bars and restaurants but smaller in magnitude than the negative effect implied by the real wages falling. Therefore, if we use the Before-After methodology to measure the impact of the smoke-free legislation on the real sales of bars and restaurants, we will obtain a negative effect. However, this is not the actual impact of the smoke-free law. If this is the case the Before-After method will be capturing not only the effect of the smoke-free legislation but also any other effect, like the one due to the economic decline in the example, that induce differences between the unobserved average real sales of bars and restaurants and its estimation using the average real sales of bars and restaurants *before* the law is applied.

From this discussion it should be clear that in order to estimate correctly the effect of the smoke-free legislation we have to be able to distinguish which impact is due to the legislation and which one no. The standard procedure consists in using a quasi-experimental design and the estimation procedure of difference-in-difference. This methodology identifies the actual impact of the smoke-free law by comparing the averages real sales of bars and restaurants of two groups. A treatment group that

includes the city or province that applied the smoke-free law, and a control group that includes cities or provinces where the smoke-free legislation was not applied. The procedure is as follows. Denote by  $t$  the period before, and by  $t+h$  ( $h>0$ ) the period after the smoke-free legislation was applied in city or province  $j$ . First, compute the average real sales of bars and restaurants in city  $j$  before the smoke-free law is applied and call this average  $MRS(j,t)$ . Second, compute the average of real sales of bars and restaurants in city  $j$  in period  $t+h$ . Let's call this average  $MRS(j,t+h)$ . Now, suppose that city  $j=1$  is the one that applies the smoke-free law. Then, the effect of the smoke-free legislation is computed as:

$$Impact(j=1) = [MRS(j=1,t+h) - MRS(j=1,t)] - [MRS(k \neq 1,t+h) - MRS(k \neq 1,t)], \text{ for all } k.$$

Where,  $Impact(j=1)$  is the effect on the real sales of bars and restaurants of the smoke-free legislation in city  $j=1$ . Notice that the formula above eliminates any common effects on the real sales of bars and restaurants of the treatment and control groups between  $t$  and  $t+h$ .

For example, suppose that the only effect on the real sales of bars and restaurants between  $t$  and  $t+h$  is a negative one induced by real wages falling. Then, the difference between  $MRS(j,t+h) - MRS(j,t)$  will capture this potential effect not only for the city applying the smoke-free legislation ( $j=1$ ) but also for cities where the smoke-free law was not applied ( $j \neq 1$ ). Therefore, the equation above will result in an impact equal to zero, reflecting correctly the null effect of the smoke-free legislation implementation on the real sales of bars and restaurants of city  $j=1$ . Now, suppose that besides the effect on the real sales of bars and restaurants due to the decline in real wages, the implementation of the smoke-free legislation in city  $j=1$  has a positive effect on the real sales of bars and restaurants in the city. Then, the first part of the equation above,  $MRS(j=1,t+h) - MRS(j=1,t)$ , will capture this positive effect implying that  $Impact(j=1) > 0$ . Again, the difference-in-difference approach will correctly capture the actual effect on the real sales of bars and restaurants in city  $j=1$  of the implementation of the smoke-free legislation.

The difference in differences model can be specified as a two-way fixed effect linear regression model:

$$y_{jt} = \alpha I_{jt} + \beta x_{jt} + \lambda_t + \mu_j + \varepsilon_{jt}$$

where  $y_{jt}$  is the outcome of interest, in our case real sales of bars and restaurants for city  $j$  in period  $t$ ;  $I_{jt}$  is an indicator variable that takes on the value one if city  $j$  applied the smoke-free legislation in period  $t$ ;  $x_{jt}$  is a vector of exogenous variables,  $\lambda_t$  is a time effect;  $\mu_j$  is a city fixed effect; and  $\varepsilon_{jt}$  is the error term. The coefficient  $\alpha$  measures the effect of the smoke-free legislation in city  $j$  (what we called  $Impact(j=1)$  above). A null (positive) value for  $\alpha$  indicates that the smoke-free legislation had a null (positive) effect on the real sales of bars and restaurants of the city.

