CONTEMPORARY ECONOMIC POLICY

LOCAL AND STATEWIDE SMOKE-FREE LAWS IN NEBRASKA: THE EFFECTS ON KENO ESTABLISHMENTS

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This study examines how smoke-free laws influence cross-border keno shopping in Nebraska. We exploit smoke-free law variation in timing and location to identify keno revenue gains and losses between neighboring smoke-free and smoke-friendly areas. We find the Lincoln municipal smoke-free law reduced keno revenue by 23.5% in Lincoln and increased keno revenue by 30.0% in smoke-friendly Surrounding Lincoln counties. The Omaha municipal smoke-free law reduced keno revenue by 14.8% in Omaha and increased keno revenue by 7.1% in smoke-friendly Surrounding Omaha counties. Following the Nebraska statewide law, no Nebraska areas had a smoke-friendly advantage and keno revenue fell by an insignificant 1.0% and 5.2% in the surrounding Lincoln and Omaha counties, respectively. Our results may be of interest to local policy makers interested in understanding the amount of business activity and tax revenue that may be migrating out of a community or even the state. (*JEL* l18, K32)

I. INTRODUCTION

A dramatic shift from smoke-friendly to smoke-free environments has occurred in the United States since the 1980s due to the enactment of local and statewide smoking bans. As of April 2011, 23 states and more than 450 municipalities have a law in effect that requires workplaces, restaurants, and freestanding bars to be 100% smoke free (American Nonsmokers' Rights Foundation 2011). The impetus for smoke-free environments came in 1964 when the first Surgeon General Report, *Smoking and Health*, was released; it held smoking responsible for a 70% increase in the mortality rate of smokers over non-smokers (National Institutes of Health, Department of Health & Human Services, U.S. National Library of Medicine 2011a). Subsequent Surgeon General Reports continued to report on the effect of smoking on smokers, as well as on non-smokers, thus transforming the issue of smoking from one of individual and consumer choice to one of public health. It was evidence of the latter effect that set in motion the regulatory movement against second-hand smoke (National Institutes of Health, Department of Health & Human Services, U.S. National Library of Medicine 2011b).

Proponents of smoke-free environments cite public health benefits and argue there is only mixed evidence that smoke-free laws reduce aggregate economic activity in restaurants and bars (Scollo and Lal 2008). Other researchers, however, point out that indoor smoke does not constitute an externality; and that the impact of smoke-free laws on establishment sales and profits depends on establishment characteristics, especially the share of patrons who are smokers (Dunham and Marlow 2000, 2003). Pakko (2008b) finds that, prior to the enactment of smoke-free laws in Columbus, Missouri, only 18% of "eating places only" establishments permitted indoor smoking, whereas 56%

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ABBREVIATIONS

GLS: Generalized Least Squares
MSA: Metropolitan Statistical Area

Contemporary Economic Policy (ISSN 1465-7287)
Vol. 31, No. 3, July 2013, 549–564
Online Early publication May 31, 2012
doi:10.1111/j.1465-7287.2012.00326.x

of "eating and drinking places" and 71% of "drinking places—alcoholic beverages" establishments permitted indoor smoking.[1] He, therefore, disaggregates the data by restaurant and bar subsector to examine if the Columbia, Missouri smoking ban had different effects on restaurants and bars and finds the effect on establishment revenue is increasingly negative for those establishments that are more likely to be frequented by smokers.[2] Adams and Cotti (2007) also find evidence that smoking bans harm bar activity more than restaurant activity.[3] Given smoking is as much a part of the atmosphere or culture of gaming venues as it is of bars, in the absence of smoke-free laws, we would expect the proportion of gaming venues with smoke-friendly policies to be similar, if not higher, than those observed in bars. Hence, research on the effect of smoking bans in the gaming sector is relevant for sorting out the differential impacts of smoking bans within the sectors of the hospitality industry.

In more recent years, gaming venues also have been required to go smoke free. As of April 2011, 16 states have enacted 100% smoke-free laws for state regulated gaming (American Nonsmokers' Rights Foundation 2011). Gaming venues include casinos, racinos,[4] racetracks, and establishments where bingo and keno are played, as well as where video lottery terminals and pull tabs are located. The gaming literature is relatively sparse, focusing on only racino gaming in Delaware and casino gaming in Illinois, and overwhelmingly finds a negative impact of smoking bans (Garrett and Pakko 2009; Pakko 2006, 2008a; Thalheimer and Ali 2008).[5]

The purpose of this article is to examine the effect of a smoking ban on keno gaming in Nebraska. Keno is a lottery or bingo style game in which a player first selects up to 20 of 80 numbers on a paper ticket. Then, from the same pool of 80 numbers, a selection device randomly selects up to 20 numbers. The winners are determined by how many of the numbers selected on the ticket match the randomly drawn numbers. Nebraska is a state that offers keno gaming in restaurants and bars, and in which municipal and statewide smoking bans were introduced at different times. These features provide an excellent opportunity to examine several ways in which smoking bans impact the gaming industry.

First, we are able to study the influence of smoke-free laws on gaming that occurs in a bar and restaurant environment. This provides an opportunity to examine if the observed negative response of gaming to smoking bans (Garrett and Pakko 2009; Pakko 2006, 2008a; Thalheimer and Ali 2008) is a result of the activity (gaming) or the setting in which the gaming occurs. Casinos and racinos tend to be large facilitates with activities and locations that are tightly regulated. Although keno is often offered at these facilities, it is one of the most "laid-back and relaxed" games at casinos that most people view as a "side game" (Keno Today 2011). That is, the player is more mobile and is not required to remain at a table, which is not the case when playing Blackjack or Craps. There are no commercial casinos or racinos in Nebraska[6] and more dollars are wagered on keno than on any other charitable gaming activity (i.e., bingo, pickle cards, and raffles) or on any other

1. In 2007, Missouri ranked fourth in terms of the proportion of adult smokers in the state (24.6%, CDC 2009). Given the high prevalence of smokers in the state, Missouri restaurant and bars owners may be less likely to self-impose smoking restrictions than other states with lower proportions of smokers so that business is not turned away. Hence, the findings of the Columbia, Missouri survey may be conservative with respect to the percent of establishments that self-impose smoking restrictions. Nebraska would be considered neither a high nor low smoking prevalence state as the prevalence of adult smoking in Nebraska is 19.9% which is approximately the median U.S. prevalence of 19.8% (CDC 2009).

2. The point estimates suggest no statistically significant effect on "eating places only" establishments, and revenue losses of about 6.5% for "eating and drinking places" and about 11% for "drinking places—alcoholic beverages" establishments (Pakko 2008b).

3. Using county level employment data from across the United States, Adams and Cotti (2007) find counties with smoking bans experience a reduction in bar employment by approximately 4% relative to counties without smoking bans, whereas there is no evidence of a reduction in restaurant employment.

4. A racino is a racetrack that also offers electronic gaming devices (i.e., video lottery terminals).

5. Studies examining the effect of Delaware's smoking ban on racinos suggest gaming revenue at Delaware's racinos declined 8%–16% (Pakko 2006, 2008a) and gaming handle at Delaware's racinos declined nearly 16% (Thalheimer and Ali 2008). The study examining the effect of Illinois' smoking ban on casinos suggest revenue and admissions at Illinois casinos declined by more than 20% and 12%, respectively (Garrett and Pakko 2009).

