SMOKE-FREE LAWS AND EMPLOYEE TURNOVER

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This study examines how smoke-free laws influence turnover among restaurant workers. The study uses a unique data set of payroll records of a franchisee of a national full-service restaurant chain operating 23 restaurants in the state of Arizona, a state where several communities have adopted smoke-free laws. Municipal smoke-free laws did not, on average, have a statistically significant effect on the probability of employee separation in the years after implementation. These results suggest that training costs associated with employee turnover would not rise for full-service restaurants in municipalities that adopt smoke-free laws. (*JEL* I18, J63)

I. INTRODUCTION

While health and safety regulations are often set at the state and federal level, many local jurisdictions also have the power to enact workplace regulations. In particular, there is a growing trend toward local regulation of workplace smoking. Today, nearly 570 local municipalities and 21 states plus the District of Columbia have enacted 100% smoke-free laws in workplaces. Enacting the first local "clean indoor air" laws in 1973, Arizona led the way among states. These local workplace regulations have the potential to influence the aggregate level of industry activity, business costs, and labor market behavior of workers. This is particularly true of the bar and restaurant industries, and other recreation and entertainment industries, since business owners in these industries frequently choose to allow smoking.

Health advocates support local smoking ordinances as a public health strategy to enhance the safety of workplaces.[1] But like all such safety regulations, including safety regulations at construction sites, mines, or manufacturing plants, smoke-free laws have potential to introduce economic inefficiencies. Free from safety regulation, workers may choose to trade workplace safety for higher wages or other desirable features of a job. Minimum safety standards cause some workers to accept something less than what they would consider an optimal mix of safety, wages, and other employment features (Pakko, 2005). One implication is that the introduction of a smoke-free law may cause some workers to leave employment at bar and restaurant businesses in municipalities with smoke-free laws, although the introduction also may encourage other workers to seek employment.

Recent literature has examined the influence of smoke-free laws in terms of customer

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1. Bar and restaurant workers' exposure to secondhand tobacco smoke is 1.5–4.4 times greater than that of individuals living with smokers (Siegel, 1993). For evidence that passive smoking causes coronary heart disease, lung cancer, and various respiratory ailments (see U.S. Department of Health and Human Services, 2006; Law and Wald, 2003; Wells, 1998). Passive smokers also experience other health conditions including eye irritation, headaches, nasal symptoms, coughs, wheezing, and hoarseness (Wakefield et al., 2003).

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demand to patronize businesses in the hospitality industry (Corsun, Young, and Enz, 1996; Glantz and Smith, 1997; Hyland, Cummings, and Nauenberg, 1999; Pakko, 2005). Other recent literature has measured private market provision of smoke-free environments to accommodate consumer preferences and the differential effect of smoke-free laws on restaurant and bar profitability (Dunham and Marlow, 2000, 2003, 2004). The purpose of this study was to examine how laws influence employee turnover, which is a key determinant of operating cost for the industry. We examine whether the likelihood of employee separation from a job at a full-service restaurant is influenced by the introduction or presence of a local smoke-free law, after controlling for other factors that influence employee separation.

II. METHODOLOGY

The likelihood of a worker separating from their job falls with tenure as workers learn more about the rewards and conditions of a particular job and employers learn more about the performance of workers (Bartel and Borjas, 1977; Jovanovic, 1979; Viscusi, 1980). Personal characteristics such as education, age, health, and sex further influence the likelihood of separation (Bartel and Borjas, 1977; Meitzen, 1986; Mincer and Jovanovic, 1981; Royalty, 1998).

The introduction of a smoke-free law also could influence the match between an existing worker and their job. The law may represent a shock to the "match" for existing workers, leading to an increase in separation rates. While many workers may prefer to work in a smoke-free workplace, other job attributes such as earnings from tips also may change as a municipal smoke-free law is implemented. Dunham and Marlow (2003) note that restaurants negatively impacted by smoke-free laws are more likely to increase job responsibilities for their workers. Some existing workers may find the new bundle of job attributes inferior to the previous arrangement. This is particularly true of any group workers, such as workers who smoke, who may have found a smoking-allowed work environment to be an amenity.