### 3. Data

We used time series data from January 2005 to February 2007 of bars and restaurants overall taxable sales (in Argentine pesos) not only for the three provinces and the city of Buenos Aires, where the smoke-free legislation was applied, but also for nineteen other provinces where the smoke ban was not applied. This data has monthly frequency and it is the outcome of interest when analyzing the impact of the smoke-free legislation. Consumer price index (CPI) was used to transform the sales data in real terms and the number of monthly restaurants in the sample was used to get average real sales per restaurant. We use aggregate real wages series in each province/city to control for macroeconomic tendencies in our regressions below. The source of the taxable sales is the Federal Administration of Public Revenues (AFIP), the real wage series was obtained from the National Economic Ministry and the CPI series comes from the National Institute of Statistics and Census (INDEC).

#### 4. Results

Table 1 shows the estimation results for the city of Buenos Aires and the three provinces –Córdoba, Santa Fe and Tucumán– that applied the smoke-free legislation. For each case the table shows two regression estimates. A base regression (column 1) without exogenous variables and another regression that uses the real wages series to control for macroeconomic tendencies in the control and treatment groups (column 2). Both specifications include a full set of temporal dummy variables that capture any non-observable time variable effect common to both groups and a full set of cross-section effects capturing any time-invariant non-observable differences between the treatment and control groups. The first row of the table shows the estimation of the parameter  $\alpha$  that measures the impact of the smoke-free laws on the real sales of bars and restaurants.

As can be seen in the case of the city of Buenos Aires, the estimation of  $\alpha$  is positive and statistically significant in both regressions indicating that, contrary to the opinions pointed out in the introduction, the implementation of the smoke-free legislation has had a positive effect on the real sales of bars and restaurants of the city. This increment in real sales was on average between 6.7 and 10% approximately. To complement these results we used the base regression and disaggregated the indicator function in a dummy variable for each month after the implementation of the smoke-free law in order to compute a monthly effect on the real sales of bars and restaurants. Figure 1 shows this evidence. The red line plots the actual real sales by restaurant in the city of Buenos Aires before and after the implementation of the smoke-free legislation. The blue line shows the estimation of the counterfactual real sales by restaurant assuming that the city would not have applied the law. The vertical line in September 2006 indicates the last month before the implementation of the smoke-free law. As the figure shows the blue line is above the red line over the whole period after the implementation of the smoke-free legislation reflecting the positive effect of the law on the real sales of bars and restaurants of the city.

In the case of Córdoba, even when the estimation of  $\alpha$  is positive in both regressions it is not statistically significant implying that the smoke-free legislation had no effects on the real sales of bars and restaurants in the province. Similar evidence is obtained for the province of Santa Fe where the estimation of  $\alpha$  is not statistically significant. Therefore in Santa Fe the implementation of the smoke-free law had no effects on the real sales of bars and restaurants either. Figures 2 and 3 show this evidence. Opposite to what was observed in the case of the city of Buenos Aires, in the cases of Córdoba and Santa Fe

the blue line in the figure is above the red line in some periods after the implementation of the smoke-free law but is below the red line in other periods indicating that, on average, the real sales of bars and restaurants in these provinces were not affected by the smoke-free laws.

The last two columns of Table 1 show the case of Tucumán. The estimation of the impact of the smoke-free legislation on the real sales of bars and restaurants is positive and statistically significant in the base regression case but becomes not statistically significant when we control for the macroeconomic tendencies in the province. The positive impact of the smoke-free legislation on the real sales of bars and restaurants, as measured by the base regression is around 10%. This can be seen in Figure 4 that shows the estimation of the counterfactual real sales by restaurant assuming that Tucumán would not applied the law above the actual sales (red line) over the whole period after the implementation of the smoke-free law.

## **5. Conclusion**

Contrary to allegations of the tobacco industry and the owners of bars and restaurants that smoke-free laws had reduced their sales, the econometric evidence presented in this paper shows that these laws did not affected negatively the sales of bars and restaurants in the city of Buenos Aires and the provinces of Córdoba, Santa Fe and Tucumán. Moreover, in the case of Buenos Aires, this paper showed that the smoke-free legislation induced an increase in the sales of bars and restaurants. Having empirical evidence of the economic impact of the smoke-free legislation in these communities is very important not only to address the arguments of the legislation opponents but also to provide scientific empirical evidence for those other provinces of Argentina that are engaged in passing smoking ban laws and are facing the same allegations. Legislators and government officials of those provinces can use this empirical evidence to promote the implementation of smoke-free laws to protect the health of patrons and employees in bars and restaurants. Moreover, our result that smoke-free laws did not affect the sales of bars and restaurants in the four communities of Argentina goes in line with the vast majority of the scientific evidence founded in studies for developed countries. This result debunks another usual argument made by the opponents to smoke-free laws in less developed countries. This is that the smoke-free laws have no economic effects only in developed countries.