6. There are Native American casino operations in Nebraska; however, these casinos are class II gaming facilities and are similar to other gaming facilities that operate in Nebraska. That is, a class II game is defined as "a game of chance including (if played in the same location) bingo, pull-tabs, lotteries, punchboard, and other games similar to bingo, whether live or electronic, in which players bet against other players; an electronic game played on a 'linked' video gaming device that is connected to a central computer system" (AGA 2010).

legal gaming sector in Nebraska (i.e., Nebraska state lottery and pari-mutuel wagering on horse races).[7]

Second, because Nebraska's smoking bans initially were imposed at the municipal level at different times and with and without keno establishment exclusions, and then at the state level, we are able to test for the existence of cross-border keno shopping. Most cross-border shopping studies have focused on the existence of cross-border purchases of alcoholic beverages (Asplund et al. 2007; Beard et al. 1997; Smith 1976), cigarettes (Lovenheim 2008; Saba et al. 1995; Thursby et al. 1991), and gasoline (Banfi et al. 2005; Doyle and Samphantharak 2008; Leal et al. 2009). In general, this literature finds consumers are willing to make purchases in bordering territories where the effective prices are lower. Few studies exist which examine the impacts of cross-border shopping for gaming activities or that are because of smoking bans. Garrett and Marsh (2002) analyze the revenue impacts of cross-border lottery shopping between the state of Kansas and its five border regions—Nebraska, Oklahoma, Colorado, Missouri, and Kansas City, Missouri. These authors focus on regional differences in lottery games, retail and population centers, and commuting patterns and estimate that in 1998 Kansas lost nearly $10.5 million to cross-border lottery shopping. Adams and Cotti (2008) focus on smoking bans in bars and attribute the increase in fatal accidents involving alcohol following these bans to cross-border shopping. That is, the passage of smoking bans in bars in one jurisdiction incentivizes smokers to drive to nearby jurisdictions that allow smoking in bars, thus increasing the likelihood of drunk drivers on the roads. Similarly, it may be the case that Nebraskans prefer to smoke and play keno and hence will drive to nearby jurisdictions which allow them to do so. Given keno proceeds are used solely for community betterment purposes and the tax revenue generated from keno gaming was $4.1 million for the fiscal year ending June 2009[8] (or 1.7% of all miscellaneous tax revenue generated), it may be of interest to local policy makers to understand the amount of business activity and tax revenue that may be migrating out of a community or even the state.

II. SMOKE-FREE LAWS IN NEBRASKA AND CROSS-BORDER KENO SHOPPING

A. Nebraska's Smoke-Free Laws

The city of Lincoln, the state capital, was the first municipality in Nebraska to impose a smoking ban on restaurants, bars, and gaming venues. The effective date of the Lincoln Ban was January 2005. In June 2006, the city of Omaha, the largest city in Nebraska, followed suit and imposed a smoking ban on restaurants and bars effective in October 2006. The Omaha Ban, however, temporarily excluded stand-alone bars, a horse racing track, and keno establishments until 2011. The temporary Omaha Ban exemption ended in June 2008 when the Nebraska Supreme Court ruled it unconstitutional, and stand-alone bars, the horse racing track, and keno establishments in Omaha also were required to be smoke free. The Nebraska Clean Indoor Air Act of 2008, a comprehensive statewide smoke-free law that requires all restaurants, bars, and gaming venues (among other indoor workplaces) in Nebraska to be 100% smoke free, became effective June 1, 2009. Figure 1 shows the effective dates of the municipal and statewide smoking bans in Nebraska.[9]

B. Cross-Border Keno Shopping

We focus on keno revenue and smoking bans in the Lincoln metropolitan statistical area (MSA) and the five Nebraska counties of the Omaha-Council Bluffs, NE-IA MSA (denoted Omaha MSA) for three primary reasons.[10] First, the majority of keno gaming in Nebraska is

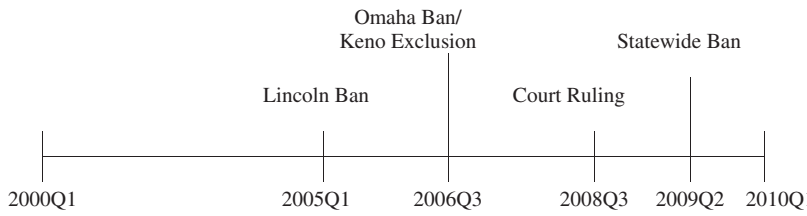
7. For the fiscal year ending June 2009, total wagering in Nebraska was $470.5 million dollars: keno accounted for 43.3%, the Nebraska state lottery accounted for 26.2%, pari-mutuel wagering on horse races accounted for 19.1%, and other charitable gaming accounted for 11.4% (Nebraska Department of Revenue, Charitable Gaming Division 2009; Nebraska Department of Revenue, Nebraska Lottery Division 2009; Nebraska Racing Commission 2009).

8. Nebraska Department of Revenue, Charitable Gaming Division (2009).

9. Also effective in June 2008 was a smoking ban in Grand Island, Nebraska. Grand Island is located in central Nebraska and is the primary city of the largest micropolitan statistical area in Nebraska. The Grand Island micropolitan statistical area includes Hall, Howard, and Merrick Counties. In fiscal year ending June 2009, only 3% of gross keno wagering in the state occurred in these three counties. Humboldt, Nebraska located in Richardson County also imposed a smoking ban; however, in fiscal year ending June 2009, no keno wagering occurred in Richardson County.

10. The Omaha-Council Bluffs, NE-IA MSA is composed of five Nebraska counties and three Iowa counties. The 2010 estimated population of the Omaha-Council Bluffs, NE-IA MSA is 865,350 with nearly 86% of all area residents concentrated on the Nebraska side.

FIGURE 1
Effective Dates of the Municipal and Statewide Smoke-Free Laws in Nebraska



played in these areas. In the fiscal year ending June 2009, over 70% of the gross keno wagered in Nebraska was in the Lincoln and Omaha MSAs.

Second, one of our main objectives is to test for the existence of cross-border keno shopping within Nebraska. The Lincoln Ban and Omaha Ban were imposed in the primary city of each MSA, and thus to identify if keno consumers are driving to nearby communities which allow them to play keno and smoke, we must observe keno gaming outside of the cities of Lincoln and Omaha. In 2004, the year before the imposition of the first smoking ban, 30% of total Lincoln MSA keno revenue was generated in communities outside of the city of Lincoln and nearly 50% of total Omaha MSA keno revenue was generated in communities outside of the city of Omaha.

Third, although it would be interesting to examine if there is cross-border keno shopping from Nebraska to its neighboring state of Iowa, the availability of Iowa keno revenue data limits our ability to do so. Keno gaming is available in Iowa; however, it is offered along with all other gaming activities in Iowa's casinos. That is, there are no venues in Iowa where only keno is played; hence, disaggregated keno revenue data could not be obtained.