The long-run effects of smoke-free laws on employee separation rates are less clear, however. Over the long run, there is turnover in staff. The match between new workers and their employers develop in the smoke-free environment, so that the smoke-free law does not represent any shock to the match. The employee separation rate in the long run could be higher, lower, or no different for restaurants in municipalities with smoke-free laws.

In this study we use a panel data set with treatment and control groups to examine the influence of local smoke-free laws on employee separations. A logistic regression of employee separation was estimated using data on employees of a franchiser of a national restaurant chain operating in the state of Arizona over a 5-yr period. The chain operates full-service restaurants serving alcohol, with seating for an average of 190 customers, and offering mid-price meals. Dunham and Marlow (2000, 2003) note that the introduction of smoke-free laws has a varying impact on different segments of the restaurant industry. Profitability is most impacted in restaurants with more seating, a larger share of sales from alcohol, and a larger share of seating in the smoking-allowed section but is not impacted by whether a restaurant is part of a chain or independent.[2] The restaurants we examine, with large seating capacity and alcohol sales, have the characteristics of restaurants likely to be impacted by smoke-free laws.

The panel data set included payroll records available for 2-wk pay periods for employees of 23 Arizona restaurants from April 1999 to April 2004 (see Table 1), as well as employee characteristics such as age, race, gender, and occupation. Each 2-wk employee pay period served as a single observation. The restaurant franchiser allowed smoking at its restaurants in the absence of a municipal smoke-free law. Of the 23 restaurants, 12 were located in municipalities with a smoke-free law as of 2004. Presence of a smoke-free ordinance was obtained from the Americans for Nonsmokers' Rights database (www.no-smoke.org) and confirmed with the company management.

Three of the restaurants opened smoke free (one in Tucson, one in Mesa, and one in Gilbert). The smoke-free ordinance in Mesa also was implemented before April 1999, so that our database for the Mesa restaurants only contained observations for workers in the period after the smoke-free law was in effect.

2. Dunham and Marlow (2004) report that chain restaurants offered more space for nonsmoking seating.

TABLE 1
Statistics for Arizona Restaurants

Location	Opened	County	Date When Community went Smoke Free
Restaurants in communities with smoke-free laws as of 2004			
Mesa, Arizona (1)	December 1992	Maricopa	July 1996
Mesa, Arizona (2)	November 1992	Maricopa	July 1996
Mesa, Arizona (3)	June 1993	Maricopa	July 1996
Mesa, Arizona (4)	November 1998	Maricopa	July 1996
Tempe, Arizona (1)	June 1994	Maricopa	May 2000
Tempe, Arizona (2)	April 1997	Maricopa	May 2000
Chandler, Arizona	November 1997	Maricopa	October 2003
Gilbert, Arizona	May 2002	Maricopa	May 2001
Tucson, Arizona (1)	September 1991	Pima	October 1999
Tucson, Arizona (2)	May 1994	Pima	October 1999
Tucson, Arizona (3)	March 1997	Pima	October 1999
Tucson, Arizona (4)	January 2000	Pima	October 1999
Restaurants in communities without smoke-free laws as of 2004			
Phoenix, Arizona (1)	December 1992	Maricopa	No
Phoenix, Arizona (2)	May 1995	Maricopa	No
Phoenix, Arizona (3)	October 1995	Maricopa	No
Pheonix, Arizona (4)	June 2002	Maricopa	No
Peoria, Arizona	September 1993	Maricopa	No
Scottsdale, Arizona	December 1994	Maricopa	No
Prescott, Arizona	February 1996	Yavapai	No
Glendale, Arizona	August 1996	Maricopa	No
Goodyear, Arizona	October 2000	Maricopa	No
Surprise, Arizona	June 2001	Maricopa	No
Sierra Vista, Arizona	September 2003	Cochise	No

Six remaining restaurants were in municipalities that were not smoke free in April 1999, but then implemented a smoke-free law later either in October 1999 (Tucson), May 2000 (Tempe), or in October 2003 (Chandler). Given the relatively short tenure of restaurant workers (see Table 2), the 7 mo of preban data for workers in Tucson restaurants and 12 mo in Tempe are sufficient for preban and postban comparisons of separation rates within restaurants.