Table 1: Economic Impact of the Smoke-free Laws on the Sales of Bars and Restaurants

Dependent variable: real sales by restaurant	Buenos Aires		Córdoba		Santa Fe		Tucumán	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
$I_{jt}$	822.5634 (294.1774)***	549.8387 (327.9611)*	249.9568 (153.4233)	0.6724 (127.5441)	145.0596 (146.4611)	-145.1387 (160.4511)	379.7598 (147.9502)**	185.4113 (182.6721)
% Change	9.96	6.66					10.38	
Real Wages		3.1487 (0.5479)***		3.2741 (0.5624)***		3.1811 (0.5657)***		3.1144 (0.5629)***
Fixed effects by province	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects by period	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Average real sales by restaurant	8255	8255	4068	4068	3346	3346	3657	3657
Observations	520	520	520	520	520	520	520	520
R-squared	0.86	0.87	0.81	0.83	0.81	0.83	0.80	0.83

Notes: Robust standard errors in parentheses. Statistical significance: \* significant at 10%, \*\* significant at 5%, \*\*\* significant at 1%. Average real sales by restaurant were computed over the period before the implementation of the smoke-free laws. The % change was computed over this average.

Figure 1: Real sales by restaurant. Buenos Aires

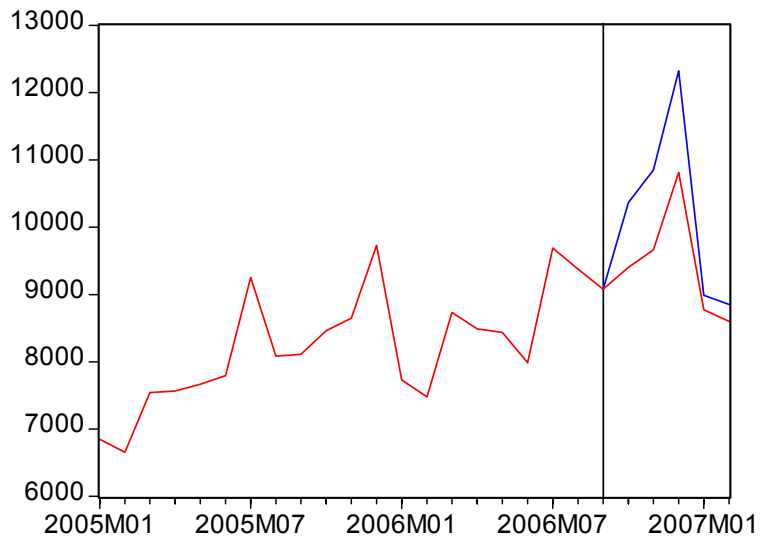


Figure 2: Real sales by restaurant. Córdoba

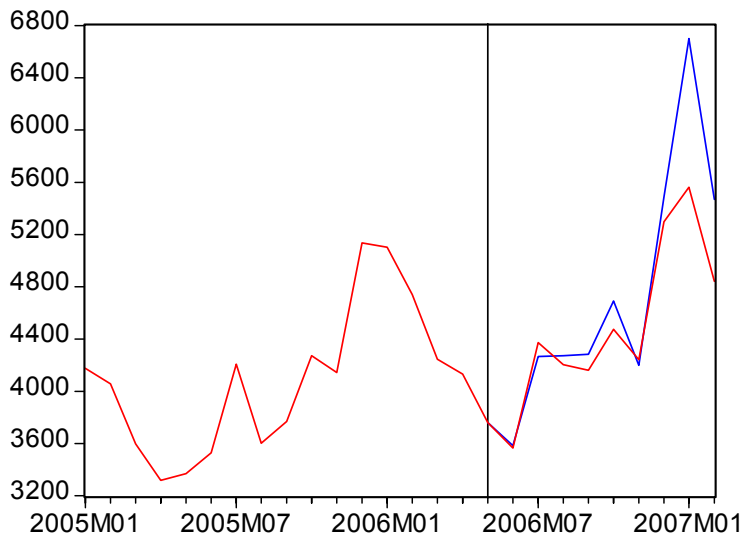


Figure 3: Real sales by restaurant. Santa Fe

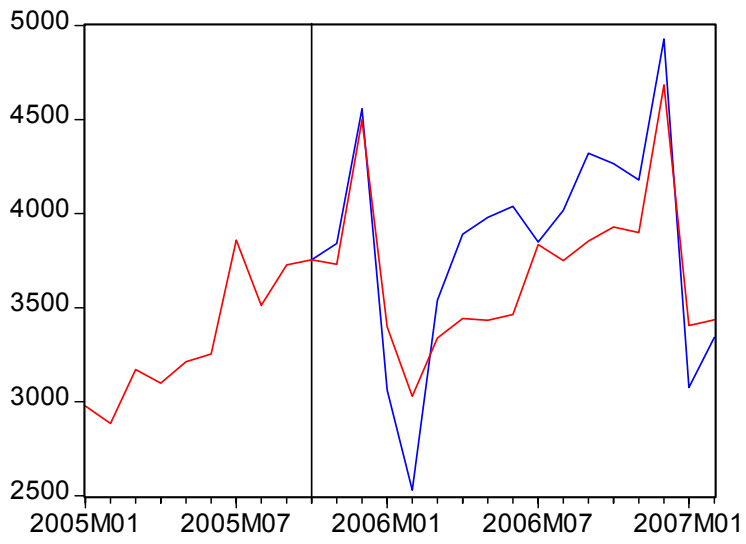
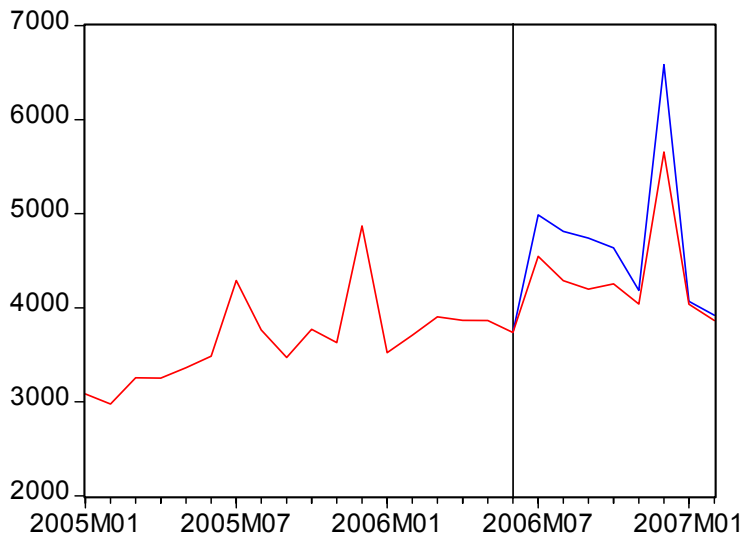


Figure 4: Real sales by restaurant. Tucumán



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## References