Iowa: Nebraska's Large Gaming Neighbor. Despite the lack of Iowa keno revenue data and although the focus of this study is on cross-border keno shopping within Nebraska, we cannot ignore the gaming environment in Iowa and its potential influence on Nebraska gaming consumers. In 1989, Iowa (along with South Dakota) became the third state to legalize commercial casinos.[11] Today, Iowa is one of only 13 states that allow commercial casino operations and it has 17 casinos operating throughout the state. In 2009, the revenue generated from Iowa casinos totaled approximately $1.4 billion; however of this amount, more than 31% was generated in its two riverboat casinos and one racetrack casino in Council Bluffs, Iowa (AGA 2010). Indeed, the Council Bluffs casino market has ranked in the top 20 of all individual casino markets in the United States from 2004 to 2009 (AGA 2005–2010).

Particularly relevant to our study area, Council Bluffs is the county seat of Pottawattamie County which is one of the three Iowa counties that complete the Omaha-Council Bluffs, NE-IA MSA. Because the Council Bluffs casino market is large and relatively close, we would expect Nebraskans to visit the Council Bluffs casinos. Indeed, Nebraskans have had this option since 1996, the year the Council Bluffs riverboat casinos were first opened and 10 years before the imposition of Nebraska's first smoking ban. Furthermore, the argument that Iowa's casinos are competing away millions of potential tax dollars has long been debated among Nebraska senators and interest groups, and discussion of this issue has recently been rekindled given Nebraska continues to face state budget shortfalls (Reed 2011). Therefore, for our analysis, we take the enticement of Council Bluffs' casinos as given, and seek to sort out the effects of a smoking ban on keno establishments in different communities within Nebraska.

A Priori Cross-Border Keno Shopping Expectations. The previous literature on smoking in casinos and racinos suggests that smoking and gaming are highly complementary. Hence, when a smoking ban is imposed on keno

11. According to the American Gaming Association, commercial casinos are defined as "land-based, riverboat and dockside casinos as well as racetrack casinos in Indiana, Iowa, Louisiana and Pennsylvania."

establishments in one location, the relative price of smoking in those keno establishments (vs. in keno establishments at a nearby location where smoking is allowed) increases substantially. As a result, the demand for the complementary good, keno gaming, changes in accordance. That is, keno demand will fall in the location where the smoking ban is imposed; and as long as transportation costs are not prohibitive, keno demand will rise in the nearby location where smoking is allowed as patrons will travel to consume their desired mix of smoking and keno gaming.

Our a priori expectations regarding cross-border keno shopping reflect the implications of standard microeconomic theory and are discussed below with a summary shown in Table 1. For ease of discussion, we define the various Nebraska locations as follows: Lincoln represents the City of Lincoln, Surrounding Lincoln represents those areas outside of Lincoln but within the Lincoln MSA, Omaha represents the City of Omaha, and Surrounding Omaha represents those areas outside of Omaha but within the five Nebraska counties of the Omaha-Council Bluffs, NE-IA MSA.

Expectation 1. The Lincoln Ban will increase the price of smoking in keno establishments in Lincoln relative to keno establishments in areas outside of Lincoln; thus, we expect keno demand in Lincoln to fall. Furthermore, we expect keno demand in Surrounding Lincoln, Omaha, and/or Surrounding Omaha to increase; however, the increase in each of these areas is not equally likely. That is, because keno establishments in Surrounding Lincoln are closest and hence have the lowest associated transportation costs, we expect keno demand to increase the most in Surrounding Lincoln. We denote these expected effects as "Effect 1" because they will be the first observation of cross-border shopping from one Nebraska area to another because of a smoking ban.

Expectation 2. The Omaha Ban/Keno Exclusion will increase the price of smoking in Omaha restaurants and non-stand-alone bars. Thus, depending on the degree of substitutability between restaurants and non-stand-alone bars and keno gaming, we may observe an increase in keno demand in the areas where smoking is still allowed (i.e., in keno establishments in Surrounding Lincoln, Omaha, and Surrounding Omaha). Keno establishments in Omaha are closest and have the lowest associated transportation costs; hence, if smokers substitute from smoke-free restaurants and non-stand-alone bars to other forms of smoke-friendly leisure activity like keno gaming, we would expect keno demand to increase in Omaha. We denote these expected effects as "Effect 2."

Expectation 3. The Nebraska Supreme Court Ruling will increase the price of smoking in keno establishments in Omaha relative to keno establishments in Surrounding Omaha and Surrounding Lincoln; thus, we expect keno demand in Omaha to fall. Furthermore, we expect keno demand in Surrounding Omaha to increase because Surrounding Omaha is closer and has lower associated transportation costs than Surrounding Lincoln. The Court Ruling may also increase the demand for gaming activities in smoke-friendly casinos in neighboring Iowa; however, as mentioned previously, we are unable to estimate this effect directly (see Section *Iowa: Nebraska's Large Gaming Neighbor*). We denote these effects as "Effect 3."

Expectation 4. Because the Statewide Ban required all Nebraska keno establishments to be smoke free, there is no longer any area(s) in

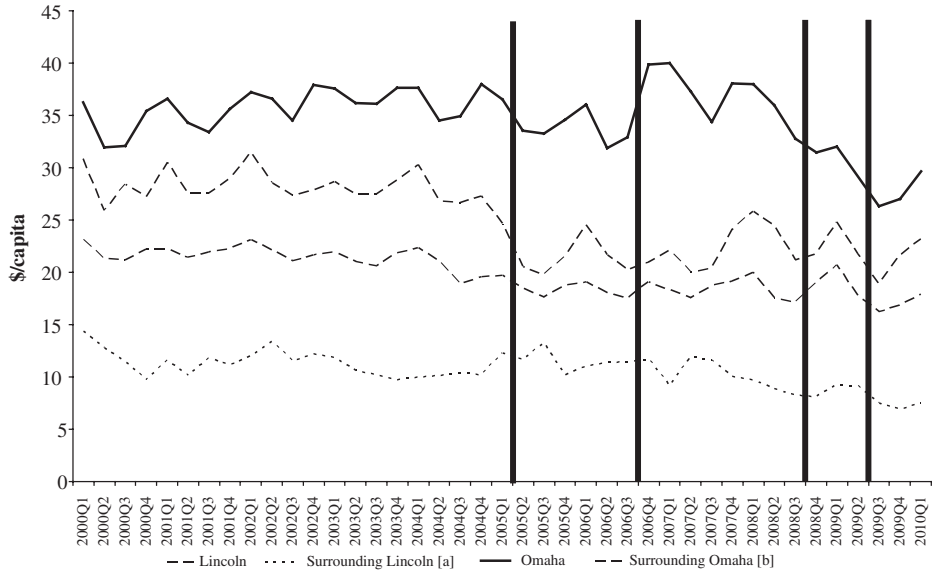
TABLE 1
A Priori Cross-Border Keno Shopping Expectations

Area	Effect 1 (Lincoln Ban)	Effect 2 (Omaha Ban)	Effect 3 (Court Ruling)	Effect 4 (Statewide Ban)
Lincoln	−	No effect	No effect	No effect
Surrounding Lincoln[a]	+	+	+	−
Omaha	+	+	−	No effect
Surrounding Omaha[b]	+	+	+	−

[a]Surrounding Lincoln represents those areas outside of Lincoln but within the Lincoln MSA.