The two treatment groups used in the analysis included restaurant payroll records during any period when a restaurant operated under a local smoke-free law. Treatment Group I included 14,927 postban payroll records from employees who worked at a restaurant both before and after the municipality where the restaurant was located implemented a smoke-free law. For these workers, the introduction of a smoke-free law represented a potential "shock" to their work situation. Treatment Group II included 69,966 payroll records for employees who worked at a restaurant only after the restaurant's municipality implemented a smoke-free law.[3] The control group in the analysis consisted of restaurant payroll records during any period when the restaurant did not face a local smoke-free law, either because the municipality where the restaurant was located never had a smoke-free law or because the law was not yet in effect. There were 90,810 payroll records in the control group.

Age, gender, ethnicity, job tenure, occupation, and separation date were obtained from company payroll system records. The payroll database did not include data on other personal characteristics of workers that could influence employee separation rates, such as education level and marital status, or other factors that could influence worker reaction

3. Therefore, Treatment Group II included payroll records for employees of the three restaurants that opened smoke free, and employees of the nine restaurants in Treatment Group I who started working there only after the restaurant became smoke free.

TABLE 2
Summary Statistics

Variable	Mean	Standard Deviation
Probability of separation and tenure		
% separating during the pay period	4.2	20.0
Tenure (d)	539	632
Tenure squared (d)	685.343	1,603,303
Personal characteristics		
Gender (%)		
Male	47.8	50.0
Female	52.2	50.0
Age (yr)	26.1	7.0
Race (%)		
White	71.4	45.2
Black	3.0	17.1
Hispanic	20.3	40.2
American Indian/Alaska Native	1.2	11.0
Asian/Pacific Islander	0.1	2.9
Not specified	4.0	19.5
Occupation (%)		
Server	54.8	49.8
Hostess	17.1	37.6
Bartender	2.0	13.9
Kitchen	24.3	42.9
All other occupations	1.8	13.4

to a municipal smoke-free ordinance, such as smoking behavior. Observations were available for each 2-wk pay period for the entire employment period. Separation was assumed to occur at the date of each worker's last entry in the payroll record. Of the approximately 9,300 workers in the payroll database, roughly one-third were still employed with the franchiser at the end of the data set.

The first model pooled observations from members of Treatment Group I, Treatment Group II, and the control group. This model examined the impact of a smoke-free law on the probability of separation for all restaurant employees after a smoke-free law was in effect, regardless of when the workers began working at the restaurants. A variable indicating whether each employee's place of work operated under a smoke-free law in a particular pay period was assigned a value of 1 for all members of either Treatment Group I or II and a value of 0 for all members of the control group. The probability of separation for employees in any particular period was modeled as a function of an employee's job tenure, job tenure squared, and personal characteristics (age, gender, and race/ethnicity), as well as a variable indicating the presence of a smoke-free law. There also was a dummy variable for each restaurant to control for idiosyncratic working conditions, and a dummy variable for each month-year from April 1999 through April 2004 to account for season and business cycle impacts. Some employees had two employment spells at a restaurant, and each spell was treated as separate members of the panel. A dummy variable was used to indicate the second employment spell. In the logistic regression, standard errors were adjusted for clustering on employee-specific identification numbers.

The second model pooled Treatment Group I with the control group. The third model pooled Treatment Group II with the control group. For all three models, we present coefficient estimates from the logistic regression as well as estimates of each variable's marginal effect.

Models 1 through 3 contain a single dummy variable indicating that an employee works at a restaurant in a municipality covered by a smoke-free law during a particular pay period. Coefficient estimates for the dummy variable indicate that the average effect of a smoke-free law on employee turnover in the years after the law is in effect. The models, however, do not capture how the effect of smoke-free laws may vary over time. In particular, such a law may have a differential effect in the first few months it is in effect relative to the longer term. It is in this initial period when most existing workers are facing a shock to working condition in regards to secondhand smoke in the workplace. In the longer run, as there is a natural turnover in restaurant staff, most workers will have joined the staff after the municipal smoke-free law was in place. The long-run effect, if any, could differ from the initial effect.