- [1] US Department of Health and Human Services (2006) "The health consequences of involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General." US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, Atlanta, GA.
- [2] Roper Organization (1978) "A study of public attitudes toward cigarette smoking and the tobacco industry in 1978." New York, NY.
- [3] Scollo M., Lal A., Hyland A., and S. Glantz (2003) "Review of the quality of studies on the economic effects of smoke-free policies on the hospitality industry." *Tobacco Control*, 12, pp. 13-20.
- [4] Glantz, S.A. and A. Charlesworth (1999) "Tourism and hotel revenues before and after passage of smoke-free restaurant ordinances," *Journal of the American Medical Association*. Vol 281, No. 20, pp. 1911-1918.
- [5] Hyland, A, Cummings K, and E. Nauenberg (1999) "Analysis of taxable sales receipts: was New York City's smoke-free air bad for restaurant business?," *Journal of Public Health Management and Practice*, 5, pp. 14-21.
- [6] Alamar, B. and S.A. Glantz (2007) "Effect of smoke-free laws on bar value and profits," *American Journal of Public Health*, Vol 97, No. 8, pp. 1400-1402.
- [7] Sebrie, E; V. Schoj and S:A: Glantz (2008) "Smoke free environments in Latin America: on the road to real change?," *Prevention and Control*, Vol 3, No 1, pp. 21-35.
- [8] El Clarín (2006) Edition of October 1  
<http://www.clarin.com/diario/2006/10/01/laciudad/h-06015.htm>
- [9] El Clarín (2006) Edition of October 21  
<http://www.clarin.com/diario/2006/10/21/laciudad/h-05801.htm>