[b]Surrounding Omaha represents those areas outside of Omaha but within the five Nebraska counties of the Omaha-Council Bluffs, NE-IA MSA. The Omaha MSA includes three Iowa counties; however, for this study, Surrounding Omaha does not include the Iowa counties of the Omaha-Council Bluffs, NE-IA MSA.

FIGURE 2
Real Keno Revenue per Person, 2000Q1–2010Q1



[a]Surrounding Lincoln represents those areas outside of Lincoln but within the Lincoln MSA.
[b]Surrounding Omaha represents those areas outside of Omaha but within the Nebraska portion of the Omaha MSA. The Omaha MSA includes three Iowa counties. In this study, Surrounding Omaha does not include the Iowa counties of the Omaha MSA.

Nebraska that has a pricing advantage, and as a result, we would not expect to observe cross-border keno shopping within Nebraska because of this ban. However, because smoking and gaming are complements, and because the Statewide Ban increases the price of smoking in keno establishments in Surrounding Lincoln and Surrounding Omaha, we would expect keno demand to drop in Surrounding Lincoln and Surrounding Omaha, respectively. We denote these expected effects as "Effect 4."

III. DATA

The authors obtained gross keno revenue data from the Nebraska Department of Revenue. The gross keno revenue data represent the total amount that was bet and are indicative of the volume of keno activity in each location. Keno wagers are carefully tracked at the local level because a percent of keno proceeds are required to be submitted to the Nebraska Department of Revenue on a quarterly basis.[12]

12. Nebraska Department of Revenue. Charitable Gaming Division, Nebraska County, and City Lottery Act, 9-648.

For the fiscal year ending June 2009, tax revenue generated from keno gaming was $4.1 million (Nebraska Department of Revenue, Charitable Gaming Division 2009).

In Nebraska, keno gaming became legal in 1968. The sample period used in this analysis begins in the first quarter of 2000, 20 quarters before the imposition of the Lincoln Ban, and extends through the first quarter of 2010. The quarterly gross keno revenues are inflated to 2010 dollars using the Consumer Price Index for all urban consumers. Furthermore, because gross keno revenue growth may be influenced by population growth, real quarterly gross keno revenues are analyzed on a per capita basis.

Figure 2 shows the real keno revenue per person over time in Lincoln, Surrounding Lincoln, Omaha, and Surrounding Omaha. The various smoking bans are represented with vertical black lines. There are clear seasonal fluctuations in the data with real keno revenue per person generally peaking in the first quarter of each year. Overall, however, real keno revenue per person is trending downward for all local areas which, in more recent years, is consistent with the economic downturn in Nebraska. Table 2 shows the

mean real keno revenue per person for each policy time period (e.g., pre-Lincoln Ban, Lincoln Ban—Omaha Ban, etc.) and the simple difference in the mean between each policy time period.

Many of the expectations outlined above can be observed in Figure 2 and Table 2. For instance, the first black vertical line in Figure 2 shows the Lincoln Ban, and we can observe a clear downward trend in Lincoln's real keno revenue per person and a clear upward trend in real keno revenue per person in Surrounding Lincoln. On the basis of the simple difference, the percentage change from the previous time period suggests real keno revenue per person dropped nearly 22% in Lincoln and rose nearly 3.5% in Surrounding Lincoln (Table 2); however, some of the other expectations are not observed. For instance, there are also downward trends for Omaha and Surrounding Omaha after the Lincoln Ban. On the basis of the simple difference, the percentage changes from the previous time period for these local areas suggest a drop of nearly 4% and 13.5%, respectively. For these areas, we expected no effect or a positive effect after the Lincoln Ban.

Of course the simple differences in average keno revenues before and after the dates of the bans do not tell us the impacts of the municipal and statewide smoke-free laws. There are many other variables that influence the demand for keno gaming in each area and changes in those variables also are reflected in the simple differences shown in Table 2. The next section presents a regression model of keno demand that allows us to estimate the marginal effects of the smoke-free laws on average keno revenue in Lincoln, Omaha, and the surrounding counties by including controls for local economic activity, the number of keno establishments, time effects, and area fixed effects.

IV. EMPIRICAL METHODOLOGY

The demand for keno gaming in each of the four Nebraska areas (i.e., Lincoln, Surrounding Lincoln, Omaha, and Surrounding Omaha) depends on the price and product characteristics of the keno establishments in that area, the price and product characteristics of competing keno establishments, and market area and external market environment conditions. The price of keno gaming to the consumer is the win percent or the amount retained by the keno establishment after paying prizes to customers as a percent of gross keno revenue. From 2000 to 2010, the actual keno win percent for all keno establishments in Nebraska remained stable at 24%. We assume the win percent holds for each area examined; hence, own price and competing areas' price variables are not included in the demand equations. The number of licensed keno establishments is included to control for the size of the local keno gaming market and is expected to be positively related to the area's keno revenue. To control for other, unobservable individual factors that influence keno demand, we include area fixed effects and area-specific quadratic time trends.

The demand for keno gaming is also affected by the level of general economic activity in the regional market and is measured by the logarithm of MSA employment. As mentioned earlier, Nebraska keno establishments face competition from neighboring Council Bluffs, Iowa's casino market. Although there are variations in the annual slot and table revenue win percentages of the casinos, these variations appear to be largely random and unlikely to be associated with the operators' decision to affect price. Hence, these competition variables are not included in the demand equations.[13] See Table A1 for variable descriptions and sources and Table A2 for descriptive statistics by Nebraska area.

The municipal and statewide smoke-free laws represent external changes in the market environment and are measured by four binary indicators that equal zero before the ban is in effect, and equal one after the imposition of the relevant smoking bans. The model specification allows keno demand to take up to two quarters to fully adjust to the imposition of each smoking ban. That is, we estimate the coefficients on the current and two lagged ban variables and gauge the total impact of the ban as the sum of the three coefficients.

To identify the impacts of the municipal and statewide smoking bans on keno demand, our empirical model restricts the effects of each ban to those areas most likely to experience demand changes, as summarized in Table 3. For example, the ban on smoking in the city of Lincoln will most likely affect the demand for keno gaming in Lincoln by increasing the own price and induce cross-border shopping in keno

13. We found none of our conclusions to be affected when we assumed the annual slot and table revenue win percentages of the casinos to be constant throughout the year.