We tested for this possibility by developing an additional model. In this fourth model, we use the full sample from the first model (both the treatment groups and the control group) and replace the single dummy variable indicating that the smoke-free law is in effect with a set of 13 dummy variables, which indicate the amount of time that had passed since the law went into effect. The first dummy indicates that the smoke-free law was in effect for one quarter or less; the second dummy

indicates that the law was in effect from 4 to 6 mo (i.e., the second quarter after the law went into effect). There are 12 such dummy variables for the first 12 quarters the law is in effect, and a final dummy variable indicating that the law had been effect for more than 3 yr.

III. RESULTS

Table 2 presents summary statistics for the workers in this sample. On average, 4.2% of workers separated from employment during a single 2-wk pay period. The average tenure of workers at any time during the 5-yr period was 539 d, which is roughly 1.5 yr. More than half of the employees were female. More than 70% of workers were white, while roughly 20% were Hispanic and 3% were African American. The average age of workers was 26 yr (standard deviation = 7 yr). More than half of the workers were employed as servers, about one-quarter as kitchen workers, one-sixth as hosts, and a fraction as bartenders or other occupations.

Coefficient estimates from the logistic regression are presented in Table 3, along with estimates on the marginal effect of each variable on the probability of separation. The marginal effects are estimated at the mean value for all variables. Coefficients for individual month and restaurant dummies are not reported for brevity but are available from the first author upon request.

Results for all workers in Table 3 are for the case where Treatment Group I, Treatment Group II, and the control group were pooled. The treatment group contains pay period observations for all workers at a restaurant operating under a smoke-free law, regardless of whether they joined the restaurant before (Treatment Group I) or after (Treatment Group II) the smoke-free law went into effect.

Results for existing workers were for the case where Treatment Group I and the control group were pooled. The treatment group contains pay period observations for workers at a restaurant operating under a smoke-free law but who joined the restaurant staff before the law was implemented. Results for new workers were for the case when Treatment Group II and the control group were pooled. The treatment group contains pay period observations for workers who joined the restaurant staff only after the smoke-free law was in effect.

In all three regressions, the probability of separation fell with tenure in the job. At mean values for tenure and tenure squared, the marginal effect of additional days of tenure reduced the probability of separation. Further, reestimates of the marginal effects at higher levels of tenure (such as tenure = 2,000 d and tenure squared = 4,000,000 d) indicated that the marginal effect of additional days of tenure would remain negative. Thus, the relationship between the greater tenure and the probability of separation was negative even for an average tenure of more than 5 yr (2000 d is roughly 5.5 yr).

The probability of separation also was lower for workers in their second spell of employment at a restaurant in both the all workers and the new workers regression. This could have occurred because workers in their second spell were more familiar with the requirements of the job and managers also were more familiar with the workers. No statistically significant difference was found in the existing workers regression, but this may have simply reflected the smaller sample size available.

The probability of separation was related to ethnicity in all three regressions. Relative to white workers, the probability of separation was lower for Hispanic workers. Gender was not related to the probability of separation in any of the three regressions. In all three regressions, the probability of separation was lower for other occupations than for the omitted category, kitchen workers. This makes sense because the other occupations category includes managers who have longer tenure. The probability of separation also was lower for bartenders in two of the three regressions.

Finally, in all three regressions, no statistically significant relationship was found between the presence of a smoke-free law and the probability of employee separation. The coefficient on the "law in effect" variable is not statistically significant in any of the regressions. This implies that there is no effect, on average, on the probability of separation in the years after a smoke-free law is adopted by a municipality. This finding, however, does not preclude an effect in the initial periods after the smoke-free law is adopted when the law provides an initial shock to the working conditions of existing restaurant workers. For example, there could be an initial increase in separation rates for existing workers after