TABLE 2
Mean Real Keno Revenue per Person and Simple Differences

		Time Period				
		Pre-Lincoln Ban Q12000–Q42004	**Lincoln Ban—Omaha Ban Q12005–Q22006**	**Omaha Ban—Court Ruling Q32006–Q22008**	**Court Ruling—Statewide Ban Q32008–Q12009**	**Post-Statewide Ban Q22009–Q12010**
Lincoln	Mean keno revenue per person	28.29	22.11	22.26	22.58	21.39
		(0.33)	(0.84)	(0.79)	(1.12)	(0.89)
	Simple difference		−6.18***	0.15	0.32	−1.19
			(0.83)	(0.97)	(1.21)	(1.37)
	Percent change		−21.8	0.7	1.4	−5.3
Surrounding Lincoln[a]	Mean keno revenue per person	11.27	11.66	10.57	8.55	7.79
		(0.29)	(0.43)	(0.44)	(0.36)	(0.48)
	Simple difference		0.39	−1.09	−2.02**	−0.76
			(0.55)	(0.64)	(0.81)	(0.91)
	Percent change		3.4	−9.3	−19.1	−8.9
Omaha	Mean keno revenue per person	35.72	34.31	37.05	32.08	28.04
		(0.41)	(0.72)	(0.89)	(0.38)	(0.81)
	Simple difference		−1.41	2.74**	−4.97***	−4.04***
			(0.89)	(1.03)	(1.29)	(1.46)
	Percent change		−3.9	8.0	−13.4	−12.6
Surrounding Omaha[b]	Mean keno revenue per person	21.56	18.64	18.51	18.99	17.21
		(0.23)	(0.31)	(0.32)	(1.02)	(0.40)
	Simple difference		−2.92***	−0.14	0.48	−1.77**
			(0.47)	(0.55)	(0.69)	(0.78)
	Percent change		−13.5	−0.7	2.6	−9.3

Note: Standard errors are in parentheses. Percent change is from the previous period.

[a]Surrounding Lincoln represents those areas outside of Lincoln but within the Lincoln MSA.

[b]Surrounding Omaha represents those areas outside of Omaha but within the Nebraska portion of the Omaha MSA. The Omaha MSA includes three Iowa counties. In this study, Surrounding Omaha does not include the Iowa counties of the Omaha MSA.

**Significance at 5% level; ***significance at 1% level.

TABLE 3
Direct and Cross-Border Keno Shopping Estimation Assumptions

Area	Effect 1 (Lincoln Ban)	Effect 2 (Omaha Ban)	Effect 3 (Court Ruling)	Effect 4 (Statewide Ban)
Lincoln	−	No effect	No effect	No effect
Surrounding Lincoln[a]	+	No effect	No effect	−
Omaha	No effect	+	−	No effect
Surrounding Omaha[b]	No effect	No effect	+	−

[a]Surrounding Lincoln represents those areas outside of Lincoln but within the Lincoln MSA.
[b]Surrounding Omaha represents those areas outside of Omaha but within the five Nebraska counties of the Omaha-Council Bluffs, NE-IA MSA. The Omaha MSA includes three Iowa counties; however, for this study, Surrounding Omaha does not include the Iowa counties of the Omaha-Council Bluffs, NE-IA MSA.

establishments in Surrounding Lincoln through a cross-price effect. The Omaha smoking ban that excluded keno establishments most likely will induce smokers to increase their demand for keno gaming in Omaha by increasing the price of eating in Omaha restaurants. The Court Ruling eliminating the Omaha keno exclusion most likely will reduce keno demand in Omaha and any cross-border demand effects will occur in the area Surrounding Omaha. The Statewide Ban most likely would affect keno gaming demand in areas that previously allowed smoking such as areas Surrounding Lincoln and Surrounding Omaha. With this a priori structure imposed, the estimation can control for period effects to account for unobservable demand factors that are common to keno demand in the Lincoln and Omaha MSAs.[14]

Our estimation of the direct and border effects of the municipal and statewide smoking bans is based on the following log-linear model of keno demand:

$$\begin{aligned}\text{lkenopc}_{it} &= \alpha_{1i} + \alpha_{2i}t + \alpha_{3i}t^2 + \delta_t \\ &+ \sum_{s=0}^{2} \text{lincban}_{t-s}\gamma_{1i}(s) \\ &+ \sum_{s=0}^{2} \text{omahaban}_{t-s}\gamma_{2i}(s) \\ &+ \sum_{s=0}^{2} \text{court}_{t-s}\gamma_{3i}(s) \\ &+ \sum_{s=0}^{2} \text{stateban}_{t-s}\gamma_{4i}(s) \\ &+ \text{lmsaemp}_{it}\beta_1 + \text{lkenolic}_{it}\beta_2 \\ &+ \text{lkenolic}_{it}^2\beta_3 + \varepsilon_{it},\end{aligned}$$

where lkenopc_{it} is real gross keno revenue per capita in period t generated in region i (i.e., Lincoln, Surrounding Lincoln, Omaha, and Surrounding Omaha); lkenolic_{it} is the logarithm of the number of keno establishments in region i at period t; and lmsaemp_{it} is the logarithm of the total number of workers in all industries within area i's MSA in period t. The area-specific unobservable effects include a time-constant component (i.e., captured via the area fixed effect α_{1i}) and a time-varying component (i.e., captured via $\alpha_{2i}t + \alpha_{3i}t^2$)[15]; the time-specific unobservable effects, common to all regions, are captured by the δ_t coefficients. The non-zero coefficients on the smoking ban variables (i.e., *lincban*, *omahaban*, *court*, *stateban*) measure the partial effects of the relevant smoke-free law on the logarithm of region i's per capita real keno revenue.

As a check on our model specification, we also estimate the impact of each smoke-free law one quarter prior and two quarters prior to the effective dates of the smoking bans. If the model specification is correct, the coefficients on the two future smoking ban variables will

14. With no restrictions on the effects of the municipal and Statewide Bans across the four regions, we are unable to include a full set of period effects because the matrix of explanatory variables is perfectly collinear.

15. As noted by Fleck and Hanssen (2008), when estimating the effects of smoking bans on local economic activity, it is important to control for unobservable local factors that might be correlated with the imposition of the smoke-free laws. To reduce this possible estimation bias, we allow for both fixed effects and unique time-varying effects for Lincoln and for Omaha (the city ban passers) as well as for Surrounding Lincoln and for Surrounding Omaha (the non-city ban passers).

be zero. To avoid perfect multicollinearity,[16] we perform the specification test in a baseline model that restricts the effect of each smoke-free law on keno demand to only that market directly affected by the ban.

Table 4 provides the estimated effects of the municipal and statewide smoke-free laws on keno revenue in Lincoln, Surrounding Lincoln, Omaha, and Surrounding Omaha from generalized least squares (GLS) estimation of the full model that includes direct effects and cross-border effects. Table 5 provides the results from GLS estimation of the baseline model without cross-border effects and includes estimates of the direct impacts of the smoke-free laws one and two quarters before they were enacted, the quarter they were enacted, and one and two quarters after they were enacted. The results of error specification tests dictated the forms of the GLS weighting matrix for each model.[17]

V. RESULTS

A. *Direct and Cross-Border Effects*

Table 4 presents the estimated direct and cross-border effects of Nebraska's municipal and statewide smoking bans on Lincoln (panel A), Surrounding Lincoln (panel B), Omaha (panel C), and Surrounding Omaha (panel D). Recall the model specification allows keno demand to take up to two quarters to fully adjust to the imposition of each smoking ban; hence, for each area (e.g., panel), the results in column 1 show the estimated contemporaneous effect of the relevant ban as well as two quarters lagged effects. Furthermore, the results from a test of the null hypothesis that these estimated coefficients are equal to zero are presented in column 1. Column 2 presents the estimated total impact of the relevant ban which is the sum of the estimated current and lagged coefficients presented in column 1. For ease of interpretation, column 3 presents the expected signs of the effects from Table 3; furthermore, we frame the discussion of the results in terms of the total impact presented in column 2 (see Table S1 for the full regression results).

First, we focus on the Lincoln Ban results. Column 2 of panel A provides the total direct effect of the Lincoln Ban on Lincoln, whereas the top portion of panel B provides the total cross-border effect of the Lincoln Ban on Surrounding Lincoln. The results show that the Lincoln Ban reduced keno revenue by 23.5% in Lincoln and increased keno revenue by 30.0% in Surrounding Lincoln. These results are consistent with our expectations. That is, when the Lincoln Ban was imposed it increased the price of smoking in Lincoln keno establishments relative to Surrounding Lincoln keno establishments. Given smoking in keno establishments in Surrounding Lincoln is a substitute for the same activity in Lincoln, keno demand fell in Lincoln and rose in Surrounding Lincoln.

The second smoking ban imposed in Nebraska was the Omaha Ban, and the top portion of panel C provides the Omaha Ban results. Recall to identify the impacts of the smoking bans on keno demand, our empirical model restricts the effects of each ban to those areas most likely to experience demand changes. Hence, in the case of the Omaha Ban, there is only a direct effect because given proximity and desire for low transportation costs, substitution will occur from Omaha's smoke-free restaurants and non-stand-alone bars to Omaha's smoke-friendly stand-alone bars and keno establishments. The results show that the Omaha Ban increased keno revenue by 10.1% in Omaha which is consistent with our expectations.

The temporary keno establishment and stand-alone bar exclusion of the Omaha Ban was overruled by a Nebraska Supreme Court Ruling. Column 2 of the bottom portion of panel C provides the total direct effect of the Court Ruling on Omaha, whereas the top portion of panel D provides the total cross-border effect of

16. Because the state smoking ban became effective in 2009:Q2 and the Court ruling occurred in 2008:Q3, the *court* binary variable lagged one (two) quarter(s) is identical to the *stateban* variable two (one) quarters in the future. The full model allows keno demand in Surrounding Omaha to be affected by both the Court ruling and the state ban; the prior quarter impacts of these bans are not estimable due to perfect multicollinearity.

17. Typically, panel data models with individual unit fixed effects, are estimated by ordinary least squares and the serial correlation within unit errors is accounted for nonparametrically by using clustered standard errors. We cannot use this approach for two reasons. First, we have too few regions. The number of cross-sectional units in our model is only four and the clustered standard error approach requires the number of clusters (cross-sectional units) to be at least as great as the number of explanatory variables. Second, our cross-sectional units are the two municipal regions, Lincoln, Omaha, and the two surrounding MSA areas. The typical panel data model assumes the units are sampled randomly from the population and the clustered standard error approach imposes a zero correlation restriction on the across unit covariance. For these reasons, we chose to parametrically model the error serial correlation as a first-order process and allow for across region error correlation, the typical error structure of a seemingly unrelated regression model.

TABLE 4
Direct and Cross-Border Effects of Nebraska's Municipal and Statewide Smoking Bans

Region		GLS Estimation [1] Direct and Cross-Border Effects with Two Quarters Lagged Effects	GLS Estimation [2] Total Direct and Cross-Border Effects	[3] Expected Sign from Table 3
Panel A: Lincoln	Effective quarter of Lincoln Ban	−0.100 (0.041)**	−0.235 (0.030)***	−
	One quarter after Lincoln Ban	−0.120 (0.053)**		
	Two quarters after Lincoln Ban	−0.014 (0.042)		
	H_0: Coefficients = 0			
	Chi-squared test (df = 3)	68.956***		
Panel B: Surrounding Lincoln	Effective quarter of Lincoln Ban	0.265 (0.076)***	0.300 (0.054)***	+
	One quarter after Lincoln Ban	0.026 (0.098)		
	Two quarters after Lincoln Ban	0.010 (0.076)		
	H_0: Coefficients = 0			
	Chi-squared test (df = 3)	38.169***		
	Effective quarter of Statewide Ban	0.086 (0.095)	−0.010 (0.089)	−
	One quarter after Statewide Ban	−0.095 (0.104)		
	Two quarters after Statewide Ban	−0.001 (0.091)		
	H_0: Coefficients = 0			
	Chi-squared test (df = 3)	1.309		
Panel C: Omaha	Effective quarter of Omaha Ban	0.028 (0.037)	0.101 (0.034)***	+
	One quarter after Omaha Ban	0.118 (0.046)**		
	Two quarters after Omaha Ban	−0.044 (0.037)		
	H_0: Coefficients = 0			
	Chi-squared test (df = 3)			
	Effective quarter of Court Ruling	0.035 (0.045)	−0.148 (0.046)***	−
	One quarter after Court Ruling	−0.120 (0.053)**		
	Two quarters after Court Ruling	−0.063 (0.046)		
	H_0: Coefficients = 0			
	Chi-squared test (df = 3)	16.230***		
Panel D: Surrounding Omaha	Effective quarter of Court Ruling	0.085 (0.036)**	0.071 (0.039)*	+
	One quarter after Court Ruling	0.020 (0.043)		
	Two quarters after Court Ruling	−0.034 (0.042)		
	H_0: Coefficients = 0			
	Chi-squared test (df = 3)	10.427**		
	Effective quarter of Statewide Ban	−0.016 (0.04)	−0.052 (0.041)	−
	One quarter after Statewide Ban	0.032 (0.041)		
	Two quarters after Statewide Ban	−0.068 (0.037)*		
	H_0: Coefficients = 0			
	Chi-squared test (df = 3)	3.725		
Panel E: Specification Tests	First-order error correlation			
	Estimated coefficient	0.149		
	H_0: Error correlation across regions = 0			
	Chi-squared test (df = 6)	50.562***		

Notes: GLS covariance allows for contemporaneous error correlation across regions. The dependent variable is the natural log of per capita real keno revenue. The models control for region fixed effects, period fixed effects, region-specific trend and trend squared, natural log of total number of workers in all industries within the MSA (i.e., LMSAEMP) and the natural log of number of licensed keno operators within a region (i.e., LKENOLIC) and this term squared.

*Significance at the 10% level; **significance at the 5% level; ***significance at the 1% level.

the Court Ruling on Surrounding Omaha. The results show that the Court Ruling reduced keno revenue by 14.8% in Omaha and increased keno revenue by 7.1% in Surrounding Omaha. These results are consistent with our expectations. That is, the Court Ruling increased the price of smoking in Omaha keno establishments relative to Surrounding Omaha keno establishments. Given smoking in keno establishments in Surrounding Omaha is a substitute for the same activity in Omaha, keno demand fell in Omaha and rose in Surrounding Omaha.[18]

18. We found that Omaha bar revenue followed a similar pattern of responses to the Omaha Ban and Court ruling. Using data on Omaha real, per capita bar revenue over the same sample period, we found the Omaha Ban increased Omaha bar revenue by about 16% and the subsequent Court Ruling reduced Omaha bar revenue by about 9%.