TABLE 3
Factors Related to the Probability of Separation

	Coefficients			Marginal Effects		
Variable	**All Workers**	**Existing Workers**	**New Workers**	**All Workers**	**Existing Workers**	**New Workers**
Intercept	−2.638***	−1.986***	−2.58***			
	−17.45	−4.95	−17.18			
Age	0.004*	0.0029	0.0048**	0.000131**	0.000091	0.000165**
	1.74	0.99	2.04			
Gender (male = 1)	0.019	0.00956	0.0161	0.00061	0.000297	0.00055
	0.65	0.25	0.586			
Tenure (d)	−0.0021***	−0.00207***	−0.0022***	−0.000068***	−6.45E−05***	−0.000075***
	−25.90	−22.07	−22.77			
Tenure squared (1000 d^2)	0.000491***	0.000468***	0.000517***	0.000016***	0.0000146***	0.0000178***
	11.65	10.07	8.66			
African American	0.088	0.0214	0.0931	0.00299	0.000067	0.00334
	1.14	0.22	1.20			
Hispanic	−0.172***	−0.161***	−0.172***	−0.00536***	−0.00483***	−0.0057***
	−4.44	−3.18	−4.36			
Asian	0.350	0.570	0.250	0.0134	0.0233	0.00968
	0.76	1.05	0.49			
Native American	0.084	0.0313	0.0962	0.00283	0.000987	0.00346
	0.76	0.21	0.381			
Race not specified	0.042	0.0647	0.0404	0.0014	0.00207	0.00142
	0.60	0.71	0.57			
Law in effect	−0.071	−0.0419	−0.0671	−0.00230	−0.00129	−0.0023
	−0.98	−0.45	−0.87			
Second spell	−0.180***	−0.0919	−0.183***	−0.00544***	−0.00275	0.00589***
	−3.82	−1.46	−3.90			
Server	0.013	0.0751	−0.0177	0.000414	0.00234	−0.00061
	0.31	1.41	−0.42			
Bartender	−0.341***	−0.171	−0.373***	−0.00960***	−0.00495	−0.0110***
	−3.46	−1.39	−3.71			
Hostess	0.063	0.116*	0.040	0.00208	0.00376*	0.0014
	1.23	1.73	0.77			

continued

TABLE 3
Continued

Variable	Coefficients			Marginal Effects		
	All Workers	Existing Workers	New Workers	All Workers	Existing Workers	New Workers
Other occupations	−1.088***	−0.931***	−1.200***	−0.0231***	−0.0202***	−0.0259***
	−8.97	−6.65	−9.13			
N	175,703	105,737	160,799			
Psuedo R^2	.0441	.0519	.0413			

***1% significance; **5% significance; *10% significance.

the law is implemented, but several years later, the long-run separation rate (for workers who joined the restaurant after the law was implemented) may be lower in municipalities with smoke-free laws. The effect of the smoke-free law on separation rates varies through time, but the average effect is zero.

To test this possibility, we estimated a fourth regression, where the "law in effect" variable from the all workers regression was replaced with 13 dummy variables indicating the length of time that a municipal smoke-free law had been in effect. Joint significance tests indicated that the coefficients on these 13 dummy variables were not jointly different from zero. This suggests that there was no significant effect on separation rates through time, just as no average effect was identified in Table 3.

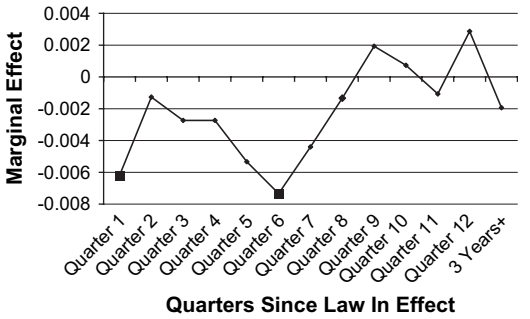
Coefficients for several individual dummy variables were significant, however. In Figure 1, we present the individual estimates from this regression for these 13 dummy variables. In particular, we show the estimated marginal effect for each of the 12 quarterly dummy variables and the 13th variable indicating that the smoke-free law had been effect for more than 3 yr.

There is a statistically significant decline in the separation rate for workers in first quarter after the smoke-free law is implemented.[4] In other words, workers are less likely to separate from their job in the first few months the law was in effect. Point estimates remain negative throughout the first eight quarters that the law was in effect, and the negative marginal effect is statistically significant in the sixth quarter. Point estimates alternate between negative and positive values beginning with the ninth quarter and are not statistically significant. These quarterly results do not show a consistent impact on separation rates.

Over the longer run, we did not find evidence of a relationship between municipal smoke-free laws and separation rates. There was no statistically significant relationship between the introduction of municipal smoke-free laws and the probability of separation beyond 18 mo.

4. We also examined whether the probability of separation changed in the quarter before the local smoking ban was implemented, as workers anticipated the coming change. We did not find a statistically significant change in the chances of separation in the quarter before implementation.

FIGURE 1
Marginal Effect of the Presence of a Local Smoke-Free Law on the Probability of Separation



Note: (■) indicates statistical significance at the 10% confidence level.

IV. DISCUSSION AND CONCLUSIONS

Previous economic research on smoke-free laws has focused on how these laws affect demand for businesses in the hospitality industry or on the differential effect of smoke-free laws on restaurant and bar profitability. The current study is an effort to examine how smoke-free laws influence the behavior of restaurant workers. In particular, we examined how adoption of municipal smoke-free laws influenced employee turnover, a key determinant of operating costs in the restaurant and bar industry. We used a unique data set of employment records of a franchiser of a national restaurant chain operating 23 full-service restaurants in the state of Arizona, a state where several municipalities have adopted smoke-free laws.

We found a statistically significant decline in the probability of separation in the initial months after a smoke-free law was implemented as well as evidence that separation rates were lower 16–18 mo after implementation. However, there was no consistent pattern of either a decline or an increase in separation rates after the implementation of a smoke-free law. No average effect was identified in the years after implementation either for ''existing'' workers who were employed at the restaurant at the time of implementation or for ''new'' workers who joined the restaurant after implementation. While we found a statistically significant decline in separation rates in two quarters, the joint effect on separation rates across all quarters was not significantly different from zero. Further, there was no evidence of a relationship between smoke-free laws and employee separation beyond 18 mo.

Taken together, these results suggest that municipal smoke-free laws did not change the separation rate for workers in the long run. The laws also did not induce an increase in employee turnover in the initial period after implementation by disrupting the match between existing full-service restaurant workers and their employers. The latter result implies that in the quarters after the implementation of a smoke-free law, the change in bundle of working conditions—which could include changes in earnings from tips as well as the change in workplace smoking—did not increase the rate of separation among existing workers overall.

By contrast, the limited evidence we did find of a change in separation rates suggests that restaurant workers are for a period more likely to remain in their job after the implementation of a smoke-free law, perhaps experimenting with the new working conditions.

These aggregate results do not imply that municipal smoke-free laws have no impact on the welfare of restaurant workers. The mix of working conditions after the introduction of a smoke-free law may not match what many workers would have chosen in the absence of a regulation, even if the discrepancies did not appear to be large enough to drive up separation rates. Further, our analysis of aggregate separation rates may mask an increase in separation rates for some groups of workers, such as smokers. But it is important for business owners, who face the training costs associated with employee turnover, that the implementation of municipal smoke-free laws did not lead to an increase in aggregate separation rates for restaurants of the franchiser we studied.

These restaurants, which provide mid-price meals and serve alcohol, are common throughout the United States. Several recent studies have indicated that larger restaurants serving alcohol are the types of restaurants whose profitability may be more likely to be affected by smoke-free laws (Dunham and Marlow, 2000, 2003). Findings regarding employee separation in these restaurants are therefore of general interest and do not merely represent a niche segment or lightly impacted

portion of the industry. This said, it is not known whether the same effect (or lack of effect) on separation rates would be found in other restaurants that offer a different mix of services to a different customer base. Future research on employee separation rates needs to focus on workers in other segments of the restaurant industry.

Future research on separation rates may be able to identify the effect of laws on specific groups of workers, such as smokers. Such research also may be able to gather data on additional factors that influence employee separation, including employee education level and family structure, or major life changes faced by employees, such as graduation from high school or college.

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