TABLE 5

Baseline Specification Results: Nebraska's Municipal and Statewide Smoking Ban Effects in Regions Where Smoking Was Banned

		GLS Estimation		
Region		**[1] Direct Effect with Two Quarters Lead and Lagged Effects**	**[2] Direct Effect with Two Quarters Lagged Effects**	**[3] Total Direct Effect**
Panel A: Lincoln	Two quarters prior to Lincoln Ban	0.020 (0.050)		
	One quarter prior to Lincoln Ban	0.014 (0.052)		
	Effective quarter of Lincoln Ban	−0.110 (0.053)**	−0.097 (0.047)**	−0.231 (0.048)***
	One quarter after Lincoln Ban	−0.103 (0.053)*	−0.096 (0.051)*	
	Two quarters after Lincoln Ban	−0.038 (0.049)	−0.038 (0.048)	
Panel B: Surrounding Lincoln	Two quarters prior to Statewide Ban	−0.120 (0.103)		
	One quarter prior to Statewide Ban	0.008 (0.106)		
	Effective quarter of Statewide Ban	0.006 (0.101)	−0.010 (0.098)	−0.154 (0.116)
	One quarter after Statewide Ban	−0.090 (0.095)	−0.095 (0.096)	
	Two quarters after Statewide Ban	−0.048 (0.091)	−0.049 (0.093)	
Panel C: Omaha	Two quarters prior to Court Ruling	−0.057 (0.038)		
	One quarter prior to Court Ruling	0.067 (0.040)*		
	Effective quarter of Court Ruling	−0.060 (0.041)	−0.044 (0.040)	−0.263 (0.050)***
	One quarter after Court Ruling	−0.124 (0.059)**	−0.140 (0.042)***	
	Two quarters after Court Ruling	−0.101 (0.056)*	−0.079 (0.041)*	
Panel D: Surrounding Omaha	Two quarters prior to Statewide Ban	0.043 (0.054)		
	One quarter prior to Statewide Ban	−0.031 (0.054)		
	Effective quarter of Statewide Ban	−0.027 (0.039)	−0.025 (0.039)	−0.047 (0.052)
	One quarter after Statewide Ban	0.029 (0.038)	0.029 (0.039)	
	Two quarters after Statewide Ban	−0.046 (0.038)	−0.052 (0.039)	
Panel E: Specification Tests	H_0: Coefficients on Leads = 0			
	Chi-squared test (df = 8)	8.099		
	First-order error correlation			
	Estimated coefficient	0.371***	0.409***	
	H_0: Error correlation across regions = 0			
	Chi-squared test (df = 6)	49.203***	48.917***	

Notes: GLS covariance allows for first-order autocorrelation and error correlation across regions. The dependent variable is the natural log of per capita real keno revenue. The models control for region fixed effects, period fixed effects, region-specific trend and trend squared, natural log of total number of workers in all industries within the MSA (i.e., LMSAEMP) and the natural log of number of licensed keno operators within a region (i.e., LKENOLIC) and this term squared.

*Significance at the 10% level; **significance at the 5% level; ***significance at the 1% level.

Finally, column 2 of the bottom portion of panels B and D provides the total direct effect of the Statewide Ban on Surrounding Lincoln and Surrounding Omaha, respectively. In the case of the Statewide Ban, there are only direct effects because this ban required all Nebraska keno establishments to be smoke free. That is, no area(s) in Nebraska had a pricing advantage once the Statewide Ban became effective; thus, no cross-border keno shopping within Nebraska occurred because of this ban. The results indicate that the Statewide Ban reduced keno revenue by 1.0% in Surrounding Lincoln and 5.2% in Surrounding Omaha; however, these results are not statistically significant. Indeed, although we expect the Statewide Ban to negatively affect the mean keno revenue in Surrounding Lincoln and Surrounding Omaha, we have only three quarters of data in each area following the imposition of the Statewide Ban. Hence, with too few post-Statewide Ban observations, we are unable to reliably estimate a causal effect of this ban.

B. Error Specification Check

Panel E of Table 4 presents the results of testing the error structure of our empirical model. First, we specify a first-order autoregressive error process and test the null hypothesis that the errors are not first-order autocorrelated. Second, we test the null hypothesis that the errors are not correlated across regions. The test results indicate the regression errors are not correlated over time. That is, the estimated first-order autoregressive error correlation coefficient is 0.15 and is not statistically significantly different from

zero. The errors, however, are correlated across regions; therefore, our GLS estimates allow for contemporaneous error correlation across regions.

C. Model Specification Check

To investigate if the estimated effects from Table 4 are stemming from the municipal and statewide smoke-free laws, rather than a previously existing trend at the time of each law, we include two quarters lead effects for each smoking ban and test the joint hypothesis that the lead coefficients equal zero for all four regions. Recall this baseline model specification with leads restricts the effects of the smoke-free laws to only affect keno revenue in the areas in which smoking actually is banned (see Section *Empirical Methodology*). That is, to identify the two quarters lead effects, the contemporaneous effect, and the two quarters lagged effects of each ban while also controlling for time constant and time-varying area-specific unobservable effects, time-specific unobservable effects, general market activity (*lmsaemp*), and the size of the local keno market (*lkenolic*), we must restrict the cross-border effects to be zero. Hence, the results in Table 5 represent the direct effect of each ban on the ban-passing area (see Table S2 for the full regression results).

The results in column 1 of Table 5 show the estimated contemporaneous effect of the relevant ban as well as two quarters lead and two quarters lagged effects. In each panel, the two lead effects are not statistically significant except for the one quarter lead on the Court Ruling in panel C; however, the sign is opposite of what would be expected for this smoke-free law. Furthermore, panel E of Table 5 presents the results of testing the joint hypothesis that the lead coefficients equal zero for all four regions. We cannot reject this hypothesis which lends support to our model specification presented in Equation (1). Finally, in panel E, the results of testing the error structure indicate the regression errors are first-order autocorrelated as well as correlated across equations; thus, our GLS estimates in Table 5 allow for first-order autocorrelation and error correlation across regions.

The results in columns 2 and 3 of Table 5 are analogous to the direct effect results presented in Table 4, the difference being the model specification in Table 5 restricts the cross-border effects to be zero. That is, the result in column 3 of Table 5 indicates that the Lincoln Ban is associated with a 23.1% decline in keno revenue in the ban-passing area Lincoln. This estimated reduction in keno revenue is very similar to the estimated total direct effect shown in column 2 of Table 4 (i.e., −23.5%). In the case of the Court Ruling, the result in panel C of Table 5 shows that the Court Ruling is associated with a 26.3% decline in keno revenue in ban-passing area Omaha. This estimated effect is larger than the estimated total direct effect from the more general model specification that includes cross-border effects. Finally, panels B and D of Table 5 show that the Statewide Ban is associated with reduced keno revenue in Surrounding Lincoln and Surrounding Omaha, respectively. However, these results are not statistically significant which is consistent with the results presented in Table 4.

In summary, the results in Table 5 support our model specification identified in Equation (1). First, the insignificant estimated lead coefficients suggest the direct and cross-border effects in Table 4 are not the result of trending differences between the city ban passers and non-city ban passers but are real effects of the relevant smoking bans. Second, the more general model specification where the cross-border effects are not restricted to be zero (i.e., Equation (1)) is specified more completely in the sense that, in this model specification, the errors are no longer autocorrelated.

VI. CONCLUSIONS

Previous studies examining the effect of smoking bans on the gaming industry have focused on racino gaming in Delaware and casino gaming in Illinois. This article examines the effects of Nebraska's smoking bans on keno gaming in Nebraska. The four Nebraska smoking bans are: (1) the municipal level ban in the city of Lincoln effective January 2005; (2) the municipal level ban in the city of Omaha, which temporarily excluded stand-alone bars, a horse racing track, and keno establishments until 2011, effective October 2006; (3) the end of the temporary Omaha Ban exemption, which ruled the exemption unconstitutional, effective June 2008; and (4) the state level ban effective June 2009.

Nebraska is a state that offers keno gaming in restaurants and bars and in which municipal and statewide smoking bans were introduced at different times. These features allow us to:

(1) examine if the previous findings that smoking bans adversely affect the gaming industry (Garrett and Pakko 2009; Pakko 2006, 2008a; Thalheimer and Ali 2008) are a result of the activity (gaming) or the setting in which the gaming occurs (i.e., casinos and racinos vs. restaurants and bars) and (2) exploit ban variation in timing and location to identify keno revenue gains and losses between neighboring smoke-free and smoke-friendly areas.

We find the Lincoln municipal smoke-free law reduced keno revenue by 23.5% in smoke-free Lincoln and increased keno revenue by 30.0% in smoke-friendly Surrounding Lincoln counties. The Omaha municipal smoke-free law reduced keno revenue by 14.8% in smoke-free Omaha and increased keno revenue by 7.1% in smoke-friendly Surrounding Omaha counties. Following the Nebraska statewide law, no Nebraska areas had a smoke-friendly advantage and keno revenue fell by an insignificant 1.0% and 5.2% in the surrounding Lincoln and Omaha counties, respectively.

The results of this study are consistent with previous studies examining the effect of smoking bans on racinos and casinos in Delaware and Illinois. Pakko (2006, 2008a) finds Delaware's smoking ban reduced racino gaming revenue at Delaware's racinos by 8%–16%, and Thalheimer and Ali (2008) find gaming handle at Delaware's racinos declined nearly 16% after Delaware's smoking ban became effective. Garrett and Pakko (2009) find Illinois' smoking ban reduced casino revenue and admissions at Illinois casinos by more than 20% and 12%, respectively. Therefore, the results of the current study suggest that the negative response of gaming to smoking bans is not because of the setting in which the gaming occurs (i.e., casinos and racinos vs. restaurants and bars). Rather, this study supports the evidence of differential impacts of smoking bans within the sectors of the hospitality industry.

Moreover, few studies exist which examine the impacts of cross-border shopping for gaming activities or that are because of smoking bans (Adams and Cotti 2008; Garrett and Marsh 2002). Our results are consistent with this literature, as well as the cross-border shopping literature in general that finds consumers are willing to make purchases in bordering territories where the effective prices are lower (Asplund et al. 2007; Banfi et al. 2005; Beard et al. 1997; Doyle and Samphantharak 2008; Leal et al. 2009; Lovenheim 2008; Saba et al. 1995; Smith 1976; Thursby et al. 1991).

Finally, our results have tax revenue implications given a percent of keno proceeds are required to be submitted to the Nebraska Department of Revenue on a quarterly basis. It appears the municipal smoking bans reallocated the source of the tax revenue from one local Nebraska area to another. Furthermore, the Nebraska Statewide Ban reduced keno gaming activity even more and hence total tax revenue.

APPENDIX

TABLE A1
Variable Definitions and Sources

Variable	Description	Source
RKENOPC	Per capita real keno revenue in dollars	Nebraska Department of Revenue
LKENOPC	Natural log of RKENOPC	Nebraska Department of Revenue
MSAEMP	Total number of workers in all industries within the MSA (in thousands)	Nebraska Department of Labor
LMSAEMP	Natural log of MSAEMP	Nebraska Department of Labor
POP	Population of the city for the regions Lincoln and Omaha; Population of the MSA for the regions Surrounding Lincoln and Surrounding Omaha	U.S. Census Bureau
KENOLIC	Number of licensed keno operators within a region	Nebraska Department of Revenue
LKENOLIC	Natural log of KENOLIC	Nebraska Department of Revenue

TABLE A2
Descriptive Statistics

	Lincoln ($n = 41$)				Omaha ($n = 41$)			
	Mean	**SD**	**Minimum**	**Maximum**	**Mean**	**SD**	**Minimum**	**Maximum**
RKENOPC	25.12	3.57	18.92	31.48	34.76	3.14	26.34	40.00
LKENOPC	3.21	0.14	2.94	3.45	3.54	0.09	3.27	3.69
MSAEMP	166.47	6.55	150.77	176.73	448.60	15.38	415.53	473.26
LMSAEMP	5.11	0.04	5.02	5.17	6.11	0.03	6.03	6.16
POP	240.93	9.15	221.53	255.19	435.88	13.67	405.66	457.32
KENOLIC	34.98	4.32	25.00	44.00	183.63	27.37	117.00	235.00
LKENOLIC	3.55	0.13	3.22	3.78	5.20	0.16	4.76	5.46
	Surrounding Lincoln ($n = 41$)				**Surrounding Omaha ($n = 41$)**			
	Mean	**SD**	**Minimum**	**Maximum**	**Mean**	**SD**	**Minimum**	**Maximum**
RKENOPC	10.65	1.66	6.96	14.36	19.92	1.93	16.22	23.12
LKENOPC	2.35	0.16	1.94	2.66	2.99	0.10	2.79	3.14
MSAEMP	166.47	6.55	150.77	176.73	448.60	15.38	415.53	473.26
LMSAEMP	5.11	0.04	5.02	5.17	6.11	0.03	6.03	6.16
POP	281.08	13.73	237.65	299.70	687.36	26.63	641.31	733.72
KENOLIC	4.71	1.36	3.00	7.00	53.85	10.71	26.00	75.00
LKENOLIC	1.51	0.29	1.10	1.95	3.96	0.22	3.26	4.32
	All Regions ($n = 164$)							
	Mean	**SD**	**Minimum**	**Maximum**				
RKENOPC	22.61	9.15	6.96	40.00				
LKENOPC	3.02	0.45	1.94	3.69				
MSAEMP	307.53	141.98	150.77	473.26				
LMSAEMP	5.61	0.50	5.02	6.16				
POP	411.31	176.56	221.53	733.72				
KENOLIC	69.29	70.08	3.00	235.00				
LKENOLIC	3.56	1.35	1.10	5.46				

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Table S1. Estimated Coefficients for Model Specification in Table 4

Table S2. Estimated Coefficients for Model Specifications in Table 5